COMMONWEALTH of VIRGINIA

DEPARTMENT OF TRANSPORTATION

Stephen C. Brich, P.E.
Commissioner

1401 East Broad Street
Richmond, Virginia 23219

(804) 482-5818
Fax: (804) 786-2940

December 17, 2024

The Honorable Jennifer B. Boysko
Chair, Senate Transportation Committee
General Assembly Building
201 North 9th Street, Room 613
Richmond, Virginia 23219

The Honorable Karrie K. Delaney
Chair, House Transportation Committee
General Assembly Building
201 North 9th Street, Room 1112
Richmond, Virginia 23219

The Honorable L. Louise Lucas
Chair, Senate Finance
General Assembly Building
201 North 9th Street, Room 1404
Richmond, Virginia 23219

The Honorable Luke E. Torian
Chair, House Appropriations Committee
General Assembly Building
201 North 9th Street, Room 1223
Richmond, Virginia 23219

Dear Chairs Boysko, Lucas, Delaney, and Torian:

In response to a request in the fall of 2022, submitted by then-Senate Transportation Committee Chairman Marsden, at the request of Senator Surovell, the Virginia Department of Transportation (VDOT) convened a work group to engage in a study relating to bicycle and pedestrian needs in Planning District 8. The attached report conveys the results of the study.

More specifically, VDOT was requested to convene a work group consisting of the Director of Transportation or his representative from each locality in Planning District 8; representatives of the Northern Virginia Transportation Commission, the Northern Virginia Transportation Authority, and the Potomac and Rappahannock Transportation Commission; representatives of the bicycle, pedestrian, and disability communities; representatives of lower-income and no-car households; and other private sector stakeholders deemed necessary. The request sought (i) to the extent information was readily available, assessment and identification of projected/planned pedestrian, bicycling, and traffic calming infrastructure in each locality but not associated with any planned road widening over at least the next 5 to 10 years in Planning District 8 and (ii) a report that, using available information regarding such projected/planned infrastructure by locality, identifies estimates and available funding sources for such projects. The request emphasized that the intent was not to require development of new data or information, but rather, that reliance solely on data and information from those localities that have previously established pedestrian plans or infrastructure needs would be sufficient. Finally, the work group was requested to submit a report to the Chairmen of the House Committees on

Transportation and Appropriations and the Senate Committees on Transportation and Finance and Appropriations no later than October 1, 2024.

It is important to note that this report represents a compilation of locality plans. It does not suggest in any way the sufficiency or advisability of any of the locality plans and whether or not they are appropriate or suitable investments. It is also noted that the localities' plans range from those that have been completed or are up to date to those that are incomplete or perhaps outdated. Nonetheless, this report consolidates, characterizes and categorizes those plans.

It is also noted that this study is similar to a study that was the subject of Senate Bill 251 patroned by Senator Surovell in the 2022 Session of the General Assembly. While SB 251 was reported by the Senate Committee on Local Government as well as Finance and Appropriations, engrossed by the full Senate, and reported by the House Committee on Counties, Cities and Towns, it was then re-referred by the House of Delegates to the House Committee on Transportation. No further action was taken on the bill.

If you have any questions, please do not hesitate to contact me or William C. Cuttler, Northern Virginia District Engineer, at (703) 259-2990.

Sincerely,

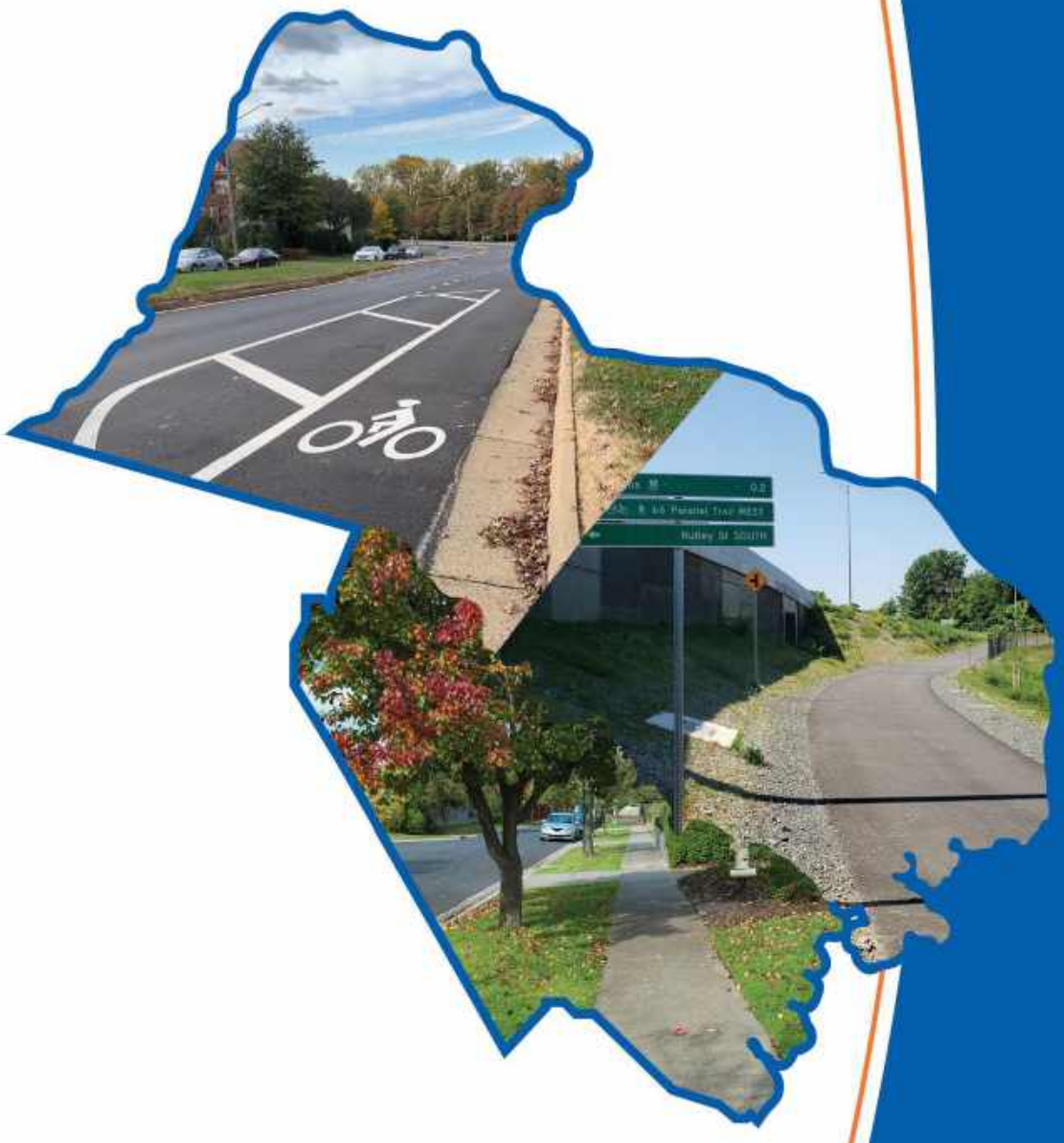
Stephen C. Brich, P.E.
Commissioner of Highways

cc: The Honorable Scott A. Surovell
The Honorable David W. Marsden
The Honorable W. Sheppard Miller III
William C. Cuttler, P.E.

Attachment

VDOT
Virginia Department of Transportation

Northern Virginia
Bicycle and Pedestrian Network Study



Final Report

Acknowledgements

We would like to express our gratitude to the following localities, organizations, and individuals who participated throughout the development of this Study, providing time and resources to offer feedback on the process:

Study Working Group Members and Invitees

Alexandria Bicycle-Pedestrian Advisory Committee (BPAC)

Arlington County

Bike Loudoun

City of Alexandria

City of Fairfax

City of Falls Church

City of Manassas

City of Manassas Park

Fairfax Alliance for Better Bicycling (FABB)

Fairfax County

Federal Highway Administration (FHWA)

Loudoun County

Metropolitan Washington County of Governments (MWCOG)

National Park Service (NPS)

Northern Virginia Regional Commission (NVRC)

Northern Virginia Transportation Authority (NVTA)

Prince William County

Prince William Trails and Blueways Council

Sustainable Mobility for Arlington County (SUSMO)

Town of Clifton

Town of Dumfries

Town of Hamilton

Town of Herndon

Town of Hillsboro

Town of Leesburg

Town of Lovettsville

Town of Middleburg

Town of Occoquan

Town of Purcellville

Town of Round Hill

Town of Vienna

Virginia Department of Transportation (VDOT)

Virginia Passenger Rail Authority (VPRA)

Other Coordinating Parties

Virginia State Senator David Marsden and staff

Virginia State Senator Scott Surovell and staff

Virginia Department of Transportation Northern Virginia District leadership

Virginia Department of Transportation Location and Design Cost Estimating

Virginia Department of Transportation Geospatial Program

Virginia Department of Transportation State Trails Office (STO) and Planning Division (TMPD)

Virginia Department of Conservation and Recreation (DCR)

Report Prepared by

VDOT

Kimley-Horn and Associates, Inc.

Toole Design Group

Contents

Executive Summary

Purpose

Following consideration of the proposed language of SB251 from the 2022 General Assembly session, then-Chairman of Senate Transportation, David Marsden, along with Senator Scott Surovell, requested that the Virginia Department of Transportation (VDOT) convene a working group to study a minimum of a 5- to 10-year projection of bicycle and pedestrian infrastructure needs, using readily available data, in Planning District 8 (Northern Virginia [NOVA]). In response, VDOT embarked on the Northern Virginia Bicycle and Pedestrian Network Study, which also serves as a complementary study to the 2003 VDOT Northern Virginia Regional Bikeway and Trail Network Study and 2015 Study Update. VDOT reviewed a compilation of regional and local plans and has assembled the recommendations for bicycle and pedestrian infrastructure but has not analyzed the sufficiency of these plans nor is this review equivalent to an endorsement of the identified investments. The purpose of this Study is to:

- Compile a planned bicycle and pedestrian network map with *readily available locality planned segments from locality datasets*
- Spatially assess the planned network to summarize access to key areas throughout the region, including four "focus" elements
- Develop planning level cost estimate ranges for construction of these facility types for improved implementation planning

In coordination with a working group of locality staff and other stakeholders, the Study assessed and identified planned pedestrian and bicycle infrastructure from long-term, locality-approved plans which are typically updated every 5 to 10 years. *This Study does not constitute a review of the existing bicycle and pedestrian conditions in NOVA, a gap analysis of these facility types, project prioritization of the provided planned segments, or an active transportation plan.*

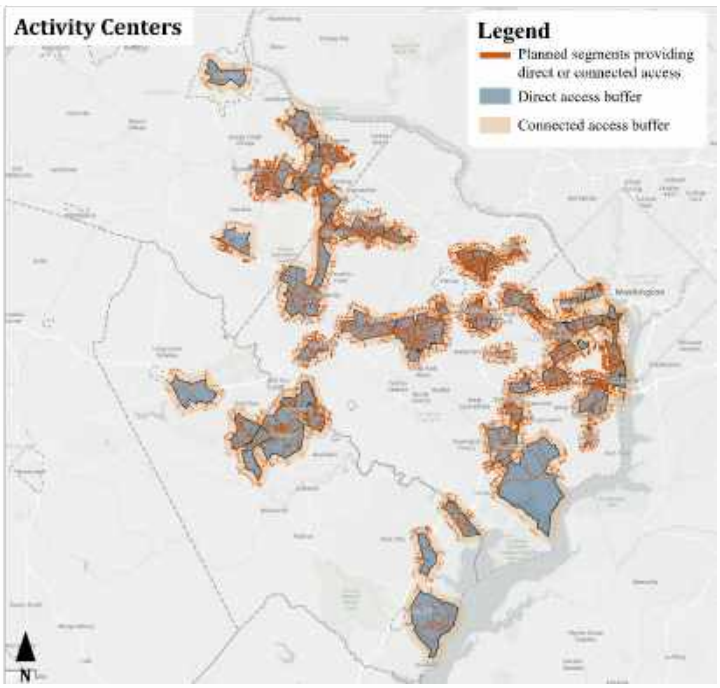
Highlights

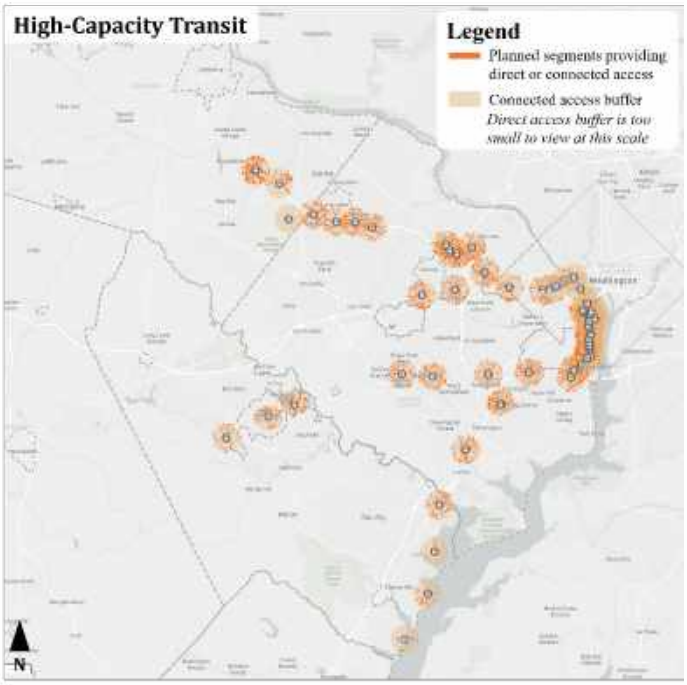
Locality planned bicycle and pedestrian network data (as of Fall 2023) was collected and merged into an online map during the data gathering phase, depicting **nearly 5,000 miles of planned bicycle/pedestrian facilities across VDOT's NOVA District.**

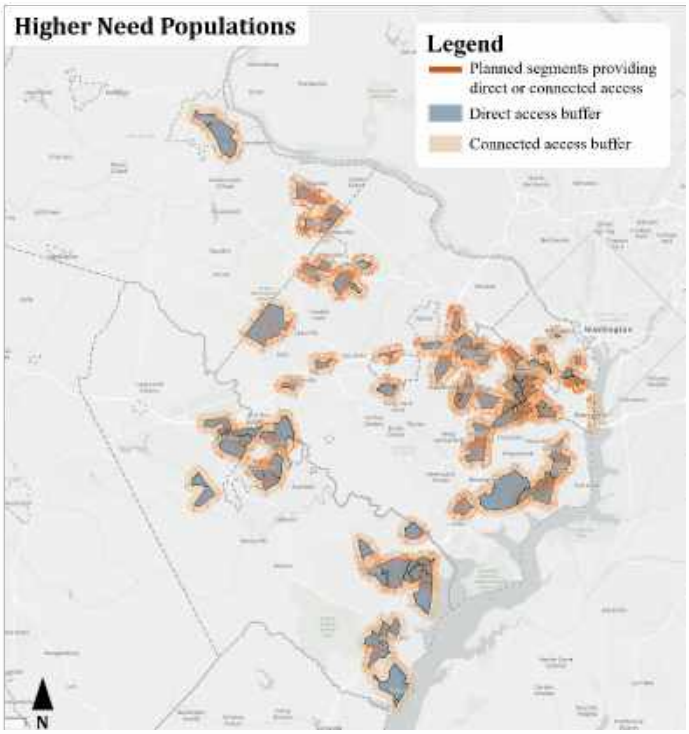
This vast network was evaluated in ArcGIS using **spatial data layers, called "elements,"** to determine the access and connectivity benefits of the planned facilities. **Four "focus elements,"** below and shown in **Figure 1**, were subjected to increased spatial analysis and cost estimate range calculations and include:

1. *Activity Centers*[1] (32% of all planned facilities provide access to this element)
2. *High-capacity transit stops/stations* (12% of all planned facilities provide access to this element)
3. *Higher Need Populations* (22% of all planned facilities are in/near this element)
4. *Regional trails* (39% of all planned facilities along/near this element)

[1] Activity centers are defined in **Table 8**.







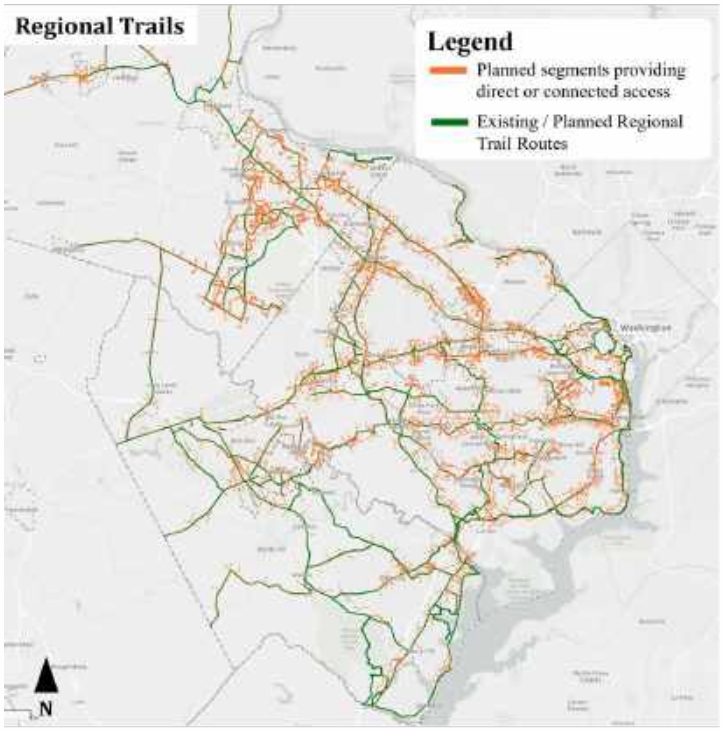


Figure 1: District-Wide Focus Elements Results

Planning level cost estimate ranges were developed by gathering recently completed project costs from around the NOVA region (sorted by facility type) and using the median project cost per mile. Some project examples in the calculation include typical engineering and infrastructure costs beyond the bike/pedestrian facility alone. These costs

are envisioned to be standalone bicycle and pedestrian facility projects but may include other related transportation enhancements. Project cost ranges assume standalone bicycle/pedestrian facility projects, which typically include other related elements, such as crosswalks and pedestrian signals or utilities. Planned segments may be implemented through various means, to be determined in the future, including through roadway or development projects, which may result in lower facility costs. **Table 1** details the planning level cost estimate ranges by facility type. **Table 2** details the planning level cost estimate ranges by focus element. This was accomplished by applying the low- and high-cost estimates by project facility type to the number of miles of that facility type that provided access through the focus element evaluation.

Table 1: Planning Level Cost Estimate Ranges, Per Mile[2]

Project Facility Type	2022 Cost Estimate (Low)	2022 Cost Estimate (High)	2034[3] Cost Estimate (Low)	2034 Cost Estimate (High)
Shared Use Path Project	$4,385,000	$9,110,000	$7,020,000	$14,580,000
Cycle Track Project	$1,840,000	$3,815,000	$2,945,000	$6,105,000
Sidewalk Project	$2,340,000	$4,860,000	$3,745,000	$7,780,000
Bike Lane Project	$ 310,000	$ 645,000	$ 500,000	$ 1,035,000
Shared Lane Project	$30,000	$55,000	$50,000	$90,000
Natural Surface Trail Project	$205,000	$420,000	$330,000	$675,000

Table 2: Planning Level Cost Estimate Ranges that Support Focus Elements

Elements	Planned Access Miles	2022 Cost Estimate (Low)	2022 Cost Estimate (High)	2034 Cost Estimate (Low)	2034 Cost Estimate (High)
Activity Centers	1,598	$3.1 billion	$6.5 billion	$5.0 billion	$10.4 billion
High-Capacity Transit Stops/Stations	600	$1.1 billion	$2.3 billion	$1.8 billion	$3.7 billion
Higher Need Populations	1,114	$2.1 billion	$4.5 billion	$3.5 billion	$7.2 billion
Regional Trails	1,923	$4.1 billion	$8.5 billion	$6.6 billion	$13.6 billion

Note: These investments are based on long-term locality plans. Mileage above may overlap between multiple focus areas and is not cumulative.

[2] The costs include sidewalk, bike lane, separated bike lane/cycle track, natural surface trail, shared use path, and shared lanes. Segments with undetermined facility types are not included in the cost estimates.
[3] 2034 cost estimates were inflated using VDOT Cost Estimating Manual guidance.

Report Contents

The report provides details on the Study process, methodologies, and results. The Study process includes three components: data gathering, elements analysis, and the development of planning level cost estimate ranges. The process is detailed in **Figure 2** below and discussed in further detail throughout the report.

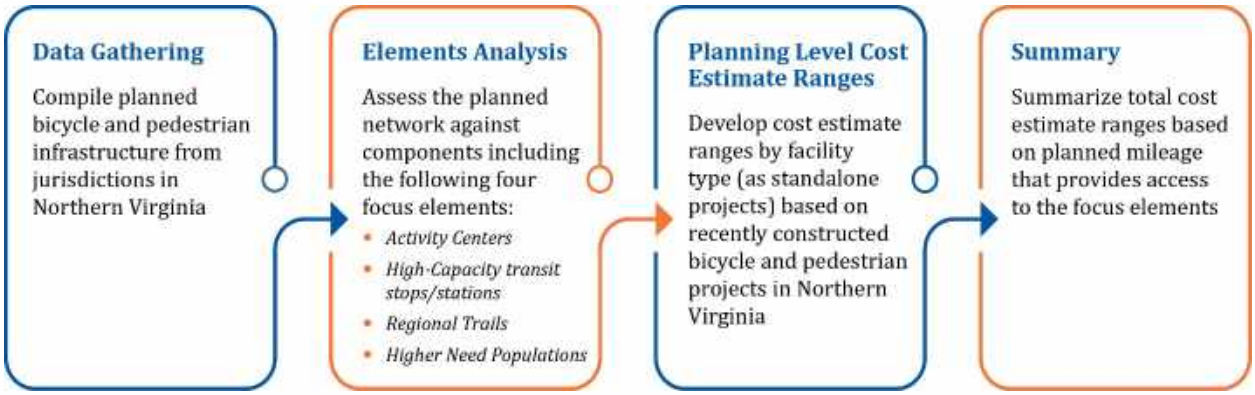


Figure 2: The Study Process

The results of this Study present the strategic planning done by Northern Virginia jurisdictions intended to build out a connected bicycle and pedestrian network. This network aids in providing access to key destinations and populations throughout the NOVA District.

Chapter 1: Project Purpose and Background

Study Purpose

In 2003, the VDOT NOVA District Regional Bikeway and Trail Network Study identified bicycle and pedestrian facilities and outlined the steps that could be taken to develop a network linking activity centers[4] throughout the region and documented these findings. The original Study included field analysis, public and stakeholder input, bicycle travel demand, demonstration projects, and final network map and recommendations. The 2003 Study was updated in 2015. The 2015 report documented progress on the construction of the original network, identified where additional segments were needed to complete and expand the network, and introduced performance measures such as bicycle level of service.

Following consideration of the proposed language of SB251 from the 2022 General Assembly session, then-Chairman of Senate Transportation, David Marsden, along with Senator Scott Surovell, requested that VDOT convene a working group to study a minimum of a 5- to 10-year projection of identified bicycle and pedestrian infrastructure accommodations, using readily available data, in Planning District 8 (NOVA). The Northern Virginia Bicycle and Pedestrian Network Study assessed and identified planned pedestrian and bicycle infrastructure accommodations from long-term locality plans, which are updated periodically. *This Study does not constitute a review of the existing bicycle and pedestrian conditions in NOVA, a gap analysis of these facility types, project prioritization of the provided planned segments, or an active transportation plan.* As many jurisdictions within the NOVA District conduct their own assessments to identify future infrastructure investments, the VDOT Study compiled these existing plans and related data to develop a *regional* picture of the planned infrastructure projects, benefits, and funding implications. VDOT reviewed a compilation of regional and local plans and has assembled the recommendations for bicycle and pedestrian infrastructure but has not analyzed the sufficiency of these plans nor is this review equivalent to an endorsement of the identified investments. The Study schedule, shown in **Figure 3**, illustrates the approximately 12-month process used to develop this report.

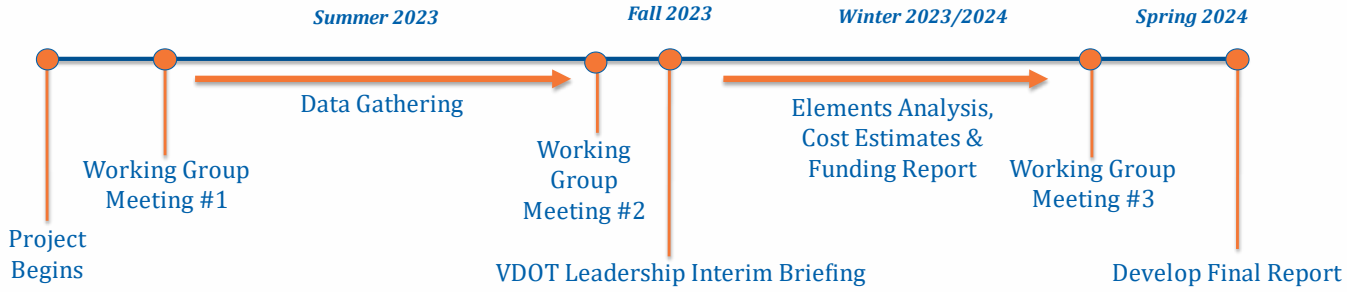


Figure 3: Study Schedule

Study Working Group

A Study working group was created to have local representatives involved throughout each phase of this Study. Throughout the Study, the working group provided valuable data and insights to advance the goals of this Study. The working group members partnered with their localities to compile and share existing and planned bicycle and pedestrian data used to develop the planned network. The working group also reviewed and discussed the data gathering and elements analysis approach and results. Each member's feedback informed the analysis and the Study deliverables. The working group met three times throughout the Study duration and coordinated on an ad-hoc basis through calls and emails during the data collection and cost estimating efforts. The invitees to the Study working

[4] Definition and data source available in **Table 7**.

group included representatives from local agencies, jurisdictions, localities, citizen groups, and regional/state/national stakeholders; however, not all invitees participated. Members/invitees of the working group represented the following agencies, jurisdictions, or entities:

- Alexandria Bicycle-Pedestrian Advisory Committee (BPAC)
- Arlington County
- Bike Loudoun
- City of Alexandria
- City of Fairfax
- City of Falls Church
- City of Manassas
- City of Manassas Park
- Fairfax Alliance for Better Bicycling (FABB)
- Fairfax County
- Federal Highway Administration (FHWA)
- Loudoun County
- Metropolitan Washington Council of Governments (MWCOG)
- National Park Service (NPS)
- Northern Virginia Regional Commission (NVRC)
- Northern Virginia Transportation Authority (NVTA)
- Prince William County
- Prince William Trails and Blueways Council
- Sustainable Mobility for Arlington County (SUSMO)
- Town of Clifton
- Town of Dumfries
- Town of Hamilton
- Town of Herndon
- Town of Hillsboro
- Town of Leesburg
- Town of Lovettsville
- Town of Middleburg
- Town of Occoquan
- Town of Purcellville
- Town of Round Hill
- Town of Vienna
- Virginia Department of Transportation (VDOT)
- Virginia Passenger Rail Authority (VPRA)

Working group meeting notes are available in **Appendix A**.

Chapter 2: Data Gathering

Purpose

The purpose of the data gathering was to map bicycle and pedestrian infrastructure planned segments for jurisdictions in the VDOT Northern Virginia (NOVA) District. The map depicted the entirety of the planned bicycle and pedestrian facilities for the NOVA District. The work effort consolidated and standardized planned bicycle and pedestrian facilities from locality-adopted plans to conduct a multijurisdictional elements analysis in later phases of the Study. **Figure 4** illustrates the network development process. The process started with requesting bicycle and pedestrian network data from all NOVA jurisdictions after the first Study working group meeting. Study working group stakeholders continued to be included throughout the data gathering process to provide data clarifications and explanations as the data was refined. The Study working group reviewed the draft map and identified further refinements to the data. The final map is a comprehensive layer of all planned bicycle and pedestrian infrastructure in the NOVA District. Methodology details and the results are discussed below.

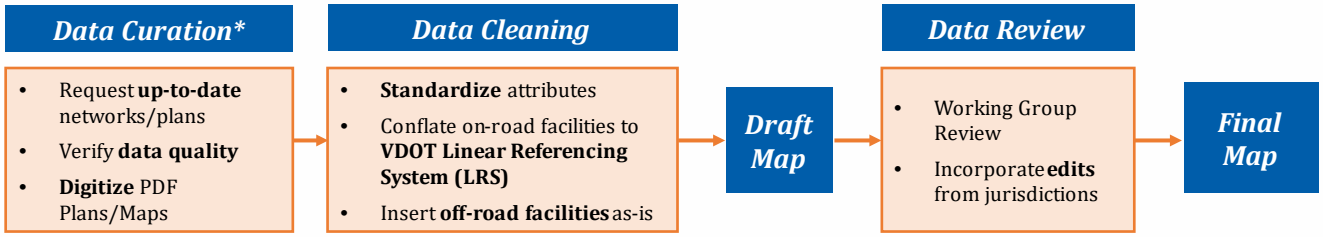


Figure 4: Network Development Process Diagram

*Data was collected from readily available locality datasets and varies in the useability for this Study.

Methodology

Data Curation

Planned bicycle and pedestrian facility data was uploaded by localities and regional entities via an online portal for use in the Study. Most localities provided Geographic Information System (GIS) data, while some provided PDF plans or image files of their planned active transportation network. Additional data—such as publicly available plans that contained bicycle and pedestrian network data—was sourced from city and county websites and open data portals. Localities that did not upload data were contacted via email and phone to ensure their inclusion in the Study.

Bicycle and pedestrian network data was gathered for all cities and counties in NOVA and almost all towns. Two towns confirmed that they do not have planned bicycle and pedestrian networks and deferred to their county's plan, while one town was could not be reached during the Study process. See the second column in **Table 3** for a summary of the data received from partner jurisdictions. *All data used in this process was sourced from readily available locality data and vary in their useability for this Study. In some cases, assumptions/adjustments to the linework were made, in coordination with the locality, to best represent a regional planned network of new and upgraded segments.*

The data was then reviewed for layers and files that showed planned (i.e., future) bicycle or pedestrian facilities for municipal entities (i.e., towns, cities, and counties). Data sources that only had existing facilities were excluded, while data that included both existing and planned facilities were filtered for planned facilities only before inclusion in the draft map. Data from regional entities, such as the Northern Virginia Regional Commission (NVRC) and Metropolitan Washington Council of Governments (MWCOG), was excluded due to the likelihood of overlaps or duplication, but their data was used to visually compare with municipal data during the map development process. Results of this data selection process are summarized by jurisdiction in the third column of **Table 3**.

Table 3: Summary of Data Provided by Municipal Jurisdiction in VDOT's NOVA District

Jurisdiction	Data Received	Data Selected	Data Sources
Arlington County	GIS Data (1 layer)	GIS Data (1 layer)	2019 Master Transportation Plan (map updated April 2022)
City of Alexandria	GIS Data (3 layers)	GIS Data (3 layers)	2021 Alexandria Mobility Plan
City of Fairfax	GIS Data (3 layers)	GIS Data (2 layers)	2021 Bike Fairfax City Plan
City of Falls Church	Plans/Maps (1 PDF)	Plans/Maps (1 PDF)	2015 Bicycle Master Plan
City of Manassas	GIS Data (1 layer)	GIS Data (1 layer)	Manassas 2040 Comprehensive Plan
City of Manassas Park	GIS Data (18 layers)	GIS Data (10 layers)	2023 Draft Active Transportation Plan [5]
Fairfax County	GIS Data (14 layers)	GIS Data (4 layers)	2014 Countywide Bicycle Master Plan* (map amended September 2019) 2014 Countywide Trails Plan* (map amended July 2018) 2017 Comprehensive Plan* (county audit of recommendations)
Loudoun County	GIS Data (14 layers)	GIS Data (4 layers)	2019 Countywide Transportation Plan (map amended February 2023) Sidewalk and Trail Program Maps
Prince William County	GIS Data (1 layer)	GIS Data (1 layer)	2040 Comprehensive Plan (Countywide Trails Map updated January 2023)
Town of Clifton	No Applicable Data	No Applicable Data	Town confirmed that data does not exist
Town of Dumfries	Plans/Maps (1 PDF)	Plans/Maps (1 PDF)	2014 Comprehensive Plan (amended November 2020)
Town of Hamilton	Plans/Maps (1 PDF)	Plans/Maps (1 PDF)	2023 Comprehensive Plan
Town of Haymarket	No Applicable Data	No Applicable Data	Town confirmed that data does not exist
Town of Herndon	GIS Data (1 layer) + Plans/Maps (2 PDFs)	GIS Data (1 layer) + Plans/Maps (1 PDF)	2019 Bicycle Network Plan
Town of Hillsboro	Plans/Maps (1 PDF)	Plans/Maps (1 PDF)	Town of Hilsboro Bike/Ped Trail Network

[5] The draft data was used for the purpose of this Study. The 2023 Active Transportation Plan is now final.

Jurisdiction	Data Received	Data Selected	Data Sources
Town of Leesburg	Plans/Maps (1 PDF)	Plans/Maps (1 PDF)	2022 Transportation Improvement Plan
Town of Lovettsville	Plans/Maps (1 PDF)	Plans/Maps (1 PDF)	2021 Transportation Master Plan
Town of Middleburg	Plans/Maps (1 PDF)	Plans/Maps (1 PDF)	2019 Comprehensive Plan
Town of Occoquan	Plans/Maps (1 PDF)	Plans/Maps (1 PDF)	Vision 2026 Comprehensive Plan (2021 Update)
Town of Purcellville	GIS Data (1 layer)	GIS Data (1 layer)	2023 Pedestrian Prioritization Project
Town of Quantico	No Applicable Data	No Applicable Data	Town could not be reached
Town of Round Hill	Plans/Maps (1 PDF)	Plans/Maps (1 PDF)	2017 Comprehensive Plan
Town of Vienna	GIS Data (2 layers)	No Applicable Data	Data provided only for existing facilities and town confirmed that planned facility data does not exist
VDOT	GIS Data (1 layer)	GIS Data (1 layer)	VDOT Bicycle Facility Inventory* (November 2023 production version)

*Data used for custom data processing to remove existing facilities and merge overlapping planned facility layers

Data Cleaning

Data layers were analyzed to determine the attributes that were available and determine how to translate them to a standardized set of attributes in the combined map. The combined map's structure and linework is based on VDOT's Statewide Bicycle Facility Inventory. The bicycle facility inventory has standardized attributes for facility type, mileage, and other key attributes. It also has consistent guidance on placement of on- and off-street facilities. On-street facilities in the inventory strictly follow VDOT's Linear Referencing System (LRS)—the state's authoritative source of roadway centerline data—while off-street facilities are drawn in place. Following a consistent format for attributes and linework to create the draft and final planned network for this Study allowed for standardized analyses in later stages, as well as potential future analyses that combine existing and planned active transportation facilities and roadway networks.

Digitization

For jurisdictions where a PDF map or image file of their planned bicycle and pedestrian facilities was the provided data source, facilities were digitized using the LRS for on-street facilities or drawn in place for off-street facilities. Attributes for each segment were filled in manually based on interpretation of the proposed facility in accord with the map's legend, facility details in other pages of the same plan, and/or clarification that was provided by relevant staff.

Attribute Standardization

Before combining the data, the Study identified a standardized set of attributes for the combined facilities map. While some values could be copied directly from the original data or calculated as the data was merged into one map (e.g., facility name and lane miles, respectively), some attributes, such as facility type, needed to be translated into a standardized set of values (see *Facility Type Translation*). **Appendix B** shows the complete list of attributes and

possible values that were collected. The documentation of these attributes and translations was then used in the data merges during map development.

Facility Type Translation

It is worth noting that facility types and nomenclature varied from jurisdiction to jurisdiction. Standardizing the attributes to the following facility types provided some continuity across jurisdictions and helped with the cost estimate phase of the Study. It was determined that for this Study, all planned segments would be condensed to VDOT's typical bicycle and pedestrian facility types, with modifications. The following six possible facility types are included in this Study:

Shared Use Path	Bike Lane	Natural Surface Trail
		

Paved Shoulder	Shared Lane	Sidewalk
		

Given the objectives of this Study, an "undetermined facility type" was added to capture projects where the facility type is yet to be specified by the jurisdiction. A separate new attribute called "detailed facility type" provides a more detailed definition of VDOT's facility types where costs could vary dramatically (e.g., separated bike lanes vs. standard bike lanes). The facility type from the source data was also preserved verbatim in a third "source facility type" attribute, for ease of reference with jurisdictional plans. See **Table 4** for a comparison of the different facility type attributes and their relationships to each other and consult **Appendix C** for the specific translations from the source facility type for each jurisdiction. In select cases in which a sidewalk is proposed to be upgraded to a shared use path, the facility type was classified as planned sidewalk to represent the addition of pavement to reach the shared use path width. Additionally, it is important to note that lane mileage is equal to the length of the planned segments, except for bike lanes and sharrows in which jurisdictions identified that facilities are planned for both sides of the street. For those planned segments, the lane mileage is double the length of the planned segment.

The source facility types and detailed facility types are defined by and sourced from localities. Due to the variations in naming convention, geometric requirements, and materials, the facilities were standardized into facility types that capture the slight variation between locality definitions. Thus, there is not a singular definition for the standardized planned facility types in this report.

Table 4: Crosswalk of Facility Types identified by Jurisdictions, Detailed Facility Types, and Standardized Facility Type

Source Facility Types Identified by Jurisdictions	Detailed Facility Type	Standardized Planned Facility Type	Typical Description*
Shared Use Path, Trail, Major Trail, W&OD	Shared Use Path	Shared Use Path (SUP)	Facilities separated from roadway with a buffer or barrier, designed for two-way travel, typically 8-14 feet of paved width
Minor Trail – only in Fairfax Co.	Narrow Shared Use Path		
Protected Bike Lane, Cycle Track	Separated Bike Lane	Bike Lane	Facilities on the road, typically min. width of 5ft (bike lane, sometimes buffered) or facilities on or adjacent to road separated with a vertical element (separated bike lane)**
Buffered Bike Lane, Green Lane	Bike Lane		
Trail	Natural Surface Trail	Natural Surface Trail	Routes developed primarily for outdoor recreational purposes
Future Study, Policy Roads, To Be Determined, Stream Valley Trail	Undetermined Facility Type	Undetermined Facility Type	-
SUP + Sidewalk – only in Loudoun	SUP and Sidewalk		
Shoulder	Paved Shoulder	Paved Shoulder	Facilities adjacent to the roadway, typically min. widths of 4-5 feet
Sharrows, Neighborways, Shared	Shared Lane	Shared Lane	Facilities typically with markings and signage on roadways with posted speed less than 35mph
Sidewalk	Sidewalk	Sidewalk	Facilities typically with a min. width of 5 feet

*The VDOT explanation of the facility types is summarized, at a high level, from VDOT Road Design Manual *Appendix A(1) VDOT Complete Streets: Bicycle and Pedestrian Facility Guidelines, Bus Stop Design and Parking Guidelines*. **Table 4** is not intended to be used as design guidance.

**Cycle tracks are denoted in the report with the language 'separated bike lane/cycle track.

Draft Map

The selected data layers from localities were combined into one layer, which standardized the linework based on whether the planned facility was on-street (e.g., bike lanes, shared lanes, paved shoulders) or off-street (e.g., shared use paths, sidewalks, natural surface trails). *On-street facilities were matched to the LRS* using a proprietary script that compared input line geometries to the distance and angular differences of segments in the LRS. If the line was similar enough, a unique identifier from the source layer was associated with the matching LRS segment, and the matching LRS segments became the new centerline for the planned facility. *Facilities that did not have a matching LRS segment* (e.g., planned off-street facilities and planned facilities on streets that currently do not exist or are along roadways that are not yet accepted into the VDOT secondary system classification) were *drawn in place* after the LRS processing stage, using the linework provided by the respective jurisdiction.

Attributes identified in the attribute standardization step were then joined from the source data layer (e.g., source facility type, project name, etc.) to the respective segments in the merged layer, and new standardized attributes were then translated or computed based on the copied source data and LRS data (e.g., VDOT and detailed facility type, mileage). Quality checks and simple manual corrections were made where necessary throughout the process.

Most localities provided complete and unified datasets that made the draft and final merges simpler to process. Two localities—Loudoun County and Fairfax County—required a more customized process due to the lack of facility status data for both jurisdictions and overlapping and conflicting plans for Fairfax County. Special data processing was done to remove existing facilities from the merged network by using a production version of VDOT's Bicycle Facility Inventory and an additional process to identify and remove overlapping proposed facilities in Fairfax County by choosing the facility type that will provide the highest level of comfort for bicyclists amongst the different plans unless it was overridden by a provided plan audit layer. **Figure 5** and **Figure 6** provide a summary of the different levels of analysis. For more information on the analysis done for each municipality, see **Appendix C**.

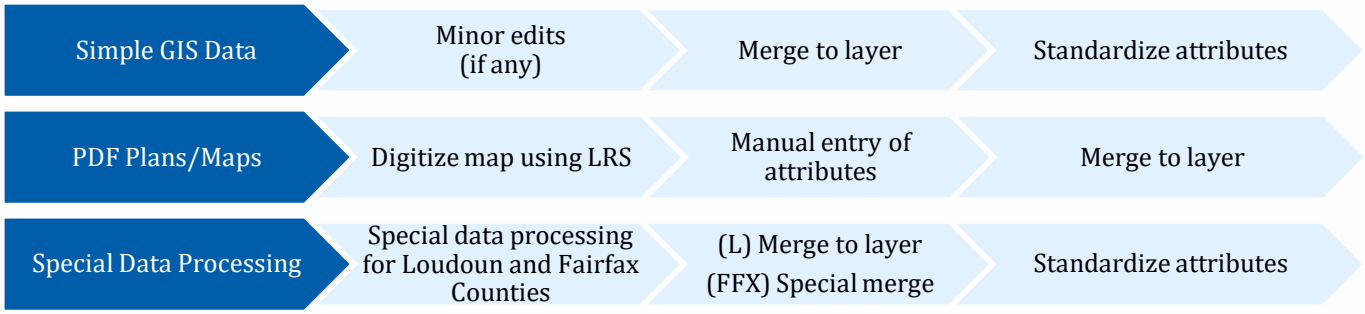


Figure 5: Simplified Process Diagram for Draft and Final Maps

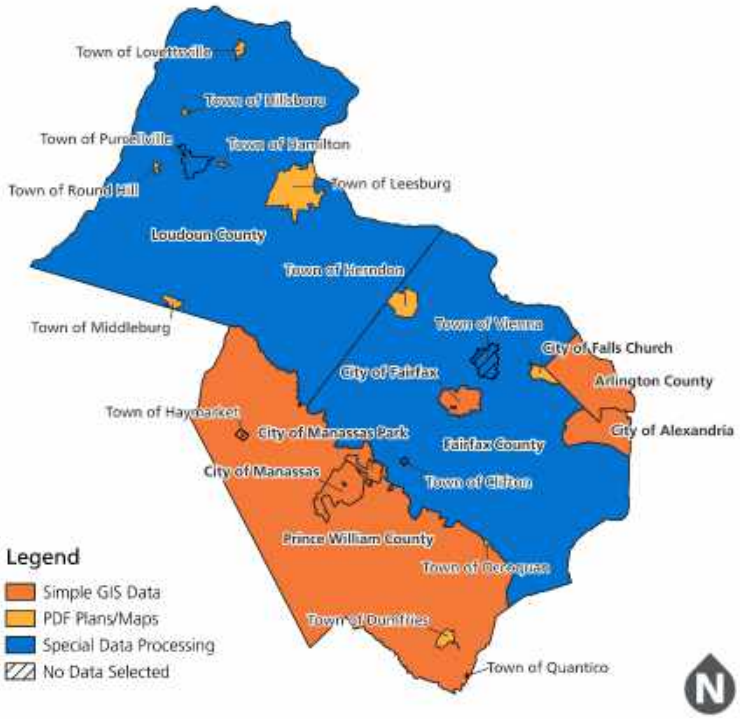


Figure 6: Map of Jurisdictions by Data Merging Process

Municipal Review

Localities were given an opportunity to review the draft map and provide feedback over the months of October and November 2023. The draft map was exported and uploaded to PublicCoordinate, a proprietary online platform traditionally used for public feedback. The draft map was shared with all members of the Study working group via PublicCoordinate, where users could mark lines that needed to be added, changed, or deleted as seen in **Figure 7**. For more systemic edits, feedback was received via email, phone calls, and online meetings.

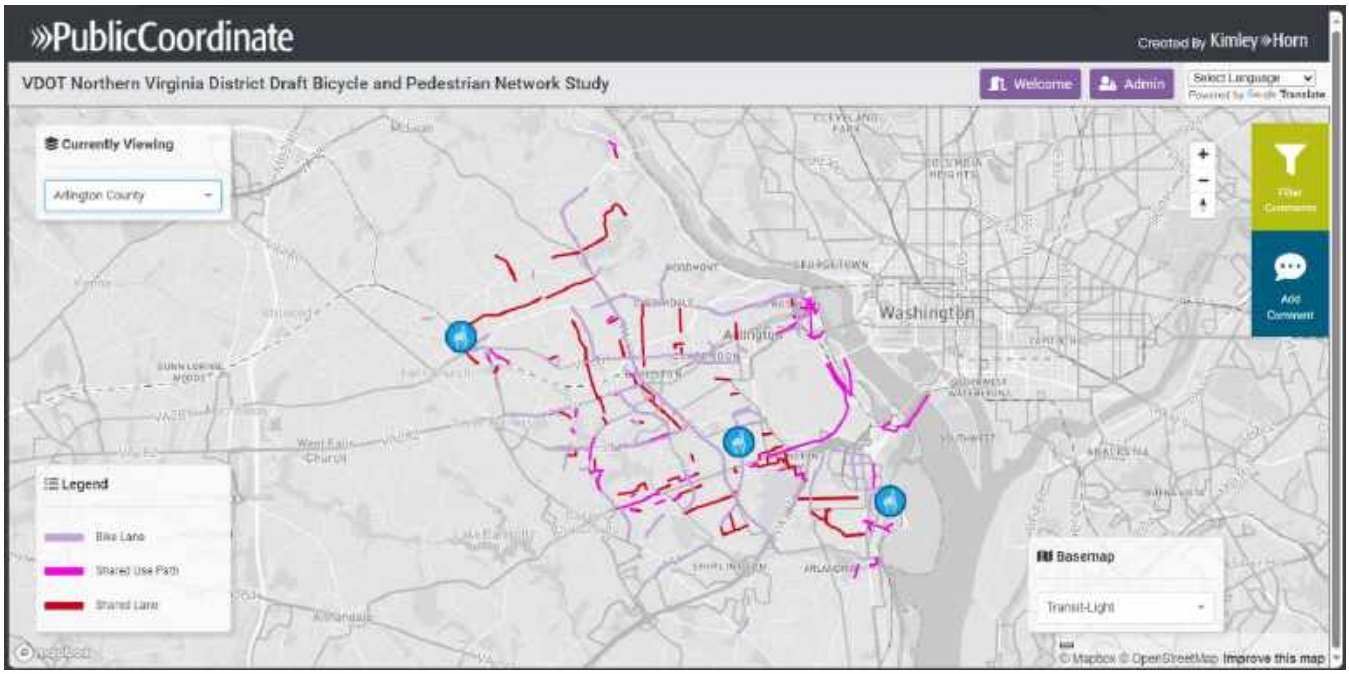


Figure 7: Screenshot of PublicCoordinate Platform

Most jurisdictions provided feedback through PublicCoordinate or did not provide feedback at all. For those who did not provide feedback, most confirmed that their planned bicycle and pedestrian network were accurate. Loudoun and Fairfax Counties required substantially more coordination to accurately represent their planned networks, which necessitated a revision to the way their data was processed and merged between the draft and final maps. These changes are documented in **Appendix C**.

Final Map

To begin finalizing the combined map, a GIS export of PublicCoordinate comments and additional simple GIS files provided by localities were added to the draft map in a similar way as described in the *Draft Map* section of the methodology. For Loudoun and Fairfax Counties, most of the coordination effort was spent determining which facilities to show as some were not publicly or administratively approved. The counties agreed on which facilities to show, and those facilities were added to the final map.

For Loudoun County, this included manual deletion of existing facilities that were already constructed but were not captured by VDOT's Bicycle Facility Inventory and special processing of the county's sidewalk and trail inventory data to add segments that will need an upgraded facility in the future. For Fairfax County, this involved the production of two versions of the network for different purposes: one for cartographic purposes which shows overlapping facilities between their Bicycle Master Plan and their Countywide Trails Plan, and one for cost estimate purposes which roughly accounts for and removes duplicate facilities from mileage counts.

Final processing was done to add a lane mile factor to on-street facilities that are likely to be built on both sides of the street (e.g., bike lanes) and aggregate short segments into longer segments to reduce the number of individual lines and ease future analysis. Processing assumptions and details can be found in **Appendix D**.

Findings

The NOVA Bicycle Pedestrian Network Study locally planned network is pictured below in **Figure 8** but is best viewed using ArcGIS Online at the following link: **ArcGIS Online map**[6]. Maps for each municipality are also available in **Appendix E**.

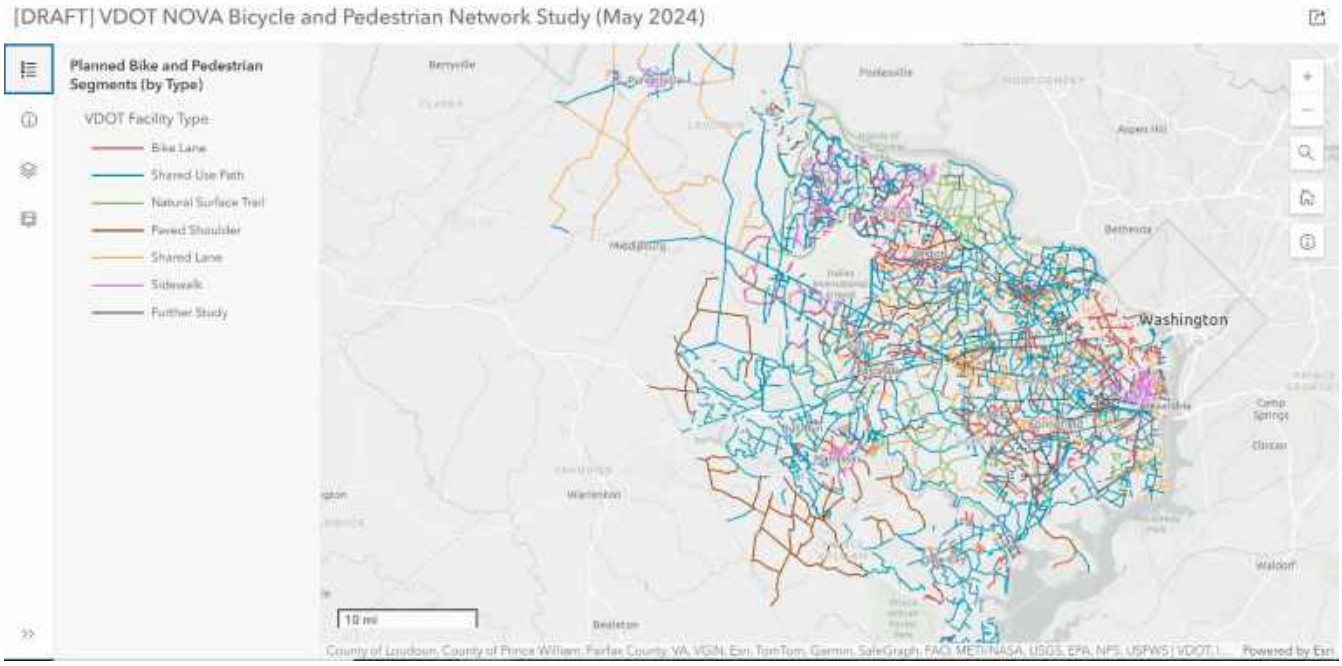


Figure 8: Screenshot of ArcGISOnline Application Used to Interact With the NOVA Bicycle Pedestrian Network Study Map

There are **nearly 5,000 miles of locally planned bicycle and pedestrian facilities across VDOT's NOVA District**, with almost half (49%) within Fairfax County's jurisdiction (i.e., excluding Fairfax City and towns within the county). The next two jurisdictions with the largest mileage of planned bicycle and pedestrian facilities are Loudoun County and Prince William County, respectively. This is likely a reflection of the counties' sizes and urban development patterns. While no single facility type comprised most of the planned bicycle and pedestrian network, *shared use paths comprised the largest share* (37%) of total proposed mileage, followed by shared lanes (18%) and bike lanes (17%). These results are displayed in **Figure 9**. Please note that using readily available data results in some planned segments possibly having been built since the time of locality plan creation and the Study's data collection.

[6] https://vdot.maps.arcgis.com/apps/instant/sidebar/index.html?appid=c3fdb0da5d41485fa6f077d6e0ebbc3a

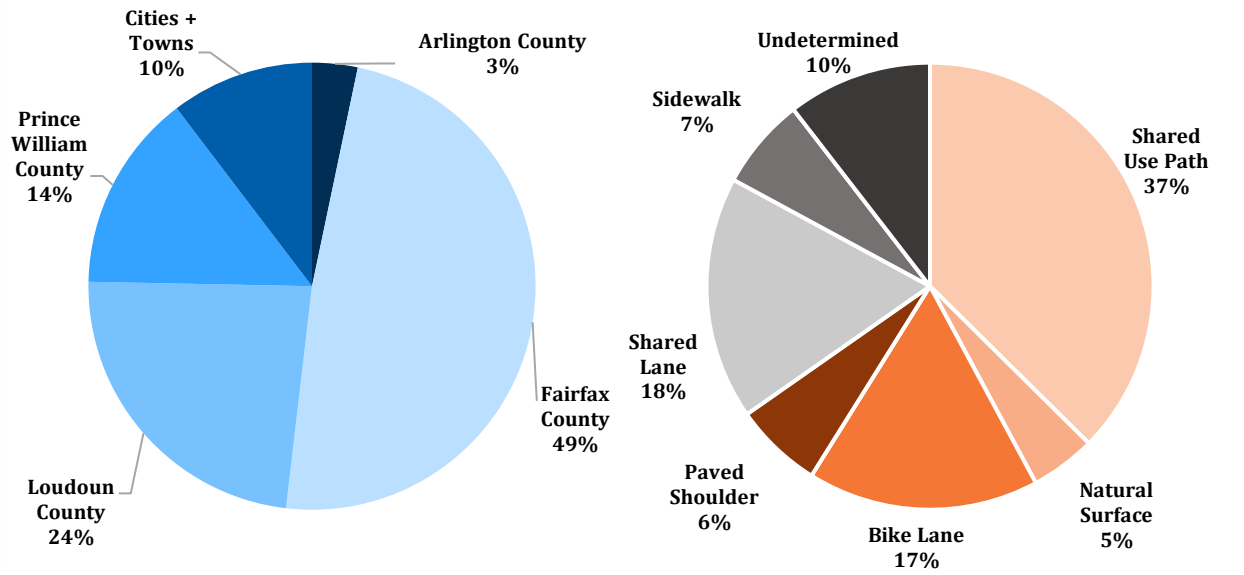


Figure 9: Percentage of Planned Segment Mileage by Locality and by Facility Type as Provided in Local Plans

Table 5 and **Appendix F** provide the results of planned bicycle and pedestrian segments by facility type and jurisdiction. Shared use paths were a facility type identified by almost all jurisdictions in NOVA. Shared lanes make up the second largest share of facility types and were primarily proposed within Fairfax and Loudoun Counties as signed bicycle facilities that support bike trips through more rural and natural areas of each county. Shared lanes in cities and towns were more likely to be described as bicycle boulevards or neighborhood bikeways which include traffic calming measures, making them more accessible to people of all ages and abilities.

Almost all jurisdictions provided data about their planned bicycle segments, which can support pedestrian connectivity along mixed-use facilities such as shared use paths and natural surface trails; however, only 11 localities explicitly provided data on planned sidewalks, which is often tracked separately from bicycle infrastructure or not methodically tracked at all. Based on that information, the **relatively low percentage and mileage of planned sidewalks in the final map should not be considered as the total planned investment for sidewalks** within the NOVA District, but more as a reflection of the availability of sidewalk status and condition data.

Table 5: Total Planned Segment Lane Mileage by County

Jurisdiction	Shared Use Path	Natural Surface	Bike Lane	Paved Shoulder	Shared Lane	Sidewalk	Undetermined	Total Mileage
Arlington	23		95		47			165
Fairfax	1,060	168	496	55	331	25	283	2,418
Loudoun	365	60[7]	110		335	208[8]	90	1,168
Prince William	348	1	76	263	26			714
Cities/ Towns	68	7	57		139	97	148	516
Total Miles	1,864	236	834	318	878	330	521	4,981

Note: Blank cells indicate that no planned mileage was reported.

[7] Natural surface trail mileage for Loudoun County does not reflect natural surface facilities identified in the Loudoun County Linear Parks and Trail (LPAT) Plan beyond those facilities that were also included in the Countywide Transportation Plan (CTP).

[8] Sidewalk mileage reflects facilities along collector and arterial roadways in the county and does not include planned sidewalk along local roadways.

Chapter 3: Elements Analysis

Purpose

The data gathering identified planned pedestrian and bicycle facilities, which were then evaluated in ArcGIS using data layers, called "elements," to determine some of the access, safety, and connectivity attributes of the planned facilities. The element analysis aimed to spatially assess how the proposed bicycle and pedestrian network can provide community benefits and identified which parts of the network can meet different needs and goals of the Commonwealth and the region. The Commonwealth Transportation Board (CTB) adopted the Policy for Integrating Bicycle and Pedestrian Accommodations in 2004, noting that "bicycling and walking are fundamental travel modes and integral components of an efficient transportation network, and appropriate bicycle and pedestrian accommodations provide the public with access to the transportation network, connectivity with other modes of transportation, and independent mobility regardless of age, physical constraints, and income."

A list of all elements included in the community benefit analysis is set out in **Figure 10**. The list of elements captures community destinations such as schools and parks. The elements also include areas of regional significance that are the result of safety, economic, and demographic analysis. The potential community benefits analysis illustrates the local and regional significance of segments and can support jurisdictions in developing a justification for funding. Analysis methodology was consistent across all elements. Based on Metropolitan Washington Council of Governments (MWCOG) Transportation Planning Board (TPB) regional goals and datasets, four focus elements, listed on the left side of **Figure 10,** are discussed in greater detail in the report.

Focus Elements	*Standard Elements*
• Activity Centers	• Capital Bikeshare Stations
• High-Capacity Transit	• Park and Ride Lots
• Higher Need Populations	• Bus Stops
• Regional Trails	• K-12 Schools
	• Colleges & Universities
	• Regional Parks
	• Local Parks
	• Pedestrian Safety Action Plan Identified Corridor

Figure 10: Elements Analysis Categories

Methodology

All planned facilities were analyzed in ArcGIS Pro to understand their spatial relationship, or lack thereof, with each of the standard and focus elements. The relationship between the planned segments and community elements is often nuanced and depends on each person's purpose for using a facility. To best capture the nuance while providing consistency, two buffer zones were used to capture segments that provide *direct access* to standard and focus elements as well as segments that are further away from the element itself but *connect* to the element area. The methodology is shown below in **Figure 11** and discussed in the following paragraph.

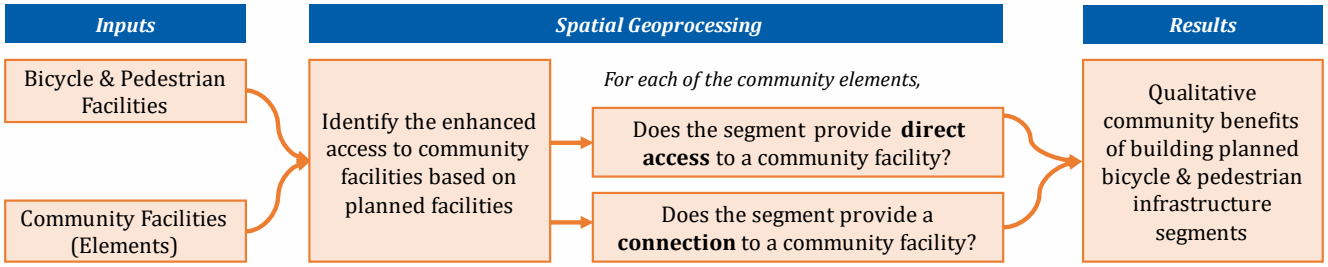
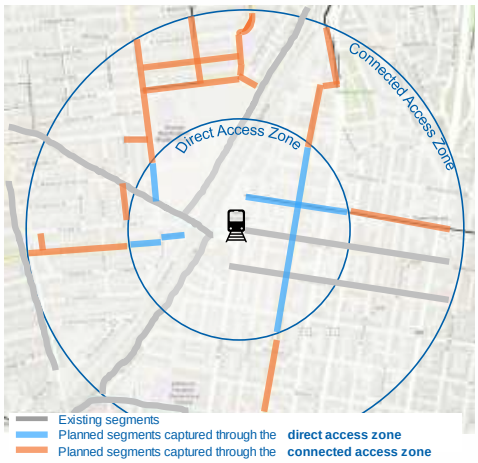


Figure 11: Elements Analysis Methodology

Planned segments were considered to provide *direct access* to an element if they were near the element itself. For example, segments within the MWCOG identified activity center boundaries provided *direct access* to the destinations within the center.

Segments were considered to provide *connected access* if they were a part of a continuous connection to either an existing or planned facility *in the direct access* zone. To measure *connected access*, the planned bicycle and pedestrian facilities were considered separately.

Note that in the analysis, segments were clipped at the edge of the direct or connected access buffer distance. For simplicity of visualization, full segments are categorized as providing direct or connected access in the ArcGIS Online map.



The sources for the existing networks and planned facilities are shown in **Table 6**.

Table 6: Elements Analysis Inputs—Bicycle and Pedestrian Facilities

Element	Data Source(s)
Existing Bicycle Facilities	VDOT publicly available bicycle facilities layer
Planned Bicycle Facilities	Sourced from working group and their respective bicycle planning documents and ArcGIS data
Existing Pedestrian Facilities	VDOT-owned layer (Received 2/9/2024)
Planned Pedestrian Facilities	Sourced from working group and their respective pedestrian planning documents and ArcGIS data

Data sources and buffer distances were developed in coordination with VDOT staff and the Study working group. The elements data was sourced mostly from regional entities such as MWCOG, Virginia Open Data, and DC Open Data. While the regional datasets and definitions provide continuity across jurisdictions, it is important to note that the data and definitions may vary from local sources. The *direct access* and *connected access* zone distances vary by element. For elements with point geographies, such as Capital Bikeshare stations and bus stops, the buffer distances were determined by identifying the average or a comfortable distance for people to walk or bike to the mode transfer point. The school buffer distances were informed by walksheds for K-12 schools. Elements with polygon geographies capture facilities within the boundaries of the polygons and the connected buffer capture facilities with a connection to, or just outside, the polygon boundary (e.g., on the other side of the street). Elements with line geographies aim to capture segments that fill gaps in continuity and connect to the line geography. **Table 7** provides detailed information on the data sources and buffer distances used for each of the elements. Assumptions and processing notes are

included in **Appendix D**. Many of these data sources are continuously updated, thus the data used in this Study is a snapshot in time reflective of data as of Fall 2023.

Table 7: Elements Analysis Inputs – Community Elements Data Sources

Element	Data Source(s)	Shape Type	Direct Buffer Distance	Connected Buffer Distance
Higher Need Populations	• MWCOG Equity Emphasis Areas (EEAs) (2016-2020 ACS) **Transportation Planning Board (TPB) endorsed.* *ArcGIS Online updated 10/16/2023.* • MWCOG defines equity emphasis areas as "census tracts with high concentrations of low-income individuals and/or traditionally disadvantaged racial and ethnic population groups" [9]	Polygon	100 ft.	0.5 mi.
Activity Centers	• MWCOG Activity Center Boundaries. TPB and COG version of Transportation Analysis Zones (TAZ) for COG Regional Activity Centers. **TPB endorsed.* • *ArcGIS Online updated 10/16/2023.* • MWCOG defines activity centers as existing urban centers, priority growth areas, traditional towns, and transit hubs that will accommodate the majority of the region's future growth. [10] It is important to note that these activity center boundaries may not reflect current or planned areas of increased pedestrian and bicycle activity.	Polygon	100 ft.	0.5 mi.

[9] https://www.mwcog.org/transportation/planning-areas/fairness-and-accessibility/environmental-justice/equity-emphasis-areas/
[10] https://www.mwcog.org/documents/2013/01/13/activity-centers-maps/

Element	Data Source(s)	Shape Type	Direct Buffer Distance	Connected Buffer Distance
High-Capacity Transit (HCT)	• MWCOG TPB/HCT_Walksheds *May 2023* • Open Data DC – Metro (Silver Line Extension) *Updated May 2023.*	Point	0.25 mi.	1 mi.
Regional Trails	• MWCOG National Capital Trail Network *Updated 2023. *TPB endorsed.* • NVRC Regional Trails (filtered to Potomac Heritage Trail) *Updated 2023.* • VDOT Open Data – US Bicycle Routes *Updated 5/9/2022.*	Line	0.1 mi.	0.5 mi.
Capital Bikeshare Stations	• Open Data DC – Capital Bikeshare Locations. *Updated 1/12/2023.*	Point	250 ft.	0.25 mi.
Park and Ride Lots	• VDOT Open Data – Park & Ride Map *Live link – Downloaded 12/2023.*	Point	0.25 mi.	0.5 mi.
Bus Stops	• Vtrans Bus Stops *Updated 3/15/2022.*	Point	250 ft.	0.25 mi.
Colleges & Universities	• Vtrans Colleges and Universities *Updated 5/16/2022.*	Polygon	100 ft.	1 mi.
Regional Parks	• NVRC Parks (Filtered for Regional) *Updated 9/23/2019.*	Polygon	100 ft.	0.5 mi.
Local Parks	• Virginia Department of Conservation and Recreation, Virginia Outdoors Plan, Local Parks Data *Updated 2018.*	Point	0.25 mi.	0.5 mi.
K-12 Schools	• Vtrans Elementary and Secondary Schools *Updated 5/16/2022.*	Point	0.25 mi.	1 mi.

Element	Data Source(s)	Shape Type	Direct Buffer Distance	Connected Buffer Distance
Pedestrian Safety Action Plan Identified Corridor	• VDOT Open Data – Pedestrian Safety Action Plan (Version 3) *Updated Fall 2023. Includes bicycle facilities.*	Line	0.1 mi.	0.25 mi.

Findings

Introduction

The qualitative outputs from the Elements Analysis demonstrate the potential community benefits of building out the planned bicycle and pedestrian facilities across the NOVA District. Each planned facility was evaluated against each of the community elements to identify how the planned infrastructure could provide bicycle and pedestrian connections. The overall results are shown below along with detailed sections for the results of the **activity centers, high-capacity transit, Higher Need Populations, and regional trail elements.**

As many of these results are geospatial in nature, an **ArcGIS Online map**[11] was developed to visualize the benefits of the planned facilities. The ArcGIS Online map includes existing networks, planned facilities, the community elements as shown in **Table 7** and examples of the direct access and connected zones and facilities for the four elements detailed in the following sections. The online map is intended to be a resource to:

- View the existing network and planned facilities within a jurisdiction
- View the existing network and planned facilities at jurisdictional boundaries
- Visualize planned facilities in the context of community elements
- Select a planned segment to see if it would provide access (direct or connected) to or for a community element
- Allow the "ID" column of the attribute table to be used as a shared value to correlate map segments to data provided by jurisdictions

The online map references static layers. Please note, these layers will not update as the base files are updated by the data owners. The layers in the online map are not intended to override local jurisdictional data and plans, but rather to be a general reference (snapshot in time) for regional coordination. Please also note that using readily-available data results in some planned segments possibly having been built since the time of locality plan creation and Study's data collection.

[11] https://vdot.maps.arcgis.com/apps/instant/sidebar/index.html?appid=c3fdb0da5d41485fa6f077d6e0ebbc3a

Results by Element

The results are organized by element and detail the benefits should the planned facilities be constructed across the NOVA District. **The planned facilities improve access to all elements.** These facilities can provide enhanced or new mobility opportunities for people to better leverage community destinations. **Table 8** summarizes the results of the elements analysis by element against the following metrics:

- **Direct Access (Lane Miles):** Sum of all planned segments that are in proximity (within the direct access zone buffer distance) to each element
- **Connected Access (Lane Miles):** Sum of all planned segments that connect to segments within the direct access zone (within the connected access zone buffer distance) for each element
- **Total Access (Lane Miles):** Sum of direct access and connected access mileage
- **Percent of All Planned Facilities:** Calculated as a percentage of all planned facilities that provide direct or connected access to each element

Note: Lane mileage is equal to the length of the planned segments, except for bike lanes and sharrows which jurisdictions identified as being planned for both sides of the street. For those planned segments, the lane mileage is double the length of the planned segment.

Table 8: Elements Analysis Results

Element	Direct Access (Miles)	Connected Access (Miles)	Total Access (Miles)	Percent of All Planned Facilities
Higher Need Populations	496	619	1,114	22%
Activity Centers	982	616	1,598	32%
High-Capacity Transit	93	507	600	12%
Regional Trails	744	1,179	1,923	39%
Capital Bikeshare Stations	27	253	280	6%
Park and Ride Lots	107	206	313	6%
Bus Stops	519	1,138	1,657	33%
Colleges & Universities	14	503	517	10%
Regional Parks	91	208	298	6%
Local Parks	738	954	1,692	34%
K-12 Schools	448	2,204	2,652	53%
Pedestrian Safety Action Plan Identified Corridor	941	484	1,425	29%

Detail: Activity Centers

The elements analysis measured which portions of the network provide connectivity to MWCOG Activity Centers throughout the NOVA District. Approximately *360 lane miles of planned bike lanes are in activity centers or within 0.5 miles of the activity center boundary*, or more than 50% of the 835 lane miles of planned bike lanes in the NOVA District. Improving bicycle and pedestrian infrastructure in and around activity centers can provide employees or shoppers with more modal options when traveling to and from the activity centers. **Table 9** summarizes the total lane mileage (direct access + connected access) of planned facilities within the analysis buffers by facility type and shows how the total lane mileage for the element compares to the total planned lane mileage within the NOVA District. **Figure 12** and **Figure 13** illustrate a snapshot of the results of the elements analysis for activity centers.

Table 9: Planned Facility Access to Activity Centers

Facility Type	Lane Mileage	Percent of All Planned Facilities
Shared Use Path	623	13%
Sidewalk	112	2%
Bike Lane	364	7%
Natural Surface Trail	27	1%
Separated Bike Lane/Cycle Track	31	1%
Shared Lane	252	5%
Undetermined Facility Type	189	4%
Total	**1,598**	**32%**

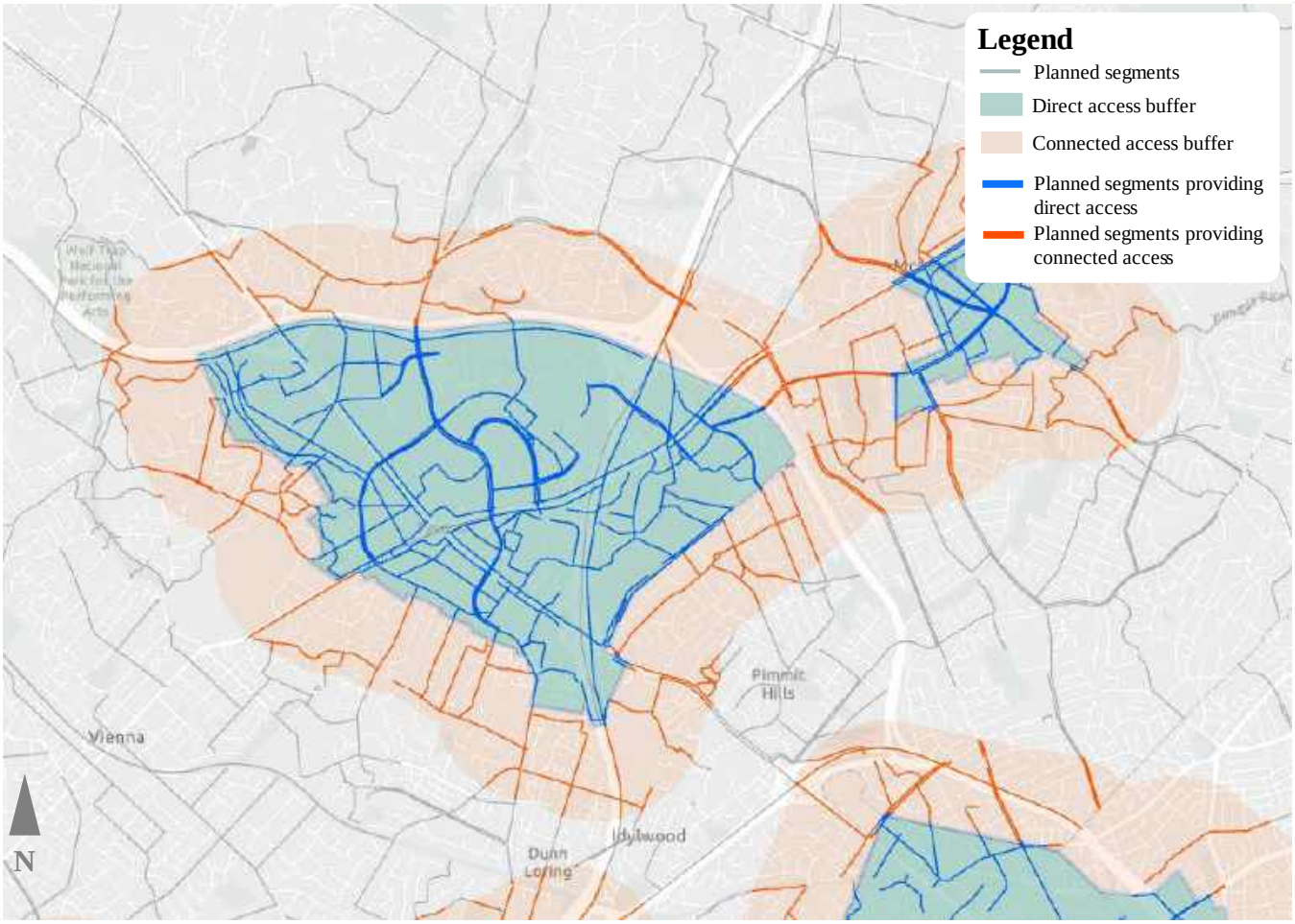


Figure 12: Example of the Analysis Buffers and Facilities for Activity Centers

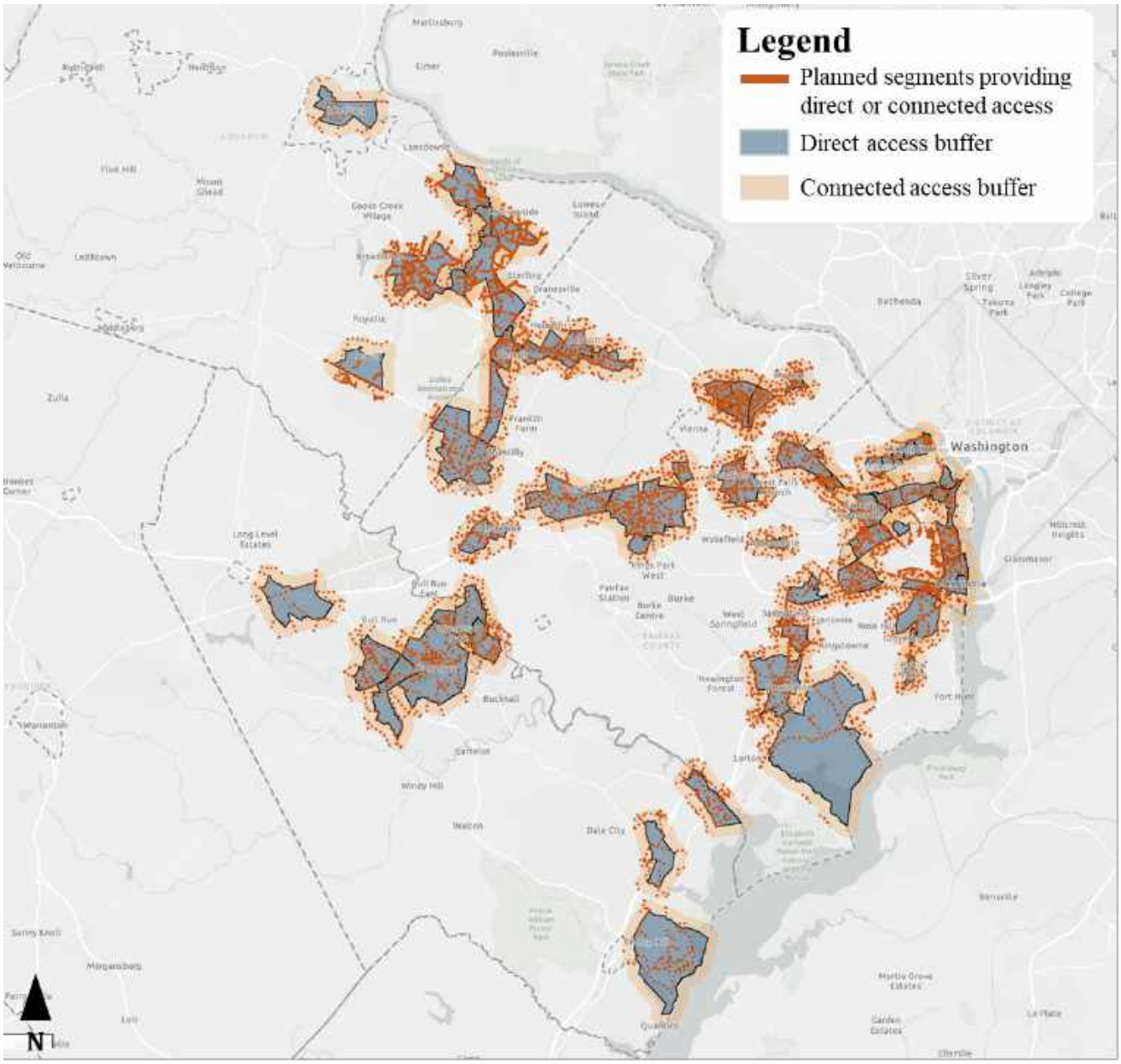


Figure 13: District-Wide Activity Centers Results

Detail: High-Capacity Transit

The elements analysis measured which portions of the network provide connectivity to a High-Capacity Transit Network throughout the NOVA District. High-capacity transit (HCT) aligns with the Transportation Planning Board (TPB) definition that includes high-capacity rail and bus rapid transit (BRT) lines. Approximately 12% of all planned facilities are within the buffer zones of high-capacity transit stations/stops. It is important to note, while 12% is relatively lower in comparison to the other elements, this figure represents planned facilities and does not include existing bicycle and pedestrian facilities within the analysis buffers. Approximately 25% of all bike lanes and separated bike lane/cycle tracks provide enhanced or new bicycle facility direct or connected access to HCT stations/stops. And approximately 50 miles of planned sidewalks can improve safe access to HCT stops/stations and opportunities to better leverage high-capacity rail and BRT transit systems. **Table 10** summarizes the total lane mileage (direct access + connected access) of planned facilities within the analysis buffers by facility type and how the total lane mileage for the HCT stops/stations element compares to the total lane mileage within the NOVA District. **Figure 14** and **Figure 15** provide a snapshot of the elements analysis results for high-capacity transit stations and stops.

Table 10: Planned Facility Access to High-Capacity Transit Stations and Stops

Facility Type	Lane Mileage	Percent of All Planned Facilities
Shared Use Path	213	4%
Sidewalk	47	1%
Bike Lane	186	4%
Natural Surface Trail	4	~0%
Separated Bike Lane/Cycle Track	11	~0%
Shared Lane	99	2%
Undetermined Facility Type	41	1%
Total	**600**	**12%**

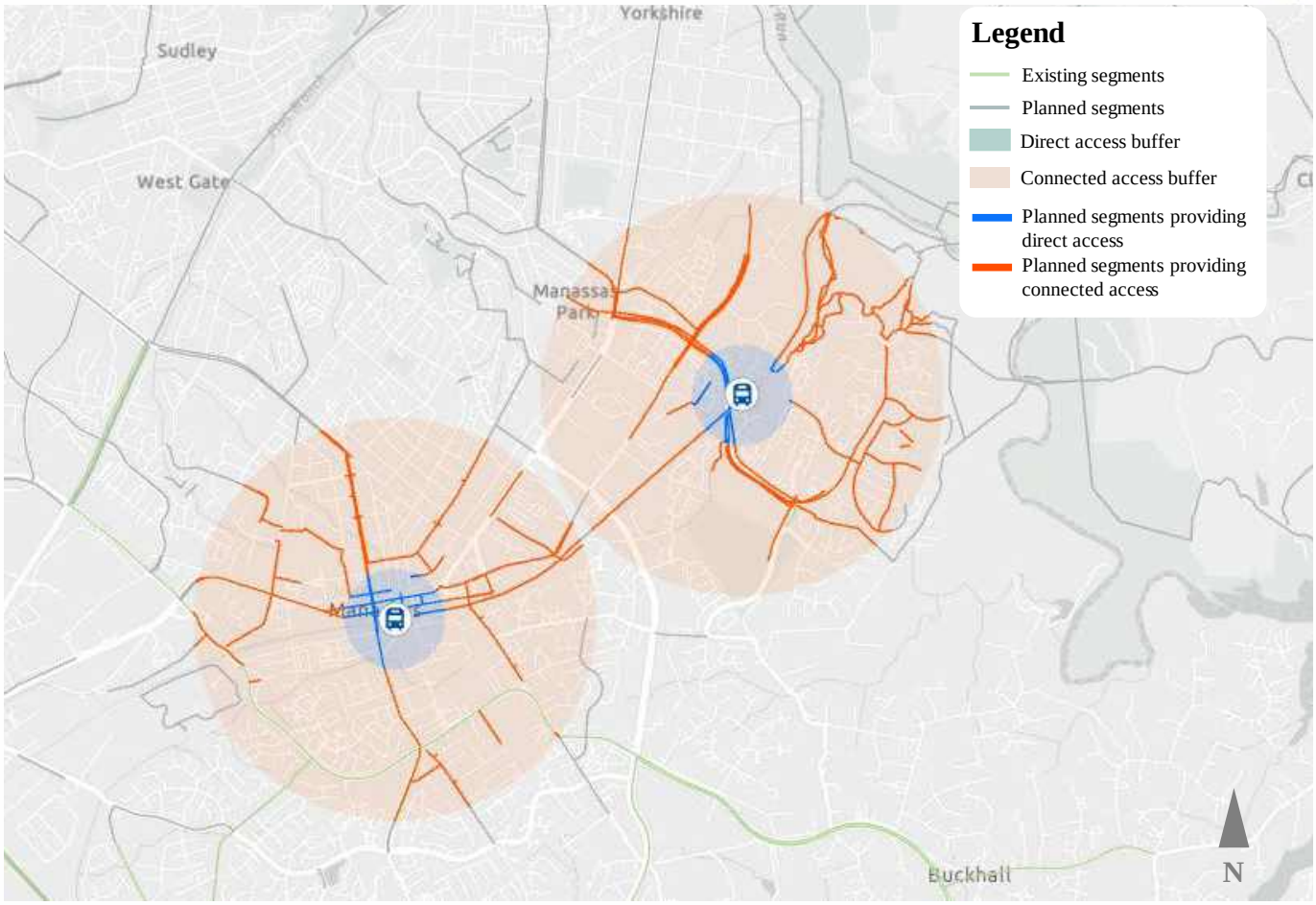


Figure 14: Example of the Analysis Buffers and Facilities for High-Capacity Transit Stations and Stops

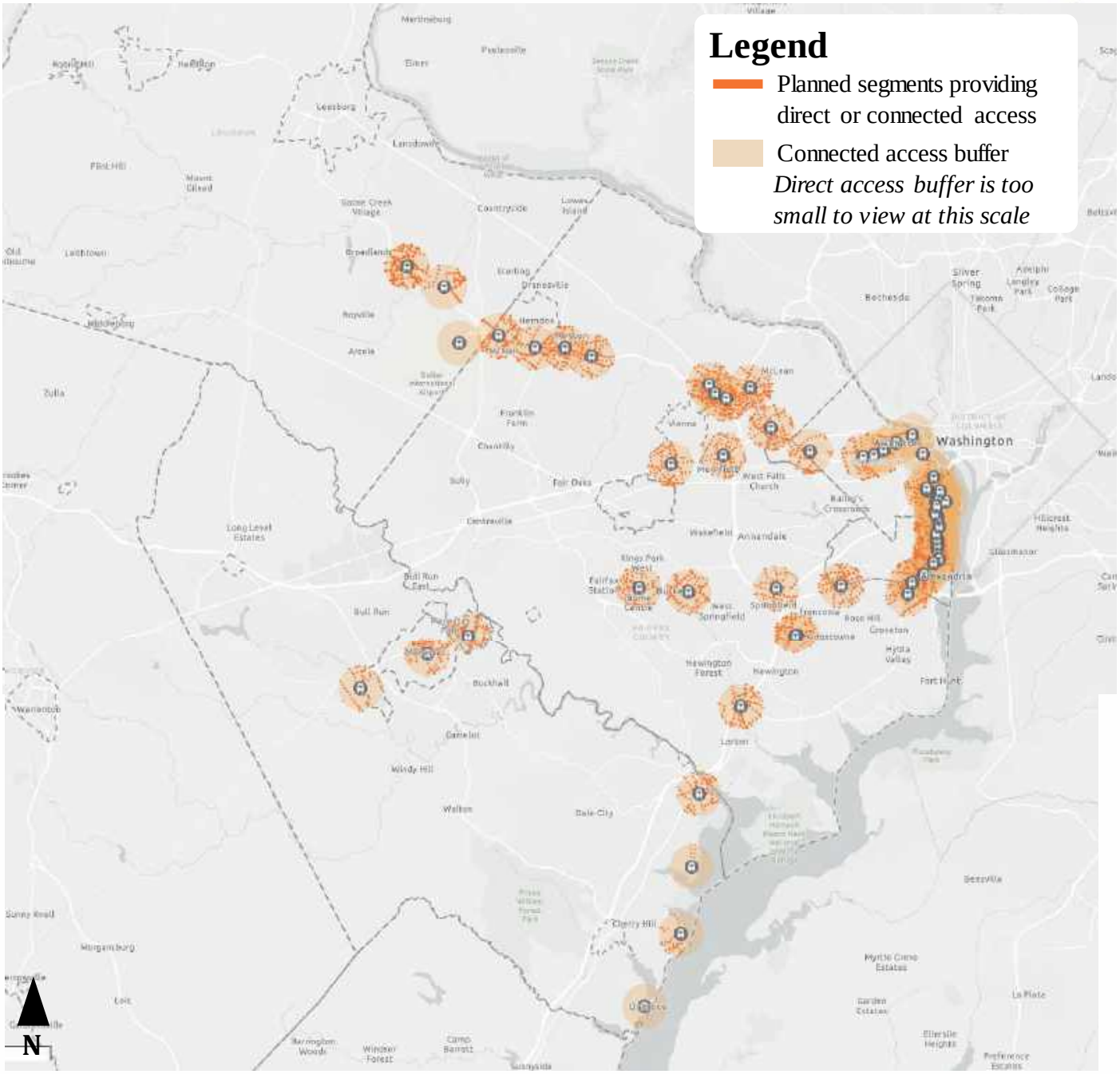


Figure 15: District-Wide High-Capacity Transit Results

Detail: Higher Need Populations

The elements analysis measured which portions of the planned facilities provide connectivity to MWCOG Equity Emphasis Areas (EEA) in the NOVA District. Approximately **1,100 miles of planned facilities provide enhanced or new bicycle and pedestrian infrastructure around Higher Need Populations** for residents and roadway users within 0.5-miles of the boundaries. Sixty percent of all planned separated bike lane/cycle track facilities are within the direct access or connected access zones. Twenty-two percent of planned sidewalk facilities (note: not all jurisdictions provided planned sidewalk information) are within both access zones, which can bridge gaps, enhance safety, and provide greater comfort for pedestrians. Additionally, planned facilities that enhance or provide new sidewalks are required to be compliant with Americans with Disabilities Act (ADA) regulations, which can update deficient infrastructure. **Table 11** summarizes the total lane mileage (direct access + connected access) of planned facilities within the analysis buffers by standardized facility type. Further, **Table 11** shows how the total lane mileage for the higher need element compares to the total lane mileage within the NOVA District. **Figure 16** and **Figure 17** provide an example of the higher need boundaries, buffers, and planned facilities.

Table 11: Planned Facility Access for Higher Need Populations

Facility Type	Lane Mileage	Percent of All Planned Facilities
Shared Use Path	429	9%
Sidewalk	74	1%
Bike Lane	255	5%
Natural Surface Trail	11	~0%
Separated Bike Lane/Cycle Track	27	1%
Shared Lane	180	4%
Undetermined Facility Type	138	3%
Total	**1,114**	**22%**

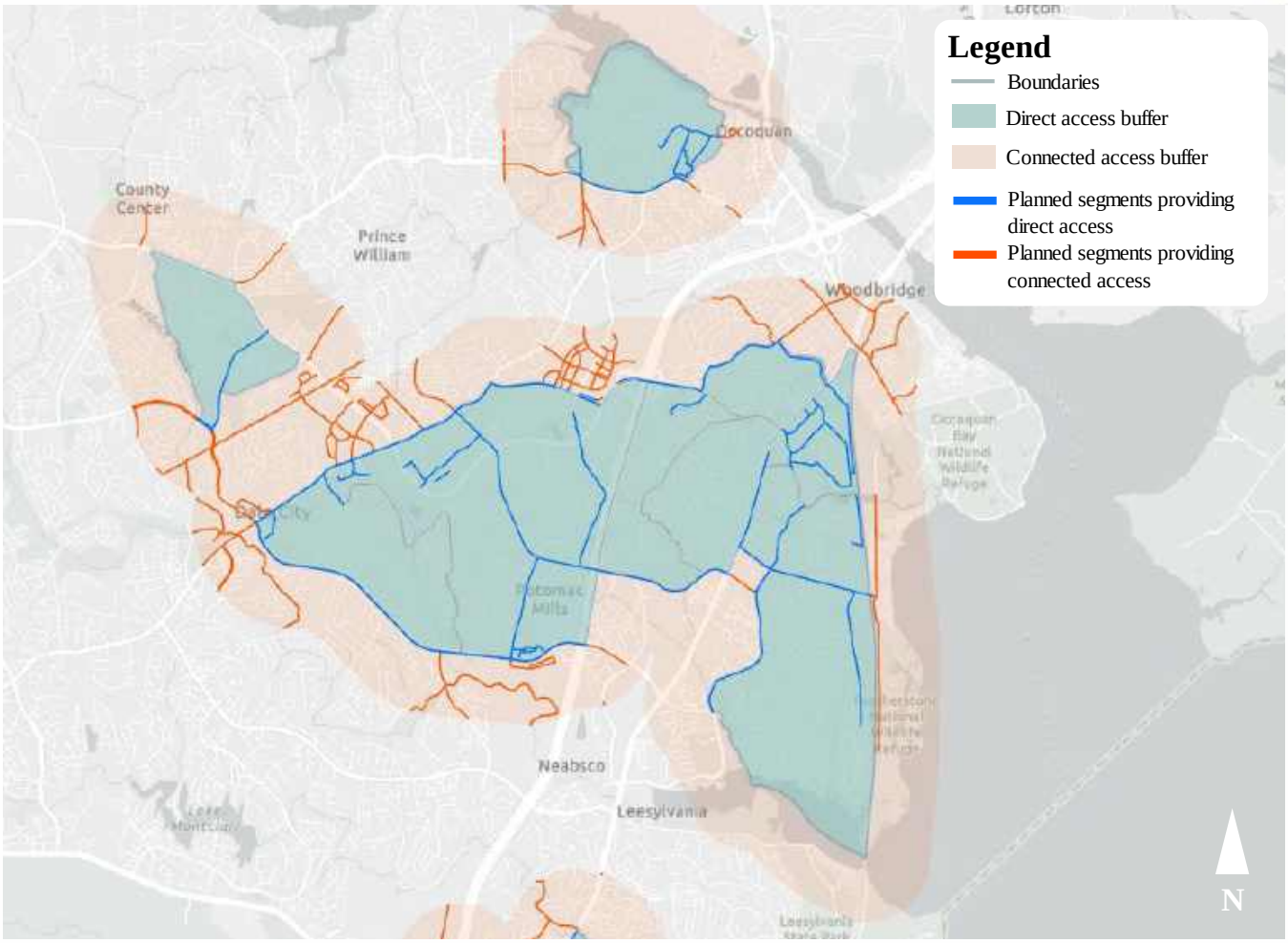


Figure 16: Example of the Analysis Buffers and Facilities for Higher Need Populations

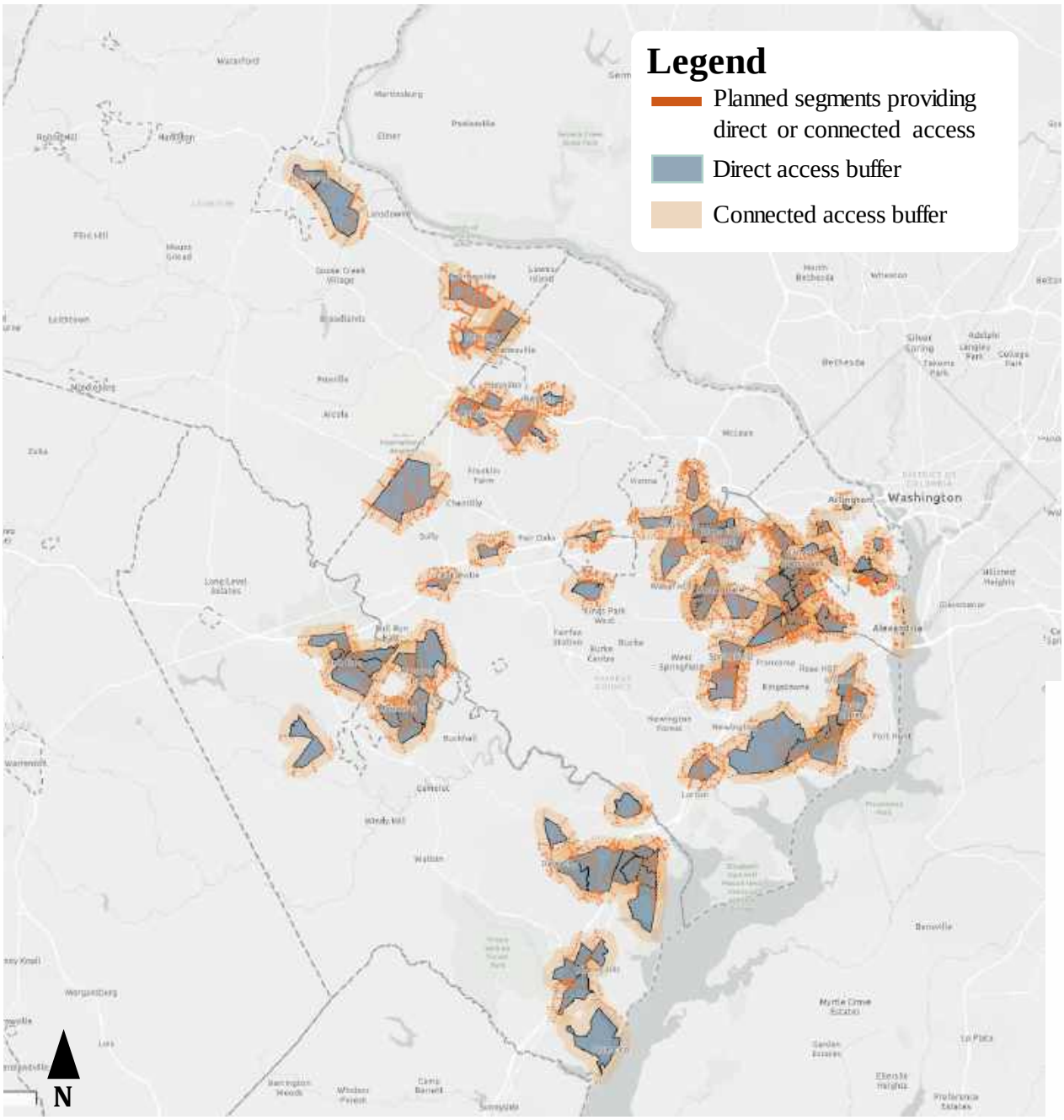


Figure 17: District-Wide Higher Need Populations Results

Detail: Regional Trails

The elements analysis measured which portions of the network provide connectivity to regional trails—including the National Capital Trail Network, Potomac Heritage National Scenic Trail, and US Bike Route 1—throughout the NOVA District. Both existing and proposed segments of regional trails in NOVA were included in the elements analysis. Approximately 40% of the planned segments provides direct or connected access to regional trails or fills gaps in the regional trail network. Shared use paths account for the largest percentage of facility types providing connectivity which can be explained by the number of miles of planned facilities that are identified as future parts of the regional trails network in NOVA. **Table 12** summarizes the total lane mileage (direct access + connected access) of planned facilities within the analysis buffers by facility type and how the total planned lane mileage for the element compares to the total lane mileage within the NOVA District. **Figure 18** and **Figure 19** provide a snapshot of the elements analysis results for regional trails.

Table 12: Planned Facility Access to Regional Trails

Facility Type	Lane Mileage	Percent of All Planned Facilities
Shared Use Path	835	17%
Sidewalk	126	3%
Bike Lane	395	8%
Natural Surface Trail	64	1%
Separated Bike Lane/Cycle Track	25	1%
Shared Lane	260	5%
Undetermined Facility Type	218	4%
Total	**1,923**	**39%**

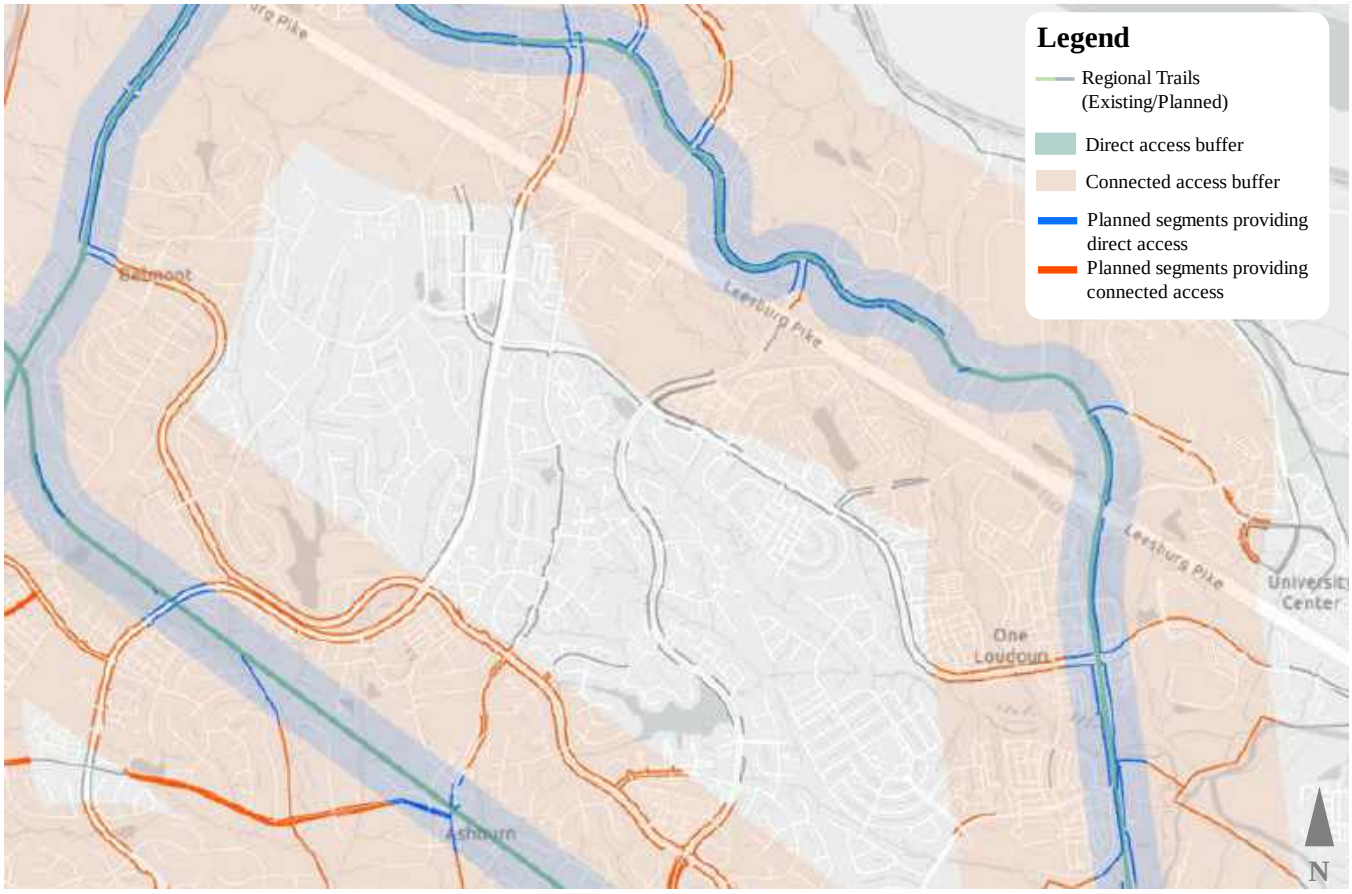


Figure 18: Example of the Analysis Buffers and Facilities for Regional Trails

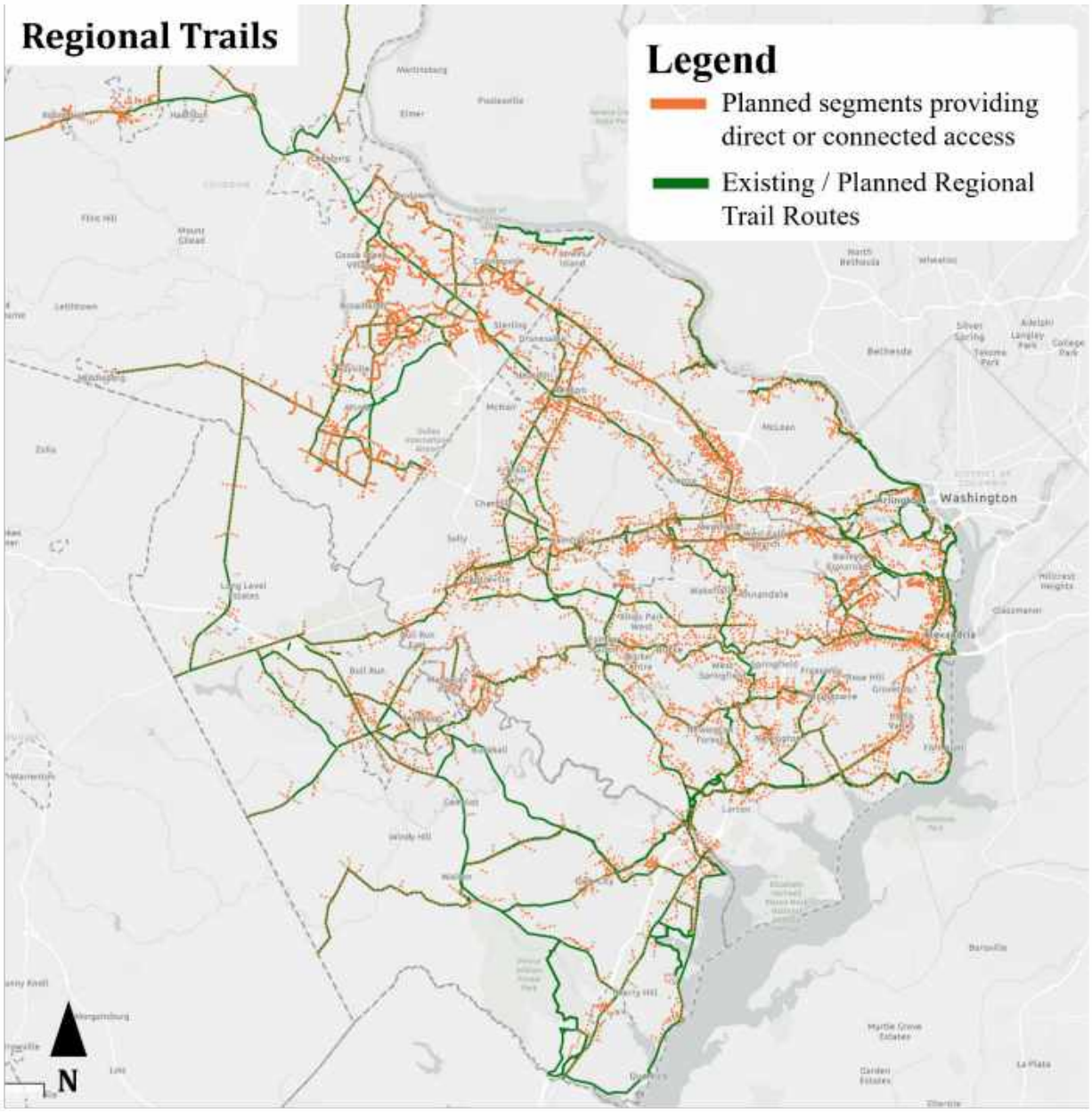


Figure 19: District-Wide Regional Trails Results

Chapter 4: Planning Level Cost Estimate Ranges and Funding Opportunities

Purpose

Planning level cost estimate ranges were researched and developed, in coordination with VDOT Northern Virginia (NOVA) Location and Design (L&D) cost estimating staff, for the various bicycle and pedestrian infrastructure types that comprise the planned network in NOVA. The intent of this effort was to understand the engineering and construction cost implications for future bicycle and pedestrian network build-out; however, once example project costs were provided for this effort, it became apparent that data was not itemized for locality projects to separate out the costs for phases or highly variable line items (e.g., right-of-way [ROW]). And in many cases, additional engineering and infrastructure improvements were included in active transportation projects as part of meeting standards/other concurrent upgrades.

Project examples were selected to be as representative of typical NOVA active transportation projects (e.g., shared use path, bike lanes, etc.) as possible. Some projects included ROW and additional roadway or intersection improvements as part of the active transportation project. With approximately 5,000 miles of locality planned bicycle and pedestrian infrastructure, many miles of which are located in urbanized constrained areas, consideration of funding opportunities is needed, some of which are outlined in this section. The project cost estimates provide localities with cost information from recent projects in and around NOVA that can help to provide high-level input to jurisdictions and stakeholders on the cost of progressing the planned network projects towards implementation.

Methodology

The methodology for developing the planning-level project cost estimates for the planned bicycle and pedestrian network involved several key steps, as shown in **Figure 20**.

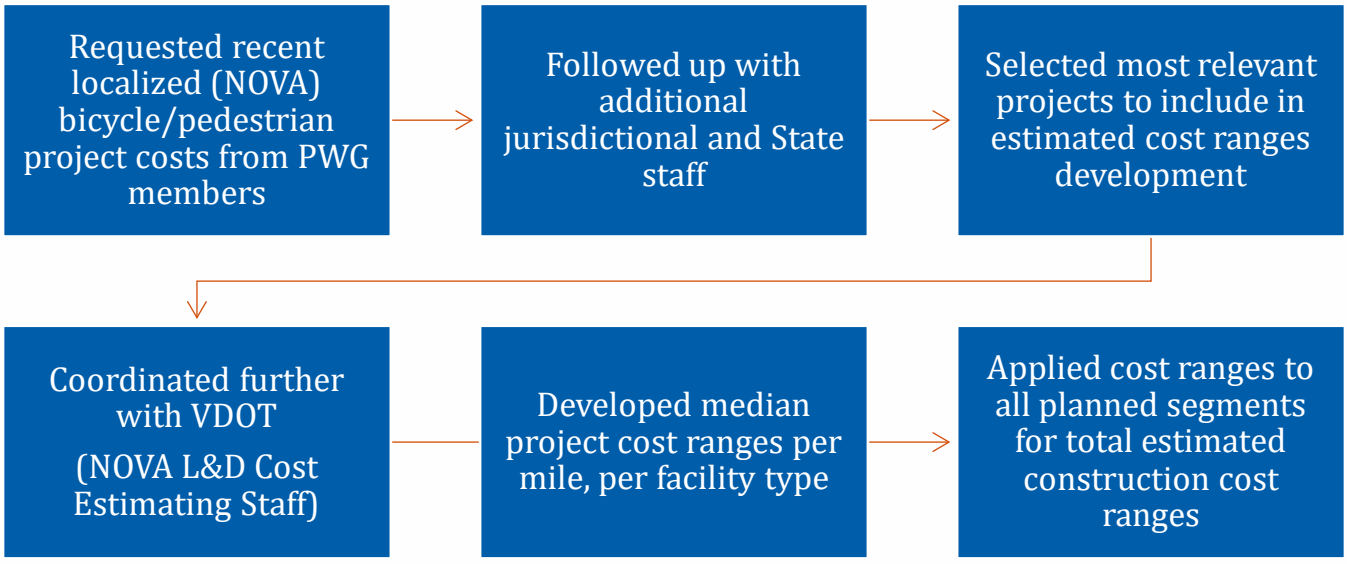


Figure 20: Cost Estimating Methodology

Data Collection

For the initial data collection, project costs for recently constructed (3-5 years), localized bicycle and pedestrian were requested from Study working group members through an online survey. The cost information requested included:

- Facility type
- Construction cost
- Project length
- Year constructed
- Project context (Urban/rural)
- Any caveats in cost (e.g., ROW required, stormwater included, utilities included, etc.)

Following the initial request, further inquiries were made through direct coordination with jurisdictional and VDOT staff to gather additional project cost information. Jurisdictional coordination extended beyond the NOVA area due to a limited number of project costs received for the facility types being investigated, which included: bicycle lanes (separated and cycle tracks), shared lanes (pavement markings, signage, traffic calming infrastructure), shared use paths, sidewalks, and natural surface trails.

In addition to direct contact with jurisdictional and partner agency staff, peer research and coordination with project partners was completed to obtain additional bicycle and pedestrian infrastructure cost estimates. Following this effort, information was provided by the following jurisdictions: Arlington County, City of Fairfax, VDOT, City of Alexandria, and Maryland Department of Transportation (MDOT). Additional information was received from the Virginia Department of Conservation and Recreation (DCR), industry professionals, and the City of Richmond. The information received was used to evaluate and verify the accuracy of the planning level cost estimate ranges.

Cost Development

Project Selection

A selection process was developed and conducted to identify the most relevant projects for inclusion in the cost estimate development. Extent of the project scope, geographic relevance, alignment with planned network objectives, and cost details were all considerations in the selection process. Based on the information received, it was determined that the localities identified bicycle and pedestrian projects more broadly than the specific VDOT project types described in the data gathering project phase. As a result, the data was analyzed and recategorized to align with the VDOT project types. Through analysis, it was apparent that **most project costs received included other engineering and infrastructure improvements, including, but not limited to, ROW, utilities, and intersection upgrades**. As a result, most of the projects included in the cost estimate development included these factors. This information was used to understand the project cost dynamics across the different facility types of the proposed bicycle and pedestrian network. The cost per mile was calculated for all project costs where it was not already given. A breakdown of the information provided and used in developing the cost estimates by facility type is shown in **Table 13**, **Table 14**, **Table 15**, **Table 16**, **Table 17**, and **Table 18**. **Appendix G** has all the project cost information provided for the purposes of this Study.

Table 13: Shared Use Path Project Cost Development Details

Shared Use Path Project	Available Data
	• **24** projects evaluated • **17** projects used in cost estimate calculations **Sources** • 4 jurisdictions (Arlington County, Fairfax County, City of Fairfax, VDOT) • 2 additional sources (MDOT, Industry professionals) **Specifics** • Several of the projects used in the cost estimate calculations included costs for constructing pedestrian bridges. • Additional factors used in cost estimate calculations for this facility type include preliminary engineering costs, lighting, traffic and pedestrian signal modification, retaining wall construction, grading, stormwater management, ROW and utility work, and/or landscaping.

Table 14: Bike Lane Project Cost Development Details

Bike Lane Project	Available Data
	• **22** projects evaluated • **9** projects used in cost estimate calculations **Sources** • 4 jurisdictions (Arlington County, Fairfax County, City of Fairfax, VDOT) • 1 additional source (VDOT Cost Estimate Tab) **Specifics** • 5 of the 9 projects accounted for two-way, separated on-street bike lanes • Additional factors used in cost estimate calculations for this facility type include preliminary engineering, stormwater management, bulb-outs, ROW, and utility work. • Separated bike lanes/cycle tracks and bike lanes serve similar needs, hence their categorization together in the previous chapters. Their respective costs vary greatly; thus, they are separated for the purpose of developing project cost estimates.

Table 15: Sidewalk Project Cost Development Details

Sidewalk Project	Available Data
	• **27** projects evaluated • **19** projects used in cost estimate calculations **Sources** • 4 jurisdictions (Arlington County, Fairfax County, City of Fairfax, City of Alexandria) **Specifics** • Additional factors used in cost estimate calculations for this facility type include preliminary engineering costs, ROW and utility work, and pedestrian signal work.

Table 16: Natural Surface Trail Project Cost Development Details

Natural Surface Trail Project	Available Data
	• **13** projects evaluated • **5** projects used in cost estimate calculations **Sources** • 2 jurisdictions (Arlington County and Town of Purcellville) • 1 additional source (Virginia DCR) **Specifics** • One of the five projects used in the cost estimate calculations employed an average of a range of estimated costs per linear foot that factored in terrain, soil type, trail width, and number of bridge and boardwalk sections needed. • Three of the five projects used in the cost estimate calculations included various additional factors in the costs, such as: trail and parking area construction cost, and National Environmental Policy Act (NEPA) review. • One of the five projects used in the cost estimate calculations for the trail construction cost was a bid cost estimate and included a 5% contingency.

Table 17: Shared Lanes Project Cost Development Details

Shared Lanes Project	Available Data
	• **8** projects evaluated • **2** projects used in cost estimate calculations **Sources** • 3 jurisdictions (City of Alexandria, Arlington County, Fairfax County) • 3 additional sources (City of Richmond, MDOT, and Montgomery County Department of Transportation [MCDOT]) **Specifics** • One of the two projects did not include mobilization, maintenance of traffic, or contingency (City of Richmond). • One of the projects included in the cost estimate calculation accounted for in-house estimates from Arlington County and the cost does not include road repaving.

Table 18: Separated Bike Lane/Cycle Track Project Cost Development Details

Separated Bike Lane/ Cycle Track Project	Available Data
	• **5** projects evaluated • **4** projects used in cost estimate calculations **Sources** • 2 jurisdictions (Arlington County, VDOT) • 1 additional source (Montgomery County) **Specifics** • Additional cost information was not provided for three of the five projects used in calculating the estimates. • One of the five projects used in the cost estimate calculations was a quick-build cycle track. • Separated bike lanes/cycle tracks and bike lanes serve similar needs, hence their categorization together in the previous chapters. Their respective costs vary greatly; thus, they are separated for the purpose of developing project cost estimates.

Analysis and Verification

Both the evaluation of the selected projects and development of the project cost estimates involved direct coordination with VDOT L&D Cost Estimating staff. Upon compiling the project cost data, median project cost ranges per mile per facility type were calculated. Coordination with VDOT L&D Cost Estimating staff was leveraged to obtain insights used to typically refine cost projections, specifically with reference to the procedures outlined in the ***VDOT Cost Estimating Manual*** (published 2021). The ***VDOT Cost Estimating Manual*** provided essential guidelines and benchmarks for the refinement cost assessment phase of this Study.

To develop uniform project cost estimate ranges and understanding that many of the planned bicycle and pedestrian segments would not be constructed for years into the future, factors were applied to develop 2022 present value base year costs for project examples. The use of 2022 as a base year is consistent with the latest federal guidelines as described in the ***US Department of Transportation (USDOT) Benefit-Cost Analysis Guidance for Discretionary Grant Programs***. For projects that were constructed prior to and including 2022, the present value cost was calculated by applying an inflation adjustment multiplier value, also identified in ***the USDOT Benefit-Cost Analysis Guidance for Discretionary Grant Programs***. For projects that had a construction year of 2023 or beyond, a 3.1% discount rate was applied to the total cost per mile, per USDOT guidance, to obtain a 2022 present-year value. Low and high median project cost estimates were then calculated based on Association for the Advancement of Cost Engineering (AACE) guidance.

Per VDOT guidance, future value 2034 costs accounted for 12 years of inflation beyond the base year. In alignment with VDOT's July 2023 memorandum on ***Addressing Inflation/Escalation on Projects to be Advertised for Construction in FY2024 and Future Year Assumptions***, a 5% annual inflation rate was applied for the first 6 years and a 3% annual inflation rate was applied for the next 6 years. These assumptions were instrumental in establishing baseline estimations for the different planned facility types.

Results by Facility Type

As previously mentioned, the selected project examples in the NOVA region for each facility type were used to derive the estimated planning-level construction cost ranges per mile by planned facility types, as shown in **Table 19**.

Project costs include the facility itself along with other elements that are typical of projects in the NOVA District, including some projects which contained: ROW, safety improvements, retaining walls, and intersection upgrades. These costs reflect land value and other factors specific to the NOVA District and may not be accurate for the other geographies within the Commonwealth.

Table 19: Median Project Cost Estimate Values per Facility Type per Mile[12]

Facility Type	Estimated Cost per Mile ($2022)	2022 Cost Estimate (Low)	2022 Cost Estimate (High)	2034 Cost Estimate (Low)	2034 Cost Estimate (High)
Shared Use Path Project	$6,745,000	$4,385,000	$9,110,000	$7,020,000	$14,580,000
Separated Bike Lane/ Cycle Track Project	$2,825,000	$1,840,000	$3,815,000	$2,945,000	$6,105,000
Sidewalk Project	$3,600,000	$2,340,000	$4,860,000	$3,745,000	$7,780,000
Bike Lane Project	$ 475,000	$310,000	$645,000	$500,000	$1,035,000
Shared Lane Project	$40,000	$30,000	$55,000	$50,000	$90,000
Natural Surface Trail Project	$310,000	$205,000	$420,000	$330,000	$675,000

Funding Opportunities

To support the development and implementation of the planned bicycle and pedestrian facilities, it is imperative to explore various grant and funding opportunities. Potential funding sources and relative timelines for pedestrian and bicycle projects are included in **Table 20**. The funding sources and timeframes are intended only to serve as a guide or resource for further reference by localities. Timeframes are subject to change per local, state, and federal funding schedules. Additional funding resources for bicycle and pedestrian opportunities as developed by USDOT Highway, Transit, and Safety Funds can be found in **Appendix H**.

[12] The costs include sidewalk, bike lane, separated bike lane/cycle track, natural surface trail, shared use path, and shared lanes. Segments with undetermined facility types are not included in the cost estimates.

Table 20: Funding Opportunities

Funding Opportunity	Department	Funding Type (Planning, Capital, Maintenance)	Funding range	Funding Obligations (% match of County to federal)	Timeline
Safe Streets and Roads for All (SS4A)	USDOT	• Planning and Demonstration • Implementation	Planning: $100,000 to $10 million Implementation: $2.5 to $25 million	Minimum 20% local match	Typically opens in spring
Active Transportation Infrastructure Investment Program (ATIIP)	Federal Highway Administration (FHWA)	• Planning and Design • Construction	Planning: $100,000 (minimum) Construction: $15 million (minimum)	Federal cost share: 80% maximum *For eligible projects serving communities with a poverty rate of more than 40% based on most census tracts served by eligible project, the federal share may increase up to 100%	Typically opens in spring and closes in early summer
Rebuilding American Infrastructure with Sustainability and Equity (RAISE)	USDOT	• Planning • Capital	Planning Maximum: $25 million Capital $5 to $25 million	Federal cost share: 80% maximum for urban projects that are not located in an area of persistent poverty (APP) or historically disadvantaged community (HDC) *The federal share may be up to 100% of the costs of a project located in a rural area, historically disadvantaged community, or area of persistent poverty	Typically opens late fall and closes in late winter/early spring
Recreational Trails Program (Virginia)	FHWA/ Virginia DCR	• Planning and Construction	No published funding range	Up to 80% federal match Local: Minimum 20% match	Spring

Funding Opportunity	Department	Funding Type (Planning, Capital, Maintenance)	Funding range	Funding Obligations (% match of County to federal)	Timeline
Transportation Alternatives Program (TA) **This program is administered by VDOT and supplements the guidance provided by FHWA*	FHWA	• Design • Construction	$2.5 million (maximum)	• Federal funds reimbursed by VDOT: up to 80% match • TA project sponsor: Minimum 20% cash match	Typically opens in spring, pre-applications due in summer, and final applications due in fall in odd numbered years. Final decisions regarding funding are made in the spring of even numbered years.
Community Development Block Grant (CDBG) Program	Virginia Department of Housing and Community Development (DHCD)	Minimum: N/A Maximum: N/A	No published funding range	N/A	N/A
SMART SCALE	VDOT	• Federal/state funds for design and construction	No published funding range	N/A (varying requirements depending on funding request)	Pre-application: spring Final application: early summer Full Applications (including supporting documents for all applications): late summer

Funding Opportunity	Department	Funding Type (Planning, Capital, Maintenance)	Funding range	Funding Obligations (% match of County to federal)	Timeline
Reconnecting Communities and Neighborhoods **(RCN)** Grant Program	USDOT	• Reconnecting Communities Pilot (RCP): Capital Construction and Community Planning • Neighborhood Access and Equity (NAE) Program: Capital Construction, Community Planning, and Regional Partnerships Challenge	RCP: Planning $2 million (minimum) Capital $5 million (minimum) NAE: No published funding range	• RCP: *Capital Construction*: 50% Federal match, 50% local match *Community Planning*: 80% federal match, 20% local match • NAE: *Capital Construction, Community Planning, and Regional Partnerships Challenge*: 80% federal match, 20% local match	Typically opens in late summer, closes early fall
Congestion Mitigation and Air Quality Improvement Program (CMAQ)	Northern Virginia Transportation Authority (NVTA)	• Funds projects directly related to project development of project types such as non-recreational bike and pedestrian facilities and intersection improvements	No published funding range.	N/A	Distributed annually following CTB approval
Regional Surface Transportation (RSTP) Program	NVTA	• Funds phases that are not general planning or studies. • Applicable to projects that improve and preserve conditions and performance on bicycle and pedestrian infrastructure	No published funding range.	N/A	Distributed annually following NVTA/CTB approval
Six Year Program	NVTA	• Applicable to multimodal transportation infrastructure projects that will have a significant regional impact	The last SYP cycle (FY2022- 2027) approved projects worth $625 million	N/A	Application for funding every 2 years

Maintenance

Identifying and planning for maintenance of bicycle and pedestrian facilities are essential for ensuring the long-term sustainability and functionality of the infrastructure. While the engineering and construction phases garner significant investment, the need for investment in ongoing maintenance should be considered. Maintenance not only preserves the integrity and usability of the facilities but also enhances safety and likelihood of use.

In addition to the construction cost requests, data requests were made to stakeholders and Study working group members to collect information on maintenance costs and management strategies for the different bicycle and pedestrian facility types. Maintenance information was provided by Virginia DCR, Henrico County, Arlington County, and industry professionals. Further peer research was conducted to assess typical maintenance cost examples in NOVA and neighboring regions.

These maintenance costs are not generalized maintenance costs, but examples that stakeholders and agency partners provided as part of this effort, and further investigation would be necessary to develop more accurate maintenance costs. **Appendix I** includes maintenance case studies on bicycle and pedestrian maintenance costs and successful management strategies.

Chapter 5: Study Summary Results

The Northern Virginia Bicycle and Pedestrian Network Study assessed and identified planned pedestrian and bicycle infrastructure accommodations from long-term locality plans which are updated typically every 5 to 10 years. In total, approximately 5,000 miles of bicycle and pedestrian facilities are planned in the NOVA District. The planned facilities expand the existing networks and provide users with connections to a variety of destinations.

To construct all of the planned segments would require a significant capital investment, as shown in **Table 21** and **Appendix J**. In addition to infrastructure costs, those entities involved in planning for bicycle and pedestrian facilities also should consider ongoing maintenance costs. With limited resources, **implementation will be phased and led by jurisdictions** in accordance with their planning, prioritization, and project delivery processes. The resources, including the elements analysis, in this Study can help jurisdictions to identify the segments that may be key to providing access and network improvements.

Table 21: Total Cost to Construct the Planned Facilities

	Total Lane Mileage	2022 Low Estimate Total	2022 High Estimate Total	2034 Low Estimate Total	2034 High Estimate Total
Shared Use Path	**1863.098**	$8,169,684,730	$16,972,822,780	$13,078,947,960	$27,163,968,840
Sidewalk	**330.107**	$772,450,380	$1,604,320,020	$1,239,386,732	$2,568,232,460
Bike Lane	**834.172**	$258,593,320	$538,040,940	$417,086,000	$863,368,020
Natural Surface Trail	**235.619**	$48,301,895	$98,959,980	$77,754,270	$159,042,825
Shared Lanes	**876.984**	$26,309,520	$48,234,120	$43,849,200	$78,928,560
Total	**4139.98**	**$9,275,339,845**	**$19,262,377,840**	**$14,857,024,162**	**$30,833,540,705**

*Please note, these cost estimates do not include paved shoulders and undetermined facility types.

It is important to note that bike lanes, shared lanes, and natural surface trails contribute to achieving access to many important elements throughout the region and their construction costs may render them more feasible for near-term implementation. Shared use paths, sidewalks, and separated bike lane/cycle tracks may require more planning, design, and infrastructure needs that may require more time and resources to implement. The full build out of the planned segments would provide improved access to capital bikeshare stations, park and ride lots, bus stops, K-12 schools, colleges and universities, regional parks, and local parks. Segments also can provide enhanced or new infrastructure along the VDOT Bicycle and Pedestrian Safety Action Plan identified corridors, thereby improving safety for vulnerable roadway users.

The estimated costs to construct the planned segments that have been identified by jurisdictions and provide direct or connected access to the four focus elements are shown in **Table 22**. Project cost ranges assume standalone bicycle/pedestrian facility projects, which typically include other related elements, such as crosswalks and pedestrian signals or utilities. Planned segments may be implemented through various means, to be determined in the future, including through roadway or development projects, which may result in lower facility costs. These costs estimates show the level of investment needed to construct facilities that have been identified by jurisdictions to **fill gaps, create new opportunities, provide benefits to overall network connectivity,** and/or **provide enhanced access** through the elements analysis included in this Study.

Table 22: Estimated Costs by Focus Element[13]

Elements	Planned Access Miles	2022 Cost Estimate (Low)	2022 Cost Estimate (High)	2034[14] Cost Estimate (Low)	2034 Cost Estimate (High)
Activity Centers	1,598	$3.1 billion	$6.5 billion	$5.0 billion	$10.4 billion
High-Capacity Transit Stops/Stations	600	$1.1 billion	$2.3 billion	$1.8 billion	$3.7 billion
Higher Need Populations	1,114	$2.1 billion	$4.5 billion	$3.5 billion	$7.2 billion
Regional Trails	1,923	$4.1 billion	$8.5 billion	$6.6 billion	$13.6 billion

Note: Based on long-term locality plans; mileage above may overlap between multiple focus areas and is not cumulative.

This Study summarizes the bicycle and pedestrian planning that has been completed by jurisdictions in NOVA. Implementation of these planned bicycle and pedestrian facilities will take strategic planning and allocation of funds from many sources. The results of this Study may be used to support and better understand regional interconnected planned investments. The results may also be used as a tool for decision-makers on resource allocation and financial decisions regarding bicycle and pedestrian infrastructure in NOVA.

[13] The costs include sidewalk, bike lane, separated bike lane/cycle track, natural surface trail, shared use path, and shared lanes. Segments with undetermined facility types are not included in the cost estimates.
[14] 2034 cost estimates were inflated using VDOT Cost Estimating Manual guidance.

Appendices

Appendix A: Working Group Meeting Notes

Appendix B: Data Gathering Attribute Data Dictionary

Appendix C: Data Gathering Facility Type Translation

Appendix D: Analysis Assumptions

Appendix E: Data Gathering Maps by Jurisdiction

Appendix F: Total Segment Lane Mileage by Town

Appendix G: Cost Estimating Project List and Calculations

Appendix H: Funding Resources

Appendix I: Maintenance Case Studies

Appendix J: Total Cost to Construct the Planned Facilities

Appendix A: Working Group Meeting Notes

NoVA Bicycle/Pedestrian Network Study

Working Group Meeting #1 Summary

(May 11, 2023)

Attendees:

Name	Agency
Amir Shahpar	VDOT
Bill Cuttler	VDOT
Fatemeh Allahdoust	VDOT
Heidi Mitter	VDOT
Larry Camp	VDOT
Maria Sinner	VDOT
Ryan Bannon	VDOT
Elwyn Gonzalez	Arlington County
Leah Gerber	Arlington County
Nicole Wynands	Fairfax County
Randall Farren	Fairfax County Park Authority
Laura Ghosh	Loudoun County
Lou Mosurak	Loudoun County
Bryce Barrett	Prince William County
Bryan Hayes	City of Alexandria
Chloe Ritter	City of Fairfax
Kerri Oddenino	City of Falls Church
Brian Leckie	City of Manassas
Steve Hall	City of Manassas Park
Bryce Perry	Town of Herndon
David Mekarski	Town of Hillsboro
Niraja Chandrapu	Town of Leesburg
Richard Klusek	Town of Leesburg
Adam Linn	Town of Occoquan
Jessica Keller	Town of Purcellville
Michael Farrell	Metropolitan Washington Council of Governments - Transportation Planning Board
Mike DePue	NOVA Parks / Prince William County Blueways and Trails
Laurel Hammig	National Park Service
Jill Kaneff	Northern Virginia Regional Commission
Griffin Frank	Northern Virginia Transportation Authority
Joy Faunce	Fairfax Alliance for Better Bicycling
Lisa Campbell	Bike Loudoun
Chris Slatt	Sustainable Mobility for Arlington County
David Samba	Kimley-Horn
Geoff Giffin	Kimley-Horn
Becca Sulla	Kimley-Horn
Hector Chang	Toole Design Group

Discussion Items:

- **Opening Remarks & Introductions**
  - Heidi Mitter and Bill Cutler provided opening remarks and context for VDOT's support, collaboration, and participation in bicycle and pedestrian projects across the region.
  - Heidi introduced herself as the VDOT Project Manager for this effort and introduced the consultant team (Kimley-Horn as lead consultant with Toole Design Group supporting)
  - Working Group Participants introduced themselves, their role in their agency and whether their agency had an active bicycle or pedestrian plan:
    - Arlington County – Bike plan is outdated and may be refreshed as part of master transportation plan update.
    - Fairfax County – County has a trails plan (1970s) and bike master plan (2014) and is working to merge both as part of the current active transportation plan
    - Fairfax County Parks – Parks has their own master planning process separate from DOT.
    - Loudoun County – County has bicycle and pedestrian plans (2019), missing link plan, and the linear parks and trails master plan - as well as a comprehensive transportation plan
    - Prince William County – County recently adopted the Mobility Chapter (December) of their comprehensive plan and has a countywide trails plan and is looking for implementation opportunities
    - City of Alexandria – City recently completed a mobility plan with a bicycle and pedestrian chapter
    - City of Fairfax – City updated comprehensive plan in 2017, adopted new bike plan in 2021, and is working on a pedestrian plan next year
    - City of Falls Church – City has a transportation chapter in the comprehensive plan and adopted their bicycle master plan in 2015. They are updating the bicycle master plan this year and are looking at broader studies (vision zero, complete streets, etc.)
    - City of Manassas – City developed their comprehensive plan in 2020 and has a bicycle and pedestrian network plan. Twenty percent of the bike network has been implemented and the transportation plan will be updated next year
    - City of Manassas Park – City is working to complete its active transportation plan, and working on shared mobility ordinance
    - Town of Herndon – Town ahs a 2019 bike plan and a separate pedestrian plan – both of which are currently being updated. Town is working on a complete streets policy and getting ready to initiate their comprehensive plan update
    - Town of Hillsboro – Town has ongoing pedestrian projects and a small trails plan
    - Town of Leesburg – Town recently update town plan. The Town's bike/trail network is implemented in coordination with Loudoun County
    - Town of Occoquan – Town is working on their first bicycle and pedestrian master plan, expanding on east coast greenway
    - Town of Purcellville – Town has a transportation plan (2008), recently completed a pedestrian prioritization study

  - MWCOG – COG is working on updates to the Nation Capital Trail Network and pursuing an update to the regional bike and pedestrian plan in future years
  - NPS – completed a paved trails study in 2016 and beginning an update process soon
  - NVTA – Responsible for the Virginia Long Range Transportation Plan, TransAction, last updated in 2022 and is continuously updated every 5 years to inform projects eligible for NVTA Six Year Program Funding.

- **Project Overview**
  - David Samba, Kimley-Horn deputy project manager, provided a high-level project overview: to leverage regional data and information to compile a comprehensive map and database of planned bicycle and pedestrian network elements.
  - Planned network elements will be assessed using a project filtering framework – those elements that pass the filtering will be entered into the maps and databased a network/infrastructure need. The timeframe for needs is 5 to 10+ years.
  - The team will also develop planning level cost estimates and information on funding strategies to address the needs.
  - The project team also clarified that this project will not be developing or laying any new networks, nor is it focused other active modes beyond walking and bicycling.
  - ***Project deliverables will be sent to the Secretary and VA Senators***
- **Project Schedule**
  - A high-level project schedule was shared with the following key milestones:

- **Project Expectations / Outcomes**
  - The key deliverables for this effort consist of the following:
    - Working Group Meetings (1 in person, 2 virtual)
    - Needs Assessment Report
    - ArcGIS Online Map of Needs
    - Planning Level Cost Estimate Development
    - Funding Report
- **Working Group Member Responsibilities**
  - Working Group responsibilities were identified as the following:
    - Attending working group meetings
    - Serving as the primary liaison between your jurisdiction/agency and VDOT
    - **KEY Responsibility**: Assisting VDOT in acquiring information related to planned networks (spatial data, plans/studies/reports, and financial data)
    - Providing comments on the draft project deliverables

- **Discussion**
  - *General*
    - Question: Fairfax County does not specifically differentiate between what is existing and what is planned... how will study team account for this?
      - Study team will leverage VDOT data as an overlay for what is existing. VDOT's statewide bicycle inventory is currently being updated.

    - *Question: Are e-bikes and scooter included in this plan?*
      - Answer: While the study is not an active transportation study, e-bike and similar modes will not be specifically excludes in so far as they use the same facilities as manual bicycles and pedestrians.

    - *Question: What will the plan do besides "stitch" together local plans?*
      - A comprehensive strategy will allow the region to explain the needs (network and funding requirements)
      - Allows the region to pursue funding form a top-down approach
      - Provides data to understand what it will take to complete the network.

    - *Question: What types of facilities are being considered in this project?*
      - To be determined as part of the filtering framework.

    - *Question: Is the project team looking at centerline or curb mapping*
      - To be determined, but for ease study team will allow working group members to submit their data in whatever format they are already using

    - *Question – Can you provide more information on how maintenance will be considered?*
      - All costs will be planning level and provided as ranges based on locally source actual cost data.
      - Cost will only be for PE and Construction – Utility/ROW cost will not be estimated.
      -

    - *Question – How will this effort inform the work of the new State trails office*
      - There will be synergy but the work program for the new office is still being developed

  - *Data Request*
    - *Question: To the extent that something is a known gap but isn't in an existing study, what opportunity exists for jurisdictions to provide this information*
      - To be determined, but the study team is generally open to discussing more. We do not want to pass over the local engagement process by highlighting a network that has not been vetted. There is the potential to put these types of example in an appendix

- It is anticipated that jurisdictions will have an opportunity to provide updates to their networks during or following this effort (given that many jurisdictions are in the process of updating their plans)

- *Project Filtering Framework*
  - Question: Can you add a filter for towns or regional boundaries
    - To be determined
  - Comment: Incorporate small area plans
    - To be determined
  - Question: Is there a way to account for connecting the gravel road network?
  - *Question: How will the project team identify which network becomes part of the map if the jurisdiction has multiple options?*
    - The study team will collaborate with the jurisdiction to better understand the status of the network, but ultimately this will be a decision for the jurisdiction to make
  - *Question: What is the timeline cut off for determining the needs?*
    - We are looking at 5 year and 10 year projects

- *Funding Opportunities*
  - This effort will not create a new funding plan - we are collectively pulling together the information and providing a tool for decision=makers to base future decisions off of
  - *Question: Is this an opportunity for VDOT to apply for bipartisan funding?*
    - To be determined, but we are taking a top-down approach and this tool could be used to help Commonwealth Transportation Board members understand how to improve county to county and jurisdiction to jurisdiction connectivity in NoVa and what it will take to fund that improvement
  - *Question: For agencies that don't have dedicated bike/ped planner – can this study include a "how to" on the implementation*

Action Items and Next Steps:

- Study Team to share Working Group Roster and Contact List
- Study Team to share Working Group Presentation Slides
- Study Team to send our data request
- Working Group members to respond to initial data request by June 2, 2023
- Study Team coordination, draft map development, draft needs report – Summer 2023
- Working Group Meeting #2 (virtual) – September/October 2023

Other Questions to be considered:

- Will there be looking at areas or intersections for prioritization of crash/safety areas?
- How available is count data and can it be used for this study?
- What are the facility types to be considered?

- How might stream crossings be considered?
- What happens if a plan is updated mid-way, can new items be added?
- What about existing facilities that are not up to approved plan (example SUP that is narrower than recommended)
- Will crashes be used to prioritize network?

NoVA Bicycle/Pedestrian Network Study

Working Group Meeting #2 Summary

October 2, 2023 | 11:00 -12:30 PM | VDOT NOVA District Office

Attendees:

Name	Agency/Group
Fatemeh Allahdoust	VDOT
David Cook	VDOT
Larry Camp	VDOT
Maria Sinner	VDOT
Ryan Bannon	VDOT
Heidi Mitter	VDOT
Amy Wright	VDOT
Elwyn Gonzalez	Arlington County
Nicole Wynands	Fairfax County
Randall Farren	Fairfax County
Laura Ghosh	Loudoun County
George Phillips	Prince William County
Bryan Hayes	City of Alexandria
Chloe Ritter	City of Fairfax
Brian Leckie	City of Manassas
Fadrique Iglesias	Town of Herndon
Richard Klusek	Town of Leesburg
Jessica Keller	Town of Purcellville
Michael Farrell	Metropolitan Washington Council of Governments - Transportation Planning Board
Jill Kaneff	Northern Virginia Regional Commission
Griffin Frank	Northern Virginia Transportation Authority
Bobby Lohr	Round Hill
Joy Faunce	Fairfax Alliance for Better Bicycling
Lisa Campbell	Bike Loudoun
Chris Slatt	Sustainable Mobility for Arlington County
Kate Widness	Kimley-Horn
David Samba	Kimley-Horn
Geoff Giffin	Kimley-Horn
Becca Sulla	Kimley-Horn
Grace Daigle	Kimley-Horn
Kyla D'Sa	Kimley-Horn
Hector Chang	Toole Design Group
Ayden Cohen	Toole Design Group

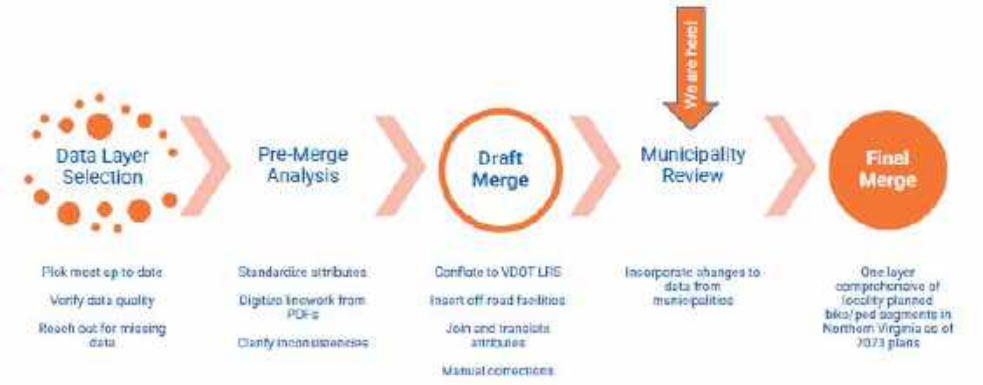
Presentation:

Slides are provided at the end of the notes.

Discussion Items:

- **Opening Remarks & Introductions**
  - Heidi Mitter provided opening remarks and context for VDOT's support, collaboration, and participation in bicycle and pedestrian projects across the region.
  - Heidi introduced herself as the VDOT Project Manager for this effort and introduced the consultant team (Kimley-Horn as lead consultant with Toole Design Group supporting)
- **Project Overview**
  - Goal: Identify, assess, and develop planning level costs for projected pedestrian and bicycle infrastructure needs in VDOT's Northern Virginia localities over the next 5 to 10+ years
  - Collaborative effort to develop a database, a map, and planning level cost estimates of planned bicycle and pedestrian infrastructure.
- **Project Schedule**
  - A high-level project schedule was shared with the following key milestones:

- **Needs Network Methodology and Approach**
  - Hector Chang walked attendees through the Data Merging Methodology and process



  - Shared initial statistics by jurisdiction and facility type
- **Network Review**
  - For jurisdictions;
    - Is your network complete and correct based on what you have provided?
    - Does this network represent your planned needs, especially in the next 5 – 10 years?
    - General comments on the network

        - Any expected updates to planned networks in the next 6 months and/or updates to planned segments?
    - Internally continuing to review
        - Natural surface trails
        - Segment lengths
        - Sidewalks
        - Bike routes vs facilities
- **Cost Estimates Survey**
    - Request for jurisdictions to fill out cost estimates survey sent out on September 19th/20th by Monday, October 16th, 2023
- **Project Elements**
    - Overview of project elements analysis to frame the functionality of the network, significance of segments, and potential to provide support for funding

Element	Lens*
Equity Emphasis Areas	Equity
Activity Centers	Accessibility
Bus Stops	Multimodal
Capital Bikeshare Stations	Multimodal
Park and Ride Lots	Multimodal
Rail Stations	Multimodal
Regional Trails	Multimodal
Colleges & Universities	Accessibility
Regional Parks	Accessibility
Local Parks	Accessibility
K-12 Schools	Accessibility
Bike/Ped Crash	Safety
Pedestrian Safety Action Plan Identified Corridor	Safety

- **Next Steps**
    - Revision to Needs Network Map
    - GIS approach/methodology for elements analysis
    - VDOT Leadership Briefing
    - Needs Report Development
    - Follow-up on Cost Estimate information
- **Discussion**
    - *General*
        - Comment: Active Fairfax will be adopted in late 2024 or early 2023, and will result in a good amount of changes to the network.
        - *Question: Representing BikeLoudoun, there are concerns with the quality of shared use path pavement (esp. when utility trucks are driving along the paths). Can a better base be incorporated into the cost estimates?*
            - There are standards that shared use paths are built using. There are different depths available, but often jurisdictions won't build deeper unless there is a particular need. The study team can mention to agencies, if there is a path with utility traffic, to please consider an enhanced depth. The cost estimates won't include a thicker asphalt. Potentially there is a factor or addition information if localities use a thicker pavement.
    - *Needs Network Methodology and Approach*

- *Question: Is the existing network, that was provided by VDOT and accessible on the Online GIS map, conflated to the centerline?*
    - The existing bicycle inventory is mapped in place (side paths and trails are in place)
- *Question: Request for the 4 asks of the network review to be shared with the Prince William County bike/ped team*
    - The study team will share the slides and suggest the team look at the specific instructions (provided unique to each jurisdiction) sent on September 19th/20th
- *Question/Comment: Laura notes that the Loudoun County network looks incomplete and incorrect. The centerline analysis doesn't capture if there is an existing facility on one side but missing on the other side of the road. Planned sidewalks and regional trails are also not included. And the sharrow and shared use path colors are too similar.*
    - The study team will send out the ArcGIS Online map to better filter but ask that comments go in the Public Coordinate map. For overall process comments, those can occur in a one-on-one but do not need to mark each individually in Public Coordinate.
    - Attendee response (via chat): Seconded and third challenges with the color scheme.
- *Question/Comment: Nicole notes that there are lots (hundreds) of gaps in the Fairfax County network ranging from small to large gaps. Facilities seems to change from off street to on street along the same corridor. Requesting a follow-up one-on-one meeting. There is better data available through Active Fairfax.*
    - The analysis aimed to minimize duplication which may have led to some of the inconsistencies. Will continue discussion in one-on-one.
- *Question: Are substandard (existing) facilities included?*
    - We do want facility upgrades to be cataloged but often there is difficulty to determine which segments this applies to from the attributes. Potential to classify the upgrade sections differently.
- *Question: Can the list of data provided to each jurisdiction (specifically requested by Laura Ghosh and Nicole Wynands) be provided?*
    - The study team can share.

o *Internal Review Discussion*

- *Comment: Sidewalks are handled via policy in Fairfax County: sidewalks are recommended on both sides of every road, unless a trail is recommended.*
- *Question: Will cross-jurisdictional facilities be a focus (for example, the boundary between Loudon and Fairfax counties)*
    - The team has an interest in high level regional connectivity and identify where facilities are aligned (or are misaligned). Facilities will not be added if one is not planned by the locality.
- *Question: If sidewalks are included in one jurisdiction will they be included in another?*

- Yes, sidewalks will not be excluded by jurisdiction. The sidewalks and pedestrians planning process is different than regional trails. Sidewalks create connectivity in a community, whereas the purpose of this study is to create a regional 'spine', so sidewalks will be evaluated against the study goals. Discussion to be continued.

- *Cost Estimates Survey*
  - *Question: Land acquisition costs aren't included? They account for half of our project budgets – so the projected budget won't be accurate. And VDOT's requirement for buffer for shared use paths typically require additional ROW acquisition.*
    - Cost estimates will have a big asterisk that it only includes PE and construction and doesn't include proposed ROW acquisition or utility costs.
  - *Question: Would the study team like some of Loudoun's projected costs? Loudoun's PMO prepared generic cost estimates for SP and sidewalks in Loudoun.*
    - The study team welcomes this, but please choose the most confident estimates.
  - *Question: For the cost estimates survey, are you seeking information for only one recently completed project? We have several to choose from in Manassas.*
    - The study team welcomes sharing without creating undue burden.
- *Project Elements*
  - *Question: How are 'activity centers' being defined? MWCOG's definition pertains to development areas but those don't focus on high bike/pedestrian activity areas. This means that the rural areas could have high bike/ped but not classified as a part of MWCOG's 'activity centers'.*
    - The study team is using the MWCOG activity centers. The study team welcomes other regional data sets to better capture the rural activity.
    - Attendee response (via chat): True, the TPB's activity centers are areas that already have or will have a lot of development, but depending on the character of the activity center not necessarily a lot of bike and ped activity. We do want to enhance bike/ped access to and within our activity centers.
  - *Question: Will the network be overlayed with VTrans and PSAP safety needs and eligibility for SMART SCALE? The updated PBSAP (bicycles include din the next update!) and vulnerable roadway user assessment should be available at the end of the year.*
    - The study team is starting the elements analysis and the PSAP is included. We can also have layers on hand to be displayed on the online map.
    - Attendee response (via chat): Sounds good. For pedestrian safety VTrans pulls from PSAP so that will already be covered/overlapped there. Yes it is large! I will get with Stephen Read to see when the PBSAP is anticipated to be released so we have the most recent data for you to use

        - *Comment: Fairfax County has a Demand and Need Analysis for Active Transportation that may be interesting to consider for this effort.*
            - The study team will follow-up in the one-on-one meeting.

Action Items and Next Steps:

- Jurisdictions to provide comments via Public Coordinate and/or with the Study team by Monday, October 16th, 2023
- Study Team to share Working Group Presentation Slides and link to ArcGIS Online map https://tooledesign.maps.arcgis.com/apps/mapviewer/index.html?webmap=b2c384a0a3fe43109993f6b8c6b4c111
- Study Team to send out list of documents uploaded to Fairfax and Loudoun County
- Study Team to schedule one-on-one with Loudoun County and Fairfax County
- Fairfax County to share updated Active Fairfax data when available
- David Cook to reach out to see when updated PBSAP is anticipated to be released so the study team can utilize the most recent data

NoVA Bicycle/Pedestrian Network Study

Working Group Meeting #3 Summary

(March 18, 2024)

Attendees:

Name	Agency
Amir Shahpar	VDOT
Amy Wight	VDOT
Heidi Mitter	VDOT
David Cook	VDOT
Maria Sinner	VDOT
Shane Sawyer	VDOT
Heidi Mitter	VDOT
Bryan Leckie	VDOT
Elwyn Gonzalez	Arlington County
Nicole Wynands	Fairfax County
Laura Ghosh	Loudoun County
Bryan Hayes	City of Alexandria
Chloe Ritter	City of Fairfax
Steve Hall	City of Manassas Park
Bryce Barrett	Prince William County
Chloe Delhomme	City of Manassas
Fadrique Iglesias	Town of Herndon
Richard Klusek	Town of Leesburg
Jessica Keller	Town of Purcellville
Michael Farrell	Metropolitan Washington Council of Governments - Transportation Planning Board
Mike DePue	NOVA Parks / Prince William County Blueways and Trails
Jim Corcoran	Fairfax County Parks Authority
Hannah Pajewski	Northern Virginia Regional Commission
Joy Faunce	Fairfax Alliance for Better Bicycling
John Bell	NOVA Park Authority
Chris Slatt	Sustainable Mobility for Arlington County
Abdulelah Altherwi	City of Manassas Park
David Samba	Kimley-Horn
Kate Widness	Kimley-Horn
Kyla D'Sa	Kimley-Horn
Hector Chang	Toole Design Group

Discussion Items:

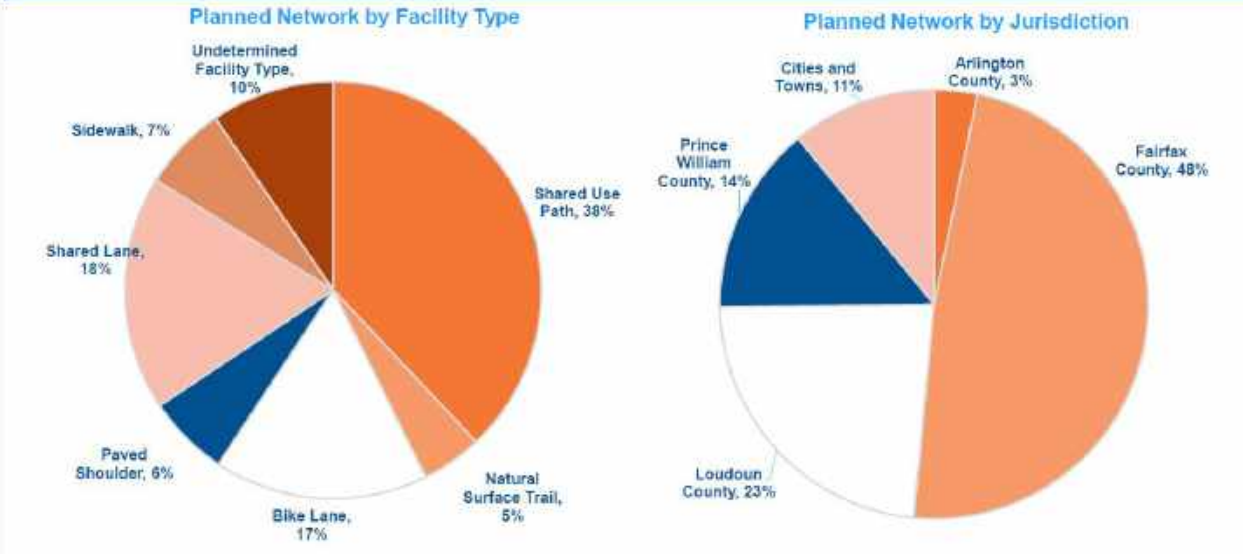
- **Opening Remarks & Introductions**
  - Heidi Mitter and Kate Widness provided opening remarks and gave a brief description on project background and schedule.
- **Final Planned Network**

- The results of the final planned network was provided to the working group, along with thanks to those who worked closely with the project team to ensure their network was most accurately reflected

Planned Network Map Statistics

Jurisdiction	Shared Use Path	Natural Surface Trail	Bike Lane	Paved Shoulder	Shared Lane	Sidewalk	Undetermined Facility Type	Total Mileage
Arlington County	23	0	95	0	47	0	0	164
Fairfax County	1,065	168	491	55	333	25	281	2,419
Loudoun County	365	60	110	0	335	208	90	1,168
Prince William County	348	1	76	263	26	0	0	714
Cities and Towns	103	7	60	1	170	97	110	548
Total Mileage	1,903	236	833	320	911	330	481	5,013

Network Statistic



- **Elements Analysis Results**
  - Analysis process and results of the spatial analysis for direct and connected zones were shared with the group, with a focus on the four priority elements: High-capacity transit, equity emphasis areas, regional trails, and activity centers.

Project Elements Results

Element	Percentage of Total Planned Mileage
Equity Emphasis Areas	22%
Activity Centers	32%
High-Capacity Transit	12%
Regional Trails	39%
Capital Bikeshare Stations	6%
Park and Ride Lots	6%
Bus Stops	33%
Colleges & Universities	10%
Regional Parks	6%
Local Parks	34%
K-12 Schools	53%
Pedestrian Safety Action Plan Identified Corridor	29%

- **Cost Estimating Methodology**
  - The methodology for how the cost estimate ranges were developed was shared along with the results of the cost estimate ranges for current 2022 year dollars, 2022 dollars with low and high contingency, and 2034 ranges that included inflation.

Cost Estimating Methodology

Estimated Cost Ranges

Facility Type	2022 Estimated Cost per mile	2022 Low Range per mile*	2022 High Range per mile*	2034 Low Range per mile**	2034 High Range per mile**
Shared Use Path	$6,745,000	$4,385,000	$9,110,000	$7,020,000	$14,580,000
Sidewalk	$3,600,000	$2,340,000	$4,860,000	$3,745,000	$7,780,000
Bike Lane	$475,000	$310,000	$645,000	500,000	$1,035,000
Natural Surface Trail	$310,000	$205,000	$420,000	$330,000	$675,000
Cycle Track	$4,695,000	$3,055,000	$6,340,000	$4,890,000	$10,145,000
Shared Lane	$50,000	$35,000	$70,000	$60,000	$115,000

*+/- 35% contingency applied to 2022 dollars

**+/- 35% contingency to 2022 dollars + 5% inflation for the first 6 years, and 3% inflation for the next 6 years

  - The results of the elements analysis were then summarized by estimated cost ranges based on the mileage of each facility type that provided direct or connected access to the top four elements. Timeframes for completion was discussed which focused on facility types that have lower cost estimate construction ranges may be completed in shorter term years as compared to those which are most costly.

- **Next Steps:**
  - Finalize report
  - Launch online map

- **Discussion:**
  - *Question: Laura G. asked did you gather insights regarding how the PROWAG requirements might affect cost per mile (due to need for upgrading additional ramps, providing median cut-thru, etc.)?*
    - No, not specifically. Due to planning level estimate the estimates were not changed based on policies or laws. But these estimates are based on actual, recent, projects that may include updating curb ramps or intersection improvements.
  - *Comment: Nicole W. mentioned that Fairfax County is already at the 2034 high range in 2024.*
  - *Question: John B. asked What was the assumed width of the shared use path and r.o.w.?*
    - Not specific to width, and gathered shared use paths costs typical of VDOT ROW, so most examples were 10f wide shared use path.
  - *Question: David C. asked Can you clarify that the cycle track facility you are looking are fully separated raised facilities with concrete barriers? There are also cycle tracks that just use striping/lane markings and flex posts which aren't this high.*
    - Cycle track examples included different variations of facility types, more quick build and more permanent.

- *Comment: Nicole W. mentioned you may want to differentiate between one way and two way cycletracks, as one affects just one side of the road, the other both sides (much more expensive).*
- *Question: Laura G. asked if activity Centers - are they consistent with the MWCOG definition?*
    - We used the MWCOG geodatabase of regional activity centers
- *Comment: Nicole Wynands noted to clarify, the MWCOG activity centers do not align with local definitions of activity centers. Definitely caveat that in your report. Same for equity areas.*
- *Comment: Laura G. noted that MWCOG activity centers reflect areas where there is a lot of development activity (not necessarily pedestrian/bicycle activity)*
    - Yes, thank you Nicole - we used MWCOG regional datasets for equity and activity centers
- *Comment: Maria Sinner noted this is an exercise based on what we've been asked to do. But open to discussion, but we are not prioritizing for any one locality. The logic behind it right now is how long for implementation, but we could entertain another logic for the report. Another component could be funding that is available right now versus future.*
- *Comment: Laura G. noted it's not that they are going to schedule the projects accordingly, it's moreso that the shorter term projects can be accommodated in a shorter term.*
- *Comment: Laura G. noted she was concerned that this will state VDOT is going to prioritize these segments. Would like assurance that it isn't the case*
    - The purpose is to paint a picture of the needs. There will be lots of caveats for the process, how the data is on the map, cost estimates, timeframes for completion. If someone thinks of a better way to bucket projects 0-5yr versus 5-10yr please let us know. We are not planning to create a timeline for the projects.
- *Question: Laura G. asked if we will you have recommendations on how to use the data that has been compiled? How do you anticipate it being used moving forward?*
    - At the staff level it will be used to see what the regional interconnected needs are and see the bigger picture beyond counties, if the public want to look at it and see what is planned for the future, could be a tool for decision-makers/Senator's for financial decisions.
    - The most important slide will be the estimated cost ranges, those numbers are based on what has been constructed. There was a sample size used to try to get at the variation in cost, but it should not be used as the exact estimate but could be a range in costs. Could be segregated by locality in the report.
- *Question: Elwyn G. asked I understand some costs vary place to place, will cost of pre-cast concrete or curb and gutter?*
    - We don't plan to drill down into sub costs of facilities, we were hoping to get cost expenditures by phase or type, but that's not the type of information we collected. We can share the spreadsheet of examples with you if you wanted to see the referenced project examples.

- *Comment: Laura G. asked if in the report are you going to be providing definitions for the different elements. When talking about bike/ped facilities, they assume they correspond to high bike/ped activity but it is about develop activity. Towns in Loudoun don't have much growth, so they often aren't included.*
    - We will add clarifying statements on the elements, and we will have jurisdictional boundaries so folks can zoom into towns or other areas that are not captured through the other elements.
- *Question: Laura Ghosh asked if they can we see planned segments by jurisdiction?*
    - We have it loosely, and we have towns and cities looped in together

Appendix B: Data Gathering Attribute Data Dictionary

Attribute Name	Attribute Description	Possible Values	Notes/Comments
(preceding fields from LRS)	*(see LRS Master documentation)*		
project_name	Project or Facility Name	*varies or null*	Facility / project name from source, if available.
planned_fac	True/False flag for whether the feature is part of the planned facility network	*TRUE/FALSE*	Leftover from pre-merge data processing.
vdot_planned_fac_type	VDOT Planned Facility Type	Bike Lane Shared Use Path Paved Shoulder Shared Lane Sidewalk Natural Surface Trail **Further Study**	Based on VDOT Bicycle Inventory format, addition in bold.
detailed_planned_fac_type	Detailed Facility Type	Bike Lane **Separated Bike Lane** **SUP and Sidewalk** Shared Use Path Paved Shoulder Shared Lane Sidewalk Natural Surface Trail **Further Study**	Based on VDOT Bicycle Inventory format, additions in bold. Allows for municipalities to suggest a facility type for "Further Study" lines for cost estimate purposes.
funded_fac	Funded Facility	1 or null	Marked true when data provided by municipality for specific facilities.
source_planned_type	Locality Facility Type	*varies or null*	Copied from locality-provided GIS info, or interpreted when digitizing PDF map. Null if provided during municipality review (see notes).
notes	Notes	*varies or null*	Comment from jurisdictional partner during municipality review.
source_ids	Array of source data ID	*integer*	Copied from original source.
unique_ids	Array of IDs from disaggreagated network	*array of integers or null*	Aggregated IDs from the disaggregated version of the network. Attribute only visible in aggregated version of network.
locality	Locality/Municipality Name	{name} {locality type}	Autogenerated using standard VDOT format (e.g., Fairfax County, Manassas City, Herndon Town)
divided_hwy	Divided Highway Marker	1 or null	Marker if on-road facility is on a divided highway. Data derived from LRS. Used for lane_miles_factor determination.
lane_mi_factor	Mileage Factor	1 or 2	Factor used to multiply miles to compute lane_miles. Computed based on facility type and divided_hwy.
source_plan	Locality Document Source	*varies*	Common name of approved plan where linework was double-checked against.
source_data_layer	Locality Data Source	*{filename}_{TDGEdits}*	Name of file uploaded to ShareFile where linework is derived. "TDGEdits" appended to end of filename if edits were made to the data.
id	Internal ID	*integer*	Autogenerated unique ID.
miles	Length (in miles)	*float*	Length of line (centerline).
lane_miles	Length in lane miles	*float*	miles*lane_mi_factor = total facility length.
network_tier	Network Tier	Major or Minor	Network tier as determined by vdot_planned_fac_type.

Appendix C: Data Gathering Facility Type Translation

Arlington County

Arlington County provided one data layer that was simple to merge into the network.

Data Layer Selection

- 'Bike_Routes_MTP_arc was provided by the County and used as-is.
- No sidewalk data was provided.

Pre-Merge Analysis

- Facility status is in the same attribute as facility type. Facilities were filtered to just include planned facilities.
- Facility types were standardized as follows:

Source Planned Facility Type	Detailed Planned Facility Type	VDOT Planned Facility Type
Planned Off Street Route	Shared Use Path	Shared Use Path
Planned Bike Lane	Bike Lane	Bike Lane
Planned On Street Route	Shared Lane	Shared Lane

Draft Merge

- No issues encountered with conflation of bicycle facilities. Shared use paths inserted in place.

Municipality Review Summary

- Arlington County staff provided feedback primarily via the PublicCoordinate platform.
- Feedback primarily composed of updates to planned bike routes based on additional feasibility studies and neighborhood area plans conducted since the County's bike plan was completed.
- Changes integrated into final network.

Loudoun County

Loudoun County provided three data layers that were complicated to merge into the network because of a lack of facility status and differences in data structure and composition between the three layers.

Data Layer Selection

Three data layers were used to generate the county's planned network:

1. Countywide Missing Segments: from version provided by Kimley-Horn dated 07/25/2022 which matches the layer provided by the County but includes information on facility type (i.e., shared use path or sidewalk) for 34 percent of all missing segments.
2. Countywide Sidewalks and Trails: from Loudoun County's Open Data portal (**link here**).
3. Countywide Transportation Plan (CTP) Planned Facilities: uploaded to ShareFile by the county.

Pre-Merge Analysis

- Due to the different data layers, three separate processes were conducted to generate different parts of the final network:
    - Generating missing off-road facilities (i.e., Shared Use Paths and Sidewalks)
    - Generating upgrades to off-road facilities
    - Generating missing on-road facilities (i.e., Bike Lanes, Shared Lanes, and Not Assigned)
- Throughout the three separate processes, recommendations made by towns in Loudoun County remain intact as the County devolves aspects of transportation planning to towns.

Generating Missing Off-Road Facilities

- All Regional Trails from the CTP was brought in as-is with Shared Use Path facility type
    - Some trails will be manually switched to Natural Surface Trail based on county feedback
- The Countywide Missing Segments layer was used as the main source of missing facilities
    - Where facility type was indicated in the layer (i.e., Shared Use Path or Sidewalk), the source facility type was used for detailed and VDOT facility types
    - For Missing Segments with no facility type, the facility type was inferred from the parallel CTP Planned Facilities line using a scripted process
        - *If CTP line is SUP one side or SUP both sides, the missing segment has the facility type of Shared Use Path*
        - *If CTP line is SUP + Sidewalk, the missing segment's facility type was determined as follows:*
            - *VDOT facility type is "Undetermined Facility Type," as it is not known yet which side of the street gets which facility*
            - *Detailed facility type is "SUP and Sidewalk," a facility type that will be unique to Loudoun County*

- *For the purposes of summary statistics on mileage and cost, the sum of the total distance for "SUP and Sidewalk" lines will be divided in half to attribute distance and cost to each facility type. This will be done separately from the map, which will show the lines as " Undetermined Facility Type."*

- *If CTP line is Bike Lane, Not Assigned, or Shared Lane, the missing segment has the facility type of Sidewalk.*

- *Some facilities will be filtered out from this sidewalk "conversion" based on their location inside a Rural Policy Area.*

- Missing Sidewalks and Shared Use Paths were inserted in place into the final network.

Generating Upgrades to Off-Road Facilities

- The Countywide Sidewalks and Trails layer was filtered to only consider facilities parallel to CTP lines, buffered to 100 feet around the centerline.
  - Confirmation of drastically realigned roads was made when the County provided a list of realigned roads via email. In those cases, sidewalks and trails of these realigned roads were manually brought into the analysis even if they were outside the 100-foot buffer.

- The sidewalks and trails located within the buffer were analyzed as follows:
  - Sidewalks under 6 feet in width were be labeled as planned "Sidewalk" upgrades
  - Trails under 10 feet in width were labeled as planned "Shared Use Path" upgrades
    - *Trails within Transition Policy Areas with a width of 6-8 and 8-10 feet were be removed from analysis altogether as they already meet the county's requirements*
  - Caveat to this method is that there are no facility type conversions
    - *This method does not distinguish if an inadequate sidewalk should be upgraded to a shared use path, or if an inadequate shared use path should be downgraded to a sidewalk.*
  - Sidewalks and Shared Use Paths identified for upgrades were inserted in place into the final network.

Generating Missing On-Road Facilities

- CTP Planned Facilities layer was filtered for Bike Lanes, Not Assigned, and Shared Lanes, and these segments were then matched to the LRS

- Facility type for these segments was translated as "Bike Lane," "Undetermined Facility Type," and "Shared Lane" respectively

- Where VDOT's Bicycle Facility Inventory says that a facility currently exists, the corresponding planned bike facility was clipped out using a scripted process to remove existing facilities

- Additional existing facilities were manually removed based on a list of existing facilities provided by County staff.

Draft Merge

- Minor issues were encountered during conflation; however, results from draft merge were not satisfactory for the County (see below) and a new methodology was devised for the final merge.

Municipality Review Summary

- Loudoun County staff reviewed the draft map and suggested several revisions to improve accuracy and bring in additional facilities not reflected in the layers originally provided.

- New data merge method was workshopped with County staff to make final network comprehensive of County's bicycle and pedestrian needs. The following methodology was used for the existing sidewalk and trails layer:

Generating Upgrades to Off-Road Facilities (SUP and Sidewalks)

1. The County-provided existing Sidewalks and Trails layer will be filtered to only consider facilities parallel to CTP centerlines with a 100 ft buffer around the lines.
2. From the filtered sidewalks and trails, we will label the facilities that need upgrades as follows:
   2.1. Sidewalks under 6 feet in width will be labeled as planned "Sidewalk," and
   2.2. Trails under 10 feet in width will be labeled as planned "Shared Use Path."

> **Note:** No facility type conversions. This method will not distinguish if an inadequate sidewalk should be upgraded to a shared use path, or if an inadequate shared use path should just become a sidewalk.

- Methodology documented above is the revised methodology.

Fairfax County

Fairfax County is currently amid an update to their bicycle/pedestrian plan, called the ActiveFairfax Transportation Plan. This plan seeks to harmonize the County's Bicycle Master Plan, Countywide Trails Plan, and bike/ped recommendations in their Comprehensive Plan by 2025. The inputs into the ActiveFairfax plan were provided to the consultant team, along with general guidance on how the County currently interprets the overlapping plan recommendations. Scripted processes were used to apply the general hierarchy amongst the plans across the whole county, resulting in a network with few overlapping segments.

Data Layer Selection

- The following layers were selected amongst those originally provided based on conversations with County staff:
    - FairfaxCompPlanAudit Recs
    - FCDOT TP 2018 Planned Trails
    - BMP2014 OnRoad Recommendations 020421
    - BMP2014 OffRoad Recommendations 020421
- County staff communicated that while "staff usually determines on a case-by-case basis which recommendation to go with," they "usually prioritize the Trails Plan recommendations over the Bike Plan recommendations, as the proposed trail facilities are more closely aligned with current best practices. However, in activity centers, the more recent [Comprehensive] Plan Audit recommendations will likely trump the Trails Plan."
- 2023 Capital Projects was included for its sidewalk project data.

Pre-Merge Analysis

Comprehensive Plan Recommendations (FairfaxCompPlanAudit Recs)

- Facility status was documented, so existing facilities were filtered out.
- Facility types were standardized as follows:

Source Planned Facility Type	Detailed Planned Facility Type	VDOT Planned Facility Type
Combined bicycle/pedestrian facility Multi-modal trail	Shared Use Path	Shared Use Path
Cycle Track	Separated Bike Lane	Bike Lane
Bicycle Lane Buffered Bicycle Lane	Bike Lane	Bike Lane
Combined bus/bicycle lane Shared outside lane	Shared Lane	Shared Lane

Countywide Trails Plan (FCDOT TP 2018 Planned Trails)

- Facility status was documented, so existing facilities (i.e., 'built' and 'built; BL') were filtered out.
    - Some facilities had "DELETE" in comment field, these were also filtered out.
- Facility types were unique in the Countywide Trails Plan and required some interpretation. Facilities were standardized as follows:

Source Planned Facility Type	Detailed Planned Facility Type	VDOT Planned Facility Type
Regional, *except:* *Interstate Route One Bikeway* *South County East-West Trail* *Cross County Trail* *Trails along Bull Run, Occoquan River, and Potomac River*	Shared Use Path	Shared Use Path
Major	Shared Use Path	Shared Use Path
Minor Minor Parallel Exceptions to Regional, *including:* *Interstate Route One Bikeway* *South County East-West Trail* *Cross County Trail* *Trails along Bull Run, Occoquan River, and Potomac River*	Narrow Shared Use Path	Shared Use Path
Stone Dust Trail Natural Surface Trail	Natural Surface Trail	Natural Surface Trail
Stream Valley Trail	Further Study	Undetermined Facility Type

Bicycle Master Plan (BMP2014 OnRoad/OffRoad Recommendations 020421)

- Facility status was not documented. Existing facilities addressed in a later step during the merge.
- Facility types were standardized as follows:

Source Planned Facility Type	Detailed Planned Facility Type	VDOT Planned Facility Type

Paved Trail Shared Use Path Sidepath	Shared Use Path	Shared Use Path
Cycletrack Cycletrack 2 Way	Separated Bike Lane	Bike Lane
Bike Lane Buffered Bike Lane Climbing Lane Colored Bike Lane	Bike Lane	Bike Lane
Paved Shoulder Striped Shoulder (3-4.5")	Paved Shoulder	Paved Shoulder
Shared Roadway Sharrow SR w/Safety Treatment	Shared Lane	Shared Lane

2023 Capital Projects

- Sidewalk project data from this layer was inserted in place into the network.

Draft Merge

- Given the prioritization amongst the three plans, Comprehensive Plan recommendations were conflated to the LRS network first and then Trails Plan and Bicycle Master Plan recommendations were conflated in sequence on roads where the Comp Plan did not propose a facility. Off-road facilities were then inserted to create the County's planned network.
    - There are some areas where the Comprehensive Plan recommendation ends at the activity area boundaries, but a different Trails Plan or BMP recommendation extends the whole length of a corridor. In these cases, both lines were preserved for further analysis by County staff.
    - Because this process was done automatically, there may be edge cases where the incorrect recommendation is highlighted (e.g., BMP over Trails Plan recommendation).
- Joining of features and translation of facility types proceeded with no major issues encountered, as detailed above.
- Because the BMP data layer did not include facility status, and the status of facilities in the other layers may not be up to date, the whole network was compared to the VDOT Statewide Bicycle Facility Inventory to identify existing facilities.
    - Existing facilities which matched the planned facility type were removed from the network.

- There are cases where planned facilities would be an upgrade to the existing network; these recommendations are preserved in these cases.
- There are cases where planned facilities would be a downgrade from the existing network (e.g., bike lane proposed along existing shared use path); these recommendations are preserved for further review by the municipality.

Municipality Review Summary

- Fairfax County staff reviewed the draft map and determined that the placement of facilities was not satisfactory for cartographic purposes due to certain inaccuracies caused by automatization of the facility selection process between overlapping plans.
- Attempts were made by the County to retrieve a version of their ActiveFairfax planned network where overlapping recommended facilities were manually changed to result in one facility type. A satisfactory version of this planned network could not be found. An update to the NOVA Bike/Ped Network Study should use the final approved version of the ActiveFairfax network.
- Given the scope of this project, the project team determined that Fairfax County's Countywide Trails Plan and Bicycle Master Plan will be shown as-is for cartographic purposes—with the Trails Plan overlapping the Bicycle Master Plan— as the most accurate depiction of currently-approved planned networks. Existing facilities were clipped out of both layers based on VDOT's Bicycle Facility Inventory.
- For cost estimate purposes, the draft network developed using the methodology described above will be used as it removes duplicate facilities and is likely to be a more accurate representation of the total mileage of the network at a macro level.

Prince William County

Prince William County provided one data layer that was simple to merge into the network, with few changes.

Data Layer Selection

- 'Mobility_Plan_Trails' was provided by the County and used with a minor update the facility status of the Occoquan Greenway, which is now built according to the Town of Occoquan.
- No sidewalk data was provided.

Pre-Merge Analysis

- Facility status was recorded in its own attribute. Facilities were filtered to just include planned facilities.
- Facility types were standardized as follows:

Source Facility Type	Detailed Planned Facility Type	VDOT Planned Facility Type
Shared Use Park	Shared Use Path	Shared Use Path
Bicycle Lanes	Bike Lane	Bike Lane
Paved Shoulder	Paved Shoulder	Paved Shoulder
Sharrows	Shared Lane	Shared Lane

- 'Greenway' facility type excluded as it seemed to be an overlay.
- 'Park' facility type in existing facilities were determined to be a mix of natural surface and paved trails based on aerial imagery. All planned 'Park' facilities were maintained through the merge, but none were designated as 'Natural Surface Trail' due to lack of available data.

Draft Merge

- No issues encountered with conflation of bicycle facilities. Shared use paths inserted in place.

Municipality Review Summary

- Prince William County staff confirmed that network was captured accurately.

City of Alexandria

The City provided a map package which included three relevant layers, one for the bike network and two for the pedestrian network. It was simple to merge them in.

Data Layer Selection

- '20210805_proposed_bike' comprised the City's planned bikeway network.
- '20210629_sidewalk_gaps' and 'Roadwalks' comprised the City's planned sidewalk network.

Pre-Merge Analysis

- Facility status was recorded in its own attribute. Facilities were filtered to just include planned facilities.
- Facility types were standardized as follows:

Source Facility Type	Detailed Planned Facility Type	VDOT Planned Facility Type
Trail	Shared Use Path	Shared Use Path
Shared Roadway	Shared Lane	Shared Lane
(All lines from sidewalk layers)	Sidewalk	Sidewalk
Enhanced Bicycle Corridor	Further Study	Undetermined Facility Type

Draft Merge

- No issues encountered with conflation of bicycle facilities. Shared use paths inserted in place.
- Sidewalks inserted in place.

Municipality Review Summary

- Alexandria City staff confirmed that network was captured accurately.

City of Fairfax

The City provided two relevant layers, one from the 2021 Bike Fairfax City plan and another related to 2023 funded projects. The data was simple to merge in.

Data Layer Selection

- 'BikePlan2021_NetworkRecommendations' comprised the City's eventual bikeway network.
    - A cancelled trail project to the city's southeast was restored for this study per city request.
- 'TranspProj_2023_lines_funded' included transportation projects funded recently.
    - Used to determine funding status for some projects in the bike plan.
    - Includes a shared use path project whose linework was not available in previous layer.
    - Includes a handful of sidewalk projects.

Pre-Merge Analysis

- Facility status was not recorded. Status was confirmed and added for existing facilities through aerial and street view imagery. Existing facilities were then filtered out.
- Facility types were standardized as follows:

Source Planned Facility Type	Detailed Planned Facility Type	VDOT Planned Facility Type
Connector Path	Shared Use Path	Shared Use Path
Two-way Cycle Track	Separated Bike Lane	Bike Lane
Bike Lanes	Bike Lane	Bike Lane
Neighborways **Super Sharrows**	Shared Lane	Shared Lane
Long-Term Improvement	Shared Use Path	Undetermined Facility Type
(Select projects in funded layer)	Sidewalk	Sidewalk

- Projects currently under Further Study/Long-Term Improvement status categorized as Shared Use Path under Detailed Planned Facility Type based on communication with City staff.

Draft Merge

- No issues encountered with conflation of bicycle facilities. Shared use paths inserted in place.
- Sidewalks inserted in place.
- Funded facilities flagged based on their presence in the funded projects layer.

Municipality Review Summary

- No comments received from the City of Fairfax.

City of Falls Church

The City provided a PDF map that needed to be digitized.

Data Layer Selection

- The 2015 Bicycle Master Plan was provided by the City of Falls Church.
    - Reference map located on page 11 of 35 of PDF document.

Pre-Merge Analysis

- Through manual digitization of the lines, facility status was recorded through aerial and street view imagery. Existing facilities were then filtered out.
- Facility types were standardized as follows:

Source Planned Facility Type	Detailed Planned Facility Type	VDOT Planned Facility Type
Off-Street Pedestrian/Bike Trail	Shared Use Path	Shared Use Path
On-Street Facility	Further Study	Undetermined Facility Type

- City staff confirmed that "on-street facility" is meant to be inclusive of various types of on-street bike facilities to be determined on a project-by-project basis.

Draft Merge

- Digitization was done directly on the LRS, no conflation needed. Shared use paths drawn manually in place.

Municipality Review Summary

- No comments received from the City of Falls Church.

City of Manassas

The City provided one geodatabase that was simple to merge into the network.

Data Layer Selection

- 'Manassas Bike Network' was provided by the City and used as-is.
- No sidewalk data was provided.

Pre-Merge Analysis

- Facility status was recorded in its own attribute. Facilities were filtered to just include planned facilities.
- Facility types were standardized as follows:

Source Planned Facility Type	Detailed Planned Facility Type	VDOT Planned Facility Type
Shared Use Path	Shared Use Path	Shared Use Path
Bike Lane	Bike Lane	Bike Lane
Shared Lane Markings Shared Street Shared Signed Road	Shared Lane	Shared Lane

- Funded status was also provided for eight projects.

Draft Merge

- No issues encountered with conflation of bicycle facilities. Shared use paths inserted in place.

Municipality Review Summary

- City of Manassas staff contacted consultant team about missing sidewalks and provided additional GIS data and maps.
- Additional sidewalks added to final network by consultant team.

City of Manassas Park

The City provided several layers that were made for their bicycle and pedestrian plan, which is currently being drafted. Layers were merged into a single, cleaned layer to be added to the network.

Data Layer Selection

- 18 data layers were provided by the City, 10 were determined to be useful
    - Layers used in this process: Additional Trails Naren, Bike Facilities Naren, Bike Facilities, Bikes Brian 02272023, Further Study Naren, Further Study, Further Study Brian 02272023, Pedestrian Rec Naren, Trails, Trails Brian 02272023, Trails Recs
- 'Combined recs list 230517' spreadsheet also provided by City upon request, which included narrative data that helped determine facility type.

Pre-Merge Analysis

- All layers were merged into a single layer and duplicate lines were removed.
    - Attributes were compared with the draft maps and data from the accompanying spreadsheet. Corrections were made where necessary
    - All layers were for planned facilities, so facility status was set as planned.
- Facility types were interpreted from an accompanying spreadsheet, which used a narrative format to describe the proposed facility (i.e., no standardized source planned type). The following facility type attributes were manually input by the consultant team.

Detailed Planned Facility Type	VDOT Planned Facility Type
Shared Use Path	Shared Use Path
Narrow Shared Use Path	Shared Use Path
Bike Lane	Bike Lane
Shared Lane	Shared Lane
Sidewalk	Sidewalk
Natural Surface Trail	Natural Surface Trail
Further Study	Undetermined Facility Type

Draft Merge

- No issues encountered with conflation of bicycle facilities. Shared use paths inserted in place.
- Sidewalks were inserted in place.

Municipality Review Summary

- City of Manassas Park confirmed that staff would review and provide comments if necessary.
- No further comments were received from City staff.

Town of Clifton

The Town did not provide data for this study. Attempts to reach staff at the Town were not successful. Planned facilities within town boundaries are from Fairfax County data.

Town of Dumfries

The Town has a publicly available Comprehensive Plan with proposed bike/ped facilities, which was digitized. Attempts to reach Town staff were not successful.

Data Layer Selection

- The 2014 Comprehensive Plan, amended in November 2020, was available on the Town of Dumfries' website.
    - Reference map located on page 90 of PDF document.
- Pre-Merge Analysis
    - Through manual digitization of the lines, facility status was recorded through aerial and street view imagery. No existing facilities were found.
    - Facility types were standardized as follows based on the narrative within the Plan:

Source Planned Facility Type	Detailed Planned Facility Type	VDOT Planned Facility Type
Walking and cycle paths	Shared Use Path	Shared Use Path
Main Street – multimodal Civic & cultural loops (multimodal)	Bike Lane	Bike Lane

Draft Merge

- Digitization was done directly on the LRS, no conflation needed. Shared use paths drawn manually in place.

Municipality Review Summary

- Town of Dumfries staff reviewed map and sent additional GIS files. Additional files were solely of existing facilities, so they were not incorporated into the final network.

Town of Hamilton

The Town is currently undergoing a Comprehensive Plan update, but the draft document does not mention proposed bike/ped facilities, except in one case which was digitized. Attempts to reach Town staff were not successful.

Data Layer Selection

- The July 2023 draft of the town's Comprehensive Plan was referenced.
    - Most bike/ped data in the plan referenced existing facilities.
    - Only one facility, a connector to the W&OD Trail, was mentioned as a proposed facility.

Pre-Merge Analysis

- One facility was digitized based on the narrative of the plan, with a facility type of Shared Use Path.

Draft Merge

- Shared use path drawn manually in place.

Municipality Review Summary

- Town of Hamilton staff reviewed map and provided feedback via PublicCoordinate.
- Sidewalk project incorporated into final network.

Town of Haymarket

The Town did not provide data for this study. Attempts to reach staff at the Town were not successful. Planned facilities within town boundaries are from Prince William County data.

Town of Herndon

The Town provided a data layer and two bike network maps. The data provided did not agree with each other. Upon clarification, Town staff indicated which map was the official one and a mix of conflation and digitization was used to include proposed projects into the network.

Data Layer Selection

- 'TOH Bicycle Network Plan' PNG file served as the reference bike map based on consultation with Town staff.
    - Map from previously approved 2019 Bicycle Network Master Plan and shapefile data used to help piece together the network and certain attributes.

Pre-Merge Analysis

- Non-existing segments were removed from shapefile and missing segments were digitized to create the Town of Herndon's network as specified in 'TOH Bicycle Network Plan'
- Facility status was recorded through aerial and street view imagery.
- No definite facility type is indicated for planned facilities in latest bike plan:

Source Planned Facility Type	Detailed Planned Facility Type	VDOT Planned Facility Type
To be Built Future Study	(varies by segment)	Undetermined Facility Type

- Previous plan and shapefile data contained information on facility type. This was kept under Detailed Planned Facility Type for cost estimating purposes.

Draft Merge

- No issues encountered with conflation of bicycle facilities to LRS. Digitization was done directly on the LRS. Shared use paths drawn manually in place.

Municipality Review Summary

- Town of Herndon staff provided feedback on accuracy of linework and facility types primarily via email.
- Changes made in final network based on feedback, including making VDOT planned facility type the same as detailed planned facility type even where the Town's most recent bike plan does not specify facility type.

Town of Hillsboro

The Town provided a PNG map of proposed sidewalk and trail projects in the town. Proposed projects were digitized.

Data Layer Selection

- 'TOHBIKEPEDNET@3x' was provided by the Town.

Pre-Merge Analysis

- Through manual digitization of the lines, facility status was recorded through aerial and street view imagery. No existing facilities were found.
- Facility types were standardized as follows based on the narrative within the Plan:

Source Planned Facility Type	Detailed Planned Facility Type	VDOT Planned Facility Type
Gaver Mill Trail Janney Mill Trail (& Bridge) Gapway Trail Catoctin Creek Trail	Shared Use Path	Shared Use Path

Draft Merge

- Shared use paths drawn manually in place.

Municipality Review Summary

- Town of Hillsboro staff provided comments solely in PublicCoordinate. Comment was about an existing facility.
- No changes made for Hillsboro in final network.

Town of Leesburg

The Town provided their latest Transportation Improvement Plan, which was used to digitize planned bike/ped facilities.

Data Layer Selection

- The Transportation Improvement Plan (TIP) dated 3/22/2022 was provided by the Town.

Pre-Merge Analysis

- Bicycle and Multimodal projects were parsed in the TIP for inclusion in the network.
- Facility types were interpreted from the narrative in each TIP project. The following facility type attributes were manually inputted by the consultant team.

Detailed Planned Facility Type	VDOT Planned Facility Type
Shared Use Path	Shared Use Path
Bike Lane	Bike Lane
Shared Lane	Shared Lane
Shared Use Path	Undetermined Facility Type

Draft Merge

- Digitization was done directly on the LRS, no conflation needed. Shared use paths drawn manually in place.

Municipality Review Summary

- Town of Leesburg staff provided comments in PublicCoordinate. Comments were a mix of non-actionable items and referrals to other plans.
- Consultant team reviewed plans and brought additional facilities into final map on a case-by-case basis.

Town of Lovettsville

The Town provided their latest Transportation Master Plan, which was used to digitize planned bike/ped facilities.

Data Layer Selection

- The Transportation Master Plan (TIP) adopted September 2021 was provided by the Town.

Pre-Merge Analysis

- Shared Use Path projects were parsed in the TIP for inclusion in the network.
- Facility types were interpreted from the narrative in each TIP project. The following facility type attributes were manually inputted by the consultant team.

Detailed Planned Facility Type	VDOT Planned Facility Type
Shared Use Path	Shared Use Path

Draft Merge

- Shared use paths drawn manually in place.

Municipality Review Summary

- No comments received from the Town of Lovettsville.

Town of Middleburg

The Town's latest Comprehensive Plan was found on the town website, which was used to digitize planned bike/ped facilities.

Data Layer Selection

- The 2019 Comprehensive Plan for the Town served as reference.
    - Referenced map on page 36 of the PDF file.

Pre-Merge Analysis

- Through manual digitization of the lines, facility status was recorded through aerial and street view imagery. No existing facilities were found.
- Shared Use Path projects were parsed in the Comp Plan for inclusion in the network, as follows:

Source Planned Facility Type	Detailed Planned Facility Type	VDOT Planned Facility Type
Potential Trails	Shared Use Path	Shared Use Path

Draft Merge

- Shared use paths drawn manually in place.

Municipality Review Guidance

- No comments received from the Town of Middleburg.

Town of Occoquan

Town staff are currently developing its first bike/ped plan but elected not provide data for this study because the plan is in its early phases. Staff referred to their existing Comprehensive Plan for inclusion in this study. The plan mentions shared lanes and the Occoquan Greenway, which have been completed, and the Riverwalk, a sidewalk project whose status is unknown. No linework was digitized based on the Comp Plan, but an edit was made on Prince William County's data to account for the Occoquan Greenway.

Municipality Review Summary

- Town of Occoquan staff provided feedback via PublicCoordinate and email for their missing facilities. Linework on PublicCoordinate matched planned facilities in documents attached in email.
- PublicCoordinate lines brought into the final network with attributes generated from interpretation of PublicCoordinate comments and plans provided.
- Additions comprised various sidewalk projects and a future trail to Tanyard Hill Park.

Town of Purcellville

The Town recently completed a Pedestrian Prioritization Project, whose data was inserted into the network as-is.

Data Layer Selection

- 'Purcellville Pedestrian Network' GIS data layer provided by the town by way of Kimley-Horn.

Pre-Merge Analysis

- Facility type was not included as part of the attribute table of the data layer, so all facilities are assumed to be sidewalk.
    - Plan narrative makes clear shared use paths are also part of the pedestrian network but does not say which planned facilities will be shared use paths.

Draft Merge

- Sidewalk layer inserted into network as-is.

Municipality Review Summary

- Town of Purcellville staff provided comments on PublicCoordinate which upgraded some of their proposed sidewalks to shared use paths.
- Comments incorporated into final network.

Town of Quantico

No contact information was provided for the town.

Town of Round Hill

The Town's latest Comprehensive Plan was found on the town website, which was used to digitize planned bike/ped facilities. After this study's completion, the town of Round Hill provided an updated existing and planned network, which should be used in future study updates.

Data Layer Selection

- Map accompanying 2017 Comprehensive Plan for the Town served as reference.

Pre-Merge Analysis

- Through manual digitization of the lines, facility status was recorded through aerial and street view imagery.
- Shared Use Path projects were parsed in the Comp Plan for inclusion in the network, as follows:

Source Planned Facility Type	Detailed Planned Facility Type	VDOT Planned Facility Type
Greenway Simpsons Creek Trail Franklin Park Trail Sleeter Lake Trail	Shared Use Path	Shared Use Path

Draft Merge

- Shared use paths drawn manually in place.

Municipality Review Summary

- Town of Round Hill staff provided a variety of comments on PublicCoordinate, including additions to the network, deletions, and changes to facility type.
- Changes incorporated into the final network based on comments.

Town of Vienna

While the Town of Vienna provided data layers, these referred to existing facilities with none that are proposed. A 'Town of Vienna Bike Map' in PDF format was also provided by the Town and it showed existing trails and "bikeable routes" primarily on existing local streets, so the map was assumed to be of the current bike network. With no data on planned facilities, no data from the town was conflated to the network and no lines were digitized. Planned facilities within the Town of Vienna's boundaries are provided by Fairfax County.

Municipality Review Summary

- No comments provided by Town of Vienna.

Appendix D: Analysis Assumptions

Data Gathering Notes/Assumptions

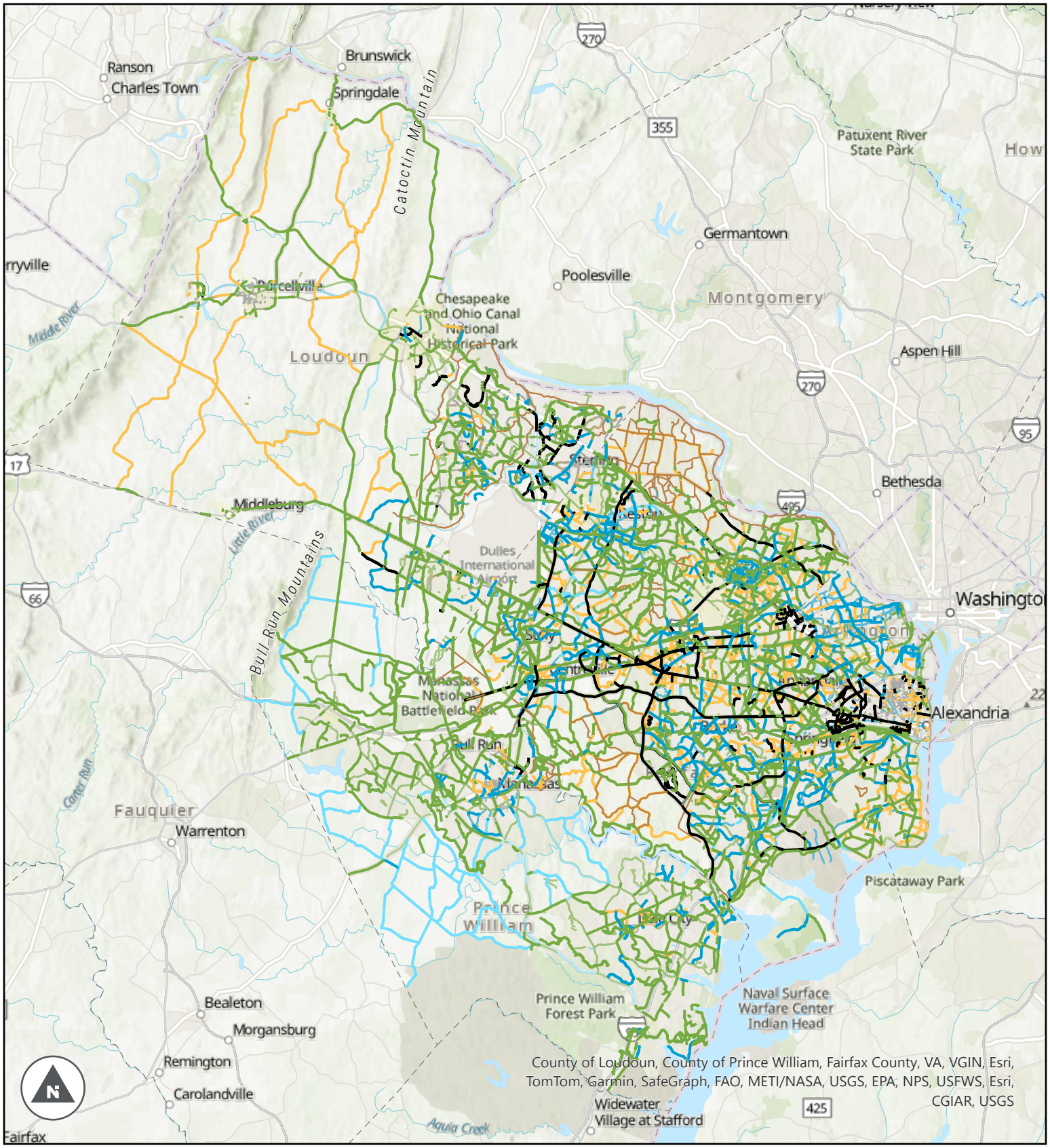
Local bicycle and pedestrian datasets are often developed to complement with other local datasets and fulfill the specific needs of the jurisdiction. Therefore, there are challenges when combining local datasets and standardizing all the data to the highest degree of accuracy possible. Due to the variations, nuance, and scope of the source data, the following section documents some of the analysis assumptions and notes.

- Through the data cleaning and merging process, the quality of the geospatial data was maintained as best possible by retaining as much of the original linework and attributes for off-road facilities and retaining as much of the attributes for on-road facilities as it was being conflated to the LRS.
- There were unique challenges during the merging process when the provided linework was very segmented and/or was of poor data quality. Examples include:
    - In Loudoun County's sidewalk and trail data, intersection approaches were drawn as separate segments from the main alignment, with no attributes to consistently merge these approaches with the main alignment. Additionally, the data had no street or project names. To generate street names, the LRS was conflated to the Loudoun County data, but this occasionally resulted in the intersection approach segments being assigned the name of the cross street rather than the name of the street the main alignment is paralleling.
    - In Fairfax County's data, linework was provided for three overlapping plans in five different GIS layers, each with unique data structures, resulting in mixed data quality and the need to remove duplicate planned projects. In some instances, this created odd segmentation at times. Specifically, this impacted the representation of planned bike lanes the greatest because they were present in two separate plans and were likely to be overridden in part or in full by shared use paths from the Trails Plan, where the linework provided was less precise.
    - On-road facilities in denser urban areas which used centerline data to represent their planned facilities, such as Arlington and Alexandria, may result in numerous very short (one-block-long) planned segments since centerline data is often split at intersections. In instances where a bike lane or shared lane takes a circuitous path using multiple streets (e.g., A to B to C Street) or where a facility is continuous but the street changes name (e.g., North Example St to South Example St), the facility is likely to be represented by separate segments corresponding to each street name/direction even though they were likely conceived as one corridor.

Elements Analysis Notes/Assumptions

- Segments were only counted if they provided continuous connected access for either bicycles or pedestrians (for example, a bike lane connection to sidewalk was not captured).
- To determine continuity, a 100-foot buffer was applied to existing and planned bicycle and pedestrian segments. Segment buffers were then dissolved based on overlaps to form continuous bicycle and pedestrian networks throughout the region. These continuous networks supported the calculations of connecting buffer access.
- The planned network strived to identify segments that would create connectivity to existing bicycle and pedestrian infrastructure to allow use by most ages and abilities. Due to the limited number of users who feel comfortable using a paved shoulder, segments identified as this facility type were removed from elements analysis.
- To calculate total mileage of provided connectivity by element, planned segments were clipped to the extents of the access zone buffers. Total mileage was represented in lane mileage, for example, bidirectional bike lanes were each counted for the same within the same segment.

Appendix E: Data Gathering Maps by Locality



VDOT NOVA Bike/Ped Network Study

Planned Network

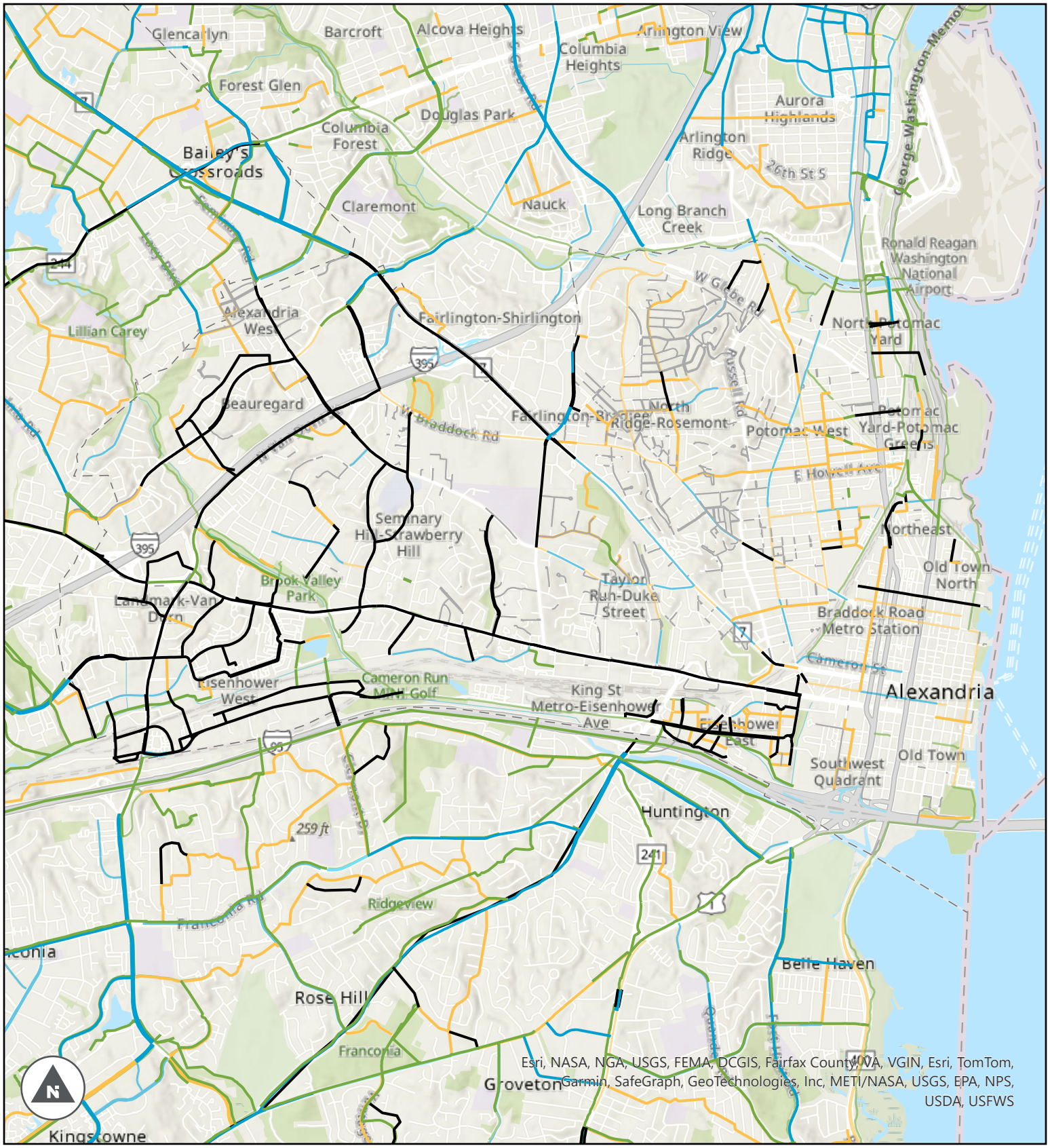
0 3.75 7.5 15 22.5 30 Miles

Major Planned Network
- Shared Use Path
- Bike Lane
- Further Study
- Natural Surface Trail

Minor Planned Network
- Shared Lane
- Paved Shoulder
- Sidewalk

VDOT Existing Network
- Shared Use Path
- Bike Lane
- Paved Shoulder
- Shared Lane

- Natural Surface Trail
- Sidewalk



VDOT NOVA Bike/Ped Network Study

Alexandria City

0 0.42 0.85 1.7 2.55 3.4 Miles

Major Planned Network

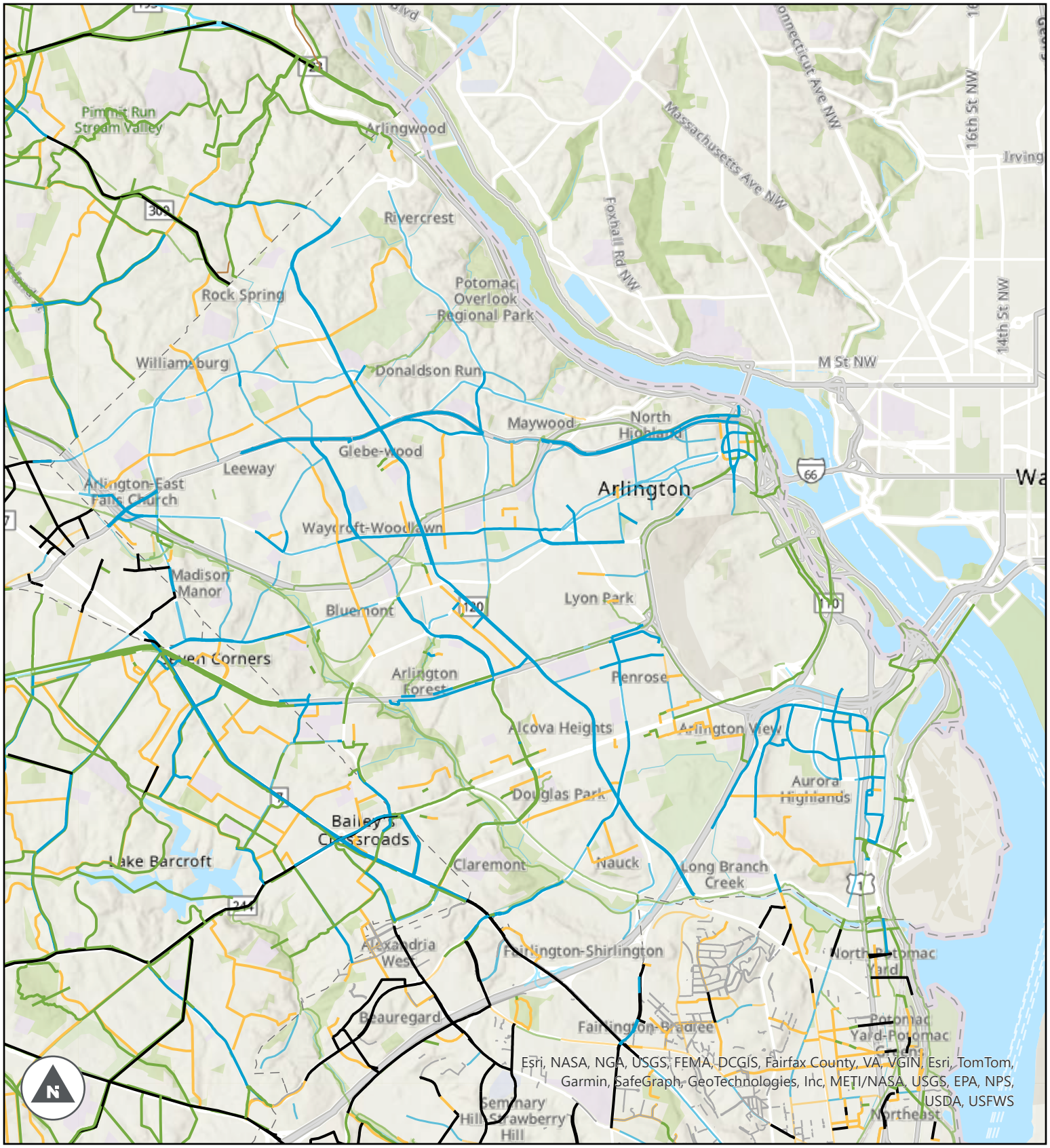
- Shared Use Path
- Bike Lane
- Further Study
  (Intended to be bike lanes, exact design may vary)

Minor Planned Network

- Shared Lane
- Sidewalk

VDOT Existing Network

- Shared Use Path
- Bike Lane
- Paved Shoulder
- Shared Lane



VDOT NOVA Bike/Ped Network Study

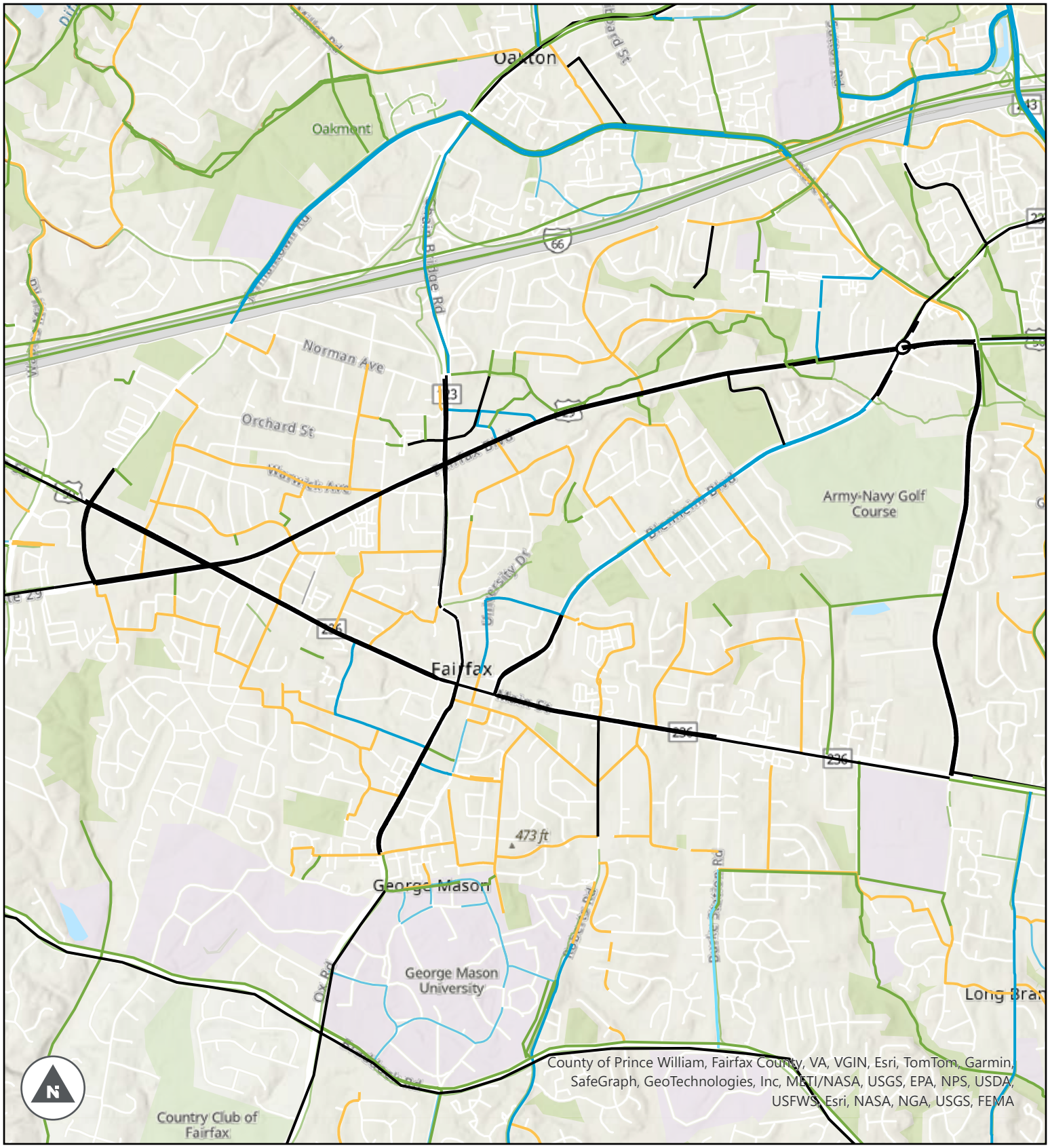
Arlington County

0 0.5 1 2 3 4 Miles

Major Planned Network
- Shared Use Path
- Bike Lane
- Further Study

Minor Planned Network
- Shared Lane
- Sidewalk

VDOT Existing Network
- Shared Use Path
- Bike Lane
- Paved Shoulder
- Shared Lane



VDOT NOVA Bike/Ped Network Study

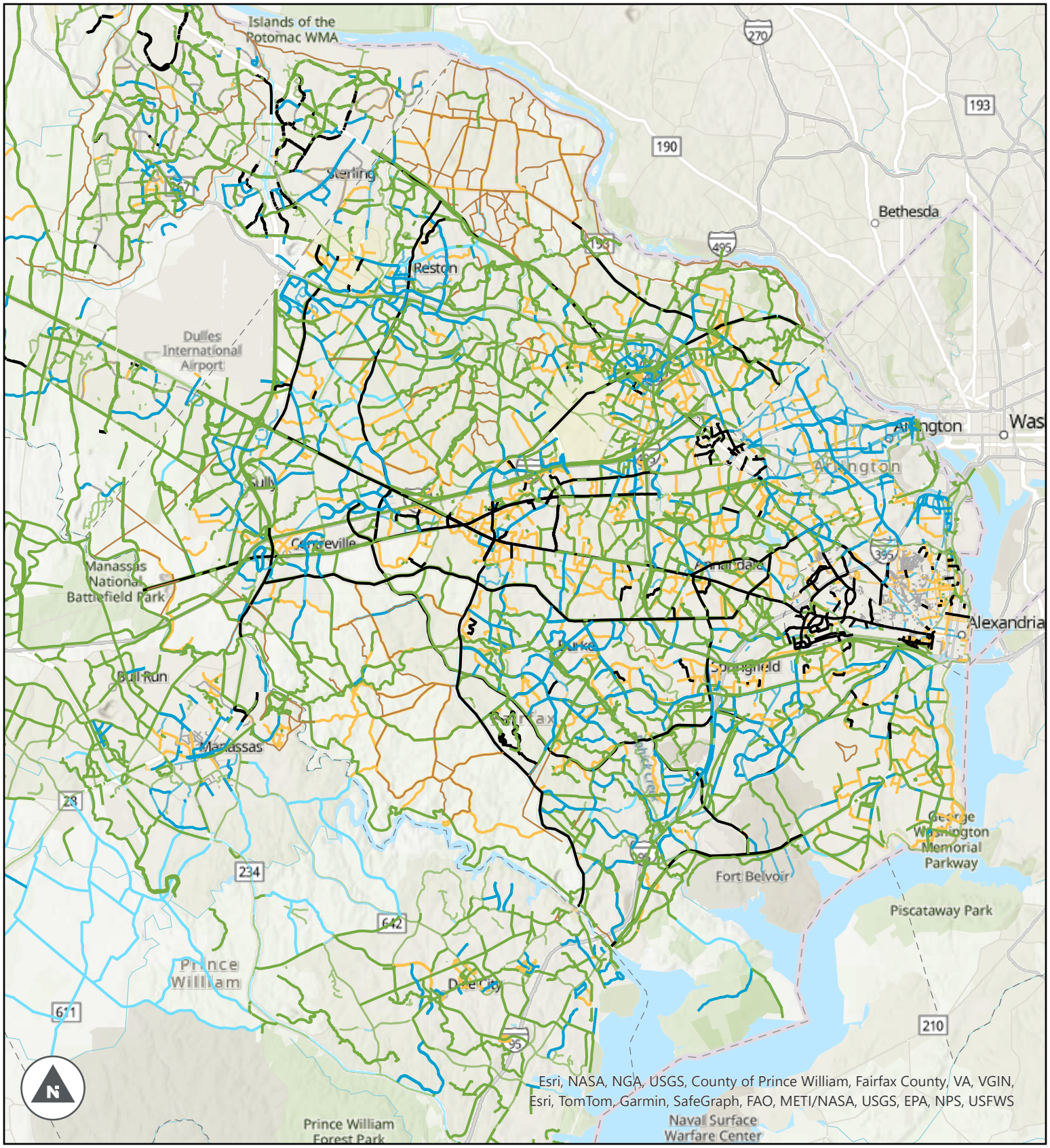
Fairfax City

0 0.28 0.55 1.1 1.65 2.2 Miles

Major Planned Network
- Shared Use Path
- Bike Lane
- Further Study

Minor Planned Network
- Shared Lane
- Sidewalk

VDOT Existing Network
- Shared Use Path
- Bike Lane
- Paved Shoulder
- Shared Lane
- Natural Surface Trail
- Sidewalk



VDOT NOVA Bike/Ped Network Study

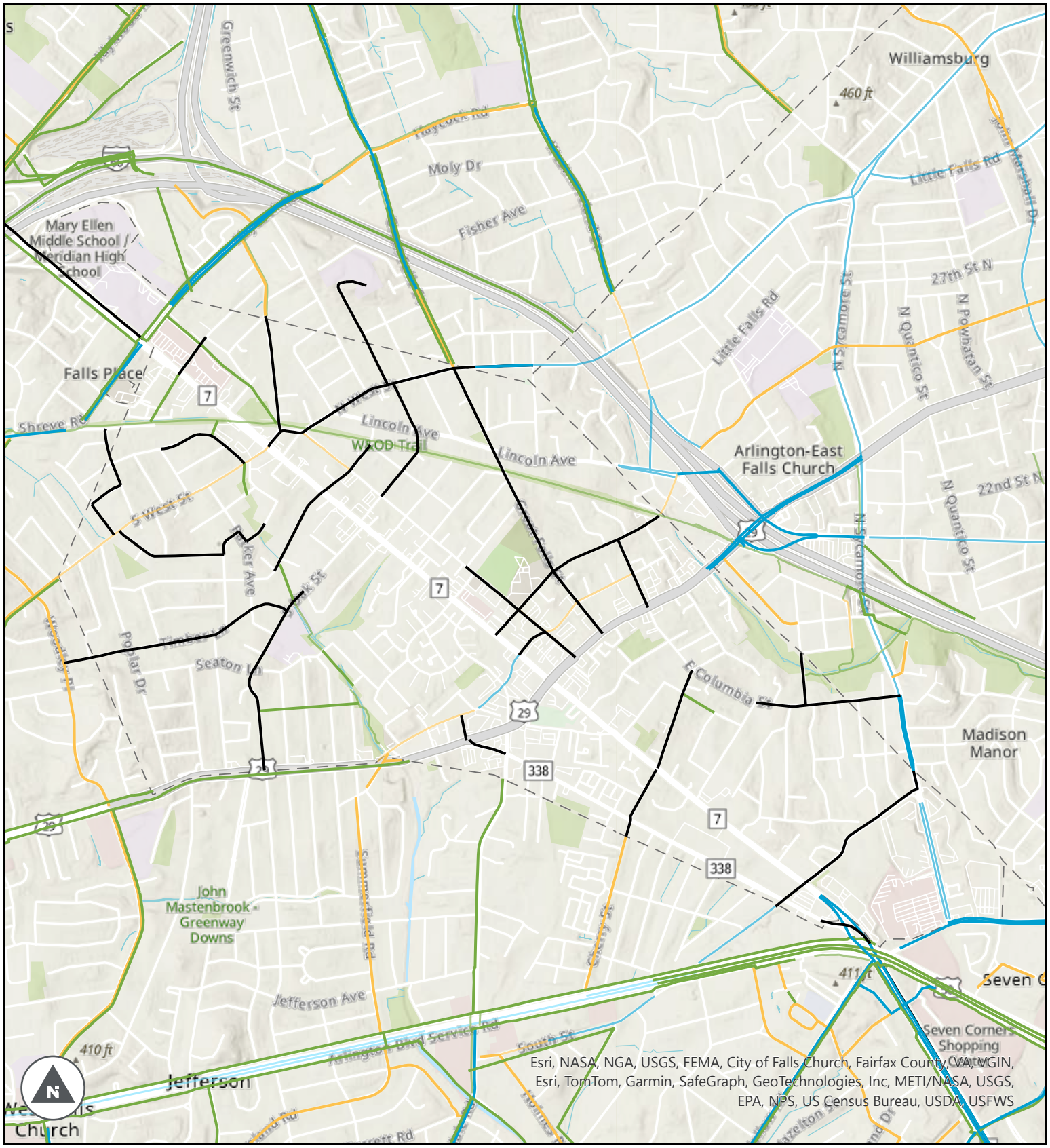
Fairfax County

0 2 4 8 12 16 Miles

Major Planned Network
- Shared Use Path
- Bike Lane
- Further Study
- Natural Surface Trail

Minor Planned Network
- Shared Lane
- Paved Shoulder
- Sidewalk

VDOT Existing Network
- Shared Use Path
- Bike Lane
- Paved Shoulder
- Shared Lane
- Natural Surface Trail
- Sidewalk



VDOT NOVA Bike/Ped Network Study

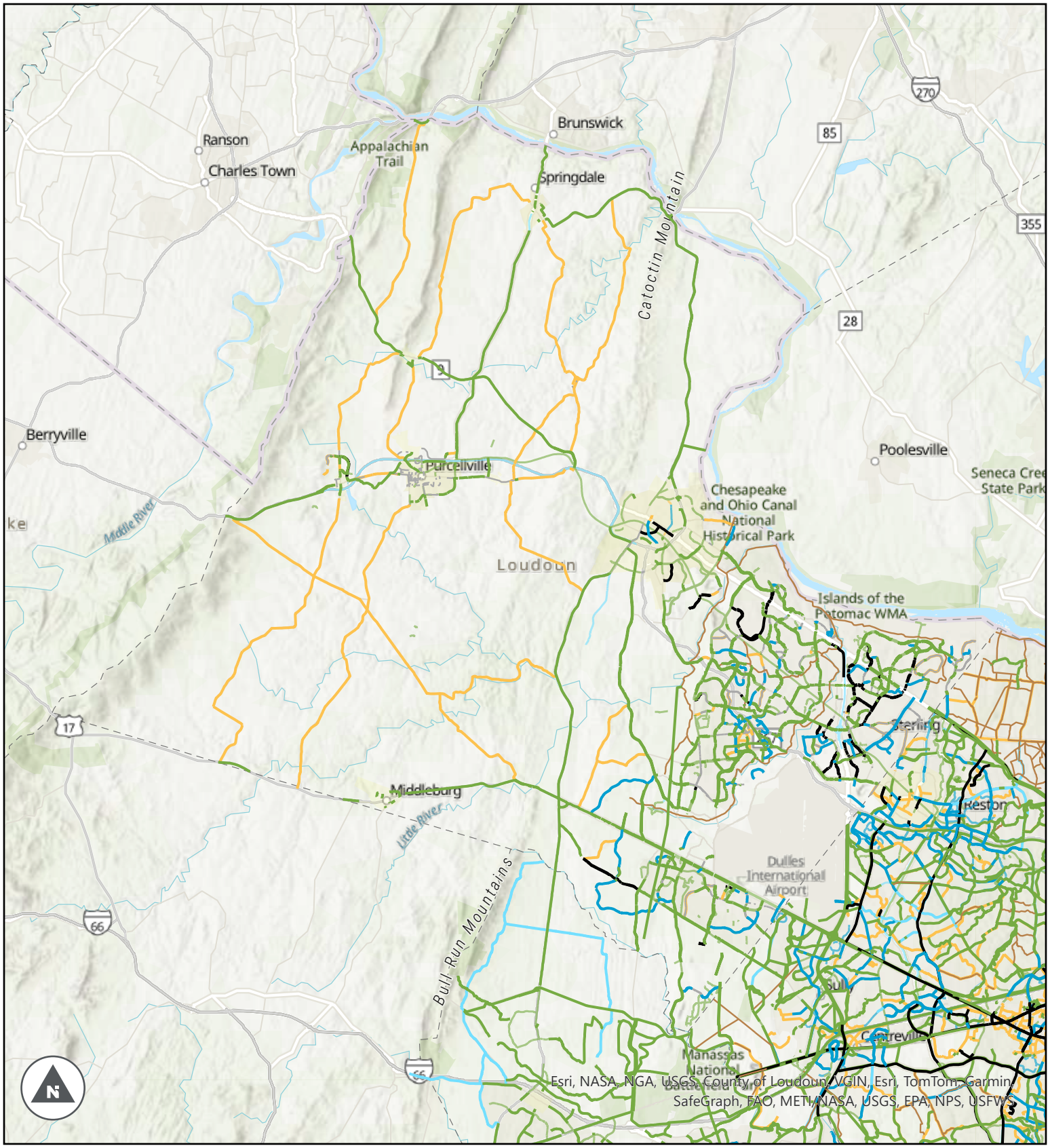
Falls Church City

0 0.17 0.35 0.7 1.05 1.4 Miles

Major Planned Network
- Shared Use Path
- Bike Lane
- Further Study

Minor Planned Network
- Shared Lane

VDOT Existing Network
- Shared Use Path
- Bike Lane
- Paved Shoulder
- Shared Lane



VDOT NOVA Bike/Ped Network Study

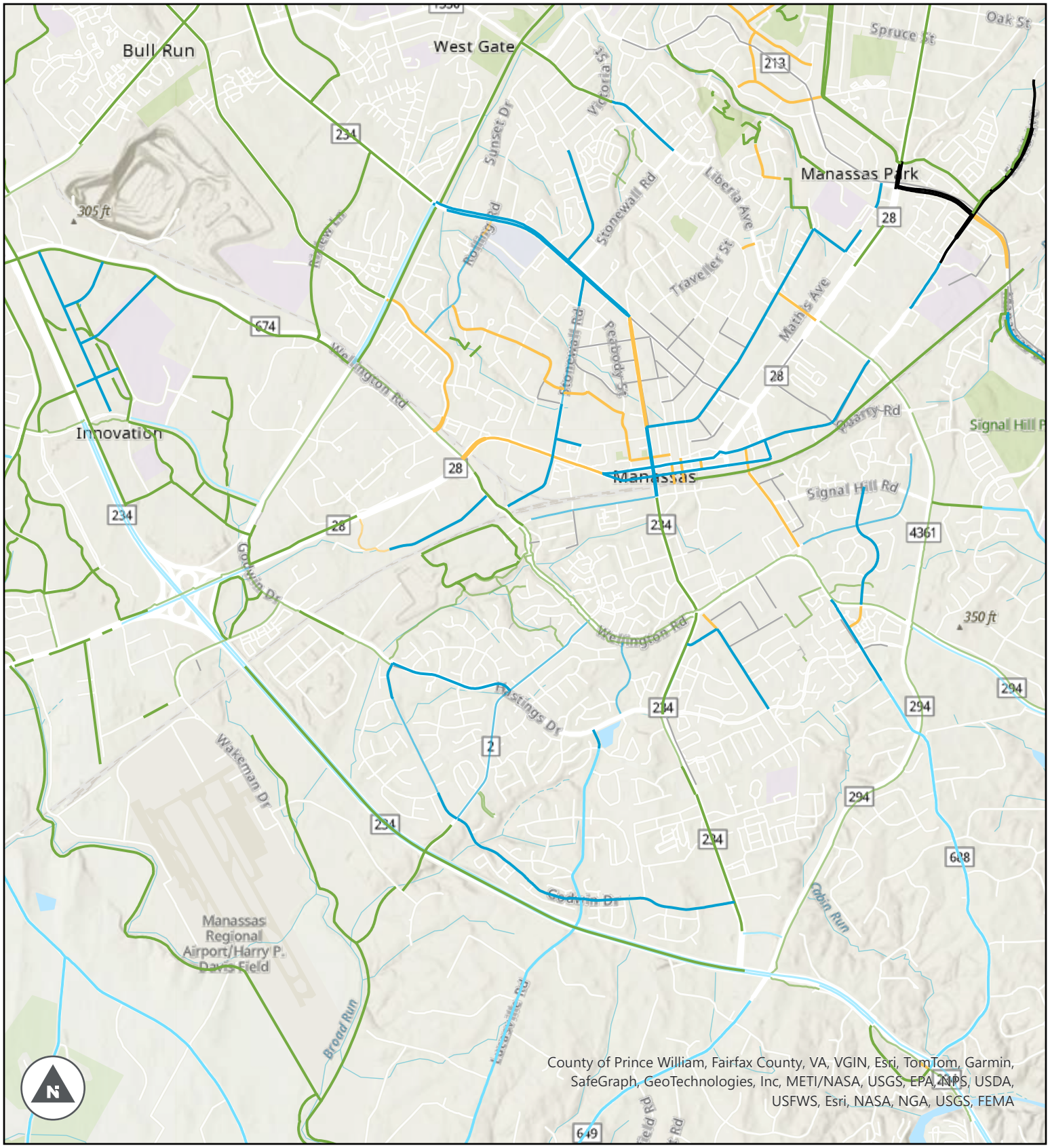
Loudoun County

0 2.5 5 10 15 20 Miles

Major Planned Network
- Shared Use Path
- Bike Lane
- Further Study
- Natural Surface Trail

Minor Planned Network
- Shared Lane
- Paved Shoulder
- Sidewalk

VDOT Existing Network
- Shared Use Path
- Bike Lane
- Paved Shoulder
- Shared Lane
- Natural Surface Trail
- Sidewalk



VDOT NOVA Bike/Ped Network Study

Manassas City

0 0.35 0.7 1.4 2.1 2.8 Miles

Major Planned Network

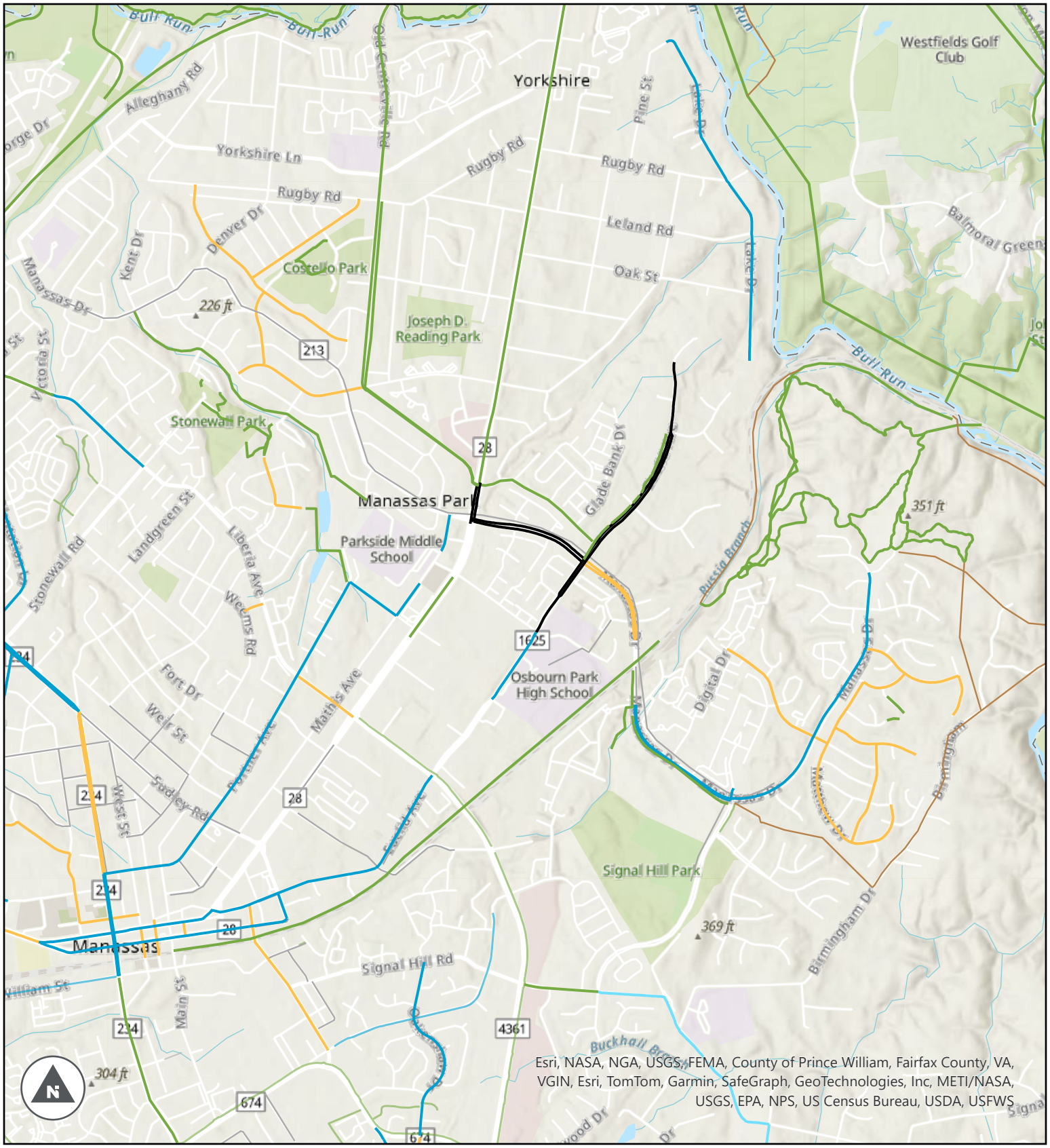
- Shared Use Path
- Bike Lane
- Further Study

Minor Planned Network

- Shared Lane
- Paved Shoulder
- Sidewalk

VDOT Existing Network

- Shared Use Path
- Bike Lane
- Paved Shoulder
- Shared Lane
- Sidewalk



VDOT NOVA Bike/Ped Network Study

Manassas Park City

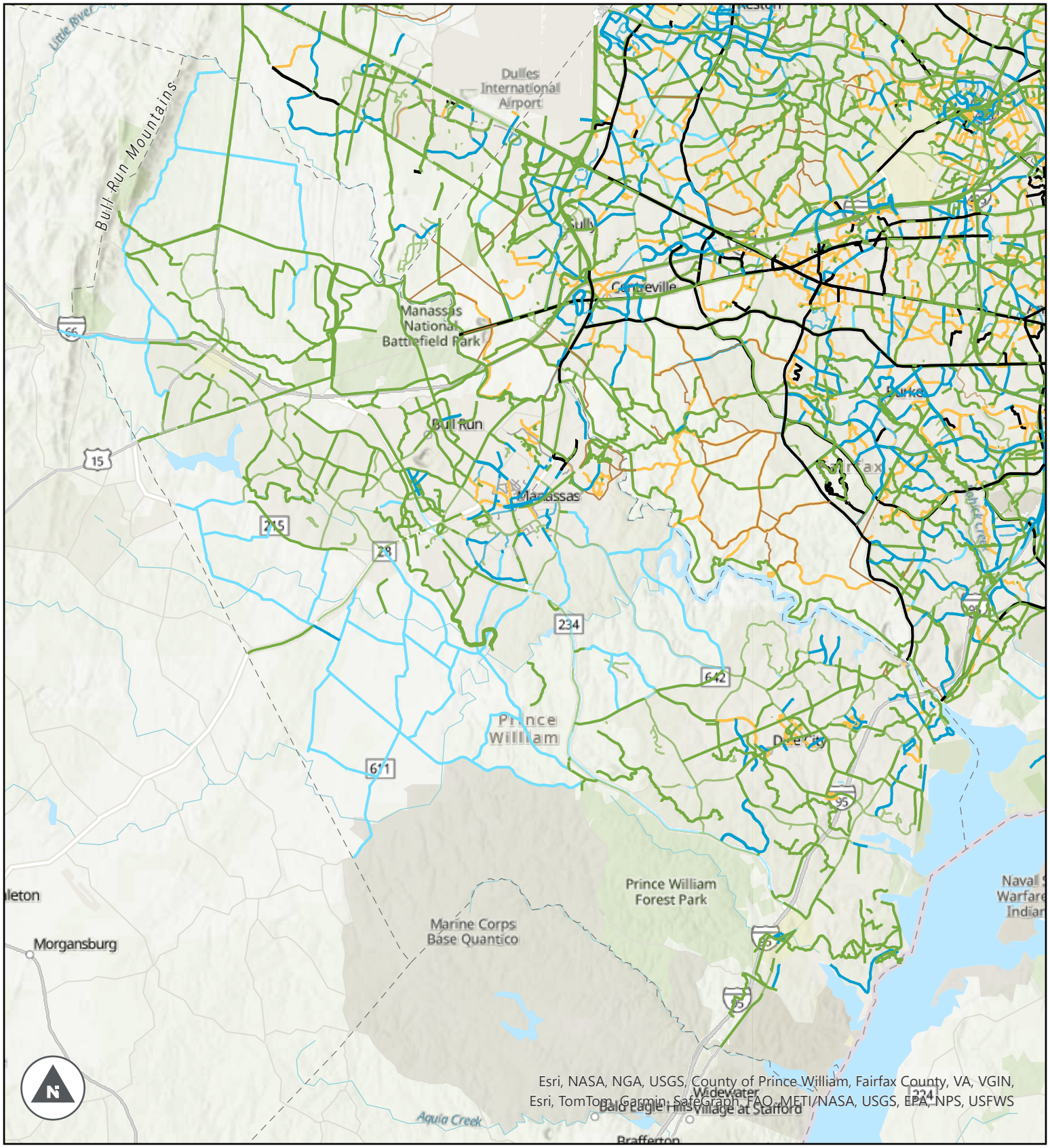
0 0.23 0.45 0.9 1.35 1.8 Miles

Major Planned Network
- Shared Use Path
- Bike Lane
- Further Study
- Natural Surface Trail

Minor Planned Network
- Shared Lane
- Paved Shoulder
- Sidewalk

VDOT Existing Network
- Shared Use Path
- Bike Lane
- Shared Lane

Sidewalk



VDOT NOVA Bike/Ped Network Study

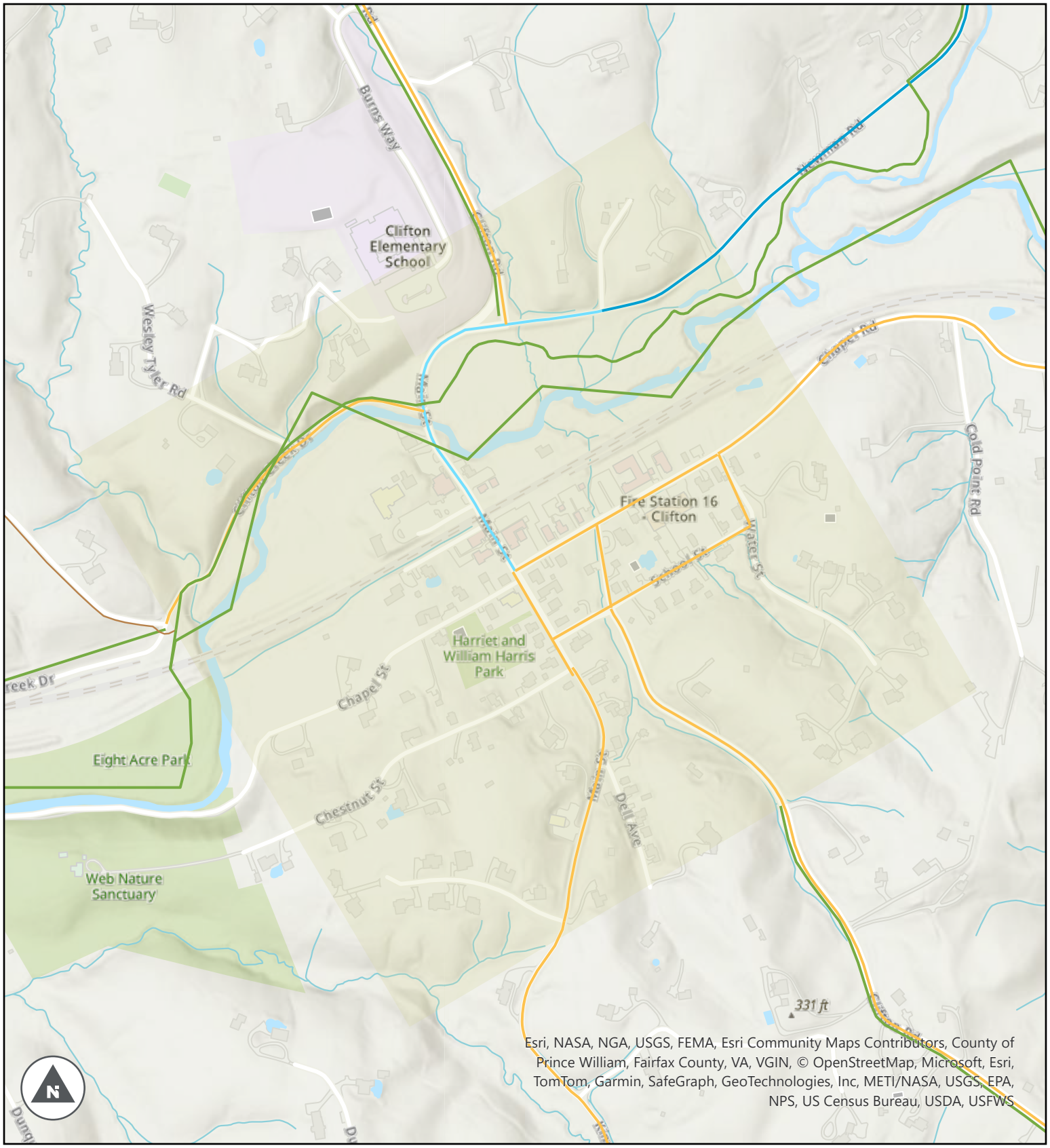
Prince William County

0 2 4 8 12 16 Miles

Major Planned Network
- Shared Use Path
- Bike Lane
- Further Study
- Natural Surface Trail

Minor Planned Network
- Shared Lane
- Paved Shoulder
- Sidewalk

VDOT Existing Network
- Shared Use Path
- Bike Lane
- Paved Shoulder
- Shared Lane
- Natural Surface Trail
- Sidewalk



VDOT NOVA Bike/Ped Network Study

Clifton town

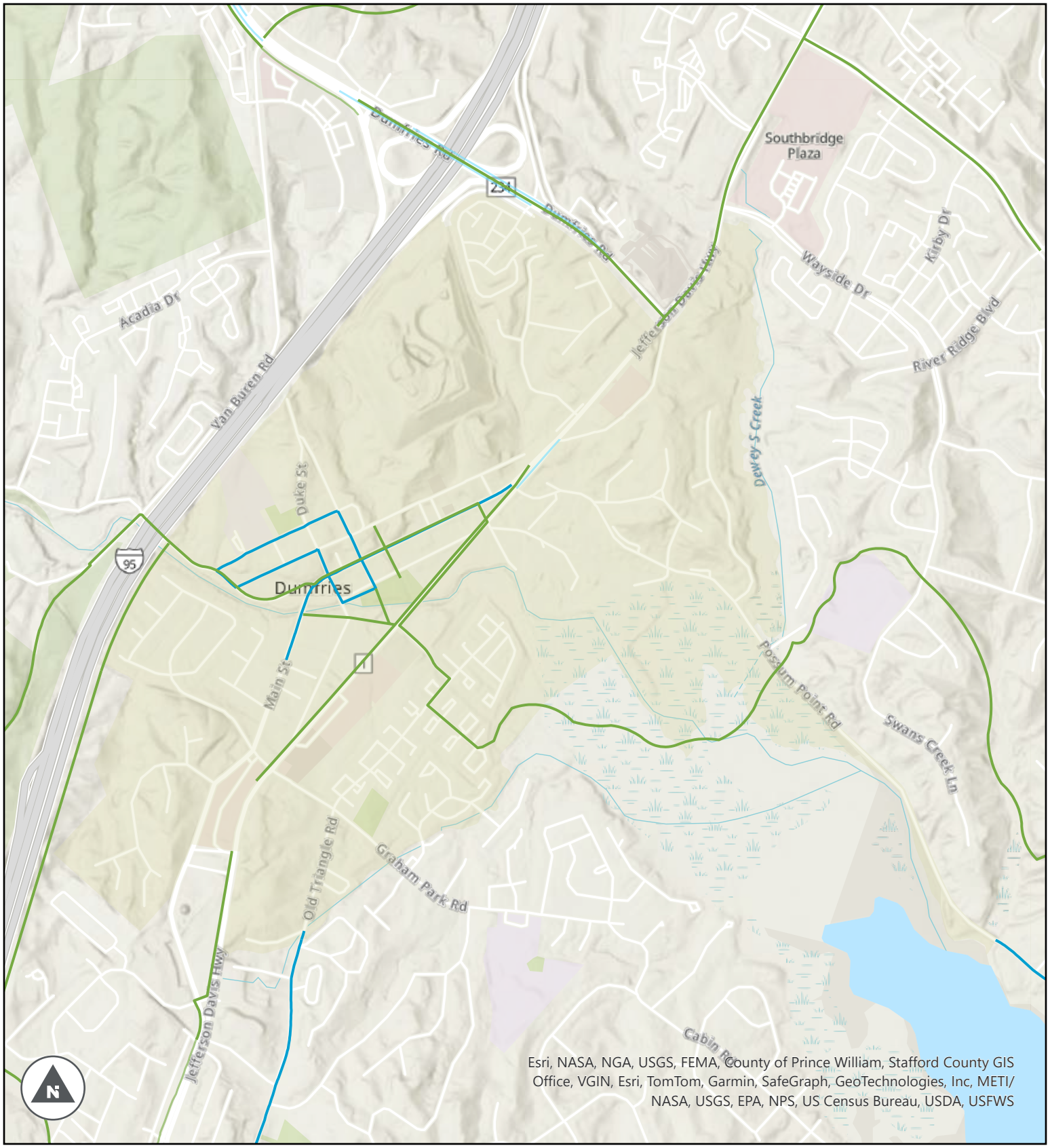
0 0.05 0.1 0.2 0.3 0.4 Miles

Major Planned Network

- Shared Use Path
- Bike Lane
- Further Study
- Natural Surface Trail

Minor Planned Network

- Shared Lane
- Paved Shoulder



VDOT NOVA Bike/Ped Network Study

Dumfries town

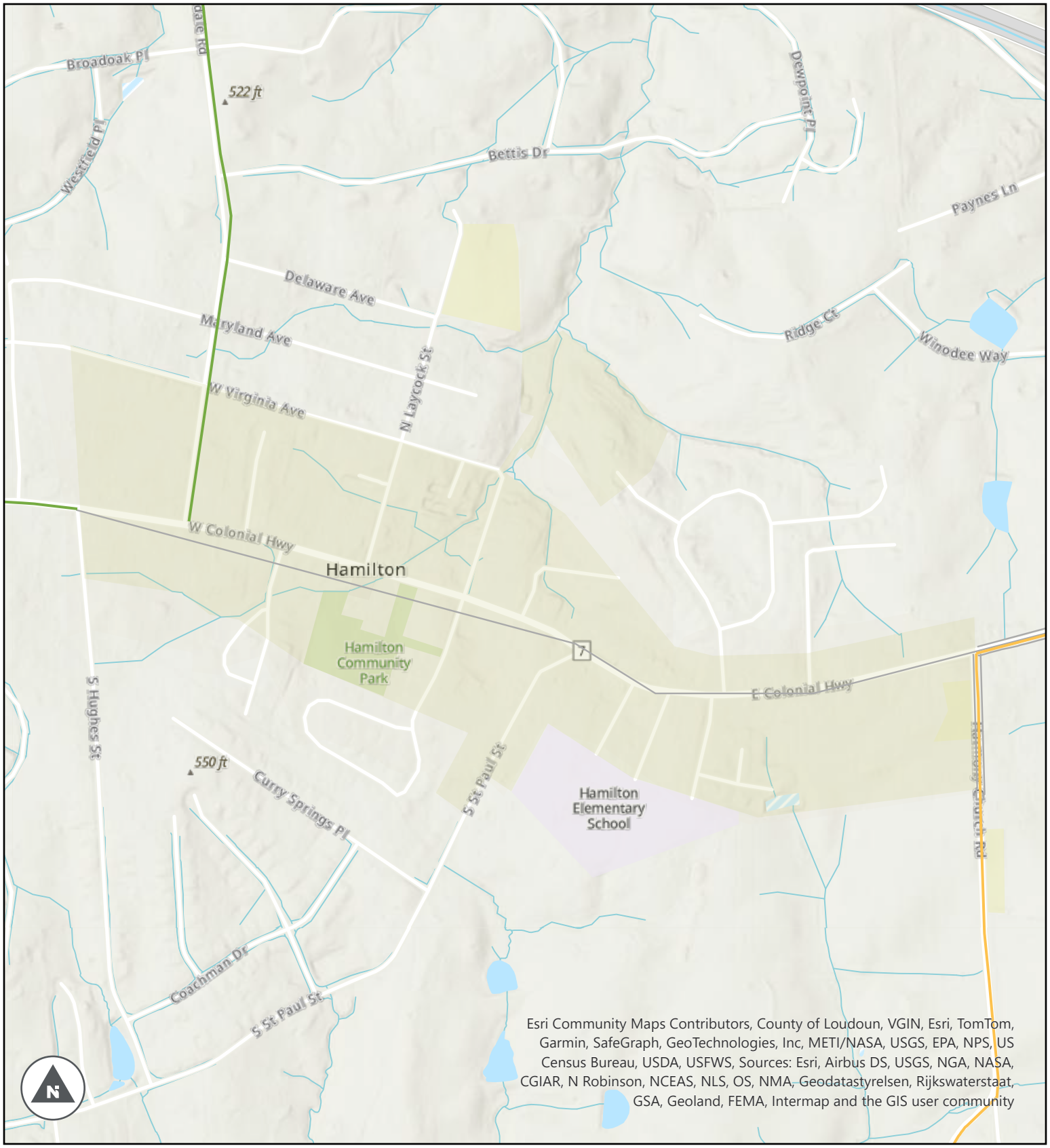
0 0.15 0.3 0.6 0.9 1.2 Miles

Major Planned Network

- Shared Use Path
- Bike Lane

VDOT Existing Network

- Shared Use Path
- Paved Shoulder



VDOT NOVA Bike/Ped Network Study

Hamilton town

0 0.07 0.15 0.3 0.45 0.6 Miles

Major Planned Network
- Shared Use Path

Minor Planned Network
- Shared Lane
- Sidewalk

VDOT Existing Network
- Paved Shoulder

VDOT NOVA Bike/Ped Network Study

Haymarket town

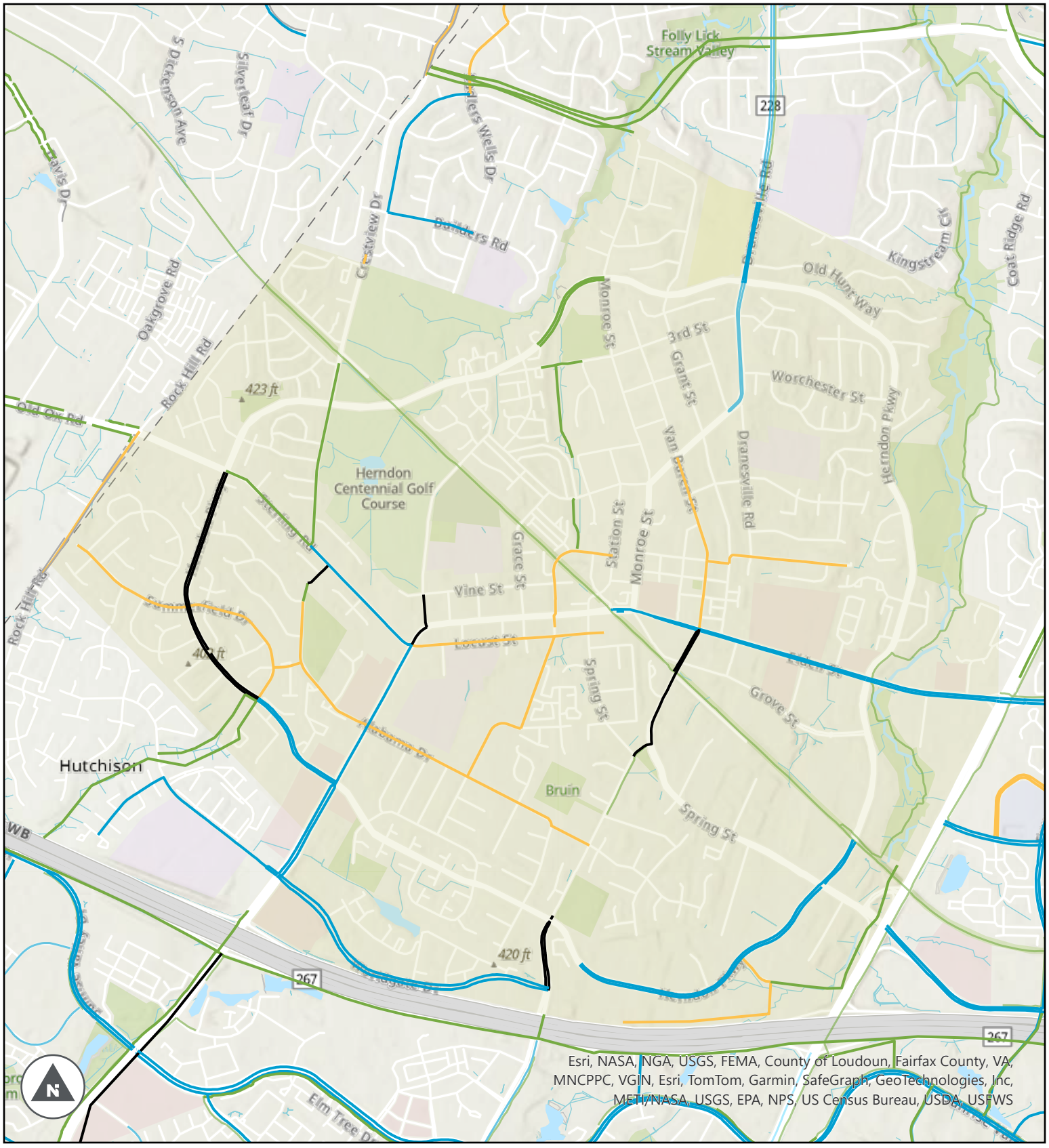
0 0.07 0.15 0.3 0.45 0.6 Miles

Major Planned Network

Shared Use Path

VDOT Existing Network

Shared Use Path



VDOT NOVA Bike/Ped Network Study

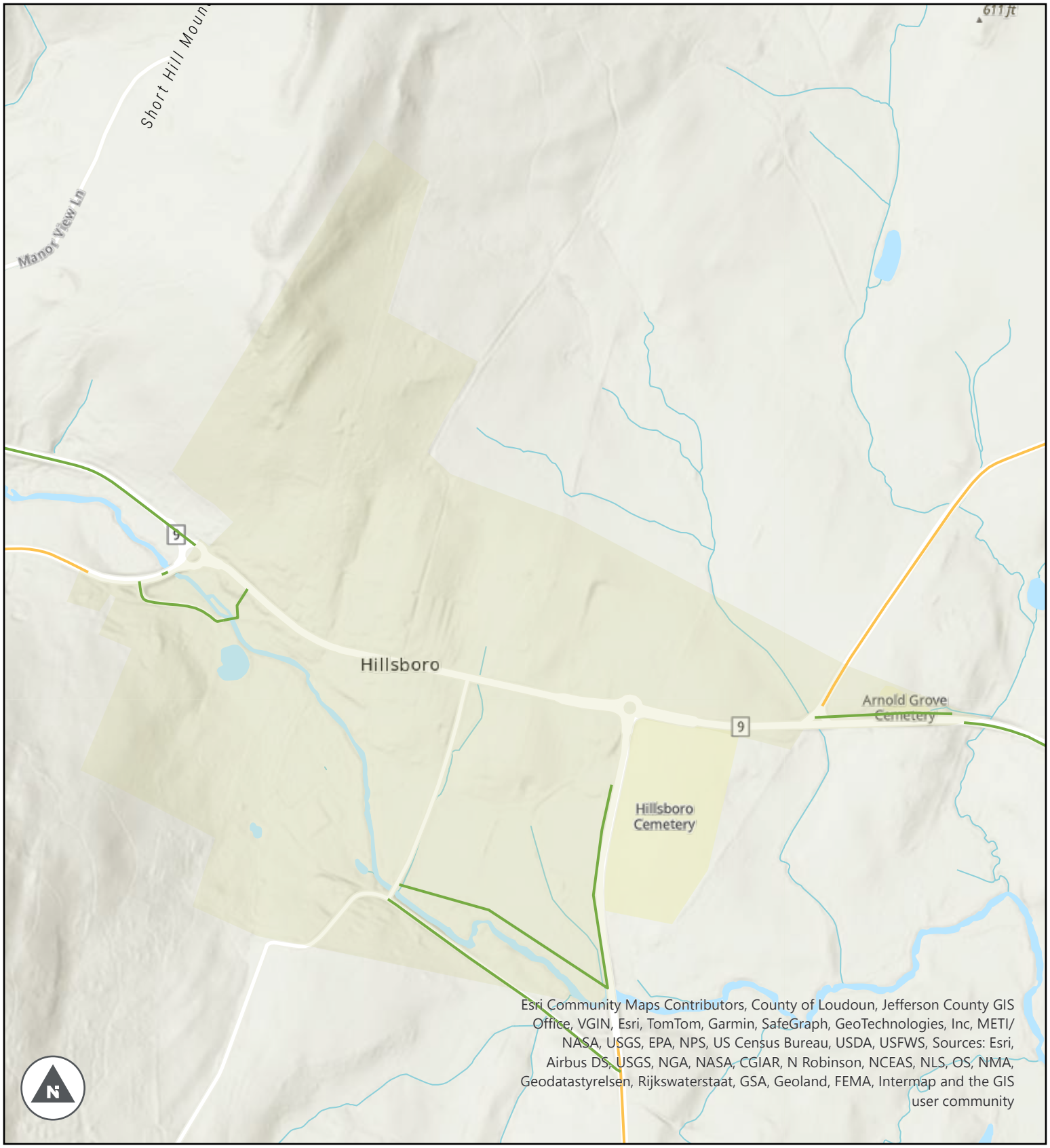
Herndon town

0 0.2 0.4 0.8 1.2 1.6 Miles

Major Planned Network
- Shared Use Path
- Bike Lane
- Further Study

Minor Planned Network
- Shared Lane
- Sidewalk

VDOT Existing Network
- Shared Use Path
- Bike Lane
- Paved Shoulder



VDOT NOVA Bike/Ped Network Study

Hillsboro town

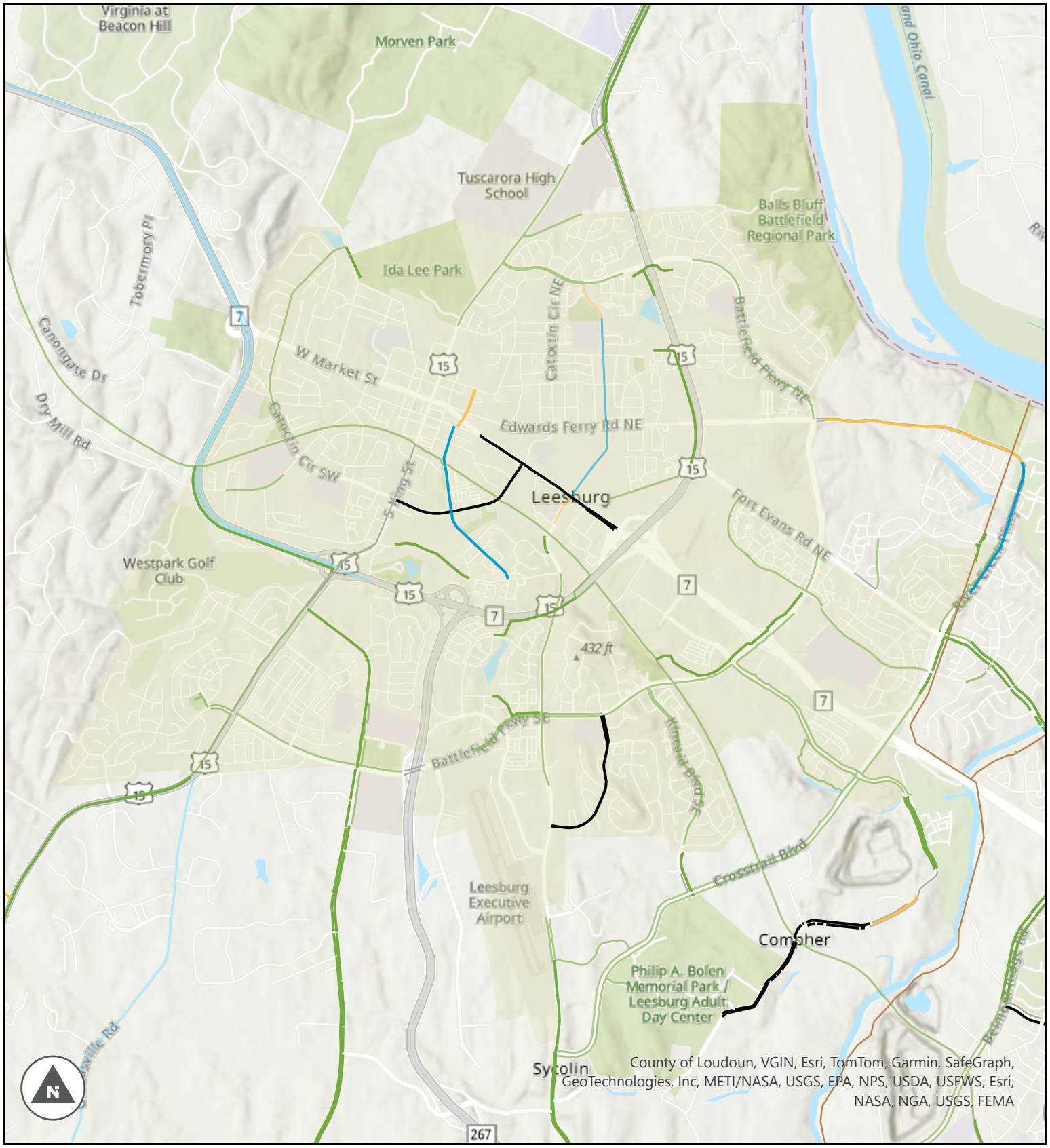
0 0.05 0.1 0.2 0.3 0.4 Miles

Major Planned Network

Shared Use Path

Minor Planned Network

Shared Lane



VDOT NOVA Bike/Ped Network Study

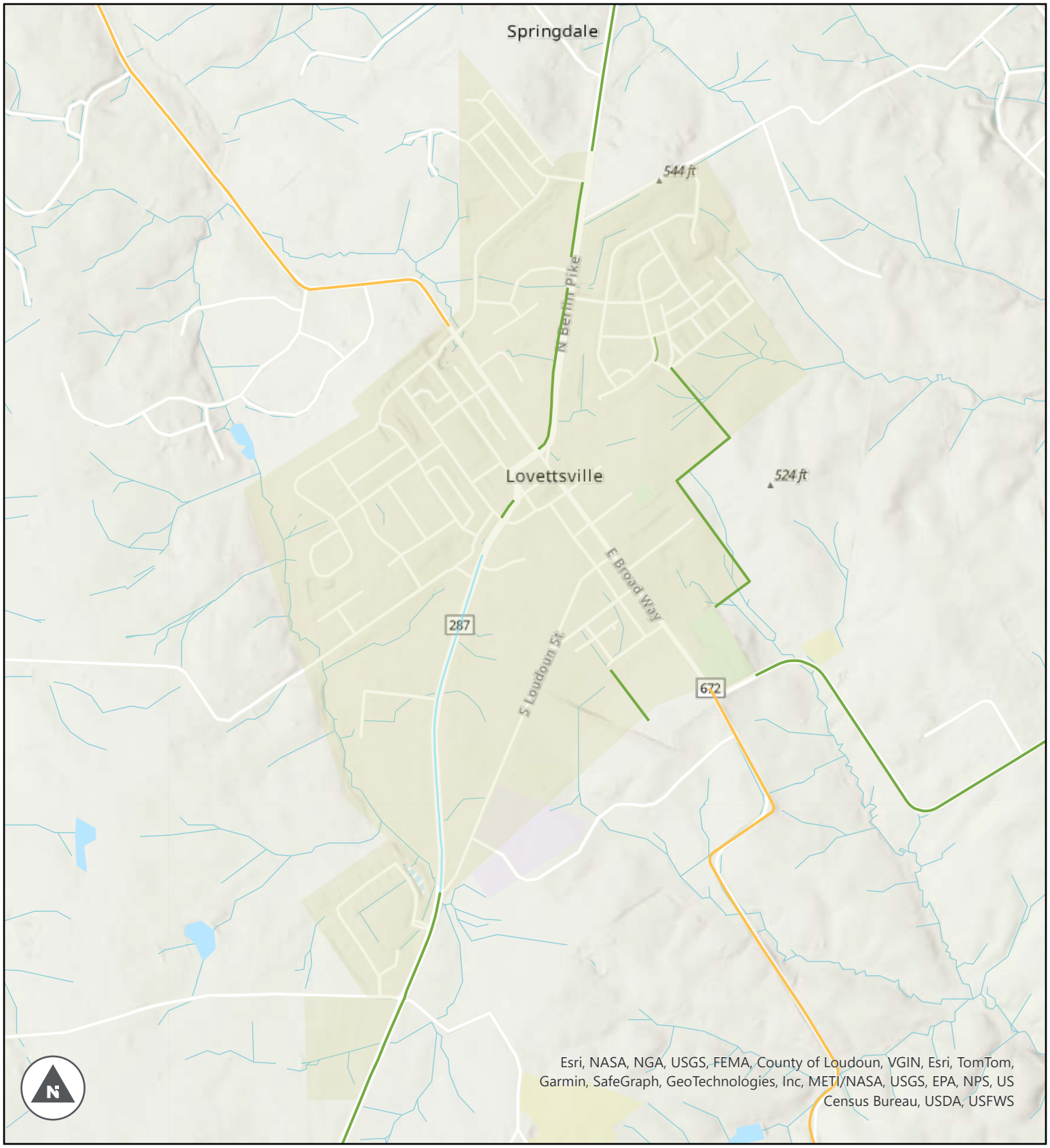
Leesburg town

0 0.38 0.75 1.5 2.25 3 Miles

Major Planned Network
- Shared Use Path
- Bike Lane
- Further Study
- Natural Surface Trail

Minor Planned Network
- Shared Lane
- Sidewalk

VDOT Existing Network
- Shared Use Path
- Bike Lane
- Paved Shoulder
- Shared Lane



VDOT NOVA Bike/Ped Network Study

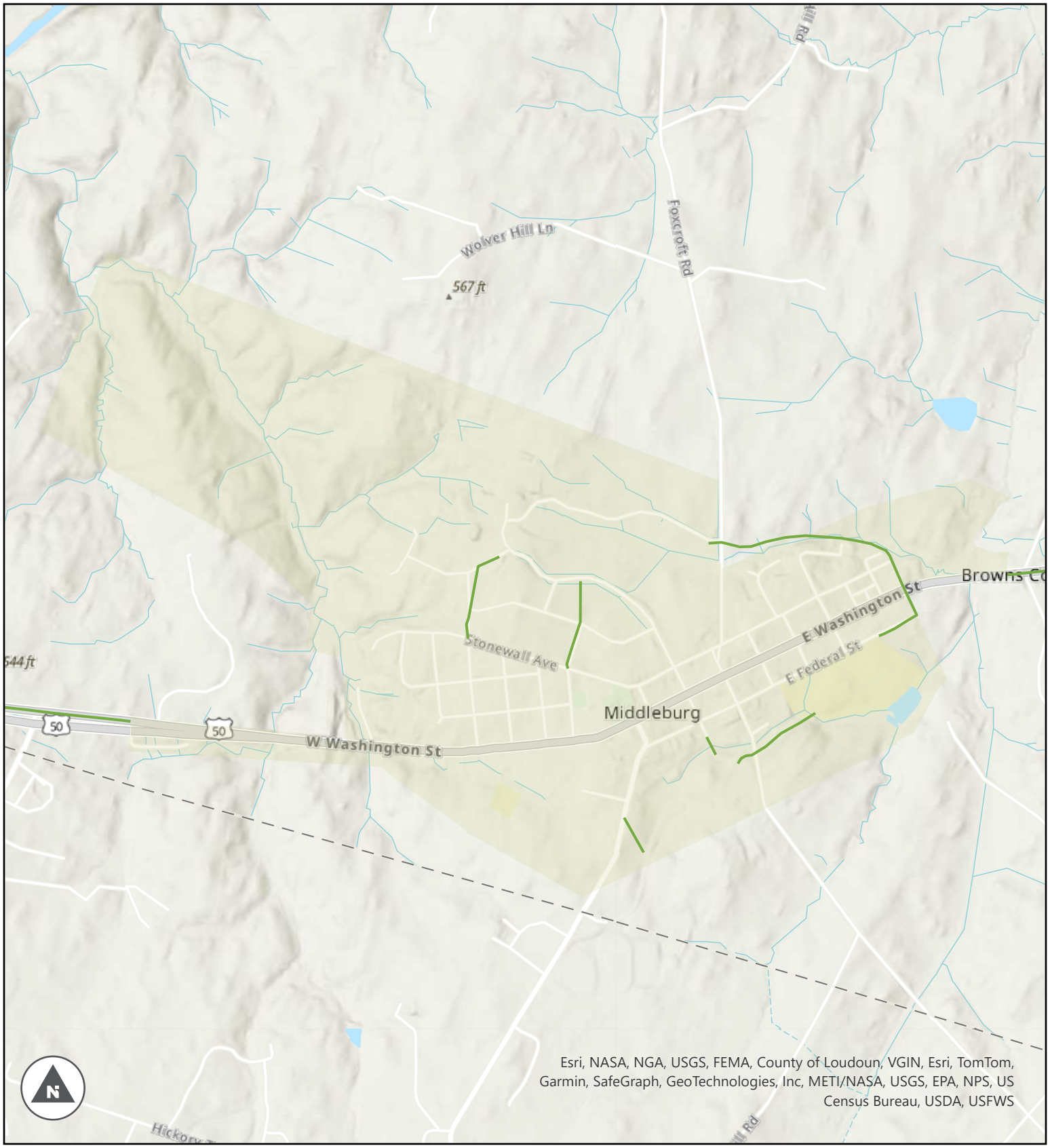
Lovettsville town

0 0.13 0.25 0.5 0.75 1 Miles

Major Planned Network
- Shared Use Path

Minor Planned Network
- Shared Lane

VDOT Existing Network
- Shared Use Path
- Paved Shoulder



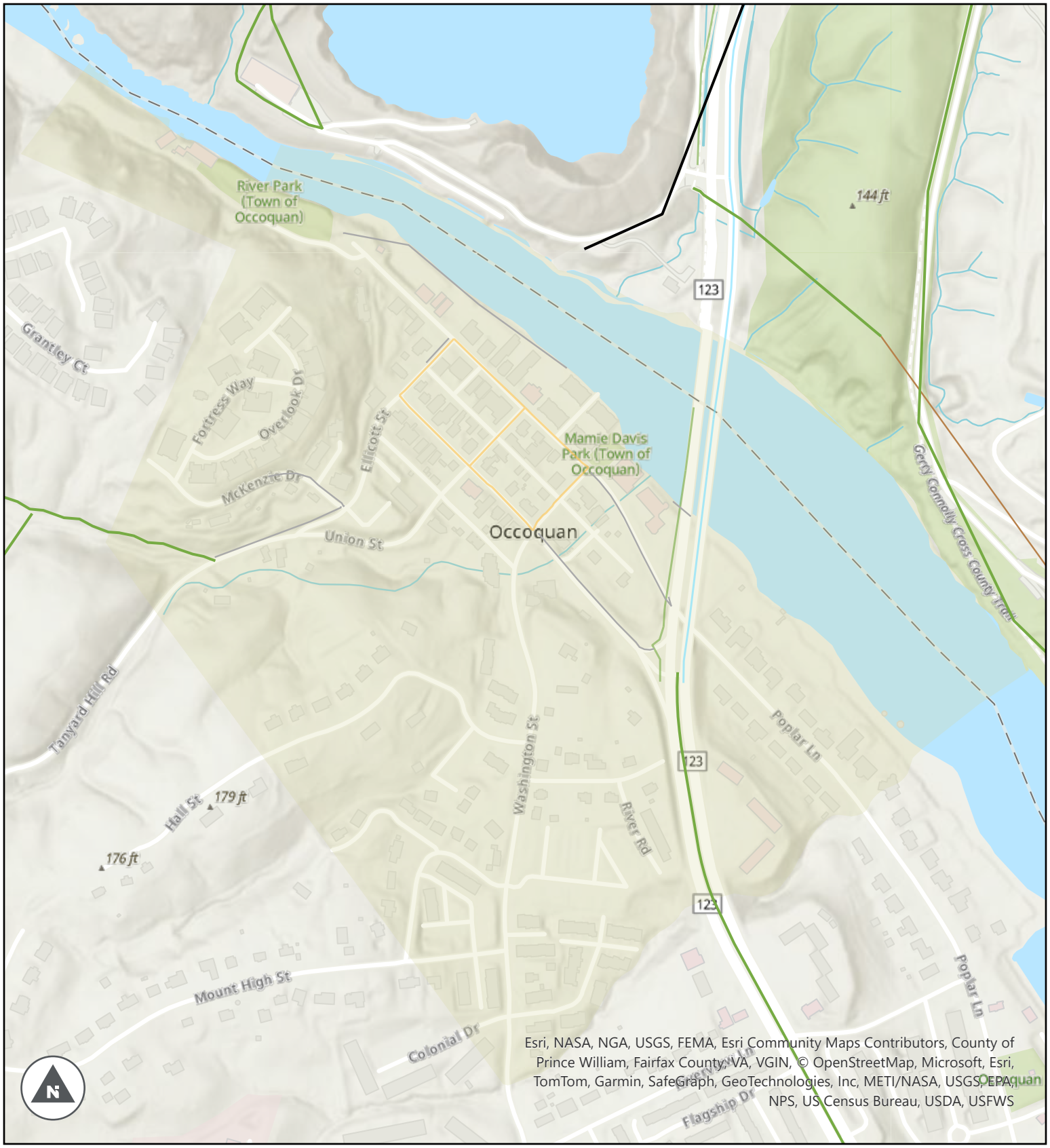
VDOT NOVA Bike/Ped Network Study

Middleburg town

0 0.13 0.25 0.5 0.75 1 Miles

Major Planned Network

Shared Use Path



VDOT NOVA Bike/Ped Network Study

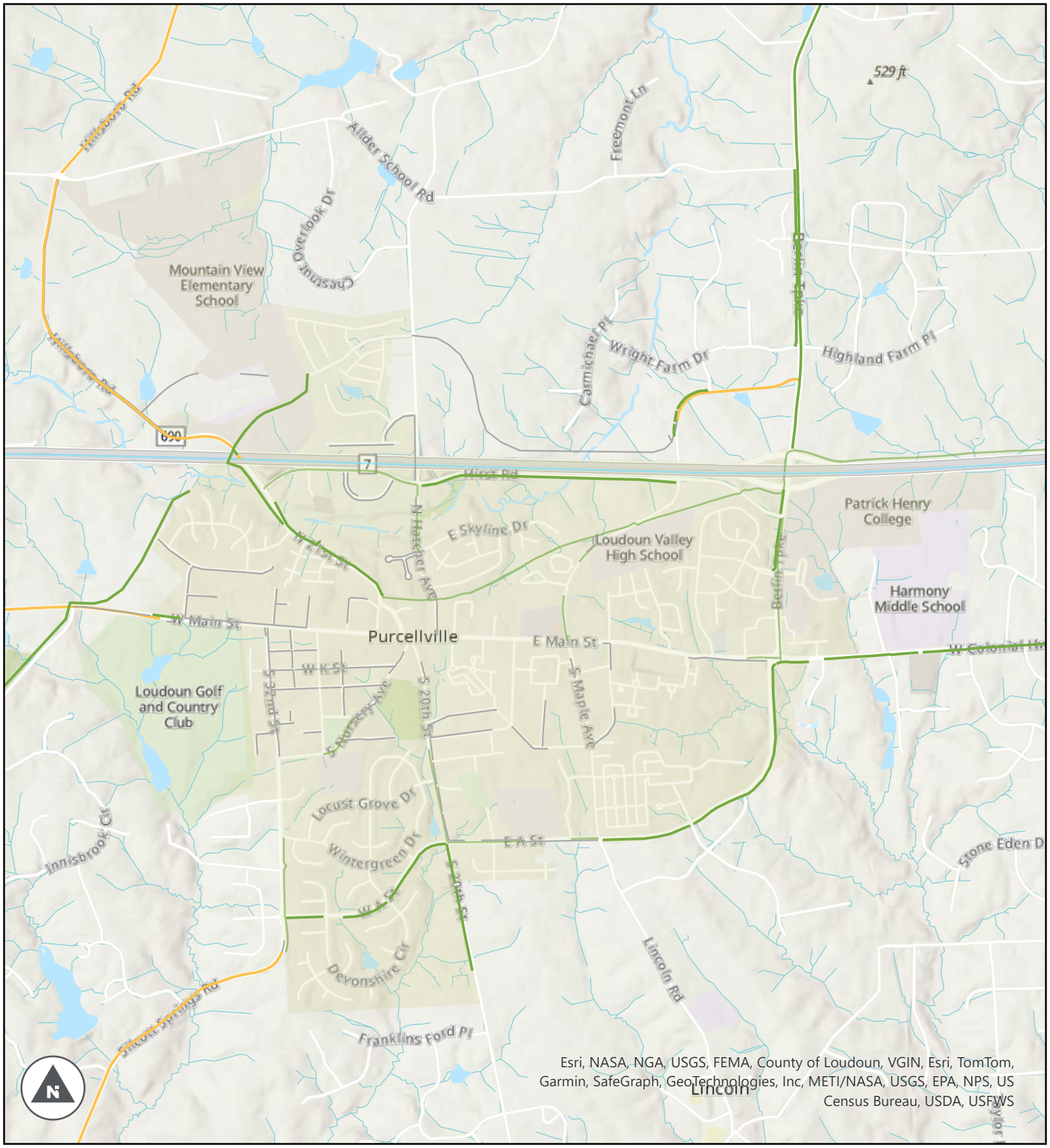
Occoquan town

0 0.05 0.1 0.19 0.29 0.38 Miles

Major Planned Network
- Shared Use Path

Minor Planned Network
- Sidewalk

VDOT Existing Network
- Shared Use Path
- Paved Shoulder
- Shared Lane



VDOT NOVA Bike/Ped Network Study

Purcellville town

0 0.23 0.45 0.9 1.35 1.8 Miles

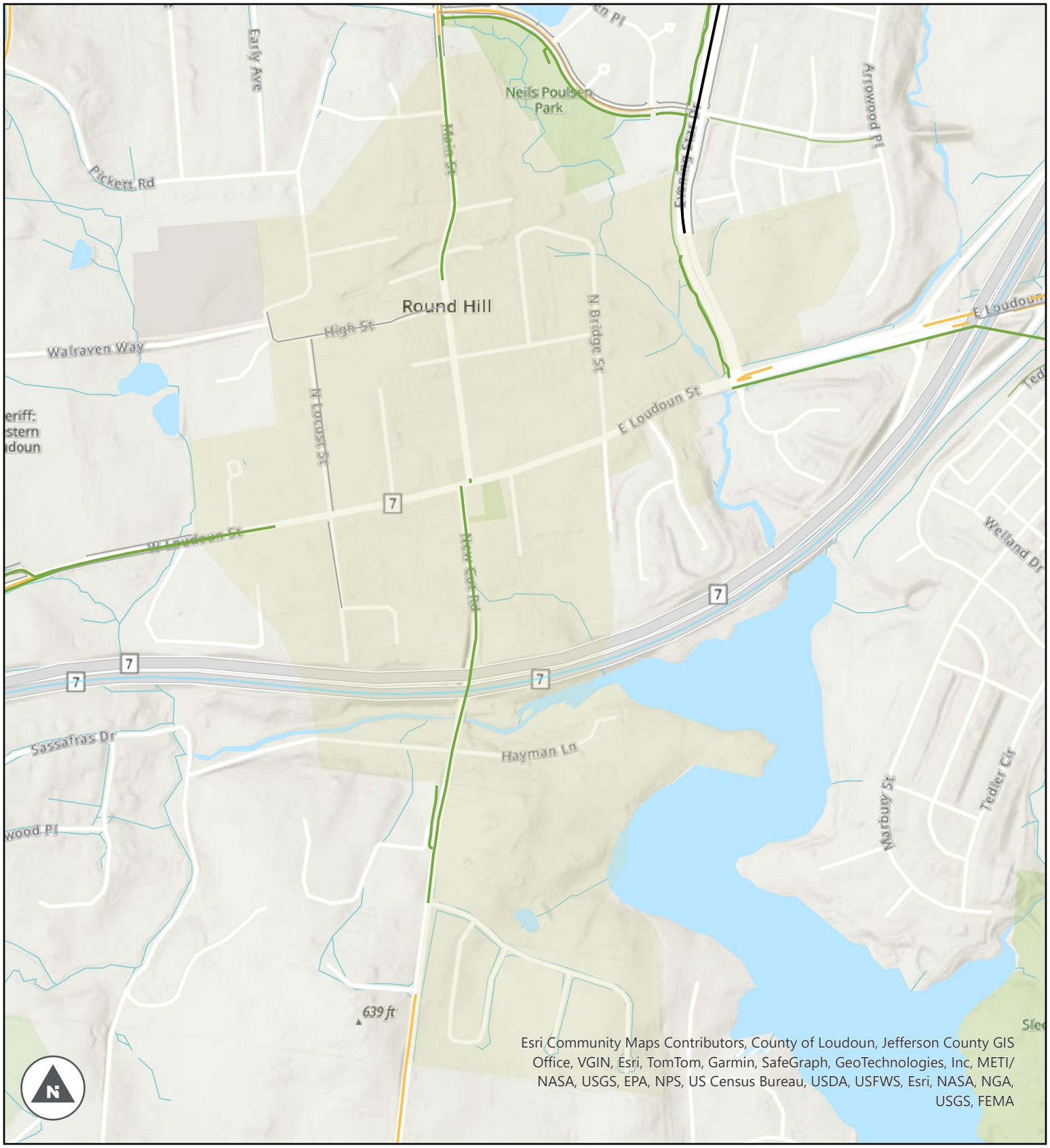
Major Planned Network
- Shared Use Path

Minor Planned Network
- Shared Lane
- Sidewalk

VDOT Existing Network
- Shared Use Path
- Paved Shoulder

VDOT NOVA Bike/Ped Network Study
Quantico town

0 0.03 0.06 0.11 0.17 0.22
Miles



VDOT NOVA Bike/Ped Network Study

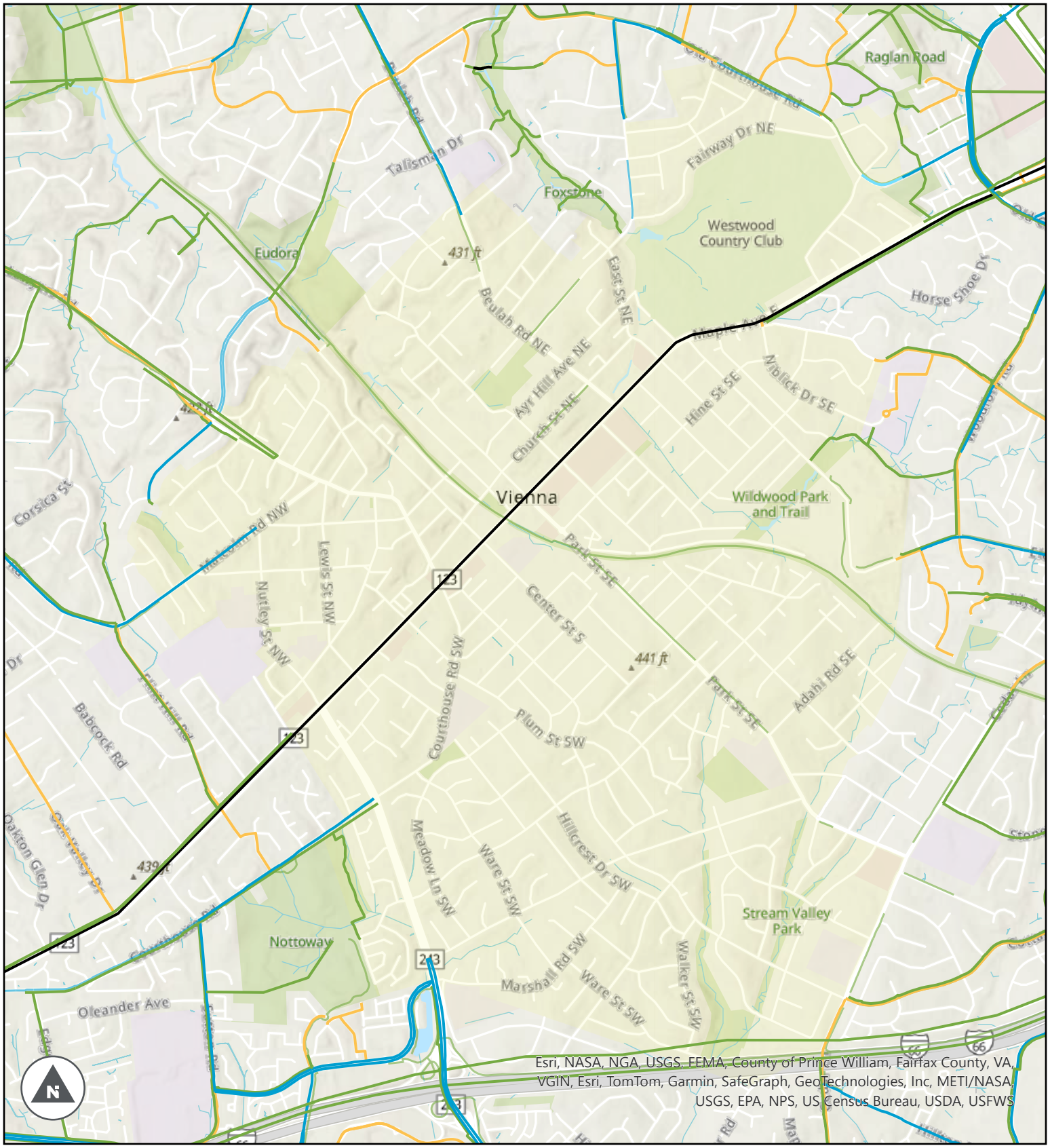
Round Hill town

0 0.07 0.15 0.3 0.45 0.6 Miles

Major Planned Network
- Shared Use Path
- Further Study

Minor Planned Network
- Shared Lane
- Sidewalk

VDOT Existing Network
- Shared Use Path
- Paved Shoulder



VDOT NOVA Bike/Ped Network Study

Vienna town

0 0.2 0.4 0.8 1.2 1.6 Miles

Major Planned Network
- Shared Use Path
- Bike Lane
- Further Study

Natural Surface Trail

Minor Planned Network
- Shared Lane
- Paved Shoulder

VDOT Existing Network
- Shared Use Path
- Bike Lane
- Shared Lane

Sidewalk

Appendix F: Total Segment Lane Mileage by Town

Table 23: Total Segment Lane Mileage by Town

Towns	Shared Use Path	Natural Surface	Bike Lane	Paved Shoulder	Shared Lane	Sidewalk	Undetermined	Total Mileage
Dumfries	2		4					**6**
Hamilton	1					1		**2**
Herndon	4		11		12		4	**31**
Hillsboro	1							**1**
Leesburg	7		3		1	1	7	**19**
Lovettsville	1							**1**
Middleburg	1							**1**
Occoquan						1		**1**
Purcellville	6					10		**16**
Round Hill	2					1		**3**
Total Miles	**28**	**–**	**18**	**–**	**13**	**14**	**11**	**81**

Note: Blank cells indicate that no planned mileage is reported.

Table 24: Total Planned Segment Lane Mileage by Independent City

Cities	Shared Use Path	Natural Surface	Bike Lane	Paved Shoulder	Shared Lane	Sidewalk	Undetermined	Total Mileage
Alexandria	9				51	64	80[15]	**204**
Fairfax	7		9		50	3	33	**102**
Falls Church	2						21	**23**
Manassas	9		27		13	12		**61**
Manassas Park	16	7	3		13	6	4	**49**
Total Miles	**43**	**7**	**39**		**127**	**85**	**138**	**439**

Note: Blank cells indicate that no planned mileage is reported.

[15] Undetermined facility type for the City of Alexandria represents proposed enhanced bike facilities which may vary by design.

Appendix G: Cost Estimating Project List and Calculations

The example projects in Appendix G are generally a sample of completed projects, mainly across Virginia and Maryland, compiled to formulate a median cost-per-mile figure for planned projects.

Jurisdiction	Project Type	VDOT Project Type	Year Constructed	Total Construction Cost	Cost per Mile (given year)	Cost per Mile ($2022)	Notes / Known Additional Improvements	Links	Selected in Cost Estimate Calculation?
Fairfax County		-	2022	$ 411,897.00	$ 5,409,990	$ 5,409,990.45	**Project:** Clarks Crossing Rd at Hawthorne Ridge		No
Arlington County	Bike Lane	Bike Lane	N/A	$ 49,218.60	$ 233,490	$ 233,489.85	**Location:** Wilson Blvd from N Frederick St to N George Mason Dr **Notes:** Partially separated and partially non-separated on-street bike lanes for both sides of the street	N/A	Yes
Arlington County	Bike Lane	Bike Lane	N/A	$ 60,878.08	$ 471,314	$ 471,314.17	**Location:** Clarendon Blvd from Courthouse Rd to N Scott St **Notes:** One lane, one-way separated (by parking on-street) bike lanes	N/A	Yes
Arlington County	Bike Lane	Bike Lane	N/A	$ 185,658.94	$ 472,879	$ 472,879.50	**Location:** Clarendon Blvd from N Garfield St to N Adams St **Notes:** Separated on-street bike lane for one side of the street	N/A	Yes
Arlington County	Bike Lane	Bike Lane	N/A	$ 108,390.77	$ 272,915	$ 272,915.24	**Location:** Wilson Blvd from N George Mason Dr to N Glebe Rd **Notes:** On-street marked bike lanes for both sides of the street	N/A	Yes
Arlington County	Bike Lane	Bike Lane	N/A	$ 112,889.77	$ 298,626	$ 298,626.25	**Location:** S Clark St from 23rd St S to 27th St S **Notes:** Separated on-street two-way bike lanes	N/A	Yes
City of Fairfax	Bike Lanes	Bike Lane	2025	$1,143,431	$ 2,286,862	$ 2,086,718.96	**Project Name:** University Drive Bike Lanes & Intersection Improvements **Notes:** Costs included stormwater infrastructure, bulb-outs, and utility pole relocation (by others on plan set)	https://www.fairfaxva.gov/government/public-works/transportation-division/university-drive-bicycle-facilities	Yes
City of Fairfax	Multimodal (Sidewalk, Cycle Track, transit improvements)	Bike Lane	2025	$30,457,000	$ 10,877,500	$ 9,925,516.05	**Project**: Blenheim Blvd MM Improvements **Notes**: Project includes reconstruction of Blenheim Blvd (formerly Old Lee Hwy) between Layton Hall Drive and Ridge Avenue to include sidewalks on both sides of the roadway, a two-way cycle		No
Fairfax County	Walkway	Bike Lane	2021	$ 2,086,059.00	$ 3,581,916	$ 3,832,650.06	**Project:** Quandor Ave Walkway **Notes:** 3,075' of on-road bike lanes; cost includes PE, ROW/utilities, and construction	tion/sites/transportation/files/assets/documents/pdf/transportation%20(general)/tdd/2017/tdd%20monthly%20status%20report%20-	Yes
Fairfax County	Roadway/signal	Bike Lane	N/A	$ 4,347,155.00	$ 11,476,489	$ 11,476,489.20	**Project**: Van Dorn St. Ped Bike Improvements *On-going/under construction as of 11/2023* **Notes:** Bid Ad Pending VDOT/FHWA Approval; Significant roadway improvements; traffic signal rebuild		No
Fairfax County	Walkway	Bike Lane	2021	$ 4,504,856.00	$ 8,915,157	$ 9,539,218.31	**Project:** Telegraph Road Walkway - S. Kings to Lee Dist. Park **Notes**: 2,810' of on-road bike lanes included; pedestrian signals; retaining walls		No
MCDOT	Bike Lanes (minor)	Bike Lane	N/A	$ 844,800.00	$ 844,800	$ 844,800.00	**Project:** N/A **Notes:** The costs provided are planning level costs from MCDOT and included on-street separated bike lanes with mostly restriping and dividers, with minor geometric work.		No

Jurisdiction	Project Type	VDOT Project Type	Year Constructed	Total Construction Cost	Cost per Mile (given year)	Cost per Mile ($2022)	Notes / Known Additional Improvements	Links	Selected in Cost Estimate Calculation?
MCDOT	Bike Lanes	Bike Lane	N/A	$ 15,972,000.00	$ 15,972,000	$ 15,972,000.00	**Project:** N/A **Notes:** The costs provided are planning level costs from MCDOT and include separated bike lanes with curb line impacts.		No
MDOT	Bike Lane (Curbside)	Bike Lane	N/A	$ 212,113.00	$ 212,113	$ 212,113.00	**Project:** N/A **Notes**: One side of roadway; (12 intersections assumed) 5 foot wide area between curb and parked card or travel lane; -Includes mobilization (10% of construction costs) and contingency (10% of construction costs); does NOT include design and permitting or preliminary site	https://www.mdot.maryland.gov/OPCP/MDOT_BPAG_Bikeways_Project_Cost_Estimator.xlsx	No
MDOT	Bike Lanes (Curbside)	Bike Lane	N/A	$ 346,907.00	$ 346,907	$ 346,907.00	**Project:** N/A **Notes:** Both sides of roadway; (12 intersections assumed) 5 foot wide area between curb and parked card or travel lane; -Includes mobilization (10% of construction costs) and contingency (10% of construction costs); does NOT include design and permitting or preliminary site	https://www.mdot.maryland.gov/OPCP/MDOT_BPAG_Bikeways_Project_Cost_Estimator.xlsx	No
MDOT	Bike Lane (w Parking)	Bike Lane	N/A	$ 374,737.00	$ 374,737	$ 374,737.00	**Project:** N/A **Notes:** One side of roadway; (12 intersections assumed); -Includes mobilization (10% of construction costs) and contingency	https://www.mdot.maryland.gov/OPCP/MDOT_BPAG_Bikeways_Project_Cost_Estimator.xlsx	No
MDOT	Bike Lanes (w Parking)	Bike Lane	N/A	$ 751,289.00	$ 751,289	$ 751,289.00	**Project:** N/A **Notes**: Both sides of roadway; (12 intersections assumed); -Includes mobilization (10% of construction costs) and contingency (10% of construction costs); does NOT include design and permitting or preliminary site	https://www.mdot.maryland.gov/OPCP/MDOT_BPAG_Bikeways_Project_Cost_Estimator.xlsx	No
MDOT	Bike Lane (Buffer)	Bike Lane	N/A	$ 374,737.00	$ 374,737	$ 374,737.00	**Project:** N/A **Notes:** One side of roadway; (12 intersections assumed); -Includes mobilization (10% of construction costs) and contingency	https://www.mdot.maryland.gov/OPCP/MDOT_BPAG_Bikeways_Project_Cost_Estimator.xlsx	No
MDOT	Bike Lanes (Buffer)	Bike Lane	N/A	$ 740,641.00	$ 740,641	$ 740,641.00	**Project:** N/A **Notes:** Both sides of roadway; (12 intersections assumed); -Includes mobilization (10% of construction costs) and contingency (10% of construction costs); does NOT include design and permitting or preliminary site	https://www.mdot.maryland.gov/OPCP/MDOT_BPAG_Bikeways_Project_Cost_Estimator.xlsx	No
MDOT	Bike Lane (protected two	Bike Lane	N/A	$ 489,929.00	$ 489,929	$ 489,929.00	**Project:** N/A **Notes:** Both sides of roadway; (12 intersections assumed); -Includes mobilization (10% of construction costs) and contingency (10% of construction costs); does NOT include design and permitting or preliminary site	https://www.mdot.maryland.gov/OPCP/MDOT_BPAG_Bikeways_Project_Cost_Estimator.xlsx	No
MDOT	Bike Boulevard	Bike Lane	N/A	$ 55,024.75	$ 55,025	$ 55,024.75	**Project:** N/A **Notes:** Both sides of roadway; (10 intersections, 40' intersection length, 100' contraflow length, 2 contraflow intersections assumed); -Includes mobilization (10% of construction costs) and contingency (10% of construction costs); does NOT include design and permitting or preliminary site	https://www.mdot.maryland.gov/OPCP/MDOT_BPAG_Bikeways_Project_Cost_Estimator.xlsx	No

Jurisdiction	Project Type	VDOT Project Type	Year Constructed	Total Construction Cost	Cost per Mile (given year)	Cost per Mile ($2022)	Notes / Known Additional Improvements	Links	Selected in Cost Estimate Calculation?
VDOT COST TAB	Bike Lane	Bike Lane	2022		$ 203,400	$ 203,400.00			Yes
VDOT	Bike Route Signage	Bike Route Signage	2017	$76,216.00	$ 21,776.00	$ 25,695.68	**Project:** USBR 1 Signage Cost Summary (From VDOT staff) **Notes:** Cost includes foundation ($250/ea.), sign post (approximately 10 ft - $200/ea.), and sign panel ($25/sqft). The estimates include a 15% contingency.		yes
Arlington County		Cycle Track	2020		$ 597,274	$ 668,946.43	**Project:** S Clark Street Cycle Track (From 23rd Street South to 27th Street South) **Notes:** This project cost estimate includes installation and removal of pavement markings, installation, removal, and replacement of signage and bollards, installation, removal, relocation, and replacement of parking, asphalt, and milling cost. The costs do not include design and soft costs (design fees, legal fees, taxes, and maintenance and repair costs that occur after construction is complete).		Yes
Montgomery County		Cycle Track	2021	$ 1,246,000.00	$ 4,385,920	$ 4,692,934.40	**Project:** Capital Crescent Surface Trail Phase 1 **Notes**: This cost includes right-of-way acquisition (minimal), concrete medians with dyed/stamped inlay, street lighting upgrades (minimal), signal work (2 intersections), resurfacing, curb & gutter, storm drain construction, markings, and signage. The cost does not include the design or staff time. This project was originally a single project that was later broken into 2 phases. Any money spent on what is now Phase 2 prior to them being split apart is attributed to Phase 1 (there was no way to separate the design costs cleanly). This project was also stuck in a re-design cycle for several years as we tried to placate several different agencies that had competing priorities, so it spent a lot of design money on redesign over several years.		Yes
Montgomery County		Cycle Track	2021	$ 1,225,284.00	$ 6,091,807	$ 6,518,233.98	**Project:** Capital Crescent Surface Trail **Notes:** This project cost does not include planning, staff time, or land acquisition (not required for this project).		Yes
VDOT	Cycle Track	Cycle Track	2023	$ 685,000.00	$ 978,571	$ 949,147.85	**Project:** Vienna Metro Station Cycle Track (quick build) **Notes:** The total cost provided is the total expenditure amount. This was a		Yes

Jurisdiction	Project Type	VDOT Project Type	Year Constructed	Total Construction Cost	Cost per Mile (given year)	Cost per Mile ($2022)	Notes / Known Additional Improvements	Links	Selected in Cost Estimate Calculation?
Arlington County	Active Natural Surface T	Natural Surface Trail	N/A	$ 91,080.00	$ 91,080	$ 91,080.00	**Project:** N/A *Provided by Arlington County Department of Parks and Recreation staff* **Notes:** The costs provided are averaged between $7-$12/LF and $20-$30/LF. The costs vary significantly based on terrain, soil type, trail width, and number of bridge and boardwalk sections needed. A general estimate for maintenance staff typically use is 20% of construction costs annually, though that is a conservative estimate and is often defrayed through the use of trained volunteers.		Yes
DCR	Natural Surface Trail	Natural Surface Trail	N/A	$ 245,193.24	$ 308,243	$ 308,242.93	**Project**: Isle of Wight County *Provided by DCR staff* **Notes**: The project cost provided is for the construction of ATV trails. The construction price included what was paid to the contractor for construction of the trail and parking area.		Yes
DCR	Natural Surface Trail	Natural Surface Trail	N/A	$ 283,215.00	$ 141,608	$ 141,607.50	**Project**: Shenandoah Valley Bicycle Coalition *Provided by DCR staff* **Notes:** The cost provided includes construction of a singletrack mountain bike and hiking trail on Narrowback Mountain in the North River Ranger District of the George Washington and Jefferson National Forest. The construction price given includes trail construction, decommissioning, and NEPA review.		Yes
DCR	Natural Surface Trail	Natural Surface Trail	N/A	$39,600.00	$39,600.00	$ 39,600.00	**Project:** N/A *Provided by DCR staff* **Notes:** The cost is an estimate for a natural surface trail up to 36" wide average of $7.50/ft for construction. There are assumed maintenance costs of 4% of replacement cost or $1,584/mile.		No
DCR	Natural Surface Trail	Natural Surface Trail	N/A	$720,000	$ 720,000	$ 720,000.00	**Project:** *Provided by DCR staff* **Notes**: Costs provided are from the most recent Rails to Trails studies and are estimates, not construction costs. The construction cost (excluding bridges and other structures) is estimated between $500,000-$720,000. Upon reviewing the numbers, VDOT supported the numbers that have overhead built in.		No
DCR	Natural Surface Trail	Natural Surface Trail	N/A	$ 330,000.00	$ 330,000.00	$ 330,000.00	**Project**: Natural surface trail - RTP project *Provided by DCR staff* **Notes**: The cost provided is the estimated construction cost for 1 mile of rail to trail and just tread construction. Maintenance notes provided include: 4% of replacement cost on larger trails would put annual maintenance costs between $13,000 and $28,000 per mile.		Yes

Jurisdiction	Project Type	VDOT Project Type	Year Constructed	Total Construction Cost	Cost per Mile (given year)	Cost per Mile ($2022)	Notes / Known Additional Improvements	Links	Selected in Cost Estimate Calculation?
Industry Partner	Natural Surface Trail	Natural Surface Trail	N/A	$264,000	$ 264,000	$ 264,000.00	**Project:** N/A **Notes:** Planning-level cost estimate; $50/LF for a 6' gravel trail with no shoulders (this may meet recreational trail standards)		No
Industry Partner	Natural Surface Trail	Natural Surface Trail	N/A	$396,000	$ 396,000	$ 396,000.00	**Project:** N/A **Notes**: The cost provided is an estimate assuming $75/LF for a 8' trail with 1' shoulders.		No
Purcellville	Trail	Natural Surface Trail	2023	$ 372,000.00	$ 935,314	$ 907,191.35	**Project:** Suzanne Kane Trail **Notes:** The provided cost is a BID cost estimate and includes 5% contingency.	https://purcellvilleva.gov/962/Suzanne-R-Kane-Nature-Preserve	Yes
MDOT	Shared Use Path (Stream valley)	Natural Surface Trail	N/A	$ 2,502,500.00	$ 2,502,500	$ 2,502,500.00	**Project:** N/A **Notes:** Two-way hard-surface trail; -Includes mobilization (10% of construction costs) and contingency (10% of construction costs); does NOT include design and permitting or preliminary site	https://www.mdot.maryland.gov/OPCP/MDOT_BPAG_Bikeways_Project_Cost_Estimator.xlsx	No
MDOT	Shared Use Path (steep terrain)	Natural Surface Trail	N/A	$ 3,575,000.00	$ 3,575,000	$ 3,575,000.00	**Project:** N/A **Notes:** Two-way hard-surface trail; -Includes mobilization (10% of construction costs) and contingency (10% of construction costs); does NOT include design and permitting or preliminary site	https://www.mdot.maryland.gov/OPCP/MDOT_BPAG_Bikeways_Project_Cost_Estimator.xlsx	No
MDOT	Shared Use Path (rolling terrain)	Natural Surface Trail	N/A	$ 1,787,500.00	$ 1,787,500	$ 1,787,500.00	**Project:** N/A **Notes:** Two-way hard-surface trail; -Includes mobilization (10% of construction costs) and contingency (10% of construction costs); does NOT include design and permitting	https://www.mdot.maryland.gov/OPCP/MDOT_BPAG_Bikeways_Project_Cost_Estimator.xlsx	No
MDOT	Shared Use Path (level terrain)	Natural Surface Trail	N/A	$ 1,573,000.00	$ 1,573,000	$ 1,573,000.00	**Project:** N/A **Notes:** Two-way hard-surface trail; -Includes mobilization (10% of construction costs) and contingency	https://www.mdot.maryland.gov/OPCP/MDOT_BPAG_Bikeways_Project_Cost_Estimator.xlsx	No
Arlington County	Shared Lane Markings	Shared Lanes	N/A	$ 23,339.80	$ 47,539.80	$ 47,539.80	**Project:** N/A *Provided by Arlington County DES* **Notes:** Costs provided by Arlington County are in-house estimates for shared lane markings at $513.70 per shared lane marking, which does not include road repaving. Center line markings are required by VDOT when applying sharrows; the center line markings are included in the estimate at $2.28 per linear foot. The cost estimate assumes 1 mile of sharrows spaced at 250 feet apart plus the $2.28/LF for center line markings.		Yes
City of Alexandria	Multimodal (Sidewalk, pavement markings, transit improvements)	Shared Lanes	2022	$ 130,000.00	$ 130,000	$ 130,000.00	**Project**: Rayburn-Reading SRTS Project **Notes:** Project cost includes pavement markings (sharrows), sidewalk, and curb ramps.	https://www.alexandriava.gov/transportation-planning/rayburn-reading-avenue-complete-streets-project	No

Jurisdiction	Project Type	VDOT Project Type	Year Constructed	Total Construction Cost	Cost per Mile (given year)	Cost per Mile ($2022)	Notes / Known Additional Improvements	Links	Selected in Cost Estimate Calculation?
City of Richmond	Shared Lane Markings	Shared Lanes	2024	$32,500	$ 32,500.00	$ 30,574.97	**Project Name:** N/A *From Department of Public Works at the City of Richmond* **Notes:** -For urban areas, the cost ranges between $25,000-$40,000 per mile for pre-formed thermoplastic SLM. The cost accounts for installation only and does not include mobilization, maintenance of traffic, contingency, etc. The average value was used for this cost estimate. The City noted that they employ SLMs in the following situations: -Intersections where bike lanes drop at a mixing zone in order to provide a dedicated right turn lane. -On "bike boulevards" where a bike route is marked and has other traffic calming elements. -On projects with contraflow bike lanes, or climbing bike lanes (i.e. those with a bike lane in only one direction)		Yes
Fairfax County	SRTS	Shared Lanes	2020	$ 1,113,448.00	$ 4,423,631	$ 4,954,466.59	**Project:** Old Courthouse Road SRTS;	https://www.viennava.gov/your-government/town-departments-at-your-service/public-works/town-project-updates/public-works-project-updates/old-courthouse-road-at-westbriar-court-ne-sidewalk-project	No
MCDOT	Restriping and minor ge	Shared Lanes	N/A	$ 506,880.00	$ 506,880	$ 506,880.00	**Project**: N/A **Notes:** The costs provided are planning level costs from MCDOT.		No
MCDOT	Shared Lanes	Shared Lanes	N/A	$ 34,848,000.00	$ 34,848,000	$ 34,848,000.00	**Project**: N/A **Notes:** The costs provided are planning level costs from MCDOT and include shared/curb less street reconstruction.		No
MDOT	Shared Lanes (one side)	Shared Lanes	N/A	$ 25,894.00	$ 25,894	$ 25,894.00	**Project:** N/A **Notes:** One side of roadway; (12 intersections assumed) accounts for shared lane markings, and related signage; -Includes mobilization (10% of construction costs) and contingency (10% of construction costs); does NOT include design and permitting or preliminary site	https://www.mdot.maryland.gov/OPCP/MDOT_BPAG_Bikeways_Project_Cost_Estimator.xlsx	No
MDOT	Shared Lanes (two sides)	Shared Lanes	N/A	$ 35,998.00	$ 35,998	$ 35,998.00	**Project:** N/A **Notes:** Both sides of roadway; (12 intersections assumed) accounts for shared lane markings, and related signage -Includes mobilization (10% of construction costs) and contingency (10% of construction costs); does NOT include design and permitting or preliminary site	https://www.mdot.maryland.gov/OPCP/MDOT_BPAG_Bikeways_Project_Cost_Estimator.xlsx	No
Arlington County	Shared Use Path	Shared Use Path	N/A	$ 633,807.64	$ 8,242,622	$ 8,242,621.53	**Project:** Custis Trail Improvements (intersection of Langston/N Scott, N Quinn, N Oak) **Notes:** Project included a traffic signal that was covered by TEO.		No
Arlington County	Shared Use Path	Shared Use Path	N/A	$ 1,009,686.26	$ 10,641,005	$ 10,641,004.90	**Project**: Potomac Yard/Four Mile Run Trail Connection from Route 1 trail to Four Mile Run trail **Notes:** $364k for contaminated soils and $85k for delay claim		No

Jurisdiction	Project Type	VDOT Project Type	Year Constructed	Total Construction Cost	Cost per Mile (given year)	Cost per Mile ($2022)	Notes / Known Additional Improvements	Links	Selected in Cost Estimate Calculation?
Arlington County	Shared Use Path	Shared Use Path	N/A	$ 2,140,306.87	$ 4,106,403	$ 4,106,402.72	**Project:** Washington Blvd Trail from S Walter Reed Dr to S Rolfe Street **Notes:** This project was for a bicycle and ped trail; the Fort Myer Construction includes a prefabricated pedestrian bridge and retaining walls.	https://www.arlingtonva.us/Government/Projects/Project-Types/Transportation-Projects/Washington-Boulevard-Trail	Yes
City of Fairfax	Trail	Shared Use Path	2026	$5,904,396	$ 24,742,231	$ 21,897,987.00	**Project:** Pickett Trail		No
City of Fairfax	Trail	Shared Use Path	2023	$852,680	$ 9,004,301	$ 8,733,560.43	**Project**: Judicial Drive Trail **Notes**: This construction cost includes construction of a small pedestrian bridge.	https://www.fairfaxva.gov/government/public-works/transportation-division/current-transportation-projects/judicial-drive-trail	Yes
City of Fairfax	Trail	Shared Use Path	2025	$17,635,000	$ 12,656,354	$ 11,548,687.63	**Project**: George Snyder Trail **Notes**: The construction cost provided includes design for the trail, bridge, and retaining wall, drainage and hydrology, stormwater management, lighting, landscaping, and erosion and sediment control.	https://www.fairfaxva.gov/government/public-works/transportation-division/current-transportation-projects/george-snyder-trail	Yes
Fairfax County	Trail	Shared Use Path	2019	$ 2,333,703.00	$ 6,057,990	$ 6,845,528.80	**Project:** Vesper Court Trail **Notes:** The project included a 90' pedestrian bridge and trail lighting. The cost provided include preliminary engineering design, ROW/utilities, and construction.	https://www.fairfaxcounty.gov/transportation/walk/projects/vesper-trail	Yes
Fairfax County	Trail	Shared Use Path	2020	$ 731,333.00	$ 3,331,698	$ 3,731,502.01	**Project:** Route 50 Trail; **Notes**: Limited detailed cost information was available for this project. The cost provided includes preliminary engineering, ROW/utilities, and construction.		Yes
Fairfax County	Trail	Shared Use Path	2023	$ 10,220,932.00	$ 6,844,201	$ 6,638,409.80	**Project:** Mt. Vernon Mem. Hwy Trail **Notes:** The cost provided is the estimated final cost, project closeout in progress as of Spring 2024. The project included a 218' long 5-span steel girder pedestrian bridge, a 155' retaining wall, and underground detention. The county added 1,600 LF of existing trail reconstruction and the cost included preliminary engineering, ROW/utilities, and construction.	http://www.fairfaxcounty.gov/transportation/walk/projects/mount-vernon-memorial-highway-trail-project	Yes
Fairfax County	Trail	Shared Use Path	2022	$ 2,526,085.00	$ 8,299,769	$ 8,299,769.01	**Project**: Burke VRE Connector Phase IV Trail **Notes**: The project included construction of a retaining wall. The cost provided includes preliminary engineering, ROW/utilities, and construction.	https://www.fairfaxcounty.gov/transportation/projects/burke-centre-vre-iv	yes

Jurisdiction	Project Type	VDOT Project Type	Year Constructed	Total Construction Cost	Cost per Mile (given year)	Cost per Mile ($2022)	Notes / Known Additional Improvements	Links	Selected in Cost Estimate Calculation?
Fairfax County	Trail	Shared Use Path	2020	$ 4,346,684.00	$ 8,628,004	$ 9,663,364.85	**Project:** Scotts Run Trail **Notes:** The project included construction of two pedestrian bridges (one 90' long and the other 50' long) and trail lighting. The cost provided includes preliminary engineering, ROW/utilities, and construction.	https://www.fairfaxcounty.gov/transportation/walk/projects/scottsrun-trail	yes
Fairfax County	Walkway	Shared Use Path	2020	$ 89,000.00	$ 469,920	$ 526,310.40	**Project:** Sunrise Valley Walkway; **Notes:** Limited project information was available. The project was provided by an industry partner and was constructed in an urban	N/A	Yes
Fairfax County	Trail	Shared Use Path	2021	$ 1,211,621.00	$ 9,139,084	$ 9,778,820.00	**Project**: Innovation Center to Arrowbrook Trail **Notes:** This project included a HAWK Signal and trail lighting.		Yes
Fairfax County	Trail	Shared Use Path	2022	$ 1,250,001.00	$ 9,295,782	$ 9,295,782.08	**Project**: Franconia Springfield Parkway Trail **Notes:** No additional information was provided for this project.		Yes
Fairfax County	Trail	Shared Use Path	N/A	$ 14,237,371.00	$ 28,946,214	$ 28,946,214.43	**Project:** Wiehle Ave/W&OD Trail *On-going/under construction as of 11/2023*		No
Fairfax County	Shared Use Path	Shared Use Path	2023	$ 3,100,000.00	$ 16,368,000	$ 15,875,848.69	**Project**: Westmoreland Shared Use Path **Notes:** Stormwater inlets and pipes, right of way needed, curb ramps included crossing driveways, pavement markings at intersections, utility pole relocations		No
Fairfax County/Industry Partner	Shared Use Path	Shared Use Path	2023	$ 1,136,927.90	$ 19,851,779	$ 19,254,877.34	**Project:** Route 50: Cedar Lane to Prosperity Avenue *Provided by an industry partner* **Notes**: The provided cost includes construction of a 10' shared use path on the north side of Route 50 from Cedar Lane to the existing trail and a pedestrian signal modification at Prosperity Avenue.	https://www.fairfaxcounty.gov/transportation/projects/route-50-bike-pedestrian-improvements	Yes
Industry Partner	Trail (Asphalt)	Shared Use Path	N/A	$ 19,500,000.00	$ 6,093,750	$ 6,093,750.00	**Project**: Virginia Beach Trail - Phase 1 *Provided by industry partner* **Notes**: This project cost is a 15% preliminary design cost estimate. The project includes a pedestrian bridge over a 10-lane roadway. Without the bridge the project would cost approximately $3.5 million per mile.	https://parks.virginiabeach.gov/about-us/planning-design-development/virginia-beach-trail	Yes
Industry Partner	Trail (Asphalt)	Shared Use Path	N/A	$ 14,000,000.00	$ 6,086,957	$ 6,086,956.52	Project: Virginia Beach Trail - Phase 2 Provided by industry partner Notes: The project includes a pedestrian bridge over a fairly wide creek. Without the pedestrian bridge it would cost approximately $5.5 million per mile.	https://parks.virginiabeach.gov/about-us/planning-design-development/virginia-beach-trail	Yes

Jurisdiction	Project Type	VDOT Project Type	Year Constructed	Total Construction Cost	Cost per Mile (given year)	Cost per Mile ($2022)	Notes / Known Additional Improvements	Links	Selected in Cost Estimate Calculation?
VDOT	Trail	Shared Use Path	N/A	-	$ 1,798,789	$ 1,798,789.00	**Project:** N/A **Notes**: The cost provided is an average construction cost of projects listed in the VDOT ERT Extension SYIP for the "Parallel to road (rural)" project type.		Yes
VDOT	Trail	Shared Use Path	N/A	-	$ 5,997,652	$ 5,997,652.00	**Project:** N/A **Notes:** The cost provided is an average construction cost of projects listed in the VDOT ERT Extension SYIP for the "Parallel to street (urban/suburban)" project type.		yes
Fairfax County	Sidewalk/Walkway	Shared Use Path	2021	$ 604,181.00	$ 2,411,244	$ 2,580,030.97	**Project**: Fair Lakes Blvd Trail **Notes:** No additional information was provided for this project.		Yes
Industry Partner	Natural Surface Trail	Shared Use Path	N/A	$596,640	$ 596,640	$ 596,640.00	**Project:** N/A **Notes:** The cost provided is an estimate assuming$100-125/LF for a 8’ asphalt trail with 2’ shoulders (multiuse path minimum)		No
MCDOT	Shared Use Path	Shared Use Path	N/A	$ 8,896,800.00	$ 8,896,800	$ 8,896,800.00	**Project**: N/A **Notes:** The costs provided are planning level costs from MCDOT.		No
Arlington County	Sidewalk	Sidewalk	N/A	$ 600,000.00	$ 12,184,615	$ 12,184,615.38	**Project**: 13th St S from S Highland St to S Walter Reed Dr **Notes:** No additional project information was provided.		No
Arlington County	Sidewalk	Sidewalk	N/A	$ 402,088.10	$ 3,598,348	$ 3,598,347.74	**Project:** W&OD Trail Safety Improvements (S Oakland St, Barcroft, S Walter Reed Dr) Notes: B06K & B07K on one contract (Sagres)		Yes
City of Alexandria	Sidewalk	Sidewalk	2023	$ 107,000.00	$ 1,883,200	$ 1,826,576.14	**Project:** Polk Avenue Sidewalk **Notes**: This project included a sidewalk extension, inclusive of curb and gutter.	Polk Avenue Sidewalk Safe Routes to Schoo	Yes
City of Fairfax	Sidewalk	Sidewalk	2023	$326,267	$ 11,484,598.40	$ 11,139,280.70	**Project**: Sager Avenue Sidewalk **Notes**: No additional project information was provided.	https://www.fairfaxva.gov/government/public-works/transportation-division/transportation-projects/sager-avenue-sidewalk#!/	No
City of Fairfax	Sidewalk	Sidewalk	2022	$253,146	$ 6,683,054	$ 6,683,054.40	**Project**: Hill Street Pedestrian Path **Notes:** This project includes crosswalk striping, signage, and curb ramps.	https://www.fairfaxva.gov/government/public-works/transportation-division/current-transportation-projects/hill-street-connection-project	Yes
City of Fairfax	Sidewalk	Sidewalk	2023	$654,668	$ 3,057,329	$ 2,965,401.81	**Project**: Chain Bridge Road Sidewalk and Cedar Avenue Pedestrian Crossing **Notes:** This project included a ROW component. No additional cost information was provided for this project.	https://www.fairfaxva.gov/government/public-works/transportation-division/current-transportation-projects/chain-bridge-road-sidewalk-and-cedar-avenue-pedestrian-crossing	Yes

Jurisdiction	Project Type	VDOT Project Type	Year Constructed	Total Construction Cost	Cost per Mile (given year)	Cost per Mile ($2022)	Notes / Known Additional Improvements	Links	Selected in Cost Estimate Calculation?
City of Fairfax		Sidewalk	N/A	$30,000	$ 2,436,923	$ 2,436,923.08	**Project**: Jones Street **Notes:** The cost value provided is an estimate; a small retaining wall was required for this project. No additional cost information was provided for this project.	https://www.fairfaxva.gov/home/showpublisheddocument/16948/637405163205270000	No
City of Fairfax	Sidewalk	Sidewalk	2022	$301,950	$ 2,277,566	$ 2,277,565.71	**Project:** Hallman Street sidewalk **Notes**: C&G not required; a different total cost listed in the project slides - the cost provided was used.	https://www.fairfaxva.gov/home/showpublisheddocument/16948/637405163205270000	Yes
Fairfax County	Sidewalk	Sidewalk	2021	$ 951,109.00	$ 25,109,278	$ 26,866,927.03	**Project**: N. West St Sidewalk - Great Falls to Brilyn; **Notes**: -Traffic Signal Rebuild; cost includes PE, ROW/utilities, and construction		No
Fairfax County	Sidewalk	Sidewalk	2020	$ 2,590,017.00	$ 9,056,483	$ 10,143,261.28	**Project**: Great Falls St. Sidewalk **Notes:** Project includes a traffic signal rebuild, 4'-6' sidewalk and curb ramps, storm drain inlets and pipes, and C&G. The cost includes $313k for preliminary engineering, $60k for ROW/utilities, and $2.2 million for construction.	https://www.fairfaxcounty.gov/transportation/projects/greatfalls-northwest	No
Fairfax County	Walkway	Sidewalk	2020	$ 1,972,087.00	$ 8,662,745	$ 9,702,274.28	**Project**: Fleet Drive Walkway - Yadkin to Franconia **Notes**: Railroad agreement/flagging required; The cost provided includes preliminary engineering, ROW/utilities, and construction.	https://www.slideshare.net/fairfaxcounty/fairfax-county-fleet-drive-walkway-improvements-sept-2020	Yes
Fairfax County	Walkway	Sidewalk	2023	$ 1,230,000.00	$ 9,134,177	$ 8,859,531.73	**Project**: Rt. 50 Walkway - Chichester to Cedar **Notes**: The cost provided is an estimated final cost; project closeout is in progress as of Spring 2024. The cost provided includes preliminary engineering, ROW/utilities, and construction.	https://www.fairfaxcounty.gov/transportation/projects/route-50-bike-pedestrian-improvements https://www.fairfaxcounty.gov/transportation/sites/transportation/files/Assets/Documents/PDF/Transportation%20Projects%2C%20Studies%20and%20Plans/Route%2050%20Bike-Ped/2G40-088-076-Plans.pdf	Yes
Fairfax County	Sidewalk	Sidewalk	2020	$ 1,917,387.00	$ 6,934,112	$ 7,766,205.32	**Project:** Chesterbrook Road - Chesterford Way to Maddux Lane **Notes**: No additional project information was provided for this project.		Yes
Fairfax County	Walkway	Sidewalk	2021	$ 1,583,281.00	$ 2,217,433	$ 2,372,653.67	**Project**: South Lake Dr Walkway - Greenskeeper to Sunrise Valley **Notes**: This project included sidewalk connections and crossings. The cost provided includes preliminary engineering, ROW/utilities, and construction.	https://www.facebook.com/RestonAssociation/videos/reston-today-new-sidewalks-and-pathway-connections/149863160467748/	Yes
City of Alexandria	Sidewalk	Sidewalk	2026	$ 32,500.00	$ 1,144,000	$ 1,012,491.45	**Project:** Leslie Avenue Sidewalk **Notes**: None.		Yes

Jurisdiction	Project Type	VDOT Project Type	Year Constructed	Total Construction Cost	Cost per Mile (given year)	Cost per Mile ($2022)	Notes / Known Additional Improvements	Links	Selected in Cost Estimate Calculation?
Fairfax County	Walkway	Sidewalk	2022	$ 1,600,001.00	$ 16,152,974	$ 16,152,973.77	**Project**: Rock Hill Rd Walkway **Notes:** Project includes a retaining wall.		No
Fairfax County	Walkway	Sidewalk	2022	$ 1,190,432.00	$ 12,570,962	$ 12,570,961.92	**Project**: Kirby Road Walkway - Chesterbrook ES to Halsey **Notes:** No additional project information was provided.		No
Fairfax County	Walkway	Sidewalk	2022	$ 1,982,819.00	$ 9,339,237	$ 9,339,236.68	**Project**: Rolling Road Walkway -Roxbury to Tuttle **Notes**: This project includes a retaining wall; no additional cost information was provided.		Yes
Fairfax County	Walkway/ Ped signals	Sidewalk	2020	$ 1,349,552.00	$ 5,793,199	$ 6,488,382.69	**Project:** Telegraph Road Walkway - Phase 1 **Notes:** This project included pedestrian signals; no additional information about the cost was provided.		Yes
Fairfax County	Walkway	Sidewalk	2022	$ 1,554,694.00	$ 6,013,761	$ 6,013,761.41	**Project**: Kirby Road Walkway - Halsey to Franklin **Notes:** No additional cost information was provided for this project.		Yes
Fairfax County	Walkway	Sidewalk	2023	$ 2,250,000.00	$ 5,809,291	$ 5,634,617.80	**Project**: Fox Mill Rd Walkway - FFX County Pkwy to Reston Pkwy **Notes**: No additional cost information was provided for this project.		Yes
Fairfax County	Walkway	Sidewalk	2021	$ 490,994.00	$ 5,184,897	$ 5,547,839.40	**Project:** Hunter Village Dr Walkway - Wentworth to Flax **Notes:** No additional cost information was provided for this project.		Yes
Fairfax County	Walkway	Sidewalk	2022	$ 828,562.00	$ 4,943,285	$ 4,943,285.15	**Project:** Lincolnia Road Walkway **Notes:** No additional cost information was provided for this project.		Yes
Fairfax County	Walkway	Sidewalk	2022	$ 1,458,727.00	$ 3,805,375	$ 3,805,374.78	**Project:** Monroe St Walkway		Yes
Fairfax County	Walkway	Sidewalk	2023	$ 900,000.00	$ 3,813,804	$ 3,699,131.11	**Project**: Lisle Ave Walkway		Yes
Fairfax County	Walkway	Sidewalk	2021	$ 1,299,773.00	$ 2,964,493	$ 3,172,007.58	**Project**: North Shore Dr Walkway - North Shore Ct to Sycamore		Yes
MCDOT	Sidewalk	Sidewalk	N/A	$ 1,515,360.00	$ 1,515,360	$ 1,515,360.00	**Project**: N/A	DataWindow (maryland.gov)	No
MDOT	Sidewalk	Sidewalk	2023	$ 12,125.00	$ 132,000	$ 128,031.04	5 inch concrete sidewalk (item 655105)	DataWindow (maryland.gov)	No
MDOT	Sidewalk	Sidewalk	2023	$ 48,000.00	$ 126,720	$ 122,909.80	5 inch concrete sidewalk (item 655105)	DataWindow (maryland.gov)	No
MDOT	Sidewalk	Sidewalk	2023	$ 11,730.00	$ 121,440	$ 117,788.55	5 inch concrete sidewalk (item 655105)	DataWindow (maryland.gov)	No
MDOT	Sidewalk	Sidewalk	2023	$ 286,000.00	$ 116,160	$ 112,667.31	5 inch concrete sidewalk (item 655105)	DataWindow (maryland.gov)	No
MDOT	Sidewalk	Sidewalk	2023	$ 286,000.00	$ 116,160	$ 112,667.31	5 inch concrete sidewalk (item 655105)	DataWindow (maryland.gov)	No
MDOT	Sidewalk	Sidewalk	2023	$ 12,600.00	$ 105,600	$ 102,424.83	5 inch concrete sidewalk (item 655105)	DataWindow (maryland.gov)	No
MDOT	Sidewalk	Sidewalk	2023	$ 11,328.00	$ 84,480	$ 81,939.86	5 inch concrete sidewalk (item 655105)	DataWindow (maryland.gov)	No
MDOT	Sidewalk	Sidewalk	2023	$ 42,798.00	$ 73,920	$ 71,697.38	5 inch concrete sidewalk (item 655105)	DataWindow (maryland.gov)	No
MDOT	Sidewalk	Sidewalk	2023	$ 66,906.00	$ 71,280	$ 69,136.76	5 inch concrete sidewalk (item 655105)	DataWindow (maryland.gov)	No
MDOT	Sidewalk	Sidewalk	2023	$ 218,261.95	$ 64,363	$ 62,427.93	5 inch concrete sidewalk (item 655105)	DataWindow (maryland.gov)	No
MDOT	Sidewalk	Sidewalk	2023	$ 33,843.50	$ 59,664	$ 57,870.03	5 inch concrete sidewalk (item 655105)	DataWindow (maryland.gov)	No
MDOT	Sidewalk	Sidewalk	2023	$ 66,600.00	$ 47,520	$ 46,091.17	5 inch concrete sidewalk (item 655105)	DataWindow (maryland.gov)	No
MDOT	Sidewalk	Sidewalk	2023	$ 192,500.00	$ 46,200	$ 44,810.86	5 inch concrete sidewalk (item 655105)	DataWindow (maryland.gov)	No

Jurisdiction	Project Type	VDOT Project Type	Year Constructed	Total Construction Cost	Cost per Mile (given year)	Cost per Mile ($2022)	Notes / Known Additional Improvements	Links	Selected in Cost Estimate Calculation?
MDOT	Sidewalk	Sidewalk	2023	$ 318,500.00	$ 36,960	$ 35,848.69	5 inch concrete sidewalk (item 655105)	DataWindow (maryland.gov)	No
MDOT	Sidewalk	Sidewalk	2023	$ 37,199.50	$ 34,320	$ 33,288.07	5 inch concrete sidewalk (item 655105)	DataWindow (maryland.gov)	No

The total construction cost of projects in the above table are: $107,504,037 (for projects used in cost-per-mile calculation, shown in green rows); $152,227,184 (for project not used in cost-per-mile calculations, shown in white rows), for a combined total of $259,731,222.

The projects in Appendix G are generally a sample of completed projects, mainly across Virginia and Maryland, compiled to formulate a median cost-per-mile figure for planned projects. These project examples were sent to the Study Team in response to a survey requesting completed project data. This list is not meant to be representative of bike/pedestrian investments in Northern Virginia.

Appendix H: Funding Resources

Pedestrian and Bicycle Funding Opportunities: U.S. Department of Transportation Highway, Transit, and Safety Funds

November 16, 2023

This table indicates likely eligibility for pedestrian and bicycle activities and projects under U.S. Department of Transportation surface transportation funding programs. Activities and projects need to meet program eligibility requirements. See notes and basic program requirements below, with links to program information. Project sponsors should integrate the safety, accessibility, equity, and convenience of walking and bicycling into surface transportation projects.

	Pedestrian and Bicycle Funding Opportunities: Highway, Transit, and Safety Funds **Key:** $ = Activity likely eligible. Restrictions may apply, see program notes and guidance. ~$ = Eligible, but not competitive unless part of a larger project.																												
	Federal Highway Administration														**Federal Lands**			**OST Grant**						**OST Loan**		**FTA**			**NHTSA**	
Activity or Project Type	ATIIP	BRI	CRP	CMAQ	HSIP	RHCP	NHPP	PROT	STBG	TASA	RTP	SRTS	PLAN	NSBP	FLTTP	TTP	TTPSF	INFRA	RAISE	RCN	SS4A	SMART	Thrive	RRIF	TIFIA	FTA	AoPP	TOD	402	405
Access enhancements to public transportation (benches, bus pads, lighting)	$		$	$			$	$	$	$				$	$	$		$	$	$	~$			~$	~$	$				
Americans with Disabilities Act (ADA)/504 Self Evaluation / Transition Plan	$		$						$	$	$		$		$	$					$		TA				$	~$		
Barrier removal for ADA compliance	$	$	$				$	$	$	$	$	$		$	$	$		$	$	$	~$			~$	~$	$				
Bicycle plans	$		$					$	$	$		$	$		$	$	$			~$	$					$	$	~$		
Bicycle helmets (project or training related)	~$				$				$	$SRTS		$				$													$	
Bicycle helmets (safety promotion)	~$				$				$	$SRTS		$				$														
Bicycle lanes on road	$		$	$	$	$	$	$	$	$		$		$	$	$	$	~$	~$	$	$			~$	~$	$				
Bicycle parking (see Bicycle Parking Solutions)	$		$	$			$		$	$	$	$		$	$	$		~$	~$	$	~$			~$	$	$				
Bike racks on transit	$		$	$					$	$					$	$			~$	$	~$				~$	$				
Bicycle repair station (air pump, simple tools, electric outlets)	$		$						$	$					$	$			~$	$	~$			~$	~$	$				
Bicycle share (capital and equipment including charging stations and outlets; not operations)	$		$	$			$		$	$					$	$		~$	~$	$	~$			~$	~$	$				
Bicycle storage or service centers (e.g. at transit hubs) including charging stations and outlets; not operations)	$		$	$					$	$					$	$			~$	$	~$			~$	$	$				
Bridges / overcrossings for pedestrians and/or bicyclists	$	$	$	$	$	$	$	$	$	$	$	$			$	$	$	$	$	$	$			~$	~$	$				
Bus shelters and benches	$		$	$			$	$	$	$				$	$	$		$	$	$	~$			~$	~$	$				
Charging stations for electric bicycles and scooters NEW	$		$	$					$	$	$				$	$						~$		~$	~$					
Coordinator positions: State/local (CMAQ/STBG limited)				$					$	$SRTS		$				$					~$									
Community Capacity Building (develop organizational skills and processes)	~$												$			$				NAE	~$		TA				~$	~$		
Crosswalks for pedestrians, pedestrian refuge islands (new or retrofit)	$		$	~$	$	$	$	$	$	$	$	$		$	$	$	$	$	$	$	$			~$	~$	$				
Curb ramps	$	$	$	~$	$	$	$	$	$	$	$	$		$	$	$	$	$	$	$	$			~$	~$	$				
Counting equipment	$				$	$	$		$	$	$	$	$		$	$	$	$		$	~$				~$	$				
Data collection and monitoring for pedestrians and/or bicyclists	$		$		$	$	$		$	$	$	$	$		$	$	$	$	$	$	$				~$	$	~$	~$		
Emergency and evacuation routes for pedestrians and/or bicyclists	$		$				$	$	$	$	$	$			$	$		$	$	$	~$				$	$	~$	~$		
Encouragement and education activities related to safe access for bicyclists and pedestrians NEW	~$			$	$				$	$SRTS	$	$	$			$					~$	~$								
Historic preservation (pedestrian, bicycle, transit facilities)	~$		$						$	$				$	$	$			~$	~$	~$			~$	~$	$				
Landscaping, streetscaping (pedestrian/bicycle route; transit access); related amenities (benches, lighting, shade, trees, water fountains); usually part of larger project	$		$				~$	$	$	$					$	$		~$	~$	~$	~$			~$	~$	$				
Lighting (pedestrian and bicyclist scale associated with pedestrian/bicyclist project)	$		$	~$	$	$	$	$	$	$	$	$		$	$	$	$	$	$	$	$			~$	~$	$				
Maps (for pedestrians and/or bicyclists) (see Idea Book)	$		$	$					$	$		$	$	$		$					$					$				
Micromobility projects, including scooter share (capital and equipment, including charging stations and outlets; not operations)	$		$	$					$	$					$	$			$	$	~$	~$		~$	~$					
Paved shoulders for pedestrian and/or bicyclist use	$	$	$	$	$	$	$	$	$	$		$		$	$	$	$	~$	$	$	$			~$	~$					
Pedestrian plans	$		$					$	$	$		$	$		$	$	$	~$	$	~$	$					$	$	$		
Public education and awareness programs to inform motorists and nonmotorized road users on nonmotorized road user safety NEW	~$				$				$	$SRTS		$				$													$	$

Pedestrian and Bicycle Funding Opportunities: Highway, Transit, and Safety Funds

Key: $ = Activity likely eligible. Restrictions may apply, see program notes and guidance. ~$ = Eligible, but not competitive unless part of a larger project.

	Federal Highway Administration														Federal Lands			OST Grant						OST Loan		FTA			NHTSA	
Activity or Project Type	ATIIP	BRI	CRP	CMAQ	HSIP	RHCP	NHPP	PROT	STBG	TASA	RTP	SRTS	PLAN	NSBP	FLTTP	TTP	TTPSF	INFRA	RAISE	RCN	SS4A	SMART	Thrive	RRIF	TIFIA	FTA	AoPP	TOD	402	405
Rail at-grade crossings	$		$		$	$	$	$	$	$	$	$			$	$	$	$	$	$	~$			$	$	$				
Recreational trails	$							$	$	$	$			$	$	$			$	$	~$				~$					
Resilience improvements to pedestrian and bicycle facilities or to protect or enhance use. REVISED	$	~$	~$	~$			$	$	$	$	$	$	note	$	$	$		$	$	$	~$	~$		~$	~$					
Road Diets (pedestrian and bicycle portions)	$		$	$	$		$	$	$	$		$			$	$	$	$	$	$	$			~$	$					
Road Safety Assessment for pedestrians and bicyclists	$				$	$			$	$			$		$	$	$			$	$		TA		~$		~$			
Safety education and awareness activities and programs to inform pedestrians, bicyclists, and motorists on ped/bike traffic safety laws	~$				$				$	$SRTS		$	$			$					$						~$	~$	$	$
Safety education positions					$				$SRTS	$SRTS		$				$					$								$	
Safety enforcement (including police patrols)					$				$SRTS	$SRTS		$				$					$								$	$
Safety program technical assessment (for peds/bicyclists)	~$				$				$SRTS	$SRTS		$	$		$	$				$	$		TA						$	
Separated bicycle lanes	$	$	$	$	$	$	$	$	$	$		$		$	$	$	$	$	$	$	$			~$	~$	$				
Shared use paths / transportation trails	$		$	$	$	$	$	$	$	$	$	$		$	$	$	$	$	$	$	$			~$	~$	$				
Sidewalks (new or retrofit)	$	$	$	$	$	$	$	$	$	$	$	$		$	$	$	$	$	$	$	$			~$	~$	$				
Signs, signals, signal improvements (incl accessible pedestrian signals) see note	$		$	$	$	$	$	$	$	$		$		$	$	$	$	$	$	$	$	$		~$	~$	$				
Signing for pedestrian or bicycle routes	$		$	$	$		$	$	$	$		$		$	$	$	$	$	$	$	$			~$	~$	$				
Spot improvement programs (programs of small projects to enhance pedestrian and bicycle use) REVISED	$		$	~$	$	$	$		$	$	$	$			$	$	$	$	$	~$	$	~$		~$	~$	$				
Stormwater mitigation related to pedestrian and bicycle project impacts REVISED	$				$	$	$	$	$	$	$	$	note		$	$	$	$	$	$	~$			~$	~$	$	note	note		
Technical Assistance (see Cross-cutting notes) NEW	~$			~$	$				$	$	$	$	note			$	$			~$	~$	~$	TA							
Traffic calming	$		$		$		$	$	$	$		$			$	$	$	$	$	$	$			~$	~$	$				
Trail bridges	$		$	~$	$	$	$	$	$	$	$	$			$	$	$	$	$	$	~$			~$	$					
Trail construction and maintenance equipment	$		$						$	$	$				~$	~$	~$				~$			~$	~$					
Trail/highway crossings and intersections	$	$	$	~$	$	$	$	$	$	$	$	$		$	$	$	$	$	$	$	$			~$	~$					
Trailside/trailhead facilities (restrooms, water, but not general park amenities)	$		~$						$	$	$			$	$	$			~$					~$	~$					
Training	~$			$	$				$	$	$	$	$			$					$		TA				~$	~$	$	
Training for law enforcement on ped/bicyclist safety laws	~$			~$	$				$SRTS	$SRTS		$				$					$						~$	~$	$	$
Tunnels / underpasses for pedestrians and/or bicyclists	$		$	$	$	$	$	$	$	$	$	$			$	$	$	$	$	$	$			$	$	$				
Vulnerable Road User Safety Assessment	$				$				$	$		$	$			$	$			$			TA				~$	~$		

Abbreviations (alphabetical order)

ADA/504: Americans with Disabilities Act of 1990 / Section 504 of the Rehabilitation Act of 1973
AoPP: Areas of Persistent Poverty Program
ATIIP: Active Transportation Infrastructure Investment Program [web link under development]
BIL: Bipartisan Infrastructure Law (Infrastructure Investment and Jobs Act (Pub. L. 117-58)
BRI: Bridge Programs, including: BFP: Bridge Formula Program; BIP: Bridge Investment Program; BRR: Bridge Replacement and Rehabilitation Program
CMAQ: Congestion Mitigation and Air Quality Improvement Program
CRP: Carbon Reduction Program
FLTTP: Federal Lands and Tribal Transportation Programs: Federal Lands Access Program, Federal Lands Transportation Program, Tribal Transportation Program, Federal Lands Planning Program and related programs for Federal and Tribal lands such as the Nationally Significant Federal Lands and Tribal Projects program
FTA: Federal Transit Administration Capital Funds
PLAN: Statewide Planning and Research (SPR) or Metropolitan Planning funds (FHWA and/or FTA funding)
PROTECT: Promoting Resilient Operations for Transformative, Efficient, and Cost Saving Transportation
RAISE: Rebuilding American Infrastructure with Sustainability and Equity
RCN: Reconnecting Communities and Neighborhoods Grant Program (includes Reconnecting Communities Pilot Program (RCP) and Neighborhood Access and Equity programs)
RHCP: Railway-Highway Crossings (Section 130) Program
RRIF: Railroad Rehabilitation and Improvement Financing (loans)
RTP: Recreational Trails Program
SMART: Strengthening Mobility and Revolutionizing Transportation (SMART) Grants Program
SRTS: Safe Routes to School Program (and related activities)
SS4A: Safe Streets and Roads for All
STBG: Surface Transportation Block Grant Program

HSIP: Highway Safety Improvement Program IIJA: Infrastructure Investment and Jobs Act (Pub. L. 117-58), also known as the Bipartisan Infrastructure Law INFRA: Infrastructure for Rebuilding America Discretionary Grant Program NAE: Neighborhood Access and Equity Program NHPP: National Highway Performance Program NHTSA 402: National Highway Traffic Safety Administration State and Community Highway Safety Grant Program NHTSA 405(g): National Highway Traffic Safety Administration National Priority Safety Programs (Nonmotorized safety) NSBP: National Scenic Byways Program	TASA: Transportation Alternatives Set-Aside (formerly Transportation Alternatives Program, Transportation Enhancements) Thrive: Thriving Communities Initiative (TA: Technical Assistance) TIFIA: Transportation Infrastructure Finance and Innovation Act (loans) TOD: Transit-Oriented Development TTP: Tribal Transportation Program TTPSF: Tribal Transportation Program Safety Fund

Cross-cutting notes

This table indicates likely eligibility for pedestrian, bicycle, and micromobility activities and projects under U.S. Department of Transportation surface transportation funding programs. Activities and projects must meet program eligibility requirements. See notes and links to program information below. Although the primary focus of this table is stand-alone activities and projects, programs can also fund pedestrian and bicycle facilities as part of larger projects. Project sponsors are encouraged to consider Complete Streets and Networks that routinely integrate the safety, accessibility, equity, and convenience of walking and bicycling into surface transportation projects. The Federal-aid eligibility of the pedestrian and bicycle elements are considered under the eligibility criteria applicable to the larger highway project. Pedestrian and bicycle activities also may be characterized as environmental mitigation for larger highway projects, especially in response to impacts to a Section 4(f) property or work zone safety, mobility, and accessibility impacts on bicyclists and pedestrians.

- See FHWA's Policy on Using Bipartisan Infrastructure Law Resources to Build a Better America.
- See FHWA Bicycle and Pedestrian Planning, Program, and Project Development (Guidance), Publications, Pedestrian and Bicyclist Safety, and Bicycle transportation and pedestrian walkways statute at 23 U.S.C. 217.
- Bicycle Project Purpose: 23 U.S.C. 217(i) requires that bicycle facilities "be principally for transportation, rather than recreation, purposes". However, 23 U.S.C. 133(b)(7) and 133(h) authorize recreational trails under STBG and TASA, therefore, 23 U.S.C. 217(i) does not apply to trail projects (including for bicycle use) using STBG or TASA funds. Section 217(i) applies to bicycle facilities other than trail-related projects, and section 217(i) applies to bicycle facilities using other programs (NHPP, HSIP, CMAQ). The transportation requirement under section 217(i) only applies to bicycle projects, not to any other trail use or transportation mode.
- Signs, signals, signal improvements includes ensuring accessibility for persons with disabilities. See Accessible Pedestrian Signals. See also Proven Safety Countermeasures, such as Crosswalk Visibility Enhancements, Leading Pedestrian Interval signals, Lighting, Pedestrian Hybrid Beacons, and Rectangular Rapid Flashing Beacons.
- Technical Assistance includes assisting local agencies and other potential grantees to identify pedestrian and bicycle safety and infrastructure issues, and to help them develop and implement successful projects. Technical assistance may be authorized under a program or sometimes as a limited portion of a program. See FHWA links to Technical Assistance and Local Support.
- The DOT Navigator is a resource to help communities understand the best ways to apply for grants, and to plan for and deliver transformative infrastructure projects and services.
- Aspects of DOT initiatives may be eligible as individual projects. Activities above may benefit safe, comfortable, multimodal networks; environmental justice; and equity.
- Occasional DOT or agency incentive grants may be available for specific research or technical assistance purposes.
- Operation costs: In general, ongoing and routine operation costs (such as ongoing costs for bike sharing or scooter sharing) are not eligible unless specified within program legislation. See links to program guidance for more information.

Program-specific notes

DOT funding programs have specific requirements that activities and projects must meet. Eligibility must be determined on a case-by-case basis. See links to program guidance for more information.

FHWA Programs

- ATIIP (IIJA § 11529): Subject to appropriations. Projects costing at least $15,000,000 to develop or complete active transportation networks and spines, or at least $100,000 to plan or design for active transportation networks and spines.
- BRI: BFP, (IIJA, Div. J, title VIII, para. (1)), BIP (23 U.S.C. 124), BRR (Department of Transportation Appropriations Act, 2022): For specific highway bridge projects and highway bridge projects that will replace or rehabilitate a bridge; project must consider pedestrian and bicycle access as part of the project and costs related to their inclusion are eligible under these programs.
- CRP (23 U.S.C. 175): Projects should support the reduction of carbon dioxide emissions from on-road highway sources.
- CMAQ (23 U.S.C. 149): Projects must demonstrate emissions reduction and benefit air quality. See the CMAQ guidance for a list of projects that may be eligible for CMAQ funds. CMAQ funds may be used for shared use paths, but not for trails that are primarily for recreational use.
- HSIP (23 U.S.C. 148): Projects must be consistent with a State's Strategic Highway Safety Plan and (1) correct or improve a hazardous road location or feature, or (2) address a highway safety problem. Certain noninfrastructure safety projects can also be funded using HSIP funds as specified safety projects.
- RHCP (23 U.S.C. 130): Projects at all public railroad crossings including roadways, bike trails, and pedestrian paths.
- NHPP (23 U.S.C. 119): Projects must benefit National Highway System (NHS) corridors and must be located on land adjacent to any highway on the National Highway System (23 U.S.C. 217(b)).
- PROTECT (23 U.S.C. 176): Funds can only be used for activities that are primarily for the purpose of resilience or inherently resilience related. With certain exceptions, the focus must be on supporting the incremental cost of making assets more resilient.
- STBG (23 U.S.C. 133): Broad eligibility for pedestrian, bicycle, and micromobility projects under 23 U.S.C. 206, 208, and 217 (23 U.S.C. 133(b)(7)). Activities marked "$SRTS" means eligible only as an SRTS project benefiting schools for kindergarten through 12th grade. Nonconstruction projects related to safe access for bicyclists and pedestrians (such as bicycle and pedestrian education) are eligible under STBG (23 U.S.C. 217(a)).

- TASA (23 U.S.C. 133(h)): Broad eligibility for pedestrian, bicycle, and micromobility projects. Activities marked "$SRTS" means eligible only as an SRTS project benefiting schools for kindergarten through 12th grade.
- RTP (23 U.S.C. 206): Projects for trails and trailside and trailhead facilities for any recreational trail use. RTP projects are eligible under TA Set-Aside and STBG.
- SRTS (23 U.S.C. 208): Projects for any SRTS activity. FY 2012 was the last year for dedicated - funds, but funds are available until expended. SRTS projects are eligible under TA Set-Aside and STBG.
- PLAN (23 U.S.C. 134 and 135): Funds must be used for planning purposes, for example: Maps: System maps and GIS; Safety education and awareness: for transportation safety planning; Safety program technical assessment: for transportation safety planning; Training: bicycle and pedestrian system planning training. Transportation planning associated with activities would be eligible, SPR and PL funds are not available for project implementation or construction.
- NSBP (23 U.S.C. 162): Discretionary program subject to annual appropriations. Projects must directly benefit and be located on or near an eligible designated scenic byway.

FHWA Federal Lands Programs

- FLTTP (23 U.S.C. 201-204): Projects must provide access to or within Federal or Tribal lands. Programs include: Federal Lands and Tribal Transportation Programs (Federal Lands Access Program, Federal Lands Transportation Program, Federal Lands Planning Program) and related programs for Federal and Tribal lands such as the Nationally Significant Federal Lands and Tribal Projects (NSFLTP) program.
  - Federal Lands Transportation Program (23 U.S.C. 203): For Federal agencies for projects that provide access within Federal lands.
  - Federal Lands Access Program (FLAP) (23 U.S.C. 204): For State and local entities for projects that provide access to or within Federal or Tribal lands.
- TTP (23 U.S.C. 202): For federally recognized Tribal governments for projects within Tribal boundaries and public roads that access Tribal lands.
- TTPSF (23 U.S.C. 202(e)(1) and 23 U.S.C. 148(a)(4)): Grants available to federally recognized Indian Tribes through a competitive, discretionary program to plan and implement transportation safety projects.

OST Grant Programs

- INFRA (IIJA § 11110): Funds projects that improve safety, generate economic benefits, reduce congestion, enhance resiliency, and hold the greatest promise to eliminate freight bottlenecks and improve critical freight movements.
- RAISE (IIJA § 21202): Funds capital and planning grants to help communities build transportation projects that have significant local or regional impact and improve safety and equity.
- RCN: Combines RCP (IIJA § 11509 and div. J, title VIII, Highway Infrastructure Programs, para. (7)), which provides funds for planning grants and capital construction grants that relate to a transportation facility that creates a barrier to community connectivity and Neighborhood Access and Equity Grant Program, Inflation Reduction Act (IRA) § 60501; enacted as Pub. L. 117-169, 23 U.S.C. 177, which provides funds for projects that improve walkability, safety, and affordable transportation access and funding for planning and capacity building activities in disadvantaged or underserved communities.
- SMART (IIJA § 25005): Provides grants to eligible public sector agencies to conduct demonstration projects focused on advanced smart community technologies and systems in order to improve transportation efficiency and safety.
- SS4A (IIJA § 24112): Discretionary program funds regional, local, and Tribal initiatives through grants to prevent roadway deaths and serious injuries. Projects must be identified in a comprehensive safety action plan (§ 24112(a)(3)).
- Thrive (Department of Transportation Appropriations Act, 2022 (Pub. L. 117-103, div. L, title I): Technical assistance, planning, and capacity-building support in selected communities.

OST Loan Programs

- RRIF (Chapter 224 of title 49 U.S.C.): Program offers direct loans and loan guarantees for capital projects related to rail facilities, stations, or crossings. Pedestrian and bicycle infrastructure components of "economic development" projects located within ½-mile of qualifying rail stations may be eligible. May be combined with other grant sources.
- TIFIA (Chapter 6 of title 23 U.S.C.): Program offers secured loans, loan guarantees, or standby lines of credit for capital projects. Minimum total project size is $10 million; multiple surface transportation projects may be bundled to meet cost threshold, under the condition that all projects have a common repayment pledge. May be combined with other grant sources, subject to total Federal assistance limitations.

FTA Programs

- FTA (49 U.S.C. 5307): Multimodal projects funded with FTA transit funds must provide access to transit. See Bicycles and Transit, Flex Funding for Transit Access, the FTA Final Policy Statement on the Eligibility of Pedestrian and Bicycle Improvements Under Federal Transit Law, and FTA Program & Bicycle Related Funding Opportunities.
  - Bicycle infrastructure plans and projects must be within a 3-mile radius of a transit stop or station. If more than 3 miles, within a distance that people could be expected to safely and conveniently bike to the particular stop or station.
  - Pedestrian infrastructure plans and projects must be within a ½ mile radius of a transit stop or station. If more than ½ mile, within a distance that people could be expected to safely and conveniently walk to the particular stop or station.
  - FTA funds cannot be used to purchase bicycles for bike share systems.
- FTA AoPP (Further Consolidated Appropriations Act, 2020 (Pub. L. 116-94); Consolidated Appropriations Act, 2021 (Pub. L. 116-260)): Promotes multimodal planning, engineering, and technical studies, or financial planning to improve transit services, facilities, and access in areas experiencing long-term economic distress, not for capital purchases.
- FTA TOD: Provides planning grants to support community efforts to improve safe access to public transportation, services, and facilities, including for pedestrians and cyclists. The grants help organizations plan for transportation projects that connect communities and improve access to transit and affordable housing, not for capital purchases.

NHTSA Programs

- NHTSA 402 (23 U.S.C. 402): Project activity must be included in the State's Highway Safety Plan. Contact the State Highway Safety Office for details.
- NHTSA 405 (23 U.S.C. 405): Funds are subject to eligibility, application, and award. Project activity must be included in the State's Highway Safety Plan. Contact the State Highway Safety Office for details. The Bipartisan Infrastructure Law expanded the eligible use of funds for a Section 405 Nonmotorized Safety grant beginning in FY 2024. See 23 U.S.C. 1300.26. For prior year grant awards, FAST Act eligible uses remain in place.
- Project agreements involving safety education, or any other positions must specify hours of eligible activity required to perform the project. Project agreements may not be expressed in terms of full or part time positions.

Appendix I: Maintenance Case Studies

Maintenance Case Studies

The following maintenance case studies were submitted by Study stakeholders and working group members for this specific Study. These maintenance costs are not generalized maintenance costs as further investigation would be necessary to develop generalized maintenance costs.

District Department of Transportation – Trail Rangers Program (District of Columbia)

The **Trail Ranger Program** is a volunteer program run through Washington Area Bicyclist Association and funded through the District Department of Transportation's (DDOT) Urban Forestry Division Grant. Trail rangers are responsible for maintaining several of the District's mixed use, paved trails with the goal of "assisting trail users, improving trail conditions, and working with local agencies to keep the trails clean, bright, and clear of obstacles." This program uses a **public dashboard** to track various maintenance work. The maintenance work through this program is categorized into four major groups, which include: trail maintenance, trail service, work order, and specific events.

Arlington County – Infrastructure Maintenance

The following information was shared by the Arlington County Department of Parks and Recreation staff. In addition to employing maintenance staff, the County partners with trained volunteers to aid with shared use path maintenance.

Most sidewalk and shared use path maintenance is performed by the Arlington County staff. The following maintenance cost information was provided by the County's Department of Environmental Services staff:

The annual cost of maintaining sidewalks ranges from $4,500/mile to $8,200—this includes sidewalk slab replacement and sidewalk shaving; however, the higher cost in the range includes maintenance for the curb and gutter as well.

The FY 2023 estimated maintenance costs for select efforts associated with the Custis Trail are:

From Lynn Street to George Washington Parkway: approximately $45,900 per mile for milling and paving (example of heavy maintenance).

From W&OD Trail to the Mount Vernon Trail: $3,255 per mile for staff hours for graffiti removal, tree and brush removal and trimming, and asphalt lining (example of light maintenance).

National Park Service (NPS) – Trail Maintenance and Management

NPS employs staff and enlists volunteers through various programs and nonprofit collaboration to manage and maintain trails. No information was available on trail maintenance costs; however, many NPS trails have their own webpage with additional volunteer information.

The **Potomac Heritage National Scenic Trail** is one trail in northern Virginia that is managed and maintained through ***NPS partnerships*** with both private organizations and government agencies.

Fairfax County

Fairfax County's **Guide to Trail Management** outlines guidance for trail maintenance efforts for both the community and Parks staff. **Section IV-Trail Maintenance** provides information on types of trails in the County, details routine maintenance tasks, and outlines maintenance standards, trail renovation programs, and maintenance tools deployed by the Parks Authority. No additional details were provided on maintenance costs or funding mechanisms in this guide.

Henrico County

Henrico County staff provided information on sidewalk and shared use path maintenance within the County. Maintenance of bike lanes are performed by in-house staff or completed with a resurfacing project, and the primary maintenance activity on bike lanes is debris removal. The County sweeps the roads and bike lanes with a street sweeper as part of the Municipal separate storm sewer system (MS-4) permit; however, those costs are not directly tied to bike lanes.

Sidewalk and shared use path maintenance is done by the County's annual contractor and costs for maintenance generally include maintenance of traffic and mobilization. The replacement costs may be considered capital investments (i.e., may not be a maintenance cost). Costs provided in 2024 for this include:

- $150/LF for total sidewalk replacement (5-foot width)
- $55/LF for total shared use path replacement (10-foot width)
- $35/LF for paving a natural surface shared use path with asphalt (5-foot width)
- Other natural surface shared use paths are maintained by HOAs/Civic Associations

Appendix J: Total Cost to Construct the Planned Facilities

	Total Lane Mileage	2022 Low Estimate Total	2022 High Estimate Total	2034 Low Estimate Total	2034 High Estimate Total
Shared Use Path	**1863.098**	$8,169,684,730	$16,972,822,780	$13,078,947,960	$27,163,968,840
Sidewalk	**330.107**	$772,450,380	$1,604,320,020	$1,239,386,732	$2,568,232,460
Bike Lane	**834.172**	$258,593,320	$538,040,940	$417,086,000	$863,368,020
Natural Surface Trail	**235.619**	$48,301,895	$98,959,980	$77,754,270	$159,042,825
Shared Lanes	**876.984**	$26,309,520	$48,234,120	$43,849,200	$78,928,560
Total	**4139.98**	**$9,275,339,845**	**$19,262,377,840**	**$14,857,024,162**	**$30,833,540,705**

*Please note, these cost estimates do not include paved shoulders and undetermined facility types.