

TransAction Plan

October 2017



TransAction is the multimodal transportation master plan for Northern Virginia. It is a long range plan addressing regional transportation needs through 2040. The Plan focuses on eleven major travel corridors in Northern Virginia, and identifies over 350 candidate regional projects for future transportation investments to improve travel throughout the region. TransAction is not bound to any budget, and proposes more projects than can realistically be funded. The results of TransAction are used to inform the NVTA's Six Year Program for capital funding, guiding decisions about which transportation improvements the NVTA should prioritize for investment.

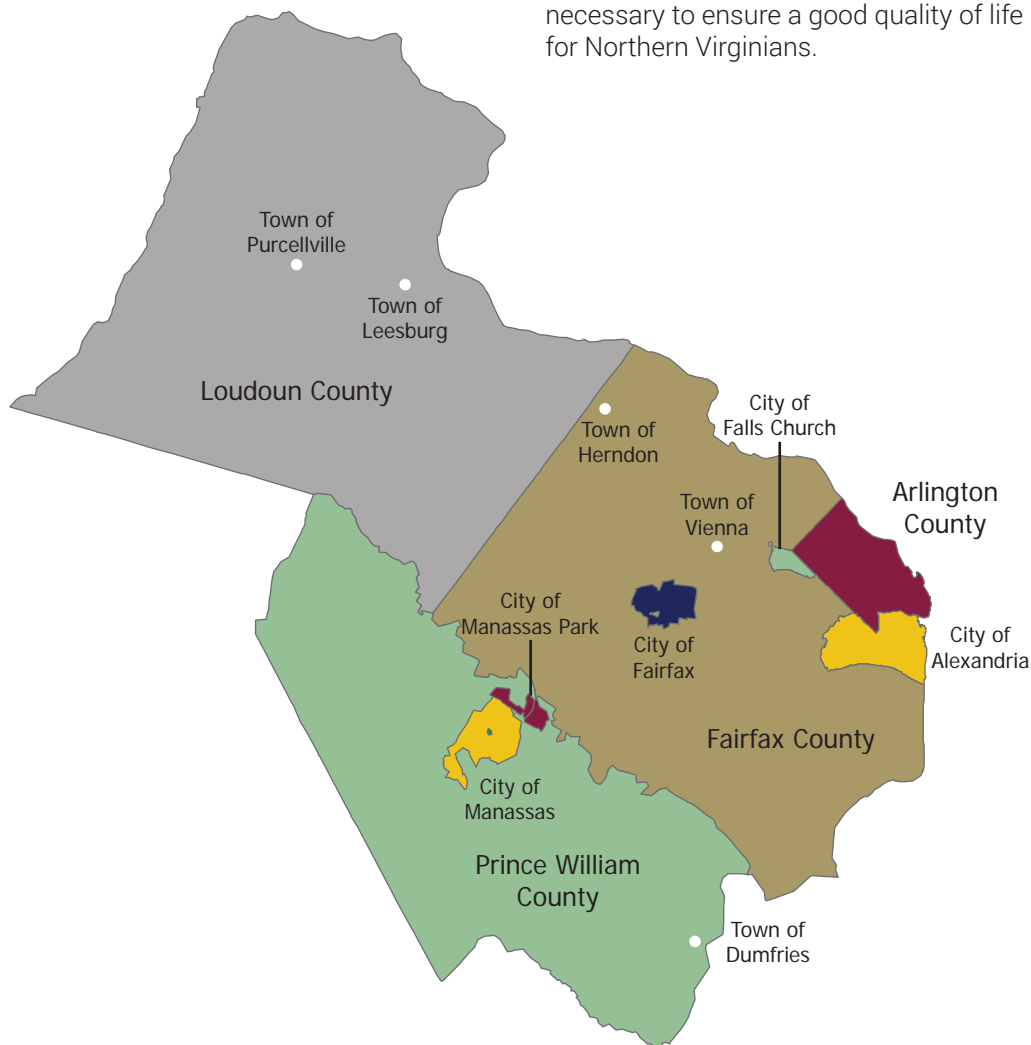
By 2040, population in Northern Virginia is forecast to increase by 24 percent, and employment by 37 percent. While this is great for the region's economic vitality,

this growth is expected to increase traffic congestion and crowding on bus and rail services. Transportation investments, such as those included in TransAction, are necessary to ensure a good quality of life for Northern Virginians.

TransAction is developed and maintained by the Northern Virginia Transportation Authority ("NVTA" or "the Authority"). The NVTA is a regional body that is focused on delivering real transportation solutions and value for Northern Virginia's transportation dollars by bringing Northern Virginia jurisdictions and agencies together to prioritize projects and implement solutions.



For more info about the TransAction Plan including the TransAction Project List:
nvtatransaction.org

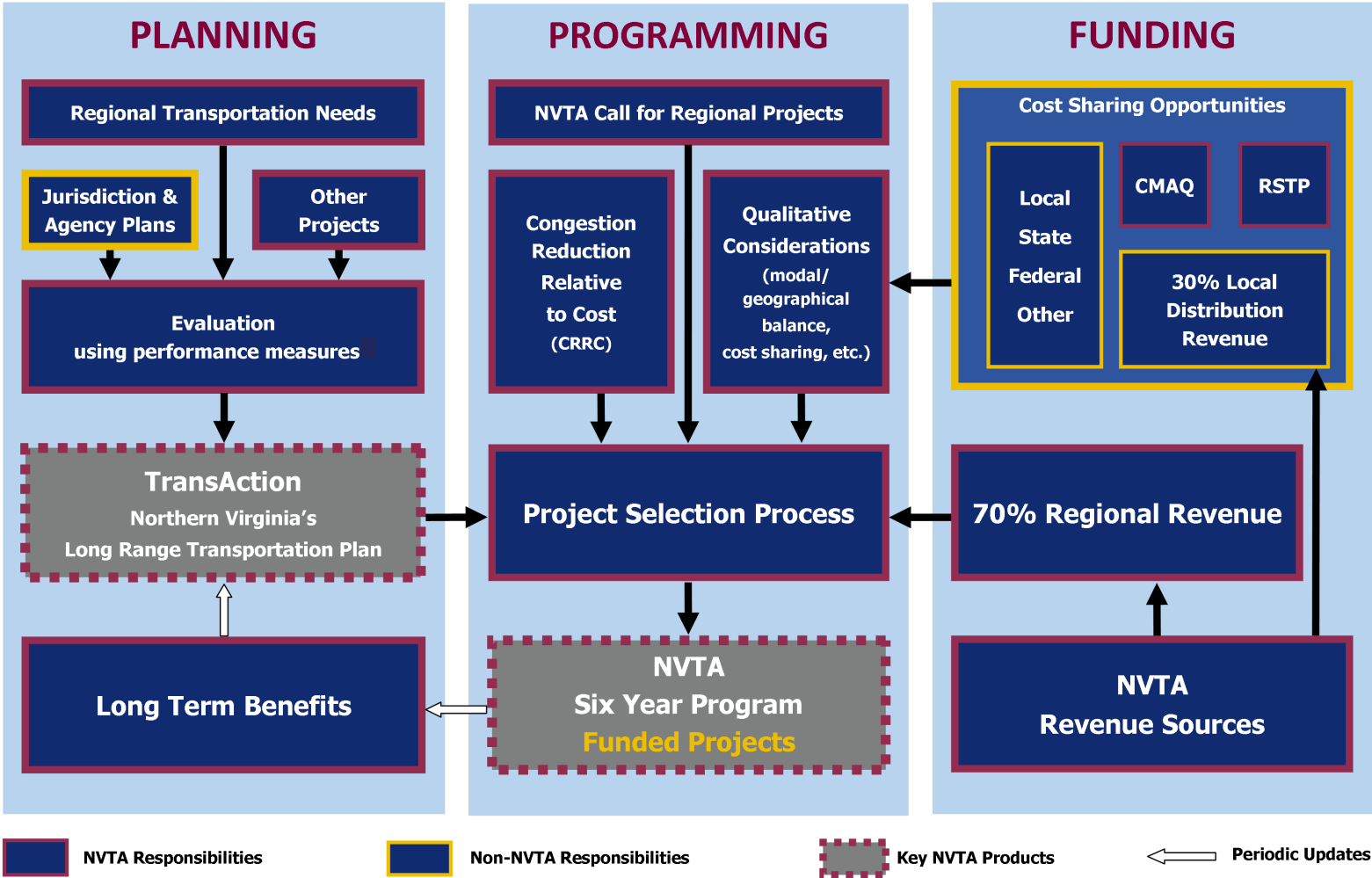




What Does The NVTA Do?

NVTA's Function

The NVTA's two key products are the TransAction Plan and the Six Year Program, which funds projects. This chart shows the many interrelated factors that go into creating those products.



TransAction is one of the NVTA's two key products. In addition to meeting various State mandates*, TransAction is an important input to the NVTA's other key product – the Six Year Program of funded projects. Subject to available revenues, the NVTA will decide in Spring 2018 which of the more than 350 projects included in TransAction will be selected for inclusion in the Six Year Program.

** Virginia Code mandates that the NVTA is responsible for developing and maintaining the long range transportation plan for Northern Virginia. Any project to be included in the NVTA Six Year Program must be evaluated in accordance with a state-mandated process referred to as HB 599, which takes its name from legislation enacted by the Virginia Assembly in 2012.*

How Was Performance Measured In TransAction?

"In the 21st century, Northern Virginia will develop and sustain a multimodal transportation system that enhances quality of life and supports economic growth. Investments in the system will provide effective transportation benefits, promote areas of concentrated growth, manage both demand and capacity, and employ the best technology, joining rail, roadway, bus, air, water, pedestrian, and bicycle facilities into an interconnected network that is fiscally sustainable."

- **TransAction Vision Statement**

Robust Process

TransAction uses a performance-based planning approach that allows policies and goals to be expressed in quantifiable terms, and creates an analytical framework to determine the degree to which different investment packages meet the goals. This approach is intended to lead to a more systematic and analytical selection process for investment priorities.

The table below outlines the goals, objectives, and performance measures that were developed to provide this analytical framework to guide the TransAction Plan.

Evaluation Using Performance Measures

In order to account for all 15 performance measures, an overall performance rating was developed. Each performance measure was assigned a weight of either five or ten percent, together totaling 100 percent. The score for each performance measure is multiplied by these weights to generate a total rating. These calculations were performed at a fine-level of geographic detail for comparisons between existing conditions and 2040 conditions with and without the TransAction Plan.

Vision: The vision statement articulates a preferred idealized state.



Goals focus on priorities and outcomes the region desires to move toward.



Objectives are measurable and targeted actions that result in incremental but tangible advancement toward the stated goals.



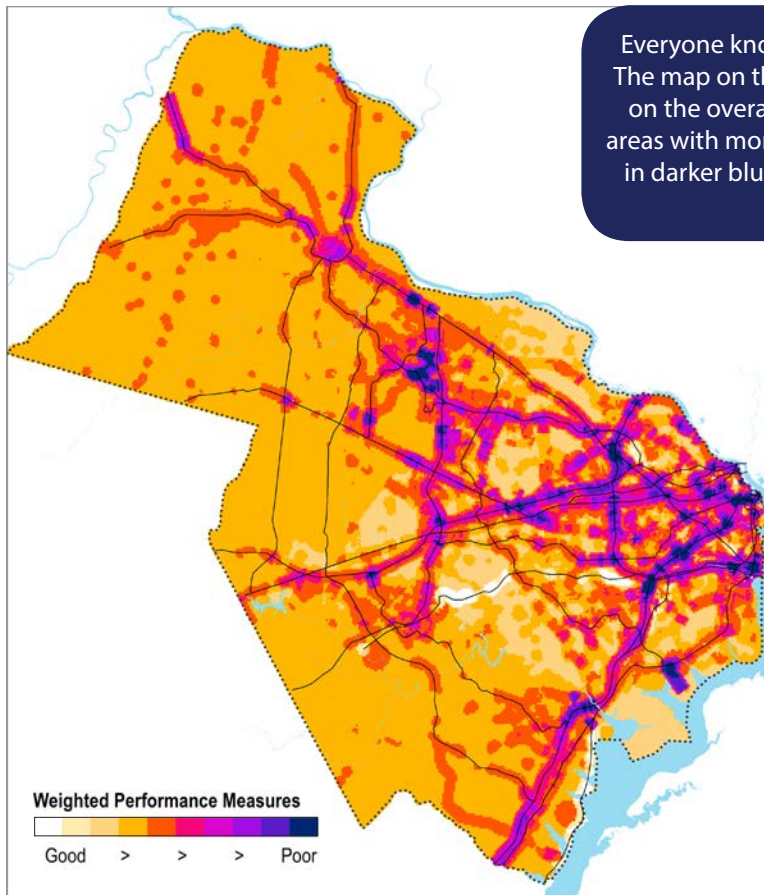
Performance Measures are used to evaluate potential performance of the transportation network. They derive from the stated objectives.

Goal	Objective	Performance Measure	Weight
Goal 1: Enhance quality of life and economic strength of Northern Virginia through transportation	Reduce congestion and crowding experienced by travelers in the region	Total person hours of delay*	10%
		Transit crowding*	5%
		Person hours of congested travel in automobiles*	5%
		Person hours of congested travel in transit vehicles*	5%
	Improve travel time reliability	Congestion severity: maximum travel time ratio	5%
		Congestion duration*	10%
	Increase access to jobs, employees, markets, and destinations	Percent of jobs/population within 1/2 mile of high frequency and/or high performance transit	5%
		Access to jobs within 45 minutes by auto or within 60 minutes by transit*	5%
Goal 2: Enable optimal use of the transportation network and leverage the existing network	Improve connections among and within areas of concentrated growth	Average travel time per motorized trip between Regional Activity Centers	5%
		Walkable/bikeable environment within a Regional Activity Center	5%
	Improve the safety of transportation network	Safety of the transportation system	5%
	Increase integration between modes and systems	First and last mile connections	10%
Goal 3: Reduce negative impacts of transportation on communities and the environment	Provide more route and mode options to expand travel choices and improve resiliency of the system	Share of travel by non-SOV modes	10%
		Person hours of travel caused by 10% increase in PM peak hour demand*	5%
	Sustain and improve operation of the regional system		
Goal 3: Reduce negative impacts of transportation on communities and the environment	Reduce transportation related emissions	Vehicle miles traveled (VMT) by speed	10%

* Measure included in HB 599 rating process.

What Are Today's Transportation Conditions?

2016 Overall Performance Rating Map

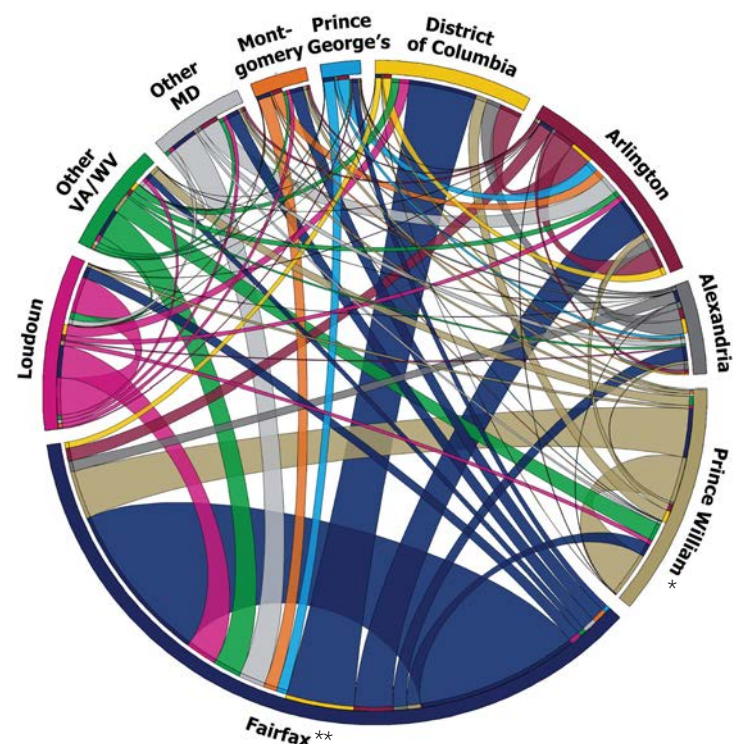


Everyone knows that transportation is a major concern in Northern Virginia today. The map on this page highlights some of the existing problems in the region based on the overall weighted performance rating. As expected, the analysis highlights areas with more severe issues along all of the major corridors in the region, as shown in darker blue. These locations correspond with areas of concern identified by the public during TransAction's outreach efforts.

2016 Origin-Destination Commute Travel Patterns

The focus of TransAction is on accommodating regional travel. The circular diagram to the right shows the proportion of people commuting between the jurisdictions in Northern Virginia each day. The graphic illustrates that the majority of regional travel in Northern Virginia tends to stay within the same jurisdiction. Travel for non-commute purposes is even more likely to stay within a single jurisdiction, as the average trip length for these types of trips is much shorter.

In order to address regional traffic problems, Northern Virginia must address both short and long-distance travel needs.



Average Trip Length



* Includes trips for the independent cities of Manassas and Manassas Park.

** Includes trips for the independent cities of Fairfax and Falls Church.

What Is Included In The Plan?

TransAction Corridor Segments



TransAction focuses much of its analysis on eleven major corridors in Northern Virginia. Each corridor is multimodal in nature and includes roadway and parallel transit facilities. Because conditions vary along these corridors, they are further divided into 28 Corridor Segments as shown in the map to the left. Detailed descriptions of the boundaries of each segment can be found in the table on page 10.

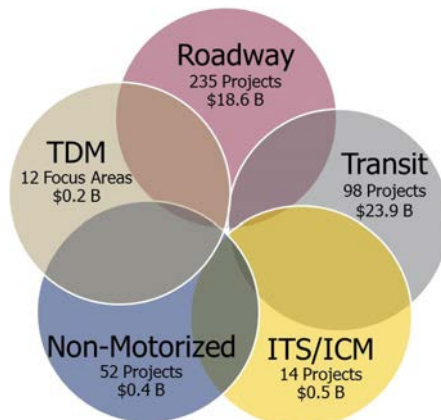
- Corridor 1: Route 7/Dulles Toll Road/Silver Line
- Corridor 2: Loudoun County Pkwy/Bi-County Pkwy/Route 234
- Corridor 3: Route 28
- Corridor 4: Prince William Pkwy
- Corridor 5: Fairfax County Pkwy
- Corridor 6: I-66/US 29/US 50 Inner/Orange-Silver Line/VRE Manassas
- Corridor 7: I-495 Beltway
- Corridor 8: I-95/I-395/US 1/VRE Fredericksburg/Blue-Yellow Line
- Corridor 9: US 15
- Corridor 10: Columbia Pike/Braddock Rd/VRE Manassas
- Corridor 11: US 50 Outer

TransAction: 352 projects
Estimated Cost: \$43.2 billion

The Plan

A balanced set of projects, programs, and policies will be needed to achieve the region's goals. The Plan includes 352 regionally significant transportation projects and programs, at an estimated cost of \$43.2 billion. However, \$10-13 billion of this cost estimate is associated with project components outside of Northern Virginia, and can only be funded and implemented in partnership with neighboring jurisdictions.

The projects vary in scope from targeted intersection and sidewalk improvements at specific locations to mega-projects involving the expansion of freeway facilities and extension of heavy rail transit lines. Transportation projects included in the Plan comprise a variety of multimodal elements including roadway, transit, TDM, non-motorized, ITS, and ICM improvements. The diagram above recognizes that some projects encompass more than one multimodal element.



Roadway: Includes the construction of new roads, capacity improvements on existing roads, and/or reconfiguration of existing roads.

Transit: Includes Metrorail extensions, capacity and service enhancements for Virginia Railway Express (VRE), new Light Rail Transit (LRT) and Bus Rapid Transit (BRT) lines, improvements to existing bus and rail services, and station access improvements.

Transportation Demand Management (TDM): A set of services designed to provide commuters with alternative options to driving alone by providing information, programs, and incentives to encourage a shift in traveler mode.

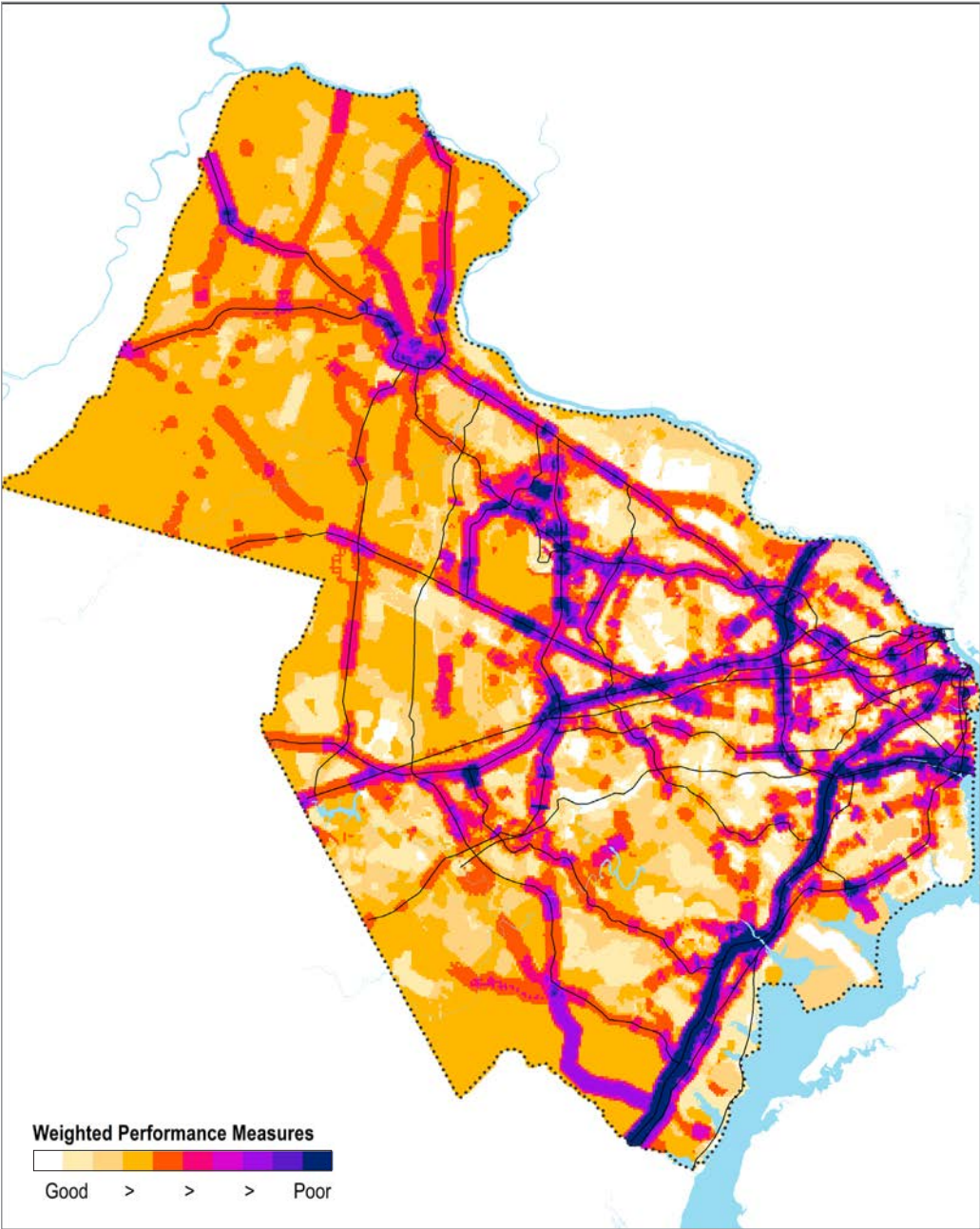
Non-Motorized: Includes bicycle and pedestrian improvements that address key connectivity in the region.

Intelligent Transportation Systems (ITS): Includes information and communication technologies to share traffic data, optimize system management and operations, provide information to travelers in real-time, and improve safety.

Integrated Corridor Management (ICM): Addresses congestion and mobility along a corridor by making more thorough use of all the available facilities in a corridor, including parallel roadways and transit.

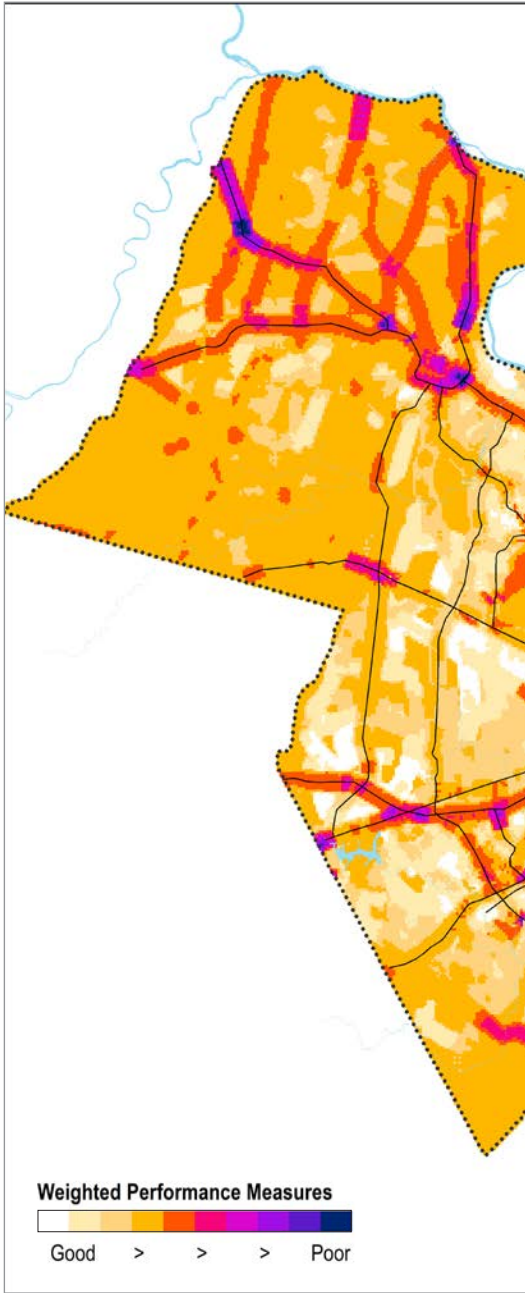
What Are The Benefits Of The Plan?

2040 'No Build' Overall Performance Rating



This map shows the overall performance rating for the Northern Virginia region under the 2040 'No Build' conditions. Areas shown in darker blue perform worse based on this rating, which combines the 15 performance measures. The 2040 'No Build' includes only projects that are already fully funded.

Plan Overall Performance Rating



This map shows the overall performance rating for the Northern Virginia region under the implementation of the 352 candidate projects. As shown, many of the major corridors in Northern Virginia show significant improvement in transportation conditions.

Performance of the regional transportation system, measured across the 15 TransAction measures, shows significant improvement across most of Northern Virginia. These benefits are most apparent along I-66, I-495, I-95, Loudoun County Parkway, Route 28, and portions of Route 7.

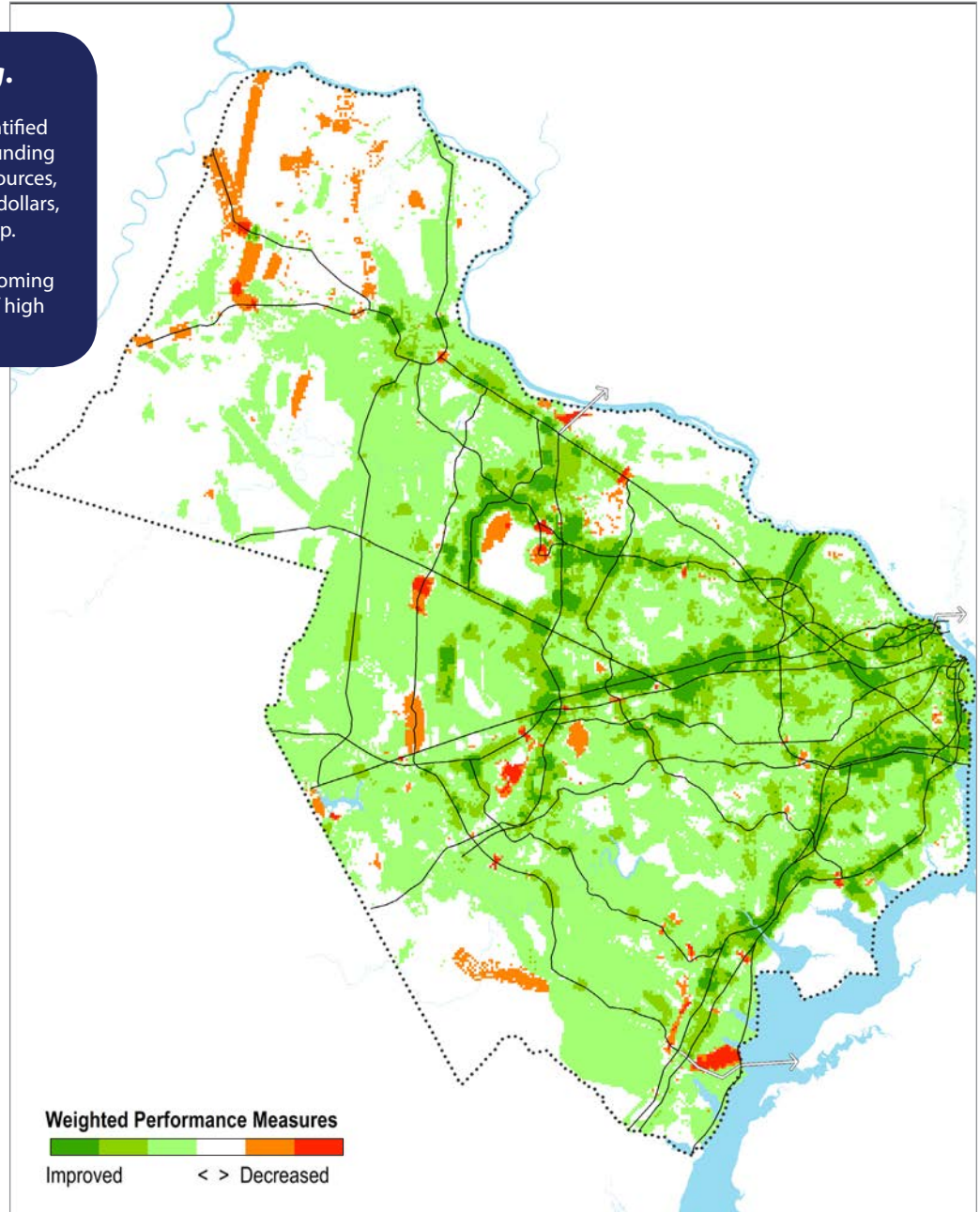
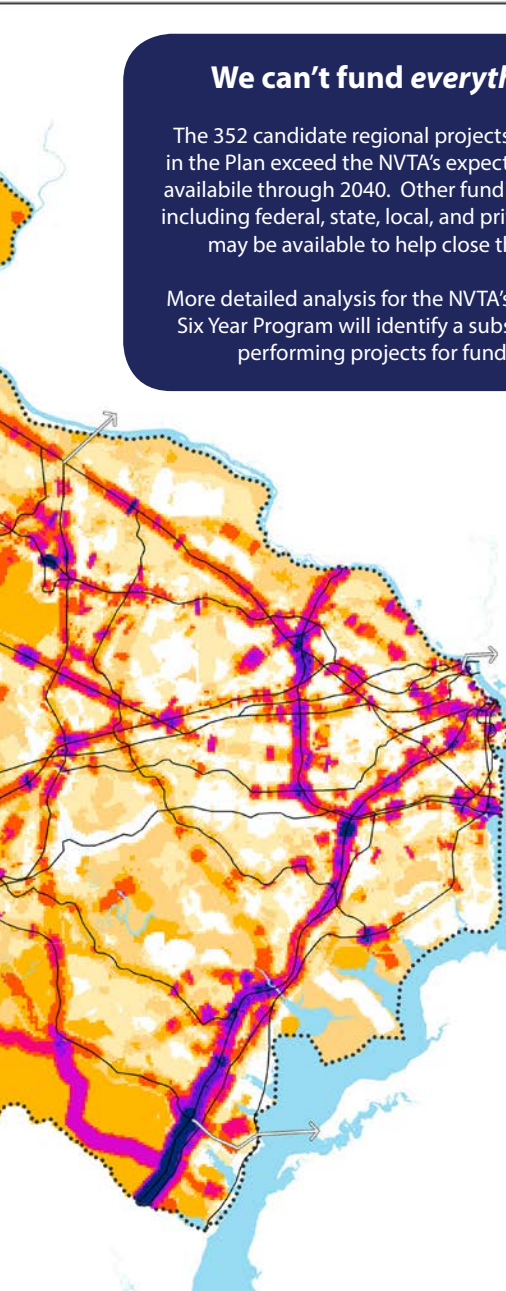


Plan Compared to 2040 'No Build' - Overall Performance Rating

We can't fund everything.

The 352 candidate regional projects identified in the Plan exceed the NVTAs expected funding available through 2040. Other funding sources, including federal, state, local, and private dollars, may be available to help close the gap.

More detailed analysis for the NVTAs upcoming Six Year Program will identify a subset of high performing projects for funding.



ating for the Northern Virginia region with regional projects of the TransAction Plan. Northern Virginia will experience significant s with the implementation of TransAction.

This map shows the change in the overall performance rating caused by the implementation of the Plan. Areas shown in green are forecast to experience an improvement in conditions with implementation of the Plan, while areas shown in orange are forecast to perform worse than without the Plan.

There are several locations where conditions get worse with the Plan. One reason for this is that new facilities carry no traffic and therefore experience no congestion before their construction, but do experience some afterwards. Another reason is the diversion of traffic onto facilities that cannot be widened for various reasons (designated scenic byways, right-of-way limitations, etc.). This is particularly the case in some of the outer suburbs, especially in western Loudoun County where increases in congestion are causing decreases in performance.

What Are The Benefits Of The Plan?

Plan - Northern Virginia Statistics

Daily Measures	2016	2040 'No Build'	Plan	Change from 'No Build'
Transit Boardings	1.0 M	1.4 M	1.6 M	14% increase
Person Trips in Motorized Vehicles	8.74 M	10.5 M	10.6 M	1% increase
Person-Miles of Travel	105 M	125 M	125 M	0.4% decrease
Person-Hours of Travel	3.30 M	5.81 M	4.45 M	24% decrease
Person-Hours of Delay	1.01 M	3.03 M	1.70 M	44% decrease
Person-Hours of Delay per Capita	0.42	1.01	0.57	44% decrease
Service Hours of Crowded Transit	10,800	20,100	7,200	64% decrease

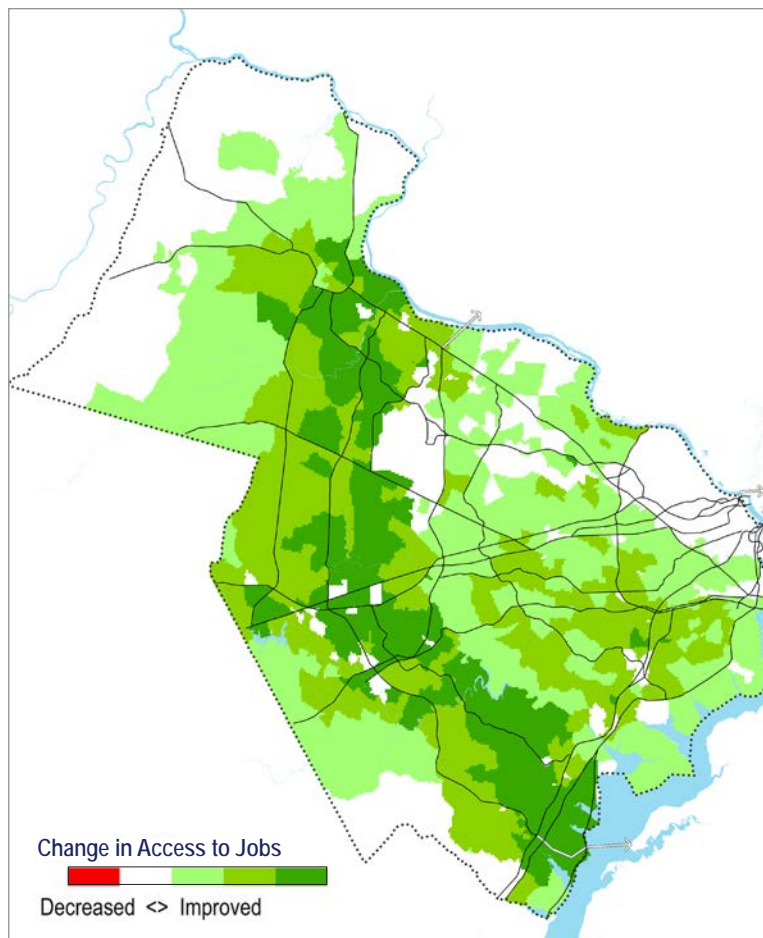
Overall, the results of this analysis show that the improvements included in the Plan benefit the entire Northern Virginia region and improve travel conditions in all corridors when compared to the 2040 'No Build' conditions.

The Plan will save each Northern Virginian an average of **27 minutes** each day.

Some of the major improvements noted on a regional level include:

- Improved travel conditions on all corridors.
- Noticeable reductions in person-hours of travel (24 percent) and person-hours of delay (44 percent), despite a slight increase in motorized trips in the region.
- Significant decrease in transit crowding (64 percent) to below 2016 levels, in part due to the inclusion of expansions to the regional transit network such as BRT and Metrorail expansions. This improvement is achieved with a simultaneous 14 percent increase in transit ridership.
- Marginal decrease in person-miles traveled.
- Job accessibility is noticeably improved for residents in a broad corridor from Leesburg to Dumfries because of improvements in the Plan. This means that more people will have access to more jobs.
- Improvements in walkability and bikeability in areas of high residential and employment density throughout Northern Virginia.
- Residual problem areas include I-95 and I-495.

Plan Compared to 'No Build' - 2040 Job Accessibility



Regional Totals	2016	2040	Change
Population	2.41 M	2.99 M	24%
Employment	1.36 M	1.87 M	37%

Benefits vary across the region, with different areas seeing varying levels of improvements in different performance measures. The improvements caused by the Plan are significant, but in most cases are not enough to bring the region back to 2016 conditions. This is primarily due to the 24 percent increase in population and the 37 percent increase in employment that are forecast for the region by 2040.

Improved Access to Jobs

Accessibility is an important consideration in the Plan. The performance measure that looks at the increase in the average number of regional jobs that are accessible from households in Northern Virginia, assuming a 45-minute commute via auto or a 60-minute commute via transit is shown in this graphic. The Plan results in widespread improvements in accessibility to jobs throughout the region with the greatest improvements in a wide swath of suburban communities in Loudoun and Prince William Counties, stretching from Leesburg in the north to Dumfries in the south. Improvement tends to be lower inside the Beltway, as jobs are already highly accessible in this area.

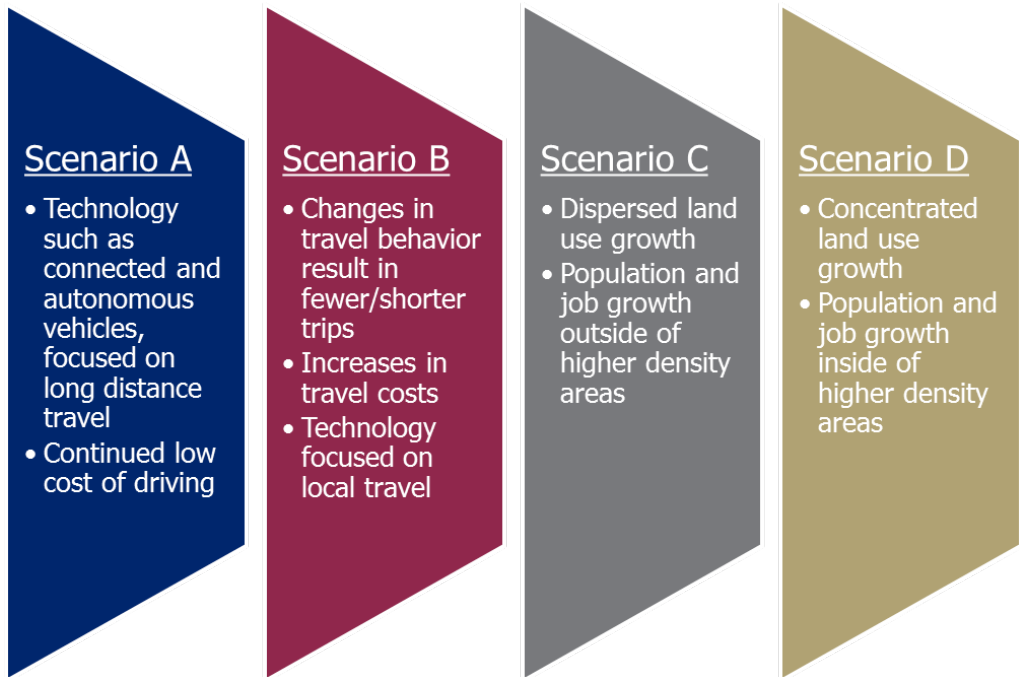
What Happens If The Future Is Different Than Expected?

TransAction is built on standard assumptions for the region about future growth and technology. But what if the future is different from what we've assumed? To test TransAction's resiliency against an unpredictable future, four Stress Tests were performed, each analyzing TransAction's performance against significantly different assumptions about land use, technology, and travel behavior.

Transportation is in the midst of a series of quiet but profound revolutions. Travelers in the future will have choices that go beyond private cars or bus and rail transit. Many of these changes will take advantage of new technology, with some of the most dramatic changes yet to come. Some of the factors that present a high degree of uncertainty in the long-term include:

- Demographic characteristics and preferences;
- Development patterns;
- Activity patterns;
- Connected and autonomous vehicles;
- Shared travel;
- Economics;
- Freight and goods movement;
- Climate change and world events;
- Information and management technologies; and
- Policy and legal evolution.

Four alternative future scenarios were analyzed as part of the TransAction planning process that investigated the impacts of these trends on transportation conditions in 2040. This range of



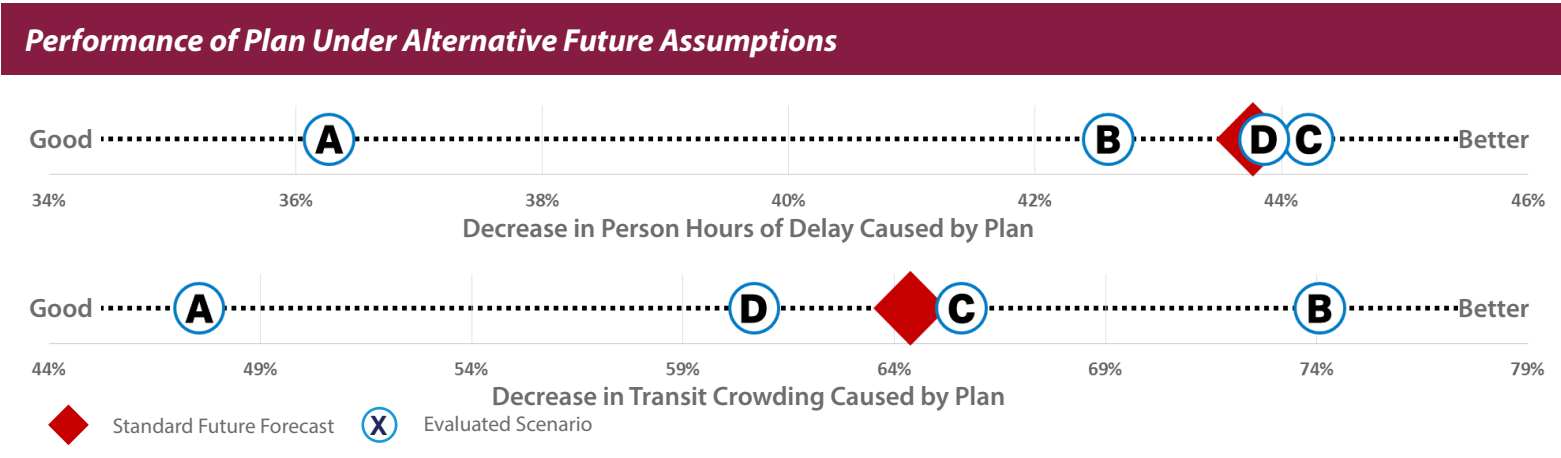
possible futures was developed to test the resiliency of improvements. It does not attempt to identify or assess every possible future, nor does it try to establish one exact picture of the future. Instead, this scenario planning effort defines a limited number of futures that — between them — encompass a wide array of potential outcomes resulting from a number of changing factors.

Sensitivity Results

The results show that the Plan does provide significant benefits under each of the potential alternate futures, although the percent improvement varies by performance measure across the scenarios. The figures below show the percent improvement achieved for two key performance measures for each of the alternative scenarios, as compared to

the standard future forecasts (as shown by the red diamond). For example, these graphics show that the Plan achieves a larger reduction in transit crowding under Scenarios C and B, than the standard future forecast. Benefits are forecast for most areas across the region under each of the alternate future scenarios tested.

These results indicate that the Plan is likely to provide benefits to Northern Virginia regardless of any of the major trends highlighted, but these trends should be monitored to identify potential future impacts.



What Did We Learn?

The impact of the 352 projects included in the Plan was analyzed for each Corridor Segment. The overall performance rating for each Corridor Segment is shown in the table to the right. These performance ratings combine the 15 performance measures detailed on page 3, summed for each of the Corridor Segments. These scores quantify the improvement across these measures caused by the Plan, relative to each other. Therefore, the Corridor Segment with the highest rating will see the greatest improvement for the most travelers.

Findings

The major findings from this analysis include:

- Northern Virginia faces unprecedented levels of travel demand, delay, and transit crowding in 2040.
- No single project, program, or policy will address all of the region's transportation needs.
- Projected regional revenues through 2040 would only fund less than a quarter of the total estimated cost of the 352 candidate regional projects in the Plan.
- Emerging trends in technology and travel preferences may improve travel conditions in 2040.
- Segments with the highest performance ratings are generally those that include a combination of acute travel issues, high volumes, and major candidate regional projects. Segments with the lowest performance ratings generally have less acute travel conditions and/or serve fewer travelers.



Segment	Description	Performance Rating
8-3	I-395/US 1/VRE Fredericksburg/Blue Yellow Line — I-495 to Potomac River	65.8
7-3	I-495 — I-95 to Woodrow Wilson Bridge	59.2
6-2	I-66/US 29/US 50/Orange Silver Line — Rt. 28 to I-495	58.1
1-4	Rt. 7/Dulles Toll Road/Silver Line — Tysons to US 1	54.7
8-2	I-95/US 1/VRE Fredericksburg — Prince William County Line to I-495	54.6
6-3	I-66/US 29/US 50/Orange Silver Line — I-495 to Potomac River	49.5
8-1	I-95/US 1/VRE Fredericksburg — Stafford County Line to Fairfax County Line	48.5
10-1	Braddock Road/VRE Manassas — Rt. 28 to I-495	45.4
2-1	Loudoun County Parkway/Belmont Ridge Road — Rt. 7 to US 50	43.9
11-1	US 50 — Fauquier County Line to City of Fairfax	42.3
3-1	Rt. 28 — Rt. 7 to I-66	40.7
6-1	I-66/US 29/VRE Manassas — Prince William County Line to Rt. 28	40.5
1-3	Rt. 7/Dulles Toll Road/Silver Line — Rt. 28 to Tysons	39.9
7-1	I-495 — American Legion Bridge to I-66	39.6
10-2	Columbia Pike/Braddock Road — I-495 to Pentagon	35.8
1-2	Rt. 7/Dulles Greenway — Town of Leesburg to Rt. 28	34.5
4-1	Prince William Parkway — I-66 to I-95	34.2
7-2	I-495 — I-66 to I-395	33.0
5-2	Fairfax County Parkway — US 50 to Rolling Road	31.0
5-1	Fairfax County Parkway — Rt. 7 to US 50	27.0
5-3	Fairfax County Parkway — Rolling Road to US 1	26.4
3-2	Rt. 28 — I-66 to Fauquier County Line	24.9
2-3	Rt. 234 — I-66 to I-95	21.0
1-1	Rt. 7/Rt. 9 — West Virginia state line to Town of Leesburg	15.8
9-2	US 15 — Rt. 7 to I-66	13.6
9-1	US 15 — Potomac River to Rt. 7	11.8
2-2	North-South Corridor/Bi-County Parkway — US 50 to I-66	7.7
9-3	US 15 — US 50 to US 29	5.8

A larger map of the corridor segments is included on Page 5.

What Happens Next?

The NVTA will use TransAction to develop a Six Year Program, providing money to implement multimodal transportation projects across Northern Virginia.



At key decision points, the NVTA will:

Use TransAction to Develop the Six Year Program.

- > Pursue targeted, multimodal, regionally-coherent strategies to address the region's transportation needs that are consistent with the region's priorities and the varying geographies of the region.
- > Work with member jurisdictions and regional stakeholders to work across jurisdictional boundaries, wherever possible, to address the region's transportation needs.
- > Work with member jurisdictions and regional stakeholders to consider the potential for near term approaches such as:
 - New, improved, and expanded transit services;
 - New regional TDM strategies that complement existing TDM programs;
 - New and existing technology systems; and
 - Completion of ongoing construction of roadway and multimodal projects.
- > Emphasize the importance of maximizing use of additional funding sources as a factor during the development of the FY2018-23 Six Year Program.
- > Assure that each project fully captures improvements for all applicable modes and users.

Monitor Emerging Trends.

Monitor emerging trends and report significant changes on an annual basis. Based on these trends, the NVTA will:

- > Consider additional analysis to identify potential subsets of projects that complement emerging trends.
- > Explore proactive policy guidance associated with emerging trends, such as:
 - Public education regarding potential new transportation technologies.
 - Integration of human-driven and Connected/Autonomous Vehicles in different geographies across the region.
 - Development of complementary transit and shared mobility services.



**Northern Virginia
Transportation Authority**
3040 Williams Drive, Suite 200
Fairfax, VA 22031

tel: 703.642.4652

TheAuthority@TheNoVAAuthority.org

 thenovaauthority.org
NVTATransAction.org

 facebook.com/TheNVTA

 [@NVTAAuthority](https://twitter.com/NVTAAuthority)
[@NVTATransAction](https://twitter.com/NVTATransAction)