Chapter 5

Needs Assessment

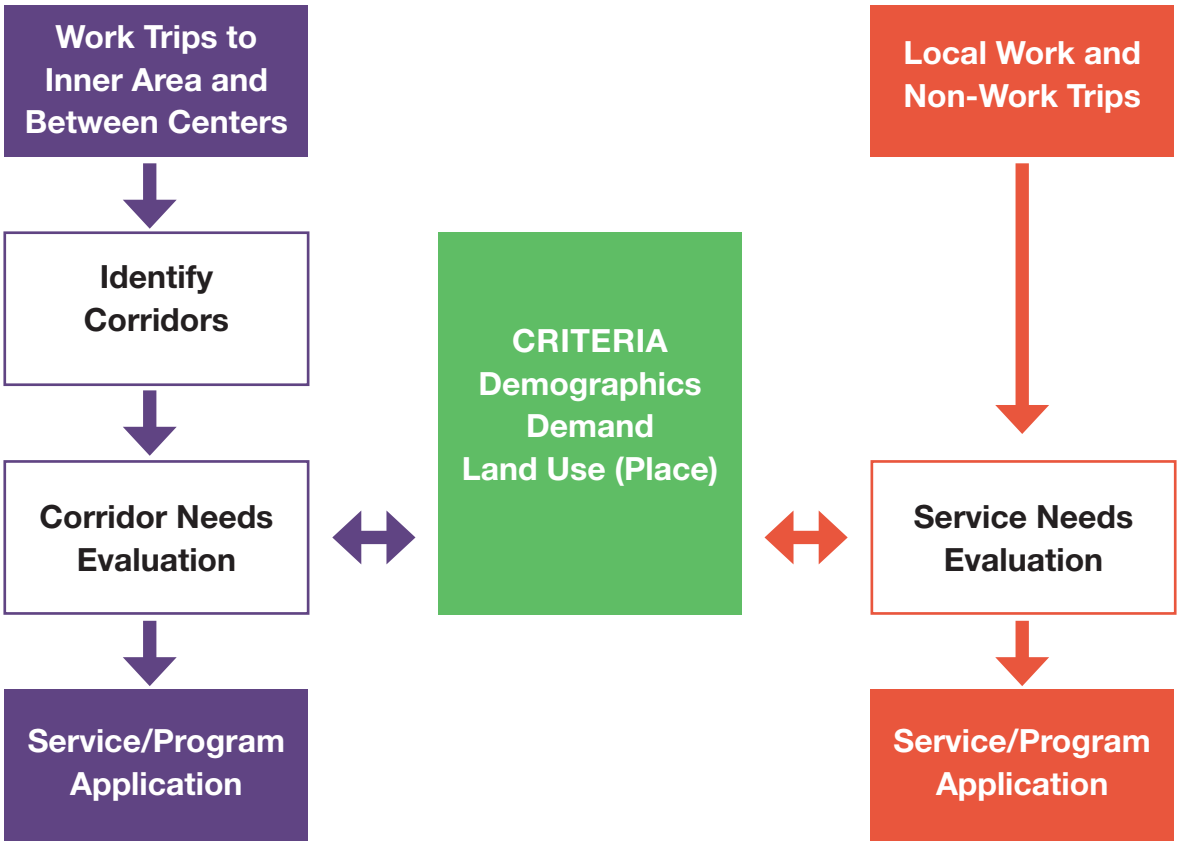

Figure 5.1: Needs Assessment and Recommendations Process

The combination of transition in land use throughout time, continued population and employment growth throughout the region, and increases in travel demand associated with changes in and outside the region will contribute to significant demand for expanded transit and transportation demand management (TDM) in the region in the future. The needs analysis that was prepared evaluated transit and TDM needs at the regional, subregional, and local levels. It quantified the effects of changing land use, population and employment growth, and travel demand growth and advised the development of commuter-oriented and all-day transit service, transit and TDM policy, and transit facility recommendations. **Figure 5.1** shows the process used to assess travel needs and develop service and program recommendations. This chapter discusses the needs assessment and recommendation development process for transportation corridors, local transit service and TDM.

TRANSIT MODES SUMMARY

Fairfax Connector bus.

A range of transit modes are recommended throughout the study area. Key characteristics of the range of mode technologies are described in **Table 5.1** on the following pages.

Table 5.1: Transit Mode Characteristics

Transit Mode	Description
Heavy Rail Transit 	Heavy rail transit (HRT) is an electric railway characterized by high speed and rapid acceleration passenger rail cars typically operating in multi-car trains on fixed rails; separated right-of-way from which all other vehicular and foot traffic are excluded; sophisticated signaling; and high platform level entry loading. Substantial and sophisticated passenger amenities are typically provided in HRT systems. **Operating Speed:** 50 mph to 70 mph **Station Spacing:** Inner area ~ ½ mile; Periphery ~ 1 to 5 miles **Runningway Type:** Exclusive dedicated **Example Systems:** Chicago 'L', New York City Subway, BART, Washington, D.C. Metrorail
Light Rail Transit 	Light rail transit (LRT) is an electrically powered, high-capacity rail technology capable of operating in a wide range of physical configurations. LRT typically operates in single vehicle or short trains in mostly or fully-dedicated runningway. Substantial and sophisticated passenger amenities are typically provided in LRT systems. **Operating Speed:** 20 mph (on street) to 60 mph (dedicated lanes) **Station Spacing:** ½ to 1 mile **Runningway Type:** Mostly dedicated, minimal shared with traffic **Example Systems:** Baltimore, Portland, Minneapolis, Dallas, Salt Lake City, Denver, Charlotte, Norfolk
Bus Rapid Transit 	Bus rapid transit (BRT) combines much of the quality of rail transit with the flexibility and cost-effectiveness of buses. BRT system elements are similar to those more commonly found in rail transit systems. BRT typically employs specifically branded special vehicles, sophisticated transit stations, off-board fare collection, level boarding, transit priority at intersections, and fully to mostly dedicated transit runningways. **Operating Speed:** Greater than 15 mph (arterial roadways); up to 55 mph (limited access facilities) **Station Spacing:** ¼ mile or more **Runningway Type:** Primarily dedicated **Example Systems:** Cleveland, Eugene, Los Angeles, Boston, Kansas City
Rapid Bus 	Rapid bus systems share some elements with BRT systems; however, the level of accommodation for transit vehicles and passengers is typically less than with BRT. Rapid bus typically operates in a mixture of dedicated [including high-occupancy vehicle (HOV) and managed lanes] and general purpose travel lanes. Rapid bus may benefit from transit signal priority, queue jump lanes, dedicated/specifically designed stops, and enhanced passenger amenities such as level boarding, off-board fare collection, and covered/enclosed waiting areas. Some branding is typical of rapid bus services. **Operating Speed:** 12 mph to 15 mph (arterial roadways); up to 55 mph (limited access facilities) **Station Spacing:** ¼ mile to 2 miles **Runningway Type:** Mixed flow and dedicated lane **Example Systems:** Bay area, New York, Chicago, Los Angeles
Streetcar 	Modern streetcars are rail transit vehicles typically intended for short trip making and circulation in areas with a high concentration of destinations and density of transit trips. Modern streetcars are typically powered by electricity received from an overhead wire; however, some streetcars use batteries and diesel electric technologies. Modern streetcars typically operate in mixed (traffic) flow in local streets with other vehicles. Like LRT and BRT, streetcar systems have significant facilities for passengers and also benefit from specific branding and identity. **Operating Speed:** 8 mph to 12 mph **Station Spacing:** ¼ mile or several urban blocks **Runningway Type:** Mixed flow **Example Systems:** Portland, Seattle, Toronto

Table 5.1: Transit Mode Characteristics *(continued)*

Transit Mode	Description
Intercity Passenger Rail 	Intercity passenger rail service typically is provided between major urban areas. For example, between Baltimore, Washington, D.C., and Richmond. This service may be controlled or managed at a state level, but is typically operated by a national or regional passenger railroad such as Amtrak. **Operating Speed:** 30 mph to 60 mph (speeds can be higher) **Station Spacing:** Depends on distance between major cities along the line **Runningway Type:** Railroad **Example Systems:** Amtrak Northeast Regional and Lynchburg to D.C. Amtrak service
Commuter Rail 	Commuter Rail is an electric or diesel propelled railway for urban passenger train service. It often runs in a corridor shared with freight and passenger rail services. Typically, commuter rail carries moderate- to long-distance commuter trips in corridors with a high density of trips with similar origins and destinations between suburbs and a central city. **Operating Speed:** 30 mph to 60 mph **Station Spacing:** 2 to 5 miles **Runningway Type:** Railroad **Example Systems:** Virginia Railway Express (VRE), Maryland Area Regional Commuter (MARC), NJ Transit, Tri-Rail
Express Bus 	Express bus service is typically designed to reduce moderate distance transit trip travel time in major metropolitan areas during heavily patronized peak commuting hours by operating in a limited stop configuration. Some systems also run express bus services outside of peak commuting periods. Express bus services often operate between park-and-ride or other passenger collection facilities and employment centers. Often, express bus services will have several stops in the vicinity of route termini, with few if any stops in the middle of the route. **Operating Speed:** 15 mph to 19 mph (arterial roadways); up to 55 mph (limited access facilities) **Station/Stop Spacing:** Limited stops, primarily at route termini **Runningway Type:** Mostly mixed flow, may benefit from HOV or other managed lanes **Example Systems:** Most major cities, Richmond Highway Express (REX) in Fairfax County and Alexandria
Regional Commuter Bus 	Regional commuter bus service is typically designed to serve specific long-distance travel markets and specific employment centers to reduce travel time and increase convenience and attractiveness for its patrons. Services typically have stops only at termini and operate with limited frequency during off-peak periods. **Operating Speed:** Up to 55 mph (limited access facilities) **Station/Stop Spacing:** Stops only at route termini **Runningway Type:** Mostly mixed flow, may benefit from HOV or other managed lanes **Example Systems:** Potomac and Rappahannock Transportation Commission (PRTC), Loudoun County Transit (LC Transit), Maryland Transit Administration (MTA), and most major U.S. cities

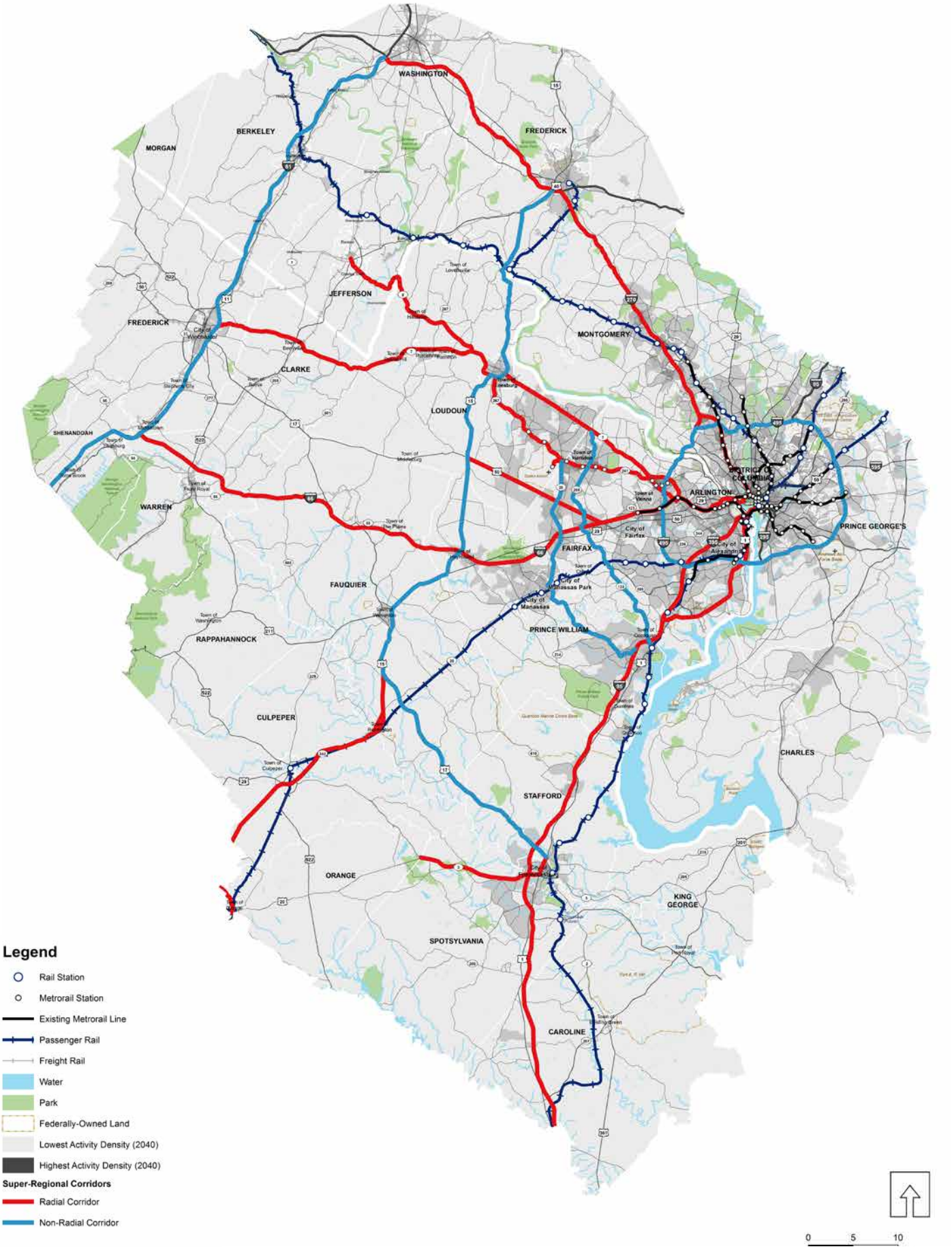

Figure 5.2: Super-Regional Corridors

CORRIDOR ANALYSIS

Arlington Transit (ART) bus.

SUPER-REGIONAL CORRIDORS

The super-regional corridors include the major travel sheds in the Super NoVa region and generally follow the major interstates and major highways in the region. An analysis of person trip characteristics confirmed the importance of these corridors for regional travel (as presented in the prior chapter of this report). These super-regional corridors carry large volumes of trips to and from the inner area, and to and from major suburban activity centers. Super-regional corridors in the Super NoVa region are shown in **Figure 5.2** on the preceding page, and are as follows:

Radial Corridors

- Northwest – Dulles/Route 7
- West – I-66/US 50/US 29
- South – I-95/US 1
- I-270/I-70

Non-Radial Corridors

- I-495
- Fairfax County Parkway/Route 123
- Route 28/Prince William Parkway
- US 15/US 17
- I-81

All of the super-regional corridors in the Super NoVa study area warrant regional transit service, based on the travel pattern analysis presented in the prior chapters of this report. A more detailed assessment of travel patterns was completed to determine which corridors require a higher level of transit service and service type (mode).

Analysis Methodology

Three-mile buffers were defined for each corridor. The corridors were used to determine the regional work trip flows for each corridor. Year 2040 work trips that begin and end within each buffered corridor and are greater than 10 miles in length were determined and categorized as regional trips. Corridor work trips that also begin and/or end in adjacent corridors also were determined and categorized as regional trips. These regional work trips have the greatest potential for being captured by new or expanded regional transit services. The regional work trips were then normalized on a trips per acre basis. Corridor segment travel flows were ranked on a comparative basis to other corridor segments.

Analysis

Table 5.2 on the following pages presents results of this analysis, with an overall ranking for each corridor segment. **Figure 5.3** shows the same results. Segments with a ranking of Tier 2 or Tier 3 regional trip characteristics warrant consideration of a higher level of transit service and service type (e.g., BRT and LRT). Corridor segments with low rankings are likely candidates for expanded or new regional and express bus services. Following is a summary of key findings from this analysis of 2040 work trip characteristics by corridor.

Northwest Corridor

- The Dulles Corridor and Route 7 have medium to high regional work trip travel characteristics from the inner area to Leesburg.
- There is a significant drop in regional work trip activity on US 15, Route 9, and Route 7 west/north of Leesburg.

West Corridor

- I-66 exhibits high regional work trip characteristics from the inner area to Haymarket, and US 50 exhibits medium trip characteristics to US 15. US 29/US 15 south of I-66 and I-66 west of Haymarket exhibit lower regional work trip characteristics.

South Corridor

- I-95 exhibits strong regional work trip characteristics to Quantico/Northern Stafford County, and medium trip characteristics to Fredericksburg.
- US 1 has strong regional work trip volumes.
- US 17 west of I-95 is an important extension of regional work trips in the I-95 corridor, with medium trip characteristics.
- US 3 is an important corridor that brings regional trips into the I-95 corridor, but with lower regional work trip volumes than the US 17 corridor.
- Work trip volumes on I-95/US 1 drop off south of Fredericksburg.

I-270/I-70

- This corridor exhibits strong regional work trip characteristics from the inner area to Frederick, MD.
- Regional work trip activity drops off north of Frederick.

I-495

- This corridor carries high volumes of regional work trips on all segments.
- The segment—with the highest volume of regional work trips—is the southern segment that travels along Alexandria between I-295 in Maryland and the Dulles Access/Toll Road.

Fairfax County Parkway/Route 123

- The northern segment of this corridor exhibits high levels of regional work trips.

Route 28/Prince William Parkway

- The northern segment of this corridor exhibits high levels of regional work trips.

US 15/US 17

- The entire corridor exhibits low regional work trip volumes, when compared to the other regional corridors.

I-81

- The entire corridor exhibits low regional work trip volumes, when compared to the other regional corridors.

Results

Based on this analysis of super-regional corridors, those corridors that have the greatest potential for higher transit capacity services are as follows:

- Northwest (Dulles) Corridor – Leesburg to Washington, D.C.
- West (I-66) Corridor – Haymarket to Washington, D.C.
- South (I-95) Corridor – Fredericksburg to Washington, D.C.
- Beltway (I-495)
- Fairfax County Parkway/Route 123 – Route 267 to I-66
- Route 28 – Route 7 (Dulles North) to I-66

All of the super-regional corridors in the Super NoVa study area warrant regional transit service. Appropriate transit service recommendations were developed for all super-regional corridors. Segments of the corridors with greatest potential for higher transit capacity were analyzed further as part of the subregional corridor analysis described below.

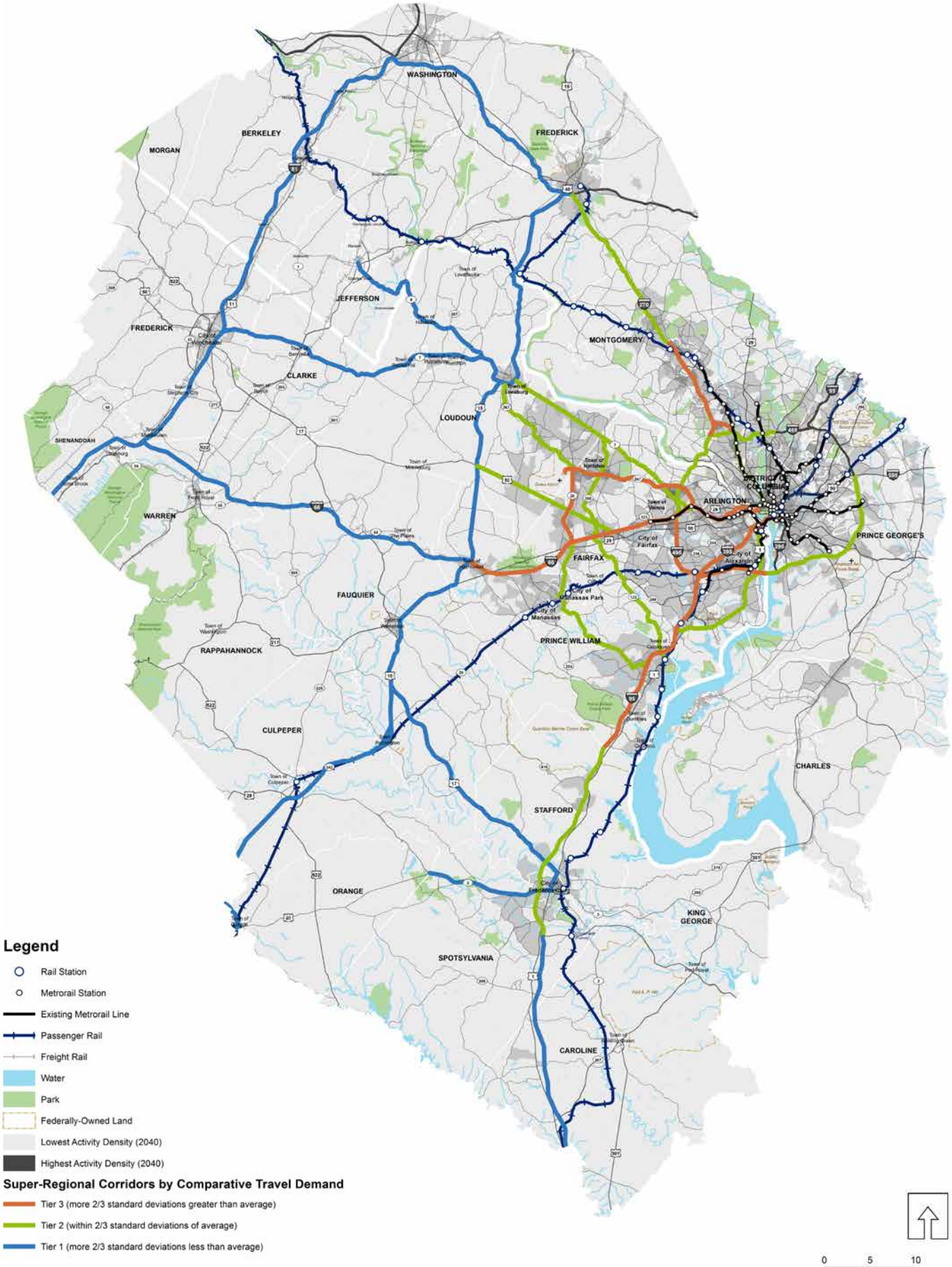

Figure 5.3: Super-Regional Corridor Analysis

Table 5.2: Super-Regional Corridor Analysis

			Corridor Regional 2040 Work Trip Flows								
	Area	Corridor	Reg Corr. Trips	Reg. Trips per Acre	%	Multi-corr. Trips	Multi-corr. Trips per Acre	%	Total Regional Trip Flows	Total Reg. Trips per Acre	Rank
Radial	Northwest/Dulles	Route 9: Charlestown-Leesburg	9,478	0.18	92%	781	0.02	8%	10,259	0.20	Tier 1
		Route 7: Winchester-Leesburg	32,668	0.31	94%	2,253	0.02	6%	34,921	0.33	Tier 1
		US 15: Frederick-Potomac River	14,607	0.18	66%	7,593	0.10	34%	22,200	0.28	Tier 1
		Dulles Toll Road: Leesburg-Dulles	94,542	2.17	80%	24,250	0.56	20%	118,793	2.72	Tier 2
		Route 267: Dulles-Reston	109,034	2.60	60%	73,624	1.76	40%	182,658	4.36	Tier 3
		Route 267: Reston-I-495	88,520	4.56	60%	58,651	3.02	40%	147,171	7.58	Tier 3
		Dulles Connector: Inside I-495	62,276	2.15	87%	9,161	0.32	13%	71,437	2.47	Tier 2
	Northwest/Route 7	Route 7: Leesburg-Dulles North	11,384	0.36	65%	6,045	0.19	35%	17,429	0.55	Tier 2
		Route 7: Dulles North-Reston	18,225	0.47	79%	4,922	0.13	21%	23,148	0.60	Tier 2
		Route 7: Reston-I-495	12,173	0.78	82%	2,715	0.18	18%	14,888	0.96	Tier 2
	West/I-66/US 29	US 29: Orange-Warrenton	4,489	0.04	90%	520	0.00	10%	5,009	0.04	Tier 1
		US 29: Warrenton-Haymarket	13,221	0.36	78%	3,705	0.10	22%	16,925	0.46	Tier 1
		I-66: Front Royal-Haymarket	20,135	0.19	91%	2,025	0.02	9%	22,161	0.21	Tier 1
		I-66: Haymarket-Centreville	68,341	1.79	75%	22,598	0.59	25%	90,939	2.39	Tier 2
		US 50: Route 28-Fairfax	19,247	0.63	58%	13,935	0.46	42%	33,182	1.09	Tier 2
		I-66: Centreville-Fairfax	78,270	3.92	63%	46,496	2.33	37%	124,766	6.24	Tier 3
		I-66: Fairfax-I-495	108,148	5.18	62%	66,072	3.16	38%	174,220	8.34	Tier 3
		I-66: Inside I-495	92,763	2.58	100%	0	0.00	0%	92,763	2.58	Tier 2
	South/I-95	Route 3: West of Fredericksburg	9,333	0.19	100%	0	0.00	0%	9,333	0.19	Tier 1
		US 17: West of Fredericksburg	2,464	0.04	84%	480	0.01	16%	2,943	0.05	Tier 1
		I-95: South of US 17	7,523	0.10	91%	753	0.01	9%	8,276	0.11	Tier 1
		I-95: US 17 to US 17	31,572	1.21	88%	4,381	0.17	12%	35,953	1.38	Tier 2
		I-95: US 17-Stafford Co. Line	51,013	1.10	82%	11,347	0.24	18%	62,360	1.35	Tier 2
		I-95: Stafford Co. Line-Dale City	60,349	2.24	75%	20,346	0.76	25%	80,695	3.00	Tier 3
		I-95: Dale City-Lorton	95,398	3.62	71%	39,795	1.51	29%	135,193	5.13	Tier 3
		I-95: Lorton-I-495	121,732	6.35	70%	53,352	2.78	30%	175,084	9.14	Tier 3
		I-395: Inside I-495	127,735	3.63	96%	4,649	0.13	4%	132,384	3.76	Tier 3
	South/US 1	US 1: Lorton-I-495	43,204	0.93	90%	5,003	0.11	10%	48,208	1.04	Tier 2
		US 1: Inside I-495	42,370	1.78	100%	0	0.00	0%	42,370	1.78	Tier 2
	I-70/I-270	I-70: Hagertown-Frederick	18,879	0.23	86%	3,151	0.04	14%	22,030	0.27	Tier 1
		I-270: Frederick-Germantown	52,765	0.88	76%	16,804	0.28	24%	69,569	1.16	Tier 2
		I-270: Germantown-I-495	122,490	2.44	72%	47,477	0.95	28%	169,967	3.39	Tier 3
		Red Line Corridor: Inside I-495	98,548	2.56	100%	0	0.00	0%	98,548	2.56	Tier 2

Table 5.2: Super-Regional Corridor Analysis (continued)

			Corridor Regional 2040 Work Trip Flows								
	Area	Corridor	Reg Corr. Trips	Reg. Trips per Acre	%	Multi-corr. Trips	Multi-corr. Trips per Acre	%	Total Regional Trip Flows	Total Reg. Trips per Acre	Rank
Circumferential	I-495/Beltway	Beltway: S. Potomac River-US 29 (in MD)	53,837	0.66	48%	57,480	0.71	52%	111,317	1.37	Tier 2
		Beltway: I-66-S. Potomac River (in VA)	66,868	3.00	51%	63,661	2.85	49%	130,529	5.85	Tier 3
		Beltway: N. Potomac River-I-66 (in VA)	72,320	1.54	86%	12,080	0.26	14%	84,400	1.80	Tier 2
		Betlway: US 29-N. Potomac River (in MD)	56,506	1.14	53%	49,552	1.00	47%	106,057	2.14	Tier 2
	Rte 7100/Rte 123	Route 286 (7100): North of I-66	10,400	0.27	12%	73,095	1.89	88%	83,495	2.15	Tier 2
		Route 286 (7100)/Route 123: South of I-66	11,978	0.23	19%	49,989	0.97	81%	61,967	1.21	Tier 2
	Route 28/PW Parkway	Route 28: North of I-66	33,429	0.81	27%	90,754	2.19	73%	124,183	3.00	Tier 3
		Route 28/Prince William Parkway: South of I-66	31,345	0.83	49%	32,989	0.88	51%	64,334	1.71	Tier 2
	US 15 & US 17	US 15: Frederick-Potomac River	11,522	0.15	86%	1,948	0.02	14%	13,470	0.17	Tier 1
		US 15: Potomac River-Leesburg-US 50	5,430	0.15	49%	5,717	0.16	51%	11,147	0.31	Tier 1
		US 15: US 50-I-66	5,644	0.12	39%	8,867	0.18	61%	14,512	0.30	Tier 1
		US 15: I-66-Warrenton	3,138	0.09	30%	7,372	0.20	70%	10,510	0.29	Tier 1
		US 17: Warrenton-Stafford Co.	1,118	0.01	11%	9,313	0.08	89%	10,432	0.09	Tier 1
		US 17: Stafford Co.-Fredericksburg	599	0.01	4%	13,785	0.22	96%	14,384	0.23	Tier 1
	I-81	I-81: West Virginia/Maryland	20,799	0.19	85%	3,682	0.03	15%	24,481	0.22	Tier 1
		I-81: Virginia Segment	17,678	0.16	77%	5,220	0.05	23%	22,898	0.21	Tier 1

Key

Tier 3: more than 2/3 standard deviations greater than average
Tier 2: within 2/3 standard deviations of average
Tier 1: more than 2/3 standard deviations less than average

SUBREGIONAL CORRIDORS

Subregional corridors are segments of super-regional corridors with the greatest potential for higher capacity transit service based on travel demand. **Figure 5.4** shows the subregional corridors evaluated.

Analysis Methodology

The subregional corridor analysis focuses on demographics and place type along the corridors. The analysis was focused on the suitability of an area to support higher capacity transit service. The corridors were evaluated based on two sets of data—activity density and place type. Activity density and place type mix were evaluated within a 0.25-mile radius of each corridor. The analysis was used to identify an initial transit service mode technology for each corridor. The following describes the evaluation methodology.

Demographics

Activity density was used to determine the level of transit service appropriate for each corridor. Based on the average 2040 activity density (people and employees per acre) in the 0.25-mile analysis area, each corridor was assigned one of four service levels—highest, medium-high, medium, and lowest. Thresholds for the four service levels were adapted from the Department of Rail and Public Transportation (DRPT) Transit Service Guidelines. **Table 5.3** shows the four levels of transit service and their corresponding activity density ranges.

Table 5.3: Transit Service Level by Activity Density

Service Level	Activity Density Range (people and employees per acre)
Highest	Above 39
Medium-High	16-39
Medium	4.5-16
Lowest	Below 4.5

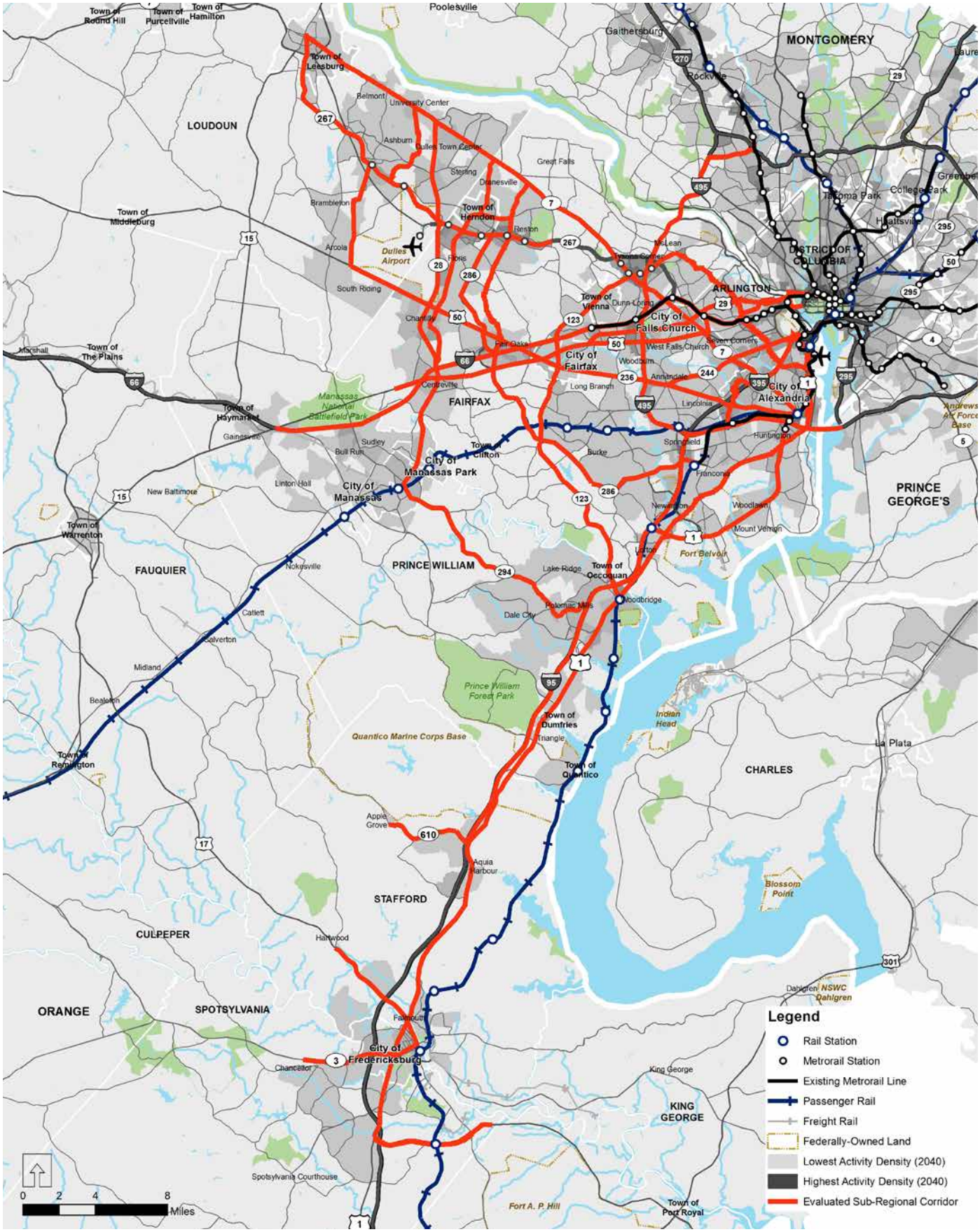

Figure 5.4: Subregional Corridors

Place Type

Place type analysis was used to determine the type of transit service appropriate for each corridor. Each corridor was assigned one of the following three service types—high all day, medium all day, and commuter. For each quarter-mile analysis area, the percentage of each place type was determined. The place types, described in Chapter 4, were classified as either suitable for medium-capacity all day service or high-capacity all day service. **Table 5.4** shows the categorization of place types.

Columbia Pike in Arlington County, VA.

Table 5.4: Place Type Suitability for Higher Capacity Transit

Place Type	Suitable for Medium-Capacity, All-Day Transit Service	Suitable for High-Capacity, All-Day Transit Service
Rural/Natural/Very Low Density Residential		
Low Density Residential		
Medium Density Residential		
High Density Residential		√
Suburban Office	√	
Suburban Commercial	√	
Regional Retail Center	√	
Rural or Village Center		
Small Town or Suburban Center	√	
Medium Town or Suburban Center		√
Large Town or Suburban Center		√
Mixed Use Neighborhood		√
Urban Center		√
Urban Core		√
Industrial		
Institutional/Military/Other		

Based on the mix of place types in the 0.25-mile analysis area, each corridor was assigned one of two service types—all day or commuter-oriented. Thresholds for the service types were developed based on the percentages of place types suitable for medium- and high-capacity transit service. **Table 5.5** shows the three service types and their corresponding place type suitability thresholds.

Table 5.5: Transit Service Type by Place Type

Service Type	Percentage of Place Types Suitable for Medium-Capacity Transit	Percentage of Place Types Suitable for High-Capacity Transit
High All-Day	Above 85% OR Above 35%	
Medium All-Day	50% - 85%	N/A
Commuter	Below 50%	N/A

Analysis

Based on the demographic and place type analysis, an initial transit mode was assigned to each subregional corridor. Transit modes were determined based on the combination of service levels and types. **Table 5.6** shows the transit mode recommendations based on service type and service level analysis. The transit modes are intended as a guide to a transit mode that could be suitable in a corridor in the future.

Table 5.6: Transit Mode by Service Type and Service Level

Service Level	Commuter Service	All-Day Service
Highest	Commuter Rail (VRE)	Heavy Rail (Metrorail)
Medium High	Express Bus (Direct or limited stop, potential for off-peak service)	LRT/BRT (Mostly or fully dedicated runningway)
Medium		Rapid Bus (Partial dedicated runningway)
Lowest	Commuter Bus (Limited stop, peak oriented)	Local Bus

The results of the subregional corridor analysis for 2040 are shown in **Figure 5.5**, **Figure 5.6**, and **Table 5.7**. The results of this analysis were used as a starting point for individual corridor recommendations. Recommendations were subsequently adjusted based on local plans, stakeholder and public input, and considerations related to the super-regional transit network.

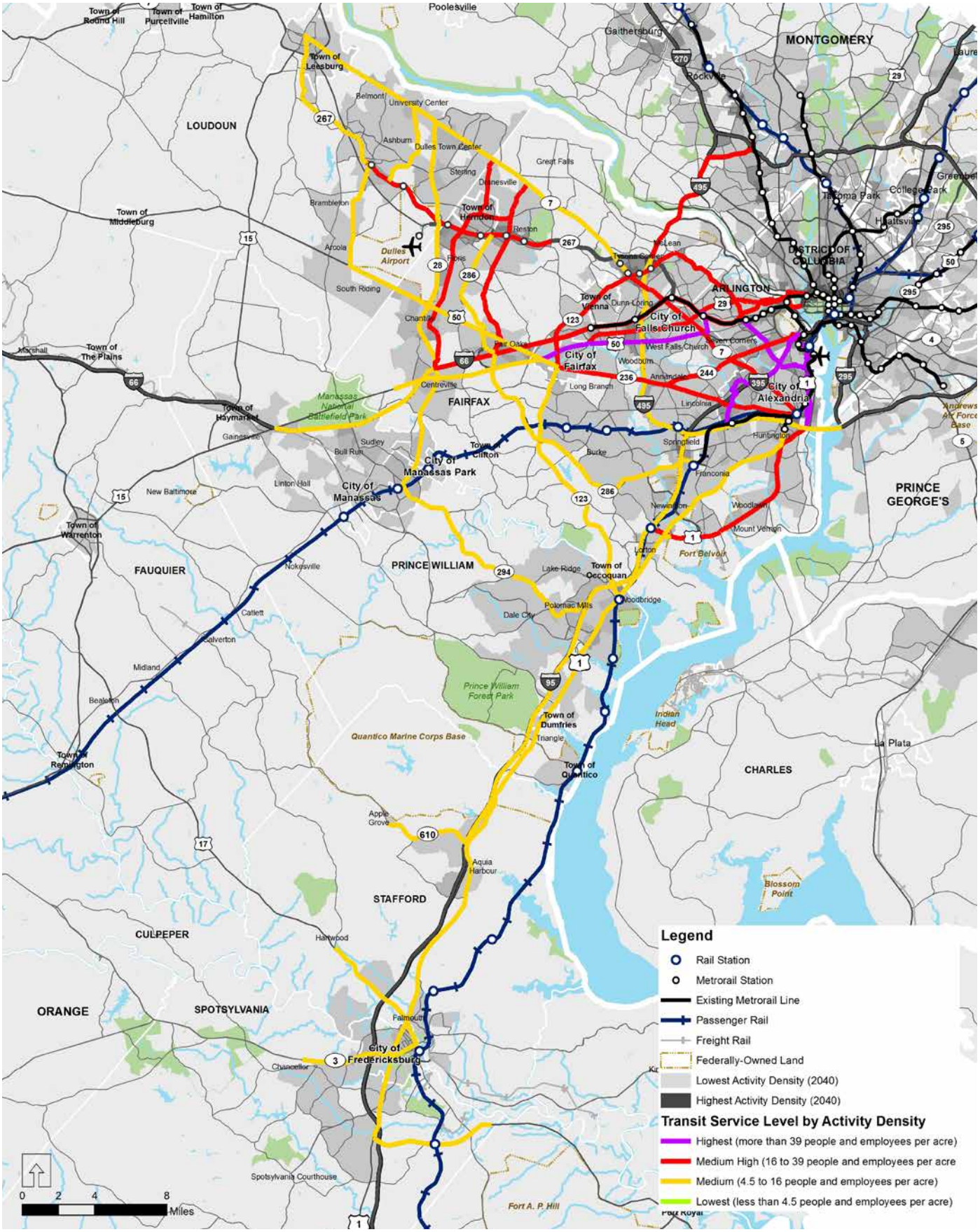

Figure 5.5: Subregional Corridor Demographic Analysis

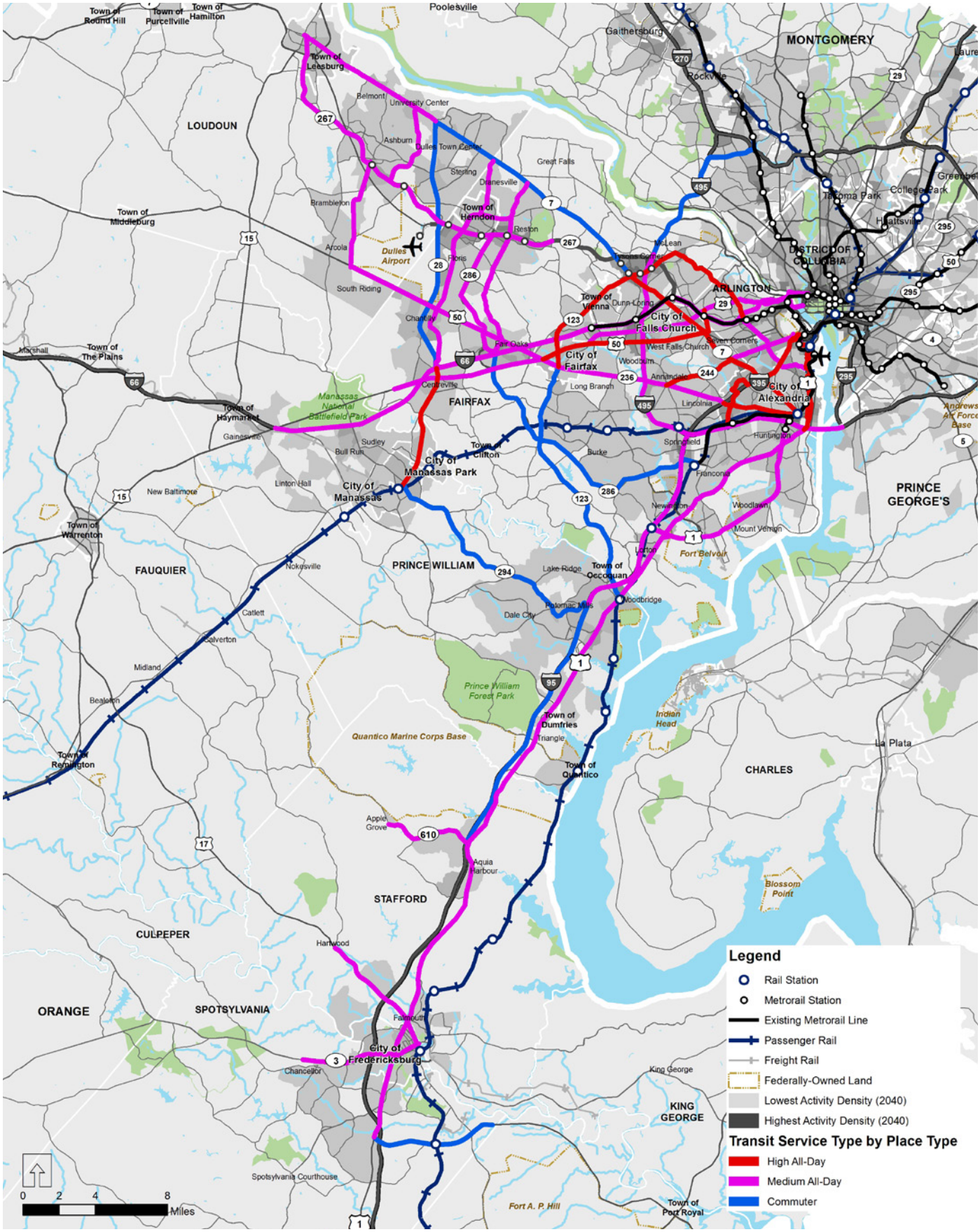

Figure 5.6: Subregional Corridor Place Type Analysis

Table 5.7: Subregional Corridor Analysis

Corridor	Average Acitivty Density - 2040 (people and employees per acre)	Service Level by Activity Density	High Place Type Suitability	Medium + High Place Type Suitability	Service Level by Place Type	Analysis Outcome
I-66: Washington, D.C. to Vienna	27.5	Medium High	10%	73%	Medium All-Day	Light Rail Transit/ Bus Rapid Transit
I-66: Vienna to Centreville	20.4	Medium High	19%	74%	Medium All-Day	Light Rail Transit/ Bus Rapid Transit
I-66: Centreville to Haymarket	9.2	Medium	34%	50%	Medium All-Day	Rapid Bus
I-95: Beltway to Lorton	15.2	Medium	7%	52%	Medium All-Day	Rapid Bus
I-95: Lorton to Dale City	14.7	Medium	16%	58%	Medium All-Day	Rapid Bus
I-95: Dale City to Stafford County	8.6	Medium	12%	45%	Commuter	Express Bus
I-495: I-270 (MD) to VA 267 (Dulles Toll Road)	24.1	Medium High	4%	39%	Commuter	Express Bus
I-495: VA 267 (Dulles Toll Road) to I-395	6.5	Medium	17%	80%	Medium All-Day	Rapid Bus
I-495: I-395 to MD Route 214	13.1	Medium	14%	50%	Medium All-Day	Rapid Bus
Route 1: Pentagon City to Beltway	76.0	Highest	70%	78%	High All-Day	Heavy Rail
Route 1: Beltway to Fort Belvoir	19.0	Medium High	0%	73%	Medium All-Day	Light Rail Transit/ Bus Rapid Transit
Route 1: Fort Belvoir to Quantico	13.5	Medium	26%	66%	Medium All-Day	Rapid Bus
Route 1: Quantico to Fredericksburg	6.9	Medium	11%	64%	Medium All-Day	Rapid Bus
Route 120 (Glebe Road): Ballston to Route 1	53.5	Highest	34%	74%	Medium All-Day	Light Rail Transit/ Bus Rapid Transit
Route 123: McLean to City of Fairfax	30.6	Medium High	38%	86%	High All-Day	Light Rail Transit/ Bus Rapid Transit
Route 123: City of Fairfax to Woodbridge	6.3	Medium	5%	19%	Commuter	Express Bus
Route 17: Stafford County to Fredericksburg	7.6	Medium	2%	68%	Medium All-Day	Rapid Bus
Route 17: Fredericksburg to Spotsylvania County	5.3	Medium	6%	33%	Commuter	Express Bus
Route 236 (Duke Street): Alexandria to I-395	38.6	Medium High	39%	74%	High All-Day	Light Rail Transit/ Bus Rapid Transit
Route 236 (Little River Turnpike): I-395 to City of Fairfax	16.9	Medium High	27%	83%	Medium All-Day	Light Rail Transit/ Bus Rapid Transit
Route 244 (Columbia Pike): Pentagon to Bailey's Crossroads	38.6	Medium High	14%	69%	Medium All-Day	Light Rail Transit/ Bus Rapid Transit
Route 244: Bailey's Crossroads to Annandale	19.7	Medium High	10%	100%	High All-Day	Light Rail Transit/ Bus Rapid Transit

Table 5.7: Subregional Corridor Analysis (continued)

Corridor	Average Acitivty Density - 2040 (people and employees per acre)	Service Level by Activity Density	High Place Type Suitability	Medium + High Place Type Suitability	Service Level by Place Type	Analysis Outcome
Route 267 (Dulles Corridor): Beltway to Reston	40.0	Highest	15%	43%	Commuter	Commuter Rail
Route 267 (Dulles Corridor): Reston to Dulles	27.9	Medium High	28%	52%	Medium All-Day	Light Rail Transit/ Bus Rapid Transit
Route 267 (Dulles Corridor): Dulles to Leesburg	10.4	Medium	22%	60%	Medium All-Day	Rapid Bus
Route 28: Route 7 to Centreville	15.3	Medium	16%	32%	Commuter	Express Bus
Route 28: Manassas to Centreville	15.2	Medium	42%	83%	High All-Day	Light Rail Transit/ Bus Rapid Transit
Route 286: Herndon to Fair Lakes	14.4	Medium	6%	70%	Medium All-Day	Rapid Bus
Route 286: Fair Lakes to Franconia-Springfield	7.8	Medium	2%	39%	Commuter	Express Bus
Route 29: Georgetown to City of Fairfax	34.3	Medium High	27%	81%	Medium All-Day	Light Rail Transit/ Bus Rapid Transit
Route 29: City of Fairfax to Centreville	13.9	Medium	18%	57%	Medium All-Day	Rapid Bus
Route 294 (Prince William Pkwy): Manassas to Potomac Mills	8.2	Medium	10%	45%	Commuter	Express Bus
Route 3: Spotsylvania to Fredericksburg	12.1	Medium	10%	81%	Medium All-Day	Rapid Bus
Route 309 (Old Dominion): Ballston to McLean	23.3	Medium High	7%	92%	High All-Day	Light Rail Transit/ Bus Rapid Transit
Route 401 (Van Dorn)/ Beauregard/I-395: Pentagon to Beltway	39.8	Highest	51%	69%	High All-Day	Heavy Rail
Route 50: Washington, D.C. to City of Fairfax	39.4	Highest	38%	79%	High All-Day	Heavy Rail
Route 50: City of Fairfax to Loudoun County	15.4	Medium	22%	75%	Medium All-Day	Rapid Bus
Route 606/Loudoun Co. Pwky: Route 7 to Braddock Road	9.2	Medium	9%	58%	Medium All-Day	Rapid Bus
Route 608/Reston Pkwy: Route 7 to Fair Lakes	17.4	Medium High	12%	63%	Medium All-Day	Light Rail Transit/ Bus Rapid Transit
Route 610 (Garrisonville Road): Stafford County to Route 1	8.6	Medium	17%	74%	Medium All-Day	Rapid Bus
Route 611/Kings Highway: Huntington to Lorton	10.8	Medium	5%	59%	Medium All-Day	Rapid Bus
Route 657 (Centreville Road): Route 7 to Centreville	17.1	Medium High	26%	62%	Medium All-Day	Light Rail Transit/ Bus Rapid Transit
Route 7: Alexandria to Tysons	38.5	Medium High	24%	90%	High All-Day	Light Rail Transit/ Bus Rapid Transit
Route 7: Tysons to Dulles Town Center	15.7	Medium	5%	27%	Commuter	Express Bus

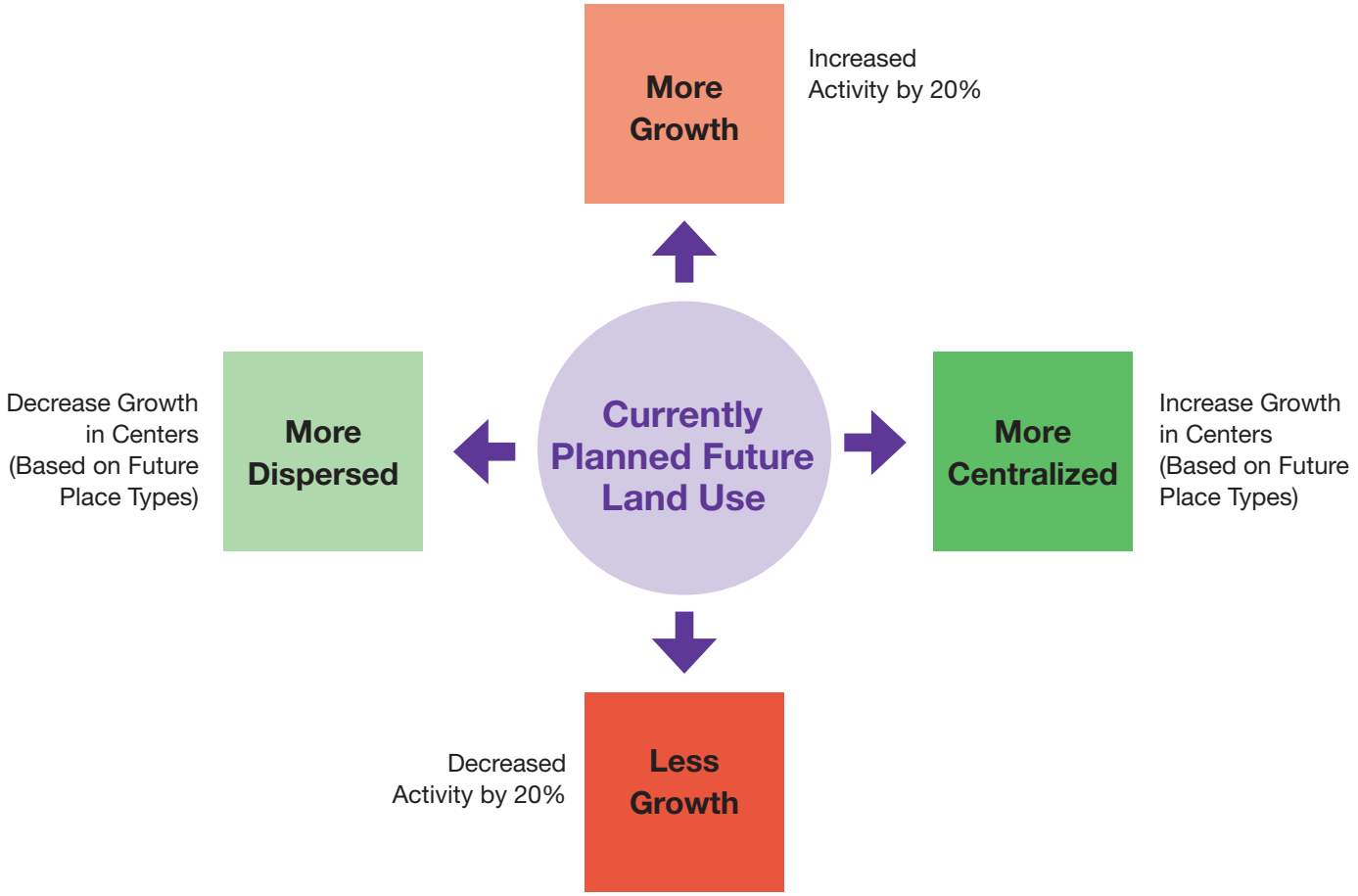

Figure 5.7: Sensitivity Analysis Scenarios

Sensitivity Analysis

The evaluation described in the previous sections was based on the currently forecast growth for the region. A sensitivity analysis was conducted to determine how the recommendations would be affected if the region grew differently. The analysis looked at four scenarios which covered fluctuation in the amount of growth as well as in the predicted patterns. **Figure 5.7** shows each scenario.

High and low growth scenarios were developed by increasing or decreasing the population and employment forecasts for the region by 20 percent. The more centralized and dispersed scenarios maintained the base forecast number of jobs and people, but redistributed them regionally. Findings of the sensitivity analysis included:

- Regional transit and TDM needs are significant irrespective of any of the four scenarios
- Shifts in population and employment would minimally affect high-capacity transit needs identified by future base forecasts
- Increasing density in already urbanized areas increases local and regional transit needs in those areas and would increase demand for high-capacity transit services
- Modest shifts in density from urban areas to rural areas does not create significant additional high-capacity transit need in those areas

Patterns of growth that increase densities in already urbanized areas, particularly those in the inner areas of the region, support investments in higher capacity transit modes better than other scenarios.

Refined Corridor Recommendations

The travel flow analysis was used to determine the highest tiered travel demand corridors. Corridors with the highest comparative travel demand were evaluated for transit suitability based on demographics and place types within 0.25-miles of the corridor. The analysis led the assignment of an "analysis transit service mode recommendation" for the subregional corridors and a recommendation for regional commuter bus service on Tier 1 super-regional corridors.

The recommendations for each corridor were then compared to existing high-capacity transit services, comprehensive plan-designated transit corridors, and detailed feasibility or environmental study recommendations for transit service. The future network was considered as a whole. Based on these evaluations, adjustments were made to the "analysis transit service mode recommendation" and resulted in the "preliminary transit service mode recommendation." The preliminary corridor recommendations were shared with agency, jurisdictional, and planning body stakeholders as well as with the public, as described in Chapter 2. Comments related to the corridor transit service modes were summarized and, in some cases, recommendations were adjusted.

Table 5.8 summarizes the development of transit service mode recommendations for each subregional corridor. The final recommendations for the corridors are described in Chapter 6. The recommendations identify transit mode technology and general corridor location based on a regional planning-level analyses of potential future need and suitability based on land use, demographics, and travel demand.

The Vision Plan includes a number of corridor-specific recommendations not currently included in local or regional plans. **Table 5.8** identifies corridors included in existing local or regional plans, corridors where the Northern Virginia Transportation Authority (NVTA) TransAction 2040 plan recommends a substantially different transit facility, and corridors for which studies are currently ongoing.

The Super NoVa Vision Plan recommendations for these corridors do not prescribe a particular approach for the implementation of the recommended service and accompanying facility type. Local and/or regional action or studies to incorporate these recommendations into local and regional plans would be needed prior to the implementation of Super NoVa corridor recommendations. In some cases, more detailed study and analysis with different approaches and goals will lead to different recommendations. Specific instances where additional analysis has already been conducted or is currently being conducted is summarized in the following:

- **Columbia Pike** — Arlington County and Fairfax County Boards have adopted, as the locally preferred alternative, modern streetcar service and continued bus service between Pentagon City in Arlington County and the Skyline area of Fairfax County.
- **US Route 1** — Arlington County Board and Alexandria City Council have a coordination agreement for the joint Route 1 Corridor Streetcar Conversion project which would convert the bus transitway (currently under construction) to a streetcar between Crystal City in Arlington County and the potential new Potomac Yard Metrorail station in the City of Alexandria.
- **US Route 1** — City of Alexandria is currently constructing a bus transitway between East Glebe Road and the Braddock Road Metrorail station.
- **Duke Street** — Alexandria City Council has approved a resolution identifying a high-capacity bus transitway as the locally preferred alternative for Duke Street between the King Street Metrorail station and Landmark Mall.
- **Van Dorn Street/Beauregard Street** — Alexandria City Council has approved a resolution identifying a high-capacity bus transitway as the locally preferred alternative for sections of Van Dorn Street and Beauregard Street between the Van Dorn Metrorail station and the Mark Center. At the Mark Center, the high-capacity bus transitway would branch into two lines with one serving Pentagon/Pentagon City via I-395 and the second serving the Northern Virginia Community College, Shirlington, and Pentagon/ Pentagon City via Beauregard Street, S. Arlington Mill Drive, and I-395.
- Fairfax County is currently studying an interconnected network of high-capacity transit corridors as part of the Fairfax Countywide Transit Network Study. Recommendations from that study may differ from the Super NoVa Vision Plan due to differences that include approach, goals, objectives, and constraints of the two studies. The county's Transit Network Study will consider prioritization, funding, impacts, and demand while the Vision Plan primarily considered potential future need and suitability.

Table 5.8: Development of Corridor Transit Service Mode Recommendations

Corridor	Existing High-Capacity Service	Programmed High-Capacity Service	Analysis Outcome Service	Preliminary Service Recommendation	Justification for Adjustment from Analysis Outcome	Stakeholder Input
I-66: Washington, D.C. to Vienna	Metrorail Orange Line		Light Rail Transit/ Bus Rapid Transit	Express Bus	Existing Metrorail in Corridor	▪ Coordinate I-66/Route 29/ Route 50 corridors
I-66: Vienna to Centreville			Light Rail Transit/ Bus Rapid Transit	Heavy Rail	Local/Regional Plans for Metrorail Extension	
I-66: Centreville to Haymarket			Rapid Bus	Rapid Bus		
I-95: Beltway to Lorton		I-95 Express Lanes	Rapid Bus	Rapid Bus		
I-95: Lorton to Dale City		I-95 Express Lanes	Rapid Bus	Rapid Bus		
I-95: Dale City to Stafford County		I-95 Express Lanes	Express Bus	Regional Commuter Bus	I-95/I-395 Rapid Bus Transit Study	
I-495: I-270 (MD) to VA 267 (Dulles Toll Road)		I-495 Express Lanes (Maryland State Line to Dulles Toll Road	Express Bus	Rapid Bus	Provide All-Day Service in Corridor Using I-495 Express Lanes	
I-495: VA 267 (Dulles Toll Road) to I-395		I-495 Express Lanes	Rapid Bus	Rapid Bus		
I-495: I-395 to MD Route 214			Rapid Bus	Rapid Bus		

Local or Regional Plan Recommendation	MPO Constrained Long-Range Plan Recommendation	NVTA TransAction 2040 Draft Recommendation	Ongoing Study	Final Vision Plan Service Recommendation
Express Lanes (I-66 Multimodal Inside the Beltway Study); Enhanced Public Transportation Corridor (EPTC) (Fairfax County Comp. Plan)		Express Priority Bus Service D.C. to Gainesville	I-66 Tier 1 Environmental Impact Statement; Fairfax Countywide Transit Network Study	Regional Commuter Bus on Existing Express or HOV Lane
Metrorail Extension to Centreville (Fairfax County Comp. Plan)		Express Priority Bus Service D.C. to Gainesville; Metrorail Orange Line Extension to Centreville	I-66 Tier 1 EIS; Fairfax Countywide Transit Network Study	Heavy Rail; Regional Commuter Bus on Existing Express or HOV Lane
EPTC (Fairfax County Comp. Plan); Metrorail Extension to Gainesville and BRT to Haymarket (Prince William County Comp. Plan)	Add HOV Lanes	Express Priority Bus Service D.C. to Gainesville; Metrorail Orange Line Extension to Gainesville	I-66 Tier 1 EIS; Fairfax Countywide Transit Network Study	Rapid Bus (Centreville to Gainesville); Regional Commuter Bus on Existing Express or HOV Lane
I-95 Express Lanes, Priority Bus Route (I-95/I-395 Bus Rapid Transit Study); EPTC (Fairfax County Comp. Plan)	I-95 Express Lanes	Metrorail Blue Line Extension to Potomac Mills; Expanded Express and Commuter Bus Service	Fairfax Countywide Transit Network Study	Regional Commuter Bus on Existing Express or HOV Lane
I-95 Express Lanes, Priority Bus Route (I-95/I-395 Bus Rapid Transit Study); EPTC (Fairfax County Comp. Plan); Metrorail Extension to Potomac Mills and BRT (Prince William County Comp. Plan)	I-95 Express Lanes	Metrorail Blue Line Extension to Potomac Mills; Expanded Express and Commuter Bus Service	Fairfax Countywide Transit Network Study	Regional Commuter Bus on Existing Express or HOV Lane
I-95 Express Lanes, Priority Bus Route (I-95/I-395 Bus Rapid Transit Study)	I-95 Express Lanes (Dale City to Stafford County Line; I-95 Express Lanes (Stafford County Line to Route 17 in Spotsylvania County)			Regional Commuter Bus on Existing Express or HOV Lane
EPTC (Fairfax County Comp. Plan)	I-495 Express Lanes (Maryland State Line to Dulles Toll Road)	Priority Bus Service (in Virginia); New Metrorail Line from Dunn Loring to Bethesda	Fairfax Countywide Transit Network Study	Rapid Bus; Regional Commuter Bus
I-495 Express Lanes, Priority Bus Route (I-95/I-395 Bus Rapid Transit Study); EPTC (Fairfax County Comp. Plan)	I-495 Express Lanes	Priority Bus Service (in Virginia); New Metrorail Line from Dunn Loring to Bethesda; Expanded Express and Commuter Bus Service	Fairfax Countywide Transit Network Study	Rapid Bus; Regional Commuter Bus on Existing Express or HOV Lane
EPTC (Fairfax County Comp. Plan)		Priority Bus Service (I-495 in Virginia), Metrorail Extension Across the Wilson Bridge (Eisenhower Avenue Station to Branch Avenue Station)	Fairfax Countywide Transit Network Study	Rapid Bus; Regional Commuter Bus

Table 5.8: Development of Corridor Transit Service Mode Recommendations (continued)

Corridor	Existing High-Capacity Service	Programmed High-Capacity Service	Analysis Outcome Service	Preliminary Service Recommendation	Justification for Adjustment from Analysis Outcome	Stakeholder Input
Route 1: Pentagon City to Beltway	Metrorail Blue and Yellow Lines/VRE Fredericksburg Line	Crystal City/ Potomac Yard Transitway Pentagon City to Braddock Road Metrorail Station	Heavy Rail	Light Rail Transit/ Bus Rapid Transit	Existing Metrorail in Corridor, Planned Crystal City/Potomac Yard	▪ Consider Connection to Huntington ▪ No Transitway Between Braddock Road Metrorail Station and Beltway
Route 1: Beltway to Fort Belvoir	VRE Fredericksburg Line		Light Rail Transit/ Bus Rapid Transit	Light Rail Transit/ Bus Rapid Transit		▪ Concern that Corridor 11 (Route 1) and Corridor 40 (Route 611) are Not Both Needed ▪ Consider Connection to Woodbridge VRE
Route 1: Fort Belvoir to Quantico	VRE Fredericksburg Line		Rapid Bus	Rapid Bus		
Route 1: Quantico to Fredericksburg	VRE Fredericksburg Line		Rapid Bus	Rapid Bus		
Route 120 (Glebe Road): Ballston to Route 1			Light Rail Transit/ Bus Rapid Transit	Light Rail Transit/ Bus Rapid Transit		▪ Consider HOV Instead of Dedicated Runningway
Route 123: McLean to City of Fairfax			Light Rail Transit/ Bus Rapid Transit	Light Rail Transit/ Bus Rapid Transit		
Route 123: City of Fairfax to Woodbridge			Express Bus	Express Bus		
Route 17: Stafford County to Fredericksburg			Rapid Bus	Rapid Bus		
Route 236 (Duke Street): Alexandria to I-395			Light Rail Transit/ Bus Rapid Transit	Light Rail Transit/ Bus Rapid Transit		
Route 236 (Little River Turnpike): I-395 to City of Fairfax			Light Rail Transit/ Bus Rapid Transit	Light Rail Transit/ Bus Rapid Transit		
Route 244 (Columbia Pike): Pentagon to Bailey's Crossroads		Columbia Pike Streetcar Service	Light Rail Transit/ Bus Rapid Transit	Light Rail Transit/ Bus Rapid Transit		

Local or Regional Plan Recommendation	MPO Constrained Long-Range Plan Recommendation	NVTA TransAction 2040 Draft Recommendation	Ongoing Study	Final Vision Plan Service Recommendation
Crystal City/Potomac Yard Transitway Pentagon City to Braddock Road Metrorail Station (Corridor Transit Improvement Project)	Crystal City/Potomac Yard Transitway; US 1 Streetcar	Crystal City/Potomac Yard Transitway (Conversion from Bus to Streetcar)	Planned Environmental Studies for Potential Conversion to Streetcar Pentagon City to Future Potomac Yard Metrorail Station	Streetcar (Pentagon City to Future Potomac Yard Metrorail Station;) Light Rail Transit/Bus Rapid Transit (Potomac Yard to Braddock Road Metrorail Station)
EPTC (Fairfax County Comp. Plan)		Priority Bus Service	Fairfax Countywide Transit Network Study	Light Rail Transit/ Bus Rapid Transit (Huntington Metro to Lorton VRE)
EPTC (Fairfax County Comp. Plan); BRT (Prince William County Comp. Plan)		Conduct Transit Study and Alternative Analysis (Huntington to Quantico)	Fairfax Countywide Transit Network Study	Rapid Bus (Lorton to Quantico)
	Regional Bus Service (Stafford County to Route 17 in Spotsylvania County)			Rapid Bus (Quantico to Route 17 in Spotsylvania County)
Primary Transit Network (PTN) (Arlington County Master Transportation Plan)				Light Rail Transit/ Bus Rapid Transit (Lee Highway to Route 1)
			Fairfax Countywide Transit Network Study	Light Rail Transit/ Bus Rapid Transit
				Express Bus
	Local Bus Service			Rapid Bus
High-Capacity Transitway (Alexandria Transportation Master Plan)		High-Capacity Transitway Within the City of Alexandria	City of Alexandria Transitway Corridors Feasibility Study	Light Rail Transit/ Bus Rapid Transit
		Priority Bus Service	Fairfax Countywide Transit Network Study	Light Rail Transit/ Bus Rapid Transit
Columbia Pike Streetcar (Locally Preferred Alternative for Arlington and Fairfax Counties)	Streetcar (Pentagon City to Skyline)		Columbia Pike Transit Initiative	Streetcar

Table 5.8: Development of Corridor Transit Service Mode Recommendations (continued)

Corridor	Existing High-Capacity Service	Programmed High-Capacity Service	Analysis Outcome Service	Preliminary Service Recommendation	Justification for Adjustment from Analysis Outcome	Stakeholder Input
Route 244: Bailey's Crossroads to Annandale			Light Rail Transit/ Bus Rapid Transit	Light Rail Transit/ Bus Rapid Transit		
Route 267 (Dulles Corridor): Beltway to Reston		Metrorail Silver Line: Tysons Corner to Reston	Commuter Rail	Heavy Rail/ Express Bus	Planned Metrorail Silver Line	
Route 267 (Dulles Corridor): Reston to Dulles		Metrorail Silver Line: Reston to Dulles	Light Rail Transit/ Bus Rapid Transit	Heavy Rail/ Express Bus	Planned Metrorail Silver Line	
Route 267 (Dulles Corridor): Dulles to Leesburg		Metrorail Silver Line: Dulles to Route 707	Rapid Bus	Rapid Bus		
Route 28: Route 7 to Centreville			Express Bus	Rapid Bus	Planned EPTC, Connectivity	▪ Concern with the Amount of Transit Service Recommended in the Area of Route 28/ Centreville Road/Fairfax County Parkway (286) ▪ Focus on Route 28 or Route 286
Route 28: Manassas to Centreville			Light Rail Transit/ Bus Rapid Transit	Light Rail Transit/ Bus Rapid Transit		
Route 286: Herndon to Fair Lakes			Rapid Bus	Express Bus	Travel Demand Indicated High Percentage of Through Trips	▪ Concern with the Amount of Transit Service Recommended in the Area of Route 28/ Centreville Road/Fairfax County Parkway (286) ▪ Fairfax County has HOV Planned on 286
Route 286: Fair Lakes to Franconia-Springfield			Express Bus	Express Bus		▪ Consider Connection to Fort Belvoir
Route 29: Georgetown to City of Fairfax			Light Rail Transit/ Bus Rapid Transit	Light Rail Transit/ Bus Rapid Transit		▪ Rapid Bus/LRT/BRT ▪ Coordinate I-66/Route 29/ Route 50 Corridors ▪ Avoid Dedicated Lanes in City of Fairfax
Route 29: City of Fairfax to Centreville			Rapid Bus	Rapid Bus		▪ Provide Connectivity to Hub in City of Fairfax

Local or Regional Plan Recommendation	MPO Constrained Long-Range Plan Recommendation	NVTA TransAction 2040 Draft Recommendation	Ongoing Study	Final Vision Plan Service Recommendation
			Fairfax Countywide Transit Network Study	Light Rail Transit/ Bus Rapid Transit
Metrorail Silver Line: Tysons Corner to Reston	Dulles Corridor Metrorail			Heavy Rail (Silver Line-Tysons Corner to Reston), Regional Commuter Bus on Existing Express or HOV Lane
Metrorail Silver Line: Reston to Dulles	Dulles Corridor Metrorail			Heavy Rail (Silver Line-Reston to Dulles), Regional Commuter Bus on Existing Express or HOV Lane
Metrorail Silver Line: Dulles to Route 707	Dulles Corridor Metrorail			Heavy Rail (Silver Line-Dulles to Route 707), Rapid Bus (Route 707 to Leesburg), Regional Commuter Bus on Existing Express or HOV Lane
EPTC (Fairfax County Comp. Plan); LRT or BRT (Prince William County Comp. Plan)		Light Rail (Dulles Airport to Manassas)	Fairfax Countywide Transit Network Study	Rapid Bus; Regional Commuter Bus (Centreville to Dulles Airport)
EPTC (Fairfax County Comp. Plan)		Light Rail (Dulles Airport to Manassas)	Fairfax Countywide Transit Network Study	Light Rail Transit/ Bus Rapid Transit
EPTC (Fairfax County Comp. Plan)	Add HOV Lanes	Priority Bus Service (Herndon/Monroe Metrorail to Fort Belvoir)	Fairfax Countywide Transit Network Study	Express Bus (Reston Town Center to Fair Lakes)
EPTC (Fairfax County Comp. Plan)		Priority Bus Service (Herndon/Monroe Metrorail to Fort Belvoir)	Fairfax Countywide Transit Network Study	Express Bus (Fair Lakes to Lorton VRE)
Enhanced Priority Bus Service (I-66 Multimodal Inside the Beltway Study); PTN (Arlington County Master Transportation Plan)		Priority Bus Service (D.C. to Fair Oaks)		Light Rail Transit/ Bus Rapid Transit (Washington, D.C. to Seven Corners)

Table 5.8: Development of Corridor Transit Service Mode Recommendations (continued)

Corridor	Existing High-Capacity Service	Programmed High-Capacity Service	Analysis Outcome Service	Preliminary Service Recommendation	Justification for Adjustment from Analysis Outcome	Stakeholder Input
Route 294 (Prince William Pkwy): Manassas to Potomac Mills			Express Bus	Express Bus		
Route 3: Spotsylvania to Fredericksburg			Rapid Bus	Rapid Bus		
Route 309 (Old Dominion): Ballston to McLean			Light Rail Transit/ Bus Rapid Transit	Light Rail Transit/ Bus Rapid Transit		▪ No Transit Due to Constraints
Route 401 (Van Dorn Street)/ Beauregard Street/I-395: Pentagon to Beltway			Heavy Rail	Rapid Bus/ Light Rail Transit/ Bus Rapid Transit	Existing Metrorail to Van Dorn, Rapid Bus on I-395, Planned Transitway	
Route 50: Washington, D.C. to City of Fairfax			Heavy Rail	Rapid Bus/ Light Rail Transit/ Bus Rapid Transit	Existing Metrorail in Part of Corridor	▪ Rapid Bus, Arlington County - BRT ▪ Coordinate I-66/Route 29/ Route 50 Corridors ▪ Avoid Dedicated Lanes in City of Fairfax
Route 50: City of Fairfax to Loudoun County			Rapid Bus	Rapid Bus		▪ Avoid Dedicated Runningways in City of Fairfax
Route 606/ Loudoun Co. Pwky: Route 7 to Braddock Road			Rapid Bus	Rapid Bus		
Route 608/ Reston Pkwy: Route 7 to Fair Lakes			Light Rail Transit/ Bus Rapid Transit	Light Rail Transit/ Bus Rapid Transit		
Route 610 (Garrisonville Road): Stafford County to Route 1			Rapid Bus	Rapid Bus		
Route 611/ Kings Highway: Huntington to Lorton			Rapid Bus	Rapid Bus		▪ Concern that Corridor 11 (Route 1) and Corridor 40 (Route 611) are Not Both Needed ▪ Concern that Density Value for Corridor May have Skewed by High Densities at Termini

Local or Regional Plan Recommendation	MPO Constrained Long-Range Plan Recommendation	NVTA TransAction 2040 Draft Recommendation	Ongoing Study	Final Vision Plan Service Recommendation
BRT Between Gainesville and Potomac Mills and Transitway Gainesville to Loudoun County (Prince William County Comp. Plan)				Express Bus (Manassas to Route 1)
	High Quality Transit Service Corrirdor			Rapid Bus
High-Capacity Transitway (Alexandria Transportation Master Plan)	Bus Rapid Transit (Pentagon Metrorail to Van Dorn Street Metrorail)	Dedicated Bus Lanes (Van Dorn Metro Station to Arlington County)		Light Rail Transit/ Bus Rapid Transit (Franconia Metrorail Station to Mark Center); Rapid Bus (Mark Center to Pentagon via I-395)
Enhanced Priority Bus Service (I-66 Multimodal Inside the Beltway Study)		Priority Bus Service (D.C. to Fair Oaks)	Fairfax Countywide Transit Network Study	Rapid Bus (Washington, D.C. to Seven Corners); Light Rail Transit/Bus Rapid Transit (Seven Corners to City of Fairfax)
		Priority Bus Service (City of Fairfax to Chantilly)	Fairfax Countywide Transit Network Study	Light Rail Transit/Bus Rapid Transit (Fair Lakes to City of Fairfax); Rapid Bus (Loudoun County Parkway to Fair Lakes)
				Rapid Bus (Route 7 to Route 50)
				Light Rail Transit/ Bus Rapid Transit (Route 606 to Fair Lakes)
				Rapid Bus
				No High-Capacity Transit Service

Table 5.8: Development of Corridor Transit Service Mode Recommendations (continued)

Corridor	Existing High-Capacity Service	Programmed High-Capacity Service	Analysis Outcome Service	Preliminary Service Recommendation	Justification for Adjustment from Analysis Outcome	Stakeholder Input
Route 657 (Centreville Road): Route 7 to Centreville			Light Rail Transit/ Bus Rapid Transit	Light Rail Transit/ Bus Rapid Transit		▪ Concern with the Amount of Transit Service Recommended in the Area of Route 28/ Centreville Road/Fairfax County Parkway (286) ▪ Focus on Route 28 or Route 286
Route 7: Old Town to Beauregard Street			Light Rail Transit/ Bus Rapid Transit	Light Rail Transit/ Bus Rapid Transit		▪ No transit due to constraints
Route 7: Alexandria to Tysons			Light Rail Transit/ Bus Rapid Transit	Light Rail Transit/ Bus Rapid Transit		
Route 7: Tysons to Dulles Town Center			Express Bus	Express Bus		
Route 7: Dulles Town Center to Leesburg			Rapid Bus	Rapid Bus		

Local or Regional Plan Recommendation	MPO Constrained Long-Range Plan Recommendation	NVTA TransAction 2040 Draft Recommendation	Ongoing Study	Final Vision Plan Service Recommendation
				Light Rail Transit/ Bus Rapid Transit (Reston Parkway to Centreville)
			Route 7 Alternatives Analysis	
EPTC (Fairfax County Comp. Plan)		Light Rail (Baileys Crossroads to Tysons Corner)	Route 7 Alternatives Analysis	Light Rail Transit/Bus Rapid Transit (Beauregard Street to Tysons Corner)
			Fairfax Countywide Transit Network Study	Express Bus
				Rapid Bus

CORE CAPACITY CONSTRAINTS

Passengers board the Washington Metropolitan Area Transit Authority Metro.

Despite robust transit systems operating in many parts of the center of the region, significant capacity constraints exist and threaten the ability for these systems to expand and meet current and future transit demand. While many of these constraints are physically located in the center of the region—Arlington County, Alexandria, Fairfax County, and the District of Columbia—their operational impact creates ripple effects across the Super NoVa region. Significant investments are already, and will continue to be, needed in the inner area of the region to support regional transit demand. Core capacity will need to become an increasingly important regional priority if it is to be resolved.

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

In December 2001, Washington Metropolitan Area Transit Authority (WMATA) performed a comprehensive assessment of issues related to rail and bus transit lines and facilities rapidly approaching or exceeding capacity. WMATA used the results of this assessment to outline a program of capital and operational improvements intended to address the continued crowding and degradation in the level of service. Since this time, WMATA has performed additional evaluations of individual proposed rail capital system improvements intended to address some of the more critical areas of capacity. This includes recommended station improvements at key transfer stations such as Gallery Place, L'Enfant Plaza, Metro Center, Farragut North/ Farragut West, and Union Station. WMATA developed a capital needs inventory in 2010 that looks at systemwide needs and projected costs. WMATA is currently working on Metro's Regional Transit System Plan (RTSP) that assesses a variety of options for capacity enhancement and expansion. At the time of Vision Plan publication, final recommendations were not available.

WMATA's Office of Long Range Planning provided the Super NoVa study the following overview of the core capacity issues through 2040 associated with stations, trains, and lines:

Stations

Issues

- Ridership growth throughout the years has resulted in passenger crowding on platforms and conflicts on platforms, mezzanines, and escalators at key transfer stations such as Metro Center, Gallery Place, and Union Station. Because each station was designed to have one way to get to a platform (i.e., at Gallery Place, all Green/Yellow riders who transfer to the West/Northbound Red Line gather at the end of the train), crowding is common and increases the dwell time of trains in the station, reducing the line capacity.

Needs

- Short- and long-term solutions are being studied for transfer stations:
  - **Gallery Place** — Study currently underway to identify short-, medium-, and long-term improvements. Previous recommendations have included extending the Red Line mezzanine across the entire length of the platform and building a pedestrian tunnel between Gallery Place and Metro Center.
  - **L'Enfant Plaza** — Study currently underway to identify short-, medium-, and long-term improvements. Recommendations could include expanding mezzanine/fare payment area, platform modifications, and/or vertical transportation changes.
  - **Metro Center** — Projects at Gallery Place and Farragut West/North would help capacity issues at Metro Center, though intrastation improvements also could be made. A study on Metro Center has yet to be undertaken.
  - **Farragut West/North** — Free transfer at ground level currently in operation, though usage is minimal. Previous recommendations have included building a pedestrian tunnel between Farragut West/North.
  - **Union Station** — A study was conducted in 2011 and recommendations included improvements to the North Mezzanine, Metrorail platform, and Amtrak (commuter rail) concourse.

Trains

Issues

- There are opportunities to expand core capacity by enabling 100 percent eight-car trains during peak periods; however, there is currently no funding allocated in the current 2040 Constrained Long-Range Plan (CLRP) for additional cars and the supporting infrastructure. WMATA currently operates about 30-35 percent eight-car trains during peak periods. It is expected that the overall system will reach capacity using the current configuration between 2025 and 2030.
- Adding rail cars to the existing trains will likely exacerbate issues in the stations, such as clearing platforms.

Needs

- Additional 360 rail cars (system growth, not including needs for Silver Line), based on the draft 2012 Rail Fleet Plan
  - Improvements to traction power system
  - Rail car storage
  - Personnel

Lines

Issues

- In the current configuration without changes or improvements in technology, approximately 26 total trains per hour can travel through the core lines (i.e., only 26 trains can run east of Rosslyn and north of L'Enfant Plaza). Surveys have shown congested segments on many lines in the core.
- **Blue/Orange/Silver** — Because of the merge at Rosslyn, the number of Blue and Orange trains that can operate in Virginia is limited. The current service plan (after commencing Rush+ service) during the peak is 19 Orange Line trains including trippers and six to seven Blue Line trains per hour during peak periods. Congestion on the Orange Line east of East Falls Church will be further exacerbated once the Silver Line comes online in 2013. The Silver Line service plan is still under development.
- **Yellow/Green** — The merge south of L'Enfant Plaza has limited the number of Green and Yellow trains that can operate in Southeast Washington, D.C. and Virginia. The current service plan (after commencing Rush+ service) is 13 Yellow Line trains and 13 Green Line trains per hour during peak periods including trippers.

Needs

- Line capacity issues are being studied in Metro's RTSP. WMATA is assessing a variety of options that include separating the Blue Line from the Orange/Silver Lines, an express line through Arlington, and separating the Yellow Line from the Green Line.

VIRGINIA RAILWAY EXPRESS

VRE's ability to expand services is limited by the ability of Union Station to accommodate more train sets midday as well as other constraints. VRE's Strategic Plan for 2004 through 2025 describes these constraints which include:

Rail Infrastructure

Issues

- VRE trains operate in a shared-rail environment with intercity passenger and freight rail.

Needs

- Rail capacity improvements

Rolling Stock

Issues

- The effective carrying capacity of the existing fleet and system have been reached with several peak period trains having standees. Existing cars need to be replaced based on maximum life-expectancy. Locomotives do not meet new federal clean air standards.

Needs

- New bi-level railcars
- Upgrade or acquire new diesel locomotive fleet

Station Parking

Issues

- Many rail station parking lots are at or exceeding their practical capacity before the end of the morning peak period. Demand at end of line stations is well in excess of supply.

Needs

- Capital funding for parking expansion

Train Storage

Issues

- There is no additional space in Washington, D.C. for midday train storage.

Needs

- More midday storage is needed in or near Washington Terminal

COMMUTER BUS

PRTC, LC Transit, and numerous other commuter service providers are hindered by insufficient or inconvenient midday storage facilities in the inner area. Due to limited storage facilities, operators must deadhead most or all of their fleet back to their overnight storage locations, idle in places they are not intended to layover, or circle city streets waiting for their return runs. All of these options represent a significant cost to operators and increase in deadhead trips back to overnight storage facilities which subject services to additional traffic uncertainty. Additional midday storage facilities in the inner area would help transit agencies operate some services more efficiency and with greater reliability. In addition to midday storage facilities, operators need support for new, expanded, and renovated vehicle maintenance facilities to accommodate existing and future demand for transit in the region.

LOCAL TRANSIT SERVICE ANALYSIS

The Trolley in Leesburg, VA. Source: Virginia Regional Transit.

METHODOLOGY/APPROACH

Local transit service needs are influenced by the land use characteristics of a community. Service needs for a rural community are much different than for an urbanized area. The Super NoVa region has been categorized into the following nine generalized land use "area types":

- Rural
- Rural Village
- Emerging
- Suburban
- Urbanizing
- Small Urban
- Medium Urban
- Large Urban
- Urban Core

Area type categorization was completed for all census designated places, and is based primarily on population densities. These area type categories are the same categories being used in the DRPT Statewide Transit/TDM Plan. **Figure 5.8** shows the area type categorization by jurisdiction in the Virginia portion of the study area for 2010 and 2040.

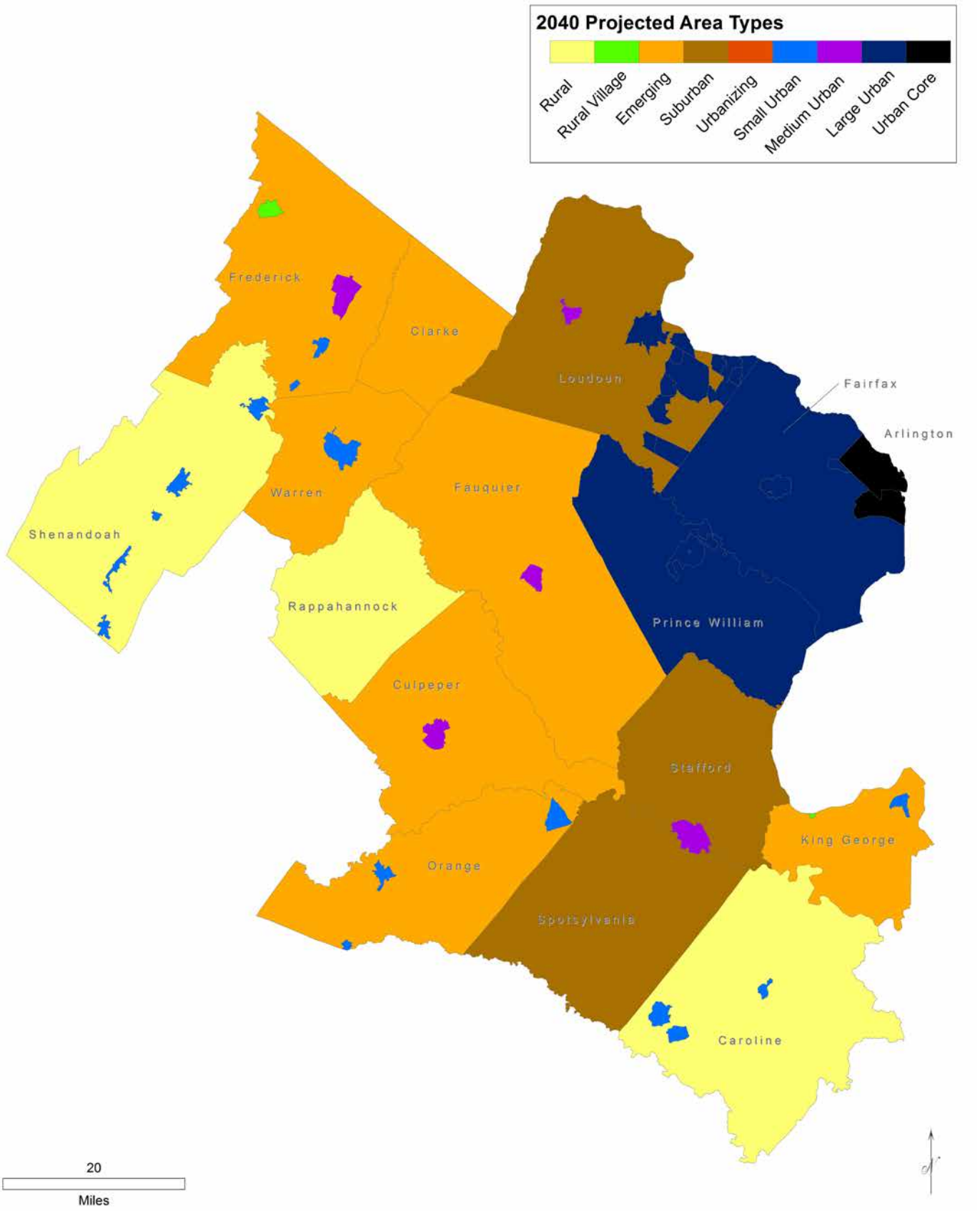

Figure 5.8: Super NoVa Area Type Categorization (Virginia Only)

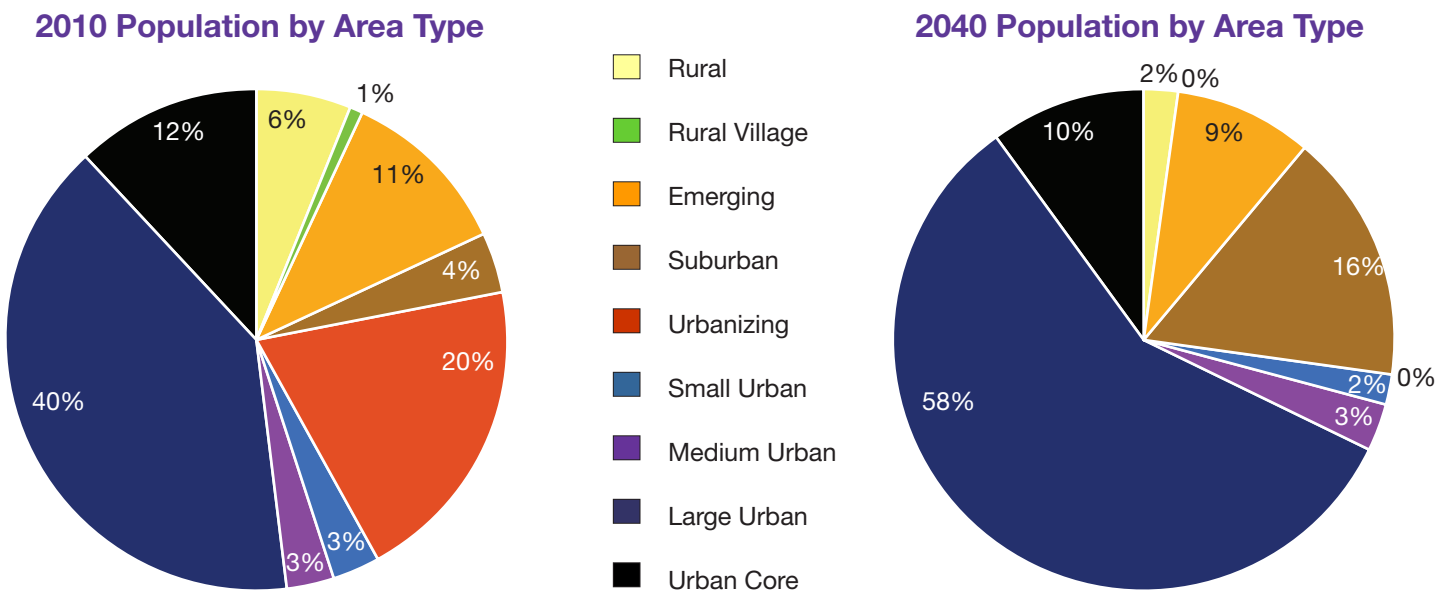

Figure 5.9: Super NoVa Population by Area Type (Virginia Only)

Figure 5.9 presents percentages of the Super NoVa population in each place type category. In 2010, the Super NoVa population (Virginia portion only) was 2.9 million. Approximately 52 percent of the Super NoVa population fell in either the "urban core" or "large urban" categories (e.g., Arlington, Alexandria, and Fairfax County). Approximately 18 percent of the population fell in the "rural", "rural village", or "emerging" categories.

The projected population for 2040 (Virginia portion only) is 4.6 million, representing a 58 percent increase from 2010. The portion that is projected to be living in urban core and large urban areas increases from 52 percent to 68 percent. The portion that is living in rural, rural village, and emerging place type areas decreases from 18 percent to 11 percent; thus, large numbers of people in the Super NoVa region will be shifting to higher density area type categories.

The change in area type triggers the need for increased transit service levels. There is an increased need for transit service for the higher area type classifications. For example, rural demand-response transit service may be sufficient for an area categorized as rural village. This same area could require all-day, fixed route services if its densities trigger an area type change to small urban.

Transit service needs were determined on the basis of transit service hours per capita. For areas that change area types, service requirement needs are at least equivalent or better than the statewide average for that specific area type. For example, an area that transitions to a "medium urban" classification requires at least 1.2 transit service hours per capita (the statewide average for this specific area type). This determination of local transit service needs is consistent with the methodology used in the Statewide Transit and TDM Plan.

ANALYSIS

Table 5.9 presents 2011 estimated service hours in the Super NoVa region by area type, and a range of potential 2040 service hour needs by area type. A range has been provided, with the lower end of the range reflecting the level of transit service required to meet the statewide average for each specified area type, and the upper end of the range reflecting a service hour bump for areas that presently perform above the statewide average. As noted in this table, 2040 estimated local transit service needs are 111 percent to 137 percent higher than 2011 service levels. Population for the Super NoVa region (Virginia portion only) is projected to increase by 58 percent, but transit service needs are expected to be approximately twice this rate because of the transition of population into higher area type categories. **Table 5.10** presents transit service needs by subarea and jurisdiction.

This analysis indicates that areas like Prince William County and Eastern Loudoun County are likely to require transit service levels similar to what is presently provided in Fairfax County. Areas like Fauquier County and Spotsylvania County are likely to require transit service levels similar to levels presently provided in Loudoun County and Prince William County. Those service needs could include expanded all-day transit services, weekend, and evening services. Local transit service needs also are likely to be interjurisdictional. For example, eastern Loudoun and Fairfax Counties fall in the "large urban" area type category by 2040. This means there will be an increase in cross-jurisdictional trips and an increased need for local transit services that cross county boundaries.

Table 5.9: Service Needs by Area Type

Area Type	Est. 2011 Serv. Hrs.	Potential 2040 Service Hour Range	
Rural	4,000	24,000	25,000
Rural Village	3,000	2,000	2,000
Emerging	40,000	129,000	145,000
Suburban	13,000	259,000	285,000
Urbanizing	194,000	0	0
Small Urban	19,000	53,000	55,000
Medium Urban	65,000	226,000	229,000
Large Urban	1,388,000	3,656,000	4,089,000
Urban Core	1,087,000	1,590,000	1,843,000
TOTAL	2,813,000	5,939,000	6,673,000
Percent Change		111%	137%

Table 5.10: Service Needs by Jurisdictional Area

Subarea	Jurisdictional Area	Estimated 2011 Service Hours	Potential 2040 Service Hour Range	
Inner Subarea	Alexandria/Arlington/Falls Church	1,099,000	1,607,000	1,862,000
	Fairfax City/County	1,358,000	1,966,000	2,276,000
	Subtotal	**2,457,000**	**3,573,000**	**4,138,000**
Northwest Subarea	Loudoun County	105,000	679,000	690,000
	Clark County	1,000	7,000	9,000
	Frederick County/Winchester	20,000	87,000	93,000
	Subtotal	**126,000**	**773,000**	**792,000**
West Subarea	Fauquier County	4,000	55,000	58,000
	Culpeper County	7,000	55,000	58,000
	Orange County	4,000	24,000	24,000
	Warren County	3,000	23,000	26,000
	Rappahannock/Shenandoah Counties	0	24,000	24,000
	Subtotal	**18,000**	**181,000**	**190,000**
South Subarea	Prince William/Manassas/M. Park	156,000	1,064,000	1,182,000
	Stafford/Spotsy/Fredericksburg	50,000	310,000	331,000
	Caroline/King George Counties	6,000	37,000	40,000
	Subtotal	**212,000**	**1,411,000**	**1,553,000**
	TOTAL FOR SUPER NOVA REGION	2,813,000	5,938,000	6,673,000
	Percent Change		111%	137%

TDM ANALYSIS

Commuter Store in Rosslyn, VA. Source: Arlington County.

METHODOLOGY/APPROACH

The analysis of the TDM programs in the Super NoVA region required identifying the goals and objectives to be achieved by these programs, identifying the strategies and services currently being provided in the study area, and assessing whether goals and objectives were being met by these programs. This analysis resulted in a gap and needs assessment that helped in the development of TDM recommendations (described in the next chapter).

Goals

The goals for TDM programs, as outlined in the Virginia Surface Transportation Plan 2035 (Nov 2010), are:

- Mobility, Connectivity, and Accessibility
- Economic Vitality
- Environmental Stewardship
- Coordination of Transportation and Land Use

Objectives

Since TDM needs vary by the place type (i.e. the density and character of the built environment), the number of origins and destinations in the area, and community values, objectives for each TDM program will differ based on the place types being served. The place types developed for the SuperNOVA region (described earlier in this study) were aggregated to match the four area types developed in the 2035 Virginia Surface Transportation Plan — urban core, suburban/feeder, small urban, and non-urban. **Table 5.11** lists the objectives of TDM strategies for each area type.

Table 5.11: TDM Service Levels Based on the 2035 Virginia Surface Transportation Plan

Urban	Suburban/Feeder	Small Urban	Non-Urban
■ Build on existing transit options and bike/walk options ■ Develop suburban transit links for inbound/reverse commute ■ Address short-trip lengths ■ Strong focus on employment end outreach ■ Target commute trips and non-work travel of residents ■ Integrate TDM into local planning, MTPs, and LRTPs ■ Increase parking management ■ Promote alternative work hours and telework at employment ■ Enhance cross-jurisdictional coordination for TDM	■ Expand non-SOV use for non-work trips in suburban centers ■ Strong focus on employment outreach in suburban centers ■ Promote feeder area ridesharing for long-distance commutes ■ Promote telework to employers and residents ■ Expand transit options; develop transit links to urban and suburban employment ■ Integrate TDM into the land development process; encourage mixed-use ■ Integrate TDM into local planning, MTPs, and LRTPs ■ Enhance cross-jurisdictional coordination for TDM	■ Expand employer outreach, especially in suburban centers ■ Primary focus on resident/commute travel ■ Promote carpool and vanpool for long-distance commutes to areas outside region ■ Promote telework to residents ■ Develop transit links to urban and suburban employment ■ Integrate TDM into the land development processes; encourage mixed-use ■ Integrate TDM into local planning, MTPs, and LRTPs ■ Enhance cross-jurisdictional coordination for TDM	■ Primarily residence-based programs for commuting within and outside the area ■ Promote telework to residents ■ Establish modest commute outreach in areas with no current program ■ Support long-distance commute markets ■ Coordinate with neighboring employment areas for outbound commuting ■ Integrate TDM into local planning, MTPs, and LRTPs

Source: Based on the *2035 Virginia Surface Transportation Plan.*

Existing Conditions

TDM programs in the Super NoVa area vary considerably. To consistently compare TDM services across different agencies and regions, services were classified into the eight TDM service categories listed below. Although each TDM service category may be provided in very different ways and at different levels by each TDM agency, the objective of the service is generally the same across TDM agencies.

- **Transportation Information** — This service is provided to help travelers identify transportation options available in the area and to help with trip planning. Information may be disseminated through retail or mobile stores; call centers or help lines; radio, TV, newspapers, or other print media; and websites and social media. Real-time travel information also can help increase convenience and reliability of trips. The majority of the TDM agencies/transportation management associations (TMA) provide information through websites, over the phone, radio/TV, or newspapers. Retail outlets or mobile stores where travelers may obtain information or buy fare media in person are less common. There is great potential for increasing service levels for real-time travel information in the future.
- **Employer Services** — Targeted education and outreach campaigns are developed by TDM agencies for employers and employees within the service area. Employer services generally include help with commute planning for employees, telework training and support, setting up and administering commuter benefit programs, and initiating or enhancing compressed or alternate work schedules for eligible employees. The majority of TDM agencies/TMAs offer some level of employer services. Employer services are acknowledged to have significant measurable impacts on commute patterns of employees and reductions in traffic congestion during peak hours. Employer services will continue to be a major focus for TDM programs in all area types, and will need to be enhanced in areas where employment is expected to increase.

Figure 5.10: Gaps and Needs Assessment Methodology

- **Education and Outreach** — Targeted campaigns are developed for specific travel corridors, modes of travel (e.g., transit), or types of travel (e.g., commutes, events, and tourism). While some temporary corridor-level education and outreach programs may be supported by TDM agencies/TMAs, these are currently not provided on an ongoing basis. Many TDM agencies/TMAs promote bicycling and walking through education and outreach, and a select few provide new resident kits to create awareness of transportation options for work and non-work trips around multifamily buildings or residential areas.
- **Ridesharing (Including Carpool/Vanpool)** — Ridematching services are a significant part of the program for the majority of TDM agencies/TMAs and include managing a database of potential drivers and riders, education of support services, and follow-up. Some TDM agencies/TMAs support or provide vanpool subsidies to help start or maintain vanpools. A regional vanpool program is being implemented to help coordinate, track, and subsidize vanpools in the future. TDM agencies also support slugging or casual carpooling, especially in the I-95 corridor in the study area.
- **Infrastructure** — While TDM agencies/TMAs typically do not own or maintain infrastructure, they may be instrumental in the planning and provision of park-and-ride lots, private shuttles, carshare, and bikeshare services. Support for infrastructure may include increasing awareness and convenience for travelers, or incentivizing trial or usage of services.
- **Financial Incentives** — When used judiciously, incentives help to encourage trial or boost usage of TDM services. Incentive programs provide best results when they are tailored to meet specific goals. Incentive programs, including NuRide and Pool Rewards, are supported by several TDM agencies.
- **Support Services** — Guaranteed Ride Home is a necessary support service that is provided in all parts of the study area served by TDM agencies/TMAs; however, the level of service differs in different jurisdictions.
- **Land Use and Zoning** — TDM agencies/TMAs can play a crucial role during the approval phase for new development to require provision of TDM services, incentives, or personnel to support establishment and maintenance of desired travel patterns for new development. Evaluation of layouts and management plans for parking areas also can help support the desired travel patterns for employees or residents of a new development. Currently, TDM agencies in the urbanized areas use land use and zoning tools to support existing or provide new TDM services and TMAs. TDM policies included in site plan developments need to be enforced by the local government and aided in implementation by TDM agencies to be effective.

Gaps and Needs Assessment

The TDM service gaps and needs analysis methodology **(Figure 5.10)** was developed to evaluate how well the goals and objectives are achieved by current and future TDM services.

New strategies that could be implemented or expanded in the future include education and outreach for visitors and tourists; ridematching for school trips; and developing and deploying technology to support trip planning, realtime transit information, and online or mobile applications for dynamic ridematching.

Table 5.12 lists the types of TDM services and strategies that are appropriate for the four aggregated area types, the place types developed for this study, and the primary audiences for the TDM strategies. While several strategies may be appropriate for various area types, the intensity will vary based on demand.

Future Conditions

This study identified the following services that could be implemented or expanded in the future. While some of these services may be provided currently by a few TDM agencies, the strategies were expected to evolve, expand, and need more focus in the future.

- Education and outreach for visitors and tourists
- Ridematching for school trips
- Developing and deploying technology to support trip planning, realtime transit information, and online or mobile applications for dynamic ridematching

Table 5.12 Appropriate TDM Services/Strategies by Area/Place Type

Service Category	Aggregated Areas	Urban	Small Urban	Suburban/Feeder		Non-Urban	
	Place Types	Urban Core/ Urban Center	Mixed Use/ Large Town or Suburban Center/ Medium Town or Suburban Center	Regional Retail Center/ Suburban Commercial/ Suburban Office/ Industrial/High Density Residential/ Medium Density Residential		Small Town or Suburban Center/Rural or Village Center/Low Density Residential/ Rural, Natural, or Very Low Density Residential	
	Primary Audience for TDM Strategies	Employees and Residents	Employees and Residents	Employees	Residents	Employees	Residents
Transportation Information	Retail/Mobile Store	√					
	Call Center/Help Line	√	√	√	√	√	√
	Radio/TV/Paper	√	√	√	√	√	√
	Websites/Social Media	√	√	√	√	√	√
	Realtime Travel Information	√	√	√	√		√
Employer Services	Commute Planning	√	√	√		√	
	Telework Support	√	√	√		√	
	Commuter Benefit Programs	√	√	√		√	
	Alternative Work Schedule	√	√	√		√	
Education and Outreach	Transit Marketing	√	√	√	√	√	√
	Corridor-Level Programs	√	√	√	√		√
	Bike	√	√		√		
	Walk	√	√	√	√		
	New Resident Kits	√	√		√		
Ridesharing	Ridematching	√	√	√	√	√	√
	Vanpool Subsidy	√	√	√		√	
	Slug Lines	√	√	√			
Infrastructure	Park-and-Ride Lots		√	√			
	Private Shuttles	√		√		√	
	Carshare	√		√		√	
	Bikeshare	√					
Financial Incentives	Goal-Based Programs	√	√	√	√	√	
Support Services	Guaranteed Ride Home	√	√	√	√	√	√
Land Use and Zoning	TDM Conditions	√	√	√	√	√	
	Parking Management	√		√		√	

FINDINGS AND CONCEPTS

Gaps and needs for TDM programs in the study area were identified through the process described above. Discussion and feedback from stakeholder meetings and team workshops helped to summarize findings into the following themes:

- TDM can help improve reliability of transportation options by:
  - Providing information on multiple travel options by location
- TDM can increase the convenience of the transportation system by:
  - Better coordination of services so that the customer sees one unified service
  - Developing consistent branding for transportation services across the region
  - Providing travel-shed/corridor-based programs
- TDM can help with response to personal emergencies by:
  - Improving/Expanding the Guaranteed Ride Home program
  - Improving/Expanding the 511 Call Center to include all transportation options
- Funding for TDM needs to be increased by:
  - Improving TDM planning and programming processes
  - Creating efficiencies through better coordination
  - Removing barriers to interjurisdictional cooperation
  - Identifying more funding streams (e.g., DRPT, other transportation funds, other public sector organizations, public-private ventures, and the open market)
- TDM can create or support first and last mile solutions by:
  - Expanding Capital Bikeshare
  - Expanding walkable communities
- TDM can evolve and expand in the future by:
  - Developing new programs for streetcar marketing
  - Supporting placemaking in transit-oriented developments and small urban areas
  - Supporting the car-free lifestyle for work and non-work travel in inner areas
  - Supporting affordability, aging in place, and Wounded Warriors

The overall goals for TDM strategies are to develop targeted TDM campaigns for major corridors and specific origins and destinations, and to encourage shorter commutes. TDM strategies also can increase awareness of how transportation choices impact affordability of an area and the health of individuals, the environment, the economy, and the community. TDM programs can be tailored to support Aging in Place and Wounded Warrior initiatives; reduce the cost of travel through more collaborative consumption models (e.g., carshare, bikeshare, transit, and rideshare); and improve community health, access, and diversity by expanding walkable/bikable areas.

Regional coordination was considered to be of prime importance for improving the provision of TDM services. This may require establishment of a regional entity focused on multimodal mobility across boundaries. There is potential for enhancing some of the existing TDM services by providing support and coordination at a regional level. Consistent regional branding for TDM and commuter assistance programs can be developed and marketed throughout the study area, and all available transportation options can be integrated to provide a single, truly multimodal system. A scalable system of hubs can be developed and appropriate TDM services could be provided at hubs.

Technology improvements and innovations also were an imperative need. Due to the multitude of travel options and discrete systems, technology is needed to improve the customer experience of travel in the region by increasing coordination and reliability. A needs assessment of the

information technology infrastructure should be conducted from a customer perspective to identify improvements. It is necessary to provide a one-stop shop for realtime information for all regional transportation options. Realtime information can improve reliability and boost traveler confidence, provide one-seat rides, and reduce reliance or need for Guaranteed Ride Home by providing information about additional travel options.

Other TDM needs include expanding outreach of the Air Quality program to feeder markets; providing TDM services at park-and-ride lots such as realtime high-occupancy toll (HOT) lanes and transit information, bike storage, access trails, and wifi coverage; developing bicycle and pedestrian plans to provide first and last mile solutions to transit; expanding the Guaranteed Ride Home service area and intensity; identifying opportunities for funding new shuttle service or supporting/expanding existing transit service through private development funds; implementing financial incentives with clear goals and an evaluation strategy; communicating the emergency response plan for transit; improving and coordinating roadway signage throughout commuter/feeder regions; expanding public-private partnerships for vanpools; improving the utility of call centers/help lines for all travel options; targeting outreach to airports and military bases; developing activity center transportation management associations;

Significant policy needs for TDM also were identified, including the need to evaluate current TDM planning and programming processes; develop a regional long-range TDM plan; coordinate TDM data collection and program evaluation; and develop performance measures that support regional mobility. Adequate and consistent funding is a special concern for TDM. There is a need to encourage public-private partnerships to expand TDM services and develop TDM strategies that address broader goals to expand potential funding streams.

The results of the needs assessment were the basis of developing the TDM vision and recommendations for the Super NoVA study area.

Note on Super NoVa Analysis

The analysis prepared for the Super NoVa vision plan was performed at a vision planning level of detail. Traditional transportation planning using four-step modeling processes and tools was of a level of complexity and detail beyond this vision planning effort. The traditional transportation planning model forces a mode choice selection process and discussion often creating a highway versus transit view. Super NoVa by definition is visioning mobility beyond boundaries, with a view of how applicable transit and TDM is within the region without mode choice tension.

At the vision level, the Super NoVa analysis began with pure demand at a high-level considering person trips from origins and destinations for work and non-work trips. These were derived from a merging of trip tables from the four representative regional MPO transportation planning models available. This information provided a basis to understand growth and growth patterns in percentage change from existing to 2040 conditions and how this change may effect established travel sheds and corridors. From there, an analysis of population and employment density was completed which further enhanced the high-level understanding of density mapping and growth activity influence mapped out in GIS form. Adding to the GIS analysis, proposed land-use as directed by each local jurisdiction was recorded and mapped in standard place type form. Local land-use considerations both existing and proposed have a direct influence on the character and future characteristics of travel mode options. As land-use becomes more dense and there is a greater density of person activity, there is a direct corresponding higher capacity transit mode that becomes applicable. Essentially a more densely developed corridor may support a higher transit mode and greater TDM activity.

At the vision level, analyses were not conducted regarding the feasibility nor impacts of implementing improvements with partially or fully dedicated transit runningways.

Recommendations for transit and TDM are presented at the vision level with respect to transit demand and applicability to any individual corridor. As corridor analysis is defined for the purposes of environmental planning for programming and mode selection purpose, the traditional transportation planning process would be defined and purposed.