Regional Mobility and Accessibility Study

Alternative Land Use and Transportation Scenarios

Phase I

Technical Report

November 17, 2006

National Capital Region Transportation Planning Board

ACKNOWLEDGEMENTS

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This study was supported by a Joint Technical Working Group with representatives from the TPB Technical Committee, Planning Directors' Technical Committee, TPB Citizen Advisory Committee, and the citizen advisory committees to MWAQC and MDPC.

The preparation of this report was financially aided through grants from the District of Columbia Department of Transportation, the Maryland Department of Transportation, the Virginia Department of Transportation, the Federal Highway Administration, and the U.S. Department of Transportation Federal Transit Administration, under the Urban Mass Transportation Act of 1964, as amended.

REGIONAL MOBILITY AND ACCESSIBILITY STUDY

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Executive Summary

Land use and transportation strategies that would put more housing and jobs in closer proximity, focus mixed use development around transit stations and implement supportive transit investments can have a positive impact on future travel conditions. This is the most significant finding of the first phase of the Regional Mobility and Accessibility Study, a study that evaluated five alternative land use and transportation scenarios for improving mobility and accessibility throughout the metropolitan Washington region

The Regional Mobility and Accessibility Study grew out of the dissatisfaction expressed by members of the National Capital Region Transportation Planning Board (TPB) in voting to approve a fiscally Constrained Long-Range Transportation Plan (CLRP) that showed congestion on the region's highway and transit networks continuing to worsen over the next 25 years. The desire of the TPB in authorizing this study was to examine additional transportation improvements beyond those that currently could be included in the region's long-range transportation plan, together with potential changes in future land use.

The concept underlying the Regional Mobility and Accessibility Study is that creative new options for improving the performance of the region's transportation system may emerge from the examination of additional transportation improvements together with potential future changes in land use. If stakeholders in the regional transportation planning process reach a consensus on these options, the region could move forward in pursuing additional funding to implement the most promising of these transportation improvements and making the necessary changes in local land use plans.

The alternative land use and transportation scenarios analyzed in this study were developed by a Joint Technical Working Group (JTWG) composed of state and local jurisdiction staff serving in their role as members of the TPB Technical Committee, the Planning Directors' Technical Advisory Committee, and the Metropolitan Washington Air Quality Committee (MWAQC) Technical Advisory Committee. In addition, members of the TPB Citizen Advisory Committee and the citizen advisory committees to MWAQC and the Council of Government's (COG) Metropolitan Development Policy Committee (MDPC) were also invited to participate in the meetings of the JTWG.

The five alternative land use and transportation scenarios analyzed in this study examined different options for enabling workers in the metropolitan Washington region to live closer to regional employment activity centers interconnected to each other through a greatly expanded regional transit network. The future land use and transit network assumptions that went into each of the scenarios were designed to test and evaluate specific features of these alternative options.

One scenario evaluated the impacts of reducing the forecast growth in long distance commuting trips to the Washington region. This scenario assumed the

development of more housing in the region than is currently planned for by 2030. Another scenario looked at the impacts of enabling more workers to live closer to their jobs by assuming some shifts in future household growth from the outer suburbs of the region to the inner suburbs and core area jurisdictions. A third scenario looked at the impacts of shifting some of the forecast job growth from core area jurisdictions to the outer suburbs. A fourth scenario, suggested by the TPB Citizen Advisory Committee, looked at the potential impacts of shifting some of the future household and job growth from the western portion of the region to the eastern portion. A fifth scenario examined the impacts of concentrating more of the region's future growth in areas that could be efficiently served by transit. Expanded transit networks assumed in these five alternative scenarios were tailored to match the shift in future household and job growth assumed for the respective scenarios.

The travel demand and air quality impacts of the alternative land use and transportation scenarios were analyzed using the latest version of the TPB's travel demand forecasting model and air quality emissions models. Land use, environmental and other impacts of these scenarios were also evaluated using selected "measures of effectiveness" and "measures of information" identified by the JTWG specifically for this study.

The results of the scenario analysis showed that concentrating more of the region's future housing growth in Regional Activity Clusters supported by an expanded regional transit network would increase transit use and daily walking and biking trips, while decreasing driving and congestion relative to current plans and growth trends. Scenarios that increased the concentration of future household and employment growth in regional activity centers supported by expanded transit connections also had small, but favorable impacts on regional accessibility, land use, air quality and other measures of effectiveness evaluated in this study.

The next phase of the Regional Mobility and Accessibility Study will focus on communicating the results of the first phase of this study to a larger audience through meetings with local community groups, regional briefings and web materials. Also, in the next phase of this study a region variably-priced lanes scenario developed by the TPB's Task Force on Value Pricing for Transportation will be analyzed and evaluated.

The purpose of this technical report is to document the technical analysis and evaluation of the five alternative land use and transportation scenarios examined in the first phase of the Regional Mobility and Accessibility Study.

1. Introduction

The Regional Mobility and Accessibility Study grew out of the dissatisfaction expressed by members of the National Capital Region Transportation Planning Board (TPB) in voting to approve a Constrained Long-Range Transportation Plan (CLRP) in 2000 that showed the performance of the regional transportation system worsening significantly over the next 25 years. Federal requirements limit the transportation facilities included in the CLRP to only those that can be funded with revenues currently projected to be available over the next 25 years. Most of the projected revenues will be needed to maintain and operate the existing transportation system, leaving little funding for new roads and transit. Thus, with the high rates of population and employment growth forecast for our region, future travel demands on the regional highway and transit networks are expected to greatly exceed currently projected revenues needed for new and expanded transportation facilities to accommodate this growth in demand.

In response to the concerns expressed about the 2000 CLRP, the TPB called for a special study, entitled "Improving Regional Mobility and Accessibility Study." In authorizing this study, the desire of the TPB was to evaluate alternatives for improving mobility and accessibility throughout the region, and to identify additional highway and transit facilities that would improve mobility and accessibility among and between regional activity centers, beyond those included in the 2000 CLRP. The TPB also directed this study to examine future land use as well as transportation improvement in evaluating alternative options to improve regional mobility and accessibility.

The concept underlying the Regional Mobility and Accessibility Study is that by examining additional transportation improvements together with potential land use changes, creative new options for improving the future performance of the region's transportation can be identified. If some of these options are attractive enough to all the stakeholders in the regional transportation planning process, a consensus may be reached on some of them. Reaching a consensus on some these options would then enable the region to move forward to find the needed revenues to implement the most promising additional transportation improvements and to make necessary changes in local land use plans.

This technical report discusses and documents the technical analysis and evaluation of the five alternative land use and transportation scenarios examined in the first phase of the Regional Mobility and Accessibility Study.

2. Study Purpose

The stated purpose of the Regional Mobility and Accessibility Study as defined by the TPB Resolution on this study is to:

> ***"evaluate alternative options to improve mobility and accessibility between and among regional activity centers and the regional core." This study "shall include the identification of 'additional highway and transit circumferential facilities and capacity, including Potomac River crossings where necessary and appropriate, that improve mobility and accessibility between and among regional activity centers and the regional core' (Vision Goal 2, Strategy 5) and that take into consideration the adopted land use plans of individual jurisdictions. The study shall also include the development of 'a regional congestion management program, including coordinated regional bus service, traffic operations improvements, transit, ridesharing, and telecommuting incentives, and pricing strategies.' (Vision Goal 5. Strategy 1.)"*** **[TPB Resolution TPB R12-2001]**

3. Organizational Structure for Study

The TPB has provided overall policy direction and guidance on the Regional Mobility and Accessibility Study (RMAS) throughout this study. Several special work sessions with the TPB were held at the beginning of this study and the TPB has been regularly briefed on the major findings of the technical analysis as results have become available. Staff has also briefed the COG Board and the Metropolitan Development Policy Committee (MDPC) on this study as work has progressed.

Technical insight and guidance on the conduct of the RMAS was provided by a Joint Technical Working Group (JTWG) comprised of members (see Appendix D) of the TPB Technical Committee, the Planning Directors Technical Advisory Committee and the Metropolitan Washington Air Quality Committee (MWAQC) Technical Advisory Committee. In addition, the TPB's Citizen Advisory Committee and the citizen advisory committees to MWAQC and MDPC were also invited to participate in the meetings of the JTWG.

During the years of the study, JTWG has provided continuing technical guidance to staff in the development and conduct of a work plan to carry out this study. These work plan activities have included: (1) development of Measures of Effectiveness (MOEs), (2) analysis of the 2000 CLRP using the study MOEs and identification of its shortcomings relative to the TPB Vision, (3) specification of the elements of a regional congestion management scenario to be tested as part of this study**,** and (4) development of five alternative land use and transportation scenarios for analysis and testing.

4. Study Approach

In providing guidance on the general outlines of the study, the TPB directed staff to use a "building block" approach. The first building block was to identify a set of measures of effectiveness by which the alternative options for improving regional mobility and accessibility would be evaluated. The second step was to apply these measures of effectiveness to the current CLRP to identify the shortcomings of this plan relative to the TPB's Vision adopted in 1998. Next, with the active involvement of the TPB, the MDPC, and the MWAQC technical and citizen committee members, several alternative regional transportation and land use scenarios for 2030 that could address the identified short-comings of the CLRP would be developed, specified, and analyzed. The TPB also directed staff to develop a "regional congestion management" scenario focusing on operational and management improvements to maximize the region's existing and planned investment in transportation infrastructure. This scenario would be analyzed first to serve as a baseline for comparison with the alternative land use and transportation scenarios. In future phases of this study, one or two "composite scenarios" are to be developed for further analysis and evaluation.

5. Measures of Effectiveness

After much discussion by the TPB and the JTWG, twelve major categories for Measures of Effectiveness (MOE) were identified for this study. These are:

- Land Use
- Travel Modal Shares
- Per Capita Vehicle Miles Traveled
- Highway and Rail Transit Congestion levels
- Peak Period Accessibility by Travel Mode
- Airport, Inter-City rail and Bus Accessibility
- Freight (Measure of Information)
- Air Quality- Mobile Emissions
- Water Quality-Indicators of Imperviousness (Measure of Information)
- Energy Consumption per Unit of Travel
- Water Quality- Nitrogen Deposition from Mobile Sources
- Safety (measure of Information)

The members of the JTWG specified the performance measures for each of these major MOE categories. These detailed MOE performance measures are discussed in the text of this report and presented in the technical report appendices.

6. Shortcomings of the 2000 CLRP Relative to the TPB Vision

Applying the various MOEs developed for the RMAS to the 2000 CLRP, the following major shortcomings relative to the TPB's Vision were identified:

- The region is forecast to add twice as many jobs as households.
- The region is projected to need an additional 250,000 in-commuters from outside the region.
- Regional activity centers/clusters are expected to capture 70% of the region's future employment growth, but only 40% of its household growth
- Only 30% of the region's employment growth and 20% of its household growth is expected to occur near Metrorail and commuter rail stations.
- Daily vehicle miles of travel are projected to increase significantly.
- Peak period highway and transit congestion is expected to become worse.
- Growth is uneven between the eastern and western portions of the region.
- Significant concern has been expressed about how current growth and transportation trends will impact future air and water quality in the region.

7. Baseline Regional Congestion Management Scenario

A baseline "regional congestion management" scenario focusing on operational and management improvements to maximize the region's existing and planned investment in transportation infrastructure was developed in accordance with the direction provided by the TPB and JTWG. This baseline scenario, termed the CLRP+, consisted of the latest forecast of future growth at the time, the COG Round 6.4 Cooperative growth forecasts, and the 2003 CLRP highway and transit networks. Traffic management and operational enhancements, such as improved signal timing and better incident management, were assumed for the CLRP+ highway network and a significantly increased frequency of rail and bus service was assumed for the CLRP+ transit. The 2003 CLRP+ also included the planned Dulles Metrorail line extension, the Bi-County Light Rail from Bethesda to Silver Spring, the Corridor Cities Transitway and the Anacostia Light Rail in this baseline.

The most significant assumption for this baseline scenario compared to the 2003 CLRP was the assumption that WMATA would have the necessary funding to accommodate all forecast rail and bus ridership in 2030. In the 2003 CLRP, forecast transit ridership in 2030 for trips to and through the regional core area were reduced to projected 2005 ridership levels. This "transit constraint" was included in the 2003 CLRP because WMATA, prior to the Metro Matters funding agreement, could not identify sources of funding needed for the purchase of additional rail cars and buses that were necessary to accommodate projected regional core area related ridership growth after 2005.

8. Description of Land Use and Transportation Scenarios

Five alternative land use and transportation scenarios were specified for analysis in this study. These scenarios were developed by the members of the JTWG with the active involvement of the TPB Citizens Advisory Committee and the citizen advisory committees to MWAQC and MDPC. All of these scenarios were based on the COG Round 6.4 Cooperative growth forecasts and 2003 CLRP highway and transit networks, which were the current forecasts and transportation plan in effect at the time these scenarios were developed.

The five alternative land use and transportation scenarios specified for analysis in this study were:

- Higher Household Growth in Region
- Transit-Oriented Development
- Region Undivided
- More Households in Inner Areas
- More Jobs in Outer Areas

8.1 Higher Households in Region Scenario

The **Higher Households in Region** scenario was designed to test the transportation impacts of reducing the forecast growth in long distance commuting trips to the Washington region from external areas outside of the region by assuming that more housing than is currently in local plans would be built in the region by 2030. With this additional housing, more future workers who worked in the region could also live here and this would lessen the need for in-commuting from areas outside the region.

In developing the land use assumptions for this scenario, the Planning Directors for the core area jurisdictions (District of Columbia, Arlington County, and Alexandria) and the inner suburban jurisdictions (Montgomery County, Prince George's County, Fairfax County, Fairfax City and the City of Falls Church) were collectively asked to allocate an additional 231,000 households beyond what had already been forecast in the region for 2030 to small area transportation analysis zones within their jurisdictions. The Planning Directors Technical Advisory Committee (PDTAC), the group specifying the land use assumptions for this scenario, agreed that the number of additional households to be allocated within each of these jurisdictions would be in direct proportion to their forecast 2030 employment. It was also agreed that these additional households were to be allocated to Regional Activity Clusters, transit centers, and other areas where the respective Planning Director believed that this higher household growth increment could be logically accommodated in a concentrated fashion. Further, it was recognized that this allocation of additional household growth would not necessarily be based on existing planning and zoning and would, in some instances, likely exceed it.

The initial figure of 231,000 additional households to be allocated to core area and inner suburban jurisdictions in this scenario was the estimated number of additional households required in 2030 to provide enough workers to fill all of the forecast jobs in the region. The estimate was based on jobs-to-households ratio of 1.6 that assumed each household in the region would have on average about 1.5 workers and that about 10% of these workers would be employed at more than one job. The workers per household and multiple job-holding assumptions used in making this estimate were based on empirically observed data from current household and labor force surveys for the metropolitan Washington region.

Although the original intent of this scenario was to allocate 231,000 additional households to core area and inner suburban jurisdictions, the Planning Directors for the District of Columbia, Arlington and Fairfax County reported that they could not fully allocate their proportionate share of the additional households unless some of it was placed into areas where it could not be logically accommodated. Rather than arbitrarily allocating the additional households to inappropriate areas, the PDTAC decided instead to reduce the total number of additional households to be allocated in scenario from

231,000 to 216,000 and accepted the submitted allocations from the District of Columbia, Arlington and Fairfax.

No additional households were allocated to the outer suburban jurisdictions (Loudoun County, Prince William County, Manassas, Manassas Park, Stafford, Frederick County, Charles County, and Calvert County) in this scenario. The reason for this was that these outer suburban jurisdictions were already forecast to receive an increase of 286,000 households by 2030 and had a much lower jobs/households ratio than in the core area and inner suburbs.

Because the assumed additional households in this scenario would make the region largely self-sufficient in terms of the number of workers it would need in 2030, forecast increases in net in-commuting from areas outside of the region were correspondingly reduced. The reduction in forecast in-commuting and other vehicles from outside the region was approximately equivalent to the number of trips that would have been made by the additional 216,000 households assumed for the region in this scenario, if these households had instead been located outside of the metropolitan Washington region.

The assumed additional 216,000 households for this scenario represent a 9% increase over the total number of households currently forecast for the region by 2030 and about a 60% increase in the increment of household growth projected for the 2010 to 2030 time period.

Figure 1- 2030 Household Growth: Higher Households in Region Scenario

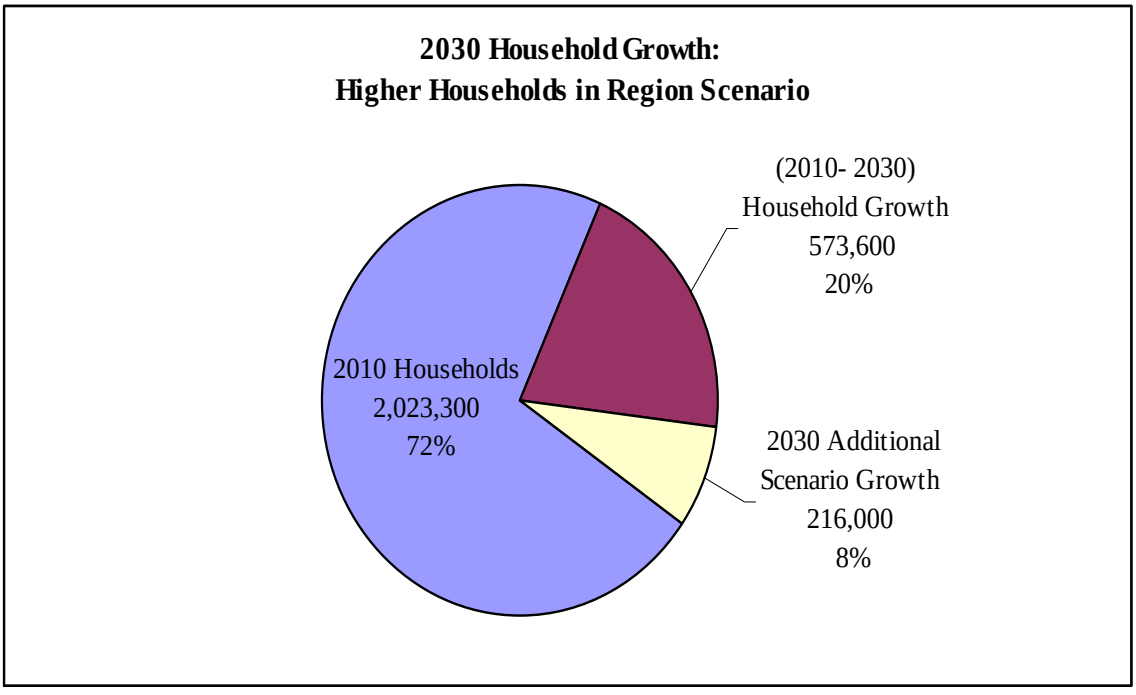


Table 1 - Higher Households in Region Scenario: Percent Change in Households and Employment

Higher Households in Region						
Jurisdictions	Households (Year 2030)			Employment (Year 2030)		
	CLRP +	Higher Households	Percent Change	CLRP+	Higher Households	Percent Change
District of Columbia	304,400	358,700	**17.8%**	831,200	831,200	**0.0%**
Montgomery County	417,400	466,000	**11.6%**	651,900	651,900	**0.0%**
Prince George's County	372,400	411,000	**10.4%**	553,000	553,000	**0.0%**
Arlington County	116,700	127,200	**9.0%**	275,800	275,800	**0.0%**
Alexandria	75,300	85,600	**13.7%**	141,000	141,000	**0.0%**
Fairfax County	453,100	506,600	**11.8%**	801,100	801,100	**0.0%**
Loudoun County	163,900	163,900	**0.0%**	258,100	258,100	**0.0%**
Prince William County	182,400	182,400	**0.0%**	209,400	209,400	**0.0%**
Frederick County	120,200	120,200	**0.0%**	177,800	177,800	**0.0%**
Charles County	76,100	76,100	**0.0%**	69,100	69,100	**0.0%**
Calvert County	35,700	35,700	**0.0%**	35,600	35,600	**0.0%**
Stafford County	63,500	63,500	**0.0%**	59,700	59,700	**0.0%**

The **Higher Households in Region** scenario also assumed that the higher increment of household growth in this scenario would be supported by a greatly expanded transit network that connected the Regional Activity Clusters, transit centers, and other areas where this increased housing growth in the region was assumed. Assumptions regarding the specific future transit improvement to be tested as part of this scenario were developed by the JTWG Transportation Scenarios Subgroup, a group consisting of members of the TPB Technical Committee and other local jurisdiction staff actively involved in transportation planning within the region.

The expanded transit network developed by the Transportation Scenario Subgroup for this scenario assumed 30 additional miles of Metrorail in addition to the planned Dulles Metrorail line expansion that was already included in the CLRP+ baseline, 30 additional miles of commuter rail, and 218 miles of light-rail (LRT) and bus-rapid transit (BRT) beyond that already in the CLRP.

Metrorail extensions assumed for this scenario, in addition to the planned Dulles line, included an extension of the Orange Line from Vienna to Centreville in Virginia and a circumferential interconnection of the Yellow and Green Lines between the Eisenhower Avenue and Branch Ave stations via a Metrorail line across the Woodrow Wilson Bridge. Extensions of VRE commuter rail service from Manassas to Haymarket in Prince William County and from Manassas to Spotsylvania County were also assumed as part of the scenario.

A total of more than 200 miles of new "transitways" were also assumed for this scenario. These assumed transitways included both LRT and BRT service operating within their own rights-of-way. In some cases where a preferred choice between LRT and BRT had not been determined, a generic transitway improvement with operating characteristics similar to both LRT and BRT was specified and tested as part of this scenario. These assumed transitway improvements included approximately 54 miles of light rail in the

District of Columbia; a light rail line connecting Silver Spring to New Carrollton (Bi-County Connector); a MD 97 Busway; and new or expanded transitways in the I-270, MD 193, Rt. 1, US 50, Pennsylvania Ave, MD5, and MD 210 corridors in Maryland and the Columbia Pike and Route 1 Highway corridors in Virginia.

Figure 2 - Higher Households in Region Scenario: Change in Number of Households

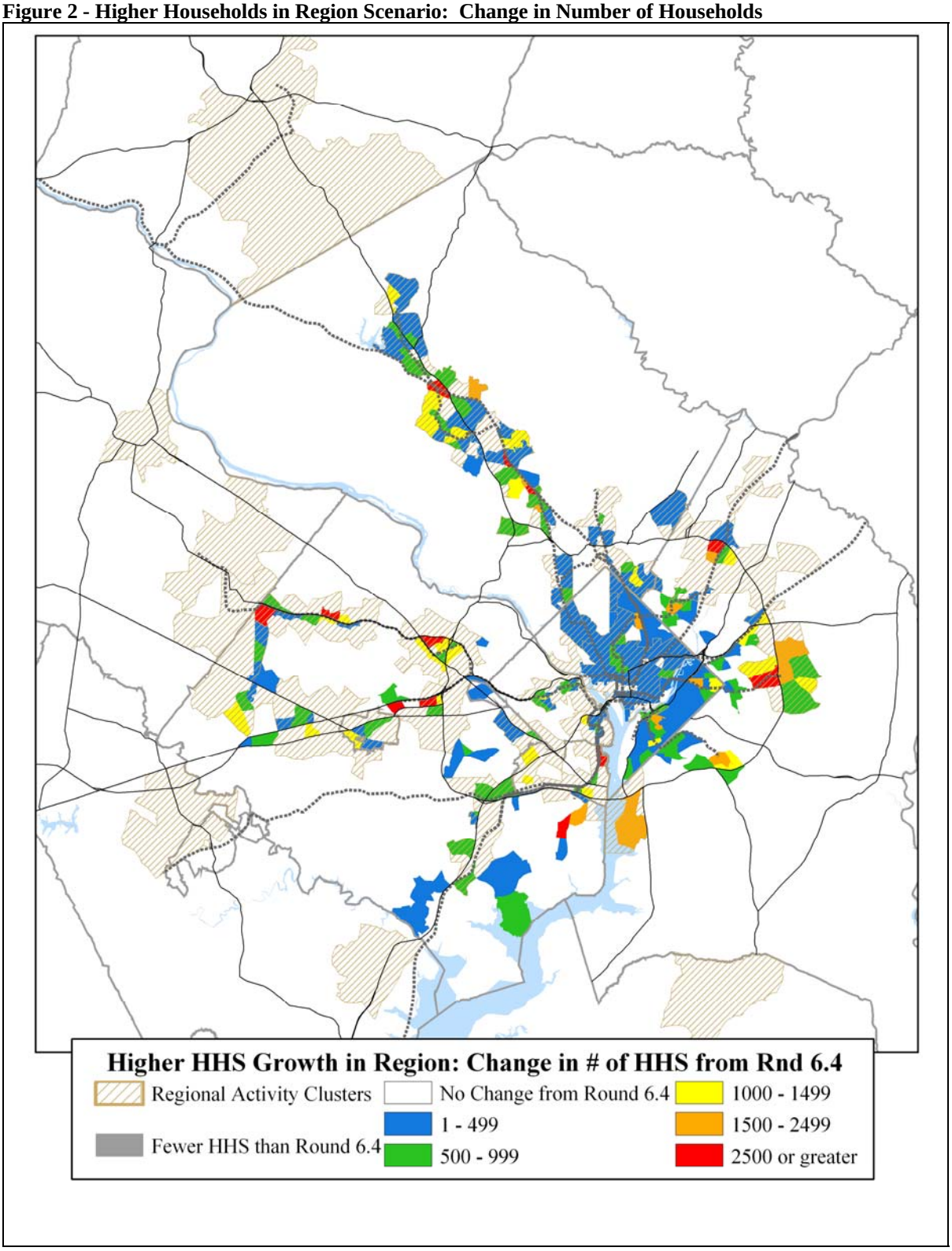
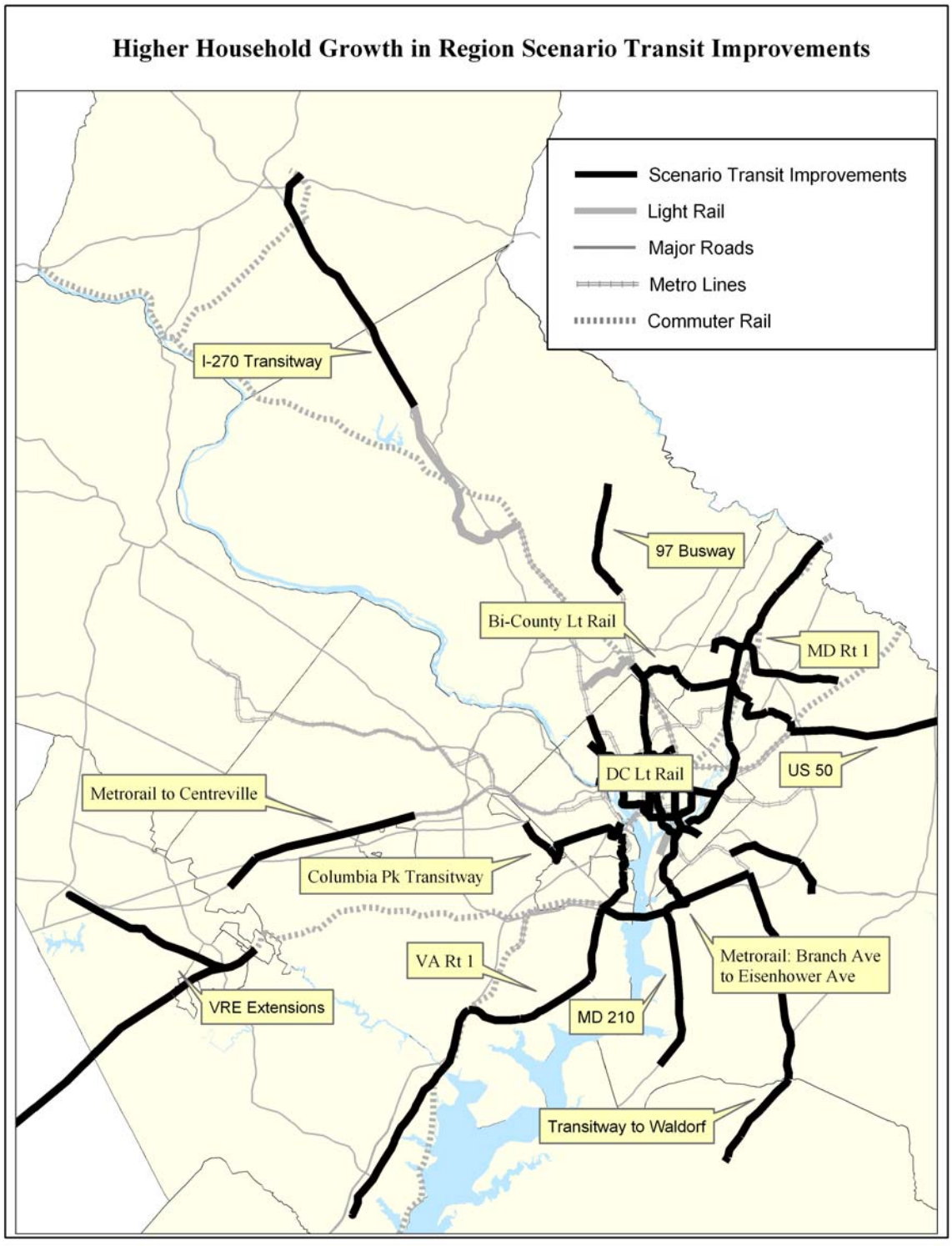


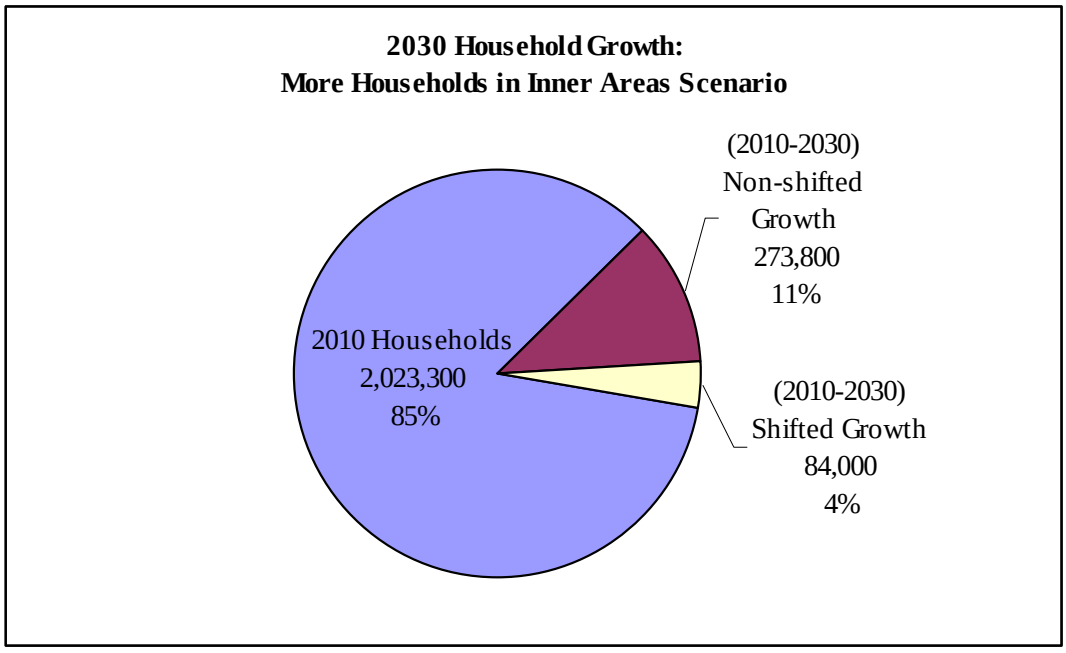
Figure 3 - Higher Households in Region Scenario: Transit Improvements



8.2 More Household Growth in Inner Areas Scenario

The **More Household Growth in Inner Areas** scenario was designed to test the transportation impacts of reducing average commuting distances in the region by assuming that more of the region's 2010 to 2030 household growth could be placed closer to employment centers in core area and inner suburban jurisdictions in a way that would provide an opportunity for more workers to live closer to their jobs. This scenario assumed a shift of 84,000 households between jurisdictions projected to have large imbalances between the numbers of jobs in these jurisdictions and the amount of housing available to house workers filling these jobs. This scenario also assumed that this shift in household growth would be from areas outside of Regional Activity Clusters to Regional Activity Clusters and other areas of concentrated employment growth in core area jurisdictions and the inner suburbs.

Figure 4 - 2030 Household Growth: More Households in Inner Areas Scenario



In developing the land use assumptions for this scenario, the region's Planning Directors sought to reduce average commuting distances by re-allocating forecast household growth between jurisdictions to bring all jurisdictions in the region closer to a 1.6 jobs-to-households ratio. Such a ratio would provide a good overall balance between the numbers of jobs forecast and the number of households needed to supply a sufficient number of workers to fill these jobs. For this reason, forecast 2010 to 2030 household growth increments for the District of Columbia, Arlington County, City of Alexandria, and Fairfax County in this scenario were increased and the forecast 2010 to 2030 household growth increments for Prince William, Frederick, Charles, Calvert, and Stafford counties were reduced (Table 2). No changes in the household growth increments for Montgomery and Loudoun counties were assumed for this scenario because the growth forecasts for these two counties showed jobs-to-households ratios very close to 1.6 in 2030.

Table 2 - More Households in Inner Area Scenario: Percent Change in Households and Employment

Households in Inner Areas						
Jurisdictions	Households (Year 2030)			Employment (Year 2030)		
	CLRP +	Households In	Percent Change	CLRP+	Households In	Percent Change
District of Columbia	304,400	342,800	**12.6%**	831,200	831,200	**0.0%**
Montgomery County	417,400	417,400	**0.0%**	651,900	651,900	**0.0%**
Prince George's County	372,400	340,000	**-8.7%**	553,000	553,000	**0.0%**
Arlington County	116,700	120,200	**3.0%**	275,800	275,800	**0.0%**
Alexandria	75,300	84,700	**12.5%**	141,000	141,000	**0.0%**
Fairfax County	453,100	485,500	**7.2%**	801,100	801,100	**0.0%**
Loudoun County	163,900	163,900	**0.0%**	258,100	258,100	**0.0%**
Prince William County	182,400	164,800	**-9.6%**	209,400	209,400	**0.0%**
Frederick County	120,200	113,700	**-5.4%**	177,800	177,800	**0.0%**
Charles County	76,100	63,900	**-16.0%**	69,100	69,100	**0.0%**
Calvert County	35,700	31,800	**-10.9%**	35,600	35,600	**0.0%**
Stafford County	63,500	52,400	**-17.5%**	59,700	59,700	**0.0%**

The **More Households in Inner Areas** scenario assumes an expanded transit network that would enhance transit connectivity among region activity clusters in core area and inner suburban jurisdictions, as well as the transportation corridors receiving increased household growth. The expanded transit network developed by the Transportation Scenarios Subgroup for this scenario assumed 30 additional miles of Metrorail beyond that already planned for the Dulles line extension. These additional 30 miles of Metrorail included an extension of the Orange Line from Vienna to Centreville and a circumferential interconnection of the Yellow and Green Lines between the Eisenhower Avenue and Branch Avenue stations via a Metrorail line across the Woodrow Wilson Bridge. These two rail line extensions were designed to serve some of the additional household growth concentrations assumed in this scenario and provide greater system-wide accessibility to Regional Activity Clusters that are either currently served by existing segments of the Metrorail system, or will be served by the planned extension of Metrorail to Dulles.

No increases in commuter rail service were assumed for this scenario. The reason for this was that assumed household growth in the outer suburban jurisdictions, such as Prince William and Stafford counties, was decreased in this scenario.

The expanded transit network for this scenario also included approximately 54 miles of light rail improvements in the District and a light rail line connecting Silver Spring to New Carrollton (Bi-County Connector). Three new transitways were also assumed for this scenario: a new transitway along Columbia Pike in Arlington County and along Route 7 from Columbia Pike to Seven Corners in Fairfax County; a transitway along Route 1 from the Pentagon to I-95 South near Lorton in Virginia; and a transitway along the entire Route 1 corridor in Prince George's County.

Figure 5 - More Households in Inner Areas Scenario: Change in Number of 2030 Households

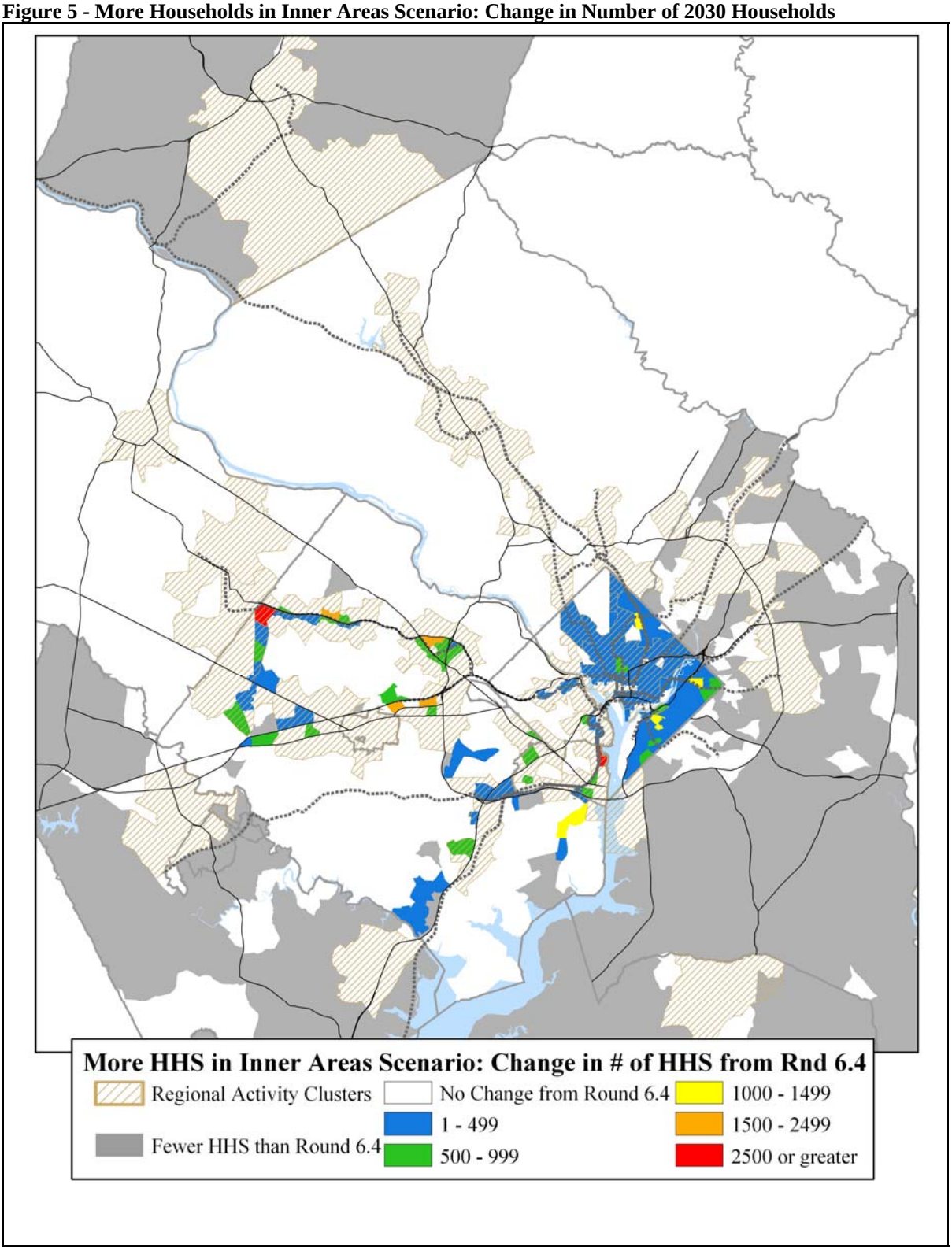
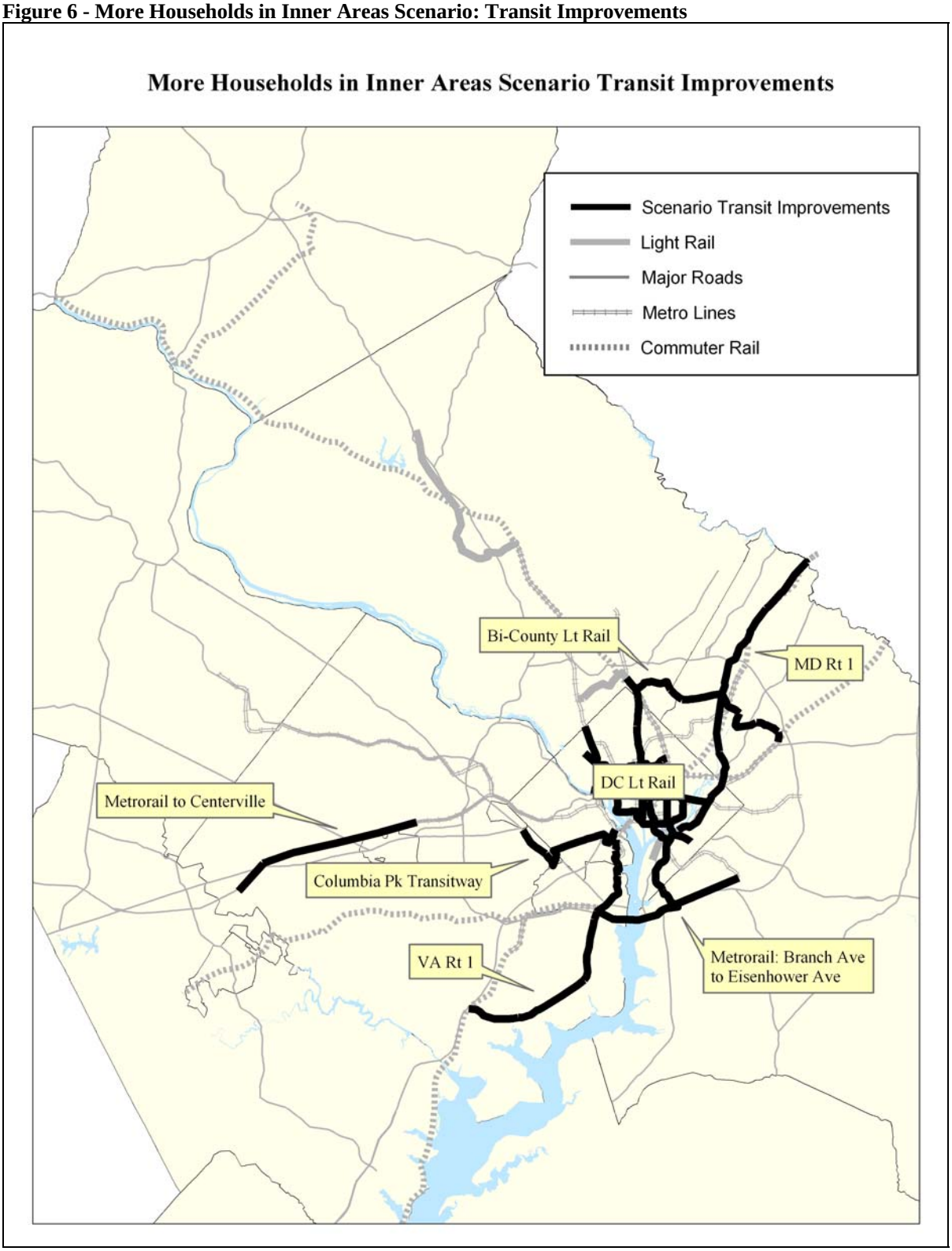


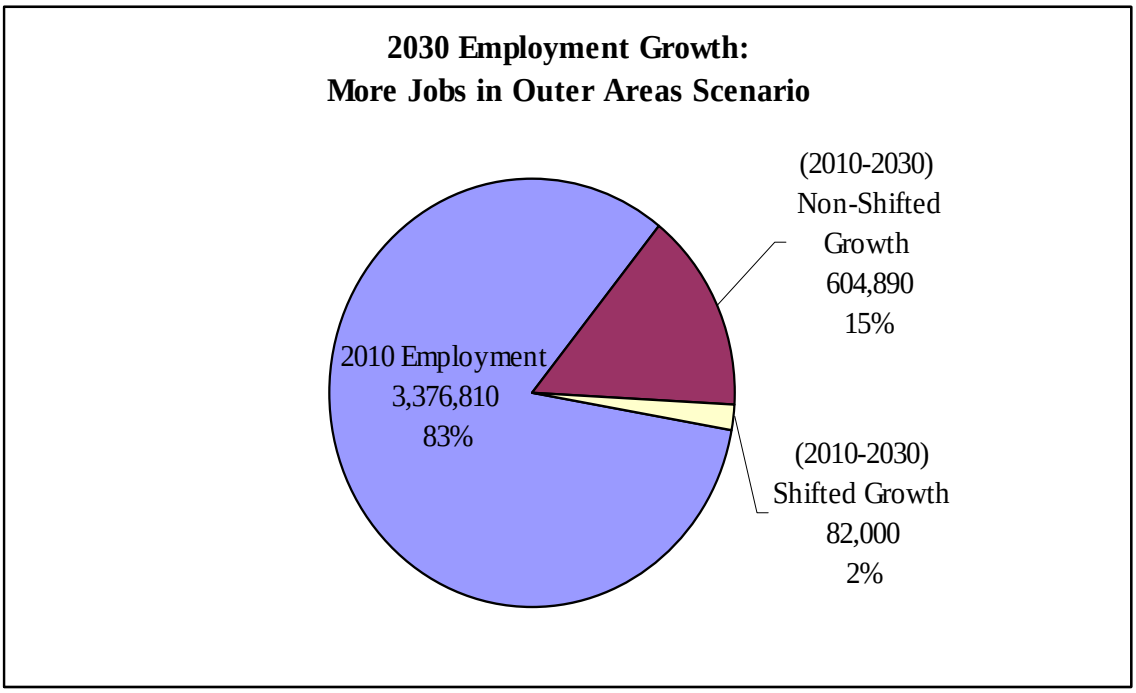
Figure 6 - More Households in Inner Areas Scenario: Transit Improvements



8.3 More Jobs in Outer Areas Scenario

The **More Jobs in Outer Areas** scenario was designed to test the transportation impacts of reducing average commuting distances by assuming more of the region's 2010 to 2030 job growth could be placed closer to residential areas in the outer suburban jurisdictions. These jurisdictions are forecast to have a greater number of households than needed to provide a sufficient number of workers to fill their forecast jobs. This scenario assumed a shift of 82,000 jobs from core area jurisdictions to outer suburban jurisdictions in ways that would permit more workers to work closer to where they live. It was also assumed in this scenario that this shift in job growth to the outer suburbs would be concentrated in Regional Activity Clusters within these outer suburban jurisdictions.

Figure 7 - 2030 Employment Growth: More Jobs in Outer Areas Scenario



In developing the land use assumptions for this scenario, the region's Planning Directors sought to reduce average commuting distances by re-allocating forecast jobs growth between core area and outer suburban jurisdictions in a way that would bring the jobs-to-households ratio closer to 1.6 in both sub areas of the region. Thus, as shown in Table 3, forecast job growth increments in the District, Arlington, and Alexandria were reduced and job growth increments in Prince William, Frederick, Charles, Calvert, and Stafford counties were increased. No changes in forecast job growth increments were assumed for Montgomery, Prince George's, Fairfax, and Loudoun counties in this scenario because the growth forecasts for these jurisdictions were already much closer to this 1.6 figure than in core area and outer suburban jurisdictions.

Table 3 - More Jobs in Outer Areas Scenario: Percent Change in Households and Employment

More Jobs in Outer Areas						
Jurisdictions	Households (Year 2030)			Employment (Year 2030)		
	CLRP +	More Jobs	Percent Change	CLRP+	More Jobs	Percent Change
District of Columbia	304,400	304,400	**0.0%**	831,200	788,300	**-5.4%**
Montgomery County	417,400	417,400	**0.0%**	651,900	651,900	**0.0%**
Prince George's County	372,400	372,400	**0.0%**	553,000	553,000	**0.0%**
Arlington County	116,700	116,700	**0.0%**	275,800	244,400	**-12.8%**
Alexandria	75,300	75,300	**0.0%**	141,000	133,300	**-5.8%**
Fairfax County	453,100	453,100	**0.0%**	801,100	801,100	**0.0%**
Loudoun County	163,900	163,900	**0.0%**	258,100	258,100	**0.0%**
Prince William County	182,400	182,400	**0.0%**	209,400	250,800	**16.5%**
Frederick County	120,200	120,200	**0.0%**	177,800	187,800	**5.3%**
Charles County	76,100	76,100	**0.0%**	69,100	84,500	**18.2%**
Calvert County	35,700	35,700	**0.0%**	35,600	39,800	**10.6%**
Stafford County	63,500	63,500	**0.0%**	59,700	70,700	**15.6%**

The expanded transit network developed by the Transportation Scenario Subgroup for the **More Jobs in Outer Areas** scenario, in addition to the planned Dulles line extension, also assumed a Metrorail extension from Vienna to Centreville and extensions of VRE commuter rail service from Manassas to Haymarket and Spotsylvania County. A light rail line connecting Silver Spring to New Carrollton (Bi-County Connector) and three major transitways, one in the I-270 corridor from Germantown to Frederick, MD; another in the MD 5 corridor from Branch Avenue to Waldorf, MD; and a third, along the entire Route 1 corridor in Virginia from Pentagon City to the Dumfries area in Prince William County were also assumed for this scenario. These assumed transit improvements were designed to improve transit service to the areas receiving additional job growth in this scenario, provide greater system-wide transit accessibility and facilitate more reverse commuting by transit to outer suburban job centers from the inner suburbs and core areas of the region.

Figure 8 - More Jobs in Outer Areas Scenario: Change in Number of 2030 Jobs

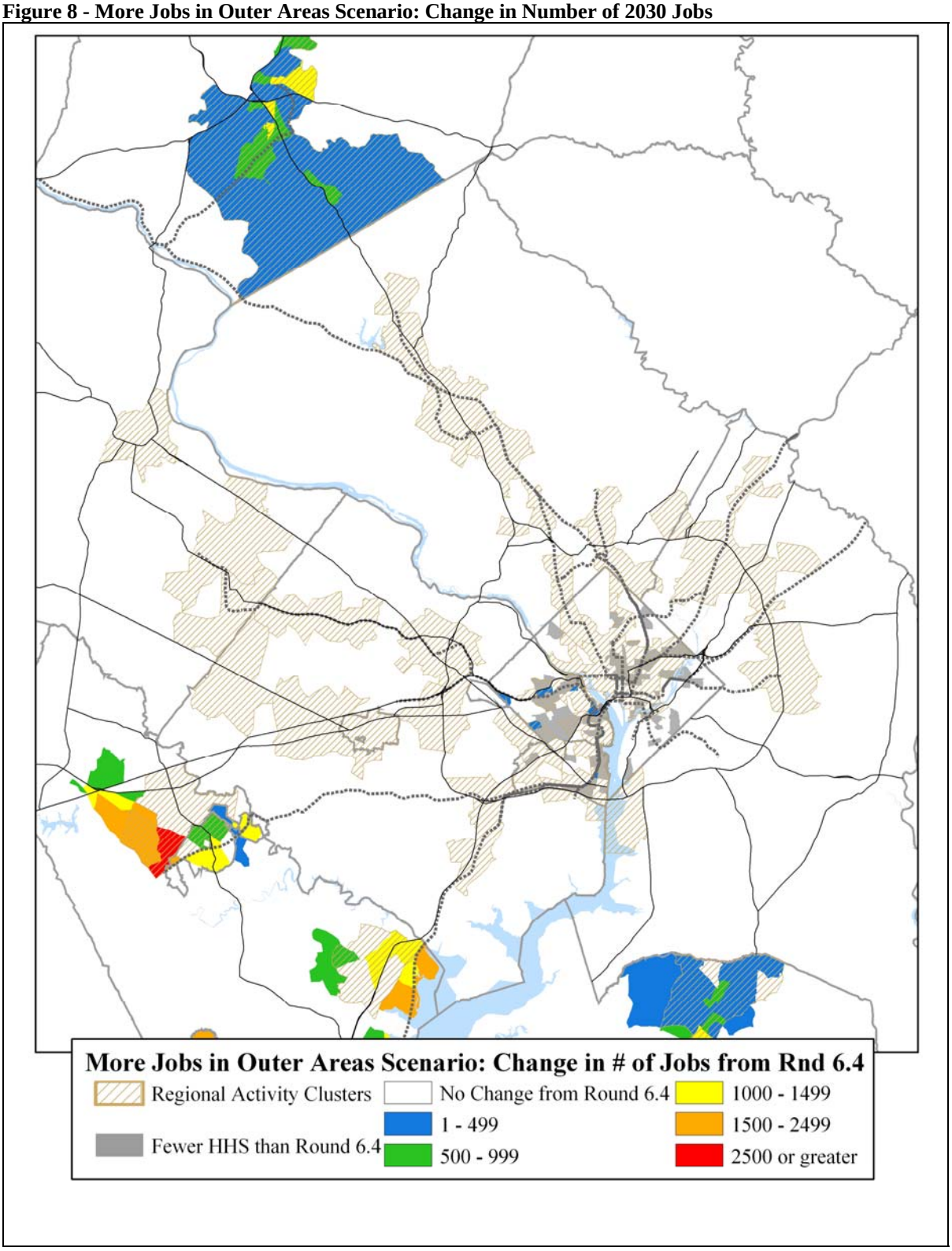
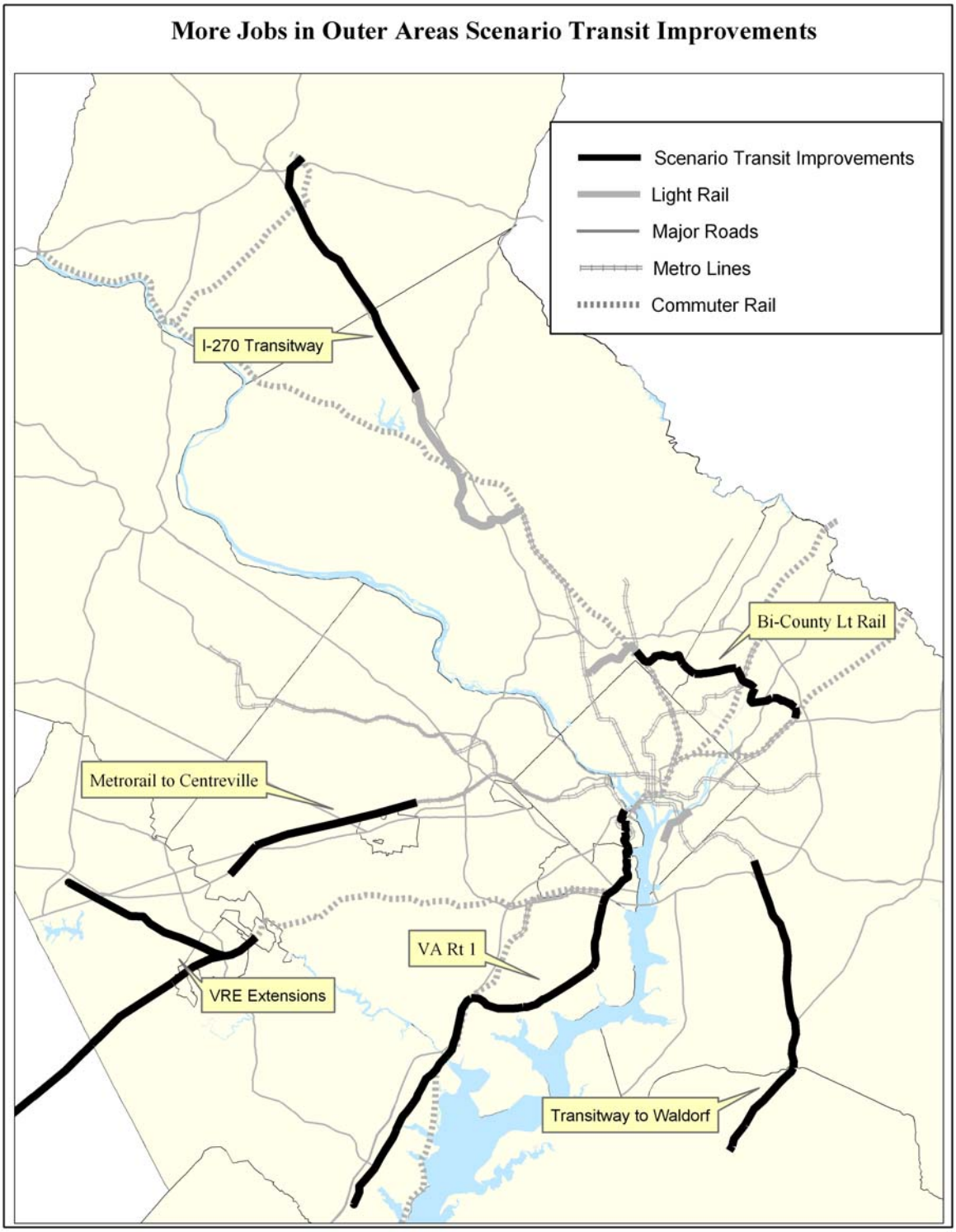


Figure 9 - More Jobs in Outer Area Scenario: Transit Improvements



8.4 Region Undivided Scenario

The **Region Undivided** scenario was designed to test the transportation impacts of enabling more workers to live closer to their jobs by assuming some shifts in future job and household growth from the western portion of the region to the eastern portion. This scenario was suggested by the members of the TPB's Citizen Advisory Committee who were interested in examining a scenario that would address some of the problems of uneven job growth and transportation accessibility between the western and eastern portions of the region that were described in the Brookings Institution "A Region Divided"[1] report.

In this scenario, all of the forecast 2010-2030 job growth outside of Regional Activity Clusters in the western portion of the region was reallocated to Regional Activity Clusters, transit centers, and other areas in the eastern portion of the region where it was believed that this additional job growth increment could be accommodated. The eastern portion of the region for the purposes of this scenario was defined as areas east of 16th NW in the District of Columbia, east of I-95 in Prince George's County (and part of Montgomery County between 16th NW in DC, and I-95 in Prince Georges's) in Maryland and east of I-95 in Arlington County, Alexandria, Fairfax County and Prince William County in Virginia. The Columbia Pike corridor in Arlington County, though slightly west of this dividing line, was also considered to be part of the eastern portion of the region for the purposes of this scenario because it shared many of the same social and economic characteristics and problems of uneven growth found in communities in the eastern portion of the region as described in the Brookings 'Region Divided' report. In total, this scenario assumed a shift of 114,000 jobs from the western to eastern portions of the region in the 2010 to 2030 time period. On a jurisdictional basis, the amount job growth reallocated to areas within the eastern portion of the region was in direct proportion to the total number of jobs forecast for the eastern portion of the region in 2030.

In addition to the assumed job shift, a household growth increment of 57,000 households from the western to the eastern portion of the region was also assumed as part of this scenario. Similar to the assumed shift in job growth, the household growth shift was from areas outside of Regional Activity Clusters in the western portion of the region to Regional Activity Clusters, transit centers, and other areas in the eastern portion of the region where it was believed this additional household growth increment could be accommodated in a concentrated fashion. The assumed job and household growth shifts from the western portion of the region to the eastern portion were designed to achieve equivalent jobs-to-households ratio in both western and eastern sides of the region.

[1] "A Region Divided, The State of Growth in Greater Washington, D.C.", 1999, The Brookings Institution. The report documents a number of disparities in the eastern versus western portions of the region. Among the issues cited by the report are: "The Income Divide"; "The Race Divide"; "The School Divide"; "The Job Divide"; and "The Transportation Divide".

Figure 10 - 2030 Household Growth: Region Undivided Scenario

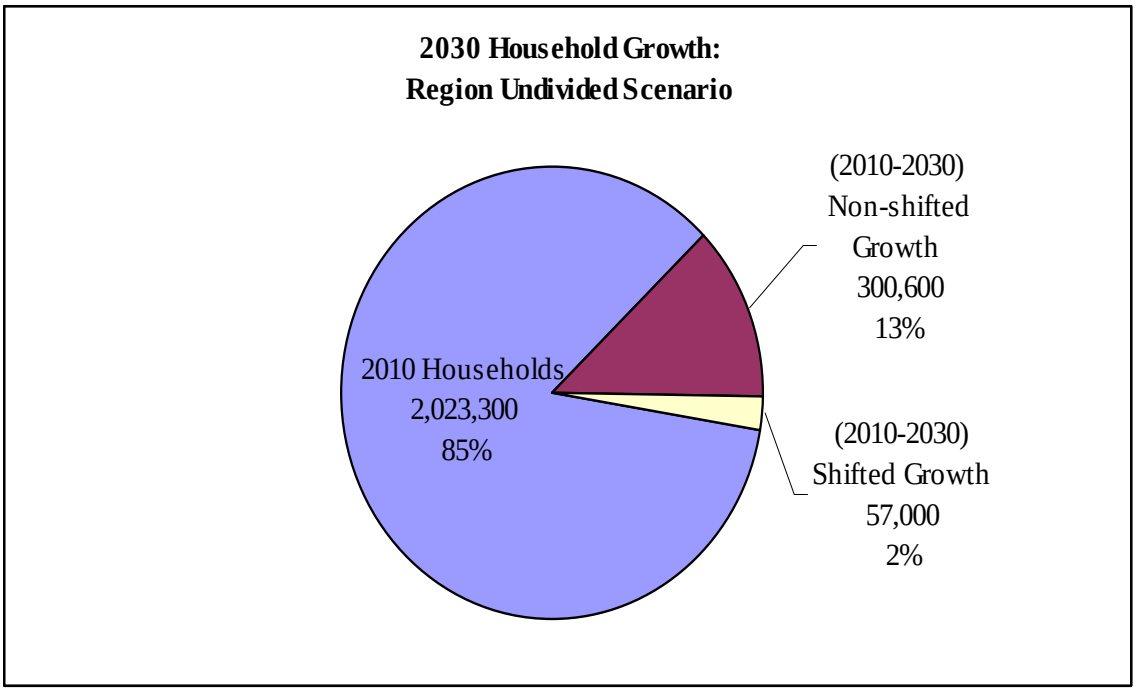


Figure 11 - 2030 Employment Growth: Region Undivided Scenario

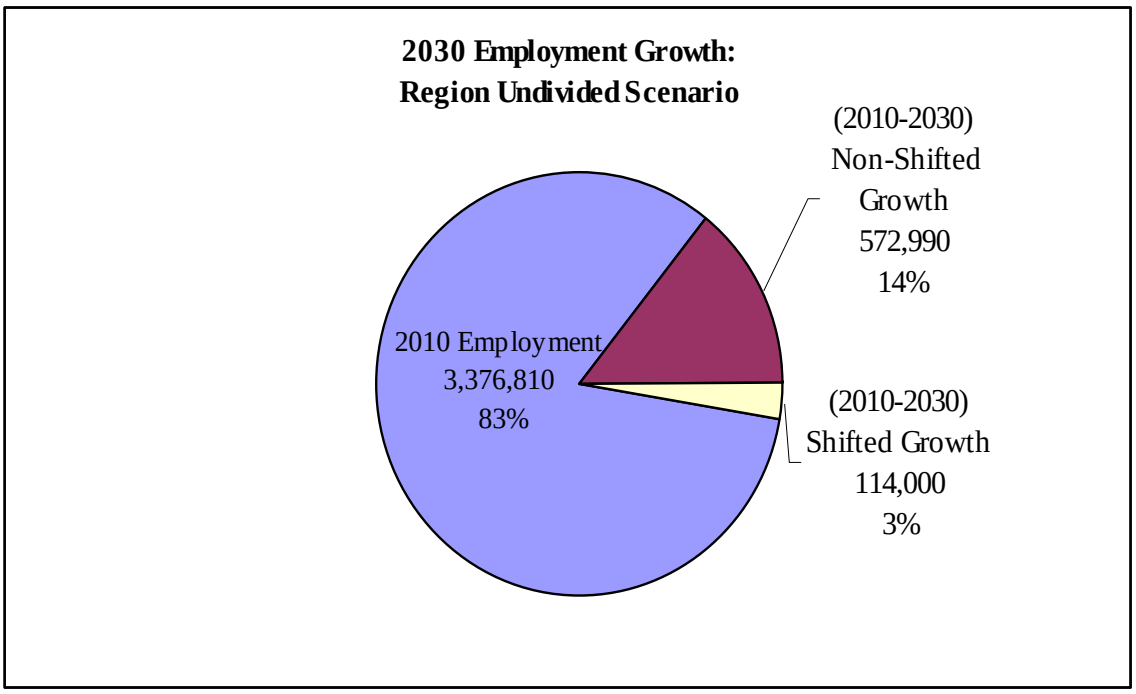


Table 4- Region Undivided Scenario: Percent Change in Households and Employment

Region Undivided						
Jurisdictions	Households (Year 2030)			Employment (Year 2030)		
	CLRP +	Region Undivided	Percent Change	CLRP+	Region Undivided	Percent Change
District of Columbia	304,400	324,600	**6.6%**	831,200	871,100	**4.6%**
Montgomery County	417,400	415,100	**-0.6%**	651,900	640,900	**-1.7%**
Prince George's County	372,400	391,600	**5.2%**	553,000	587,700	**5.9%**
Arlington County	116,700	120,700	**3.4%**	275,800	283,600	**2.8%**
Alexandria	75,300	79,600	**5.7%**	141,000	149,500	**5.7%**
Fairfax County	453,100	455,100	**0.4%**	801,100	799,000	**-0.3%**
Loudoun County	163,900	134,000	**-18.2%**	258,100	209,700	**-23.1%**
Prince William County	182,400	174,900	**-4.1%**	209,400	195,400	**-7.2%**
Frederick County	120,200	107,500	**-10.6%**	177,800	157,600	**-12.8%**
Charles County	76,100	78,600	**3.3%**	69,100	74,000	**6.6%**
Calvert County	35,700	35,700	**0.0%**	35,600	35,600	**0.0%**
Stafford County	63,500	63,500	**0.0%**	59,700	59,700	**0.0%**

Except for the planned Metrorail Dulles line extension already included in the baseline for all scenarios examined in this study, assumed transit improvements developed for **The Region Undivided** scenario by the Transportation Scenario subgroup were focused on the eastern side of the region. These assumed improvements included a circumferential interconnection of the Yellow and Green Lines between the Eisenhower Avenue and Branch Ave stations via a Metrorail line across the Woodrow Wilson Bridge, 54 miles of light rail in the District of Columbia; a light rail line connecting Silver Spring to Branch Avenue via New Carrollton and Largo (Bi-County Connector) and new or expanded transitways in the Rt. 1, MD 193, US 50, MD5, and MD 210 corridors in Maryland and the Columbia Pike and Route 1 Highway corridors in Virginia.

Figure 12- Region Undivided Scenario: Change in Number of Households

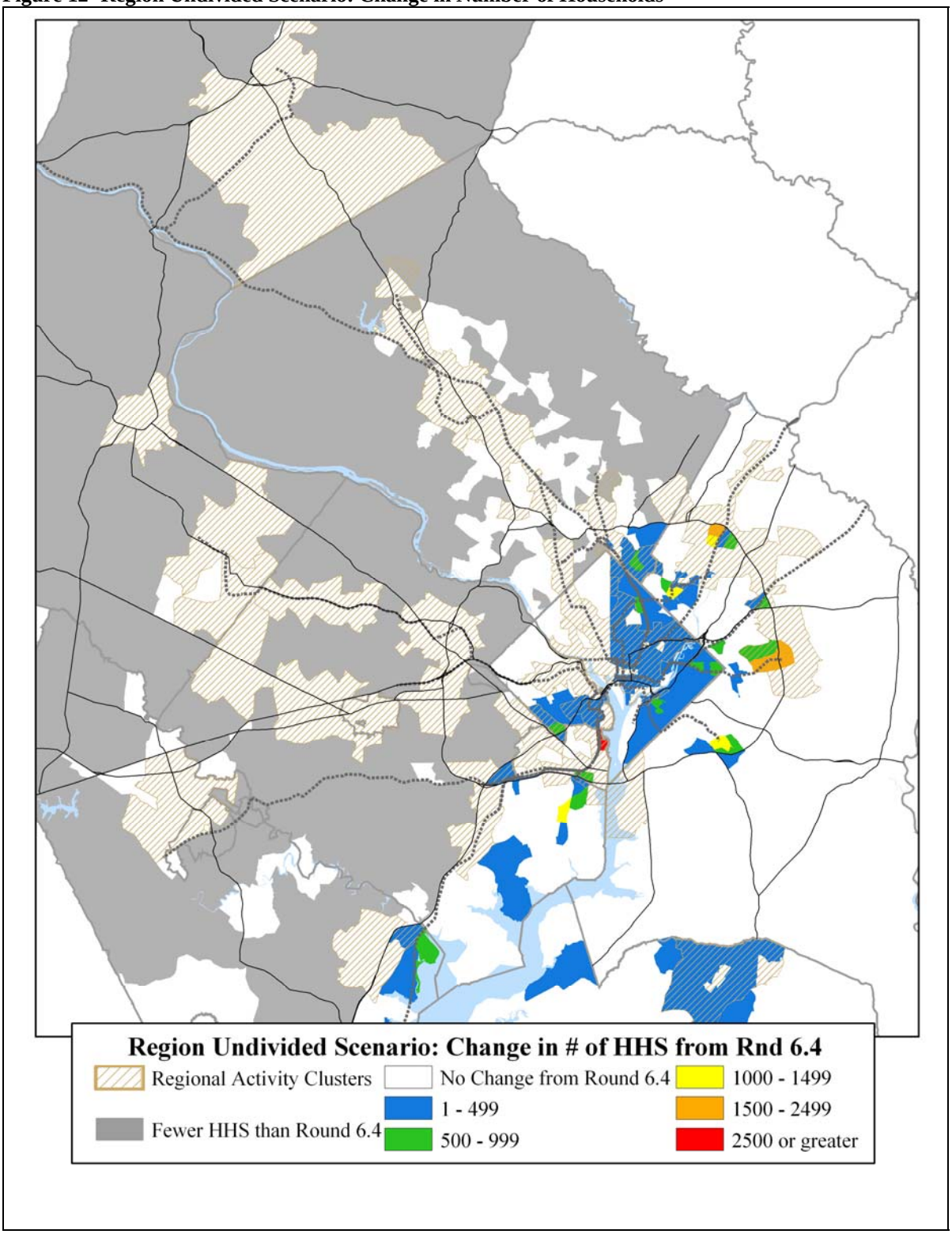


Figure 13 - Region Undivided Scenario: Change in Number of Jobs

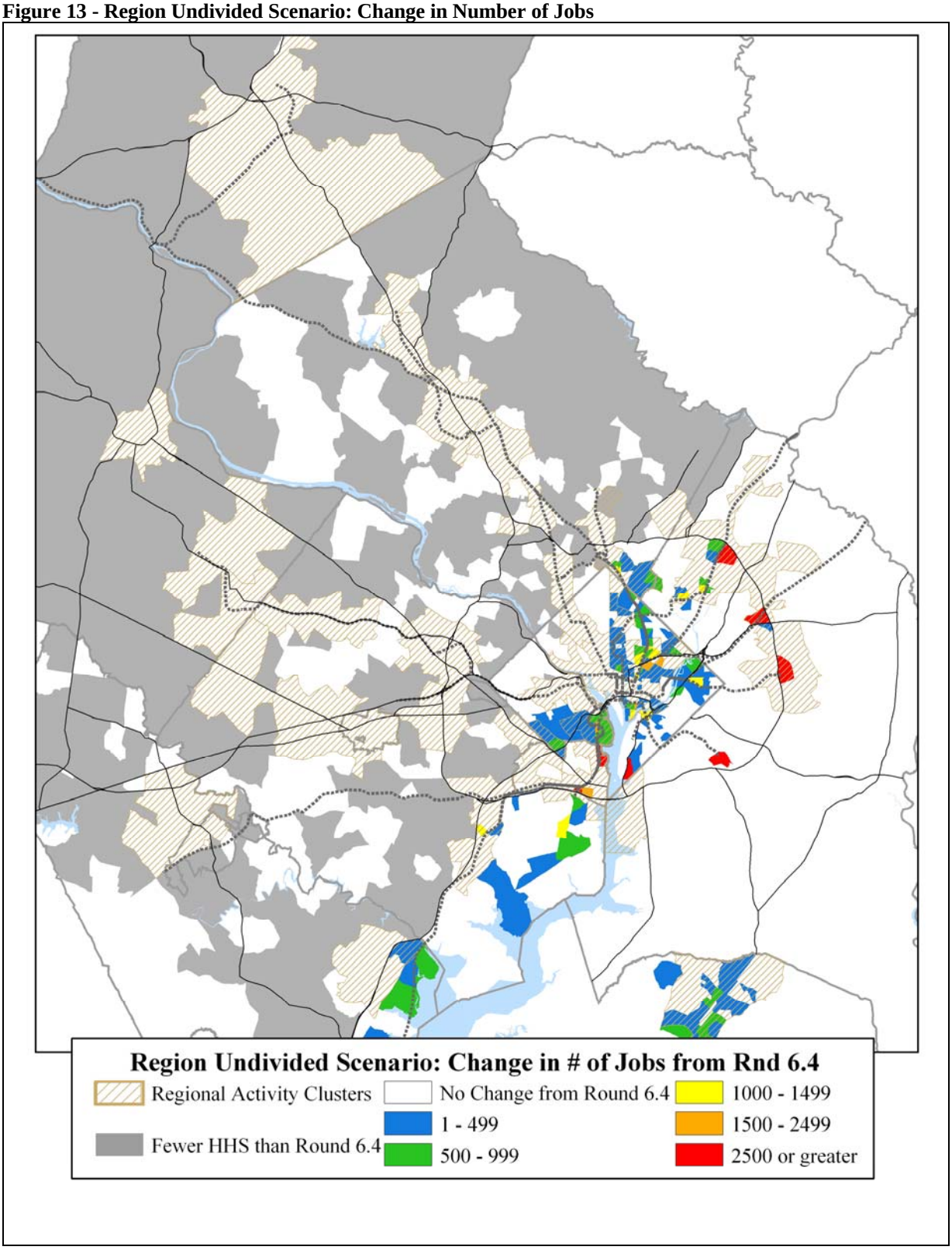
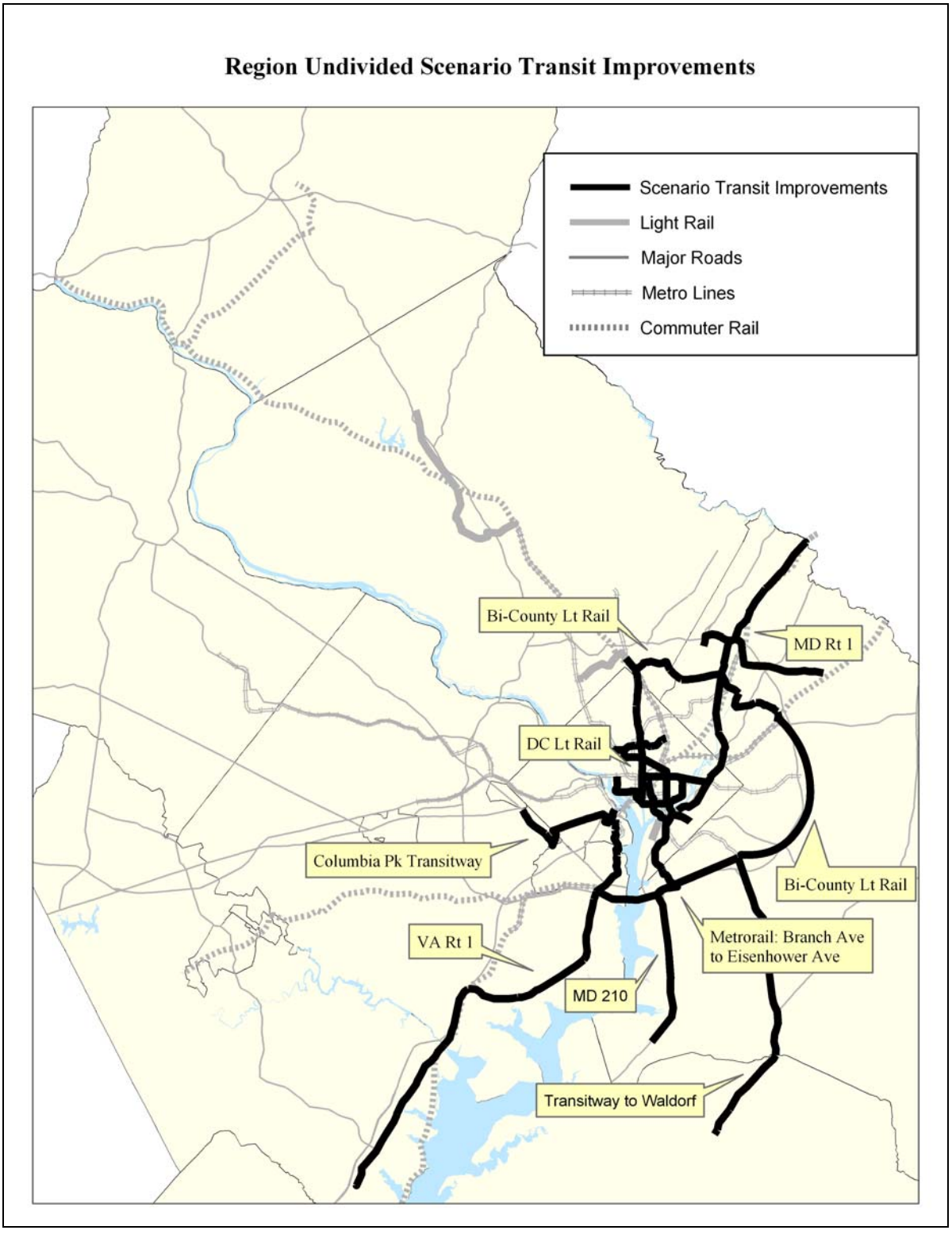


Figure 14 - Region Undivided Scenario: Transit Improvements



8.5 Transit-Oriented Development Scenario

The **Transit-Oriented Development** scenario was designed to test the transportation impacts of concentrating more of the region's 2010 to 2030 growth in areas that could be efficiently served by an expanded regional transit network. This scenario assumed a shift, to the maximum extent possible, of forecast 2010 to 2030 job and household growth to areas within ½-mile of current or planned Metrorail stations, commuter rail stations or other current or potential transit centers. The growth shifted into these transit areas came from non-transit areas outside of Regional Activity Clusters.

In total, shifts of 150,000 jobs and 125,000 households were assumed for this scenario. Most of these assumed job and household shifts occurred within each jurisdiction, but some growth was shifted between jurisdictions in cases where some jurisdictions could not logically accommodate all of its 2010 to 2030 growth within its transit areas and other jurisdictions had the capacity to accommodate more than its forecast 2010 to 2030 growth in its current and planned transit areas. A shift of 37,500 jobs to transit areas in Montgomery and Prince George's County from non-transit areas in Loudoun, Prince William and Frederick counties were assumed for this scenario as was a shift of 34,500 households to transit areas in the District of Columbia, Montgomery County, Prince Georges County, and Fairfax County from non-transit areas in Loudoun, Prince William and Frederick counties.

Figure 15 - 2030 Household Growth: Transit Oriented Development

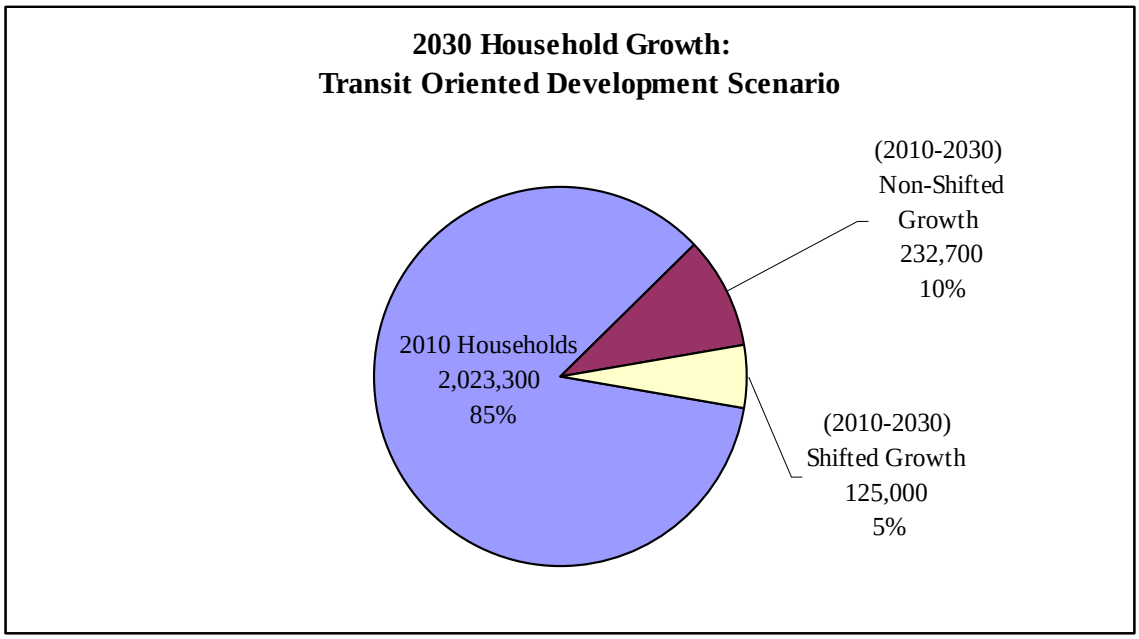


Figure 16 - 2030 Employment Growth: Transit Oriented Development Scenario

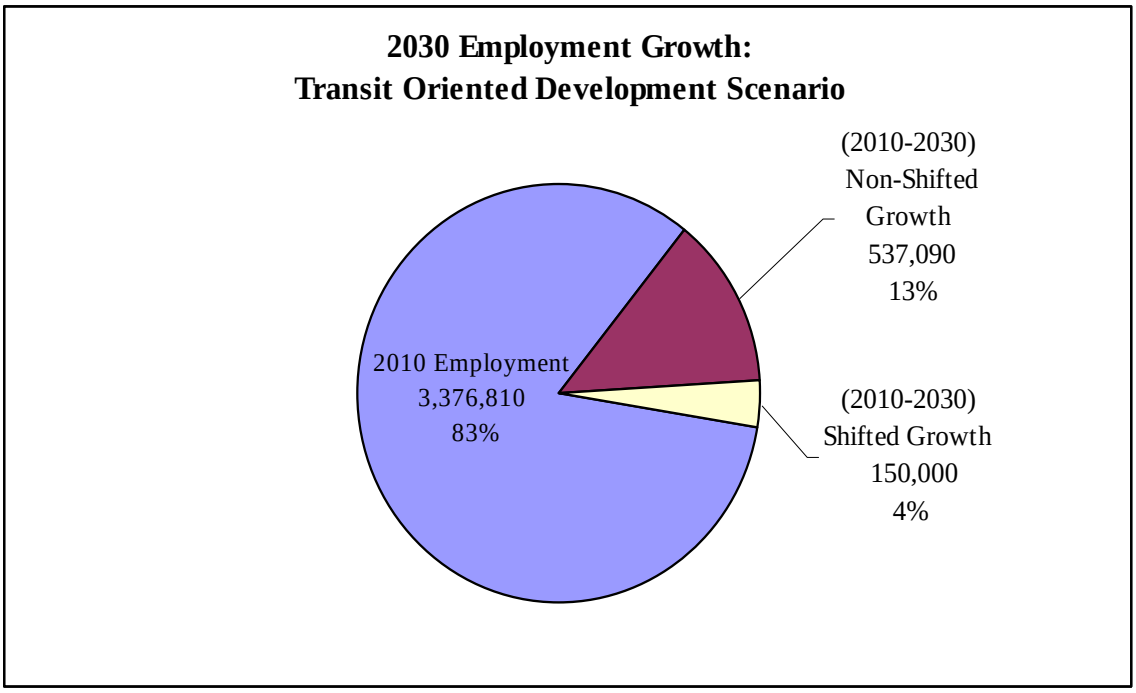


Table 5 - Transit Oriented Development: Percent Change in Households and Employment

Transit Oriented Development						
Jurisdictions	Households (Year 2030)			Employment (Year 2030)		
	CLRP +	TOD	Percent Change	CLRP+	TOD	Percent Change
District of Columbia	304,400	310,700	**2.1%**	831,200	831,200	**0.0%**
Montgomery County	417,400	427,300	**2.4%**	651,900	667,200	**2.3%**
Prince George's County	372,400	378,000	**1.5%**	553,000	575,900	**4.0%**
Arlington County	116,700	116,700	**0.0%**	275,800	275,800	**0.0%**
Alexandria	75,300	75,300	**0.0%**	141,000	141,000	**0.0%**
Fairfax County	453,100	466,500	**3.0%**	801,100	801,100	**0.0%**
Loudoun County	163,900	153,000	**-6.7%**	258,100	246,600	**-4.7%**
Prince William County	182,400	175,100	**-4.0%**	209,400	203,100	**-3.1%**
Frederick County	120,200	103,100	**-14.2%**	177,800	157,600	**-12.8%**
Charles County	76,100	76,100	**0.0%**	69,100	69,100	**0.0%**
Calvert County	35,700	35,700	**0.0%**	35,600	35,600	**0.0%**
Stafford County	63,500	63,500	**0.0%**	59,700	59,700	**0.0%**

The expanded transit network developed by the Transportation Scenario Subgroup for the **Transit-Oriented Development** scenario was the same one as developed for the **Higher Households in Region** scenario. The expanded transit network for both of these scenarios included 30 additional miles of Metrorail in addition to the planned Dulles Metrorail line expansion that was already included in the CLRP+ baseline, 30 miles of

additional commuter rail, and 218 miles of light-rail (LRT) and bus-rapid transit (BRT) beyond that already in the CLRP.

Metrorail extensions assumed for this scenario, in addition to the already planned Dulles line, included an extension of the Orange Line from Vienna to Centreville in Virginia and a circumferential interconnection of the Yellow and Green Lines between the Eisenhower Avenue and Branch Ave stations via a Metrorail line across the Woodrow Wilson Bridge. Extensions of VRE commuter rail service from Manassas to Haymarket in Prince William County and from Manassas to Spotsylvania County were also assumed as part of the scenario.

A total of more than 200 miles of new "transitways" were also assumed for this scenario. These assumed transitways included both LRT and BRT service operating within their own rights-of-way. In some cases where a preferred choice between LRT and BRT had not been determined, a generic transitway improvement with operating characteristics similar to both LRT and BRT was specified and tested as part of this scenario. These assumed transitway improvements included approximately 54 miles of light rail in the District of Columbia; a light rail line connecting Silver Spring to New Carrollton (Bi-County Connector); a MD 97 Busway; and new or expanded transitways in the I-270, MD 193, Route 1, US 50, Pennsylvania Ave, MD5, and MD 210 corridors in Maryland and the Columbia Pike and Route 1 Highway corridors in Virginia.

Figure 17 - Transit Oriented Development: Change in Households

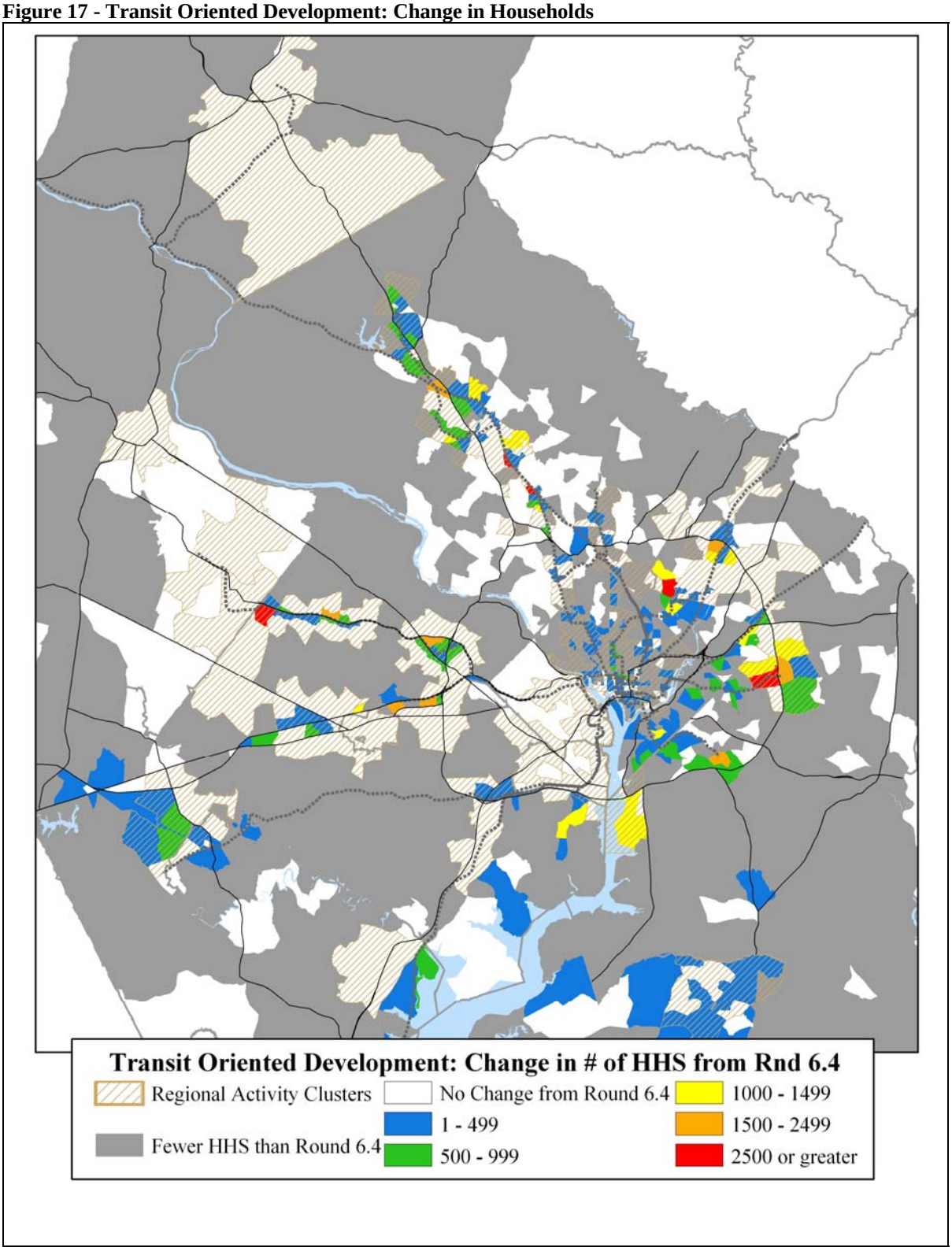


Figure 18 - Transit Oriented Development: Change in Jobs

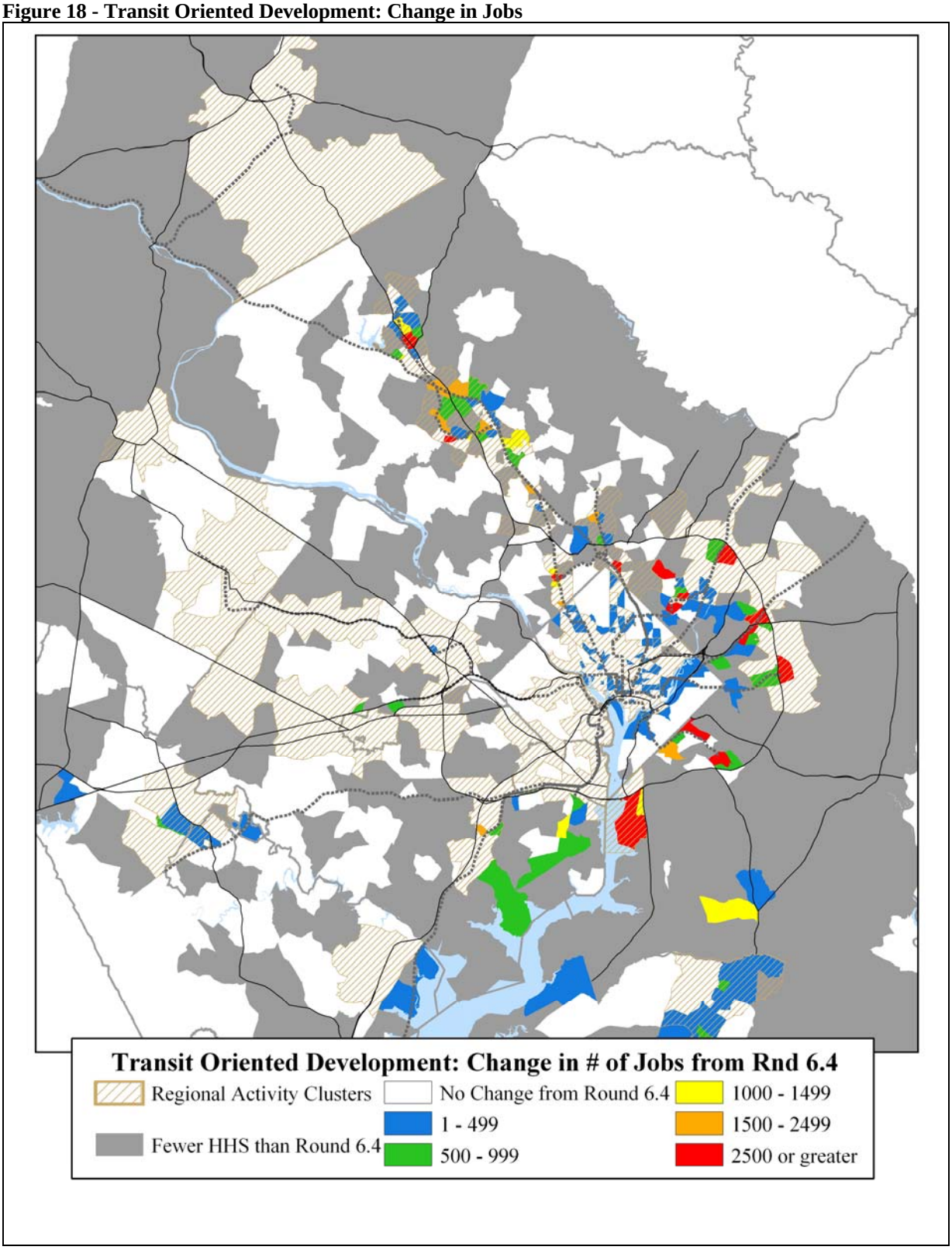
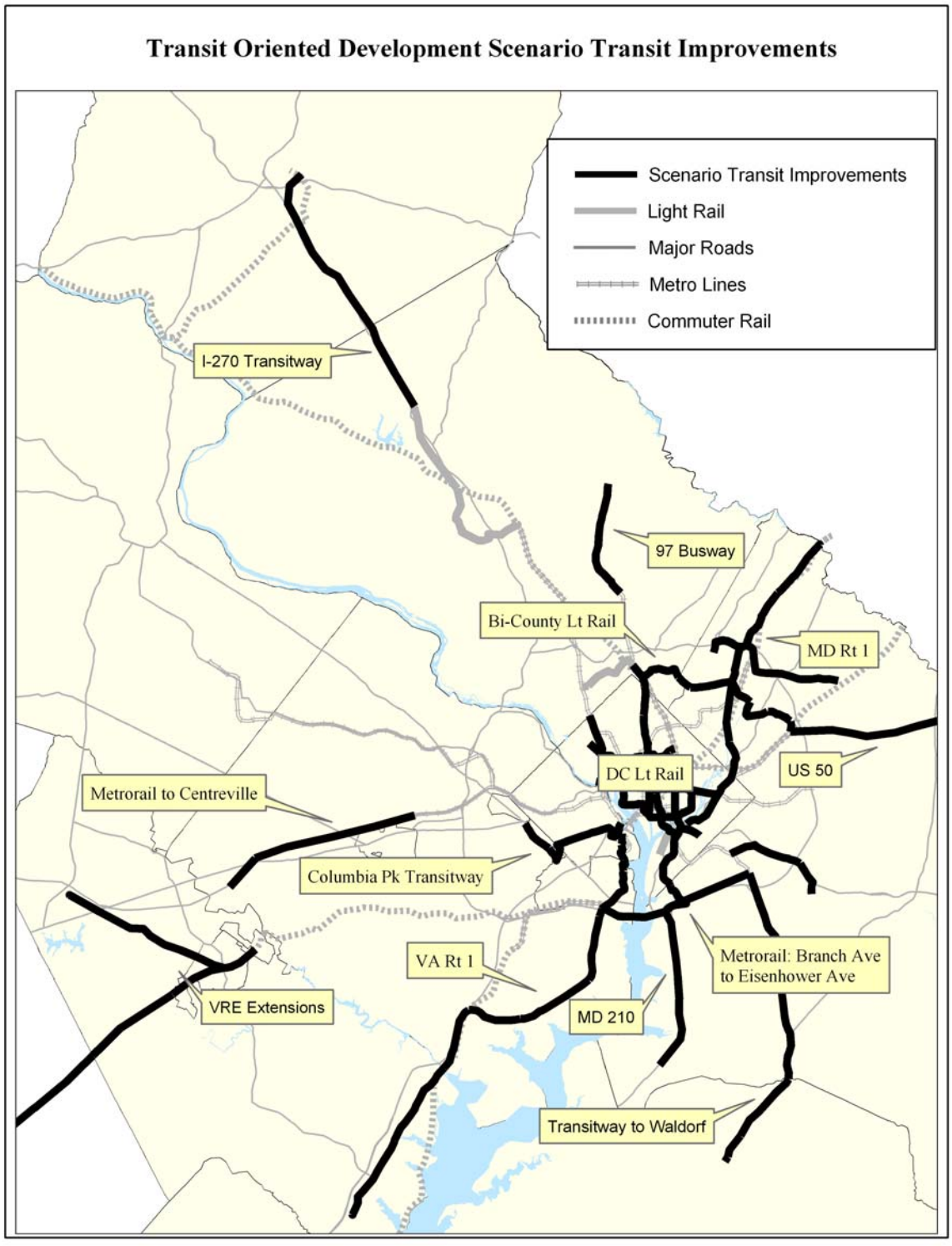


Figure 19 - Transit Oriented Development: Transit Improvements



9. Scenario Analysis

9.1 Higher Household Growth in Region

Land Use

- In the **Higher Household Growth in Region** scenario, 90% of the households will be located within a land area of 1085 square miles, approximately 30.6% of the region's total land area (3541 square miles). This total is 43 square miles less than the base. (Appendix A - Figure 1.2.b) The combined land area used for 90% of the region's employment and households will be 1,211 total square miles, approximately 34.2% of the region's total land area. 9.2 percent of the 2010 to 2030 employment growth and 15.1% of the household growth is expected to occur outside of the 2010 90^{th} percentile boundary. (Appendix A - Figure 1.3.b)

- The average ratio of jobs to workers in the Regional Activity Clusters is 1.8, compared to 2.2 in the base. (Appendix A - Figure 1.4.a) The ratio of jobs to workers lowers or holds steady in all Regional Activity Clusters. The significant decreases in the jobs to workers ratio occur in the Dulles Corridor and the Dulles South clusters. (Appendix B - Table 1.1)

- In the Regional Activity Clusters, 25% of households and 35% of employment will be located within a ¼-mile of a transit station, compared respectively to 13% and 25% in the base. (Appendix A - Table 1.1.a-b) Regional Activity Clusters also have 49% of households and 57% of employment located within a ½-mile of a transit station, compared respectively to 34% and 49% in the base. (Appendix A - Table 1.1.c-d)

- The region includes 13% of households and 26% employment that will be located within a ¼-mile of a transit station, as compared respectively to 6% and 18% in the base. (Appendix A - Table 1.2.a-b) Also within the region, 28% of households and 45% of employment will be located within ½-mile of a transit station, compared respectively with 16% and 36% in the base. (Appendix A - Table 1.2.c-d)

- Of the 446 transit stations, 278 will be inside a Regional Activity Cluster, compared with 115 of 172 in the base. (Appendix A - Table 1.3) In addition, 22 of the 24 Regional Activity Clusters will contain a transit station, compared to 16 in the base. (Appendix A - Table 1.4)

- The dot density pattern for household growth reveal higher concentrations in the core area and the inner suburbs compared to the base. (Appendix A - Figure 1.6.b)

Vehicle Travel and Congestion

- Daily vehicle miles traveled (VMT) per capita is 22.0, compared with 24.2 for the base. (Appendix A - Figure 2.1)

- Highway congestion levels decrease primarily on outer suburban highways. Increased congestion levels occur in scattered spots throughout the region, mainly in areas of increased household development. (Appendix A - Figure 2.2.b)

- The Higher Household Growth in Region scenario transit network was built on the 2030 CLRP+ network; therefore it is assumed there is no transit constraint through the core.

Mode Choice

- Most of the Regional Activity Clusters show a decrease in SOV commuting mode share productions compared with the base and only Leesburg, Fairfax Center, Manassas, and Potomac Mills show increases. (Appendix A - Figure 3.1.a) Most of the Regional Activity Clusters show a decrease in SOV commuting mode share attractions compared with the base, only Leesburg, Dulles South, and Fairfax Center show minimal increases. (Appendix A - Figure 3.2.a)

- Several Regional Activity Clusters show an increase in transit commuting mode share productions, with National Harbor showing the largest increase at 10.5%. Leesburg, Dulles North, Dulles South, and Potomac Mills show a slight decrease. (Appendix A - Figure 3.3.a) Most of the Regional Activity Clusters show an increase in transit commuting mode share attractions, with the Pentagon area showing a 4.0% increase and National Harbor showing a 5.9% increase. Only Leesburg shows a decrease. (Appendix A - Figure 3.4.a)

- Most of the Regional Activity Clusters show a decrease in HOV commuting mode share productions and attractions; only Gaithersburg, Bethesda, Silver Spring, and Waldorf show slight increases. (Appendix A - Figure 3.5-3.a) All Regional Activity Clusters show increases in walk / bike mode share productions, with Tysons Corner showing the largest increase at 4.8%. (Appendix A - Figure 3.7.a)

Accessibility

- There is moderate increase in highway accessibility to jobs within 45 minutes primarily northern Prince George's County and eastern Montgomery County. Moderate losses occur in Prince George's county inside the beltway. (Appendix A - Figures 4.1.b & 4.7.a) Moderate increases also occur in transit accessibility to jobs within 45 minutes scattered around the region, primarily around the transit improvements. There are some significant increases along the MD 301 and MD 5 transitway improvements. (Appendix A - Figures 4.2.b & 4.8.a)

- There are scattered moderate and significant increases in walk access transit accessibility to jobs within 45 minutes, inside the beltway along the scenario transit improvements. (Appendix A - Figures 4.3.b & 4.9.a)

- There are moderate increases in highway accessibility to households within 45 minutes throughout most of the core, Montgomery County, Prince George's County and Fairfax County. There are no decreases in highway accessibility to households. (Appendix A - Figures 4.4.b & 4.10.a)

- There are moderate and significant increases in transit accessibility to households within 45 minutes throughout the region in areas of increased households and / or improved transit. (Appendix A - Figures 4.5.b & 4.11.a)

- Walk access transit accessibility to households within 45 minutes increase throughout the region in areas of increased households and / or improved transit. (Appendix A - Figures 4.6.b & 4.12.a)

- Highway accessibility to major airports within 45 minutes had few gains or losses. (Appendix A - Figure 4.13.a) There are a few pockets that increase transit accessibility to major airports within 45 minutes, mostly in western Prince George's County and western Fairfax County. (Appendix A - Figure 4.14.a)

- There are few gains or losses in highway accessibility to regional rail stations within 45 minutes. (Appendix A - Figure 4.15.a) But transit accessibility to regional rail stations within 45 minutes increases along many of the scenario transit improvements, as well as along the Manassas bound VRE line. (Appendix A - Figure 4.16.a) Northern Montgomery County is the only area that had significant change in highway accessibility to regional bus depots. (Appendix A - Figure 4.17.a) There are pockets of transit accessibility gains to regional bus depots within 45 minutes scattered around the transit improvements in Arlington County, the inner suburbs, and southeastern Prince William County. (Appendix A - Figure 4.18.a)

- There is no significant change in accessibility to a regional freight terminal within 60 minutes. (Appendix A - Figure 4.19.a)

Environment

- Mobile source emissions changed. In comparison to the base, for this scenario, volatile organic compounds (VOC) mobile source emissions increased from 30.2 to 30.5 tons per day (Appendix A - Figure 5.1), Nitrogen oxides (NOx) decreased from 32.7 to 32.5 tons per day (Appendix A - Figure 5.2), Winter carbon monoxide (CO) increased from 1,138 to 1,163 tons per day (Appendix A - Figure 5.3), Direct particulate matter (PM) 2.5 decreased from 746 to 736 tons per year (Appendix A - Figure 5.4) and, particulate matter (PM) 2.5 precursor decreased from 10,786 to 10,709 tons per year. (Appendix A - Figure 5.5)

- Limestone Branch, Catoctin Creek – Loudoun County, Mattawoman Creek, and Piney Run – Dutchman Creek watersheds see increases in 2010 to 2030 household growth of 55% or higher. (Appendix A - Figure 5.7.b) Accotink Creek, Broad Run, Cabin John Creek and Potomac River – Upper Tidal are watersheds that have a 13.7% to 17.2% level of impervious surface in 2000 that see significant household and / or employment growth between 2010 and 2030. (Appendix A - Figure 5.8.b)

- The percent impervious surface in the regional watersheds for year 2000 is 8.1%. There is a 2010 to 2030 employment growth of 22% and household growth of 28% in this area. (Appendix A - Table 5.1.b)

- Nitrates Deposition in the Chesapeake Bay is estimated to be reduced by 8.9% compared to the CLRP+ baseline. This estimated is derived from the drop in Nitrogen oxides (NOx) mobile emissions in this scenario.

- Changes in total energy use for this scenario cannot be fully determined without a detailed engineering analysis of the power requirements of the expanded transit network assumed for this scenario. Gasoline consumption by auto, trucks and vans are estimated to be 1.3% less than the CLRP+ in this scenario.

Safety (Measure of Information)

- No forecasts, therefore no comparisons, can be assumed for traffic accidents or fatalities based on VMT or transportation infrastructure improvements. However, the region will always consider safety to be a top priority in transportation planning.

9.2 More Households in Inner Areas

Land Use

- In the More Households in Inner Areas scenario, 90% of the region's households will be located within a land area of 1043 square miles, approximately 29.5% of the region's total land area (3541 square miles). This total is 85 square miles less than the base. (Appendix A - Figure 1.2.c)

- The combined land area used for 90% of the region's employment and households will be 1,186 total square miles, approximately 33.5% of the region's total land area. 9.2% of the 2010 to 2030 employment growth and 12.1% of the household growth is expected to occur outside of the 2010 90th percentile boundary. (Appendix A - Figure 1.3.c)

- The average ratio of jobs to workers in the Regional Activity Clusters is 2.0, compared to 2.2 in the base. (Figure 1.4.b) The ratio of jobs to workers lowers or holds steady in all Regional Activity Clusters. The largest decreases in the jobs to workers ratio occur in the Dulles Corridor and the Dulles South clusters. (Appendix A - Table 1.1)

- 25% of the Regional Activity Clusters' households will be located within a ¼-mile of a transit station, compared with 13% in the base. (Appendix A - Table 1.1.a) 35% of the Regional Activity Clusters' employment will be located within a ¼-mile of a transit station, compared with 25% in the base. (Appendix A - Table 1.1.b)

- 46% of the Regional Activity Clusters' households will be located within a ½-mile of a transit station, compared with 34% in the base. (Appendix A - Table 1.1.c) 56% of the Regional Activity Clusters' employment will be located within a ½-mile of a transit station, compared with 49% in the base. (Appendix A - Table 1.1.d)

- 12% of the region's households will be located within a ¼-mile of a transit station, compared with 6% in the base. (Appendix A - Table 1.2.a) 26% of the region's employment will be located within a ¼-mile of a transit station, compared with 18% in the base. (Appendix A - Table 1.2.b) 26% of the region's households will be located within a ½-mile of a transit station, compared with 16% in the base. (Appendix A - Table 1.2.c) 43% of the region's employment will be located within a ½-mile of a transit station, compared with 36% in the base. (Appendix A - Table 1.2.d)

- Of the 384 transit stations, 261 will be inside a Regional Activity Cluster, compared with 115 of 172 in the base. (Appendix A - Table 1.3) In addition, 19 of the 24 Regional Activity Clusters will contain a transit station, compared to 16 in the base. (Appendix A - Table 1.4)

- The dot density pattern for household growth reveals higher concentrations in the core area and along the Dulles Corridor and I-66 compared to the base. (Appendix A - Figure 1.6.b)

Vehicle Travel and Congestion

- Daily vehicle miles traveled (VMT) per capita is 24.1, compared with 24.2 for the base. (Appendix A - Figure 2.1)

- Highway congestion levels decrease primarily in outer suburban highways from where households were shifted. Increased congestion levels occur in scattered spots throughout the region, mainly in areas where households were shifted. (Appendix A - Figure 2.2.c)

- The More Households in Inner Areas scenario transit network was built on the 2030 CLRP+ network; therefore it is assumed there is no transit constraint through the core.

Mode Choice

- Most of the Regional Activity Clusters show a decrease in SOV commuting mode share productions compared with the base. Only the outer areas of Leesburg, Dulles South, Dulles North, Waldorf, and Potomac Mills show increases. (Appendix A - Figure 3.1.b) Most of the Regional Activity Clusters show a decrease in SOV commuting mode share attractions compared with the base. Only Fairfax, Prince William, and Loudoun counties have clusters that show minimal increases. (Appendix A - Figure 3.2.b)

- Most of the Regional Activity Clusters show an increase in transit commuting mode share productions, with National Harbor showing the largest increase at 10.9%. Dulles North, Dulles South and Waldorf show a slight decrease. (Appendix A - Figure 3.3.b) Most of the Regional Activity Clusters show an increase in transit commuting mode share attractions, with the National Harbor, Silver Spring, and New Carrollton areas showing increases over 2.5%. Decreases are seen in the outer clusters of Northern Virginia. (Appendix A - Figure 3.4.b)

- Most of the Regional Activity Clusters show a decrease in HOV commuting mode share productions. Only six of the clusters show very slight increases. (Appendix A - Figure 3.5.b) Most of the Regional Activity Clusters show a decrease in HOV commuting mode share attractions. Eight of the clusters show very slight increases. (Appendix A - Figure 3.6.b)

- Most of the Regional Activity Clusters show increases in walk / bike mode share productions, with Tysons Corner showing the largest increase at 3.9%, and only the Pentagon area showing a slight decrease. (Appendix A - Figure 3.7.b)

Accessibility

- There is moderate increase in highway accessibility to jobs within 45 minutes primarily inside the beltway in Prince George's. Some moderate losses occur around the Tysons Corner area. (Appendix A - Figures 4.1.c & 4.7.b) There are moderate increases in transit accessibility to jobs within 45 minutes scattered around the region, primarily in eastern D.C. and western Prince George's County. There are some significant increases around the National Harbor area. There are a few scattered pockets of moderate loss in accessibility. (Appendix A - Figures 4.2.c & 4.8.b)

- There are scattered moderate and significant increases in walk access transit accessibility to jobs within 45 minutes, primarily inside the beltway along the scenario transit improvements and around the National Harbor area. (Appendix A - Figures 4.3.c & 4.9.b)

- There are moderate increases in highway accessibility to households within 45 minutes throughout most of the core and in Fairfax County. Only one zone has a decrease in highway accessibility to households. (Appendix A - Figures 4.4.c & 4.10.b)

- There are mostly moderate and significant increases in transit accessibility to households within 45 minutes in the core area and inside the beltway, as well as along I-66 along the improved transit line. (Appendix A - Figures 4.5.c & 4.11.b)

- There are mostly moderate, with a few significant, increases in walk access transit accessibility to households within 45 minutes in the core area and inside the beltway, as well as along I-66. (Appendix A - Figures 4.6.c & 4.12.b)

- There are few gains or losses in highway accessibility to major airports within 45 minutes. (Appendix A - Figure 4.13.b) There are a few pockets that increase transit accessibility to major airports within 45 minutes, mostly in western Prince George's County and western Fairfax County. (Appendix A - Figure 4.14.b)

- There are gains in highway accessibility to regional rail stations within 45 minutes in western Fairfax County. Only a few zones show a decrease. (Appendix A - Figure 4.15.b) Transit accessibility to regional rail stations within 45 minutes increases along the transit improvements around the beltway and along I-66. (Appendix A - Figure 4.16.b)

- There are gains in highway accessibility to regional bus depots within 45 minutes in the Dulles Corridor and along I-66. (Appendix A - Figure 4.17.b)

- There are pockets of transit accessibility gains to regional bus depots within 45 minutes in the National Harbor area and along the Columbia Pike transitway. (Appendix A - Figure 4.18.b)

- There is no significant change in accessibility to a regional freight terminal within 60 minutes. (Appendix A - Figure 4.19.b)

Environment

- Volatile organic compounds (VOC) mobile source emissions are 29.8 tons per day, compared with 30.2 in the base. (Appendix A - Figure 5.1) Nitrogen oxides (NOx) mobile source emissions are 32.4 tons per day, compared with 32.7 in the base. (Appendix A - Figure 5.2) Winter carbon monoxide (CO) mobile source emissions are 1,127 tons per day, compared with 1,138 in the base. (Appendix A - Figure 5.3) Direct particulate matter (PM) 2.5 mobile source emissions are 740 tons per year, compared with 746 in the base. (Appendix A - Figure 5.4) Particulate matter (PM) 2.5 precursor NOx mobile source emissions are 10,690 tons per year, compared with 10,786 in the base. (Appendix A - Figure 5.5)

- Limestone Branch, Catoctin Creek – Loudoun County, and Piney Run – Dutchman Creek watersheds see increases in 2010 to 2030 household growth of 55% or higher. (Appendix A - Figure 5.7.c) Accotink Creek, Broad Run, Cabin John Creek and Potomac River – Upper Tidal are watersheds that have a 13.7% to 17.2% level of impervious surface in 2000 that see significant household and / or employment growth between 2010 and 2030. (Appendix A - Figure 5.8.c) The percent impervious surface in the regional watersheds for year 2000 is 8.1%. There is a 2010 to 2030 employment growth of 22% and household growth of 17% in this area. (Appendix A - Table 5.1.c)

- Nitrates Deposition in the Chesapeake Bay is estimated to be reduced by 0.9% compared to the CLRP+ baseline. This estimated is derived from the drop in Nitrogen oxides (NOx) mobile emissions in this scenario.

- Changes in total energy use for this scenario cannot be fully determined without a detailed engineering analysis of the power requirements of the expanded transit network assumed for this scenario. Gasoline consumption by auto, trucks and vans are estimated to be 0.9% less than the CLRP+ in this scenario.

Safety (Measure of Information)

- No forecasts, therefore no comparisons, can be assumed for traffic accidents or fatalities based on VMT or transportation infrastructure improvements. However,

the region will always consider safety to be a top priority in transportation planning.

9.3 More Job Growth in Outer Areas

Land Use

- In the **More Job Growth in Outer Areas** scenario**,** 90% of the region's jobs will be located within a land area of 583 square miles, approximately 16.5% of the region's total land area (3541 square miles). This total is 12 square miles more than the base. (Appendix A - Figure 1.1.c) The combined land area used for 90% of the region's employment and households will be 1,258 total square miles, approximately 35.5% of the region's total land area. 11.1% of the 2010 to 2030 employment growth and 25.1% of the household growth is expected to occur outside of the 2010 90th percentile boundary. (Appendix A - Figure 1.3.c)

- The average ratio of jobs to workers in the Regional Activity Clusters is 2.2, the same as in the base. (Appendix A - Figure 1.4.b) The ratio of jobs to workers moves towards 1.0 or holds steady in most Regional Activity Clusters. Frederick, Manassas, and Waldorf have increasing ratios because jobs were shifted to these areas. (Appendix A - Table 1.1)

- 15%of the Regional Activity Clusters' households will be located within a ¼-mile of a transit station, compared with 13% in the base. (Appendix A - Table 1.1.a) 27% of the Regional Activity Clusters' employment will be located within a ¼-mile of a transit station, compared with 25% in the base. (Appendix A - Table 1.1.b) 37% of the Regional Activity Clusters' households will be located within a ½-mile of a transit station, compared with 34% in the base. (Appendix A - Table 1.1.c)

- 51% of the Regional Activity Clusters' employment will be located within a ½-mile of a transit station, compared with 49% in the base. (Appendix A - Table 1.1.d) 7% of the region's households will be located within a ¼-mile of a transit station, compared with 6% in the base. (Appendix A - Table 1.2.a) 20% of the region's employment will be located within a ¼-mile of a transit station, compared with 18% in the base. (Appendix A - Table 1.2.b) 19% of the region's households will be located within a ½-mile of a transit station, compared with 16% in the base. (Appendix A - Table 1.2.c) 38% of the region's employment will be located within a ½-mile of a transit station, compared with 36% in the base. (Appendix A - Table 1.2.d)

- 157 of the 261 transit stations will be inside a Regional Activity Cluster, compared with 115 of 172 in the base. (Appendix A - Table 1.3) 20 of the 24 Regional Activity Clusters will contain a transit station, compared to 16 in the base. (Appendix A - Table 1.4)

- There is a more concentrated dot density pattern in the outer suburbs, most noticeable in Charles County. (Appendix A - Figure 1.5.b)

Vehicle Travel and Congestion

- Daily vehicle miles traveled (VMT) per capita is 24.2, the same as in the base. (Appendix A - Figure 2.1)

- Highway congestion levels decrease primarily along the major corridors heading into the core area, from where jobs were shifted. Increased congestion levels occur along corridors heading toward outer suburban clusters, to areas where jobs were shifted. (Appendix A - Figure 2.2.d)

- The More Jobs in Outer Areas scenario transit network was built on the 2030 CLRP+ network therefore it is assumed there is no transit constraint through the core.

Mode Choice

- Most of the Regional Activity Clusters show an increase in SOV commuting mode share productions compared with the base, with Potomac Mills having the highest increase at 3%. Only the Waldorf area has a decrease. (Appendix A - Figure 3.1.c) About half of the Regional Activity Clusters show an increase in SOV commuting mode share attractions, mostly in the core area and Fairfax County. The decreases occur mostly in clusters outside the beltway. (Appendix A - Figure 3.2.c)

- Most of the Regional Activity Clusters show a decrease in transit commuting mode share productions, with only Frederick, Manassas, and Waldorf showing increases. (Appendix A - Figure 3.3.c) The Regional Activity Clusters in the core area and in Fairfax County show a decrease in transit commuting mode share attractions, while the outer clusters show slight increases. (Appendix A - Figure 3.4.c)

- Most of the Regional Activity Clusters show decreases in HOV commuting mode share productions. Only the District and the clusters around the beltway in Montgomery and Prince George's counties show slight increases. (Appendix A - Figure 3.5.c) Most of the Regional Activity Clusters show a decrease in HOV commuting mode share attractions, with the outer areas of Frederick, Waldorf, National Harbor, and Leesburg showing slight increases. (Appendix A - Figure 3.6.c) Most of the Regional Activity Clusters show marginal increases in walk / bike mode share productions, while the core area clusters showing slight decreases. (Appendix A - Figure 3.7.c)

Accessibility

- There are moderate decreases in highway accessibility to jobs within 45 minutes primarily in the core area from where jobs were shifted. Few moderate gains occur. (Appendix A - Figures 4.1.d & 4.7.c) There are moderate increases in transit accessibility to jobs within 45 minutes along the transit improvements connecting the outer suburban Regional Activity Clusters. There are very few zones of moderate loss. (Appendix A - Figures 4.2.d & 4.8.c)

- There are moderate and significant increases in walk access transit accessibility to jobs within 45 minutes along the Route 1 and I-66 corridors in Virginia. (Appendix A - Figures 4.3.d & 4.9.c) There are scattered moderate increases in highway accessibility to households within 45 minutes in the core area. Only the Manassas area shows any decrease in highway accessibility to households. (Appendix A - Figures 4.4.d & 4.10.c)

- There are mostly moderate and significant increases in transit accessibility to households within 45 minutes along all transit improvements, except for the I-270 transitway. (Appendix A - Figures 4.5.d & 4.11.c) There are moderate increases in walk access transit accessibility to households within 45 minutes primarily along the Route 1 corridor in Virginia. (Appendix A - Figures 4.6.d & 4.12.c)

- There are few gains or losses in highway accessibility to major airports within 45 minutes. (Appendix A - Figure 4.13.c) There is increased transit accessibility to major airports within 45 minutes along the Route 1 corridor in Virginia, as well as in the areas of Manassas / Centreville. (Appendix A - Figure 4.14.c) There are few gains or losses in highway accessibility to regional rail stations within 45 minutes. (Appendix A - Figure 4.15.c)

- Transit accessibility to regional rail stations within 45 minutes increases along the transit improvements in Virginia and northern Prince George's County. (Appendix A - Figure 4.16.c) Highway accessibility to regional bus depots within 45 minutes mostly stays the same, although there are some scattered losses in Virginia. (Appendix A - Figure 4.17.c) There are pockets of transit accessibility gains to regional bus depots within 45 minutes mostly along Route 1 in Fairfax and Prince William counties. (Appendix A - Figure 4.18.c)

- There is no significant change in accessibility to a regional freight terminal within 60 minutes. (Appendix A - Figure 4.19.c)

Environment

- Volatile organic compounds (VOC) mobile source emissions are 30.2 tons per day, the same as in the base. (Appendix A - Figure 5.1) Nitrogen oxides (NOx) mobile source emissions are 32.7 tons per day, the same as in the base. (Appendix A - Figure 5.2) Winter carbon monoxide (CO) mobile source

emissions are 1,139 tons per day, compared with 1,138 in the base. (Appendix A - Figure 5.3) Direct particulate matter (PM) 2.5 mobile source emissions are 746 tons per year, the same as in the base. (Appendix A - Figure 5.4) Particulate matter (PM) 2.5 precursor NOx mobile source emissions are 10,781 tons per year, compared with 10,786 in the base. (Appendix A - Figure 5.5)

- Catoctin Creek – Loudoun County; Double Pipe Creek; Cedar, Kettel and Broad Runs; and Piney Run – Dutchman Creek watersheds see increases in 2010 to 2030 employment growth of 100% or higher. (Appendix A - Figure 5.6.d) Occoquan Bay has a 13.2% level of impervious surface in 2000 and has a 47% increase in employment growth, indicating an area of concern. (Appendix A - Figure 5.8.d) The percent impervious surface in the regional watersheds for year 2000 is 8.1%. There is a 2010 to 2030 employment growth of 22% and household growth of 16% in this area. (Appendix A - Table 5.1.d)

- Nitrates Deposition in the Chesapeake Bay is estimated remain the same compared to the CLRP+ baseline. This estimated is derived from the lack of change in Nitrogen oxides (NOx) mobile emissions in this scenario.

- Changes in total energy use for this scenario cannot be fully determined without a detailed engineering analysis of the power requirements of the expanded transit network assumed for this scenario. Gasoline consumption by auto, trucks and vans are estimated to be 0.1% less than the CLRP+ in this scenario.

Safety (Measure of Information)

- No forecasts, therefore no comparisons, can be assumed for traffic accidents or fatalities based on VMT or transportation infrastructure improvements. However, the region will always consider safety to be a top priority in transportation planning).

9.4 Region Undivided Scenario

Land Use

- In the **Region Undivided** scenario**,** 90% of the region's jobs will be located within a land area of 526 square miles, approximately 14.9% of the region's total land area (3541 square miles). This total is 45 less square miles than the base. (Appendix A - Figure 1.1.e) 90% of the region's households will be located within a land area of 1068 square miles, approximately 30.2% of the region's total land area (3541 square miles). This total is 60 square miles less than the base. (Appendix A - Figure 1.2.e) The combined land area used for 90% of the region's employment and households will be 1,201 total square miles, approximately 33.9% of the region's total land area. 4.5% of the 2010 to 2030 employment growth and 16.4% of the household growth is expected to occur outside of the 2010 90th percentile boundary. (Appendix A - Figure 1.3.e)

- The average ratio of jobs to workers in the Regional Activity Clusters is 2.2, the same as in the base. (Appendix A - Figure 1.4.d) The ratio of jobs to workers lowers slightly or holds steady in all Regional Activity Clusters, except for the New Carrollton / Largo area, which increases marginally. (Appendix A - Table 1.1)

- 23% of the Regional Activity Clusters' households will be located within a ¼-mile of a transit station, compared with 13% in the base. (Appendix A - Table 1.1.a) 35% of the Regional Activity Clusters' employment will be located within a ¼-mile of a transit station, compared with 25% in the base. (Appendix A - Table 1.1.b) 47% of the Regional Activity Clusters' households will be located within a ½-mile of a transit station, compared with 34% in the base. (Appendix A - Table 1.1.c) 56% of the Regional Activity Clusters' employment will be located within a ½-mile of a transit station, compared with 49% in the base. (Appendix A - Table 1.1.d) 12% of the region's households will be located within a ¼-mile of a transit station, compared with 6% in the base. (Appendix A - Table 1.2.a) 26% of the region's employment will be located within a ¼-mile of a transit station, compared with 18% in the base. (Appendix A - Table 1.2.b) 26% of the region's households will be located within a ½-mile of a transit station, compared with 16% in the base. (Appendix A - Table 1.2.c) 45% of the region's employment will be located within a ½-mile of a transit station, compared with 36% in the base. (Appendix A - Table 1.2.d)

- 254 of the 396 transit stations will be inside a Regional Activity Cluster, compared with 115 of 172 in the base. (Appendix A - Table 1.3) 20 of the 24 Regional Activity Clusters will contain a transit station, compared to 16 in the base. (Appendix A - Table 1.4) There is a more concentrated dot density pattern for employment growth in Prince George's County, Charles County and the District of Columbia. (Appendix A - Figure 1.5.d)

- There is a marked concentration of dot density pattern for household growth in eastern D.C., Prince George's County, Charles County, and along the Route 1 corridor in Virginia. There is a noticeable drop in the household growth dot density in the western portions of the region. (Appendix A - Figure 1.6.d)

Vehicle Travel and Congestion

- Daily vehicle miles traveled (VMT) per capita is 24.1, compared with 24.2 for the base. (Appendix A - Figure 2.1)

- Highway congestion levels decrease where jobs and households were shifted away, primarily along the beltway in Virginia and to the west. Increased congestion levels occur primarily along the highways in the District, Prince George's County and Charles County. (Appendix A - Figure 2.2.e)

- The Region Undivided scenario transit network was built on the 2030 CLRP+ network therefore it is assumed there is no transit constraint through the core.

Mode Choice

- Most of the Regional Activity Clusters show a decrease in SOV commuting mode share productions compared with the base. Only the outer areas of Leesburg and Potomac Mills show increases. (Appendix A - Figure 3.1.d) Most of the Regional Activity Clusters show a decrease in SOV commuting mode share attractions compared with the base. The areas where jobs were shifted from tend to show slight increases, including the outer ring of suburban Virginia clusters. (Appendix A - Figure 3.2.d)

- All of the Regional Activity Clusters show an increase in transit commuting mode share productions. Waldorf has an increase of 6.1%, while National Harbor has the largest increase at 14.4%. (Appendix A - Figure 3.3.d) Most of the Regional Activity Clusters show an increase in transit commuting mode share attractions, with the National Harbor and New Carrollton areas showing increases over 6%. Decreases are seen in the western outer clusters of Northern Virginia. (Appendix A - Figure 3.4.d)

- Most of the core area and inner suburban Regional Activity Clusters show a decrease in HOV commuting mode share productions. Many clusters in Northern Virginia and along the I-270 corridor show slight increases. (Appendix A - Figure 3.5.d) All of the Regional Activity Clusters that show a decrease in HOV commuting mode share attractions are outside of the District in the western portion of the region. The clusters with a slight increase are scattered throughout the region. (Appendix A - Figure 3.6.d)

- Most of the Regional Activity Clusters show increases in walk / bike mode share productions, with only the I-95 / Springfield area showing a slight decrease. (Appendix A - Figure 3.7.d)

Accessibility

- Moderate increases in highway accessibility to jobs within 45 minutes primarily occur inside the beltway in Prince George's County and inside eastern D.C. Some moderate losses occur just outside of northwest D.C. and in the Dulles area. (Appendix A - Figures 4.1.e & 4.7.d) There are moderate increases in transit accessibility to jobs within 45 minutes scattered around the beltway from Silver Spring to Springfield, and significant increases in many parts of Prince George's County. (Appendix A - Figures 4.2.e & 4.8.d)

- There are scattered moderate and significant increases in walk access transit accessibility to jobs within 45 minutes, primarily inside the beltway along the scenario transit improvements and in the District of Columbia. (Appendix A - Figures 4.3.e & 4.9.d) There are very few moderate increases or decreases in highway accessibility to households within 45 minutes in the region. (Appendix A - Figures 4.4.e & 4.10.d)

- There are mostly moderate and significant increases in transit accessibility to households within 45 minutes in the core area and inside the beltway, as well as along the Virginia Route 1, and Maryland Highways 5 and 301 transit improvements. (Appendix A - Figures 4.5.e & 4.11.d) There are mostly moderate and significant increases in transit accessibility to households within 45 minutes in the core area and inside the beltway. (Appendix A - Figures 4.6.e & 4.12.d)

- There are few gains or losses in highway accessibility to major airports within 45 minutes. (Appendix A - Figure 4.13.d) There are a few pockets that increase transit accessibility to major airports within 45 minutes, mostly in western Prince George's. (Appendix A - Figure 4.14.d) There are gains in highway accessibility to regional rail stations within 45 minutes in western Fairfax County. Only a few zones show a decrease. (Appendix A - Figure 4.15.d) Transit accessibility to regional rail stations within 45 minutes increases along the transit improvements around the beltway and along Virginia Route 1. (Appendix A - Figure 4.16.d) There are gains in highway accessibility to regional bus depots within 45 minutes in western Fairfax County, with very few zones showing a loss in accessibility. (Appendix A - Figure 4.17.d) Transit accessibility to regional rail stations within 45 minutes increases along the transit improvements around the beltway and along Virginia Route 1. (Appendix A - Figure 4.18.d)

- There is no significant change in accessibility to a regional freight terminal within 60 minutes. (Appendix A - Figure 4.19.d)

Environment

- Volatile organic compounds (VOC) mobile source emissions are 29.8 tons per day, compared with 30.2 in the base. (Appendix A - Figure 5.1) Nitrogen oxides (NOx) mobile source emissions are 32.4 tons per day, compared with 32.7 in the base. (Appendix A - Figure 5.2) Winter carbon monoxide (CO) mobile source emissions are 1,123 tons per day, compared with 1,138 in the base. (Appendix A - Figure 5.3) Direct particulate matter (PM) 2.5 mobile source emissions are 738 tons per year, compared with 746 in the base. (Appendix A - Figure 5.4) Particulate matter (PM) 2.5 precursor NOx mobile source emissions are 10,682 tons per year, compared with 10,786 in the base. (Appendix A - Figure 5.5)

- Potomac River – Upper Tidal watershed sees an increase in 2010 to 2030 employment growth of 72%. (Appendix A - Figure 5.6.e) Mattawoman Creek, Zekiah Swamp and Patuxent River – Lower watersheds see increases in 2010 to 2030 household growth of 54% or higher. (Appendix A - Figure 5.7.e) Broad Run, Cabin John Creek and Potomac River – Upper Tidal are watersheds that have a 13.7% to 15.7% level of impervious surface in 2000 that see significant household and / or employment growth between 2010 and 2030. (Appendix A - Figure 5.8.e) The percent impervious surface in the regional watersheds for year 2000 is 8.1%. There is a 2010 to 2030 employment growth of 22% and household growth of 16% in this area. (Appendix A - Table 5.1.e)

- Nitrates Deposition in the Chesapeake Bay is estimated to be reduced by 0.9% compared to the CLRP+ baseline. This estimated is derived from the drop in Nitrogen oxides (NOx) mobile emissions in this scenario.

- Changes in total energy use for this scenario cannot be fully determined without a detailed engineering analysis of the power requirements of the expanded transit network assumed for this scenario. Gasoline consumption by auto, trucks and vans are estimated to be 0.8% less than the CLRP+ in this scenario.

Safety (Measure of Information)

- No forecasts, therefore no comparisons, can be assumed for traffic accidents or fatalities based on VMT or transportation infrastructure improvements. However, the region will always consider safety to be a top priority in transportation planning.

9.5 Transit Oriented Development Scenario

Land Use

- In the **Transit Oriented Development** scenario, 90% of the region's jobs will be located within a land area of 526 square miles, approximately 14.9% of the region's total land area (3,541 square miles). This total is 45 less square miles than the base. (Appendix A - Figure 1.1.f) 90% of the region's households will be located within a land area of 1,026 square miles, approximately 29.0% of the region's total land area (3,541 square miles). This total is 102 square miles less than the base. (Appendix A - Figure 1.2.f) The combined land area used for 90% of the region's employment and households will be 1,152 total square miles, approximately 32.5% of the region's total land area. 4.8% of the 2010 to 2030 employment growth and 11.3% of the household growth is expected to occur outside of the 2010 90th percentile boundary. (Appendix A - Figure 1.3.f)

- The average ratio of jobs to workers in the Regional Activity Clusters is 2.0, compared to 2.2 in the base. (Appendix A - Figure 1.4.e) The ratio of jobs to workers lowers slightly or holds steady in most Regional Activity Clusters, with Dulles Corridor dropping from 3.5 in the base to 2.4. Bethesda, Waldorf, and National Harbor slightly increase. (Appendix A - Table 1.1) 24% of the Regional Activity Clusters' households will be located within a ¼-mile of a transit station, compared with 13% in the base. (Appendix A - Table 1.1.a) 35% of the Regional Activity Clusters' employment will be located within a ¼-mile of a transit station, compared with 25% in the base. (Appendix A - Table 1.1.b)

- 47% of the Regional Activity Clusters' households will be located within a ½-mile of a transit station, compared with 34% in the base. (Appendix A - Table 1.1.c) 58% of the Regional Activity Clusters' employment will be located within a ½-mile of a transit station, compared with 49% in the base. (Appendix A - Table 1.1.d) 12% of the region's households will be located within a ¼-mile of a transit station, compared with 6% in the base. (Appendix A - Table 1.2.a) 27% of the region's employment will be located within a ¼-mile of a transit station, compared with 18% in the base. (Appendix A - Table 1.2.b) 27% of the region's households will be located within a ½-mile of a transit station, compared with 16% in the base. (Appendix A - Table 1.2.c) 47% of the region's employment will be located within a ½-mile of a transit station, compared with 36% in the base. (Appendix A - Table 1.2.d)

- 278 of the 446 transit stations will be inside a Regional Activity Cluster, compared with 115 of 172 in the base. (Appendix A - Table 1.3) 22 of the 24 Regional Activity Clusters will contain a transit station, compared to 16 in the base. (Appendix A - Table 1.4)

- Throughout the region, all employment growth is shown in a concentrated dot density. (Appendix A - Figure 1.5.e) Compared to the base, there is a noticeable

lack of concentration of dot density pattern for household growth throughout the region and there is a marked concentration around transit. (Appendix A - Figure 1.6.e)

Vehicle Travel and Congestion

- Daily vehicle miles traveled (VMT) per capita is 24.0, compared with 24.2 for the base. (Appendix A - Figure 2.1)

- Highway congestion levels increase and decrease throughout the region. (Appendix A - Figure 2.2.f)

- The Transit Oriented Development scenario transit network was built on the 2030 CLRP+ network therefore it is assumed there is no transit constraint through the core.

Mode Choice

- Most of the Regional Activity Clusters show a decrease in SOV commuting mode share productions compared with the base. The outer areas of Leesburg, Dulles North and Potomac Mills, as well as Bethesda, show slight increases. (Appendix A - Figure 3.1.e) Most of the Regional Activity Clusters show a decrease in SOV commuting mode share attractions compared with the base. The clusters of western Fairfax County and Leesburg show slight increases. (Appendix A - Figure 3.2.e)

- All of the Regional Activity Clusters, except for Dulles North, show an increase in transit commuting mode share productions. Waldorf has an increase of 4.4%, while National Harbor has the largest increase at 10.5%. (Appendix A - Figure 3.3.e) Most of the Regional Activity Clusters show an increase in transit commuting mode share attractions, with Silver Spring increasing by 3.7% and National Harbor increasing by 6.1%. Slight decreases are found in Fairfax Center, Dulles South, and Leesburg. (Appendix A - Figure 3.4.e)

- Most of the core area and inner suburban Regional Activity Clusters show a decrease in HOV commuting mode share productions. Clusters are scattered throughout the region showing slight increases. (Appendix A - Figure 3.5.e) Most of the core area and inner suburban Regional Activity Clusters show a decrease in HOV commuting mode share attractions. Clusters are scattered throughout the region showing slight increases. (Appendix A - Figure 3.6.e)

- All of the Regional Activity Clusters show increases in walk / bike mode share productions, with Tysons Corner (4.2 %) and National Harbor (5.8%) having the largest increases. (Appendix A - Figure 3.7.e)

Accessibility

- Moderate increases in highway accessibility to jobs within 45 minutes are scattered primarily inside the beltway. Some moderate losses occur inside the beltway as well. (Appendix A - Figures 4.1.f & 4.7.e) There are moderate increases in transit accessibility to jobs within 45 minutes scattered around the beltway primarily in eastern D.C., western Prince George's County and inner Fairfax County. Significant increases occur along the MD 5 and 301 transit improvements. (Appendix A - Figures 4.2.f & 4.8.e)

- There are scattered moderate and significant increases in walk access transit accessibility to jobs within 45 minutes, primarily inside the beltway along the scenario transit improvements and along the I-66 transit improvement. (Appendix A - Figures 4.3.f & 4.9.e)

- There are very few moderate increases in highway accessibility to households within 45 minutes primarily just to the west of the beltway, with a few scattered moderate losses in Prince George's County. (Appendix A - Figures 4.4.f & 4.10.e) There are mostly moderate and significant increases in transit accessibility to households within 45 minutes in the core area and inside the beltway, as well as along the Virginia Route 1, I-66, and Maryland Highways 5 and 301 transit improvements. (Appendix A - Figures 4.5.f & 4.11.e) There are mostly moderate increases in transit accessibility to households within 45 minutes in the core area and inside the beltway, with significant increases in the National Harbor area. (Appendix A - Figures 4.6.f & 4.12.e)

- There are few gains or losses in highway accessibility to major airports within 45 minutes. (Appendix A - Figure 4.13.e) There are increases in transit accessibility to major airports within 45 minutes in western Prince George's and the Centreville area in Fairfax County. (Appendix A - Figure 4.14.e) There are gains in highway accessibility to regional rail stations within 45 minutes in western Fairfax County. (Appendix A - Figure 4.15.e)

- Transit accessibility to regional rail stations within 45 minutes increases in Mt. Vernon, National Harbor, Greenbelt, Fairfax County and Prince William County. (Appendix A - Figure 4.16.e)

- There are gains in highway accessibility to regional bus depots within 45 minutes in the National Harbor area, along Virginia Route 1, Prince George's County and Montgomery County. (Appendix A - Figure 4.17.e)

- Transit accessibility to regional rail stations within 45 minutes increases along the transit improvements around the beltway and along Virginia Route 1. (Appendix A - Figure 4.18.e)

- There is no significant change in accessibility to a regional freight terminal within 60 minutes. (Appendix A - Figure 4.19.e)

Environment

- Volatile organic compounds (VOC) mobile source emissions are 29.8 tons per day, compared with 30.2 in the base. (Appendix A - Figure 5.1) Nitrogen oxides (NOx) mobile source emissions are 32.4 tons per day, compared with 32.7 in the base. (Appendix A - Figure 5.2) Winter carbon monoxide (CO) mobile source emissions are 1,126 tons per day, compared with 1,138 in the base. (Appendix A - Figure 5.3) Direct particulate matter (PM) 2.5 mobile source emissions are 739 tons per year, compared with 746 in the base. (Appendix A - Figure 5.4) Particulate matter (PM) 2.5 precursor NOx mobile source emissions are 10,682 tons per year, compared with 10,786 in the base. (Appendix A - Figure 5.5)

- Potomac River – Upper Tidal watershed sees an increase in 2010 to 2030 employment growth of 98%. (Appendix A - Figure 5.6.f) Mattawoman Creek watershed sees an increase in 2010 to 2030 household growth of 53% or higher. (Appendix A - Figure 5.7.f) Broad Run has a 2000 level of impervious surface of 14.7% with an increase of 91,100 jobs and 26,500 households. Potomac River – Upper Tidal has a 2000 level of impervious surface of 13.7% and has an increase of 40,800 jobs forecast. (Appendix A - Figure 5.8.f) The percent impervious surface in the regional watersheds for year 2000 is 8.1%. There is a 2010 to 2030 employment growth of 23% and household growth of 16% in this area. (Appendix A - Table 5.1.f)

- Nitrates Deposition in the Chesapeake Bay is estimated to be reduced by 8.9% compared to the CLRP+ baseline. This estimated is derived from the drop in Nitrogen oxides (NOx) mobile emissions in this scenario.

- Changes in total energy use for this scenario cannot be fully determined without a detailed engineering analysis of the power requirements of the expanded transit network assumed for this scenario. Gasoline consumption by auto, trucks and vans are estimated to be 1.0% less than the CLRP+ in this scenario.

Safety (measure of Information)

No forecasts, therefore no comparisons, can be assumed for traffic accidents or fatalities based on VMT or transportation infrastructure improvements. However, the region will always consider safety to be a top priority in transportation planning.

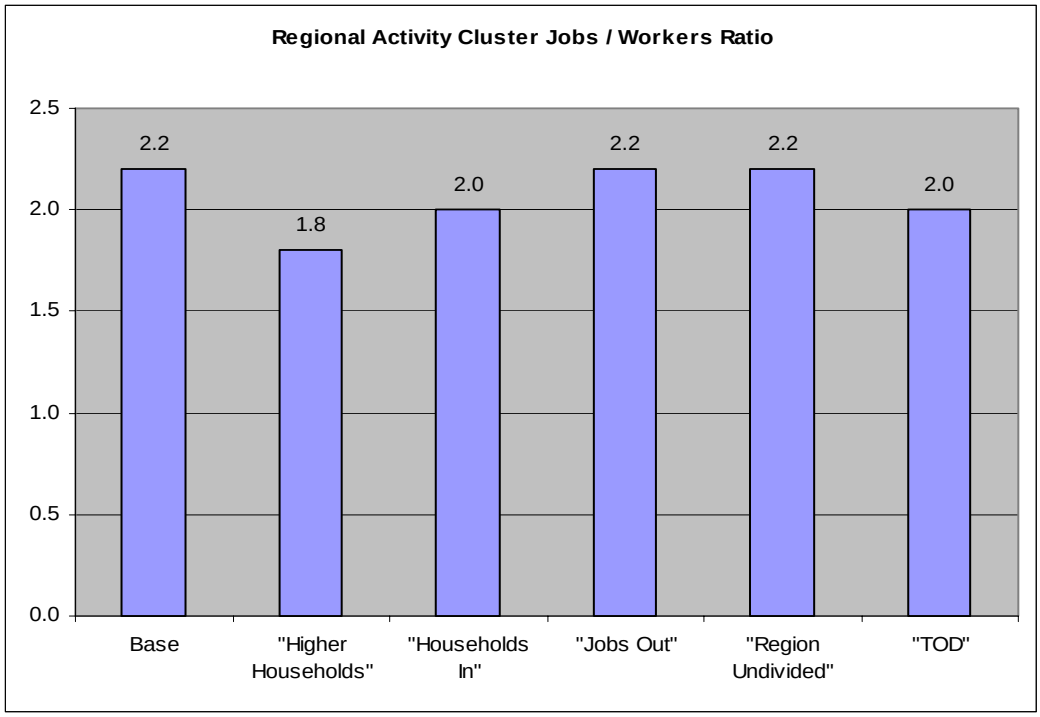
10. Summary of Major Findings

10.1 Land Use

Ratio of Total Jobs to Number of Workers: One of the goals of the Planning Directors in developing the land use assumptions for the scenarios examined in this study was to bring the job / worker ratio closer to 1.0 within the Regional Activity Clusters. This was accomplished adding additional household growth to Regional Activity Clusters that were primarily regional employment centers. Of the 24 clusters, only three, Leesburg, Waldorf, and Baileys Crossroads had a ratio less than 1.0 in Round 6.4 cooperative forecasts for the year 2030. This means in these areas there were more workers than jobs available. All of the other Regional Activity Clusters had more jobs than workers.

Scenarios that shifted more household growth into the clusters had a greater effect in improving job/worker ratios in these clusters than scenarios than concentrated more employment growth in these clusters. This is seen in the chart below, where the largest overall drop in this ratio is seen in the "Higher Households" scenario, followed by the "Households In" and "TOD" scenarios. The remaining scenarios do not produce the same overall effect because they each shift employment from core area clusters. In the "Region Undivided" scenario, employment shifts offset household shifts. In the "Jobs Out" scenario, the shifting of employment from inner clusters to outer clusters leaves the ratio unchanged.

Figure 20 - Regional Activity Clusters, Jobs /Workers Ratio



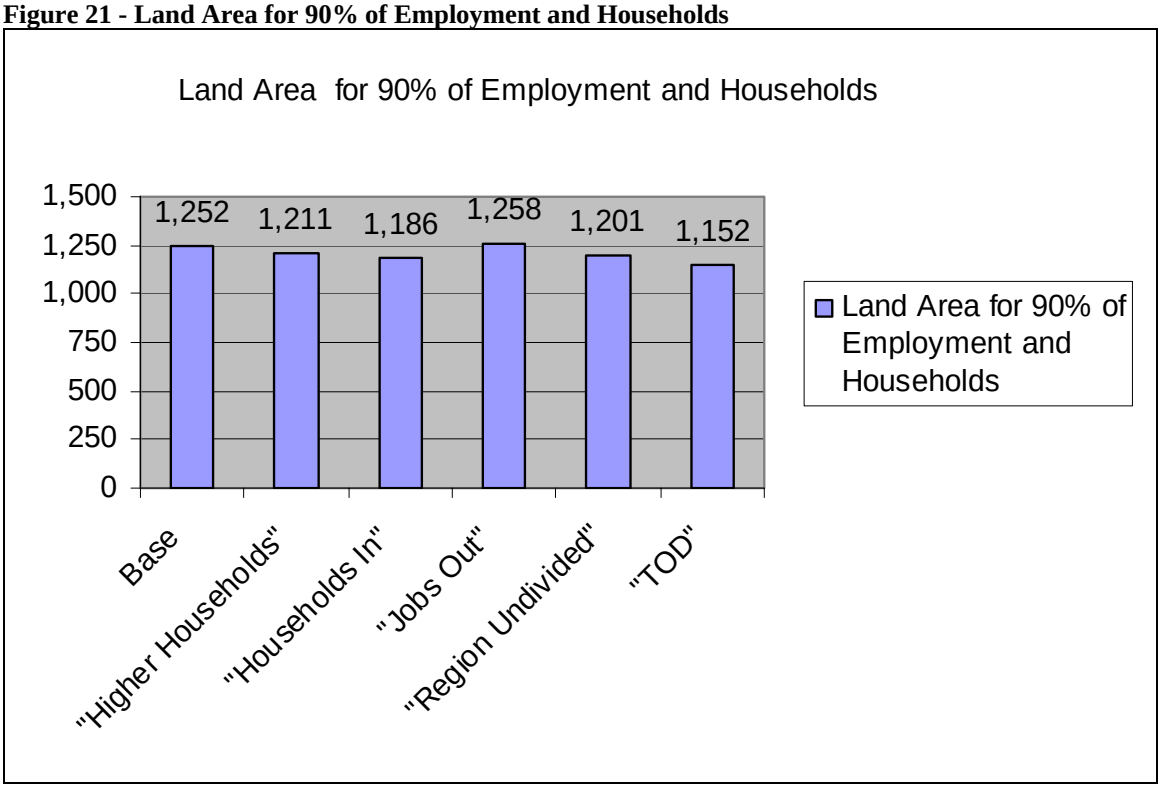
The impact shifting more future household growth on regional activity center job/worker ratios is dramatically seen in activity clusters in western Fairfax County. (Appendix A - Table 1.1) The Tysons Corner, the Dulles Corridor, and Dulles South activity clusters experience dramatic drops in the job / worker ratios for the scenarios that shift more housing into these clusters. Tysons Corner shifts from 3.5 to 2.5 in the "Higher Households" scenario, 2.6 in the "TOD" scenario, and 2.7 in the "Households In" scenario, while Dulles South shifts from 5.2 to approximately 4.0 in the "Higher Households" and "Households In" scenarios.

It is important to note that not all workers working in a particular cluster will choose to live there, or that all workers living in a particular cluster choose to work in that cluster. Nonetheless, many more workers would choose to both live and work in these clusters if additional housing opportunities were provided in these heavily employment-based clusters in the future.

Employment and Household Growth Patterns

The total land area that would be needed to house and provide employment sites for 90% of the region's jobs and households in 2030 in most of the scenarios is less than would be required for the baseline scenario based on current trends and land use plans. Only the "Jobs Out" scenario would use more land area, but this additional land was only requiring 6 more square miles, and thus, virtually the same land used as in the baseline scenario.

Figure 21 - Land Area for 90% of Employment and Households

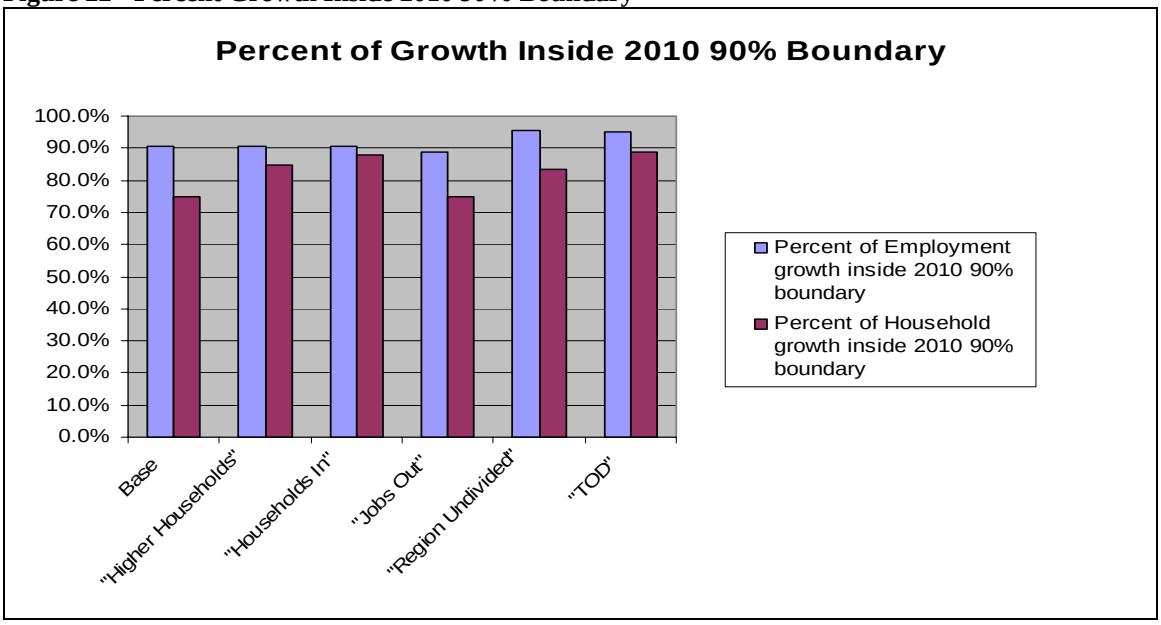


The "TOD" scenario has the most dramatic change compared to the baseline scenario, requiring 100 square miles less than in this baseline, an area roughly the size of core (DC, Arlington, and Alexandria). Also very significant for "TOD" scenario is that the total land area for its 90% boundary is virtually the same as the boundary for 2010, meaning that basically almost all forecast future development between 2010 and 2030 could be accommodated within areas in the region that had already been developed by 2010.

The "Higher Households", "Region Undivided" and "Households In" scenarios used between 41 and 66 less square miles for their 90% combined household / employment development footprint. As with the job / worker ratios measure, scenarios that shifted or added households to Regional Activity Clusters, transit centers and other areas where this growth could be logically accommodated had the most effect.

All of the scenarios heavily concentrated future growth in areas expected to be developed by 2010, as indicated in below. The baseline and all alternative scenarios had the vast majority of forecast 2010-2030 household and employment growth occurring within the 2010 90% boundary; indicating concentration of future development within the region's development envelope. The "TOD" and "Region Undivided" scenarios had a greater percentage of employment growth inside this boundary. All scenarios that shifted households that shifted or added households to Regional Activity Clusters, transit centers and other areas in concentrated fashion increased the percentage of household growth inside the 2010 development envelope.

Figure 22 - Percent Growth Inside 2010 90% Boundary



Employment and Households near Transit

The percent of regional households and jobs near transit stations is affected by both land use changes and transit improvements. The measures of effectiveness reflect the number of jobs and households within both ¼-mile and ½-mile of transit stations. Although

many people would be willing to walk further, these distances were chosen as a reasonable distance most people would be willing to walk to a transit station. A transit station for this purpose is defined as one along a fixed guideway, meaning a Metro station, a VRE or MARC station, a light rail station, or a transitway station. WMATA and local bus stations are not included in this analysis.

All scenarios show improvement in the percentage of employment and households within both distances, even if some scenarios only shifted one or the other. This makes sense because each scenario has significant transit improvements. "Higher Households", "Households In", "Region Undivided" and "TOD" show significant improvements over the base, between 8-9% in employment within ¼-mile of a station, while also showing a 7-11% improvement in employment within ½-mile of stations. The same scenarios also have 6-7% improvements for households within ¼-mile of stations, while also showing a 10-12% improvement for households within a ½-mile. "Jobs Out" has improvements between 1-3% for both employment and households within both distances specified. The improvements for "Jobs Out" were not as high because jobs were shifted away from the Metro heavy core area to outer jurisdictions where development and transit stations are more spread out. However, the "Jobs Out" scenario did show increases in the outer clusters that received increased employment and where transit improvements were made. The charts below indicate the total percentage of regional households and employment near transit stations and how they relate to the base.

Figure 23 - Employment and Households within ¼-mile of a Transit Station

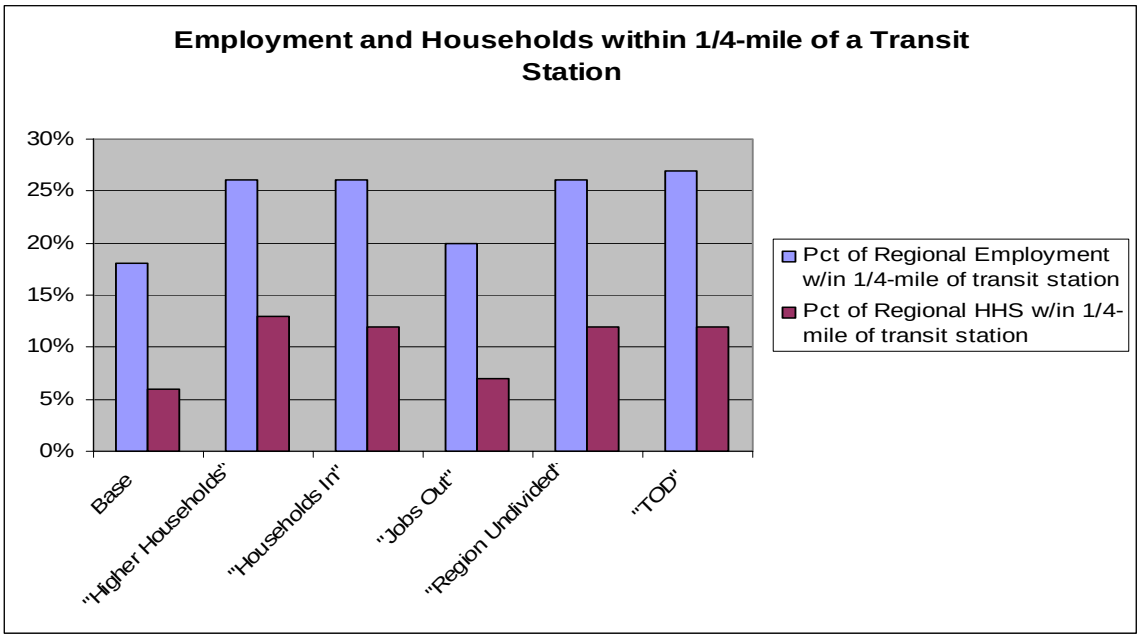
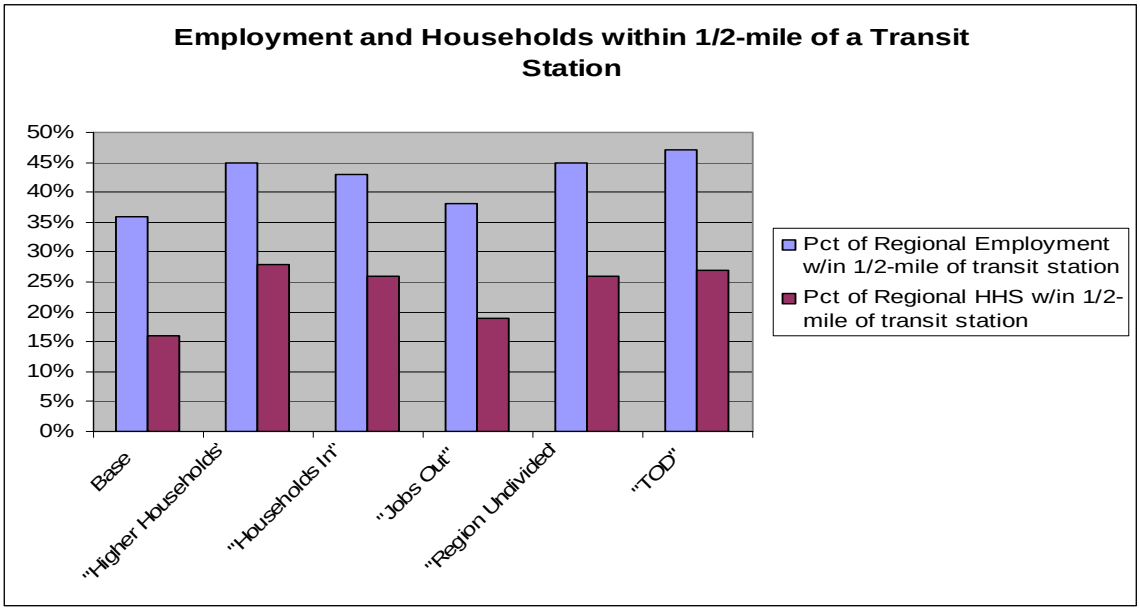


Figure 24 - Employment and Households within ½-mile of a Transit Station



10.2 Vehicle Miles Traveled and Congestion

Daily Vehicle Miles Traveled (VMT) and VMT per Capita: In addition to transit improvements, all of the scenarios involve some combination of shifting jobs and households closer together, and thus all scenarios show a decrease in daily VMT and per capita VMT. Somewhat surprisingly, "Jobs Out" shows a decrease in VMT despite having more daily vehicle trips. This suggested concentration of more jobs in regional activity centers can reduce region VMT and VMT per Capita by reduce average trips lengths for worker living in or close to these centers. Even more surprising, "Higher Households" has the largest decrease in VMT and VMT per capita despite having nearly 170,000 more vehicle trips per day. This is primarily due to external trips being cut, thereby shortening the average vehicle trip. "Households In", "Region Undivided" and "TOD" are all very similar, showing decreases in VMT between 0.8% and 1.0%. The percent may seem small, but this change accounts for between 1.21 and 1.47 million miles driven each day.

Figure 25 - Daily VMT

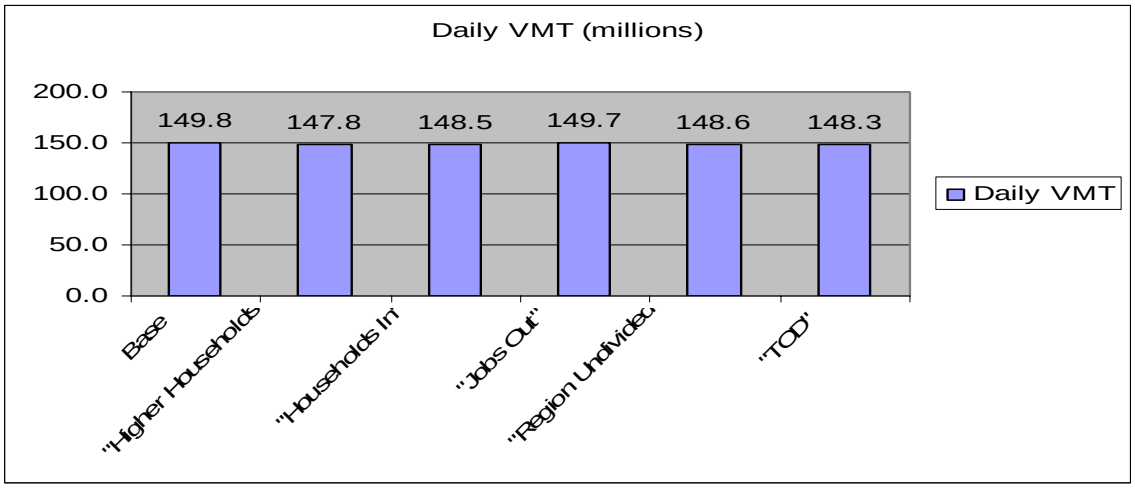
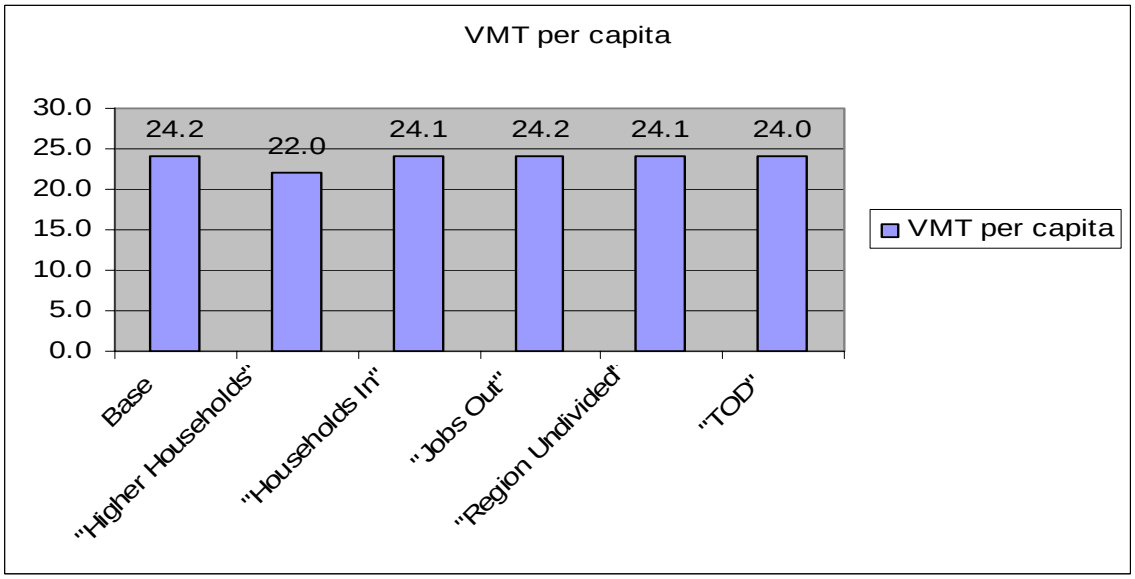


Figure 26 - VMT per capita



A.M. Peak Highway Congestion Levels

All scenarios show a reduction in lane miles of severe congestion relative to the CLRP+ baseline. Severe congestion for this measure of effectiveness was defined as regional highways links have a volume to capacity (V/C) ratio of 1.0 or above in the AM peak period. All scenarios have 1.4% to 6.9% less congested lane miles compared to the baseline, which equates to between 37 to 177 line miles. Changes in lane miles of severe congestion from the CLRP+ baseline for major links of the regional highway network are shown for each scenario in Appendix A – in Figures 2.2b through 2.2f.

The “Higher Households” scenario shows extensive reductions in AM highway period congestion levels in Loudoun, Prince William, Frederick, Charles and Stafford counties. This is primarily the result of reducing the forecast growth in long distance commuting trips to employment sites in the region from external areas outside the region. Because in this scenario the region is assumed to house almost all the workers it needs to fill its forecast jobs, forecast increases of in-commuting and other vehicle trips from these areas outside the region are significantly reduced. Increased congestion occurs in “Higher Households” scenario in the areas most affected by the higher increments of household growth assumed, especially Montgomery, Prince George’s and Fairfax counties.

The “Households In” scenario reduces congestion in areas where household growth was shifted from, such as Charles County and western Loudoun and Prince William counties. Increased congestion is seen around the Beltway in other areas in western Fairfax and eastern Prince William counties.

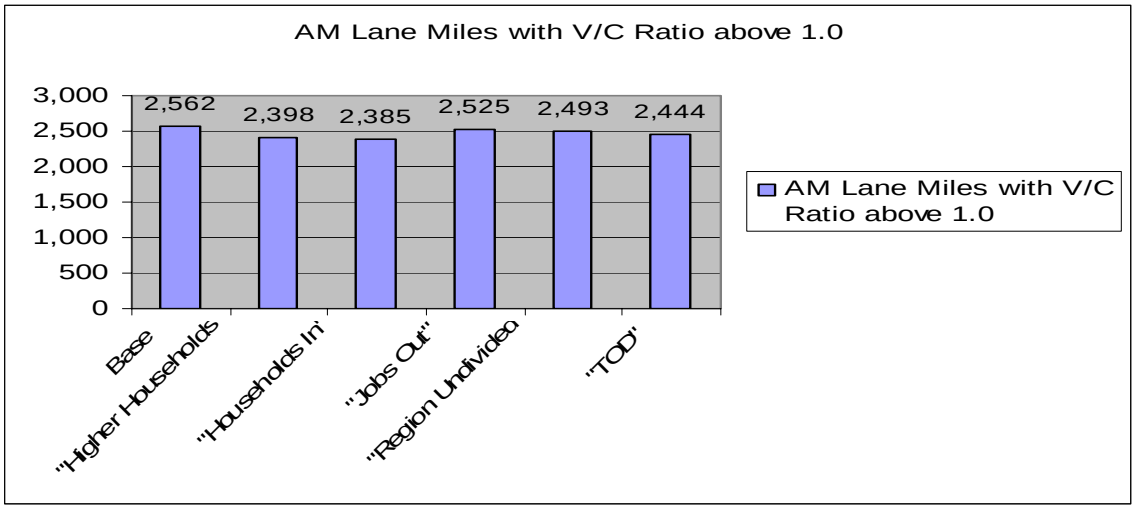
The “Jobs Out” shows reduction in congestion levels in the core area, as well as in the inner areas of inner suburban jurisdictions. Increased congestion levels in this scenario were seen on segments of the regional transportation network serving the activity clusters where additional job growth was shifted, mostly in Prince William, Frederick and Charles counties.

The “Region Undivided” scenario showed reduction in congestion mostly on the western side of the region in Fairfax, Loudoun and Prince William counties and increased congestion levels on the eastern portion of the region in D.C., Prince George’s and Charles counties. Some increased congestion relative the CLRP+ baseline was also seen in eastern Prince William County.

The “TOD“scenario is interesting because congestion is increased and lessened throughout the region, often in the same general area. This reflects in many cases an increase in congestion in one direction and decreased congestion in the opposite direction. It also reflects the widespread shifts of both jobs and household growth within each jurisdiction assumed for this scenario.

When viewing figures 2.2b to 2.2f in Appendix A some assumptions must be made as to the directionality of the increases or decreases in congestion. Staff has not been able to go into the fine detail required to investigate the directionality of congestion on each link. However, with knowledge of the land use shifts, one can assume that most improvements occur in areas that have less household and / or employment growth compared to the base and more congestion occurs where there is more growth.

Figure 27 - AM Lane Miles with V/C Ratio above 1.0

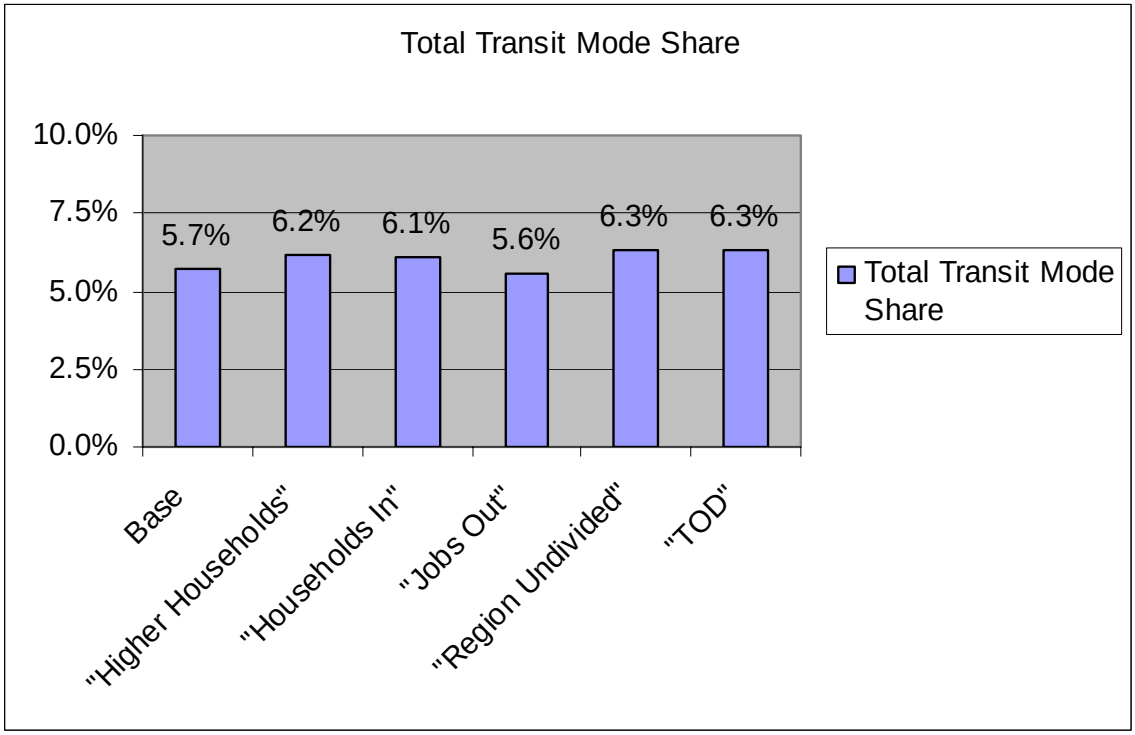


10.3 Mode Choice

Mode Share: Some general patterns of SOV, HOV, transit and walk / bike modal shares for daily trips can be identified for Regional Activity Clusters. Modal shares for daily travel by persons traveling from or to Regional Activity Clusters are largely influenced by existing land use land use patterns and do not change significantly in either direction for most clusters in all of the scenarios, as shown in Appendix A – figures 3.1.a to 3.7.e. SOV mode share decreases in a large majority of clusters in all scenarios, except for "Jobs Out". HOV mode share generally drops in Regional Activity Clusters for all scenarios. Transit mode share generally increases in all clusters in all scenarios, except for the "Jobs Out" scenario. Walk / bike mode share generally increases in all clusters in all scenarios, except for the "Jobs Out" scenario. Large increases in transit and walk / bike modal shares were seen in some clusters that gain a large amount of households, like Tysons Corner, and / or have major transit improvements that interconnect the cluster to the Metrorail System, such as connecting the National Harbor regional activity cluster to both the Branch Avenue and Eisenhower Avenue stations.

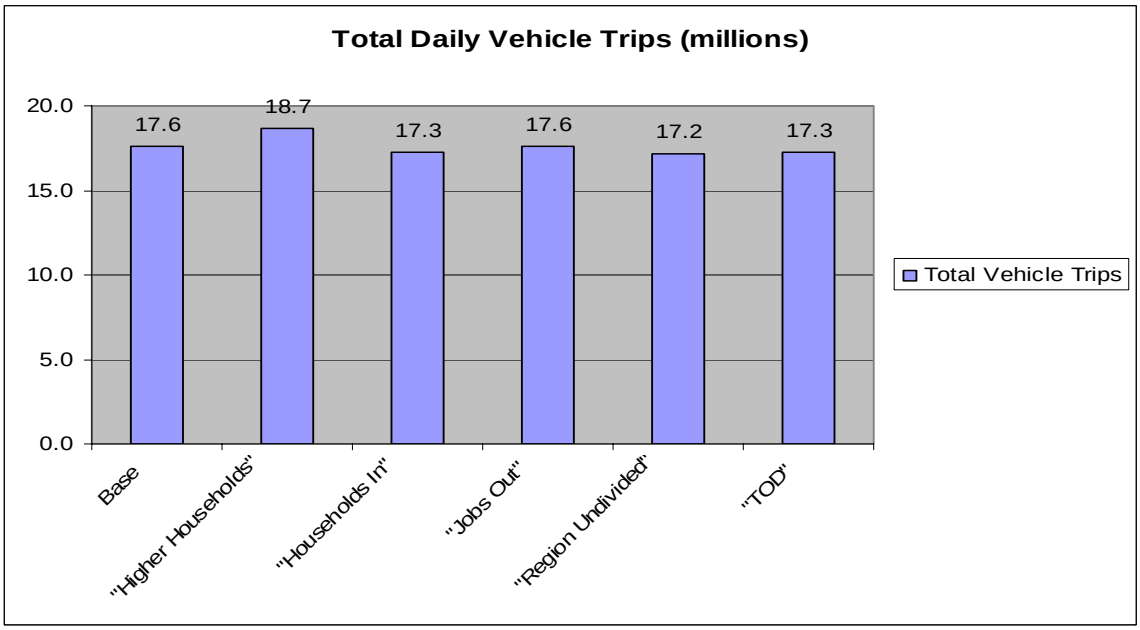
Regionally, the modal share of daily trips by transit increases for all scenarios except the "Jobs Out" scenario increased, as shown in Figure 14. The primary reason for this is all the scenarios placed some additional household and/or job growth in areas that could be efficiently served by an expanded regional transit network. The reason that the regional transit modal share for the "Jobs Out" scenario did not increase is that job growth was shifted from core area jurisdictions with very high transit modal shares to employment centers in the outer suburbs that currently have much less density and lower transit modal shares than found in core area jurisdictions. Though transit usage did not increase regionally in the "Jobs Out" scenario, it did increase within the activity clusters in the outer suburbs that received more job growth in this scenario.

Figure 28 - Total Transit Mode Share



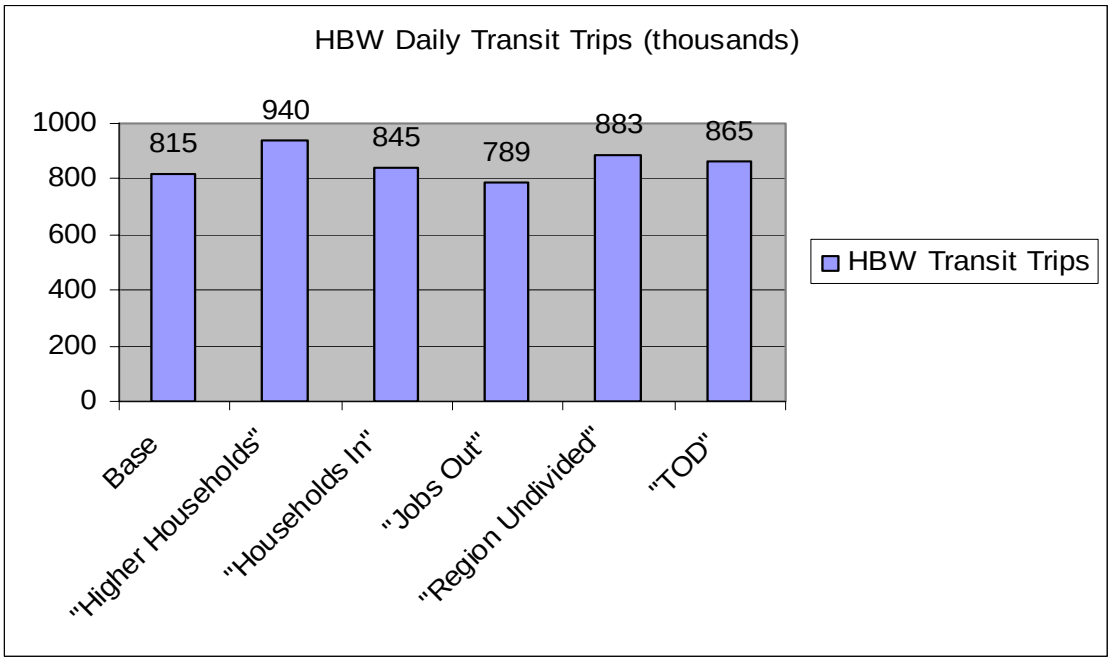
Trips: Increasing the number of households in "Higher Households" scenario resulted in an increase in the total the number of daily vehicle trips in the region. Also, daily vehicle trips in "Jobs Out" scenario increased slightly because the share of daily trips made by transit dropped by a small amount for this scenario. Decreases in total daily vehicle trips were seen in the "Households In", "Region Undivided" and "TOD" scenarios.

Figure 29 - Total Daily Vehicle Trips



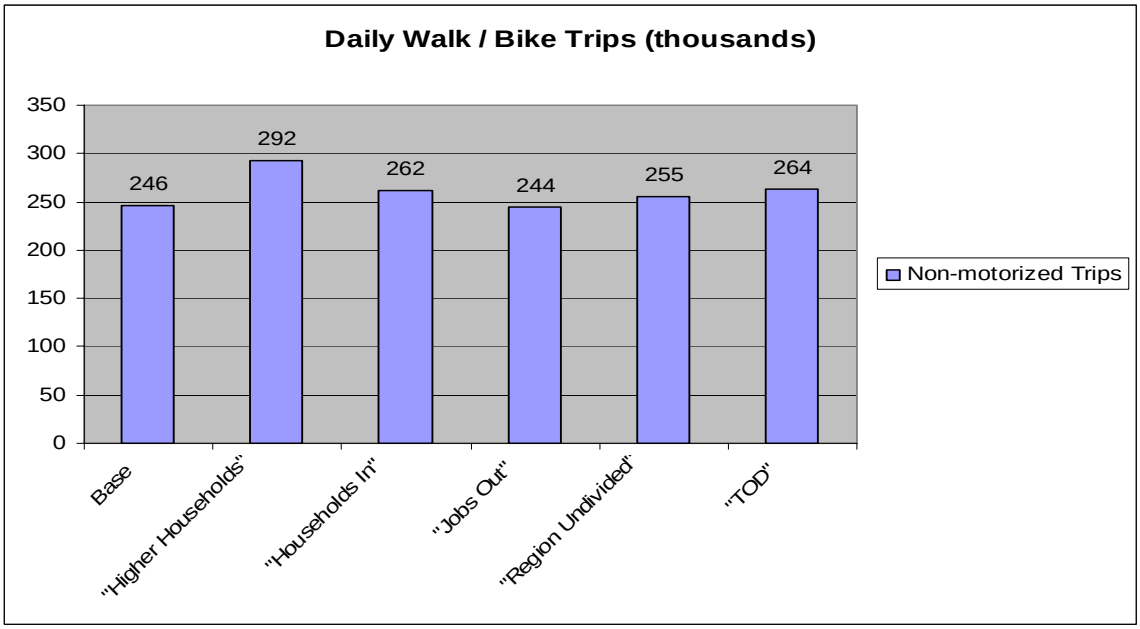
For all scenarios except for “Higher Households”, there is an opposite effect on daily transit trips, especially when combined with transit improvements. Daily home based work transit trips increase by 30,000 to 125,000 trips for the “Households In”, “TOD”, “Region Undivided” and “Higher Households” scenarios. Overall daily transit trips drop in the “Jobs Out” scenario by 26,000, but transit trips do increase in the outer areas.

Figure 30 - HBW Daily Transit Trips



Walk and bike trips change in a similar pattern to transit trips. “Higher Households” increases these daily trips by 47,000, while the “Households In”, “Region Undivided” and “TOD” increases walk / bike trips by 10,000 to 19,000. The “Jobs Out” scenario sees a decrease of 1,000 daily walk / bike trips.

Figure 31 - Daily Walk / Bike Trips



The overall pattern suggests that by moving households closer to employment centers, rather than the other way around, will increase alternative modes of transportation to SOV.

10.4 Transit accessibility

All scenarios show some moderate and significant increases in transit accessibility to jobs and households. Very few losses in job accessibility or household accessibility is seen in any of the scenarios. Moderate change in accessibility to jobs is defined as gaining or losing access to at least 150,000 jobs from a particular Transportation Analysis Zone (TAZ) in 45 minutes of travel time. A significant change is defined by a change of at least 300,000 jobs. Moderate change in accessibility to households is defined as gaining or losing access to at least 50,000 households from a particular TAZ, in 45 minutes while a significant change is defined by a change of at least 150,000 households. The 45 minute threshold for measuring accessibility changes is based on empirical data correlating accessibility data to transit usage and vehicle ownership.

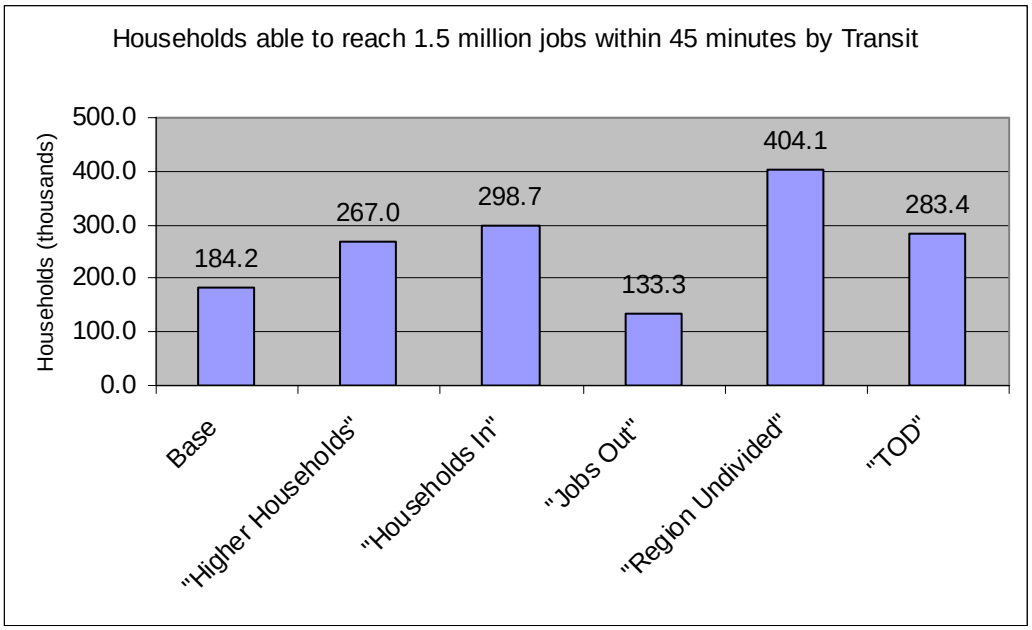
Changes in accessibility to jobs and households can result of from changes in either land use or the regional transportation system. Changes in transit accessibility are often the result of both improvements in transit service and land use.

There is some consistency in the changes in transit accessibility to jobs seen in all scenarios. First, there are no areas with significant losses in accessibility to jobs by transit and very few areas with moderate losses. Even in areas where employment was shifted from, the numbers were not high enough to have a major effect. Coupled with transit improvements in all scenarios, it makes sense that no real losses in job

accessibility by transit were observed. Secondly, moderate and significant increases in transit accessibility were seen in all scenarios. The transit improvements assumed in the different scenarios all scenarios show some moderate gains, but improvements in certain transportation corridors stand out more often than others in gaining a "significant" amount of job accessibility. The MD 210 and MD 5/301 corridors significantly gain improved accessibility to jobs in all scenarios because of transit improvements and employment shifts assumed in three scenarios. Similarly, areas in Prince George's County in and around the beltway consistently gains accessibility to jobs in most scenarios. The "Region Undivided" scenario also shows dramatic gains in accessibility to jobs by transit in the northern and western areas of the county.

Although the maps in Appendix A - Figures 4.3.a – 4.4.f give an indication of the concentrations of different levels of transit accessibility, they do not tell the whole story. It is also important to know how many people are affected by that change. The chart below indicates the total households able to reach 1.5 million jobs by transit, what is defined as "significant" accessibility. A first glance at the maps indicates similarities between all the scenarios. However, quite clearly, disparities exist. In the "Jobs Out" scenario, the region has 50,000 fewer households with access to a "significant" level of jobs than the base. The "Region Undivided" scenario more than doubles the number of households with "significant" access to jobs due to the potent combination of transit improvements in previously underserved, highly populated areas and the gain of more jobs and household development.

Figure 32 - Households able to reach 1.5 million Jobs with 45 minutes by Transit



There are no losses in accessibility to households across all scenarios. Again, most gains in household accessibility are moderate and occur along the transit improvements or in areas that gained households. The "Higher Households" scenario has the most dramatic

display of significant gains in accessibility to households due to the 216,000 extra households in the area.

In general, both employment and household accessibility increases in areas that have increased employment development and / or along the transit improvements. Without analyzing individual lines, it is evident that the transit improvements along Route 1 in Virginia, the Bi-County Connector from Silver Spring to Branch Avenue, and Metro extension over the Wilson Bridge have the most noticeable improvements.

10.5 Highway Accessibility

Accessibility to households and employment by highway does not have the same consistency as by transit. All scenarios show moderate gains and losses in job accessibility. All scenarios show moderate increases in accessibility to households. All of the scenarios, with the exception of the "Higher Households" scenario, have a very few scattered moderate losses in household accessibility. Increases in accessibility to households and employment are primarily an effect of more households and employment in that area, while a decrease in highway accessibility to households and employment is primarily caused by congestion associated with increased housing and / or employment in those areas.

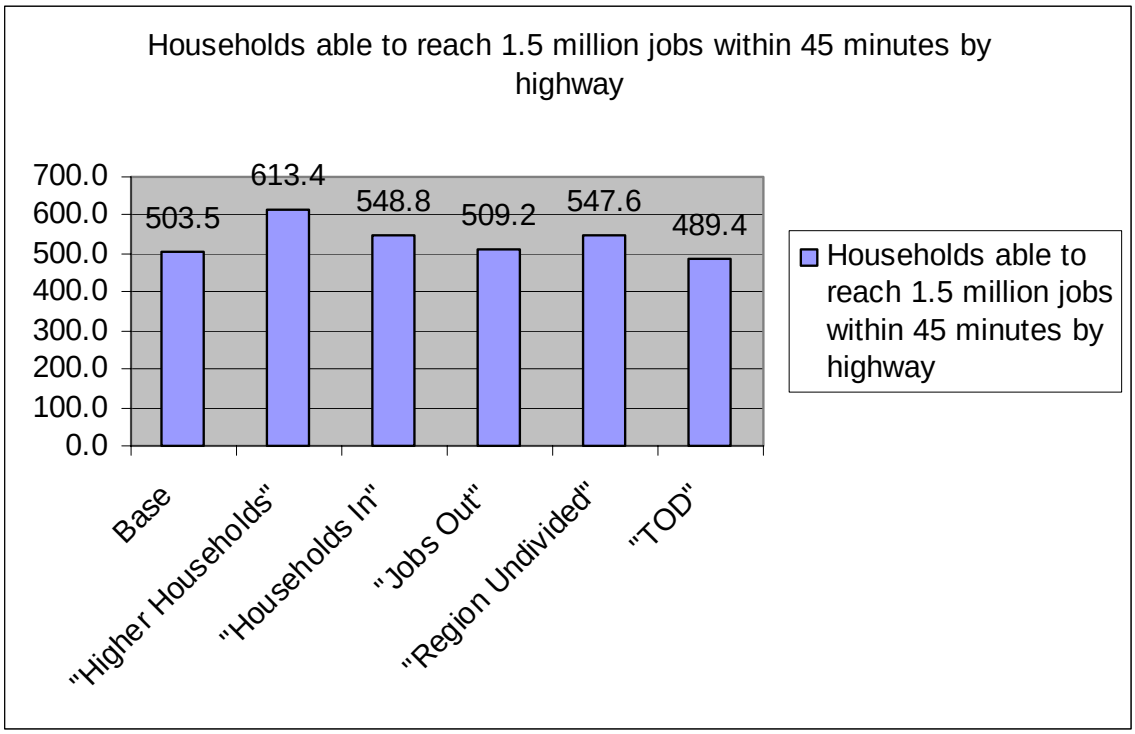
Somewhat surprisingly, the "Region Undivided" scenario does not show the same level of moderate gains in household accessibility as the other three scenarios that shift or gain households. The increased congestion in the eastern part of the region for this scenario must offset the gains in households. For the other three scenarios, there are large concentrations of moderate gains found inside the beltway and in Fairfax County, with the "Higher Households" scenario also gaining accessibility to households in Montgomery County and Prince George's County.

There are no significant gains or losses in job accessibility by highway. Each scenario has different areas of moderate gains and losses in job accessibility. Expectedly, "Jobs Out" shows losses in the core and gains in the outer suburbs. Surprisingly, most of the job accessibility gains occur inside the beltway, most likely due to less congestion in those areas. "Higher Households" primarily gains outside the beltway in eastern Montgomery and northern Prince George's counties, and losses inside the beltway. The opposite occurs in the "TOD" and "Households In" scenarios, with their losses occurring around the Tysons Corner area and their gains scattered inside the beltway. Not surprising, the "Region Undivided" scenario has gains inside the beltway in D.C. and Prince George's County, and losses scattered throughout the west.

Again, at first glance, the job accessibility (not the "change in accessibility") maps indicate a similar pattern for all scenarios' highway accessibility to jobs. But the chart below indicates there are significant differences. Obviously, the "Higher Households" scenario would have the highest total because of the large increase in households to the

region assumed in this scenario. The "Households In", "Jobs Out" and "Region Undivided" scenarios all have more of the total households able to reach "significant" jobs by highway. The "TOD" scenario has a decrease, primarily due to the increased congestion associated with the employment and household shifts.

Figure 33 - Households able to reach 1.5 million Jobs within 45 minutes by Highway



In general, increases in highway accessibility to jobs and households are seen in areas that have reduced development, thereby reducing congestion. Decreases are generally seen in areas of increased development, resulting in increased congestion. In many areas, it is possible that congestion may not change dramatically because shifts from SOV to transit use may offset some of the congestion effects of increased development. Also, even with these assumptions, some areas that have less forecast growth may have increased highway mobility due to less congestion.

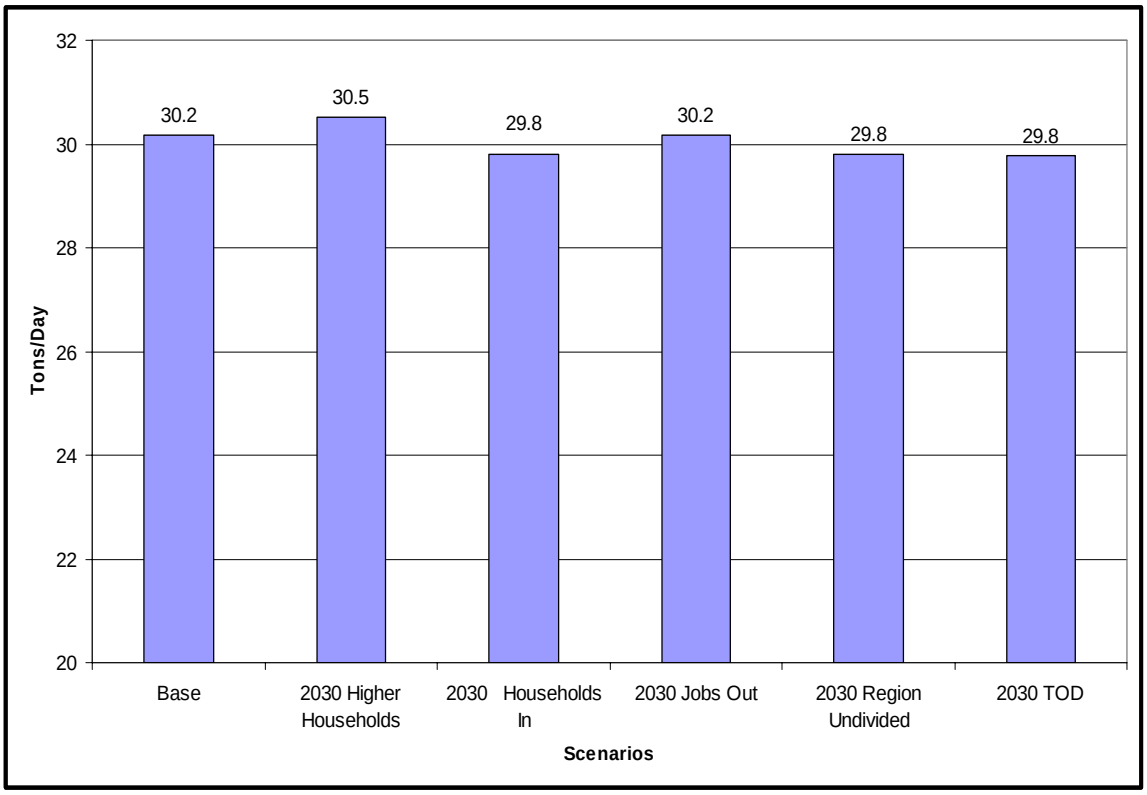
10.6 Air Quality

Mobile source emissions are primarily a factor of VMT. All scenarios generally show slight improvements or hold steady for NOx, Direct PM2.5 and PM2.5 Precursor NOx compared to the year 2030 base. Mobile source emissions modeling for this study was done for the MSA, so each of the pollutant totals may not necessarily reflect totals for the officially designated metropolitan Washington "attainment area."

Volatile Organic Compounds (VOC) Emissions

Despite having the lowest VMT (affecting running emissions) of the five scenarios, the "Higher Households" scenario increases (VOC) because the number of trips also increases, thereby increasing the emissions from cold starts and hot soaks.

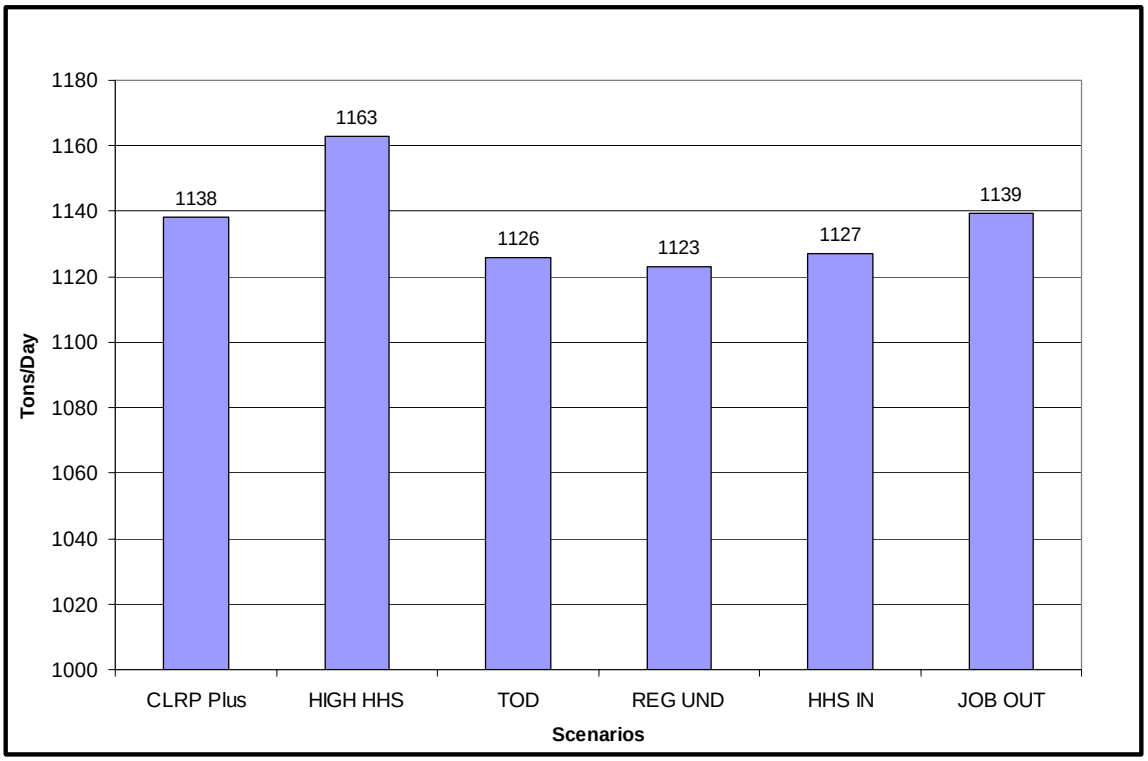
Figure 34 - Volatile Organic Compounds (VOC) Emissions



Winter CO Emissions

As in the VOC emissions, only the "Higher Households" scenario increases winter CO by a noticeable amount, 25 tons per day, a 2.2% jump. The running emissions for "Higher Households" are better than the other scenarios. However, the increased number of daily vehicle trips results in more emissions from starts. The "Jobs Out" scenario virtually stays the same, while "Households In", "Region Undivided" and "TOD" decrease 1 to 1.3%.

Figure 35 - Winter CO Mobile Source Emissions



Although the scenarios do not differ greatly from the base, all scenarios and the base have less negative impact on air quality than in 2010. These forecast reductions are largely the result of assumed improvements in vehicle emissions technology and fleet turnover.

10.7 Caveats

It is important to note some caveats regarding the findings in this study. The first is that assumed land use changes for the scenarios developed in this study only examine potential changes in growth patterns for the 2010 to 2030 period. Much of the housing and employment that is in place or will be constructed by 2010 is expected to remain in place and not subject to potential shifts. Further, not all of the forecast job and household growth in the 2010 to 2030 period was shifted in every scenario. In most scenarios less than half the forecast growth was shifted around. Typically, growth forecast to occur outside of regional activity center clusters was shifted to areas in Regional Activity Clusters, around transit centers, or to other areas where more growth could be logically accommodated in a concentrated fashion. Thus, overall region-wide changes in travel presented for the alternative scenarios are based on a relatively small percentage changes in the distribution overall employment and household growth in the region.

A second thing to remember when comparing results between scenarios evaluated in this study is that not all scenarios are equal in terms of the amount of land use changes and transit improvements assumed. The “Higher Households” scenario has 216,000 more households than the other four scenarios and a much larger regional transit network assumed for the other scenarios, except the “TOD” scenario. Similarly, the “TOD” and

"Region Undivided" scenarios have much more dramatic land use changes and transit improvements than either the "Households In" or "Jobs Out" scenario.

10.8 Next Steps in Regional Mobility and Accessibility Study (Phase II)

The next phase of the Regional Mobility and Accessibility Study will focus on seeking out opportunities for public outreach regarding the study's Phase I results. Staff, working with the JTWG and the TPB Citizen's Advisory Committee, will communicate the results of the first phase of this study to a larger audience through meetings with local community groups, regional briefings and web materials.

Also, in the next phase of this study a region variably-priced lanes scenario developed by the TPB's Task Force on Value Pricing for Transportation will be analyzed and evaluated. Initial JTWG discussions will focus on exploring options for improved transit service on the variably-priced lanes network segments and assessing potential land use impacts and change that may result from this variably-priced lanes network.