CHAPTER 4

CONNECTING LAND USE AND TRANSPORTATION

4.1 INTRODUCTION

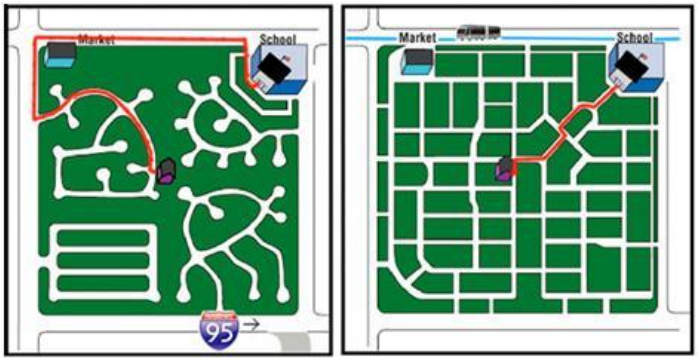
As the George Washington Region continues to grow, so will the need to improve and expand upon the Region's transportation infrastructure and services. Over the past thirty years, the Region has grown at a rapid rate, far higher than any other part of Virginia. This growth has been largely as a result of the Region being a "bedroom community" to Northern Virginia and Washington D.C.

This growth has been largely dispersed and low density in nature and has taken place at the urban fringe. As this dispersed type of development continues to take place, it makes providing economical and efficient public services a challenge. With regard to transportation, these dispersed development patterns increase the distance between similar urban cluster land uses and therefore increase the need for roadway improvements and create more traffic on the Region's roadway system. Much of the development, both commercial and residential, is situated off of the Region's primary roadways (Routes 1, 3, 17, 208, 610, etc). As these developments were constructed, these primary routes were used as the main access points to developments, rather than incorporating a local street network. The resulting lack of overall local street connectivity has placed additional strain on the Region's primary/arterial roadway system by forcing all of the trips to use them, regardless of trip purpose.

Figure 4.1, below, shows examples of a non-connected street system and a connected system. The connected street system, shown on the right, is characteristic of a pre-WWII, traditional development pattern. Downtown Fredericksburg is representative of this development style. The image on the left depicts a post-WWII non-connected street pattern. This development style is most characteristic of the suburban development that is found throughout the Region, most notably in the areas that experienced the highest growth in the past thirty years.

Figure 4.1

Examples of Non-Connected and Connected Street System



In 2009, facing a funding gap of more than $7.5 billion between Regional transportation needs and available resources, FAMPO adopted a 2035 Long Range Transportation Plan which took the cost and impacts of decentralized growth into account. The 2035 Plan recommended that land use and transportation planning be linked going forward. In that Plan, FAMPO stated that land use policy is a local government function and that FAMPO could serve as a Regional forum and resource to local governments to consider the options, trade-offs and costs of often difficult land use policy decisions.

Moreover, work on the 2040 Long Range Transportation Plan shows that inadequate long-term transportation funding for the Region worsens, as little can be done to keep up with existing and emerging decentralized growth patterns. The estimated $7.5 billion shortfall in the FAMPO 2035 Long Range Transportation Plan has grown to over $8.9 billion (both urban and rural needs), as shown in the Needs Plan in Chapter 6 of this document. Approximately $700 million of that $8.9 billion deficit represents roadway needs that are not eligible for federal funding (Rural Minor Collectors and Urban/Rural Local Roads). These costs will fall directly to the state, local governments, and residents.

Future year forecasts in the FAMPO Regional Travel Demand Model confirm these unintended consequences will continue if the Region does not better integrate land use (demand), urban form (design), and transportation (supply) decision-making processes.

4.2 LAND USE SCENARIO PLANNING

4.2.1 Overall Context and Process

Your Vision, Our Future was an initiative ordered by the FAMPO Policy Committee in 2009 to provide more information for local government decision-makers, to show the costs of alternative land use policies and their impacts regionally. It brought together residents, developers, business leaders and elected officials in the region for the opportunity to explore and debate competing growth visions, their trade-offs and alternative futures. The full summary document can be found in Appendix C of this Plan.

Central to *Your Vision, Our Future* was the notion that people in the Region should guide its growth, with local governments as the ultimate deciders. Government at all levels, working with property owners and the private sector, should develop new ideas to decide if a change in the direction current trends are taking would be best for local jurisdictions and for the Region.

Scenario planning was used throughout the process to identify Regional goals and community values, as well as explore different alternatives for growth, development and transportation investments in the region. Data, tools and recommendations from the Your Vision, Our Future initiative were used to develop the socio-economic dataset used as inputs into the FAMPO Travel Demand Model.

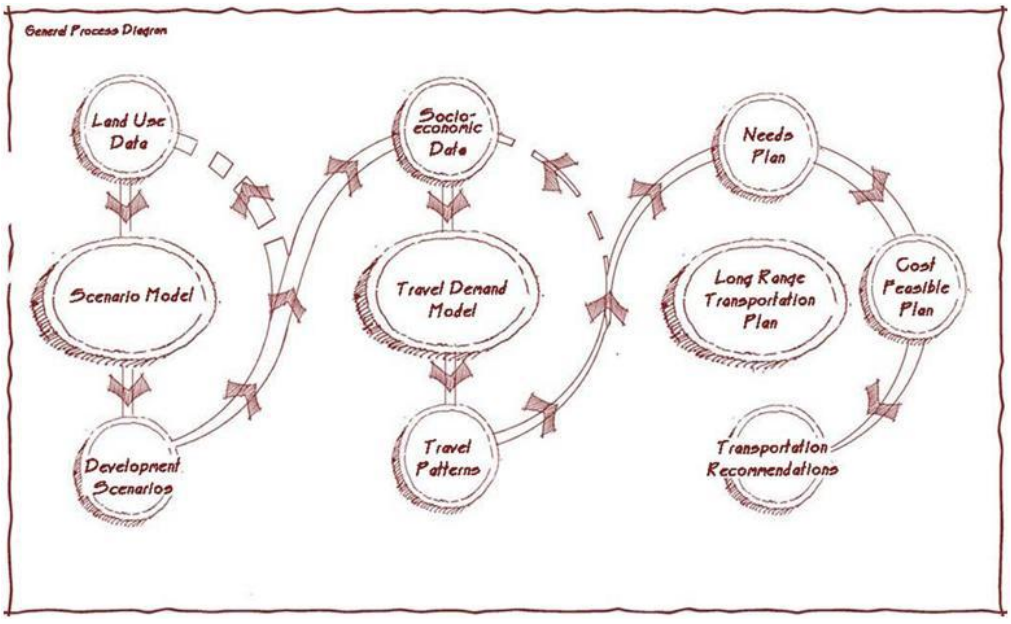
Scenario planning represents the next generation of analytical processes created to evaluate the influence of development intensities and land use patterns on the efficiency of a proposed transportation system. Visualization of the interaction between land use, urban form and transportation decisions, as well as the causational factors that explain the push-pull relationship between them, provides community leaders with the information they need to evaluate the consequences of potential actions.

The Federal Highway Administration (FHWA), Environmental Protection Agency (EPA), and other federal agencies are actively promoting the use of scenario planning by state departments of transportation, metropolitan planning organizations and local governments to better integrate transportation and land use decisions in the Long Range Transportation Plan (LRTP). The Commonwealth of Virginia is also supportive of this approach.

A spatial data planning model using CommunityViz software was developed to evaluate the impacts of land use decisions on surrounding public facilities and services (including the influence of land use and urban form decision-making on Regional travel behavior). Refer to Figure 4.2, below, which depicts the general planning process between the CommunityViz model and the FAMPO Travel Demand Model.

Figure 4.2

General Planning Process between CommunityViz Model and FAMPO Travel Demand Model



Evaluating the relationship between land use, urban form and Regional travel behavior in a scenario planning analysis produces several benefits. When considered together, decisions and investments regarding all three elements can have a significant impact on the George Washington Region:

- The impacts to sensitive land uses may be minimized when facilities identified for transportation investments are located after considering appropriate land use patterns and development intensities for the area.
- Prime locations for development may be stimulated if transportation investments consider available capacity or appropriate mobility options.
- Complementary activities may be placed next to existing or planned transportation infrastructure, making the most of land use opportunities and dedicated transportation investments.
- The quantity and location of travel demand may be influenced by land use decisions, making the possibility of real choices for various modes of travel both accessible and attractive.

4.2.2 Scenario Development

It was important for Your Vision, Our Future that the growth scenarios prepared for study reflected the Region's rich history, environmental assets, military presence, and geography within the "super region" extending between Washington, D.C. and Richmond, VA. The project team worked with several stakeholder groups to understand the challenges and opportunities facing the region and create viable alternative growth scenarios.

Four primary activities were used by the project team to collect information for preparing the five alternative growth scenarios; these activities included focus group meetings, citizen workshops, two on-line surveys and a project steering committee. A list of general themes to guide the process was developed.

These themes included the following:

- Increasing Jobs to Housing Balance
- A Variety of Housing Options
- Be Aware of Military Needs
- Transportation Mobility
- Environmental Stewardship
- Historic Preservation
- Preserving Rural Character
- Recognize the Individuality of each Locality
- One Scenario to Consider Impacts of Urban Development Areas

4.2.3 Growth Scenarios

Five growth scenarios were prepared using the general themes and other information volunteered by the partnering groups. Each scenario was different enough to pose real choices for how the Region could develop under one or more planning initiatives. The five alternative growth scenarios include:

1. Decentralized Growth
2. Compact Centers and Growth Corridors
3. Green Print
4. Greater Jobs-Housing Balance
5. Existing Community Plans

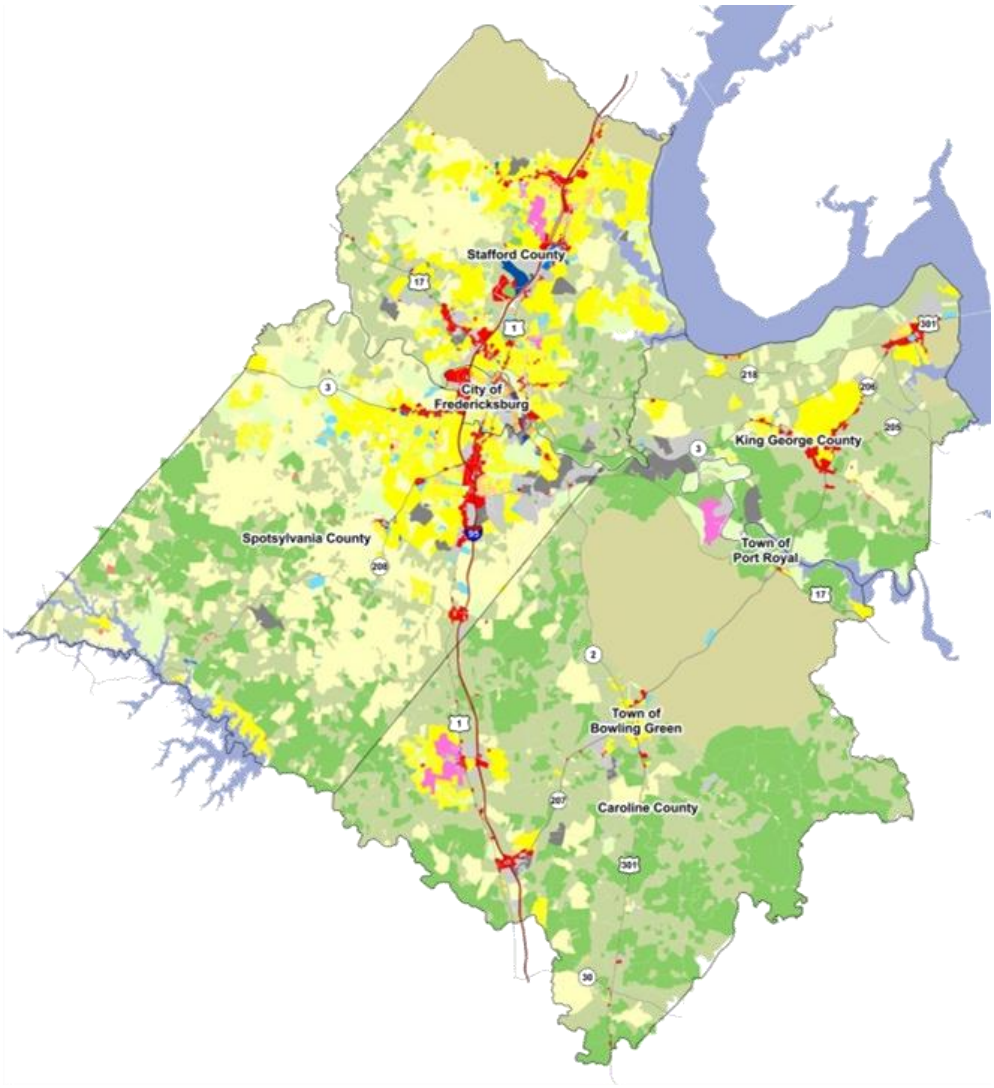
Decentralized Growth

The decentralized growth scenario contemplates how the Region could develop if the dispersed pattern of development occurring in some areas of the George Washington Region were to continue. New growth would take the form of single use, low-density development that is generally isolated or not-well connected. Common features of the scenario include: green field development patterns, outward expansion of public utilities and transportation investments that favor convenience for automobile users. Development types and locations assigned in the scenario follow closely existing zoning maps and ordinances administered by cities, towns and counties in the Region and/or past trends to rezone rural areas in high-growth areas for new residential neighborhoods. Refer to Figure 4.3, on the following page, to see the land use pattern under this Scenario.

Anticipated growth assumed for the Region recognizes the George Washington Region as a bedroom community to nearby large metropolitan centers, namely Washington, D.C. and Richmond, VA. The growth scenario best represents development patterns and intensities assumed for FAMPO's 2035 Constrained Long Range Transportation Plan (CLRP).

Figure 4.3

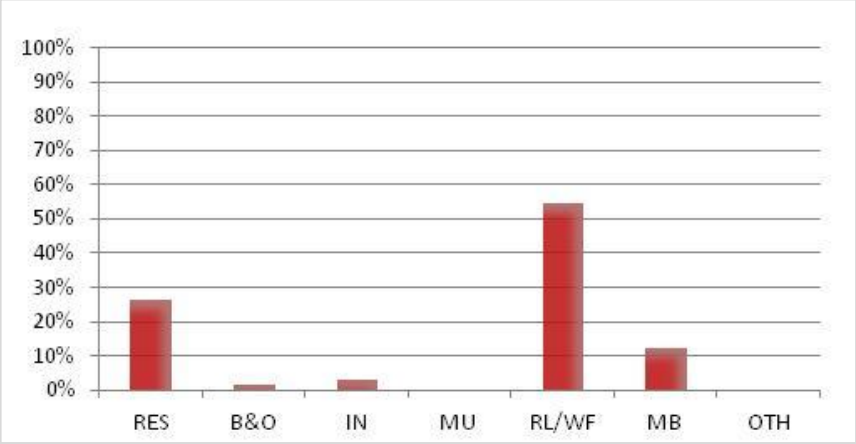
Decentralized Growth Scenario



As shown in Figure 4.4 below, the dominant land use categories in this scenario are Open Space, Rural Living and Working Farms representing 55% and residential uses, accounting for 27% of the total land area.

Figure 4.4

Dominant Land Use Categories for Decentralized Growth Scenario



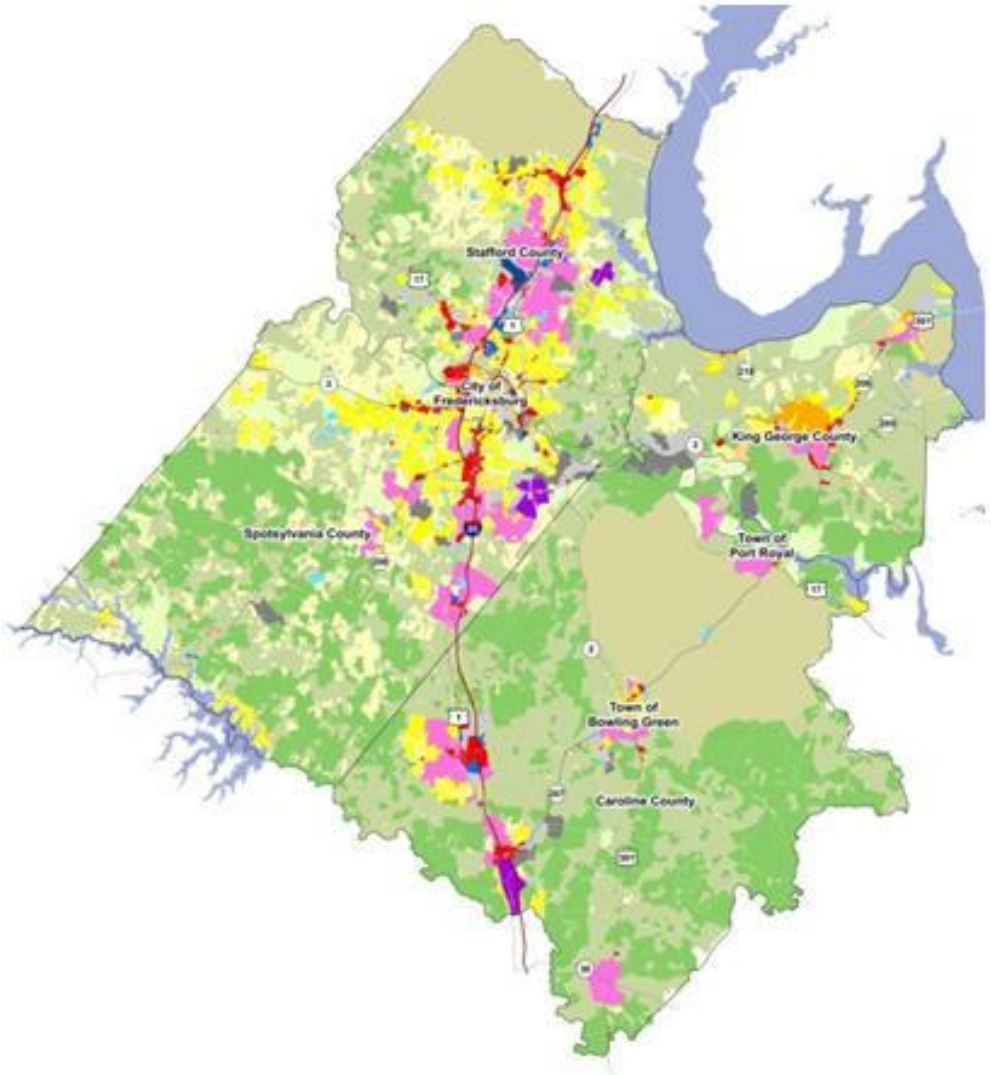
Compact Centers and Growth Corridors

The compact centers and growth corridors scenario contemplated how the region could develop if new growth was focused into compact, walkable communities with nearby opportunities to live, work, shop and be entertained. Development in each center could vary in scale, use and intensity; represented by rural hamlets, community centers, employment centers or town centers.

Communities would accommodate a portion of new growth in existing urban areas (i.e., infill development or redevelopment), leaving more undeveloped land for open space and agriculture uses. Common features of the growth scenario include: concentrated development areas, land preservation outside developed centers, a variety of development types and intensities and more travel options (i.e., walking, bicycle, transit, and automobile). Environmentally-sensitive lands identified in the George Washington Region Commission's Green Infrastructure Report and/or identified battlefield protection areas also influenced the selection of designated growth centers. Refer to Figure 4.5, on the following page, to see the land use pattern under this Scenario

Figure 4.5

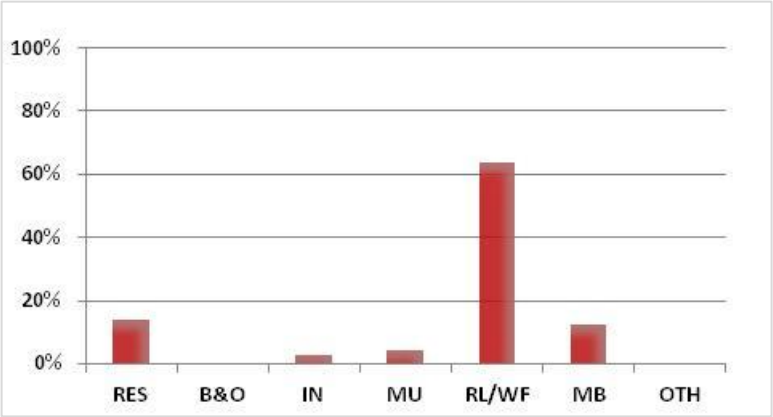
Compact Centers and Growth Corridors Scenario



Like other scenarios, the anticipated growth contemplated for the Region in this scenario also recognizes the George Washington Region as a bedroom community to nearby large metropolitan centers, namely Washington, D.C. and Richmond, VA. Most future growth was concentrated in designated compact centers, while acknowledging some development will occur in outlying suburban or rural areas (i.e., an 80/20 split for allocating new growth between compact centers and outlying areas). The predominant land uses in this category are rural living, preserved open space (64%) and working farms, as well as residential uses (14%) as seen in Table 4.6 on the following page.

Figure 4.6

Predominant Land Uses for Compact Centers and Growth Corridors



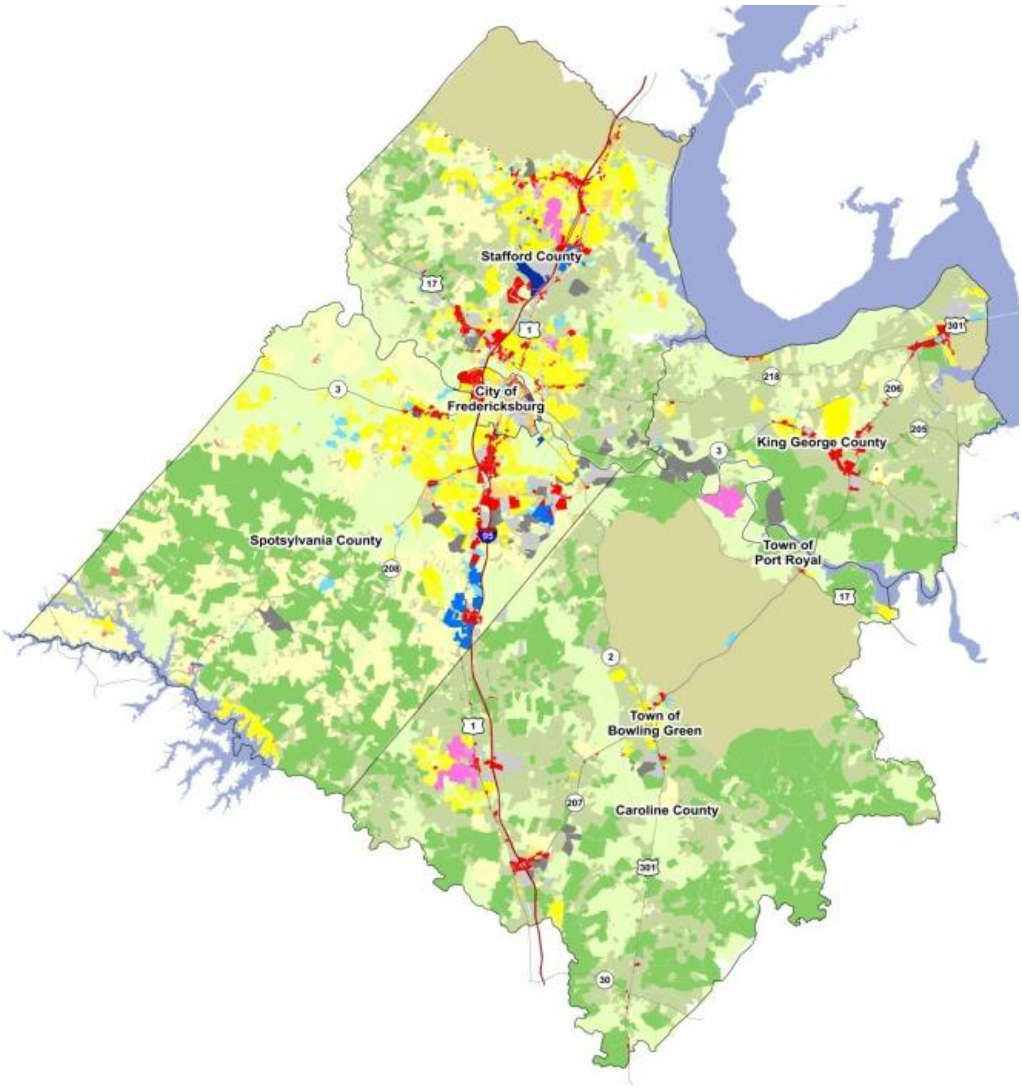
Green Print Scenario

The green print initiative scenario contemplates how the Region could develop if new growth is directed away from identified environmentally-sensitive lands and resources. Preservation of natural areas and cultural resources maximize the protection of large, contiguous forested lands and the tree bands that connect them, also recognized are working farms and battlefield landscapes identified in potential National Register boundaries.

Low impact development principles and best management practices for storm water runoff would be incorporated into future development. Transfer of development rights or purchase of development rights may be necessary for preserving some areas in the green print area approved for development but not yet built. . Refer to Figure 4.7, on the following page, to see the land use pattern under this Scenario

Figure 4.7

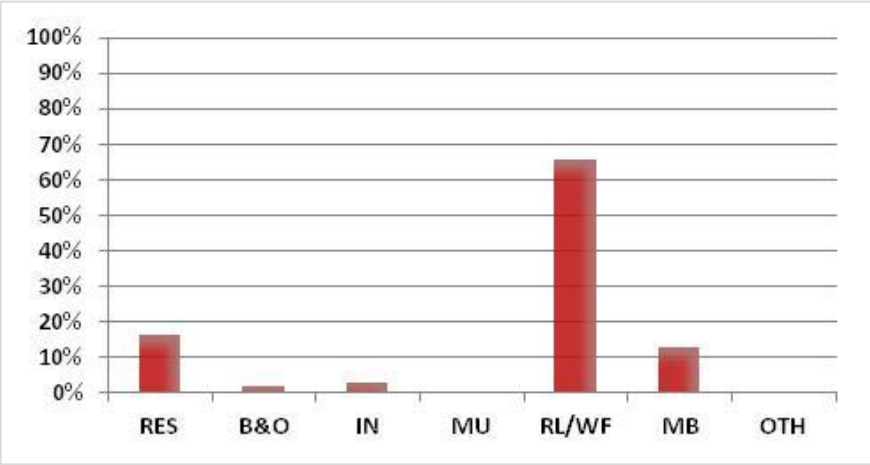
Land Use Pattern for Green Print Scenario



As shown in Figure 4.8, on the following page, the predominant land uses are preserved open space, rural living and working farms. Residential uses comprise about 15% of the total land area. Again anticipated growth contemplated for the Region recognizes the George Washington Region as a bedroom community to nearby metropolitan centers, namely Washington, D.C. and Richmond, VA. Development patterns and intensities in this scenario consider the impact of new rules for the Chesapeake Bay Watershed, which link urban and suburban land cover to target pollutant loading thresholds for the Bay.

Figure 4.8

Predominant Land Uses for Green Print Scenario



Greater Jobs to Housing Balance Scenario

The greater jobs-housing balance scenario contemplates how the Region could develop if more employment was to be attracted to the George Washington Region. The objective would be to reduce overall commuting distance for residents because of greater proximity to local employment opportunities. Benefits may include reductions in commute time and distance, reduced traffic congestion and reduced air emissions. Development locations, types, patterns and intensities in this development scenario would mimic closely those recommended in the compact centers and growth corridors scenario.

Anticipated growth contemplated for the Region theorizes a greater balance between employment and housing in the Region. Specifically, employment forecasts were held for 2040 while population forecasts were decreased to 2020 levels developed to support FAMPO's 2040 Long Range Transportation Plan.

This scenario matched exactly the development types, patterns and intensities depicted in the compact centers and growth corridors scenario.

Community Plans Scenario

The community plans scenario contemplates how the Region develops if city and county comprehensive plans are fully implemented. Preferred development types, patterns, locations and intensities called for in the local plans vary from rural to suburban to urban for different parts of the Region. Federal Regulations regarding the development of the Metropolitan Transportation Plan (23 CFR, Part 450.3229(c)) specify that current land use conditions must be used to forecast travel demand.

Common features of this growth scenario include concentrated development areas (especially along Interstate 95 and CSX rail corridors), limited infrastructure investment outside designated service areas, preservation of working farms and compatible land uses near military bases. This scenario used mixed-use development and higher densities/intensities to reduce the amount of land needed to meet population and employment growth for the Region, which leaves significantly more land in rural or farm conditions. The growth patterns and development intensities assigned for the scenario follow exactly locally-adopted comprehensive plans in the Region.

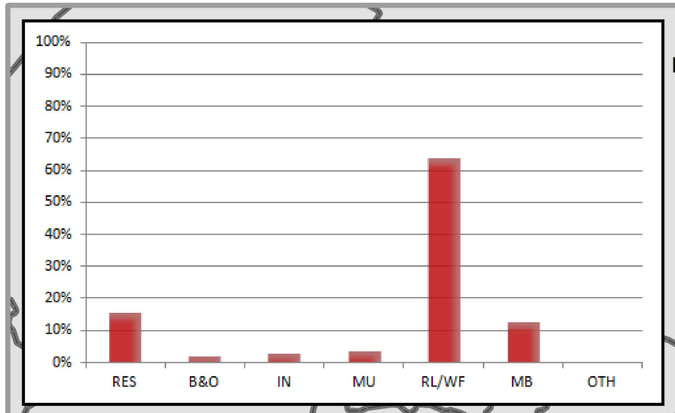
This scenario was used to allocate population and employment forecasts prepared by FAMPO/GWRC staff for 2040 in the CommunityViz scenario planning model. Output from the scenario planning model was then used in the FAMPO Travel Demand Model to forecast future year travel behavior (and link deficiencies) on the regional transportation system. Map 6, on the following page depicts the future land use of the Region, according to the currently adopted local Comprehensive Plans.

As shown in the graph on Map 6, on the following page, the predominant land uses for this scenario remain to be preserved open space, rural living and working farms at 64% of the land area. Residential uses make up the next largest land use grouping at 15%. The residential land use grouping represents a 12% decrease in land area from the decentralized growth scenario (scenario that best represents the current land use pattern in the region). The residential use grouping also only represents a 1% increase in total land area dedicated to residential uses from the Compact Centers and Growth Corridors Scenario.

GEORGE WASHINGTON

2040 Long Range Transportation Plan

MAP 6: Community Plans Scenario Land Use



Legend:

- Civic & Institutional
- Heavy Industry
- Light Industry
- Large-Lot Residential Neighborhood
- Metropolitan Center
- Multifamily Suburban Neighborhood
- Mobile Home Community
- Military Base
- Mixed Use Neighborhood
- Preserved Open Space
- Regional Airport
- Rural Crossroads
- Rural Living
- Suburban Commercial Center
- Small-Lot Suburban Neighborhood
- Suburban Office Center
- Town Center
- Transit Oriented Development
- Urban Development Area
- Working Farm

FAUQUIER COUNTY
PRINCE WILLIAM COUNTY
MCB Quantico
MARYLAND
STAFFORD COUNTY
Potomac River
NSWC Dahlgren
KING GEORGE COUNTY
ORANGE COUNTY
SPOTSYLVANIA COUNTY
Fort A.P. Hill
WESTMORELAND COUNTY
Rappahannock River
ESSEX COUNTY
CAROLINE COUNTY
KING & QUEEN COUNTY
LOUISA COUNTY
HANOVER COUNTY
KING WILLIAM COUNTY
Miles
0 5 10 20

CITY OF FREDERICKSBURG

Miles
0 3 6 12

Next Steps in Scenario Planning

Going forward, land use scenario planning will be integrated within FAMPO's overall long-range planning process. FAMPO will continue to explore the implications that different land use densities and patterns have on travel demand, the provision of public transportation services, environmental concerns such as water and air quality, the conservation of open space, as well as conservation of environmentally, socially and historically sensitive areas. The data, land use models and any additional products from the scenario planning process will continue to be available to local governments as resources to assist them in making decisions regarding future land use plans and the development/revision of their regulatory ordinances.

4.3 FUTURE LAND USE IMPLICATIONS ON TRANSPORTATION INFRASTRUCTURE AND SERVICES

As demonstrated in both the 2035 and 2040 FAMPO Long-Range Transportation Plans, the George Washington Region is at a crossroads. The Region will continue to grow and will become one of the most populous areas in Virginia. Despite efforts to accommodate this growth through the expenditure of public and private funds on investments in transportation infrastructure and services, the Region's residents and economic base have began and will continue to be negatively impacted by roadway congestion and safety as well as the inability to provide economical public transportation.

These problems are a result of the lack of adequate funding needed, as shown in Chapters 6 and 7, to address the identified needs, as well as by the Region's current land use patterns, which will perpetuate the widening of existing roads and continue the need to construct new roads to serve the dispersed development pattern.

As a result of the Transportation Act of 2007 (HB3202), which established the requirement for Urban Development Areas (UDAs), or Targeted High Growth Areas, to be included in local comprehensive plans, localities in the George Washington Region began to consider how the land use policies contained in their Comprehensive Plans and regulating ordinances impact the transportation system. The intent of the UDA is to designate areas that are appropriate for higher density development due to their proximity to transportation and public infrastructure (water and sewer) or areas that could be redeveloped or receive infill development. These requirements were targeted at high growth localities throughout the Commonwealth. Since the passing of HB3202, the Virginia General Assembly has subsequently revised the UDA Legislation in 2009, 2010 and 2011. The latest iteration, HB869, approved on April 4, 2012, made the establishment of UDAs within local comprehensive plans optional. Both Stafford and Spotsylvania Counties have UDAs, or Targeted High Growth Areas, in place within their plans. The densities and intensities of these areas within each locality are captured in the Community Plans Scenario that was used to feed the FAMPO Travel Demand Model for the development of this plan.

As shown in Map 7 on the following page, even with designated Targeted High Growth Areas, in the future, there will still be significant congestion on the Region's roadways, as many of the high growth areas create much more motor vehicle traffic than the network can handle.

The Highway Needs Plan inset map presents the most optimistic outlook. However, as noted later in this plan (Chapters 6 and 7) this future is neither attainable nor sustainable. In monetary terms, the price tag is approximately $12.2 billion to construct, and in terms of quality of life, environmental and cultural impacts and community support, it is not feasible. Simply widening roadways, even if the funds were available, would be met with strong public resistance. Neighborhoods, businesses and the rich historical and cultural resources would be paved over and the environment would suffer greatly.

The Constrained Highway Plan inset shows that with the transportation infrastructure investments based on revenues, there is still considerable congestion along the major corridors in the Region, most notably I-95, US Routes 1, Business 1, and 17 and Routes 3, 208, and 218.

Although the Travel Demand Model does not have the capability to measure demand for public transportation services, the bleak funding outlook for public transportation (refer to Chapter 8) indicates that there will not be sufficient resources to fund transit service in the frequency needed to actually remove enough vehicle from the road to bring the roadway congestion to a manageable level.

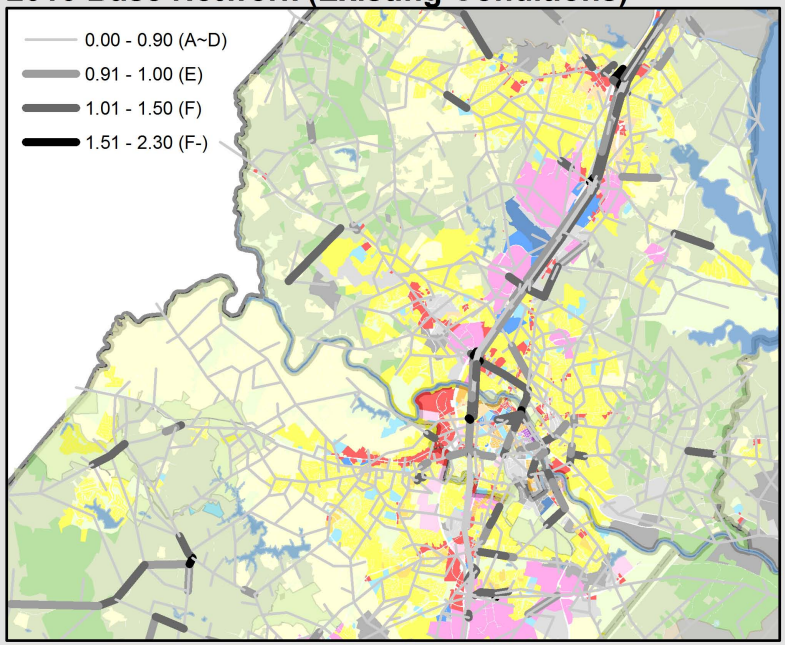
Moreover, the overall dispersed land use pattern that will still be prevalent in the Region further inhibits the likelihood of public transportation becoming a real solution to mobility or roadway congestion within the Region. For example, the Virginia Department of Rail and Public Transportation's Transit Service Design Guidelines (2008) indicates that levels of development in order to sustain rail (light or heavy) are population densities of 6,700-15,000 persons per square mile; 125,000-250,000 jobs served; Central Business District (CBD) floor area ratios (FAR) of 6.0 to 10.0; commercial FAR of 1.0 to 2.5 and 10 to 25 residential dwelling units per acre.

For fixed route bus service population densities should be 2,500-4,000 persons per square mile; 4 to 5 jobs per acre; a FAR of 0.35-1.0 and 4-5 residential dwelling units per acre. Maps 3 and 5 in Chapter 3 depict the current and projected population and employment densities. These maps show that the Region does not have the density needed to support rail. The Region does, however, just meet the densities needed to support fixed route bus service (i.e. FRED).

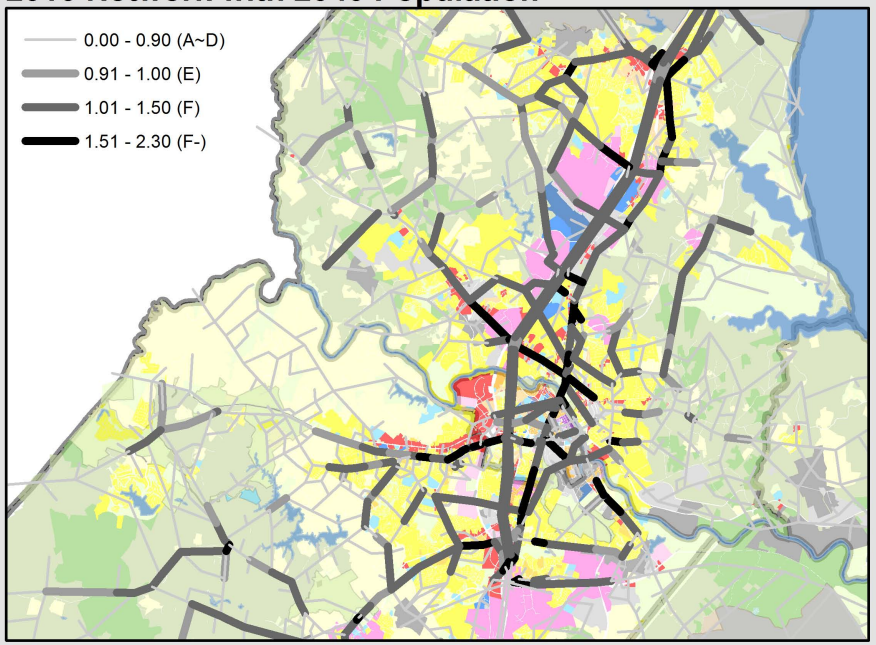
The public transportation market in the I-95 Corridor will continue to flourish as the need for van and carpools, and commuter bus will continue to rise with the development of the I-95 HOV/HOT Lanes and additional commuter parking that is currently programmed into the FAMPO TIP and the VDOT Six-Year Improvement Program (SYIP). The expansion of Virginia Railway Express (VRE) to Spotsylvania County, as well as additional commuter parking capacity at both of the Stafford County Stations and in Downtown Fredericksburg, will ensure that VRE remains a vital component to the Region's transportation network.

Map 7: Comparative Levels of Service

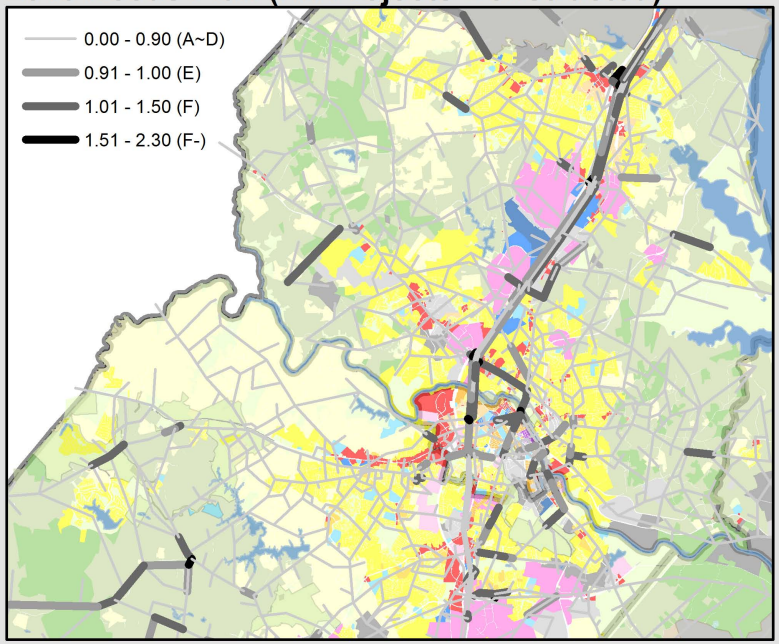
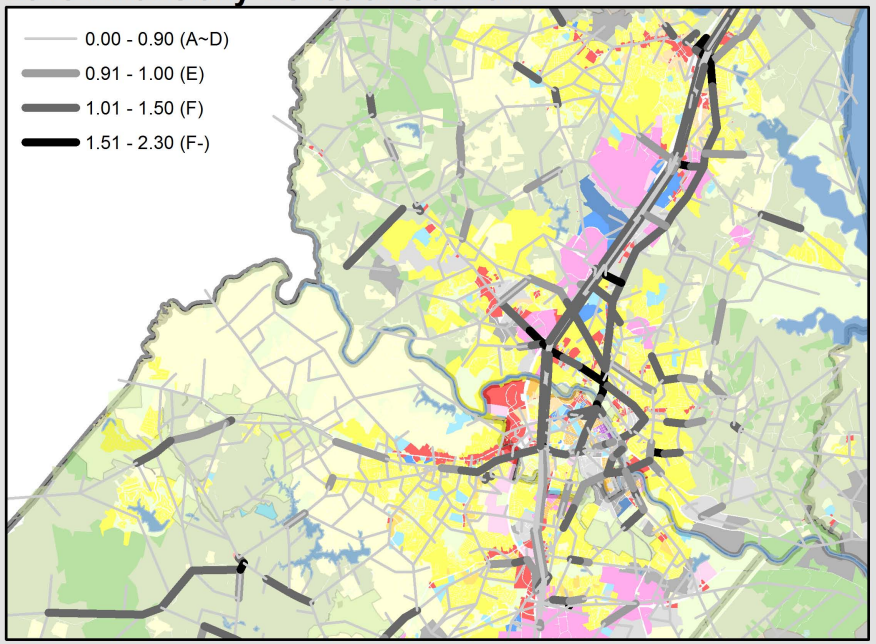
2010 Base Network (Existing Conditions)



2010 Network with 2040 Population



2040 Needs Plan (All Projects Constructed)



2040 Financially Constrained Plan