Appendix B: Future Conditions and Needs

Regional Growth and the Transportation System

Continued growth in the region depends on strong public infrastructure. This includes a regional transportation system that provides effective, reliable options for everyone.

The regional transportation system influences the location of growth and development. Similarly, the type of growth and location of growth influence travel choices. Recognizing this transportation / land use connection, the BRTB strives to coordinate land use planning and transportation decisions among municipal, county, regional, and state partners.

Population and Employment Growth – Cooperative Forecasting Group

A vital part of this coordination is the work of the Cooperative Forecasting Group (CFG). The CFG consists of representatives of state and local planning agencies. This group develops and maintains population, household, and employment forecasts for the Baltimore metropolitan region.

Round 8A Forecasts

In June 2014, the BRTB endorsed the Round 8A forecasts developed by the CFG. The Round 8A forecasts are updates to the Round 8 cooperative forecasts, which the BRTB endorsed in August 2013.

Population Forecasts – Round 8A								
Jurisdiction	2010	2015	2020	2025	2030	2035	2040	% change: 2010-2040
Anne Arundel	537,656	559,619	580,007	593,595	606,689	618,177	628,048	16.8%
Baltimore City	620,961	636,722	647,282	656,314	667,210	676,726	680,262	9.5%
Baltimore	805,029	823,121	832,393	846,771	858,183	869,523	880,726	9.4%
Carroll	167,134	170,549	175,900	179,437	183,258	186,180	189,574	13.4%
Harford	244,826	251,991	258,668	265,098	273,127	281,029	291,089	18.9%
Howard	287,085	309,043	332,273	346,517	357,094	363,501	366,352	27.6%
Region	2,662,691	2,751,045	2,826,523	2,887,732	2,945,561	2,995,136	3,036,051	14.0%

Household Forecasts – Round 8A								
Jurisdiction	2010	2015	2020	2025	2030	2035	2040	% change: 2010-2040
Anne Arundel	199,378	206,441	213,504	220,565	227,626	234,647	241,542	21.1%
Baltimore City	249,903	256,904	261,374	265,100	269,632	273,496	274,976	10.0%
Baltimore	316,715	321,983	325,447	331,312	335,749	340,162	344,539	8.8%
Carroll	62,406	64,142	66,219	68,025	69,692	71,305	72,853	16.7%
Harford	90,218	94,095	97,892	101,689	105,488	109,298	113,090	25.4%
Howard	104,749	112,173	123,899	130,948	135,517	138,513	139,497	33.2%
Region	1,023,369	1,055,738	1,088,335	1,117,639	1,143,704	1,167,421	1,186,497	15.9%

Employment Forecasts – Round 8A								
Jurisdiction	2010	2015	2020	2025	2030	2035	2040	% change: 2010-2040
Anne Arundel	323,148	342,011	361,688	376,085	391,312	404,986	424,061	31.2%
Baltimore City	381,772	388,651	402,534	415,971	428,751	441,346	454,167	19.0%
Baltimore	446,250	465,801	484,533	492,436	499,296	504,820	510,565	14.4%
Carroll	70,889	73,063	76,107	78,421	80,888	82,996	85,351	20.4%
Harford	104,670	115,562	126,040	135,775	146,269	157,191	167,261	59.8%
Howard	181,381	196,381	211,381	226,381	241,381	251,710	260,309	43.5%
Region	1,508,110	1,581,469	1,662,283	1,725,069	1,787,897	1,843,049	1,901,714	26.1%

Inputs for Modeling

The Round 8A forecasts provide the spatial location and concentration of population, households, and employment. These serve as key inputs to the region's travel demand model. Planners use this model to simulate individuals' work and non-work travel patterns.

Output from the travel demand model helps to identify regional transportation needs. This informs the decisions the BRTB makes about potential new projects in developing the long-range transportation plan. Appendix G presents additional information about the travel demand model's forecasts with respect to projects in this plan.

From 2010 to 2040, the region's population is expected to grow 14%, while employment growth is projected at 26%.

By 2040, the Baltimore region's population is expected to surpass 3 million people for the first time.

Coordinating with Other Regions

BMC staff members also use forecasts in discussions on bi-regional growth assumptions with planning organizations in adjoining regions. These include the Metropolitan Washington Council of Governments and Wilmington Area Planning Commission.

Environmental Issues

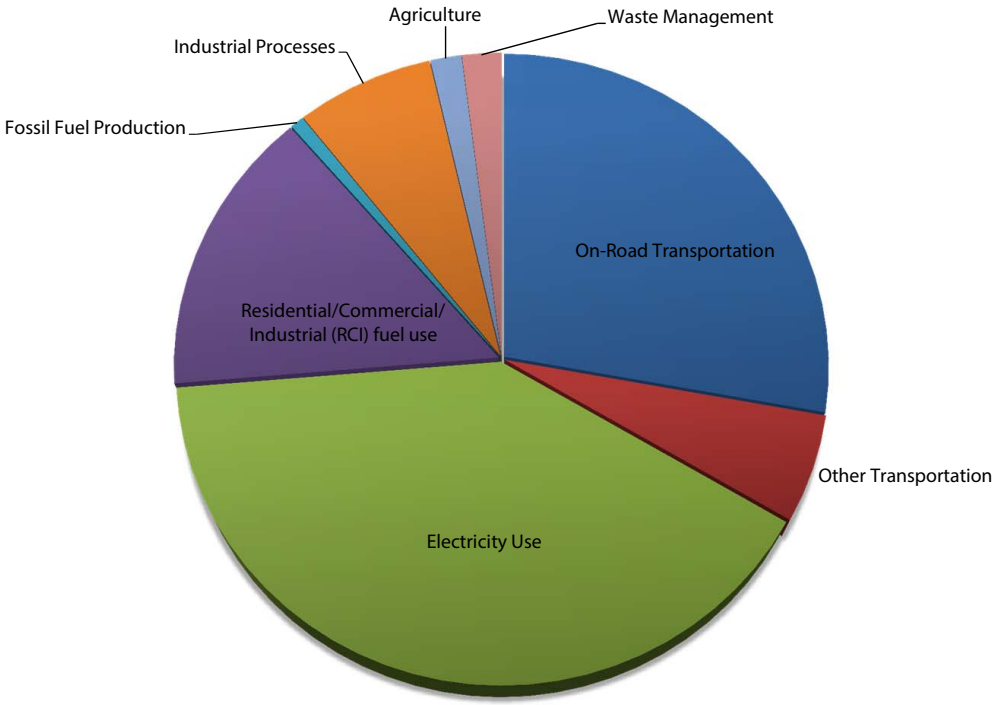
Chapter 1 of this plan (see Page 1-6) describes the federal requirements the region must meet to maintain conformity with national air quality standards. Besides these air quality conformity issues, the region faces several other environmental challenges.

Greenhouse Gas Emissions and Climate Change

There is a strong link between growth in vehicle miles traveled (VMT) and greenhouse gas (GHG) emissions from the transportation sector. More miles traveled directly equates to the combustion of more gallons of fuel and the release of carbon dioxide.

Emissions of carbon dioxide, a key GHG, result from the burning of fossil fuels such as gasoline and diesel fuel. In 2010, 28 percent of the state's GHG emissions were from the on-road transportation sector (see the figure below from Maryland's Greenhouse Gas Reduction Plan, September 2013). The entire transportation sector accounted for 33 percent of emissions in 2010 in the state, and represented the second largest source sector for GHGs in Maryland, behind electricity consumption at 40 percent.

Maryland Greenhouse Gas Emissions by Sector, 2010



Environmentally conscientious planning must consider the implications of potential long-term climate change and the role that vehicle emissions play. GHG emissions that result from human activity are believed to contribute to global warming, which is the increase in average global temperature.

Global warming is a result of an enhanced greenhouse effect, a naturally occurring process by which heat from the sun is radiated off the Earth's surface and then is trapped in the earth's atmosphere by GHGs, causing the Earth's surface temperature to increase. The Earth's surface temperature has increased by 1.4 degrees Fahrenheit over the past 100 years. According to the EPA, the average temperature at the Earth's surface could increase from 2 to 11.5 degrees Fahrenheit in the next 100 years.

Sea Level Rise

Global warming is just one aspect of climate change. Sea level rise, rainfall patterns, snow cover, and ice cover are also changing. The Fort McHenry sea level gauge in Baltimore, Maryland has recorded sea level rise at the rate of 1.03 feet every 100 years between 1902 and 2013[1]. The Maryland Climate Change Commission (Scientific and Technical Working Group) reports projections of sea level rise in Maryland of between 0.9 and 2.1 feet by 2050 and between 2.1 and 5.7 feet by 2100[2]. The Maryland State Highway Administration (SHA) is currently planning for changes in mean sea level in the Baltimore region of between 2.01 feet (Harford County, Baltimore County and Baltimore City) and 2.08 feet (Anne Arundel County) by 2050 and between 5.59 feet (Harford County, Baltimore County and Baltimore City) and 5.7 feet (Anne Arundel County) by 2100.

How Far Can We Get?

With the understanding that climate change planning and greenhouse gas emissions mitigation is an important consideration of transportation planning, the Baltimore Regional Transportation Board initiated the "How Far Can We Get?" study in FY 2014. The purpose of this study was to understand the level of emission reductions that are achievable through a reasonable level of reduction measure implementation, and to inform the region's next long-range transportation plan.

The Maryland State Highway Administration is currently planning for changes in mean sea level in the Baltimore region of between 2.01 feet (Harford County, Baltimore County and Baltimore City) and 2.08 feet (Anne Arundel County) by 2050 and between 5.59 feet (Harford County, Baltimore County and Baltimore City) and 5.7 feet (Anne Arundel County) by 2100.

The combination of measures chosen by the "How Far Can We Get?" Committee, in consideration of feasibility of implementation, could potentially achieve nearly a 3 percent carbon dioxide (CO_2) equivalent reduction in 2030 and just under a 10 percent reduction in 2040. The study shows that the most beneficial measures are those that increase the fuel economy of vehicles, now and into the future. Some of the recommended measures from the study are included in the Transportation Emissions Reduction Measure (TERM) funding list in Chapter 4 of this plan. These include promotion of eco-driving and travel demand management measures such as clean commuting, electric vehicles, and idle reduction for heavy-duty trucks.

1 http://tidesandcurrents.noaa.gov/sltrends/sltrends.html. Web site accessed April 29, 2015.

2 Boesch, D.F., L.P. Atkinson, W.C. Boicourt, J.D. Boon, D.R. Cahoon, R.A. Dalrymple, T. Ezer, B.P. Horton, Z.P. Johnson, R.E. Kopp, M. Li, R.H. Moss, A. Parris, C.K. Sommerfield. 2013. Updating Maryland's Sea-level Rise Projections. Special Report of the Scientific and Technical Working Group to the Maryland Climate Change Commission, 22 pp. University of Maryland Center for Environmental Science, Cambridge, MD.

Chesapeake Bay

The Chesapeake Bay watershed includes six states and is 64,000 square miles in size. There are excess amounts of nutrients (nitrogen and phosphorus) and sediment being deposited into the Bay. Downstream effects of excess nutrients and sediment include loss of water clarity and algal blooms. Sources of these pollutants include agriculture, urban and suburban runoff, wastewater, and atmospheric deposition.

Sea level rise, increased temperatures, and other aspects of climate change are predicted to hinder efforts to clean up the Chesapeake Bay. According to the Maryland Greenhouse Gas Reduction Act Plan[3], increased runoff and rainfall events from climate change could affect the Bay through increased erosion and sediment loads. Higher peak stormwater flows also would mean greater amounts of nutrients transported downstream, degrading water quality. Additionally, climate change will likely cause a decline in biodiversity of plants and animals in the forests of Maryland. Increasing summer temperature will likely cause higher ozone levels and more frequent exceedances of the federal ozone air quality standard. Sea level rise will also require costly mitigation measures to protect the region's transportation infrastructure from higher water and damage caused by storm surges.

EPA issued a "pollution diet" in December 2010 across the entire Chesapeake Bay as well as each tidal segment. This pollution diet is in the form of a Total Maximum Daily Load (TMDL), with caps set on levels of nitrogen, phosphorus, and sediment going into the Bay. TMDLs are Clean Water Act regulatory tools that set daily limits on pollutants going into water bodies. There are a series of accountability measures to ensure the TMDL caps are being met.

As part of Maryland's plan to reach its interim (2017) nitrogen and phosphorus reduction goals for the Chesapeake Bay TMDL, the state is implementing a set of measures to address sources of water pollution, one of which is urban stormwater runoff. Urban stormwater runoff includes runoff from roadways. There are a number of different ways to mitigate the effects that presence of roadways can have on stormwater runoff pollution, including stormwater management ponds, stream restoration, tree planting, and street sweeping.

State of the Bay Report

According to the Chesapeake Bay Foundation 2014 State of the Bay report, the health of the Chesapeake Bay is slowly improving. Water quality indicators such as dissolved oxygen and water clarity have seen an improvement, while levels of nutrient pollution did not improve in 2014. Amounts of underwater grasses providing critical habitat have improved, while the number of blue crabs has dropped dramatically.

3 Maryland Department of the Environment. 2013. Maryland's Greenhouse Gas Reduction Action Plan.

Freight Movement and Connections

The efficient movement of freight, within and through the region and between modes, is a vital element of the region's economy. Many businesses maintain smaller inventories and rely on "just-in-time" deliveries of materials and goods. Anything that complicates or slows the movement of freight slows the delivery of materials and goods to consumers and businesses. MAP-21 has recognized the importance of freight by including it in one of the eight basic planning factors that each long-range transportation plan must address: "Increase the accessibility and mobility options available to people and for freight."

Regional Freight Network

The greater Baltimore region is Maryland's leading goods movement center. Each year, more than 307 million tons of freight valued at nearly $1 trillion move over Baltimore's highway, rail, port, and airport facilities, serving domestic and international demand for a wide range of goods.[4]

Between now and 2030, freight on the region's transportation system is projected to nearly double,[5] with significant percentage increases across the modes and the largest volume increase in truck tonnage. The growth in freight demand, combined with the predicted growth in private vehicle travel, commuter or intercity rail, and passenger air services, will place additional stress on the capacity of the region's transportation system.

Given current levels of congestion, the doubling of freight traffic on the region's infrastructure will create additional challenges for transportation planners. Other trends and challenges include the need to enhance highway safety, a need for improved intermodal connections, the security of goods movement, and lack of sufficient truck parking.

Growth at the Port of Baltimore

Another issue planners need to account for is the expected significant growth at the Port of Baltimore. An August 31, 2015 press release from the Maryland Port Administration notes that the port's public marine terminals had a record year in 2014, and overall the port handled 29.5 million tons of international cargo at a value of nearly $53 billion. Baltimore is ranked as the top port among all U.S. ports for handling autos and light trucks, farm and construction machinery, imported forest products, imported sugar, and imported aluminum. Overall, Baltimore is ranked ninth for the total dollar value of cargo and 13th for cargo tonnage for all U.S. ports.

In addition, the Port of Baltimore is one of two East Coast ports with a 50-foot channel. The Seagirt Marine Terminal, the port's primary container facility, features a 50-foot berth that will enable the port to accommodate super-draft ships that will be able to pass through the widened Panama Canal beginning in 2016. The Seagirt Terminal has 11 cranes, four of which are "Super Post-Panamax," capable of handling the biggest ships in the world. This will help to make the Port of Baltimore into a gateway for general cargo such as containers and autos and bulk cargo such as gypsum and iron ore. This growth will require the Maryland Port Administration and its partners to evaluate the need for additional facilities to accommodate increased demand.

4 Cambridge Systematics. *Mid-Atlantic Rail Operations Study.*
5 Maryland Department of Transportation. *Attainment Report on Transportation System Performance.*

"Mega-Regional" Projects

Chapter 4 mentions two "mega-regional" facilities that have regional freight implications: the B&P Tunnel that carries freight and passenger traffic through Baltimore City and the Amtrak / freight rail bridge over the Susquehanna River between Harford and Cecil counties. Both of these facilities need significant improvements (or replacement) to handle increased rail traffic. MDOT is studying alternatives for improving these facilities to better accommodate current and future rail traffic and has provided periodic updates to the BRTB about findings and developments.

Funding for any possible future improvements to these facilities would be from sources outside the jurisdiction of the BRTB. Nonetheless, regional planners and modelers need to be aware of the potential effects of any improvements (or lack of improvements) on the region's transportation network. The BRTB, supported by BMC staff, will determine these potential effects on regional travel demand and patterns should these projects advance beyond the study phase.

Freight Initiatives

Freight Modeling Initiative

BMC and SHA are working together under a grant from the Federal Highway Administration to study freight movement in the Baltimore region and to enhance the simulation of freight traffic in BMC's and SHA's travel models. This "C20" freight model project will provide information on the components of freight movement: locations of cargo transfers, type of commodities and characteristics, long-distance freight routing, and local delivery patterns.

This information will be incorporated into two simulation tools: a statewide supply chain freight model for use by SHA and an urban-tour-based commercial vehicle model for use by BMC. The statewide supply chain freight model seeks to provide insight into suppliers' and distributors' choice in transportation mode, shipment size, and commodity-specific characteristics to simulate long-distance truck traffic. The urban-tour based commercial vehicle model seeks to understand and simulate the local delivery of goods and services to area households.

Global Cities Initiative

Launched in March 2012, the Global Cities Initiative (GCI) is a $10 million, 5-year project sponsored by Brookings and JPMorgan Chase. The Baltimore region is one of the regions chosen to participate in this initiative.

GCI aims to help leaders of U.S. metropolitan areas to strengthen their regional economies by becoming more competitive in the global marketplace. The initiative:

- looks at such key indicators as advanced manufacturing, exports, foreign direct investment, freight flow, and immigration
- shares best practices and policy innovations from across the nation and around the world
- creates an international network of leaders from global cities focused on deepening global trade relationships.

The Baltimore region, for purposes of this initiative, consists of the jurisdictions covered by the BMC as well as Cecil County. The BMC serves on the steering committee, along with the Baltimore Development Corporation and the Greater Baltimore Committee (the lead local agency on the project). The initiative will result in a regional export strategy to be released in early 2016. This process involves all of the regional economic development agencies. In addition, BMC managed an on-line survey of regional businesses as part of the research. Local companies are also taking part in individual interviews and focus groups managed by the Greater Baltimore Committee.

Comprehensive Planning / Growth Management

To develop a comprehensive plan, each local jurisdiction first forecasts the number of new residents and new workers expected in the jurisdiction over a period of 20+ years, and where the new residents and workers will choose to locate. The forecasts, often called socioeconomic forecasts, are then used to plan for the public facilities and services—such as schools, water/sewer lines, roads, police departments, and fire stations—needed to accommodate all residents and workers in the local jurisdiction.

Growth management refers to the policies and procedures that local jurisdictions, regions, and states use to accommodate more residents and workers. While specific policies and procedures differ from jurisdiction to jurisdiction, in general most local jurisdictions use growth management to encourage, guide, and support new development in areas where public facilities and services are in place or are planned to be in place. Such an approach in most cases is effective, maximizes cost-effectiveness, and minimizes environmental impacts. In addition, growth management is also used to limit new development on land or where a particular land use is valuable to the public. For example, local jurisdictions often use growth management to preserve environmental, historic, and/or economic resources.

The commitment to growth management in the Baltimore region dates from the 1960s. That decade saw innovative policies such as the Urban Rural Demarcation Line (URDL) in Baltimore County and ambitious efforts such as the plan for a whole "new" town, Columbia, in Howard County. In addition, the state of Maryland, considered a pioneer in statewide growth management policies, has provided both guidance and technical expertise to support the commitment.

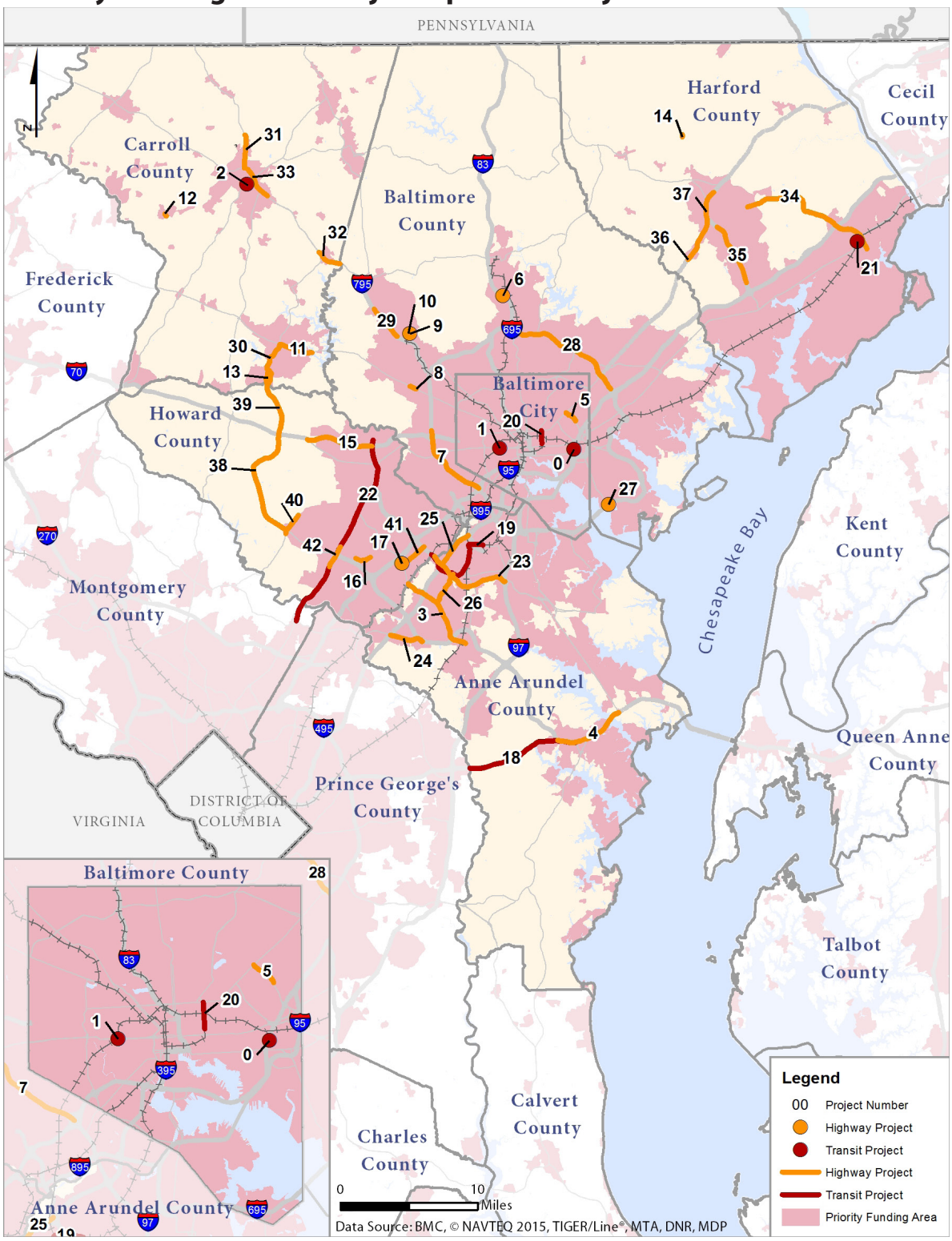
As noted in the first section of this chapter, the BRTB's Cooperative Forecasting Group (CFG) convenes its members from the local jurisdictions and the state of Maryland to develop a socioeconomic forecast for the entire region. So the forecast, and the regional transportation plan based on the forecast, are consistent with its members' growth management policies and procedures.

Growth Management Legislation

The Priority Funding Act of 1997 provided a new approach to statewide growth management, based on fiscal incentives, as opposed to regulations, to manage growth. The legislation created five programs to encourage investment in developed areas and preservation of farmland, forests, and other natural resources.

The Priority Funding Areas (PFA) program provides incentives for jurisdictions and developers by concentrating growth-related projects in PFAs that are existing communities and places where local governments want state funding for future growth. Growth-related projects include most state programs that encourage growth and development, such as highways, sewer and water construction, economic development assistance, and state leases or construction of new office facilities. And the Rural Legacy Areas (RLA) program provides state funds to support the preservation of large, contiguous tracts of land that are designated by local governments and land trusts and are critical to the economy, environment, and quality of life.

The Sustainable Communities Act of 2010 established Sustainable Communities (SCs) to stimulate reinvestment in Maryland's older communities by preserving historic or non-historic properties and refocusing the state's community programs.

The Sustainable Growth and Agricultural Preservation Act of 2012 linked development potential to wastewater treatment. This act established four additional designated areas, or tiers, to encourage development in areas with existing or planned public sewer service and to limit development in areas with private septic systems. Local jurisdictions set the boundaries of all designated areas, which the State then uses to set priorities for infrastructure investment statewide.

Priority Funding Areas / Major Expansion Projects