Sustainable Suburbs: A Place-Based Approach for Environmental Sustainability at a Regional Scale

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A capstone thesis paper submitted to the Executive Director of the Urban & Regional Planning Program at Georgetown University’s School of Continuing Studies in partial fulfillment of the requirements for Masters of Professional Studies in Urban & Regional Planning.

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ABSTRACT

Urban planners today find themselves at the forefront of the global effort to combat climate change. As unsustainable development patterns have led to increased vehicle miles traveled and carbon footprint per capita, localities are facing the task of correcting the outcomes of poor land use decisions as well as responding to ever increasing development pressures. Taking a regional approach in tackling environmental sustainability issues is preferable to the status quo of piecemeal decision-making within each jurisdiction since many problems transcend local boundaries. This paper explores how these issues are localized in Planning Districts 9 and 16 in Virginia and argues that a regional comprehensive plan; coordinated, compact development in priority areas; and planning for alternative transportation options must be instituted if these regions at the brink of sprawl are going to achieve a more sustainable future.

KEYWORDS

Development patterns, environmental sustainability, climate change, land use, regionalism

RESEARCH QUESTIONS

1. How have localities in Planning Districts 9 and 16 failed to plan for environmental sustainability? What data supports this?
2. What planning tools and strategies can be used to make these regions more sustainable?
3. Are localities in Planning Districts 9 and 16 better able to plan for environmental sustainability on their own or in a regionally coordinated effort? What are the barriers to regional planning?

ACKNOWLEDGEMENTS

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Introduction

“We abuse land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect.” Aldo Leopold, *A Sand County Almanac*¹

“The urgent challenge to protect our common home includes a concern to bring the whole human family together to seek a sustainable and integral development, for we know that things can change.” Pope Francis, *Laudato si’*²

Planning for sustainability is the defining challenge of the twenty-first century³. The global issue of climate change is revealing the desperate need for responsible planning as populations continue to grow and urbanize. Flooding and drought, extreme weather events, sea level rise, and loss of important species are a few of the many imminent threats facing the world today. Conservative estimates from the Urban Land Institute reveal that by 2050, worldwide carbon emissions need to drop to between 60-80 percent of their 1990 levels⁴. Today, planners are busy righting the wrongs of poor land use decision-making, federal highway and housing policy, and unregulated growth throughout the country – each of which have contributed to human-induced climate change. For the United States to contribute its share in reducing emissions and model responsible development, urban planners must treat sustainability as one of the foremost concerns both in policy and practice.

While many places in less developed parts of the world are already facing the extreme effects of these climate change, the United States is not excluded from such challenges. Communities in California are facing unparalleled drought, the East Coast is dealing with greater consequences from hurricanes and storms, and cities across the country are seeing record

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temperatures each year. There is no doubt we are seeing the effects of climate change but it is more important to realize the contributions we are making to its existence. Poorly planned development patterns can exacerbate many of the issues associated with climate change including vehicle miles traveled and carbon footprint per capita. The links between land use patterns and climate change have, as this paper describes later in detail, been well established and as a result, planners must be accountable for ensuring that development is regulated in a way that does not further impair environmental conditions for future generations. This paper explores just a small fraction of the global issue of climate change by analyzing unsustainable development patterns in Planning Districts 9 and 16 in Virginia and how, by taking a regional planning approach, these regions can move toward a more sustainable future. With a set of thorough planning recommendations, Planning Districts 9 and 16 will be able to better plan for environmental sustainability at the regional scale.

Definitions

Environmental Sustainability

Sustainability has become of the most widely used – and, at times, misused – words in the urban planning discipline\(^5\). The word came to the forefront of global discourse after the 1987 Brundtland Commission report known as *Our Common Future*, which provided a working definition for sustainability and focused primarily on sub-topic of sustainable development\(^6\). For roughly the last 30 years, the word has largely been used in the context of pressing issues such as climate change and resource depletion and as a result, sustainability is often thought of as solely

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an environmental issue when in truth, the word also encapsulates social and economic realities. Campbell describes sustainability as the center of a triangle (see Figure 1) with “Three E’s” in the corners: economic development; equity, social justice; and environmental protection. As the three fundamental planning priorities, according to Campbell, these Three E’s are inherently at odds with one another and it is the planner’s job to balance each one with the others. For example, between environmental protection and economic development there has historically been a resource conflict wherein for economies to grow, they must use natural resources which can disrupt environmental integrity. For Campbell, sustainability lies at the center of this triangle.

Figure 1. The Three E’s of Sustainability.

For the purposes of this paper, the primary “E” hereafter will be environmental protection, or in this case, environmental sustainability. While social equity and economic development are core

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to overall sustainability, the scope of this paper only explores sustainability from an environmental perspective despite the interconnectedness with the two other E’s.

Development Patterns

Urban development patterns typically have the following broad characteristics: relatively high densities, walkable places, a variety of transportation options, and a mix of uses. This does not exclude places outside of downtown areas from being considered urban although the further away from a central city a place is, the less likely it is to incorporate these characteristics. Downtown Washington, DC and the Rosslyn-Ballston Corridor each come to mind as urban places. However, highly populated areas such as these are not the only types of places to fit the definition of urban development. Urban places are classified as such because of their relatively high density and intensity of development compared to what lies around them.

To fit the geography and scale of this analysis, it is also worth considering smaller areas, both in size and population, that fit the aforementioned characteristics. While not typically thought of as “urban,” in the way the word is most commonly used today, places like Fredericksburg, Orange, Warrenton, and Culpeper contain much different land use patterns than the development that lies within the 5-mile radius around each town. For instance, many of the central streets in Warrenton are walkable, contain a mix of uses, and contain much more density than the rest of Fauquier County. Suburban development patterns, on the other hand, defined here as areas that are less dense, require automobile travel, and separate uses, are much more prevalent throughout the PDs 9 and 16. These areas surround the handful of historic towns that take a much more urban form. Outside of the few urban areas, there is a mix between traditional rural development and sprawling suburban development patterns (see Figure 2).
Figure 2. Sample Development Patterns in Planning Districts 9 and 16.

An historic town on the Rappahannock River, the City of Fredericksburg has a grid pattern in its urban core. Other historic towns in the two planning districts include Orange, Warrenton, and Culpeper.

Route 610 and I-95 (to the right) in northern Stafford County. Route 610 serves as a commercial corridor and feeder for the interstate. Most of the development near Route 610 is single-family and multi-family residential.

The intersection of Route 17 and Route 28 in Fauquier County. A number of businesses line each road along with single-family residences. There is also significant farmland in this area.

Source: ESRI Aerial Imagery Basemap.
Walk Score has become a common indicator to gauge how urban or suburban a place tends to be. By considering factors such as proximity to grocery stores, restaurants, schools, and parks, Walk Score assigns a number between one and one hundred for a given place with one hundred being very walkable. Highly walkable places such as New York, NY and Washington, DC have city-wide Walk Scores of 88 and 74, respectively, although Walk Scores for individual neighborhoods can vary greatly depending on the proximity of nearby amenities. Table 1 provides a few Walk Score examples from addresses marked with a red circle in Figure 2 on the previous page.

Table 1. Walk Scores in Planning Districts 9 and 16.

<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>Address</th>
<th>Walk Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fredericksburg</td>
<td>1000 Princess Anne St.</td>
<td>85</td>
</tr>
<tr>
<td>Stafford County</td>
<td>91 Eustace Rd.</td>
<td>26</td>
</tr>
<tr>
<td>Fauquier County</td>
<td>10871 King Nobel Ln.</td>
<td>44</td>
</tr>
</tbody>
</table>


Geography

The geography of this analysis includes nine counties, one independent city, and ten incorporated towns in Northern and Central Virginia. Together, these localities make up Planning Districts 9 and 16 (see Figure 3). A Planning District is a geographic area in which there are member local governments with shared interests and together, make up a Planning District Commission, defined by the Virginia Association of Planning District Commissions, as “a political subdivision of the Commonwealth chartered under the Regional Cooperation Act by the local governments of each planning district. As such they are a creation of local government
encouraged by the state.” The Code of Virginia (§15.2-4207) defines the purpose of Planning District Commissions as:

…to encourage and facilitate local government cooperation and state-local cooperation in addressing on a regional basis problems of greater than local significance. The cooperation resulting from this chapter is intended to facilitate the recognition and analysis of regional opportunities and take account of regional influences in planning and implementing public policies and services…The planning district commission shall also promote the orderly and efficient development of the physical, social, and economic elements of the district by planning, and encouraging and assisting localities to plan, for the future.

Planning District 9 includes five counties (Culpeper, Fauquier, Madison, Orange, and Rappahannock) and eight incorporated towns (Culpeper, Gordonsville, Madison, Orange, Remington, The Plains, Warrenton, and Washington) and the regional planning agency is the Rappahannock-Rapidan Regional Commission (RRRC). In PD 16, there are four counties (Caroline, King George, Stafford, and Spotsylvania), one independent city (Fredericksburg), two incorporated towns (Port Royal and Bowling Green), and has the George Washington Regional Commission (GWRC) as a regional planning agency. It is also worth noting that because of their aggregate population size, Stafford County, Spotsylvania County, and the City of Fredericksburg have an MPO known as the Fredericksburg Area Metropolitan Planning Organization (FAMPO) for regional transportation planning and this entity operates within the GWRC. In 2014, Planning District 9 had a total of 172,958 residents while Planning District 16 totaled 352,679. Figures 3-5 further describe the regions using spatial and demographic data.

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8 Virginia Association of Planning District Commissions, Introduction to Planning District Commissions http://www.vapdc.org/?page=IntrotoPDCs
9 Ibid.
Figure 3. Planning Districts 9 and 16 and Their Proximity to Washington, DC.

Source: Map by author. Data from Virginia Geographic Information Network and aerial imagery basemap from ESRI.
Figure 4. PD 9 and 16 Population, 2004-2014.

Source: ACS 5-Year Estimates, U.S. Census Bureau

Figure 5. PD 9 and 16 Population Density, 2004-2014.

Source: ACS 5-Year Estimates, U.S. Census Bureau

There are several important reasons for this selected geography. First, the planning recommendations later in this paper are regional in nature. Thus, it is necessary to address places
with established planning agencies that think and work beyond local boundaries. While land use decisions are only made at the local level in Virginia, the regional planning commissions operate in an advisory role and make efforts to coordinate land use, transportation, and other planning-related decision-making. Second, both of these defined regions are largely suburban in nature and need to make changes to their built environments if they are going to achieve greater environmental sustainability. Lastly, each region is facing immense development pressure that extends outward from nation’s capital. In order for sprawl to come to a halt, places at the edge of the Washington, DC region will need to implement better planning strategies and, as described later in this paper, do so in a regionally coordinated manner.

Intended Audience

Local and regional planners and elected officials within PDs 9 and 16 are the primary audience for this report. By extension, this report may be of value in other low-density regions contending with sustainability. Local planners within city and county governments are responsible for regulating land use decisions as well as creating and amending guiding policy documents such as the comprehensive plan. Since these plans and regulations are approved by city councils and boards of supervisors for each member jurisdiction, the elected officials in each place play a crucial role in shaping development. Regional planners, although without the ability to make land use decisions, are a vital component of planning in that they serve in advisory role to their member jurisdictions. Moreover, each regional commission board is made up of elected officials who represent their locality’s interests. Therefore, regional planners, who are able to see issues with a perspective larger than a local planner, can perhaps better identify with many of the arguments advanced in this paper.
Literature Review

Today, there is little debate that there is a strong connection between development patterns and environmental sustainability\textsuperscript{10}. It is relatively difficult to pinpoint just how much of an effect development patterns have on the environment, but there are a handful of metrics associated with development that have been studied extensively and point to a positive relationship between the two. Below is a brief summary of this interconnectedness as described by the experts followed by the missing links of existing proposed solutions.

One of the best metrics for measuring how environmentally sustainable development patterns are in an area is vehicle miles traveled, or VMT. Ewing et al. provides an extensive overview of the relationship between increased VMT and impact on climate change\textsuperscript{11}. Transportation related emissions account for a third of all greenhouse gas emissions in the United States and tackling this issue, according to the authors, involves a three-legged stool: vehicle fuel economy, carbon content of fuel, and the amount of driving, or VMT\textsuperscript{12}. Between 1980 and 2005, VMT increased at a rate three times as fast as population growth and the authors argue that it is development patterns that have contributed to such a drastic increase\textsuperscript{13}. VMT for PDs 9 and 16 are detailed later in this report.

A second metric that has come to the forefront of the discussion regarding development patterns and environmental sustainability is carbon footprint per capita, or per household in some cases. In a 2009 opinion article for Yale Environment 360, David Owen details the issue of seeing low-density, spread-out development as environmentally friendly\textsuperscript{14}. Referencing a Forbes

\textsuperscript{11} Ewing et al., \textit{Growing Cooler}, 4-9.
\textsuperscript{12} Ibid, 2.
\textsuperscript{13} Ibid.
ranking of greenest states, Owen believes Vermont, ranked the greenest state, actually sets a poor example. “Spreading people thinly across the countryside, Vermont-style, may make them look and feel green, but it actually increases the damage they do to the environment while also making that damage harder to see and address. In the categories that matter the most, Vermont ranks low in comparison with many other American places.” A Vermonter, he writes, consumes almost one hundred gallons more per year than the national average due to the auto-dependent development patterns. Owen continues:

Americans tend to think of dense cities as despoilers of the natural landscape, but they actually help to preserve it. If you spread all 8.2 million New York City residents across the countryside at the population density of Vermont, you would need a space equal to the land area of the six New England states plus New Jersey, Delaware, Maryland, and Virginia — and then, of course, you’d have to find places to put all the people you were displacing.

As described above, these hundred-mile commutes lend themselves to increased VMT and a much larger negative impact on the environment.

More recently, in Jeff Speck’s *Walkable City*, he describes the flaws in thinking that cities are more harmful to the environment than suburbs:

...there is certainly a logic in looking at pollution from a location-by-location perspective. But this logic was based on an unconsidered assumption, which is that the most meaningful way to measure carbon is by the square mile. It isn’t. The best way to measure carbon is per person. Places should be judged not by how much carbon they emit, but by how much carbon they cause us to emit. There are only so many people in the United States at any given time, and they can be encouraged to live where they have the smallest environmental footprint. That place turns out to be the city—the denser the better.

A relatively simple concept, carbon footprint per capita is a more appropriate way to gauge how well a given place allows people to emit high or low amounts of carbon through their lifestyle

15 Ibid.
16 Ibid.
which is indeed shaped by the built environment. Understanding that carbon footprint is best measured on a per capita basis rather than by area is crucial for grasping the fact that more compact development patterns are more environmentally sustainable than their suburban counterparts.

Outdated zoning texts that favor low-density, auto-dependent development patterns are being rewritten in many cities, but suburban localities that rely on a strong residential tax base are slow to change and by not adapting, are facilitating sprawl. Though not exactly a metric like the two aforementioned, poorly constructed – or poorly updated – zoning codes are less noticeable in contributing to sprawl but nevertheless have a significant impact. Dating back to the 1920s and the establishment and subsequent upheld constitutional authority of single use zoning, cities have operated largely within the assumption that keeping homes away from commercial and industrial uses actually helps preserve environmental integrity and contributes to a better quality of life. Moreover, the prevalence of the automobile makes this type of zoning possible to implement and once low-density, single use development patterns are established, they require automobile use. PDs 9 and 16 have an abundance of local zoning codes that facilitate and reinforce, whether actively or passively, sprawling development.

A missing link between the current situation in Planning Districts 9 and 16, wherein there is multifaceted problem of fixing poor development patterns as well as preparing for new development, is that the proposed remedies for achieving greater environmental sustainability are predominantly local in nature. Yet, reducing VMT, carbon footprint per capita, and updating

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18 Calthorpe, *Urbanism*, 44.
20 Ibid, 50-52.
existing zoning texts – must be approached from a regional perspective because they each transcend local boundaries. From the perspective of creating a more environmentally sustainable land use pattern, it is unfortunate that land use decisions are made purely at a local level. In PDs 9 and 16, this means that there are nine separate jurisdictions each planning for development with no explicit regard for regional considerations; each has its own comprehensive plan that details how the jurisdiction will handle transportation, public services, affordable housing, employment growth, and much more. Ziegler writes, “Today, there appears to be an increasing concern about the psychological, civic, economic, resource and environmental costs associated with this automobile-dominated hypersprawl landscape. Critical concern sufficient to change the legal, institutional and development dynamics of urban sprawl in this country, however, clearly does not yet exist.”

\textsuperscript{22} If PDs 9 and 16 are going to move toward a more environmentally sustainable future, these “legal, institutional, and development dynamics of urban sprawl” must change. Regional issues cannot be solved with local solutions.

\textsuperscript{22} Ziegler, \textit{Urban Sprawl}, 61.
**Research Methodology**

In order to develop a set of planning recommendations for greater environmental sustainability at a regional scale, the following research questions were used:

1. How have localities in Planning Districts 9 and 16 failed to plan for environmental sustainability? What data supports this?
2. What planning tools and strategies can be used to make these regions more sustainable?
3. Are localities in Planning Districts 9 and 16 better able to plan for environmental sustainability on their own or in a regionally coordinated effort? What are the barriers to regional planning?

By an extensive review of the existing literature, researching appropriate data sources, and conducting interviews with experienced planning professionals, it is possible to gather information in order to make urban planning recommendations. For the metrics researched, data was collected from the U.S. Department of Transportation, the Virginia Department of Transportation, the U.S. Census Bureau, University of Virginia Weldon Cooper Center for Public Service, and the University of California-Berkeley CoolClimate Network. Numerous books and articles from leading planning professionals such as Peter Calthorpe, Jeff Speck, David Owen, and Edward Ziegler were used to describe overall trends related to climate change and development patterns in order to better understand how to localize these issues in PDs 9 and 16.
Research Findings

1. How have localities in Planning Districts 9 and 16 failed to plan for environmental sustainability? What data supports this?

   Sprawl in PDs 9 and 16 is not simply the result of local land use decisions. There are a handful of issues that reach far beyond local planning: federal highway policy, changes in technology, and lifestyle preferences that seem to vary from decade to decade. However, the current built environment of PDs 9 and 16 is not an accident from a planning perspective. Low-density residential zoning requirements, giving into development pressure, and planning only for the automobile have been at the center of inducing sprawl in these regions. Detailed below are the thoughts of planning experts in each region followed by an analysis of the data.

Existing Development Patterns in PDs 9 and 16 According to Planning Professionals

   Jeff Walker, AICP served as the Executive Director of the Rappahannock-Rapidan Regional Commission (the regional planning body for PD 9) for 16 years until April 2016. In describing the nature of the development in the region, Walker said, “We are pretty diffuse in terms of our settlement patterns here. We are pretty sprawled on the one hand; but we’re also, in many respects, living pretty lightly on the earth. We don’t have the compact development that is going to fit the sustainability advocates’ pattern and we don’t have any density that is going to make fixed-route transit easy.” Most of the sprawling development Walker mentions is taking place in Fauquier County while the four remaining counties of Rappahannock, Culpeper, Orange, and Madison are predominantly rural. Fauquier County, averse to growth until the late 1990s, has experienced most of its growth along Interstate 66 and Routes 15 and 17.

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In PD 16, Tim Ware is the Executive Director of the George Washington Regional Commission. “The big growth area here has been Stafford County [in recent years]. They just keep on keeping on. Spotsylvania is approving development which continues to put pressure on the environment as well as roads and transportation. That’s the number one issue in the region, transportation,” Ware said. Both Stafford and Spotsylvania Counties have sprawling development off of Interstate 95 and, with the expansion of the I-95 HOT lanes last year, still provide relatively short commute times considering their distance away from Northern Virginia and Washington, DC. Ware, when asked why local governments have not planned for more mixed-use development, cited the transportation system, saying that it comes down to “getting people from A to B.” Essentially, the land use patterns reinforce themselves and new development follows already established auto-dependent patterns.

Erik Nelson, a senior planner in the City of Fredericksburg with over 25 years of experience in the area, points to issues beyond local control that have facilitated sprawl: “It’s a result of the national highway system. We have such a pattern nationwide and we have subsidized the overall development and that’s why you have spread out areas. Certain counties are picking up the idea of nodes and denser development but it’s not universal…here in the City, we have the advantage of the street grid which gets extended at least until traditional suburbs.” Beyond the impact of the highway system, Nelson believes compact, mixed-use development doesn’t work in these regions because of the way infrastructure is laid out and paid for as well as a lack of desire from the general public who have been content with sprawl.

Looking at the Metrics in PDs 9 and 16

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24 Tim Ware, interview by author, Fredericksburg, VA, March 16, 2016.
Having established a connection between development patterns and environmental sustainability earlier in this report, it is important to localize these issues within Planning Districts 9 and 16. With nine different local histories of planning decisions, this paper does not explore this research question for each individual political jurisdiction; rather, aggregate data for the combined localities are used and compared to benchmarks. For the metrics described below, data from the U.S. Census Bureau, the Virginia Department of Transportation, and a national study for the UC-Berkeley can shed light on both regions.

Vehicle Miles Traveled

Greenhouse gas emissions are the most notable driver of human-induced climate change as described by Ewing et al.\textsuperscript{26}. The authors point out that the primary greenhouse gas burned into the atmosphere is carbon dioxide, almost 20 pounds of which is released for every gallon of gasoline burned\textsuperscript{27}. If the earth is going to see marginal rather than drastic increases in average temperatures, scientists estimate global emissions will need to decrease to between 60 and 80 percent of their 1990 levels. Since the burning of carbon dioxide through transportation related means accounts for 33 percent\textsuperscript{28} of all carbon dioxide emitted in the United States, there is a necessity for alternatives for the way our transportation systems are planned and developed. While increasing fuel economy and making the carbon content of fuel more environmentally friendly are worthwhile endeavors, Ewing et al. note that despite these investments, their benefits are expected to be offset by increases in VMT\textsuperscript{29}. Even though VMT increased at a faster rate

\textsuperscript{26} Ewing et al., \textit{Growing Cooler}, 1.

\textsuperscript{27} While it seems unusual that one gallon of gasoline, weighing just over six pounds, could produce almost twenty pounds of carbon dioxide, Daniel Engber of \textit{Slate} writes that hydrocarbons from the gasoline, when burned, break apart and then recombine with oxygen atoms. “How Gasoline Becomes CO2.” \textit{Slate}, November 1, 2006.

\textsuperscript{28} More recent estimates, such as those from the U.S. Energy Information Administration in 2013, show that this number is now closer to 28 percent.

\textsuperscript{29} Ewing et al., \textit{Growing Cooler}, 2.
than total population from 1980 to 2005, VMT has either decreased or grown marginally since then. Figures 6-11 show the changes in population and VMT in the U.S., Virginia, and PDs 9 and 16 from 2004 to 2014. (Note: VMT statistics for the U.S. and Virginia are annual while in PDs 9 and 16, data was available as daily VMT which was then multiplied to show annual totals.)

Figure 6. U.S. Population and Annual VMT, 2004-2014.

Source: ACS 5-Year Estimates, U.S. Census Bureau, Federal Highway Administration
Figure 7. Percent Change in U.S. Population and Annual VMT, 2004-2014.

Source: ACS 5-Year Estimates, U.S. Census Bureau, Federal Highway Administration

Generally, between 2004 and 2014, the U.S. population grew between one half of a percent and one percent while VMT fluctuated and did not correspond to overall population changes. The most likely explanation for the significant drop in VMT in 2008 and 2009 is the economic recession which, due to financial constraints, kept both commercial and personal trips down. In 2014, total VMT started approaching its pre-recession totals.
Trends in Virginia were roughly the same as they were nationally for the same time period. Population rose steadily but VMT rose and fell as much as one and a half percent during
recession years. Virginia population started growing at a slower rate in 2012 but VMT increased in both 2013 and 2014.

Figure 10. PD 9 and 16 Population and Annual VMT, 2004 and 2014.

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<tbody>
<tr>
<td>Caroline</td>
<td>24,019</td>
<td>29,778</td>
<td>759</td>
<td>943</td>
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<tr>
<td>Culpeper</td>
<td>40,192</td>
<td>49,166</td>
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<td>68,248</td>
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<td>25,371</td>
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<td>Madison</td>
<td>9,226</td>
<td>13,157</td>
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<tr>
<td>Orange</td>
<td>28,970</td>
<td>35,026</td>
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<td>297</td>
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<tr>
<td>Rappahannock</td>
<td>7,171</td>
<td>7,361</td>
<td>108</td>
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<tr>
<td>Spotsylvania</td>
<td>111,850</td>
<td>129,188</td>
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<tr>
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<td>139,992</td>
<td>1,381</td>
<td>1,549</td>
</tr>
<tr>
<td>Fredericksburg</td>
<td>20,458</td>
<td>28,350</td>
<td>344</td>
<td>339</td>
</tr>
</tbody>
</table>

Source: University of Virginia Weldon Cooper Center for Public Service, Virginia Department of Transportation.
Between 2004 and 2014, population increased in each of the PD 9 and 16 localities. Stafford County saw the largest population growth with over 25,000 people while Rappahannock County only grew by a couple hundred people. Annual VMT increased substantially in some places and actually dropped in Madison County, Rappahannock County, and the City of Fredericksburg. Caroline County, Culpeper County, Spotsylvania County, and Stafford County each saw significant increases in VMT during this time period.

Figure 11. PD 9 and 16 Percent Change in Population and VMT, 2004 and 2014.
<table>
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<tr>
<th></th>
<th>04-09 %</th>
<th>14-15 %</th>
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</thead>
<tbody>
<tr>
<td>Fredericksburg</td>
<td>-1.4</td>
<td>38.6</td>
</tr>
<tr>
<td>PD 9</td>
<td>6.9</td>
<td>16.2</td>
</tr>
<tr>
<td>PD 16</td>
<td>13.8</td>
<td>21.4</td>
</tr>
<tr>
<td>Virginia</td>
<td>3.0</td>
<td>10.9</td>
</tr>
<tr>
<td>U.S.</td>
<td>1.7</td>
<td>8.8</td>
</tr>
</tbody>
</table>

Source: ACS 5-Year Estimates, U.S. Census Bureau, Federal Highway Administration, University of Virginia Weldon Cooper Center for Public Service, Virginia Department of Transportation.

This final chart showing percent change in population and VMT for each locality, each Planning District, the state of Virginia, and the U.S. shows differences in the growth rates of each category between 2004 and 2014. U.S. population grew by 8.8 percent and Virginia grew by 10.9 percent. Each jurisdiction except for Fauquier County and Rappahannock County grew twice as much as the U.S. and six jurisdictions grew twice as fast as Virginia.

Percent change in VMT in the U.S. was 5.18 times less than percent change in population growth. In Virginia, percent change in VMT was over 3.63 times less than percent change in population. The national and state trends are different from the individual localities in this analysis. Two localities (Caroline County and Culpeper County) actually saw a greater percent change in VMT than in population. In PD 9, percent change in VMT grew by 2.34 times less than percent change in population. In PD 16, percent change in VMT grew by 1.55 times less than percent change in population. For each region, the percent change in VMT growth compared to population growth was not proportional with national and state growth which shows that these regions are experiencing more substantial growth in VMT.

Essentially, between 2004 and 2014, these regions had more VMT growth than what would be expected given their population growth compared to national and state numbers. This means that there are factors at hand that are contributing to greater VMT in PDs 9 and 16 and one of those factors is development patterns. Although trends have since perhaps changed, a 1990 conducted by the EPA noted that development patterns account for 64 percent of changes.
in VMT while demographic factors and market changes account for the remaining 36 percent\textsuperscript{30}. Since these regions are auto-dependent, it makes sense that VMT growth is more substantial given a certain growth in population over this ten-year period. If VMT is going to drop to levels that will allow the U.S. – and, by extension, these regions – to contribute to lower carbon emissions, planners in PDs 9 and 16 will need to change the way in which development is taking place. If population is expected to continue to increase in these regions, there must be a proactive decision for more sustainable development patterns.

The University of Virginia Weldon Cooper Center for Public Service’s Demographics Research Group made a series of population projections for localities in Virginia in 2012\textsuperscript{31}. Figure 12 shows the 10-, 20-, and 30-year projections for each locality in PD 9 and 16.

\textsuperscript{30} U.S. Department of Transportation, Federal Highway Administration, “1990 Nationwide Personal Transportation Survey.”

Figure 12. Population Projections, 2010-2040.

With a total projected increase of 471,197 people in just 30 years, PDs 9 and 16 cannot continue the same patterns of sprawl if they are going to achieve a sustainable future. Stafford and Spotsylvania Counties, in particular, must respond to this demand for growth with strategies that could cope with a doubling of population in such a short time frame. Without planning for changes in the way the built environment takes shape in the coming years, VMT will continue to increase.

Carbon Footprint per Capita
It is well understood that total carbon emissions are greatest in dense places and drop as density decreases. However, the more appropriate way of measuring carbon emissions is not by how much a place emits, but how much that place causes its residents to emit\textsuperscript{32}. Why, in almost every major metropolitan city in the U.S., is carbon footprint per capita in a central city less than in that city’s suburbs? The primary answer is that the development patterns require driving a car for almost every daily trip outside of a central city\textsuperscript{33}. Since transportation related emissions account for roughly one-third of all emissions in the U.S., places that require automobile travel for almost every trip are not going to be sustainable forms of development, especially when compared to walkable, urban places. David Owen writes:

> The real problem with cars is not that they don’t get enough miles per gallon; it’s that they make it too easy for people to spread out, encouraging forms of development that are inherently wasteful and damaging…The critical energy drain in a typical American suburb is not the Hummer in the driveway; it’s everything the Hummer makes possible—the oversized houses and irrigated yards, the network of new feeder roads and residential streets, the costly and inefficient outward expansion of the power grid, the duplicated stores and schools, the two-hour solo commutes.\textsuperscript{34}

Places that fit this description – like much of PDs 9 and 16 – have substantially higher carbon footprints per capita (or household) than urban areas. Figure 13 shows average annual carbon footprint per household in and around Washington, DC. (Note: The higher the carbon footprint, the darker the red; the lower the carbon footprint, the darker the green.)

\textsuperscript{32} Speck, Walkable City, 54.
\textsuperscript{33} Ewing et al., Growing Cooler, 2-3; Speck, Walkable City, 55-57.
\textsuperscript{34} David Owen, Green Metropolis: Why Living Smaller, Living Closer, and Driving Less Are the Keys to Sustainability, (New York: Penguin Group, 2009), 48, 104.
Interestingly, a few places within PDs 9 and 16 have below average carbon emissions per household: the City of Fredericksburg and Town of Warrenton (in Fauquier County). Both of these places are historic small towns with relatively high density (compared to what lies around each place), walkable and pedestrian-oriented streets, and many mixed-use areas. They each have a concentrated, central area with a grid pattern that functions as a downtown where there is a mix of jobs, retail, housing, and entertainment. Conversely, the vast majority of land in these regions has very high levels of carbon emissions per household, described in Figure 14.
Figure 14. Average Annual Carbon Footprint per Household in PD 9 and 16.

<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>Metric Tons of Carbon Dioxide per Household per Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caroline</td>
<td>52.20</td>
</tr>
<tr>
<td>Culpeper</td>
<td>54.40</td>
</tr>
<tr>
<td>Fauquier</td>
<td>62.00</td>
</tr>
<tr>
<td>King George</td>
<td>54.40</td>
</tr>
<tr>
<td>Madison</td>
<td>52.70</td>
</tr>
<tr>
<td>Orange</td>
<td>51.80</td>
</tr>
<tr>
<td>Rappahannock</td>
<td>54.30</td>
</tr>
<tr>
<td>Spotsylvania</td>
<td>57.40</td>
</tr>
<tr>
<td>Stafford</td>
<td>61.10</td>
</tr>
<tr>
<td>Fredericksburg</td>
<td>41.00</td>
</tr>
<tr>
<td>PD 9 Average</td>
<td>55.04</td>
</tr>
<tr>
<td>PD 16 Average</td>
<td>53.22</td>
</tr>
<tr>
<td>Virginia</td>
<td>51.20</td>
</tr>
<tr>
<td>U.S.</td>
<td>48.50</td>
</tr>
</tbody>
</table>


Nationwide annual carbon footprint per household was 48.5 metric tons in 2013 and the state average for Virginia slightly higher at 51.20 metric tons. The most compact, dense locality – the City of Fredericksburg – had a significantly smaller carbon footprint per household than the
national and state average as well as any other locality. The three localities with the most sprawling development – Stafford County, Spotsylvania County, and Fauquier County – had the highest carbon footprints per capita and this is largely due to the amount of driving and transportation related emissions coming from these places. Once again, using these metrics helps planners understand the way land use decisions and carbon emissions are interrelated. For these localities, as a whole, to move toward a more environmentally sustainable future, they will need to accommodate the expected population growth with compact, dense development that will support future transportation alternatives.

These two metrics, VMT and carbon footprint per household, help in understanding the way development patterns contribute to climate change. Any type of development – from archetypal sprawl to the most compact of communities – will contribute to climate change. However, the data described above makes it clear that the suburban and rural development patterns in PDs 9 and 16 that require automobile use for virtually every trip are less environmentally sustainable than more compact development. It is also worth noting that this paper only explores the environmental and climate ramifications of development patterns in these regions. Much has been written regarding the economic, social, and health benefits of more compact development and while this literature is certainly valuable, the environmental concerns addressed here must be of utmost importance as these regions consider the costs and benefits of what type of development they are going to allow and encourage in the coming years.
2. What planning tools and strategies can be used to make these regions more sustainable?

Sprawl is not unique to PDs 9 and 16. In every metropolitan area of the country, suburban sprawl is the dominating type of development outside central cities. Some regions have been more progressive in fixing sprawl and planning for alternative types of development than others and as a result, we now have a number of tools and strategies planners can actually use to change the status quo of sprawl. As aforementioned, many of the issues that lead to and result from unsustainable development patterns are beyond the capacity of planners but this does not exclude them from playing an active role in the push for greater environmental sustainability. This section explores how planners can update zoning texts and maps, work to retrofit failing suburban development, and educate the public through dissemination of informational materials highlighting the costs of continued sprawl.

Rewrite Local Zoning Texts, Update Zoning Maps, Ensure Consistency with Future Land Use Map

All development that occurs within PDs 9 and 16 fits somewhere within local zoning texts. Whether a new suburban office park, a subdivision of agricultural land, or a planned unit development that does not quite fit a given zoning classification but provides superior benefits, all forms of new development are approved or denied based on what local governments have permitted in their zoning code or ordinance. With over 400,000 additional residents expected between these regions in the next 30 years, it will be essential to update or rewrite zoning texts that actually encourage low-density development in places where higher densities and a mix of uses would be more appropriate in light of sustainability concerns. Since a significantly large proportion of expected population growth will be taking place in Stafford and Spotsylvania Counties, the examples below will come from places within these counties:
As one of the fastest growing localities in the state, Stafford County has, over the years, developed an urban services area (USA), to help confine development along I-95, U.S. 1 (which runs roughly parallel to I-95), U.S. 17, and Route 610. The USA is outlined in red in Figure 15. The light green color that takes up most of the area of the county shown on this map is for A-1, or agricultural, which the county defines in their zoning ordinance as “areas for traditional agricultural activities and to provide for their continuation as well as preservation of areas of rural character.”
Based on the existing landscape of these agricultural and low-density areas, such a definition is suitable. However, when the county’s future land use plan (Figure 16) has urban development areas (purple) and suburban (yellow) in places that are zoned agriculturally, there is a mixed signal given to developers. It is one thing to keep areas zoned in such a way that preserves their character, but if the county wants to keep growth along I-95 and within or close to the USA, it would make sense to consider changing the zoning so that developers would have less difficulty in the planning process. Today, a mixed-use, walkable development proposal less than a mile from I-95 might need to go through a rezoning, special use permit, or planned unit development process – each of which add significant financial burden to the developer. Again, growth should not carry a negative connotation. It is unsustainable, sprawling growth that should be prevented. As more and more residents move to Stafford County, where will they go? With agricultural zoning in places that are intended for higher densities in the future, nothing is stopping a developer from subdividing one or two parcels into more low-density, auto-dependent
housing. The county must strike a balance between what they allow for in their zoning ordinance and what they want or expect to see in the future. It is certainly possible to up-zone certain places for higher densities while grandfathering existing development into a special type of overlay within the USA.

Figure 17. Spotsylvania County Zoning Map.

A snapshot of northwestern Spotsylvania County’s zoning map is not unlike Stafford County’s in that there is a substantial amount of land zoned for rural (light green) and agricultural (green) uses in places close to transportation including a newly opened commuter rail station. There is a mix of planned development housing (purple) and R-1, or low-density residential, zoning near I-95 as well.
The future land use map in the county’s comprehensive plan creates a far different build-out scenario than what current zoning encourages as far as development patterns. The majority of land along U.S. 17, I-95, and U.S. 1 is commercial (red), mixed-use (pink), and employment centers (purple). Once again, it is difficult to imagine mixed-use development in land that is today zoned agriculturally or rurally. Quickly growing localities must be able to actually facilitate compact, mixed-use development in their zoning ordinances. Even counties that are experiencing less growth than Stafford County and Spotsylvania must decide what type of development they are going to encourage and upon doing so, ensure that the current zoning map creates an efficient way for developers to build.

Many of the local zoning texts that exist today reflect the anti-growth sentiments of residents in low-density areas. There are undoubtedly some valid reasons for keeping most rural residential, agricultural, and open space lands zoned to preserve what is existing. However, there is also good reason to zone undeveloped places – even open space in some cases – for compact
development if they fit certain criteria. The zoning classification of a given part of a county should not merely reflect what currently exists but also what should exist in the future with regard to infrastructure, transportation, and nearby amenities. If compact development is ever going to be possible, there must be appropriate zoning classifications in the right places that explicitly call for it. Otherwise, developers will continue to build single-family homes in low-density subdivisions, further and further away from collector roads and highways that will inevitably lead to more of the same. It is not enough to have a future land use plan that calls for a certain type of development if there is not also a zoning ordinance that allows for it without adding undue burden to a developer.

For example, if a place in Spotsylvania County along the I-95 corridor has open space on either side of a collector road and this area is zoned for low residential development, as illustrated by Figure 17, it would presumably follow that whenever the market conditions are right for a developer, they will build a low-density subdivision or office park in that space and do so by right. If, however, the zoning for that area calls for compact development, this is what the county would see in the future. This is not to say that all undeveloped places in each jurisdiction should be zoned for compact development. In fact, most of them should be left alone as they are of immense ecological and aesthetic importance. The point is that by zoning for compact development in the right places, localities are likely to reap the economic, social, and environmental benefits of such decisions with the expected jump in population in the next 30 years.

Retrofit Suburban Development Patterns

Retrofitting suburban development patterns has become a recent trend in urban planning throughout the country. Case studies and best practices have been carefully documented by the
likes of Ellen Dunham-Jones and June Williamson in *Retrofitting Suburbia: Urban Design Solutions for Redesigning Suburbs* in 2011 and Galina Tachieva in *Sprawl Repair Manual* in 2010. While both books focus on the economic and social failings of current sprawling development, this paper has established the environmental consequences as well. If planners in localities that have experienced any form of sprawl over the last half-century can find ways to actually redesign places through public-private partnerships or other means, it would create a plethora of opportunities for infill and redevelopment. PDs 9 and 16 each provide a number of candidates for places where suburban retrofits would help shape a new, more sustainable built environment.

Tachieva describes the difference between what she calls the neighborhood unit model and the sprawl model\(^3^5\). The neighborhood unit model has the following:

- The physical size of the neighborhood is defined by a five-minute walk from its geographic center to its edge, covering approximately a quarter of a square mile.
- The basic needs of daily life are available in close proximity. The neighborhood offers transit, employment, shopping, plus civic and leisure activities.
- Streets form a connected network, providing alternate routes that help disperse traffic, and are equitable for vehicles, pedestrians, and bicyclists.
- Diversity in the type, size, and disposition of buildings, streets, open spaces creates many options in environments, experiences, functions, uses, prices, and populations.
- These attributes contribute to the conservation of energy, natural resources, farmland, open space, time, and money.

Sprawl, on the other hand, typically has these characteristics:

- Commercial, residential, and civic uses are separated from each other with no regard for distance.
- Daily needs are accessible only by car.
- Roads are arranged in a discontinuous pattern that reduces the choice of route and mode of transport, and creates congestion.
- The elements of sprawl are separate pods containing singular building types, sizes, and dispositions, leading to a limited range of environments, experiences, functions, uses, prices, and populations.
- These attributes contribute to the less-efficient use of energy, natural resources, farmland, open spaces, time, and money.

For retrofitting to work, planners must first recognize opportune sprawl, defined here as places that would fit the description for sprawl but show potential for increased density and a mix of uses, and then work with current landowners and developers to redesign and repurpose these places. By understanding the core differences between the neighborhood unit model and the sprawl model, there is a chance to retrofit some suburban places into functioning, cost-effective, and environmentally sustainable places.

Tachieva further argues that “to be most effective, sprawl repair must begin at the regional scale and consider the larger context – existing infrastructure, thoroughfare connectivity, potential for transit and goals for preservation and regeneration of natural systems”36. This idea of taking a regional approach is central to the recommendations provided later in this paper. With a regional perspective for retrofitting, planners can take into account the projected demographic and employment changes in a place. Not every type of sprawling development pattern is suitable for retrofitting. Rather, as Tachieva points out, “The objective is to analyze transportation, other infrastructure, and natural areas as a complete system to identify the nodes best suited for repair.”37 In Planning Districts 9 and 16, there are market conditions, projected demographic changes, and natural resources concerns that make some places better than others for retrofitting. This is why it is necessary to understand sprawl as a regional issue and work to fix its byproducts from a regional perspective.

What types of retrofits can take place in these regions? Below are three examples within PDs 9 and 16 that would be well suited to undergo a design retrofit.

Figure 19. U.S. 17 in Stafford County near I-95.

36 Ibid, 33.
37 Ibid.
Stafford County is one of the fastest growing localities in the state. As residential and commercial development has grown rapidly in recent years, the areas that have seen the most changes to the built environment are the collector roads leading to I-95 (seen above to the right side of the image). U.S. 17 in the southern part of the county has seen dramatic commercial growth, all of which has been entirely auto-dependent. Some of the most valuable land in the county is covered in surface parking lots for various commercial and industrial users. Located within the urban services area and within close proximity to many residential areas, the U.S. 17 corridor should be a prime target for a retrofit of its form.
Located just north of the historic Town of Warrenton, U.S. 17 Business is a typical commercial corridor with big box stores, surface parking lots, and a separation of uses. Nearby residential densities are relatively high and there has been a fair share of new development in recent years. When market conditions are favorable, this location would also be suitable for design retrofit that incorporates a mix of uses and offers better connectivity for pedestrian users.
Perhaps the best potential retrofit site is U.S. 1 in Spotsylvania County just south of Exit 126 on I-95. New, dense residential development has taken shape in recent years as the county’s population has grown. While there is still a separation of uses, there is a strong potential for alternative design options given the amount of residential and commercial development in a relatively small area. The addition of a new VRE commuter rail station nearby will also facilitate more development in this area. If county staff can work closely with developers, this location could be a mixed-use, walkable hub for the county and beyond as it continues to grow.

While only a relatively small number of places in the PD 9 and 16 localities are truly sprawl in their form, it is nevertheless worthwhile to work with developers on retrofitting them because it not only changes the form and function of the existing place but it also sets a precedent for the type of development these localities should want to encourage. When the market is right, whether in two or ten years, places with heavy development pressure must focus their efforts away from greenfields and toward areas that can be revitalized.

Educate the Public through Outreach and Engagement

The land use decision-making mechanism in each PD 9 and 16 jurisdiction is roughly the same: a developer will approach staff with a proposed project; after working with developer, planning staff and other government agencies will either recommend approval or denial to the governing body; the governing body will either approve or deny the proposed development. Despite the oversimplification, what this essentially illustrates is that elected officials get the final say in land use decisions. Ideally, the elected men and women in office reflect the values of their constituents. If sprawl has become the predominant type of land use pattern in these regions, it is not as simple as saying planners are the only ones at fault. In truth, the elected officials who approve development and the citizens who elect these men and women to office
have been compliant in the growth of sprawling development throughout each region. James Howard Kunstler, quoted in Ziegler, offers this insight:

So the suburbanites become NIMBYs (Not In My Back Yard) and BANANAs (Build Absolutely Nothing Anywhere Near Anything). If they’re successful in their NIMBYism, they’ll use their town government to torture developers (i.e. the people who create growth) with layer upon layer of bureaucratic rigmarole, so that only a certified masochist would apply to build something there. Eventually, all this unwanted growth leap-frogs over them to cheap, vacant, rural land farther out (controlled by politicians hungry for “rateables”), and then all the new commuters in the farther-out suburb are choking the NIMBY’s roads anyway to get to the existing mall in NIMBYville.38

In and around the City of Fredericksburg, there was a grassroots political movement in the early 2000s to slow growth called Voters to Stop Sprawl39. Although it has since dissolved, their mission was to fund and support politicians who would make an effort to try and control growth. Many advocates, like lawyer Thomas Savage, recognized the symptoms of the early stages of sprawl: “We’re firing a shot across the bow…Our region is not dying. It’s morphing into road congestion, polluted water and poor air quality, and our quality of life is going down the toilet”40. The issue that came to a head in many of the PD 9 and 16 localities at the time was the realization that growth is not the issue; the type of growth is the issue. Instead of advocating for smart growth and compact development, these anti-sprawl movements pushed for higher developer costs which hurts affordability for the owner or renter and lower densities which perpetuated sprawl41. Ronald Utt, Ph.D. writes:

Typical of such a [regulatory] barrier implementation process is what has recently occurred in Stafford County, Virginia where the population grew by 47.5 percent between 1990 and 2000. In an effort to slow such growth and upgrade its demographics to ensure that new arrivals possessed the tax paying capacity likely

40 Ibid.
to yield net new revenues of a sufficient magnitude to cover net new costs, Stafford began imposing a series of barriers on new home construction. Beginning in 1999, the county imposed “mandatory proffers” which operate much like impact fees, which in Virginia are illegal under state law. Imposed on builders seeking to rezone land to construct homes or apartments, these “proffers” were set at $20,399 for a single-family detached house, $19,301 for a town house, $9,807 for an apartment, and $10,523 for a mobile home.42

Utt goes on to note that once these barriers failed to achieve desires results, the county slowed the permit process, downzoned various parts of the county, required mandatory amenities like sodded rather than seeded lawns, and blocked proposals by changing the zoning of various parcels that were planned for development43. If the political activists achieved anything in the early years of the new millennium, it was an environment more favorable for continued sprawl. With 14 years of hindsight, this is precisely what transpired. It is safe to say that even those in the general public who want to stop sprawl do not always know the best way to reach the desired outcomes.

How can planners actually educate the general public? Of course, there are already public meetings wherein planners provide the local governing body of a given jurisdiction with their recommendation on a proposal, town hall style meetings, and other various public engagement strategies. With very few exceptions, none of these meetings are used primarily to actually educate the public on a given topic. While it would be unwise to try to advance any type of agenda that has political ramifications, there is nothing preventing local and regional planners from finding new and creative ways of disseminating data they collect. For instance, planning departments could gather data – such as changes in land cover or impervious surface area – and publish a brief informational flyer on their website. Other strategies might include using the local newspaper, in print or online, to spell out in simple terms what types of decisions are being made

42 Ibid., 1-2.
43 Ibid., 2.
regarding land use in the area. A third idea would be to provide monthly or quarterly pamphlets that detail what new development has taken place or is being proposed.

Educating the public – although perhaps not a conventional planning tool – could help to change the current paradigm of sprawl. If residents of these jurisdictions see growth as the enemy and there is another 400,000 people expected in the next 30 years, there is a problem that needs solving. Growth is not the enemy; rather, irresponsible growth is the most significant threat to these places. Ziegler continues:

Before they are willing to adopt more compact living, they must come to believe that the benefits of smart growth outweigh the detriments of sprawl. Greater density living will not be palatable until the harms caused by sprawl – congested highways, air pollution, diminished water quality, and loss of open space – are viewed as unsolved without the use of more smart growth techniques. Thus, even if planners and lawyers can draw up a perfect smart growth code, political pressures may prevent its adoption or compromise its administration once adopted.  

There must be a way to move away from the status quo of sprawl and part of any workable solution will be a shift in the way the populations of these places think about sprawl. Even by spending minimal time and effort on educational materials, planning departments could help their citizens understand the detrimental effects of what current lifestyle preferences are achieving. And by doing so, even beyond the immediate effect of greater knowledge among the citizenry, planners have the chance to advance greater dialogue and action among local residents who want to play a part in planning decisions. It is no secret that oftentimes, local planning efforts ebb and flow with the political climate of the day. If more citizens in PD 9 and 16 localities understand concepts such as density, parking minimums, transit-oriented development and the like, there is a greater chance that these ideas will come to the forefront of political discourse as well.

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44 Ibid., 61.
3. Are localities in Planning Districts 9 and 16 better able to plan for environmental sustainability on their own or in a regionally coordinated effort? What are the barriers to regional planning?

To answer this question, it is first necessary to understand that these issues – sprawl, sustainability, and transportation and land use decision-making – are both local and regional concerns. It is often said that environmental threats such as poor air and water quality, pollution, habitat fragmentation, and ecosystem disruption are issues that transcend local boundaries but they do not fall into regional boundaries either. It is not as simple as making the case for one or the other; these issues must be approached in a multifaceted way. Jeff Walker, former Executive Director of the Rappahannock-Rapidan Regional Commission said, “The caveat [to planning for sustainability] is that sustainability is an elusive term. It is, inherently, going to mean different things to different people because it filters through your own politics and your own values. It is not one or the other – local or regional – it needs to be multi-level, period.”45 For a variety of reasons, it is most frequently through a local lens that these issues are addressed since governance and decision-making structures are set up at the county or city level. Since planning has such a vital role to play in how environmental sustainability issues are tackled, the question must be asked whether there needs to be a more regional perspective in how these issues are understood and, more importantly, addressed.

The governance and planning structures in Virginia are perhaps the most significant barriers to effective regional planning. Erik Nelson, a senior planner in Fredericksburg, notes that “It’s nice if we can talk about [environmental sustainability] at a regional level…There is a certain amount of stuff that has been talked about regionally but nobody talks about it in their comprehensive plans. Every [locality] has to write their own code. And that’s what it comes

45 Walker, interview by author, March 3, 2016, Culpeper, VA.
down to. In Virginia at least, regional commission boards are comprised of local elected officials. It’s very political and no one wants to step on anyone’s toes.”46 Tim Ware, Executive Director at the George Washington Regional Commission echoes this sentiment in saying, “We have no political agenda. We are here to do what our local governments ask us to do…We just listen to our [local] elected officials.”47 It is well beyond the scope of this analysis to examine the positives and negatives about the governance structures in Virginia and how they affect planning decisions. The issue is that, as a result of how regional commissions are set up and managed, dating back to the 1960s, it is difficult to have anything beyond advisory planning services at a regional level. Asked if this is ever likely to change, each of the interviewees for this analysis said no, citing the tricky political climate in Virginia. Regardless, there is nothing that would prevent member jurisdictions of each regional planning commission voluntarily engaging in more substantial regional planning.

Since 2010, the American Planning Association has created a series of documents to improve local comprehensive planning. In 2015, APA published *Sustaining Places: Best Practices for Comprehensive Plans* in which the authors outline what can and should be done to address sustainability issues through local comprehensive planning by reviewing best practices. The study includes a set of required principles, processes, and attributes as standards for sustaining places. One of the six required principles for a comprehensive plan, as defined by the document’s predecessor, *Sustaining Places: The Role of the Comprehensive Plan*, is Responsible Regionalism which is defined as “[ensuring] that all local proposals account for, connect with,

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46 Nelson, interview by author, March 16, 2016, Fredericksburg, VA.
47 Ware, interview by author, March 16, 2016, Fredericksburg, VA.
and support the plans of adjacent jurisdictions and the surrounding region.”48 The report continues:

Because regional agencies coordinate the activities of groups of local governments, they provide an institutional setting for joint decision making that transcends local politics. From the local government perspective, the plans and policies of adjacent jurisdictions have reciprocal impacts, in terms of factors such as the location of new development, commuting patterns, and stormwater flows. Therefore, connecting these plans and policies through the comprehensive plan is a way to understand and manage these and other overlapping functions, such as regional greenway systems, and to responsibly integrate a community’s plan with those of its neighbors.49

Despite the potential benefits of incorporating regional thinking into local comprehensive plans, very few local jurisdictions actually do this. In PDs 9 and 16, only the City of Fredericksburg and King George County (and to a much lesser extent, Rappahannock County) have a regional component or chapter within their comprehensive plans although a few others simply mention regional coordination for transportation planning. Under “Principles for a Livable Community” in the Fredericksburg comprehensive plan, regionalism is listed, as are five best practices to support it. Further, in Appendix A of the document, the five best practices are described and these would serve as a proper model for other localities to emulate:

1. Coordinate local land use planning with regional transportation investments.
2. Coordinate local open space plans with regional green infrastructure plans.
3. Encourage development patterns that can sustain transit.
4. Continue to promote regional cooperation and inter-jurisdictional agreements for services and infrastructure.
5. Encourage consistency between local capital improvements and regional infrastructure priorities.

While perhaps not surprising that only one of the jurisdictions has a regional element, this fact does not bode well for improved regional coordination. Theoretically, each jurisdiction supports regionalism because they are part of a regional planning district but if the primary, local, guiding

49 Ibid., 18-19.
policy document does not include any mention of regionalism, it is hard to argue that member jurisdictions are actively pursuing greater regional coordination and planning. If environmental sustainability is best achieved through a regional approach, there must be greater emphasis in guiding policy documents and specifically, the local comprehensive plan.

The truth is that environmental sustainability issues are best approached from local and regional perspectives but today, only local planning efforts are actively engaging these issues in PDs 9 and 16. At most, the regional commissions are providing overarching advisory services such as GIS assistance and green infrastructure plans. From a regulatory and forward-thinking, planning perspective, very little can be done in terms of approaching environmental sustainability until elected officials of member jurisdictions willingly push for this to happen.

Peter Calthorpe explains that there is an inherent push against regionalism:

> Such a major reordering of government policies and subsidies will take a powerful political coalition. The coalition against such integrated planning can be large: localities looking for growth and tax base regardless of development quality or regional implications; developers looking for opportunities to repeat past successes without regard for changing times or consequences; neighborhood groups hoping to preserve and enhance property values by exclusionary practices; and people (i.e. voters) simply afraid of the unknown or a loss of control. The forces for the status quo are powerful drives that are self-reinforcing. The defensive desire for a secure and exclusive private domain and the tendency of specialists to maximize segments rather than wholes, both conspire to inhibit change.50

The George Washington Regional Commission conducted a strategic assessment in 2012 in which they surveyed staff, board members, member government employees, nonprofit agency staff, and various other stakeholders regarding the role of the agency and its practices. Below are some of the responses when asked, “What concerns you about GWRC?”:

> “Lack of local political commitment to financially support the organization and realistically consider opportunities for regionalization of programs and services that can be more cost-effectively delivered on a regional scale.”

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“There is no regional planning, only reacting to problems. With elected officials in charge, there is little hope for improvement, votes come first, and all else is second place.”

“GWRC is somewhat isolated from local government. More outreach and/or more frequent presentations before the governing bodies may raise the profile of services available or collaborative opportunities.”

“I’m not sure that I know as much about what GWRC gets ‘done,’ so much as things it studies…I value the research, very much so, but would like to hear more, more regularly about this research is used in shaping advocacy efforts.”

Although a relatively small sample, these responses help illustrate some of the issues associated with the way regional planning is carried out in PD 16 and to no fault, necessarily, of the GWRC but rather the way in which the regional commission fits into the political agendas of local elected officials. While the Rappahannock-Rapidan Regional Commission does not have a comparable document, it is likely that they face some of the same issues in PD 9 given that their board, staff, and funding are set up in the same way as the GWRC.

Despite the overwhelming barriers to effective regional planning, the fact remains that issues such as environmental sustainability and sprawl are best approached through a regional lens. Until regional commissions are given the funding, direction, and capacity to carry out more forward-thinking, strategic planning studies and policies surrounding these issues, the problems we see today in each region will continue to grow and become further away from the scope of local planning. The recommendations at the end of this analysis offer some guidance regarding how to achieve greater environmental sustainability in the future as populations grow in light of the weaknesses of the existing governance structures that inhibit effective regional planning.

Urban Planning Recommendations

1. *Regional planning commissions should work with member jurisdictions to create a regional comprehensive plan.*

   The only way to move away from making land use decisions without regional consideration is to create a guiding policy document that is explicitly regional. While it is doubtful that there will ever come a time where such a document would be mandated from the state, there are no legal barriers in the way of member jurisdictions choosing to create one through a collaborative effort. Populations across the country have understood that sprawl – among other planning topics – is a regional issue. The sooner the residents of PDs 9 and 16 realize this, the sooner they would push for elected officials who would give consideration to planning regionally.

   A regional comprehensive plan would have the same general elements as local comprehensive plan, be updated every five years, and each updated local comprehensive plan must comply and include a regional element to ensure congruency among planning documents. This will require localities to consider their own land use decisions in light of regional needs and can only be done by mutual agreement among localities. As the guiding planning and policy document, a regional comprehensive plan would allow the region as a whole to better be able to plan for environmental sustainability and many other issues inherently regional in nature.

   A number of cities have established regional comprehensive plans in the last 20 years including San Diego, CA and Portland, OR. In the San Diego region, the San Diego Association of Governments, or SANDAG, published San Diego Forward in 2015 and this document combined the regional comprehensive plan and long range transportation plan into one guiding policy document. Working with their 19 member jurisdictions and the state-level Strategic

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Growth Council, SANDAG created a regional plan that incorporated smart growth, multimodal transportation projects, greenhouse gas emissions targets, performance monitors, and live-work centers. While many communities in the region were already talking about these issues, it is not until they are seen in the context of the entire region that they can be more fully understood and, as a result, see better planning practices. The project was also able to receive funding through grants awarded by the Strategic Growth Council, which is a “cabinet level committee to Governor Brown that is tasked with coordinating activities of state agencies to assist in the planning of sustainable communities and addressing climate change.”

If a time comes in Virginia where the state takes a more progressive role in addressing climate change, there may be future opportunities for funding such a plan in PDs 9 and 16.

Portland, OR, on the other hand, has a regional governing body known as Metro that in 1995, published a Regional Framework Plan which has since been updated in 2005, 2010, and 2014. Earlier, in 1992, the Portland region adopted Metro’s charter which gave Metro “jurisdiction over matters of regional concern and required adoption of a Regional Framework Plan.” The Plan covers topics such as regional transportation, protection of lands outside the urban growth boundary, housing densities, settlement patterns, and coordination with nearby jurisdictions. Unlike most places across the country, Metro actually has the authority to make land use decisions that local governments must adhere to. Additionally, Metro’s board is made up of directly elected officials rather than local elected officials from member jurisdictions.

Funding for such a document in PDs 9 and 16 would need to come from member jurisdictions and applying for state and federal grants that support regional planning issues. It is doubtful that without strong political will a regional comprehensive plan could be funded so it

53 Ibid.
would be of great importance to highlight the benefits that would come from such a policy
document, even those that extend far beyond environmental concerns. Today, the only regional
policy document that has a significant impact on land use decisions is the long range
transportation plan, a document that both the RRRC and GWRC have. A regional comprehensive
plan could build on the transportation plan so that transportation and land use topics could be
described and planned for in a joint effort.
2. Regional planning commissions should, through working with member jurisdictions, identify nodes for dense, compact development as the population continues to grow.

Today, it would not be feasible for mass transit beyond the existing commuter rail in these regions due to cost and land constraints. However, with the expected jump in population between now and 2040, threshold densities for fixed-route transit could be reached if development was compact enough and in the right places. It would be wise to end reliance on auto-dependent development – and thus decrease VMT and carbon footprint per capita – by creating a component in the regional transportation plan that would encourage compact development patterns and smart growth.

One way to fix the failings of suburban development is to add density to an existing infrastructure network through redevelopment and infill. Retrofitting suburban developments has come to the forefront of planning in recent years and localities could use consultants who do such work to create a series of plans or proposals that would reshape the automobile-centric built environment of these regions. In Stafford County, language was added to the 2010 update of the comprehensive plan wherein there would be new Urban Development Areas (UDAs) as mandated by the state. Section 3.5 of the plan states:

Urban Development Areas are areas of the County where an urban scale of development is most appropriate. These areas will support a more intense, pedestrian and transit oriented form of development, located in close proximity to primary road networks, transportation hubs, and along the rail corridor. Urban areas are intended to meet the requirements of Section 15.2-2223.1 of the Code of Virginia pertaining to Urban Development Areas. This more urban form of development will allow residents to work, live, shop and play within a relatively small area without fully relying on the automobile. Focus should be on the form of development, incorporating principles of traditional neighborhood design, including, but not limited to, (i) pedestrian-friendly road design, (ii) interconnection of new local streets with existing local streets and roads, (iii) connectivity of road and pedestrian networks, (iv) preservation of natural areas, (v) and mixed-use neighborhoods. Various types of dwellings, community uses
and business activities may locate within the same block or within a single building.\textsuperscript{55}

While this update appears overwhelmingly supportive of compact development – something desperately needed in Stafford County given its population projections – recent opposition to the policy and an update in the state code making UDAs optional are threatening its implementation. The Department of Planning and Zoning website notes:

This requirement [to have UDAs] has since been made optional as the result of changes in state legislation and the County Board of Supervisors has directed the Planning Commission to revise the Future Land Use Plan and Map to amend this land use concept. Prior discussion on the issue has suggested renaming these UDAs as Targeted Growth Areas (TGAs) with the location of, and the amount and type of, growth to be modified to best fit in with the existing conditions and future trends in Stafford County.\textsuperscript{56}

Essentially, the Board of Supervisors has suggested changing the Future Land Use Map to be modified to “fit in with the existing conditions” in the county. In case that is unclear, this means more low-density, auto-dependent sprawling development. This situation is ongoing and it reflects the tendency in these regions, not only in Stafford County, to stick to the prevailing type of development. Regardless of the language used in the comprehensive plan, localities will need to contend with development pressure in a responsible way. Figures 22 and 23 are examples of proposed projects in Stafford County, each within a UDA and with its own set of potential outcomes.


One of the largest projects currently under review in Stafford County is the George Washington Village. Located within an approved UDA, the overall project takes up over 1,000 acres and includes over 2,000 new housing units. The applicant requested a PUD and the original zoning of the parcels was a mix of agricultural, business, and industrial. The Concept Plan pitches the project as being a traditional neighborhood design with a mix of uses which fits in with the goals of a UDA. The issue with this development is that the uses are completely separated and every trip will require a car unless you happen to live right next to the town center area. The proposed layout for the town center area has space for big-box scores with ample parking, something not exactly conducive to walkability or a pedestrian-oriented environment. Beyond the aesthetics, this development will further increase VMT and carbon footprint per capita since new residents will need to drive for every trip.
Unlike the George Washington Village, the proposed Courthouse Village project incorporates a mix of uses and walkable streets within a relatively small area. With a mix of civic, residential, office, and open space, Courthouse Village could potentially become an urban hub for the county and region. This type of development would increase density, facilitate new transportation alternatives over time, and allow residents to access places of work and entertainment by walking or biking.
By identifying nodes for compact development and encouraging growth in these places, regional planning commissions can provide localities with oversight and technical assistance as well as the data, analysis, and maps that support compact development. Even in less populous and dense places such as Rappahannock County and Madison County, both of which have successfully inhibited sprawling growth to certain extents in recent decades, compact development principles can be applied to the little amount of growth that is happening. If more affordable housing is needed, for example, concentrate the additional residences near existing commercial and employment centers. However, since the majority of growth is going to be taking shape in places along I-66 and I-95 in Fauquier County, Stafford County, and Spotsylvania County, it will be important to primarily identify places in these localities where current and future residents can live, work, and play without needing to drive a car for every trip.
3. Regional planning commissions should work with localities to update zoning maps and texts that actually encourage infill and redevelopment in already established areas, places with existing infrastructure, and in places that could eventually contain enough density to allow alternative transportation options beyond the automobile for every trip.

If PDs 9 and 16 are going to lessen the impact additional population will have on VMT and carbon footprint per capita, compact development is a necessity. Building upon the second recommendation above, regional planning commissions will need to help facilitate growth in the right places as well as the right type of growth for eventual transportation alternatives. By updating local zoning texts and maps, creating a strong and politically-supported regional comprehensive plan, and educating the public to garner support for new development patterns, planners can play a significant role in creating places that decrease VMT and carbon footprint per capita. Figure 24 shows the existing rail network in PDs 9 and 16.

Figure 24. Existing Rail Lines in Northern and Central Virginia.

Source: Virginia Department of Rail and Public Transportation.
A 2010 report by the Urban Land Institute described the impact compact development and transit-oriented development can have on climate change\(^57\). Figure 25, described in the report, shows the proportion of trips made by mode and purpose according to the National Household Travel Survey by the U.S. Department of Transportation in 2001. Somewhat unsurprisingly, 87 percent of trips were made by the automobile while only 10 percent were by walking or transit. Interestingly, however, only 18 percent of total trips are for work or are work-related according to the study. This means that with compact development, the vast majority of trips could be made without having to drive which is something sprawl cannot afford. Since so many residents in PDs 9 and 16 commute north to the Washington, DC metropolitan area for work, it is perhaps reasonable to think that more than 18 percent of trips in these regions are for work – and this may be true – but with the national average of 18 percent, it is also reasonable to think that with responsible planning, many daily trips apart from to and from work can be made walking, bicycling, or with public transit if compact development can prevail in these localities.

Figure 25. Trips by Mode and Purpose.


Some might argue that existing densities, especially along rail lines, would not justify increased fixed-route transit capacity whether that comes in the form of more train cars, more tracks, both, or something else all-together. Especially in light of the jurisdiction-wide population density data described in Figure 5, it is difficult to make the case for additional stops or new lines. However, a common misconception in the connection between density and transit is that density thresholds for transit-oriented development must be at a county-wide level\textsuperscript{58}. Jarrett Walker points out, referencing a Paul Mees book titled *Transport for Suburbia*, the problems with saying “transit requires high density”:

> First, it offers no hope to places that are already built at low densities and unlikely to change. Second, it gives public transit in low-density areas an excuse for descending into a cycle of underinvestment, official neglect, and lazy operations, because after all, nobody expects public transit in low density areas to be any good anyway. Third, it invites sweeping claims about transit’s viability based on the overall average density of a city, claims that, as we’ll see, make no sense at all.\textsuperscript{59}

Walker continues by noting that density is a difficult word for two reasons; one, it is hard to define and two, it carries emotions with it, especially in already established low-density places. Regarding the first difficulty, Walker points to a table in Mees’ book showing that on a metropolitan level (total population per hectare), Los Angeles is denser than New York City. This illustration highlights that density means different things at different times, that is it a relative term. In terms of transit, Walker writes, “Transit reacts mainly with the density right around its stations. It is in the nature of transit to serve an area very unevenly, providing concentrated value around its stops and stations and less value elsewhere. So what matters for


\textsuperscript{59} Ibid.
transit is the density right where the transit it, not the aggregate density of the whole urban area.  

The population density caveat in PDs 9 and 16, especially in the three quickly growing counties of Fauquier, Stafford, and Spotsylvania, is that with effective planning, densities can dramatically increase in the coming years. While the additional population might not drastically influence county-wide population density, there is a very real opportunity to increase density around existing and proposed rail stations that would justify new stations and more capacity. In concert with updates to the zoning map that allows for greater densities around the sites identified through the second recommendation in this analysis, regional planners can work with localities to increase densities in the right places. Upon doing so, there is a significant potential for additional commuter rail stations, additional rail lines, and compact development.

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60 Ibid.
Conclusion

“And so I must declare my dissatisfaction with movements to promote soil conservation or clean water or clean air or wilderness preservation or sustainable agriculture or community health or the welfare of children. Worthy as these and other goals may be, they cannot be achieved alone. I am dissatisfied with such efforts because they are too specialized, they are not comprehensive enough, they are not radical enough, they virtually predict their own failure by implying that we can remedy or control effects while leaving causes in place. Ultimately, I think, they are insincere; they propose that the trouble is caused by other people, they would like to change policy but not behavior.” Wendell Berry, “In Distrust of Movements”\textsuperscript{61}

Perhaps the most frightening reality facing urban planners in the United States today is that, despite how well the data reveals how unsustainable our lifestyle is, the status quo of sprawling development continues to prevail. The American dream of the single family home in a large lot subdivision, close enough for a ten-minute drive to Walmart but far enough from the city for peace and quiet, is still the dominating lifestyle choice for many Americans and planners are left finding ways to cope with this reality however unsustainable it may be. For the recommendations in this paper to be implemented – or even seriously considered – it will take more than finding a consensus among planners. It will require local populations of engaged citizens collectively buying into ideas and policies that have, until recently, been foreign to them.

The next 40-home subdivision in Stafford County, complete with the proffers asked for by the county and its citizens, a public park that goes over and above open space requirements, and away from critical conservation areas, will, unless there are any unusual circumstances, probably get a recommendation from the planning department and be approved by the Board of Supervisors. Families will move in and meet their neighbors. Kids will attend local schools. Parents will adjust to their new government jobs in Washington or Quantico. This will all take place without much of a thought given to the regional sustainability issues surrounding this type

of development. In truth, the overall environmental impact of this individual subdivision may not seem too significant. But there is going to come a time – indeed, it is already here in the eyes of many – where reluctance to curtail sprawl is going to reach a breaking point. Ziegler puts it this way:

Local governments often make planning decisions based upon parochial considerations, which not only fail to take account of the problems of sprawl, but in many instances are detrimental. This is partly a result of local protectionist considerations but it also reflects a lack of foresight about the need for controlling sprawl and the government’s inability to perceive its role to protect its own self-interests by controlling sprawl.\(^{62}\)

The steep uphill battle for environmental sustainability playing out in Planning Districts 9 and 16 certainly encapsulates this issue but added to it is the fact that the public is also unaware of the way lifestyle choices, whether imposed upon individuals by the built environment or reinforced by it, contribute to sprawl.

There is no getting around it: unless drastic measures are taken regarding the threats of climate change, the built environment and social systems of the world are at risk. Better planning decisions in Central Virginia are not going to solve global sustainability issues. But they can play a very important role in taking one step at a time in the right direction. Moving toward a sustainable future will take more than what is outlined in this report; federal environmental policy, new technologies, and changing demographics will certainly shape what happens in PDs 9 and 16 in the coming years. Will we emit less carbon with driverless cars? Will the federal government reach consensus and move forward with a national high-speed rail system? Answers to questions such as these will also dictate local decision-making. Regardless of what forces shape the built environment of tomorrow, local and regional planners in PDs 9 and 16 – and

across the world – will need to understand their role, however large or small it may be, and plan for an environmentally sustainable future.
Bibliography


