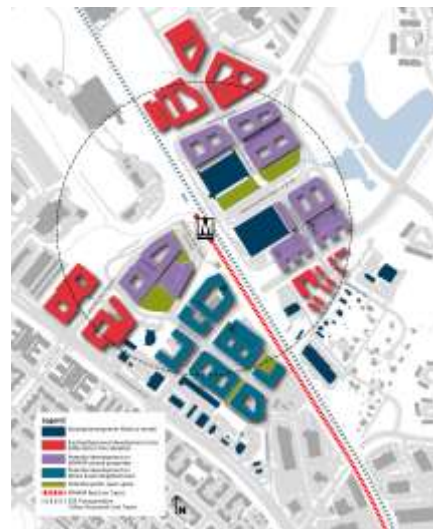
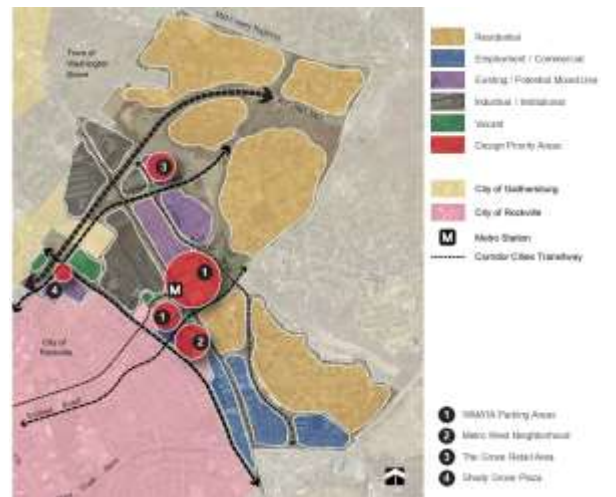


Shady GROVE

MINOR MASTER PLAN AMENDMENT



Planning Board Draft Plan Appendix

Demographic and Economic Profile,
Housing, Environmental Resources, and
Public Schools

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INTRODUCTION

This document supplements the information in the Planning Board's Draft Plan for the 2020 Shady Grove Sector Plan Amendment. These appendices contain technical analysis of demographic data, housing, schools and mobility that supports the recommendations in the Draft Plan.

The first appendix illustrates demographic information derived from the 2010 United States Census Update and American Commuter Survey as well as profiles of the different business sectors within the Sector Plan area. Appendix two provides an overview of housing within the Sector Plan area, including affordable housing and rents within the Study Area. The third appendix details environmental resources in the plan area, and the fourth appendix details public schools information.

A separate transportation appendix supports the mobility recommendations in the Board's Draft Plan, and another report details the Historic Preservation designation for the Derwood Store and Post Office to the County's Master Plan for Historic Preservation.

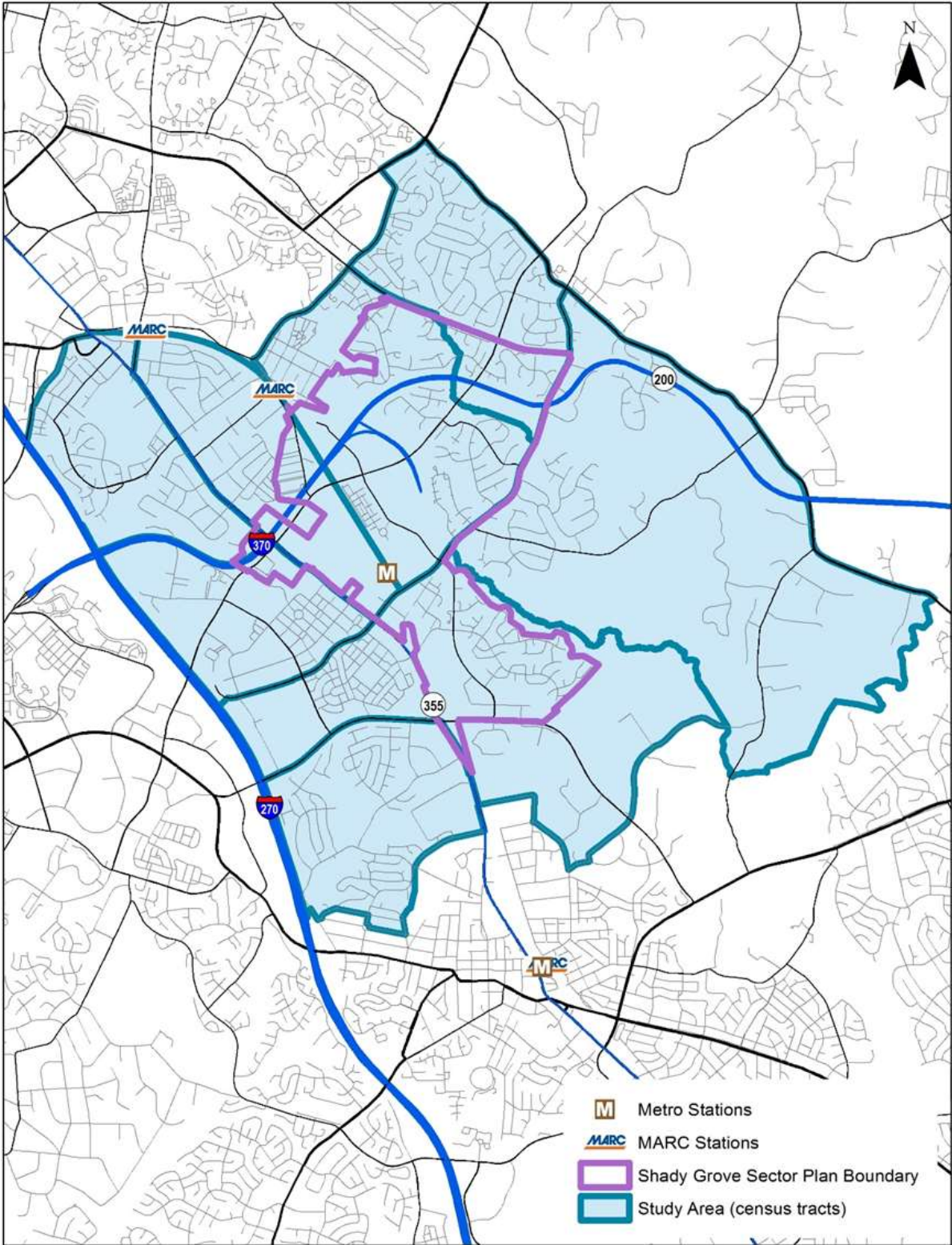
APPENDIX 1: DEMOGRAPHIC AND ECONOMIC PROFILE

Prepared by Lisa Govoni, lisa.govoni@montgomeryplanning.org and Corinne Blackford
Corinne.blackford@montgomeryplanning.org

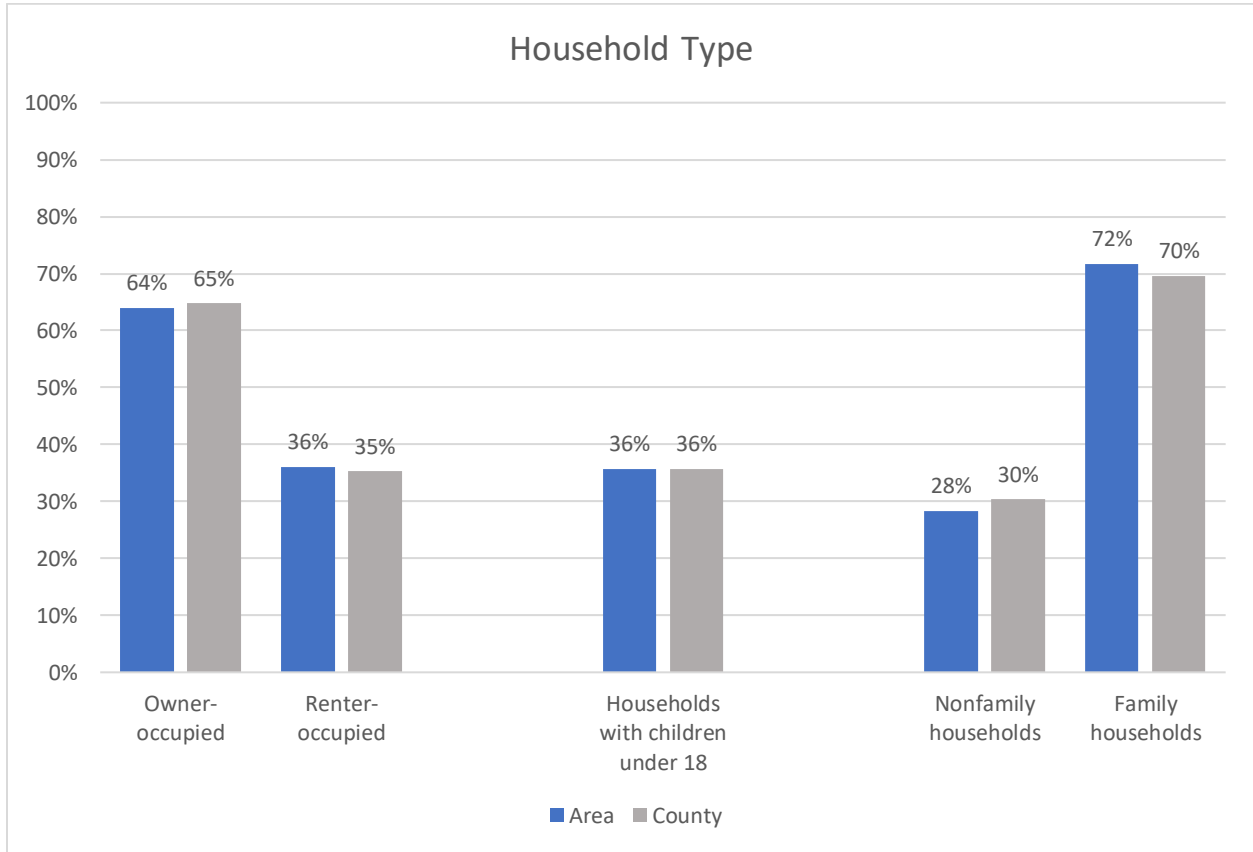
Demographics

The demographics of the Plan Area were analyzed using U.S. Census Bureau data for a Study Area that fully encompasses the Plan Area. This was done to improve data reliability, as the Plan Area boundaries cover too small an area to report on that area alone. The larger Study Area allows planners to explore population and household characteristics in the general vicinity.

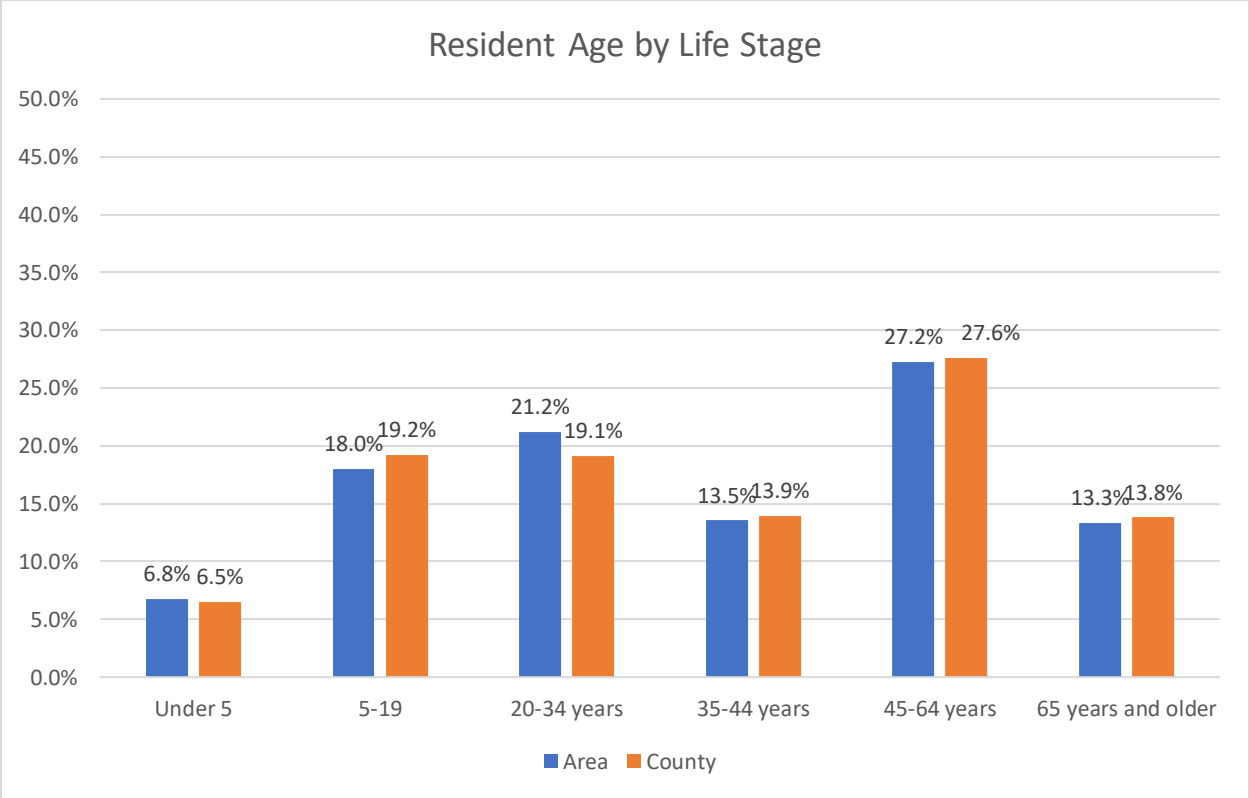
Nearly 64 percent of households in the Study Area are estimated to be living in owner-occupied housing while 36 percent are estimated to be living in rented housing. That owner-occupied percentage is one percentage point lower than the breakdown seen when looking at the universe of households in Montgomery County.



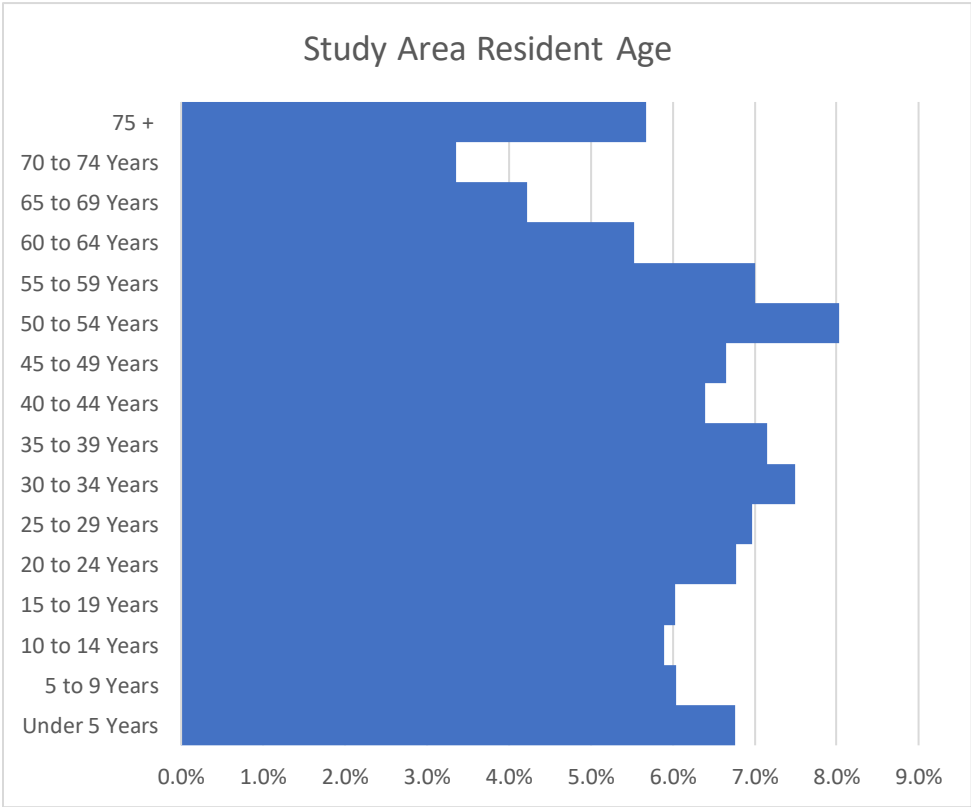
Family households, which are households whose members are related, comprise nearly 72 percent of households in the Study Area, which is two percentage points higher than the rate seen for the county as a whole. Households with children younger than 18 were almost 36 percent of households, the same rate seen for the county as a whole. This indicates that a majority of households do not have any school-age children living in them.



The age of residents in the Study Area closely resembles the age of residents in the county in general.



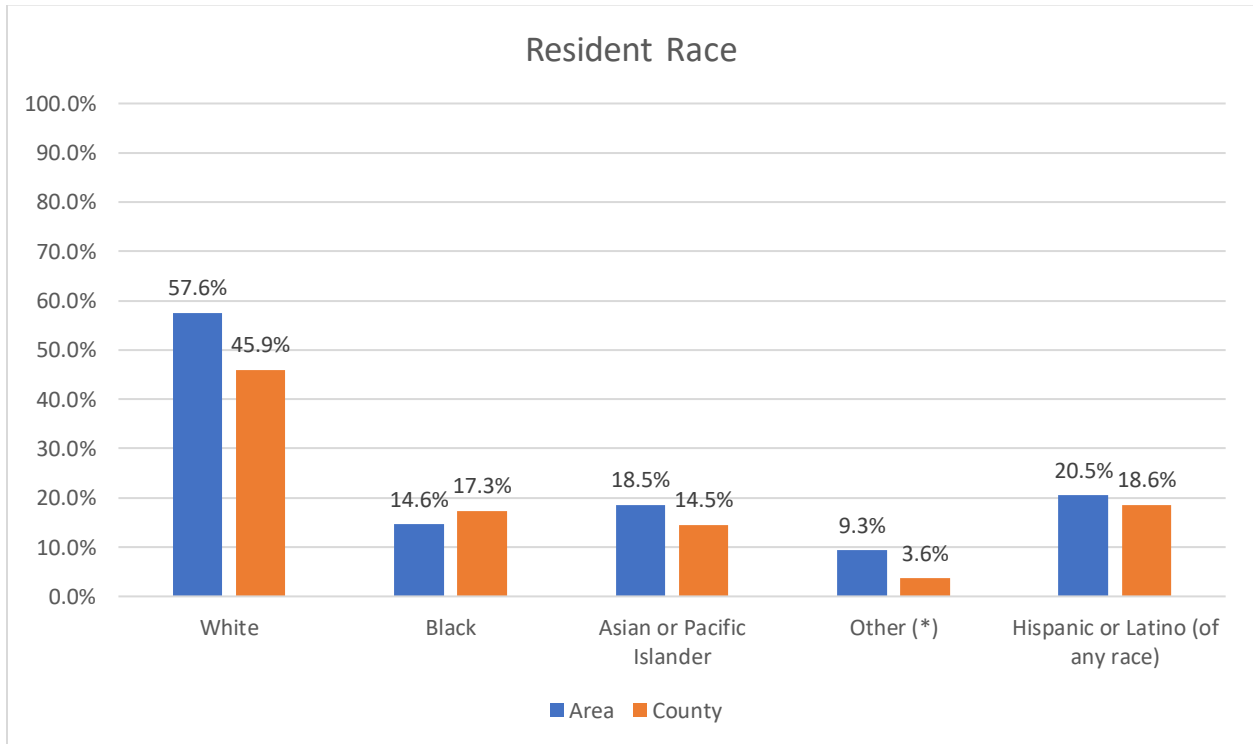
When resident ages are grouped into rough life-stage categories, there is a slightly higher percentage of younger people ages 20-34 living in the Study Area relative to that group living in the county in general: 21 percent of people in the Study Area are aged 20-34 while 19 percent of people in the county are aged 20-34.



The older adult population is comparable across both geographies. Adults aged 55 and older comprise more than one quarter of the population in

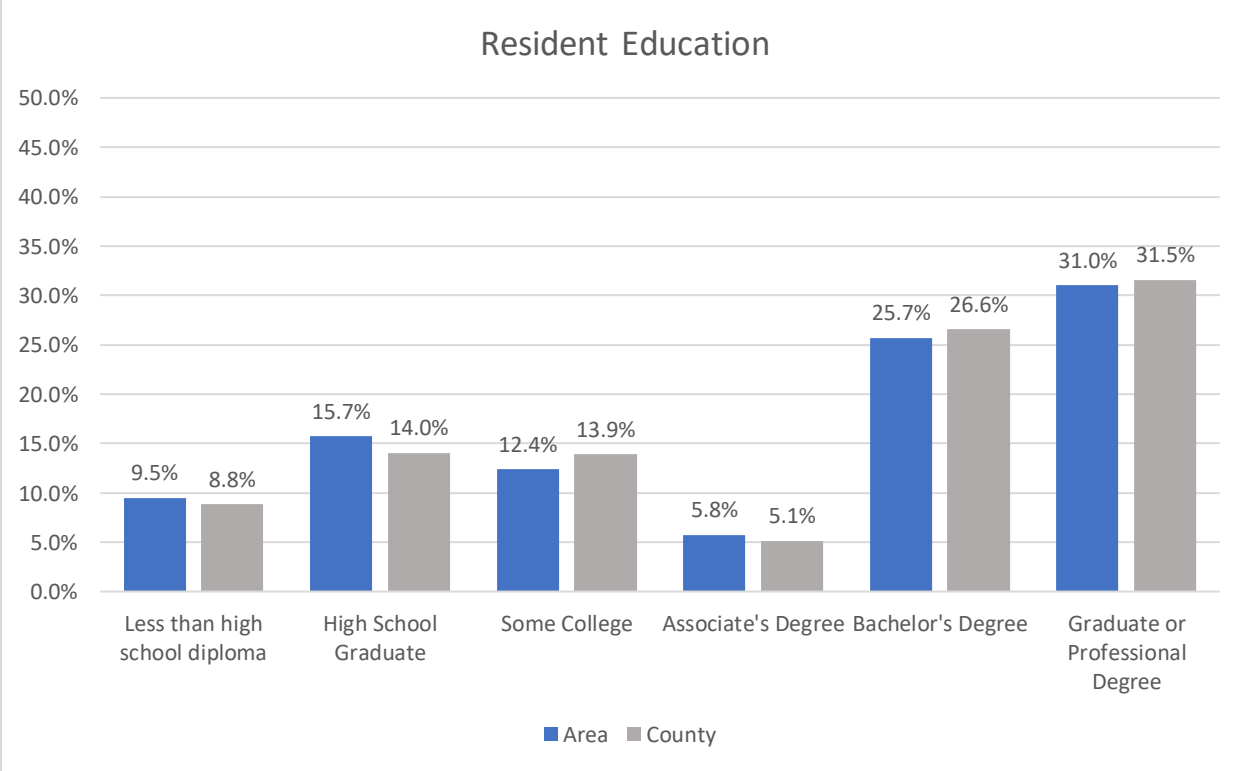
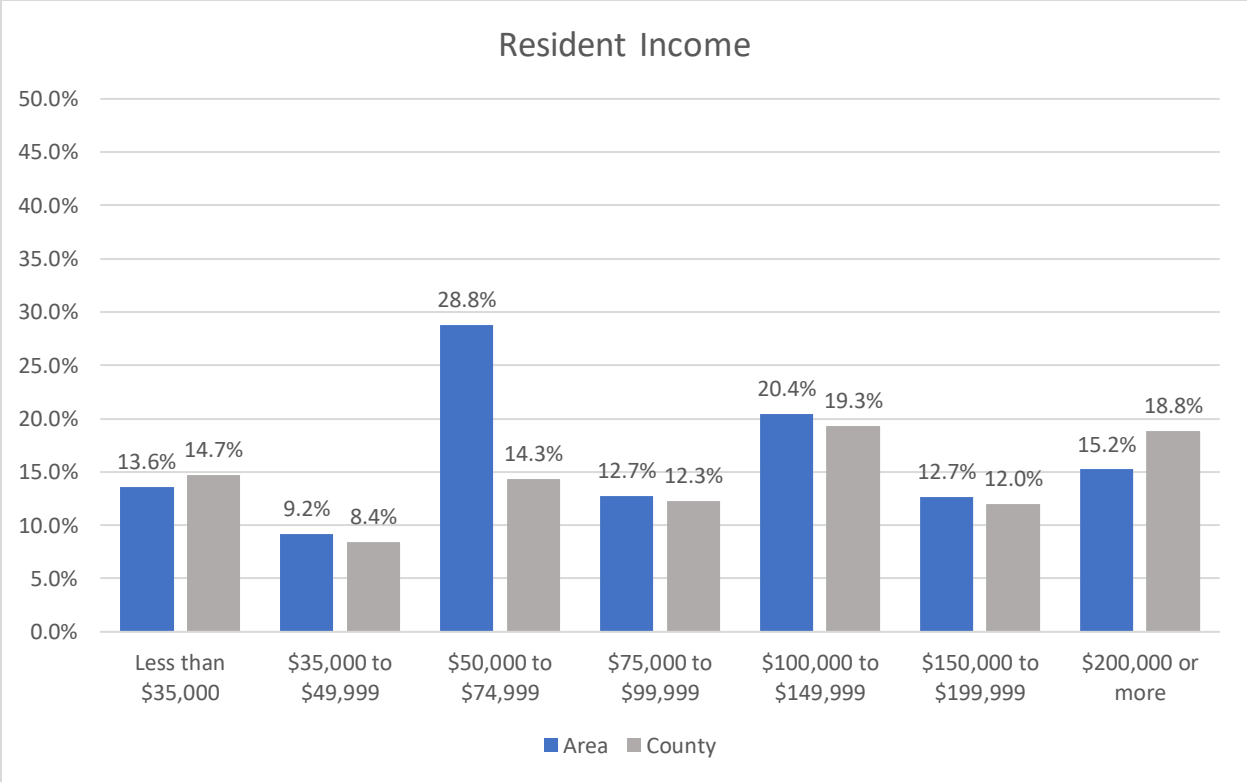
the Study Area. As the Baby Boomer generation continues to age, the older adult cohort will continue to expand, particularly if longevity and aging-in-place trends continue.

Relative to the share across the wider county, there are fewer people of color living in the Study Area. While just under 46 percent of county residents identify as white, nearly 58 percent of Study Area residents do.



There is also a higher share of Asian and a slightly higher share of Hispanic or Latino (of any race) residents living in the Study Area than the county at large. Almost 19 percent of Study Area residents identify as Asian, compared to 15 percent of County residents. More than 20 percent of Study Area residents identify as Hispanic or Latino (of any race), compared to fewer than 19 percent of county residents.

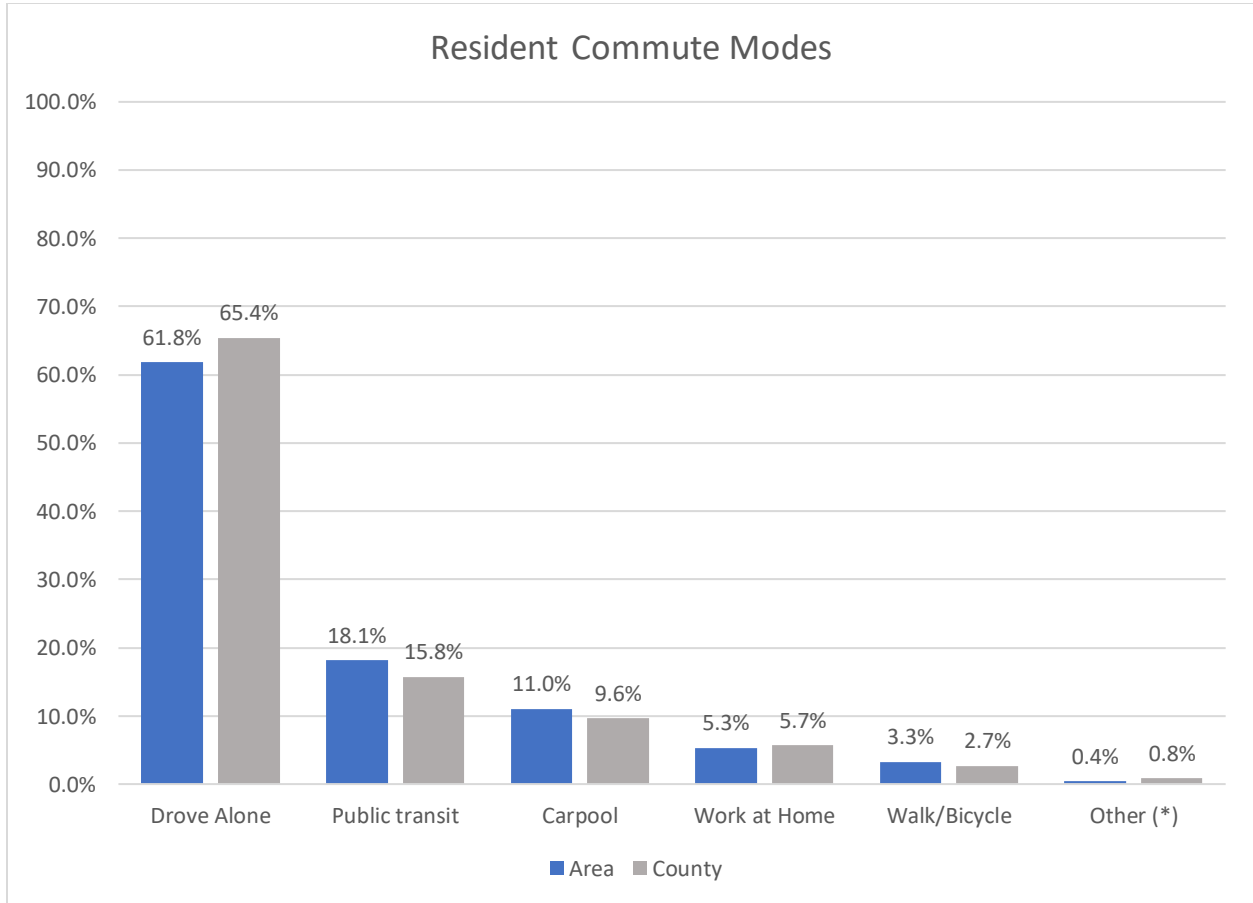
Incomes in the Study Area diverge from countywide income estimates primarily in the \$50-74,000 range. In the Study Area, under 29 percent of residents report incomes in the \$50-74,000 range, compared to just 14 percent countywide. A more minor divergence appears in the \$200,000 and above income range, with about 15 percent of Study Area residents reporting incomes at that level, compared with almost 19 percent of countywide residents. The Study Area has a higher concentration of middle-income residents than the county.



Study Area resident educational levels are similar to those across the county. More than one quarter of residents’ report attaining at least a bachelor’s degree and more than 30 percent report attaining a graduate or professional degree. Fewer than ten percent report having no high school

diploma.

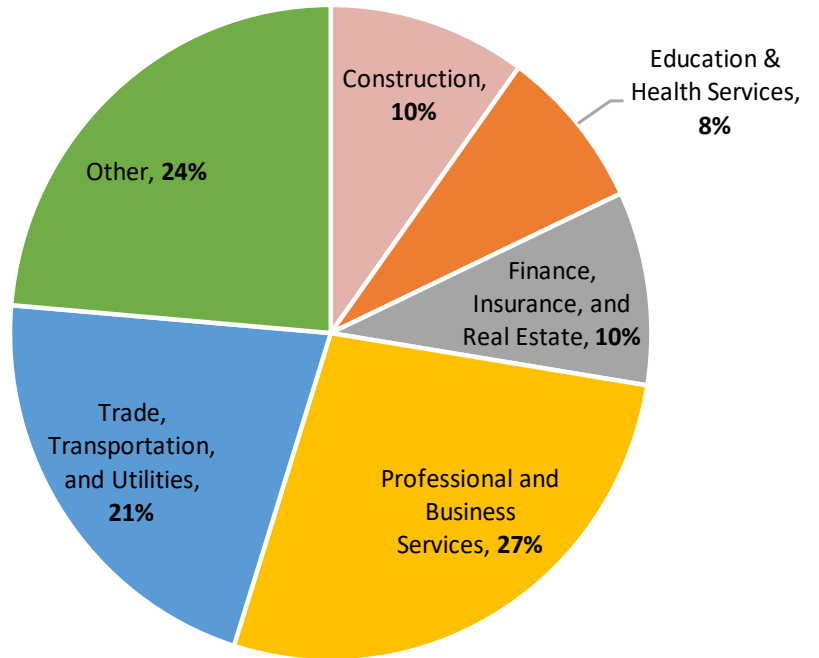
Commuters in the Study Area have similar commute habits when compared to the county at large, but with a somewhat smaller percentage of residents who drive alone to work. While more than 65 percent of countywide commuters report driving alone to work, about 62 percent of Study Area commuters do. There is a correspondingly higher share of public transit users and carpoolers in the Study Area. Still, the vast majority of Study Area commuters go to work by car. Solo drivers and carpoolers combined account for nearly 73 percent of Study Area commuters. Among the Study Area residents who do not take cars or public transit, most are working at home.



Area Business Profile

There are more than 450 businesses operating in the Plan area, employing more than 10,000 workers. Jobs at these businesses span a diverse range of industries, from construction to professional services. The largest employer in the Plan area is a local government agency, the Montgomery County Department of Transportation. The second largest is auto

dealer DARCARS of Rockville. The industry breakdown of Plan area employment can be seen here. Although automotive uses are highly visible in the Plan area and account for a significant portion of area employment, life science and technology services are also a key component of the business community. Examples of these firms include a biotech company focused on cancer research and genetics, a supplier of fuel cells, a semiconductor equipment company, and an automation technology company. The proximity of the Plan area to the Great Seneca Science Corridor along with the availability of light industrial space make this location well suited for these firms.



Industrial Space Inventory

Industrial Buildings				
	# of Buildings	Total SF	Vacancy %	Average Rent PSF
Shady Grove MMPA	28	967,534	3.7%	\$ 11.21
Montgomery County	647	14,909,872	6.4%	\$ 11.51

The Shady Grove Minor Master Plan Amendment (MMPA) area includes various light industrial uses such as electrical, kitchen and bath, granite, and construction materials supply businesses; HVAC, plumbing, and mechanical services contractors; automotive businesses; and U-Haul. These uses are mostly concentrated along Oakmont Avenue, west of Crabbs Branch Way and north of Indianola Drive, and along Redland Road. Many of the buildings are well-configured and provide desirable features such as separate loading bays and roll-up garage doors. Others more closely resemble flex and office space. The Plan area has a relatively low vacancy rate and competitive rental price for these types of spaces.

Office Space Inventory

Office Buildings				
	# of Buildings	Total SF	Vacancy %	Average Rent PSF
Shady Grove MMPA	36	1,405,232	9.0%	\$ 18.90
City of Gaithersburg	218	8,410,489	7.8%	\$ 23.39
Montgomery County	1,531	72,542,271	12.5%	\$ 28.23

The majority of the Plan area office inventory is concentrated along the southern part of the Plan area, primarily along Crabbs Branch Way, south of Indianola Drive and north of Gude Drive, as well as along Standish and Calhoun Drives. Office parks located in the Plan area include large office buildings such as Metro Executive Park and Metro Park North, which lease for \$18.50 to \$23.50 per square foot. Other office structures in the Plan area include one- and two-story buildings that offer flex and warehouse functions that make them adaptable for users. Office condominiums are also available and offer significantly lower rental rates. The offices styled as townhomes at Franklin Park Office Condos lease for around \$13 per square foot. On average, the office vacancy rate in the Plan area is lower than in the County's overall office market, at 9% versus 12.5% vacancy.



Trevigen: Cancer research/genetic toxicology

SFC Smart Fuel Cells: Major supplier of fuel cells for mobile/off-grid energy

Axcelis Technologies: Equipment/services for semiconductor industry

Intelligent Automation, Inc.: Advanced manufacturing products for Federal agencies

Research and Development/Flex Buildings

R&D/Flex Buildings				
	# of Buildings	Total SF	Vacancy %	Average Rent PSF
Shady Grove MMPA	20	814,826	7.1%	\$ 15.15
Montgomery County	287	11,573,324	10.4%	\$ 16.06

Research and development and flex space in the Plan area most resembles office space, however, it can accommodate light industrial uses and generally represents a hybrid between office and industrial building types. Rents are typically lower for these spaces than traditional office facilities because interior finishes are not as extensive as in office buildings. Users drawn to this type of space often seek facilities for administrative activities tied to services in manufacturing or logistics industries.

Research and Development and flex space in the Plan area is located in Metro Park North, along Standish Place, where there are also many office buildings. Like the traditional industrial buildings in the Plan area, such as on Oakmont Avenue, these buildings have loading bays and roll-up garage doors. Examples of these spaces include Shady Grove Industrial Park, the FedEx distribution facility, and the Oakmont Research and Development building.

Retail Space Inventory

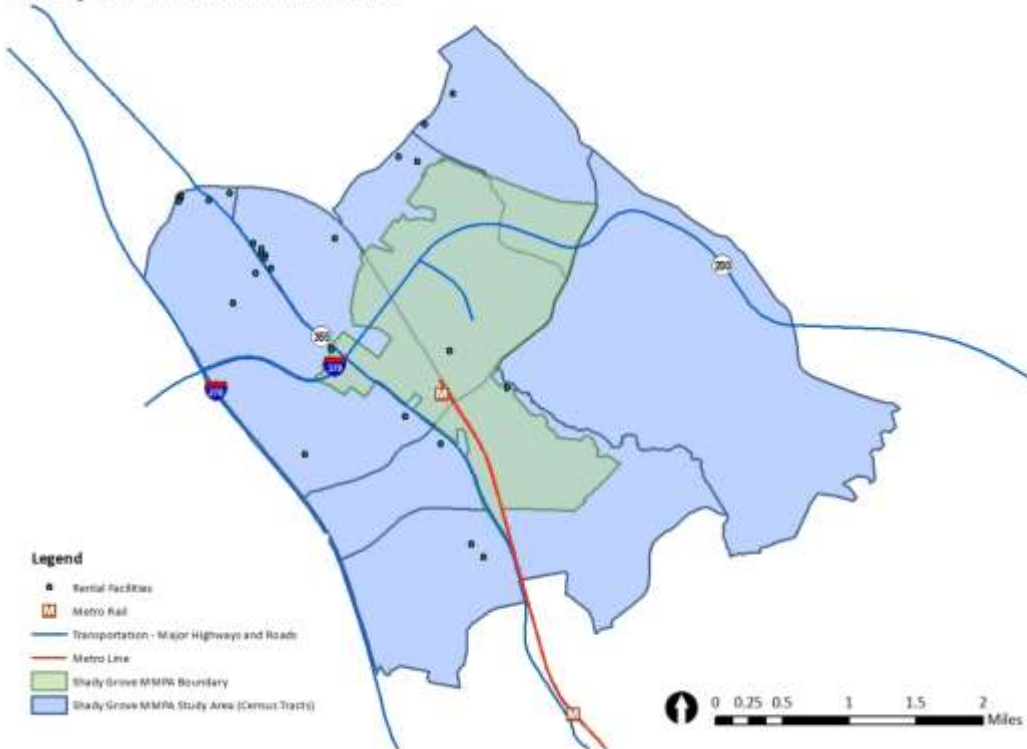
Retail Buildings				
	# of Buildings	Total SF	Vacancy %	Average Rent PSF
Shady Grove MMPA	54	732,070	0.9%	\$ 19.75
<i>Nearby Shopping Areas</i>				
<i>The Grove (Shady Grove MMPA)</i>	6	124,652	1.6%	\$ 25.62
<i>King Farm</i>	6	103,744	4.2%	\$ 33.08
<i>Rio at Washingtonian</i>	14	997,419	1.0%	\$ 35.35
<i>Downtown Crown</i>	13	272,106	12.4%	\$ 33.31

Plan area retail inventory is located in the Grove Shopping Center and along Frederick Avenue. Because the Frederick Avenue retail is predominately auto oriented, including auto dealers, body shops, and auto parts and repair shops, there is an industrial aesthetic in the area. The Grove Shopping Center is a grocery-store-anchored strip mall. Rental rates in the shopping center are significantly lower than at nearby “destination retail” centers to the west, including King Farm, Rio, and Downtown Crown. Vacancy at the shopping center is also lower in comparison to nearby retail destinations, and the retailers are ultimately more stable.

APPENDIX 2: HOUSING

Prepared by Lisa Govoni (lisa.govoni@montgomeryplanning.org)

Shady Grove Rental Facilities



Multifamily Residential

The Shady Grove Minor Master Plan Amendment Area contains three multi-family rental facilities and one residential multi-family condominium. The multi-family residential developments are: Mallard Cove, Shady Grove Apartments, the Daley, Momentum at Shady Grove, and Mallard Cove.

- Mallard Cove is a garden-style condominium built in 1985 and converted to a condominium in 2005 with 121 units.
- The Shady Grove Apartments is a low-rise garden style multi-family rental building owned by the Housing Opportunities Commission (HOC) of Montgomery County. Built in 1980, the property currently has 144 affordable units and a zero percent vacancy rate. The average unit size is 908 square feet (757 SF one-bedroom unit, 953 SF two-bedroom unit, and 1,097 three-bedroom unit).
- The Daley is a mid-rise multi-family rental facility built in 2017 and owned and operated by Bozzuto. It contains 333 units, 77 units affordable through the Moderately Priced Dwelling Unit (MPDU) Program, and the Workforce Housing Program. The average unit size is 838 SF (549 SF for a studio, 157 SF for a one-bedroom unit, 1,082 SF for a two-bedroom unit).

- Momentum at Shady Grove is a mid-rise residential building that is part of the Towns at Shady Grove development. This 110-unit building is unique since all of units are considered Workforce Housing. The financing for this development was provided by the Maryland Department of Housing and Community Development and the Montgomery County Department of Housing and Community Affairs. The average size of one-bedroom units is between 713 square feet and 813 square feet, while the average two-bedroom units are between 1,097 square feet and 1,090 square feet.
- Bainbridge Shady Grove is a multi-family residential development within the City of Rockville.

Table 1: Rental Facilities in the Shady Grove MMPA Plan Area

NAME	YEAR BUILT	STUDIO	1-BED	2-BED	3-BED	TOTAL	AFFORDABLE UNITS
SHADY GROVE APARTMENTS	1980	0	45	83	16	144	144
MOMENTIUM AT SHADY GROVE	2020					110	
THE DALEY	2017	51	157	125	0	333	77
TOTAL		51	202	208	16	587	221

Source: CoStar

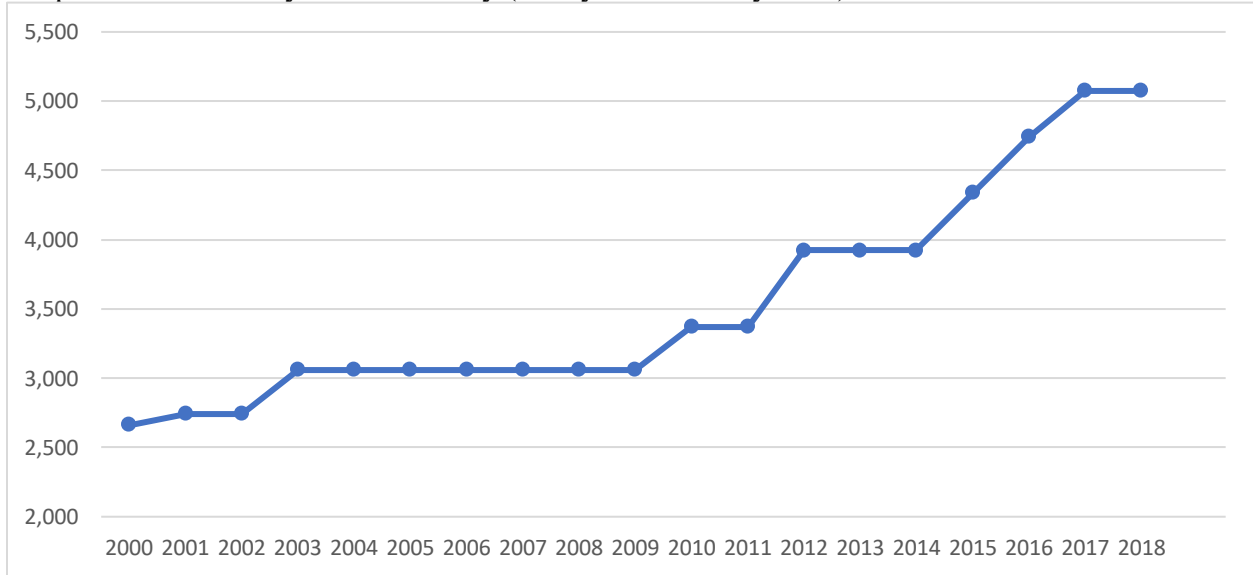
Table 2: Rental Facilities Average Effective Rent

NAME	AVG EFFECTIVE RENT (STUDIO)	AMI ¹	AVG EFFECTIVE RENT (1-BED)	AMI	AVG EFFECTIVE RENT (2-BED)	AMI	AVG EFFECTIVE RENT (3-BED)	AMI
SHADY GROVE APARTMENTS			\$1,156	51%	\$1,252	51%	\$1,342	46%
THE DALEY	\$1,569	98%	\$1,822	97%	\$2,317	114%		
MOMENTIUM AT SHADY GROVE								

¹Average Area American Income (AMI) calculated for the Shady Grove Apartments at 30 percent, given utilities are included. AMI was calculated at 25% of Area Median Income given utilities are not included for the Daley. Source: CoStar

Average effective rent varies for the two rental facilities in the Shady Grove MMPA Plan Area. The Shady Grove Apartments, which are older and owned by a mission-driven affordable housing provider, have lower rents, around 50 percent AMI. Given its newer age and amenities, the Daley has rents around 100 percent Area Median Income (AMI), affordable to a single-person household earning around \$80,000, two-person household earning around \$90,000, or three-person household earning approximately \$100,000 a year.

Graph 1: Multi-Family Unit Inventory (Shady Grove Study Area)

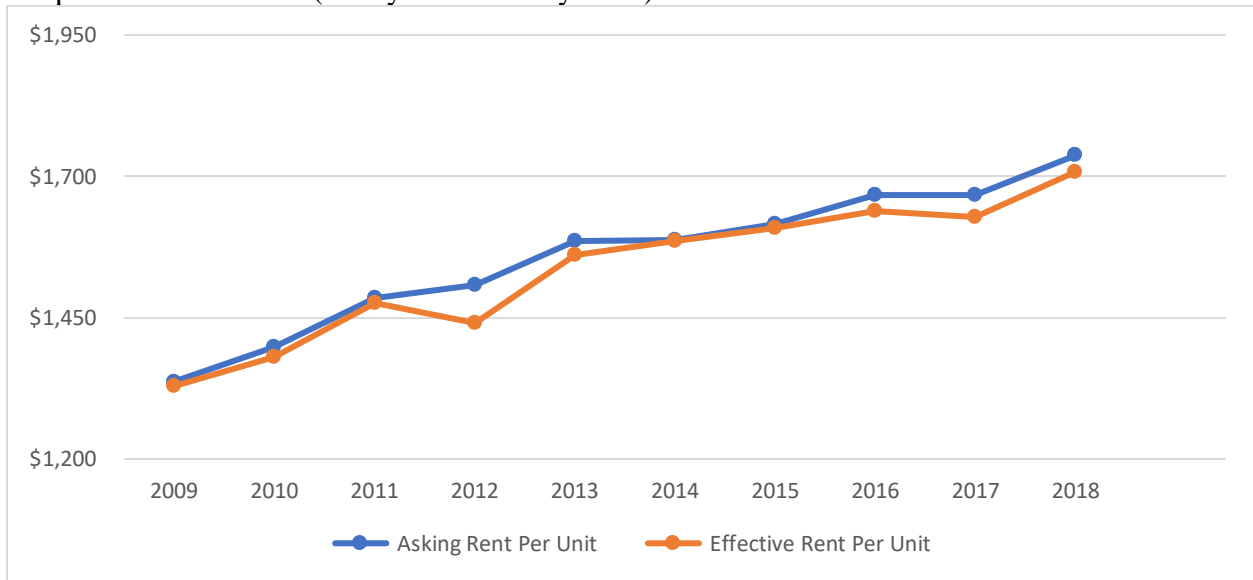


Source: CoStar

The Shady Grove MMPA Study Area contains eight census tracts and is used to study the greater demographic and housing conditions effecting the Plan Area.

While there are only three rental facilities containing units in the Shady Grove MMPA Plan Area, there are currently more than 5,000 rental multi-family units in the Shady Grove Study Area, an increase of more than 90 percent since 2000 and a 66 percent increase in the past ten years. This new inventory includes projects like the Daley (2017), which is within the plan area and added 333 units, but also Banbridge Shady Grove (2015), The Flats at Shady Grove (2016), and Gables Upper Rock (2012), and 17 Barkley Lane (2010).

Graph 2: Rent Per Unit (Shady Grove Study Area)

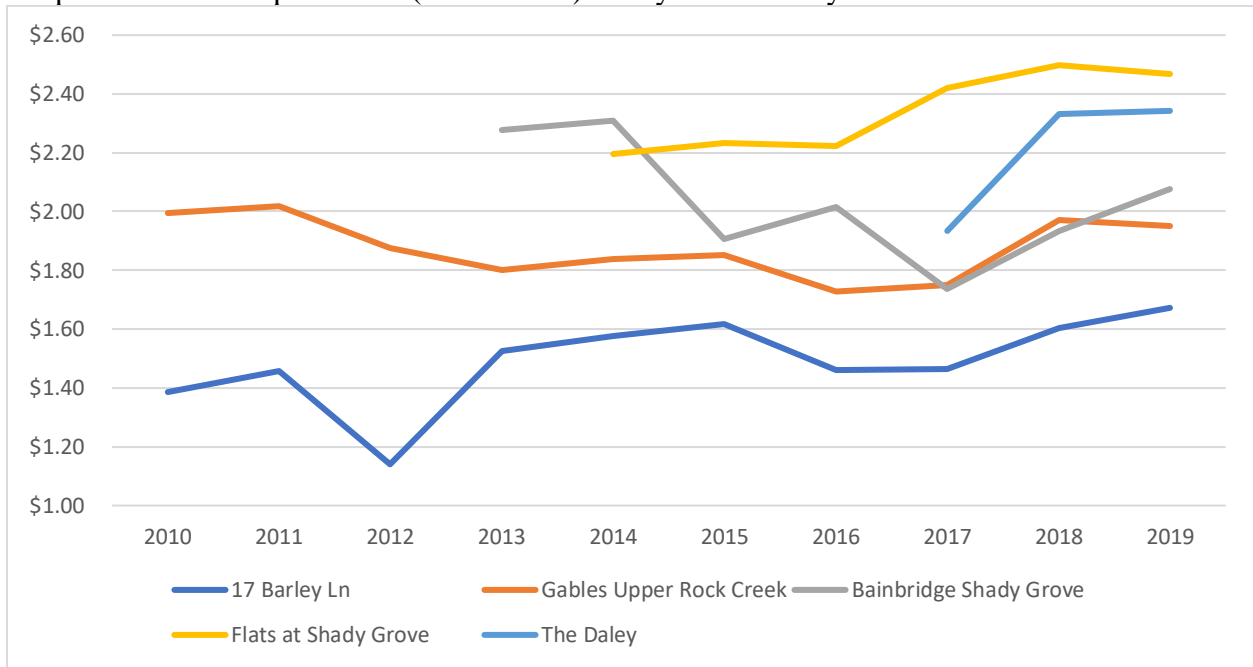


Source: CoStar

The difference between asking rent and effective rent is that effective rent is considered the rent charged, including concessions – things like a free month’s rent. The difference between the asking and effective rent is about 2 percent, and the overall vacancy rate for the entire study area was around 5 percent in 2018.

The average effective rent per unit in the Shady Grove Study area is \$1,700 in 2018 or \$1.70 per square foot. The average rent in the study area has increased by almost 30 percent since 2009.

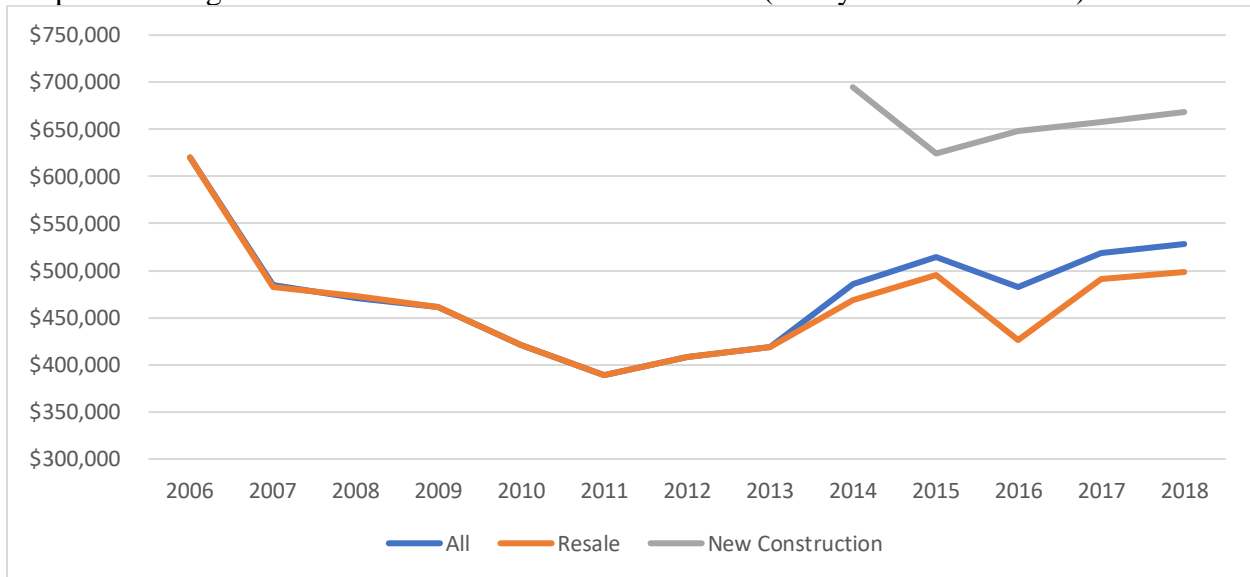
Graph 3: Rent Per Square Foot (New Builds) Shady Grove Study Area



Source: CoStar

The Shady Grove Study Area includes seven new multifamily facilities, 17 Barkley Apartments, Flats at Shady Grove, Gables Upper Rock Creek, Bainbridge Shady Grove, The Daley, and Momentum at Shady Grove, which are within the Shady Grove MMPA boundaries. The Momentum at Shady Grove delivered in Q1 of 2020 and has not reported its rents to CoStar for analysis yet, but the six other new multi-family facilities (17 Barkley Apartments, Flats at Shady Grove, Gables Upper Rock Creek, Bainbridge Shady Grove, The Daley) had an average effective rent of \$2.07, which is 20 percent higher than the average effective rent per/square foot for all multi-family facilities in the Shady Grove Study Area.

Graph 4: Average Sold Price Resale vs. New Construction (Shady Grove Plan Area)



Source: CoreLogic

The average sold price for a home in the Shady Grove Plan is around \$525,000, which is 15 percent lower than the peak in 2006 of \$620,000. It is 36 percent higher than the 2011 low of \$390,000. New inventory was added to the plan area through the EYA townhouses at Westside starting around 2014 and the project has added around 100 single-family units. New construction tends to have a much higher price point. The average price for a resale is around \$500,000, whereas new construction is around \$670,000, about 35 percent more than the price of resale homes. This is typical throughout the county; new-construction single-family homes generally average around \$700,000.

Affordable Housing Methodology

To determine affordability, households are first categorized by their income relative to the area median income (AMI). AMI is adjusted for household size. Low-to-moderate income households are those earning up to 65 percent of AMI. The income limits in the table below are based on income requirements for Montgomery County’s moderately priced dwelling unit (MPDU) program and the US Department of Housing and Urban Development (HUD) standards.

Table 1 - 2018 Income Limits

HOUSEHOLD SIZE	65% AMI	80% AMI (MARKET RATE AFFORDABLE)	100% AMI (MEDIAN)
1	\$53,300	\$65,600	\$82,000
2	\$60,970	\$75,040	\$93,800
3	\$68,575	\$84,400	\$105,500
4	\$76,180	\$93,760	\$117,200
5	\$82,290	\$101,280	\$126,600

Source: Montgomery County DHCA, HUD

Second, rather than count the number of households, we count the number of rental units affordable to them to understand the inventory of low-cost housing. We, therefore, need to assume the number of bedrooms that a household of a particular size needs. Households of different sizes will have different needs with respect to bedrooms. And households of the same size will even have different bedroom needs. For example, two unrelated adults would typically need two bedrooms, while a married couple would need one.

The following table provides the Planning Department’s standard assumptions regarding the distribution of household sizes by the number of bedrooms:

Table 2 – Household-Size Distribution by Number of Bedrooms

HOUSEHOLD SIZE	NUMBER OF BEDROOMS				
	Efficiency	1	2	3	4
1	100%	30%			
2		70%	10%		
3			60%	20%	
4			30%	50%	40%
5				30%	60%

Third, based on the previous two tables of household income limits and our assumptions about the distribution of household sizes by the number of bedrooms, we estimate income limits by the number of bedrooms. This calculation is a weighted average of household-income limits for each bedroom size. For example, for one-bedrooms occupied by households up to 100 percent of AMI, the maximum weighted income is $.3 \times \$82,000 + .7 \times \$93,800 = \$90,260$.

Table 3 – Income Limits by Number of Bedrooms

# OF BEDROOMS	65% AMI	80% AMI	100% AMI
0	\$50,180	\$61,760	\$77,200
1	\$58,669	\$72,208	\$90,260
2	\$63,239	\$81,592	\$97,290
3	\$76,492	\$90,952	\$117,680
4	\$79,846	\$99,024	\$122,840

Fourth, affordable housing is defined as housing that costs no more than 25 percent of household income, if utilities are not included, or 30 percent of household income if utilities are included. This definition is similar to the rent requirement for MPDUs set by the County Department of Housing and Community Affairs (DHCA). The maximum affordable rent by the number of bedrooms is listed below.

Table 4 – Affordable Limits at 30 Percent of Income

# OF BEDROOMS	65% AMI	80% AMI	100% AMI
0	\$1,255	\$1,544	\$1,930
1	\$1,380	\$1,698	\$2,123
2	\$1,488	\$1,919	\$2,289
3	\$1,800	\$2,140	\$2,769
4	\$1,878	\$ 2,329	\$2,890

Table 5 – Affordable Limits at 25 Percent of Income

# OF BEDROOMS	65% AMI	80% AMI	100% AMI
0	\$ 1,045	\$1,287	\$1,608
1	\$ 1,150	\$1,415	\$1,769
2	\$1,240	\$1,600	\$1,908
3	\$1,500	\$1,783	\$2,307
4	\$1,565	\$1,941	\$2,408

Affordable Housing Definitions:

Income Restricted Affordable Housing: A Moderately Priced Dwelling Unit (MPDU) or a dwelling unit built under government regulation or binding agreement requiring the unit be affordable to households at or below the income eligibility for the MPDU program.

Income Restricted Workforce Housing: Defined in Chapter 25B as housing that is affordable to households at or below 120 percent area wide median income (AMI). When a master plan refers to Workforce Housing as a part of its affordable housing goals or requirements, incomes are limited to 100 percent of AMI.

Market Rate Affordable Housing: Market rate affordable dwelling units are affordable to households earning no more than 80% of area median income, adjusted as MPDUs for household and unit size, and must not exceed the median rent for the planning area.

Rent Restricted Affordable Housing: Describes when rent increases will be limited, and there is no income test for the tenant. The preservation of market rate affordable housing may require an agreement that both establishes the baseline rent (priced to be affordable at 80 percent of AMI) and rent restrictions (such as requiring that rents increase by only the Voluntary Rent Guideline).

APPENDIX 3: ENVIRONMENTAL RESOURCES

Prepared by Steve Findley, Steve.Findley@montgomeryplanning.org.

The General Plan's overall goal for environmental planning stated in the 1993 *General Plan Refinement* is to "Conserve and protect natural resources to provide a healthy and beautiful environment for present and future generations. Manage the impacts of human activity on our natural resources in a balanced manner to sustain human, plant, and animal life" (p. 70). Implementation of this goal guides the environmental recommendations in Montgomery County's Master Plans.

Shady Grove Existing Conditions

Shady Grove's neighborhoods are diverse in their environmental character. Established single-family neighborhoods that are green with trees frame a central area that encompasses existing light industrial uses and the former County Service Park (CSP) adjacent to the Metro and CSX train tracks and the County's Solid Waste Transfer Station. The County services have largely been relocated as part of the County's Smart Growth Initiative, which recognizes that these lands that lie close to the Shady Grove Metro Station should have a higher value for redevelopment as residential and mixed-use communities. The former service and light industrial areas are largely paved spaces and single-story service buildings, mostly devoid of trees except for fringes along the margins of the property, and a nice stand of hardwood trees on the former Department of Parks service area north of the regional stormwater pond along Crabbs Branch Road. The large, treeless, and impervious surfaces can be improved through the redevelopment process to incorporate much better stormwater management treatments to manage runoff and improve water quality, and increased tree canopy to reduce urban heat island effect, filter air, sequester carbon, and provide a more healthful environment.

Stream Valley Parks

Notable natural resources in and adjacent to the area include several forest stands that occur in stream buffers and east of the Grove Shopping Center. Mill Creek and Crabbs Branch Stream Valley Parks also contain forest, as well as the streams for which they are named and the stream valley habitats they provide. These parks also provide opportunities for much-needed passive recreation. Connecting people in Shady Grove to these parks is a priority in this Sector Plan. Most of the Shady Grove Plan area drains east into the Rock Creek watershed. The Plan area includes portions of three Rock Creek Subwatersheds: Mill Creek, Crabbs Branch, and the Southlawn Tributary. Mill Creek and Crabbs Branch flow into Rock Creek north of Route 28, making them Maryland State Use Class IV streams, suitable for use as "recreational trout waters," meaning that the State may stock trout for recreational fishing, but stocked populations cannot survive and reproduce. The Southlawn Tributary flows into Rock Creek south of Route 28, making it a Maryland State Use Class I stream, suitable for "water contact recreation and protection of aquatic life."

The most recent results of the County's biological stream monitoring program have rated the stream water quality of Mill Creek and the Southlawn Tributary as "Fair," based on the presence or absence of indicator species of fish and aquatic macroinvertebrates. Stream monitoring

indicated that the water quality in Crabbs Branch is “Poor.”

A small corner of the Shady Grove plan area near the intersection of Shady Grove Road and Frederick Road (MD 355) drains southward into the Upper Watts Branch watershed, which is a Maryland State Use Class I-P stream. The “P” designation indicates that the Watts Branch feeds into the potable water supply for the region. The most recent biological stream monitoring results place the Upper Watts Branch into the “Good” water quality category.

Forest and Tree Cover, and Impervious Surfaces

Water quality is especially correlated with the amount of forest cover and the percentage of the watershed that is impervious. Within the Shady Grove Sector Plan boundary, approximately 36 percent of the area is covered by impervious surfaces, while roughly 11 percent of the area is covered by forest.

Tree canopy coverage does not match forest cover in terms of environmental benefits. However, there are still significant water quality, air quality, carbon storage and health benefits that accrue from a healthy tree canopy. Approximately 41 percent of the Sector Plan area is currently covered by tree canopy.

Recent work completed for Montgomery County by the World Resources Institute and the Woods Hole Research Center, in coordination with Montgomery County Department of Environmental Protection (DEP), the Montgomery County Planning Department, and the Metropolitan Washington Council of Governments (MWCOCG), has created a report estimating the contribution of forest and tree cover in Montgomery County to carbon sequestration in fulfillment of achieving the County’s Greenhouse Gas reduction goals.

Based on the sequestration and removal factors developed in this study, the existing forest in the Shady Grove Sector Plan area is sequestering 14,358 Metric Tons of Carbon Dioxide Equivalents (MTCO_{2e}), and, if preserved, will continue to sequester an additional 594 MTCO_{2e} each year. The existing tree canopy outside of forest is sequestering approximately 10,542 MTCO_{2e} (assuming an average tree age of 20 years), and could continue to sequester up to an additional 4,240 MTCO_{2e} each year for the foreseeable future.

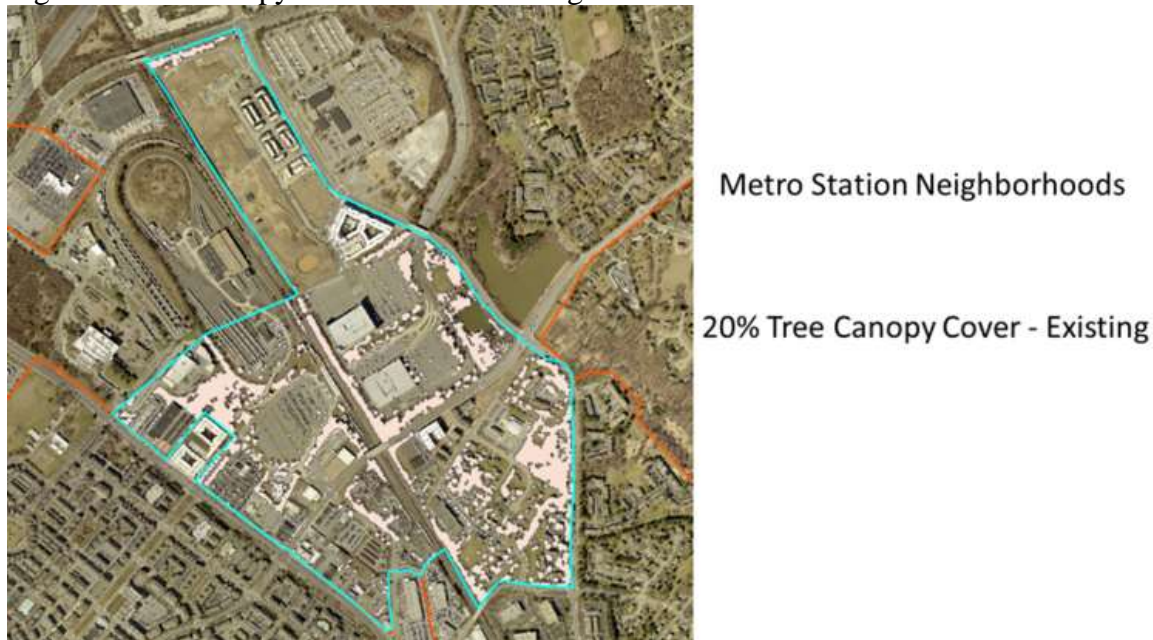
Among the other benefits provided by the tree canopy include the mitigation of urban heat island effect. Heat-related illnesses kill more people than any other weather-related phenomena and tend to kill people of color disproportionately from the general population. Most of these deaths occur during extreme heat events, when temperatures in urban areas can be as much as 10 degrees Celsius higher than in surrounding neighborhoods. Trees mitigate urban heat island effect both by shading paved areas and through evapotranspirative cooling.

Trees have also been shown to reduce the incidences of several diseases, including cardiovascular diseases, hypertension, and diabetes. In a recent study of over 46,000 Australians, people living in proximity to tree canopy of 30 percent or more had 2.4 percent lower rates of cardiovascular disease, 6.8 percent lower rates of hypertension, and 5.7 percent lower rates of diabetes.

There are many human health and environmental sustainability benefits associated with trees. Subsequently, Master Plans should always strive to achieve the maximum tree canopy that can be accommodated in the Plan area. This will vary depending on how much existing tree canopy is present and where that canopy is located, and the recommended zoning, land use, and infrastructure. Tree canopy that is located interior to a development site is harder to preserve during the redevelopment process than canopy in perimeter locations. This Sector Plan recommends maintaining the overall tree canopy in the Shady Grove Sector Plan area at no less than 40% percent and striving to increase the tree canopy coverage in the Metro Neighborhoods. This recommendation is based on staff’s analysis of the existing tree canopy, tree canopy that will be realized in new development already under construction, and the potential to add additional canopy through redevelopment.

An ArcGIS analysis of the Metro Station Neighborhoods (Figure 1) indicate that currently there is approximately 20% tree canopy coverage, shown in beige in the image below.

Figure 1: Tree canopy within the Metro Neighborhoods



Within the Metro Neighborhoods area, staff proposes to increase tree canopy through streetscape and open space plantings that maximize shade over paved surfaces. Recommendations include:

- Plant native shade trees that produce large canopies, spaced a maximum of 30 feet apart on center.
- Where possible, plant smaller native trees spaced in between the large trees.
- Provide adequate soil volume to create and sustain a healthy tree canopy. Refer to the Montgomery County Complete Streets document for guidance on planting specifications.
- Provide artificial shade structures in open areas over pavement where trees cannot be planted, especially in open spaces. These shade structures may include arbors, umbrellas, or features that can be opened or closed to allow flexibility in use.

- Providing tree canopy should not deter the provision of high-quality pedestrian and bicycle facilities, but should, in fact, enhance the safety and usability of those facilities. Trees should be incorporated into the designs of pedestrian and bicycle facilities at the very beginning of the planning process to ensure that healthy, safe, high-quality facilities are constructed.
- Staff also recommends the use of green roofs wherever possible, to provide additional heat island mitigation, stormwater control, carbon sequestration, and air quality benefits.



New street trees adjacent to the Daley and residential townhouses at Shady Grove Station, Westside.

Provision of Environmental Services

Undeveloped land provides most of the services necessary to sustain life. Through a combination of biological communities and biochemical processes, an undeveloped landscape produces clean air, filters water, provides shelter, produces food, moderates temperature extremes (heat island effect), attenuates flood flows, and improves the climate through the storage of carbon.

Modern buildings provide a more comfortable environment for human life, and transportation systems facilitate people's movements between residences, employment centers, shopping areas, etc. As areas develop, the biological communities are removed, along with the associated environmental services they provide. These environmental services must be replaced if life is to

be sustained. We pay to create water filtration and delivery systems, and to build stormwater management facilities to protect water quality, reduce flooding, protect infrastructure, and maintain aquatic life. We build HVAC systems to heat, cool, and filter air, and pay for the energy needed to run them. We plant trees and create landscaped areas to provide shade, generate oxygen, filter air and water, and provide the green environment that has demonstrated benefits for physical and mental health. But artificial systems cannot fully replace the environmental functions lost when development occurs. Ultimately, a balance must be achieved between development and the preservation of natural resources if we are to create sustainable communities.

In the Shady Grove Sector Plan, this balance is achieved both locally and regionally. Locally, the Sector Plan identifies existing natural resource areas that can be preserved and makes recommendations to replace lost environmental services. But equally important is the planning principle of concentrating development in areas where infrastructure already exists, rather than creating sprawl developments that eliminate additional natural resources farther from the urban centers. By redeveloping underutilized land in Shady Grove, forested watersheds in the Agricultural and Open Space ring in the northern and western portions of Montgomery County are preserved as fully functioning ecosystems that provide environmental services to the entire area, including clean water for the Potomac River, large-scale provision of clean air, carbon sequestration, flood attenuation, and high-quality aquatic and terrestrial habitat for animals and plant communities.

Focus on Energy Conservation

Montgomery County developed policies that help balance development and environmental protection, including requirements for detaining and treating stormwater runoff to protect aquatic habitats and water quality, and forest conservation regulations that are designed to preserve forests where possible and replant forests to provide a measure of mitigation for forest lost to development. One area where significant opportunities for improvement remain is in energy conservation and clean energy generation. Conserving energy reduces air pollution and atmospheric carbon emissions. It reduces the demand on an aging electric delivery infrastructure and reduces operating costs. Effective energy conservation is both economical and beneficial to human health. There are two areas of focus for energy conservation: building energy and transportation energy.

Conservation of energy and clean energy generation in buildings depends on site design, building design, building construction including materials and systems, and building operation. While building construction is primarily the purview of the Montgomery County Department of Permitting Services (DPS), site design and building design are both planning concerns. Site designs that permit building orientation to maximize opportunities for passive solar lighting and heating set up the optimal situation for energy conservation. In addition, building orientations that are optimal for passive solar energy use are also optimal for the orientation of solar energy panels for clean energy generation. Building design features should include properly designed shading features to reduce solar heating in the summertime. The building heights and orientations in the Metro station area lend themselves to efficient placement of photovoltaic systems to harvest solar energy and convert it to electricity. This Sector Plan recommends that

planners and developers monitor the rapid advances in energy conservation and clean energy generation, and incorporate improvements in these areas, whenever possible.

Transportation energy use can be reduced by providing non-auto alternatives that allow people to get to their significant destinations on foot, by bicycle, or by transit. Safe and attractive pedestrian paths and bikeways need to be integrated into all Master Plans and Site Plans. Transportation energy use can also be reduced by mixed-use communities that allow people to meet their basic needs without having to travel long distances by car. Developing near the Shady Grove Metro Station increases the opportunities for people who live within the Sector Plan area to commute by transit and decreases the per capita vehicle miles residents travel by automobile.

Greenhouse Gas Modeling

Montgomery County Code Chapter 18A-15 requires the Planning Board to model the carbon footprint of planning areas as part of the sector plan. Another law (Montgomery County Code Chapter 33A-14) requires the Planning Board to estimate the carbon footprint of areas being master planned, and to make recommendations for carbon emissions reductions. Carbon footprint is calculated by estimating the greenhouse gas (GHG) emissions from construction and operation of the projected development.

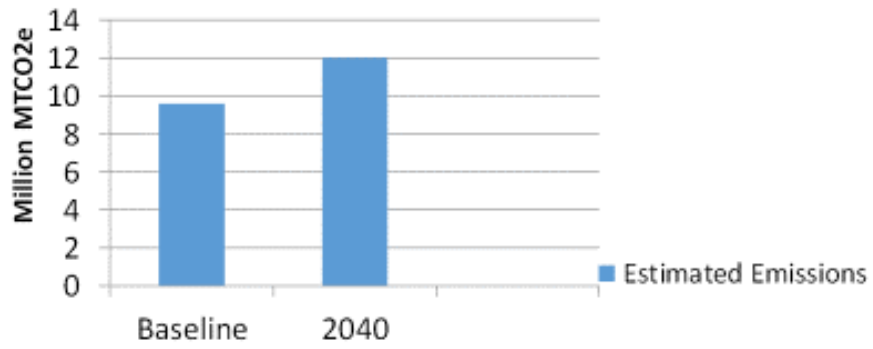
There are three main components to greenhouse gas emissions: embodied energy emissions, building energy emissions, and transportation emissions in projecting total emissions for an area. Embodied emissions are emissions that are created through the extraction, processing, transportation, construction and disposal of building materials, as well as emissions created through landscape disturbance (by both soil disturbance and changes in above ground biomass). Building energy emissions are created in the normal operation of a building, including lighting, heating cooling and ventilation, operation of computers and appliances, etc. Transportation emissions are released by the operation of cars, trucks, buses, and motorcycles. Results are given for the total life of the development from construction to demolition and are given in Metric Tons of Carbon Dioxide Equivalents (MTCO_{2e}).

Shady Grove Sector Plan GHG Emissions Analysis

Because Master Plans focus on areas that are most appropriate for new or re-development, the increased numbers of housing units and non-residential spaces naturally result in an overall increase in greenhouse gas emissions. This is the case for the Shady Grove Minor Master Plan Amendment. The carbon footprint estimation shows an increase in total greenhouse gas emissions of about 25 percent above the existing condition, based on an assumption of a business-as-usual approach to development.

Even though the overall GHG emissions are increasing, the compact, walkable and bikeable urban design of the plan is allowing for the number of residential units to triple, and the residential population to increase by one-third, while the emissions are increasing by one-quarter. Recommendations for reducing GHG emissions are included in the Plan's section on Air Quality and Carbon Emissions.

Estimated Carbon Emissions Shady Grove Montgomery County



APPENDIX 4: PUBLIC SCHOOLS

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Three high school clusters service the Shady Grove Sector Plan: Gaithersburg, Magruder, and Richard Montgomery (Figure 1). Most of the anticipated new development from this Sector Plan will occur in the Gaithersburg Cluster and smaller amounts of residential development in the Magruder Cluster. The existing Derwood Station residential neighborhood, east of Crabbs Branch Way, is in the Richard Montgomery Cluster.

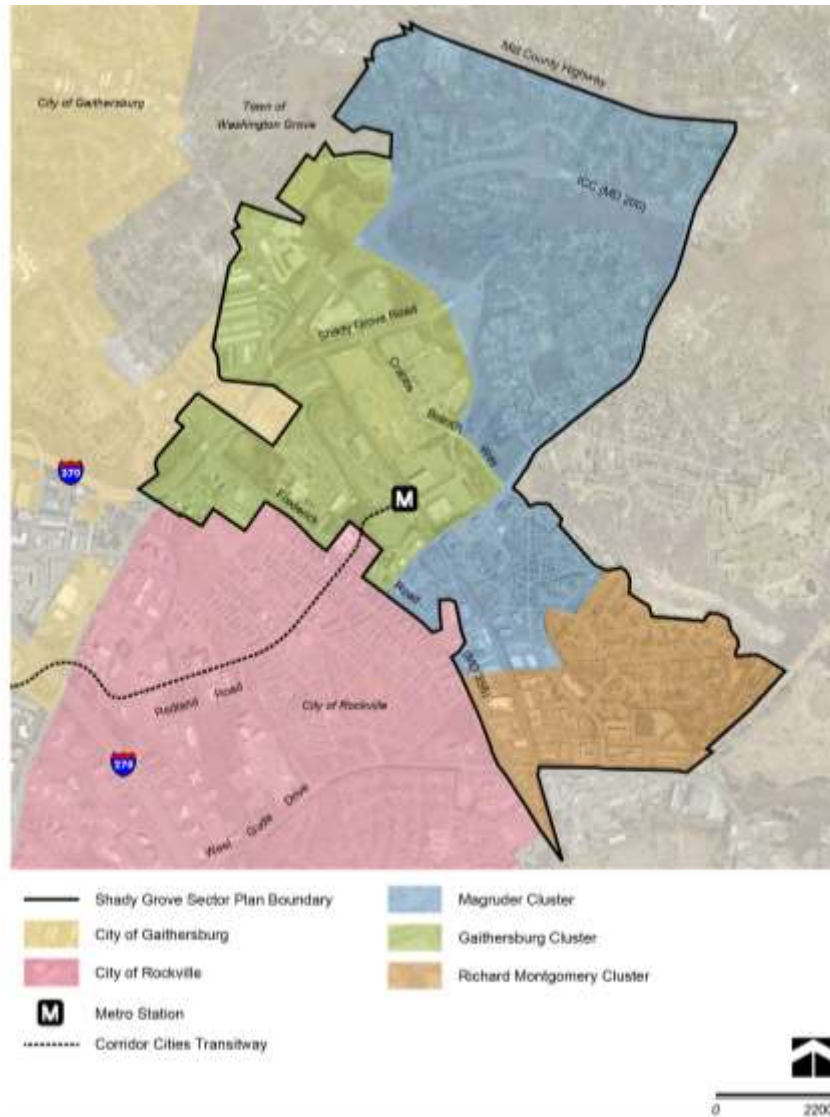


Figure 1: High school clusters in the Sector Plan

Gaithersburg Cluster

The Gaithersburg Cluster, like other school clusters in the County, has experienced significant enrollment growth in the last decade. Since 2007, elementary school enrollment in the Gaithersburg Cluster has increased by more than 800 students. Several new developments, including Shady Grove Station and Downtown Crown in the City of Gaithersburg, are projected to significantly impact the cluster. Most of the Metro Neighborhoods and the Grove Shopping Center are in this cluster.

Elementary School

Washington Grove elementary school is the service area for the Metro Neighborhoods, which are north of Redland Road. There is existing enrollment capacity for this school within the six-year CIP. However, additional residential development from this plan area and surrounding areas are likely to require an additional elementary school in the long-term. This plan reconfirms the 2006 Sector Plan preferred school site at Jeremiah Park for the plan area.

Several elementary schools in this cluster, including Gaithersburg, Rosemont, Strawberry Knoll and Summit Hall exceed their enrollment program capacities. In 2015, Montgomery County Public Schools (MCPS) conducted a Gaithersburg Cluster Elementary School Capacity Study to determine whether additions to cluster schools could address the projected deficits. This study led MCPS, in 2017, to begin the process to select a new site for a new elementary school in the cluster. MCPS also explored reassigning a portion the Sector Plan, east of I-370, to the Magruder cluster but this option was not pursued. In 2019, MCPS determined that a new school will be built in the cluster at Kelley Park in the City of Gaithersburg. This will be the eight elementary school in the Cluster, and it is projected to open by the Fall of 2022.

	Official Enroll.	Projected Enrollment					
	2019-2020	2020- 2021	2021- 2022	2022- 2023	2023- 2024	2024- 2025	2025- 2026
Gaithersburg Elementary							
Program Capacity	737	737	737	737	737	737	737
Enrollment	866	869	878	890	887	884	883
<i>Space available</i>	-129	-132	-141	-153	-150	-147	-146
New Elementary School							
Program Capacity				740	740	740	740
Enrollment				0	0	0	0
<i>Space available</i>				740	740	740	740
Coshen Elementary School							
Program Capacity	594	594	594	594	594	594	594
Enrollment	571	549	536	540	541	548	561
<i>Space available</i>	23	45	58	54	53	46	33
Laytonville Elementary School							
Program Capacity	447	447	447	447	447	447	447
Enrollment	392	400	403	420	438	432	421
<i>Space available</i>	55	47	44	27	9	15	26
Rosemont Elementary School							
Program Capacity	568	568	568	568	568	568	568
Enrollment	647	654	662	662	674	675	671
<i>Space available</i>	-79	-86	-94	-94	-106	-107	-103
Strawberry Knoll Elementary							
Program Capacity	459	459	459	459	459	459	459
Enrollment	651	668	666	667	665	676	682
<i>Space available</i>	-192	-209	-207	-208	-206	-217	-223
Summit Hall Elementary School							
Program Capacity	457	457	457	457	457	457	457
Enrollment	702	729	726	732	721	723	704
<i>Space available</i>	-245	-272	-269	-275	-264	-266	-247

	Off. Enrollment	Projected Enrollment					
	2019 - 2020	2020-2021	2021-2022	2022-2023	2023-2024	2024-2025	2025-2026
Washington Grove Elementary School							
Program Capacity	613	613	613	613	613	613	613
Enrollment	462	474	471	472	467	477	482
<i>Space available</i>	<i>151</i>	<i>139</i>	<i>142</i>	<i>141</i>	<i>146</i>	<i>136</i>	<i>131</i>

Middle Schools

Forest Oak Middle and Gaithersburg Middle are the two middle schools in this cluster. The Superintendent’s recommended FY 21 budget indicates that enrollment capacity will exceed the program capacity at Forest Oak beginning in 2021 through 2034. The long-range projections for Gaithersburg Middle, through 2034, indicate that the school will not exceed its program capacity.

	Off. Enr.	Projected Enrollment							
	2019 - 2020	2021 - 2021	2021 - 2022	2022 - 2023	2023 - 2024	2024 - 2025	2025 - 2026	2029	2034
Forest Oak Middle School									
Program Capacity	955	955	955	955	955	955	955	955	955
Enrollment	950	954	981	975	989	971	976	990	1014
<i>Space available</i>	<i>5</i>	<i>1</i>	<i>-26</i>	<i>-20</i>	<i>-34</i>	<i>-16</i>	<i>-21</i>	<i>-35</i>	<i>-59</i>
Gaithersburg Middle School									
Program Capacity	1009	1009	1009	1009	1009	1009	1009	1009	1009
Enrollment	877	897	935	927	931	934	959	950	975
<i>Space available</i>	<i>112</i>	<i>112</i>	<i>74</i>	<i>82</i>	<i>78</i>	<i>75</i>	<i>50</i>	<i>59</i>	<i>34</i>

There is an existing middle school in King Farm that could address future Gaithersburg cluster middle school needs.

High School

Gaithersburg High School is the only high school in this cluster. Current projections indicate there are enrollment deficits, more than 300 students at the end of the six-year CIP. Longer range projections indicate additional enrollment deficits exist beyond the six-year CIP.

	Off. Enr.	Projected Enrollment							
	2019 – 2020	2021 – 2021	2021 – 2022	2022 – 2023	2023 – 2024	2024 – 2025	2025 – 2026	2029	2034
Gaithersburg High School									
Program Capacity	2443	2443	2443	2443	2443	2443	2443	2443	2443
Enrollment	2412	2479	2537	2682	2692	2768	2840	2864	3000
<i>Space available</i>	<i>31</i>	<i>-36</i>	<i>-94</i>	<i>-239</i>	<i>-249</i>	<i>-325</i>	<i>-397</i>	<i>-421</i>	<i>-557</i>

A new high school at Downtown Crown is projected to be completed by 2025 for this cluster.

Magruder Cluster

The residential neighborhoods east of I-370, including Mill Creek and Parkside Estates, are in the Magruder cluster. New students from the Old Derwood and Metro South neighborhoods will attend schools in this cluster. Mill Creek Towne Elementary School and Candlewood Elementary School provide primary elementary service for this portion of the plan area. Shady Grove Middle School is the middle school for this portion of the cluster.

Elementary Schools

There are six elementary schools in this cluster, including: Candlewood, Cashell, Flower Hill, Mill Creek Towne, Judith A. Resnik and Sequoyah. Candlewood and Mill Creek Towne are the two elementary school service areas that include portions of the Sector Plan area. Candlewood’s current and projected enrollment are forecast to be within the school’s program capacity per the six-year CIP. Mill Creek, however, exceeds its current enrollment and is projected to stay above the program capacity with the six-year CIP.

	Off. Enr.	Projected Enrollment					
	2019	2021	2021	2022	2023	2024	2025
	2020	2021	2022	2023	2024	2025	2026
Candlewood Elementary School							
Program Capacity	515	515	515	515	515	515	515
Enrollment	387	387	392	402	397	401	399
<i>Space available</i>	<i>128</i>	<i>128</i>	<i>123</i>	<i>113</i>	<i>118</i>	<i>114</i>	<i>116</i>
Mill Creek Towne Elementary School							
Program Capacity	336	336	336	336	336	336	336
Enrollment	507	514	536	533	535	525	512
<i>Space available</i>	<i>-171</i>	<i>-178</i>	<i>-200</i>	<i>-197</i>	<i>-199</i>	<i>-189</i>	<i>-176</i>

Middle Schools

Redland Middle and Shady Grove Middle are the two middle schools for this cluster. Both schools are within their current enrollment capacities for the six-year CIP. In the long-term to 2034, both schools are forecast to remain within their program capacities.

	Off. Enr.	Projected Enrollment							
	2019	2021	2021	2022	2023	2024	2025	2029	2034
	2020	2021	2022	2023	2024	2025	2026		
Redland Middle School									
Program Capacity	765	765	765	765	765	765	765	765	765
Enrollment	635	650	649	627	630	617	618	620	625
<i>Space available</i>	<i>130</i>	<i>115</i>	<i>116</i>	<i>138</i>	<i>135</i>	<i>148</i>	<i>147</i>	<i>145</i>	<i>140</i>
Shady Grove Middle School									
Program Capacity	854	854	854	854	854	854	854	854	854
Enrollment	575	615	643	688	704	715	715	619	605
<i>Space available</i>	<i>279</i>	<i>239</i>	<i>211</i>	<i>166</i>	<i>150</i>	<i>139</i>	<i>139</i>	<i>235</i>	<i>249</i>

High School

Magruder high school is the only high school for the cluster. Both existing and projected enrollment indicate enrollment will not exceed the high school's program capacity. A capital project for the high school is anticipated by 2027.

Richard Montgomery Cluster

Derwood Station, an established residential neighborhood east of the Crabbs Branch Way, is the only residential area of the plan area that is within the Richard Montgomery cluster. This area will be the only part of the Sector Plan that will contribute future students to this cluster since no residential development is anticipated for industrial properties along MD 355. A large segment of this cluster is in the City of Rockville, including the area covered by City's Rockville Pike Neighborhood Plan, which anticipates significant development in the future.

Elementary Schools

Five elementary schools are in the cluster, including: Beall, College Gardens, Richie Park, Bayard Rustin, and Twinbrook. College Gardens Elementary School provides service for the Derwood Station neighborhood as well a portion of King Farm in the City of Rockville. The enrollment forecast indicates that College Gardens will not exceed the program capacity within the six-year CIP. Most elementary schools in the cluster are forecasted to be within their program limits.

The newest elementary school in the cluster, Bayard Rustin, was opened in September 2018 at 332 W. Edmonston Avenue in the City of Rockville.

Middle School

Julius West Middle School is the only middle school in the cluster. Within the six-year CIP, enrollment is projected to exceed the school's program capacity for several years. However, in the long-term to 2034, the enrollment forecast indicate that school will not exceed its program capacity.

High School

Richard Montgomery High School is currently the only high school in the cluster. It is over its program capacity by more than 200 students within the six-year CIP and also in the long-term. A new high school, Crown High School, should open in 2025.

PLANNING BOARD DRAFT PLAN

Proposed Development

The Planning Board’s Draft Plan of the Shady Grove Sector Plan Amendment recommends up to 4,500 new residential units in the plan area, which is primarily in the Gaithersburg Cluster with a smaller amount in the Magruder Cluster.

Most of the approved pipeline of development, which is the Shady Grove Station, Westside and Jeremiah Park, will primarily impact the Gaithersburg cluster. This development, based on the mix of townhouses and multifamily residential development, is forecast to add up to 380 elementary students, 153 middle school students, and 202 high school students. If the approved Shady Grove Station, Jeremiah Park development is not implemented, the number of projected students would be less.

The student generation rates for the Gaithersburg and Magruder clusters are shown below:

Student Generation Rates-UpCounty (Gaithersburg and Magruder clusters)			
<i>Housing Type</i>	<i>Elementary</i>	<i>Middle</i>	<i>High</i>
Townhouse	0.251	0.116	0.151
Multifamily Mid-Rise	0.204	0.074	0.099
Multifamily High-rise	0.074	0.031	0.037

The projected impact from unbuilt development from Shady Grove Station, Westside and Jeremiah Park are shown below:

Gaithersburg Cluster				
Residential Type	Residential Dwelling Units	Elementary	Middle	High
Townhouses	602	151	70	91
Multifamily	1126	230	83	111
	1,728	381	153	202

The Draft Plan assumes that at least 70 percent of the new residential development will be mid-rise or high-rise and the remaining would be townhouses. The existing Sector Plan area is primarily composed of single-family residential dwellings and residential townhouses.

School Sites

The 2006 Sector Plan recommended Jeremiah Park as the preferred elementary school site and the Piedmont Crossing/Casey at Mill Creek property, if it was purchased with private funds. The approved preliminary plan for Shady Grove Station has a dedicated 8.1 acre park-school site. The implementation of this park-school site is dependent on the relocation of the MCPS bus

depot. There are no other properties, besides public parks, with redevelopment potential that could accommodate a public school. There are two reserved school sites in King Farm that could be implemented to meet elementary and middle school needs.