Appendix E: Environment

SILVER SPRING
DOWNTOWN AND ADJACENT COMMUNITIES PLAN

Silver Spring Downtown and Adjacent Communities Plan – Environmental Recommendations

1. Urban Resiliency

- Resiliency
- Methods of Resiliency
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Urban Resiliency

Responding to the global need to address climate change, Montgomery County launched a planning process to develop actions, strategies, and recommendations to meet the County's net zero carbon emissions goals by 2035. It is called the Climate Action Plan which aims to cut 80% emissions by 2027 and 100% by 2035. Concurrently, the Montgomery County Planning Commission drafted Thrive Montgomery 2050, a long-range guide for community development that also addresses carbon emissions and other elements of a changing climate.

These aspirational initiatives could steer the county towards reduced climate impacts and increased climate resiliency making Silver Spring a desirable and prosperous place to be for decades to come. As land use planners our recommendations and requirements are a pivotal piece in this climate puzzle. Smart, truly sustainable land use policy decisions are urgently needed for a "Livable Built Environment" as coined by the American Planning Association. LBE reduces impacts on the built and natural environment, mitigates the drivers of climate change, and builds resiliency to help citizens and nature adapt to a changing world. It merges climate solutions and the drivers of climate change with all land uses and development recommendations at all local scales.

As the Earth's temperatures rise, Montgomery County's most egregious and direct climate events and hazards as identified by the Metropolitan Washington Council of Governments are and will be extreme temperatures, continued rising temperatures, increased precipitation and drought, and habitat and biodiversity loss[1]. These conditions along with other regional vulnerabilities such as reduced air and water quality, unreliable access to food, transportation and power disruptions could have a devastating impact on all life, infrastructure, and the economy. Undertaking climate change effects requires planning for resiliency: the ability to anticipate, plan, prepare, respond, and thrive economically, socially, and environmentally no matter what kinds of chronic stresses or hazardous events experienced.

Planning staff has worked in close collaboration with many local, state, and regional agencies to identify and address overlapping and needed climate resiliency goals, initiatives, policies, and recommendations. We also used the following reference documents as support in developing the recommendations in this section.

- Montgomery County Climate Action Plan, June 2021
- Thrive Montgomery 2050
- Montgomery County Hazardous Mitigation Plan 2018
- Montgomery County Department of Transportation Sustainability Plan
- Planning for Climate and Energy Equity in Maryland. 2013
- Climate Change Policy Guide, American Planning Association 2020
- Council of Government Summary of Potential Climate Change Impacts, Vulnerabilities, Adaptation Strategies in Metropolitan Washington Region

Urban Climate Resiliency:

Urban Climate Resilience practice is an effort to identify climate risks and vulnerabilities and implement actions to make urbanity more resilient.

[1] Summary of Potential Climate Change Impacts, Vulnerabilities, and Adaptation Strategies in the Metropolitan Washington Region: A synopsis of lessons learned from the Metropolitan Washington Council of Governments' climate adaptation planning initiatives from 2010 – 2012.

,Building climate resilence is complex. Despite the challenge. this plan has identified the county's top climate impacts and made recommendations to counter the impending effects within Silver Spring.

Climate resiliency calls for action on dozens of fronts, but in general environmental urban planning actions fall into 2 buckets:

1. **Adaptation**: Reducing risks of climate impacts to communities as the planet continues toward warm and thresholds are broken. Adaptation is the process of anticipating, planning, preparing for, and adjusting to the actual or expected climate changes and its associated hazards and disasters. Adaptation aims to minimize and reduce the economic, social, cultural, and environmental vulnerabilities and losses to present and future generations. Climate adaptation requires collaboration with nearly all government agencies and municipalities to implement a wide breath of design elements, strategies, infrastructure, and programs. To the best of existing global knowledge, many relevant to the environment and urban planning are recommended in this chapter.

2. **Mitigation/Sequestration**: Every parcel of land, built upon or not, can perform functions that mitigate development and sequester greenhouse gasses to become a part of the climate solution. Nature Based Design that mimics nature urban development can create performance elements can absorb precipitation, reduce energy demands, improve species biodiversity, and cool surface and air temperatures thus mitigating extreme temperatures. Simultaneously, the green elements, and perhaps future technologies can drawdown carbon emissions and improve air and water quality. These performance based capacities create a Livable Built Environment while producing opportunities to increase social equity, green economies, sustainable growth, and a more habitable community.

Community-Wide Issues & Recommendations

Environmental Equity & Health
The effects of climate and environmental inequity are often most acutely felt in lower income, elderly, and minority communities. Historically these communities are known to have distant or inaccessible parks and open space for rejuvenation and recreation, less shade trees and vegetation, poorer quality housing and insulation, lower energy efficiencies, and more. These conditions create chronic physical and economic stress, can cause elevated utility costs, and diseases such as heat stroke, respiratory and heart conditions, allergies, and bronchial infections.

Urban planners can assist in alleviating some of these inequities by equally distributing environmental resources such as parks, open green space, trees and vegetation, stormwater management, community gardens, even energy efficient buildings. These changes can improve social equity and capital, promote psychological wellness, enhance mood and human dignity, reduce anxiety, improve physical health, and air and water quality all while cultivating an innate and lifelong appreciation for nature and its associated benefits.

Recommendations
- Locate equitable green parks and green space within walking distance of all residents.
- Every park must be designed equitably with living plant material including native canopy trees, shrubs, grasses, and flowers.

- All streetscapes must be designed equitably with living plant material including native canopy trees, shrubs, grasses, and flowers.
- All citizens should have access to heated and cooling centers, emergency shelters, and emergency hubs.
- Prioritized urban tree canopy and green infrastructure in low-income neighborhoods targeting the hottest streets as noted in the Climate Action Plan and within these recommendations.

Nature Based Solutions and Sequestration

Nature-based Solutions (NbS) are sustainable planning, design, and engineering practices that weave natural features to mimic nature in the built environment. They provide vital lost services rendered by a natural landscape to mitigate climate impacts and improve community resiliency. NbS are large or small scale features such as green infrastructure, tree and vegetated plantings, green roofs, permeable pavement, community gardens, and more.

The objectives of NbS are to mitigate the impacts of extreme urban heat, flooding, and poor air and water quality. They should be integrated throughout the community on all land parcels such as streetscapes, parks, open space and private property. Simultaneously, they create habitats and corridors that store and sequester carbon, foster a connection between people and nature and rejuvenate our spirits improving mental and physical health. Investing in NbS can provide cost effective, nature-based solutions for adaptation to climate change while also creating opportunities to increase: social equity; green economies; sustainable urban development; improved quality of life; human health; and wellbeing.

NATURE BASED DESIGN SOLUTIONS

RISING URBAN TEMPERATURES

Extreme Heat

Extreme heat is Montgomery County's number one climate threat. With each passing year summers are getting longer and hotter punctuated with record breaking extended heat waves. Extreme heat is already deadlier than all other natural disasters combined, and it will be exacerbated as planet temperatures rise. Major increases in deaths, hospitalizations, and emergency room visits have been documented to occur during heat waves. Those most susceptible to heat include pregnant women, young children, the elderly, and people with certain preexisting conditions such as diabetes or heart disease, and people who work or exercise outdoors.

Urban Heat Island Analysis

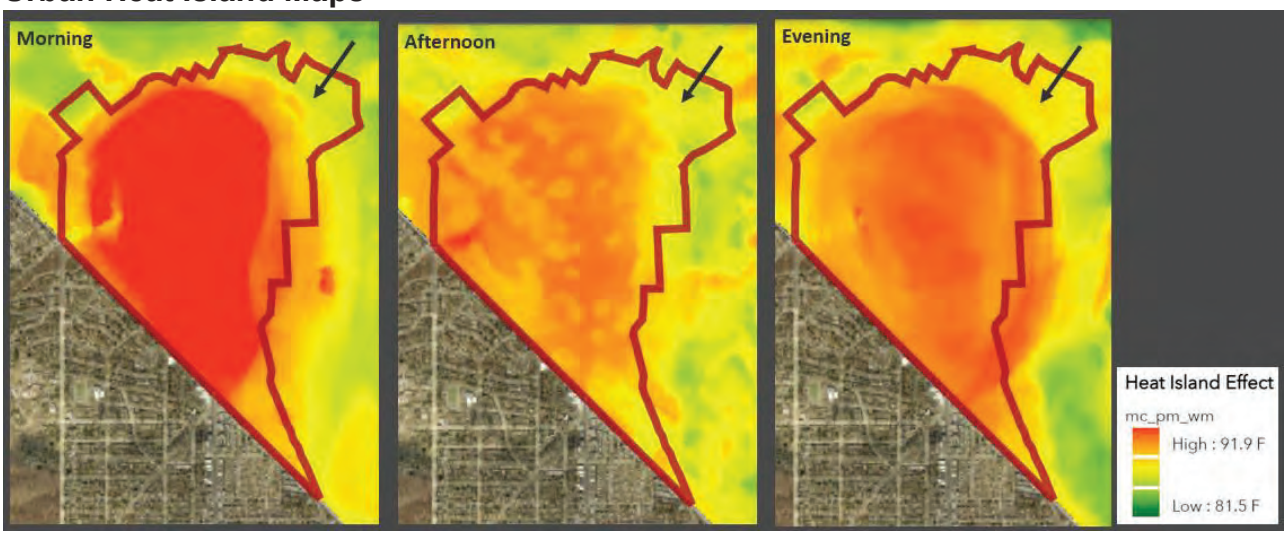
Urban Heat Islands are areas with substantially warmer atmospheric temperatures than its shaded surroundings. They are created by a combination of radiating heat from a high impervious surface cover, humidity, vehicle, building and generator emissions, and the absence of vegetation that provides evaporative cooling. The effects can be more severe at night as the thermal mass from buildings and surfaces slowly release their stored heat.

Concentration of heat in urban areas is a concern because it creates health risks from heat exposure and the increased formation of air pollutants, particularly ground-level ozone or smog. It also affects energy consumption through additional air conditioning needs to counter the higher temperatures. The urban heat island effect is projected to escalate with climate

change.

While the phenomenon of heat islands are well-known, for the first time, Montgomery County Planning Commission was able to obtain satellite imaging from NOAA's Office of Oceanic and Atmospheric Administration. The heat island maps shown below were from data collected in the summer of 2018. The temperature data are colored in shades ranging from green (coolest areas) to red (warmest areas). In the satellite images, areas with trees, patches of woods, and parks are significantly cooler than areas with dark impervious pavements and buildings.

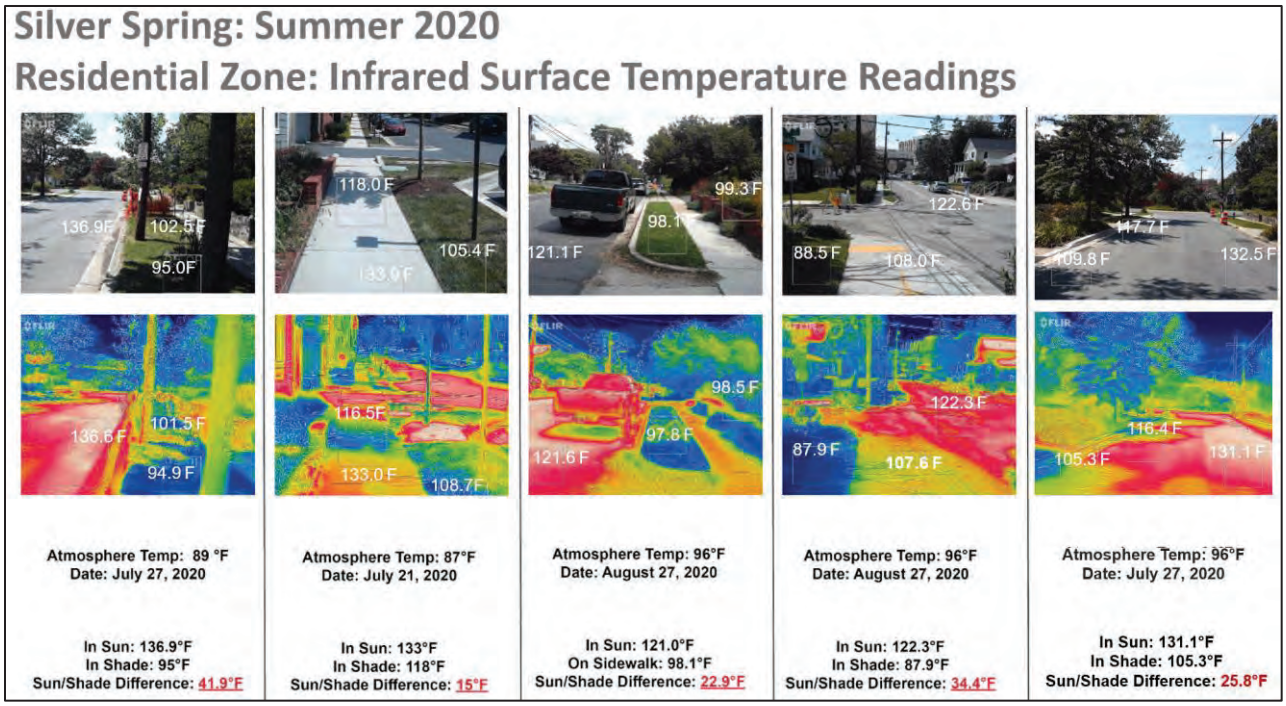
Urban Heat Island Maps

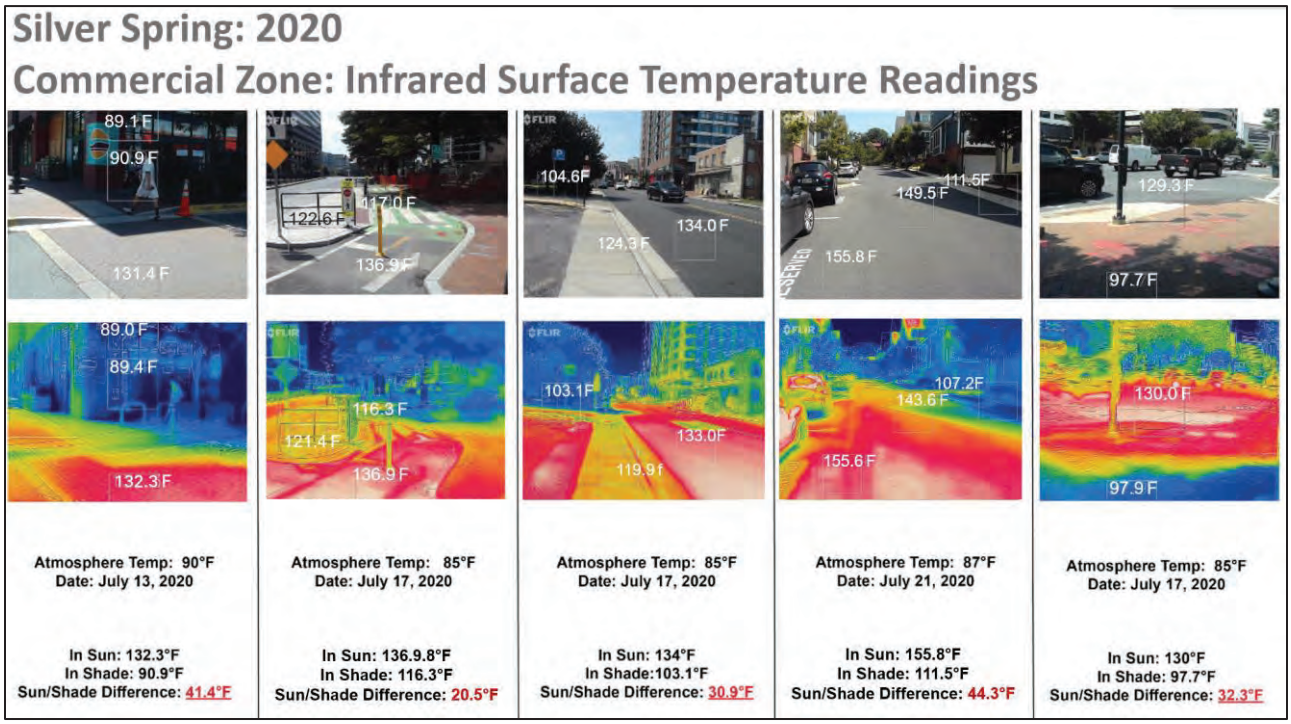


Surface Temperature Analysis

Impervious surfaces, buildings with low-albedo materials, and a lack of vegetated areas are the major causes of extreme pedestrian thermal temperatures during the summer months. In the summer of 2020, Environmental Planning staff used high resolution, Forward Looking Infrared (FLIR) thermal imaging cameras (Model T430sc) to identify the surface temperatures of various microclimates within downtown Silver Spring. FLIR camera works by receiving radiation from the target object (sidewalks, streets, play surfaces, parking lots, etc.), plus radiation from its surroundings that has been reflected onto the objects surface. The findings were astonishing.

Conventional, unshaded paving materials found throughout Silver Spring averaged between 109 to 155 degrees Fahrenheit. These temperatures are unbearable for extended periods of time and dangerous for humans and wildlife alike. Temperature variations differed due to the various kinds of surface pavement materials, colors, coatings, porosity, reflectivity, orientation, building and vegetative shade. In general, lighter colored surfaces were cooler than darker surfaces.





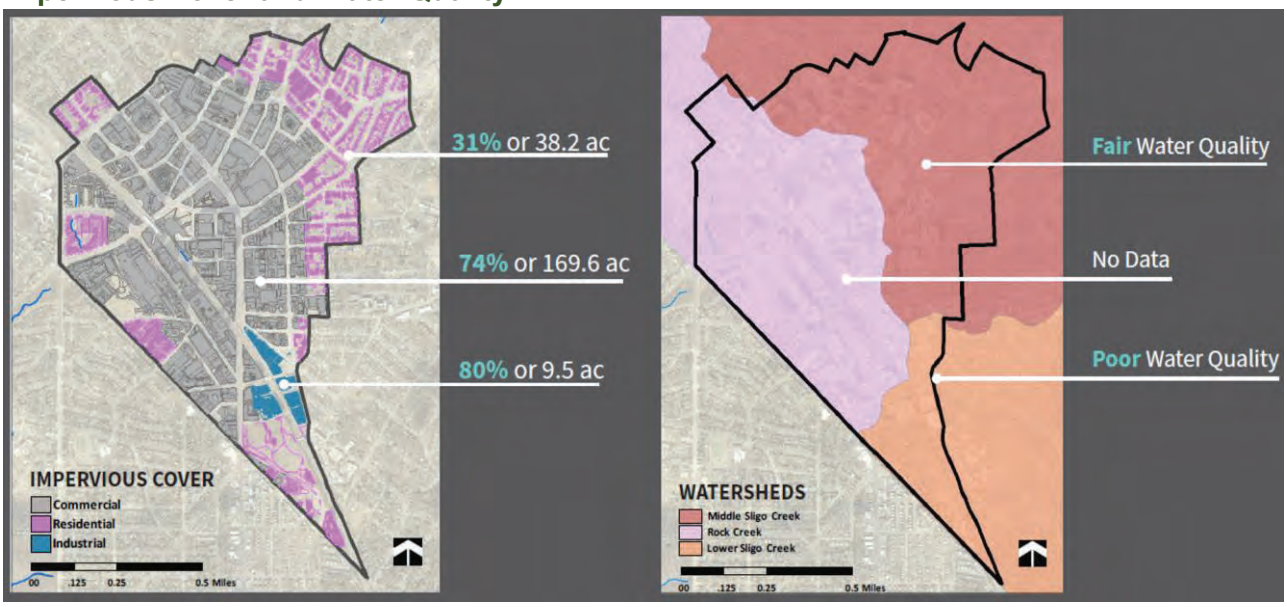
Silver Spring Impervious Cover

Impervious cover refers to anything that prevents water from soaking into the ground. Examples include parking lots, sidewalks, buildings, and streets. In addition to causing heat island effect and escalated surface temperatures, impervious surfaces curtail groundwater recharge, soil saturation, sediment and pollutant filtration, and the slow release of water from saturated soils to streams, wetlands, or other water bodies. When a surface is impervious, stormwater sweeps across it taking pollutants such as sediments, oils, de-icing salts, sand, pet waste, lawn fertilizers, and other pollutants. These pollutants are discharged into storm drain inlets which

discharge at outfall points along streams causing increased stream surges, stream bank erosion, algae blooms, reduced aquatic life, and reduced water quality. Impervious surface cover over 8% alters stream morphology (shape), reduces aquatic habitat quality, and subsequent aquatic life.

Silver Spring has a high impervious cover in all three zones. The commercial areas have an 74% impervious cover, the residential zones have 31% impervious, and the industrial zones have over 80% impervious cover. Consequently, high impervious cover both inside and outside of the Silver Spring Sector Plan boundary contribute to the fair and poor water quality found in the middle and lower Sligo Creek watersheds.

Impervious Cover and Water Quality



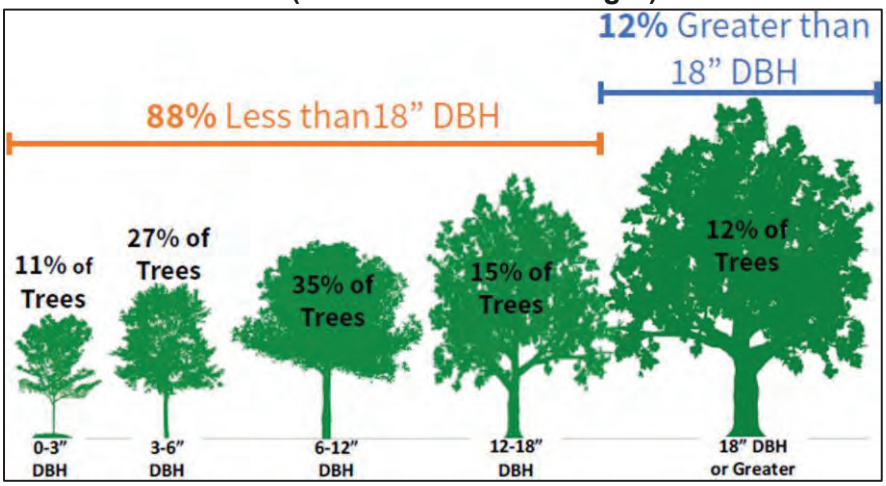
Tree Canopy Analysis

The presence of trees and urban nature improve people's mental and physical health, commerce, property values, desirability, children’s attention and imagination, and beyond. Ecologically, trees reduce the effects of heat island, cool the streetscape, sequester and store carbon emissions, improve air and water quality, and provide habitat and food for many declining species. However, not all trees perform and function in the ways listed.

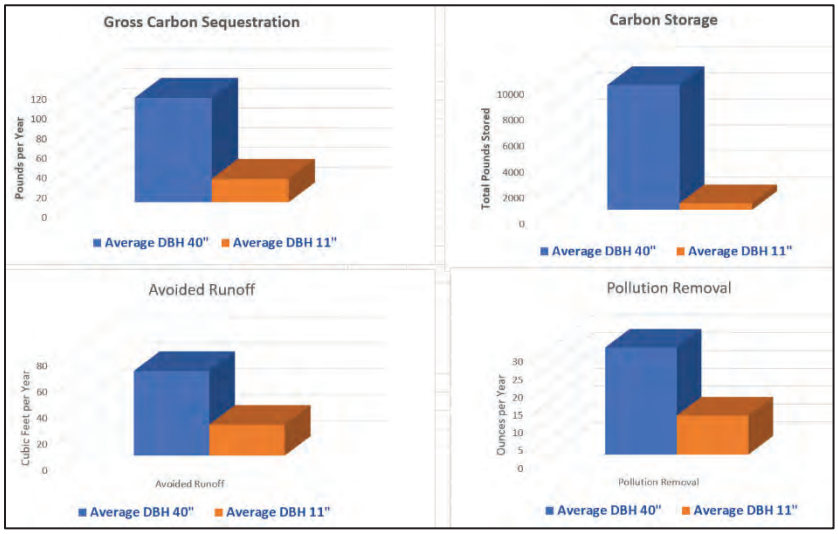
Young trees struggle to establish in the hot, paved urban environment and are more vulnerable to heat stresses, drought, wind, storms, and mortalit. Unfortunately, 88% of all trees are less than 15-inches in diameter at breast height and do not provide the shade needed to cool the streetscape. Their chances of survival are quite uncertain and highly unlikely. On the other hand, mature, larger canopy trees are stronger against winds, storms, drought, and disease while providing over triple ecological value, and cool the streets by well over 10 degrees. Yet we are rapidly losing them. Only 12% of all trees in Silver Spring are 18-inches in diameter or larger.

To determine the actual performance value of the trees in Silver Spring, staff utilized i-Tree software to measure the a few tangible tree benefits such as removal of atmospheric carbon dioxide, carbon storage capacity, pollution removal, and stormwater reduction. By far, there is a significant difference in performance value of larger trees.

Majority of Tree Sizes in Silver Spring
DBH(diameter at breast height)



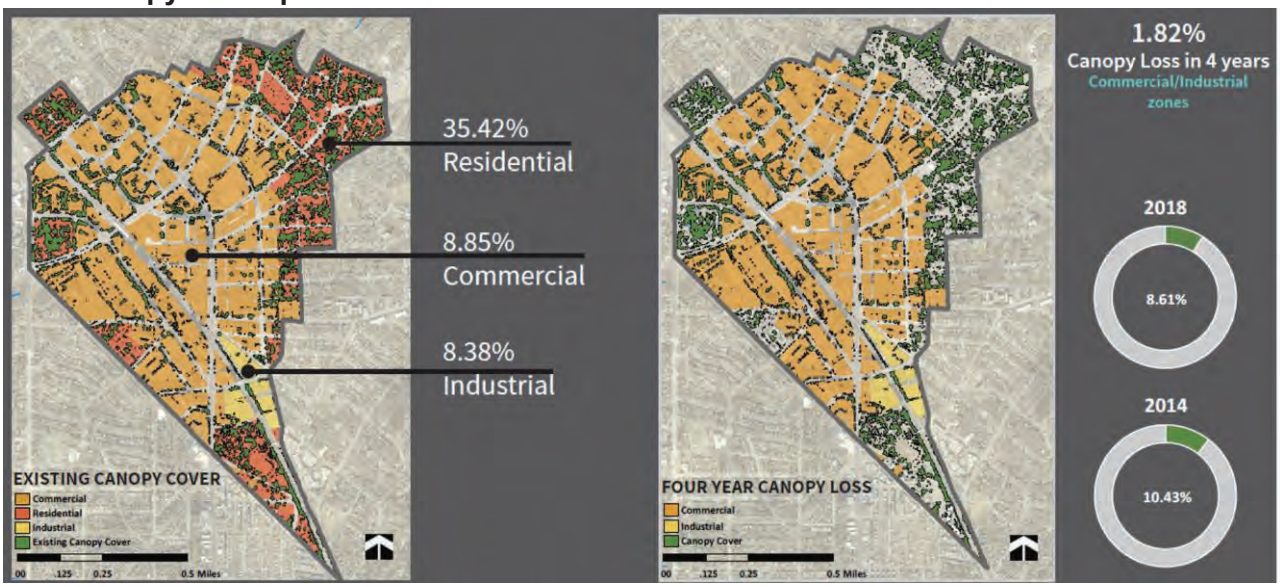
Graphed Performance Value of Large Trees verses Smaller Trees:



	Tree Diameter under 11-inches at Breast Height	Tree Diameter over 18-inches at Breast Height	Difference
Carbon Sequestered/lbs	23.59 lbs/approximately	105.78 lbs/approximately	348% approximately
Carbon Stored/lbs	503 lbs/approximately	9,604 lbs/approximately	1,809% approximately
Stormwater runoff avoided/cubic feet	23.56 lbs/approximately	64.54 lbs/approximately	180% approximately.
Pollution Removal/Ounces	10.9 Ounces/ approximately	29.92 Ounces/ approximately	174% approximately

Performance Value of Large Trees verses Smaller Tree

Tree Canopy Cover per Zone



Recommendations

There are many strategies to combat heat island temperatures and build a resilient community. The most effective and proven methods are installing Nature Based Solutions (NbS) on every parcel of land including the right-of-way. NbS will have countless benefits and they will address the escalating temperatures, heat island effect, tree loss, water quality, habitat loss, and human health and desirability.

- Implement the principles of the Cool Streets Recommendations that will be included in the Design Guidelines into new site development and street renovations on public and private property.
- Plant diverse, stratified, and climate- and region-appropriate native tree species to reduce vulnerabilities, diseases, and improve their ability to thrive in a changing climate. Update Silver Spring Streetscape Standards, Forest Conservation, and other environmental guidelines as necessary.
- Prioritize urban tree canopy and green infrastructure in targeting the hottest streets and where tree canopy is deficient (see Map 25).
- Encourage a minimum of 35% green cover on Optional Method Development projects. A project may achieve the 35% green cover requirement by:
    - Providing an intensive green roof (6 inches or deeper) on the rooftop of the buildings.
    - Proving native canopy tree cover on the landscape of the project site area at ground level; and/or
    - Providing a combination of tree canopy cover and intensive green roof for a total of 35%or greater on the total site.

  *May be reduced for on-site energy generation or ccupiable rooftop amenities.
- All new rooftops not covered in green roofs or alternative energy generation should be cool roofs with low-albedo surfaces.

- Consider a Cool Roof Initiative that encourages existing property owners to paint their roofs with reflective surfaces which can reduce the effects of heat island by as much as 33 percent.
- Encourage all property owners to take advantage of MNCPPC's free Tree Montgomery program.
- Apply Sustainable Sites Initiatives (SITES) principals to new construction projects.

Energy

Over 40% of the county's total carbon emissions comes from buildings and their reliance on fossil fuels. To meet the County's Net Zero Carbon goals by 2035, reducing emissions from the building sector and our dependency on non-renewable resources is paramount. Long dismissed as too expensive, energy efficient and even net zero buildings have grown in affordability, popularity, and demand. Continued advances in technology and building materials will make it even easier to reach net zero or even net positive building aspirations.

The ability of a community to provide clean, reliable energy in the face of power outages, resource availability, or transmission disruptions is called Energy Resiliency. These emergency situations are a hardship to all however those most often affected are the vulnerable and lower income citizens who do not have equal and/or financial access to resources. To avert these inequities, all buildings must have access to local renewable energy such as solar, geothermal, micro-grids, and other dependable electricity sources thereby reducing reliance on distant power networks, non-renewable resources, and susceptible powerlines.

In the meantime, before all residents have local alternative energy, it is increasingly urgent to plan for the inevitable temporary loss of community power. During those events emergency shelters and resiliency hubs are critical supportive resources. Resiliency hubs are designed to provide emergency heating and cooling capability; refrigeration of temperature sensitive medications and milk from nursing mothers; plug power for charging of cell phone and computer batteries; certain durable medical equipment, as well as emergency lighting. Emergency shelters differ as they provide shower options, food services, and locker rooms.

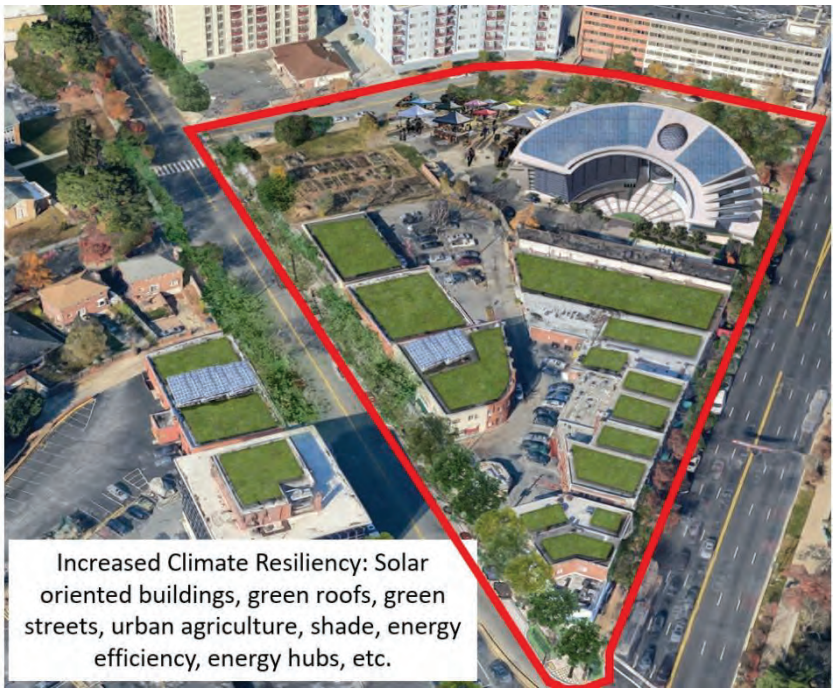
Recommendations:

- Encourage exceeding the county's minimum energy standards.
- Support and encourage onsite alternative energy such as solar, geothermal, and/or future renewable resource energy technologies.
- Optimize building orientation to maximize passive and active solar energy. For building owners and/or tenants this will reduce energy consumption, utility costs, and increase marketability.
- Encourage Housing Opportunities Commission redevelopment to incorporate Energy Hubs with backup solar and battery storage for a minimum of 72 hours of off grid energy during local and regional energy outages.
- For public[2] and large properties or/and consolidated land parcels with more than one building encourage the use and installation of decentralized and renewable/clean energy systems such micro-grids.

[2] Montgomery County is embracing microgrids to improve the resiliency of public facilities, reduce their environmental impact and reduce operational costs to taxpayers. Microgrids are local power systems that use clean and renewable energy sources

- Reduce consumption of natural resources and new materials through repurposing and recycling of existing buildings or materials.

Energy Efficient and Resilient Community



Food Security

Only recently have urban planners begun to address and advance food security, sustainable local agriculture, and their essential supporting food systems[3]. This is due to a movement to improve health and food equity nationally. Locally, Montgomery created a Food Security Plan (MCFSP, 2017) which envisions all people having access to safe, sufficient, and nutritious food. Unfortunately, the downtown Silver Spring study area has been identified by Feeding America as a food insecure community. The current food system in and around downtown Silver Spring does not support equitable access to affordable, healthy , local food. The COVID-19 pandemic triggered an economic crisis, resulting in an estimated 50% increase in food insecurity in Montgomery County along with a disruption in the food supply chains that further exacerbated inequities in reliable, affordable, and sufficient food access for residents.

Urban planners have an opportunity to shape the food system landscape by lifting restrictive planning policies, regulations, and zoning code barriers to foster greater food security, food sovereignty, and food access. Staff have been working with the Montgomery County Food Council, a non-profit organization that works with government agencies, elected officials, and community-based organizations to create a more resilient local food system. Many other county documents are simultaneously addressing food security, equity, and sustainability including: the Montgomery County Climate Action Plan, the Sustainability Plan, THRIVE Montgomery 2050,

[3] A food system includes all processes and infrastructure involved in feeding a population: growing, harvesting, processing, packaging, transporting, marketing, consumption, distribution and disposal of food and food-related items. It also includes the inputs needed and outputs generated at each of these steps.

DEP's Strategic Plan to Advance Composting, Compost Use, and Food Scraps Diversion. Each plan plays an overlapping and important role identifying the county's concerns, risks, barriers, and actions needed. To build an equitable and resilient urban food system in Silver Spring the following needs. Recognizing the limitations and opportunities of urban planners, the recommendations address a few of these inequities.

1. Unreliable long-term urban agricultural opportunities.
2. Inadequate supply of affordable, walkable, and healthy food retail.
3. Lack of local food processing, storage, and kitchen space.
4. Inadequate food distribution and aggregation hubs.
5. Lack of affordable retail and industrial rental space.
6. Local food producers have limited access to affordable retail space.

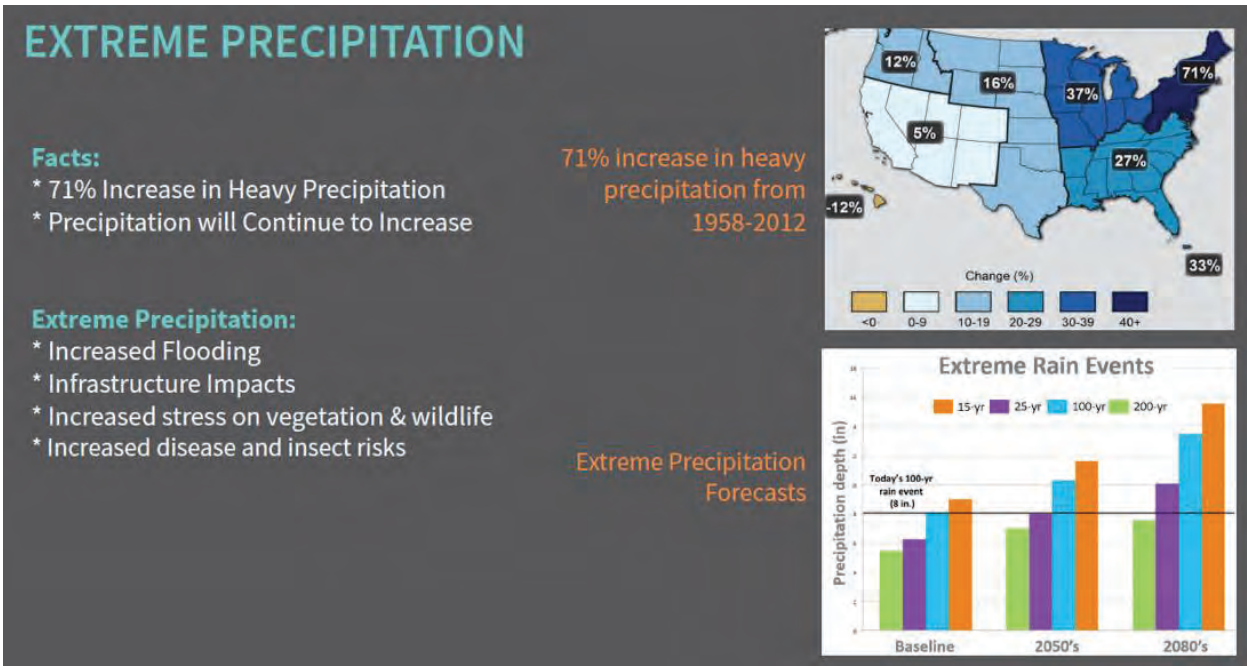
Recommendations

- Increase local capacity for the production of culturally appropriate foods, through increased opportunities for community gardening and agriculture efforts (MCFSP)
- Support the establishment of healthy corner stores, farmers markets, and other access points for federal benefits usage (MCFSP)
- Remove obstacles to urban agriculture activities and support land access for local agricultural initiatives such as community farms, food farms, commercial food kitchens, food processing, rooftop farms, food forests, farmers markets, food carts, and stalls, etc.
- Maximize opportunities for food production on sites eligible for property tax credits under the Urban Agriculture Tax Credit
- Support zoning that allows agricultural and agricultural related land uses on the Montgomery County College campus
- Support onsite community composting and education hubs to bring us closer to meeting the County's Zero Waste goals.
- Support equitable land and resource access for local food production by farmers, residents, and community groups.
- Allow urban agriculture and associated businesses on vacant lots, underutilized land, and parking areas with landowner agreements.
- Allow temporary food businesses such as food carts and food trucks in all zones.
- Allow shared use kitchens, cut and wash facilities and processing equipment for farm produce, meat, and grains, and aggregation and distribution infrastructure
- Support long-term access to local farming opportunities and support their associate small businesses
- Increase access to licensed kitchen space and storage infrastructure for food entrepreneurs, to build processing capacity for farm produce and value added products.

Water Quality

Impervious surfaces cover 77-percent of Silver Springs commercial and industrial area. Impervious surfaces prevent stormwater from infiltrating into onsite soils and the water table consequently rainwater sheets off the pavement taking all debris, oils, and contaminants into the storm drains flowing directly into nearby waterways. Untreated runoff causes stream surges, erosion, poor water quality, aquatic habitat destruction and flooding. Consequently, Sligo Creek has fair to poor water quality and degraded aquatic habitats. No data has been collected for the Rock Creek Watershed. Predicted increases in precipitation and extreme storm events will further compromise the streams, water quality, and the infrastructure associated with it. Additionally, todays county stormwater management requirements treat a maximum of 2.6

inches of rain. This is not enough to meet the extreme weather and precipitation forecasted for this region which could cause further stream damage and potential flooding.



Silver Spring is comprised of public and private land primarily developed prior to current stormwater management requirements. As roads and property redevelops modern stormwater management systems such as green infrastructure are being installed to meet the county's standards. Green infrastructure is a network of nature-based solutions intended to treat runoff prior to it entering local waterways. They are designed to capture, slow, treat, and slowly release runoff into the stormdrain system. Its components mimic nature and often contain soils, grasses, shrubs, and/or trees. Green infrastructure simultaneously has a myriad of public health, economic, community, and environmental benefits. A few supplementary benefits to address Silver Springs existing conditions are cooler streets and communities, increased desirability and economic activity, urban beautification and equity, cleaner air and water, and greater biodiversity for defense against increasing diseases and insect attacks.

<u>Recommendations:</u>

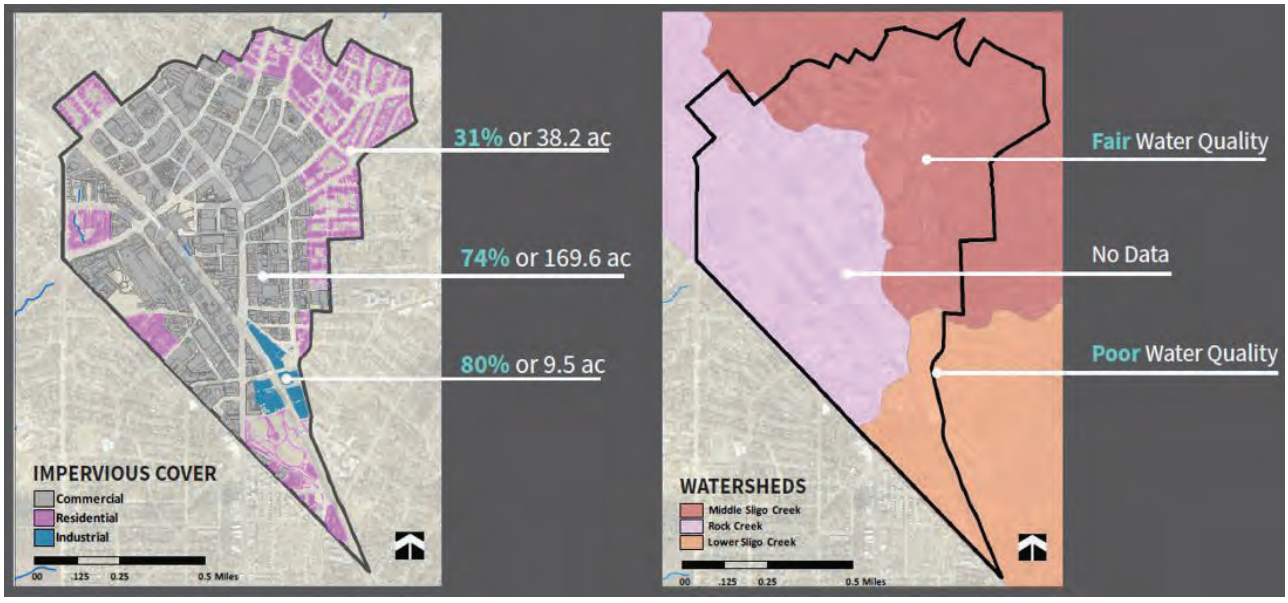
- There are varying urban challenges for meeting the county's strict stormwater requirements including but not limited to existing underground infrastructure, onsite compacted or clay soils, or the small size of the property. Furthering design challenges stormwater treatment locations are often limited to courtyards or rooftops areas where there are competing use demands such as solar or outdoor seating and play areas. Creative and innovative stormwater design is essential to maximize treatment volumes and ensure Silver Spring reduces its untreated stormwater management rates. The following is recommended:
    a. Fully comply with the Chapter 19 of the County's Erosion, Sediment Control, and Stormwater Management Code.
    b. Maximize greenroof stormwater credit using an 8-inch soil medium or approved equivalent. This simultaneously increases building insulation, reduces urban

Heat Island Effect, and increases opportunity for native plant, insect and other species biodiversity.

c. Consider using rainwater catchment cisterns for irrigation or other allowable uses within the zone.

- Minimize impervious cover on redevelopment sites through the installation of green infrastructure such but not limited to: bioretention areas, stormwater swales and trenches, structured cells, stormwater planters, permeable pavements, or other future green technologies.
- Stormwater management within the right of way must be separate from street tree panels as they require routine cleanout and tree replacement.
- Where surface parking is retained, integrate vegetative stormwater management systems and/or solar systems covering a minimum of 35%.

Impervious Surface Cover and Water Quality



Drought and Water Supply

Drought is one of the county's top climate concerns along with its associated impacts on water supply. According to representatives within the Washington Suburban Sanitary Commission (WSSC) and the Montgomery Hazardous Mitigation Plan water supplies should be quite sufficient for Silver Spring. However, it is anticipated that beginning in and/or around the year 2040 water supplies may become a concern during extreme droughts particularly in the fall seasons. To avert water supply shortages WSSC and the Montgomery County Emergency Management and Homeland Security Office are implementing studies and measures to ensure sufficient water is available in the future.

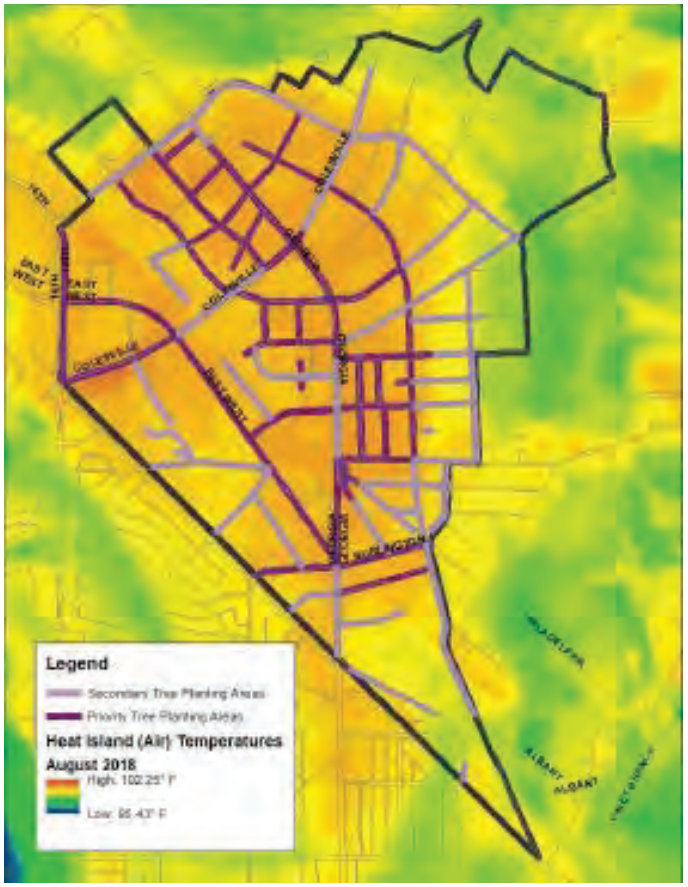
Transportation

Combustible fuel vehicles account for 41% of carbon emissions in the county. Reducing vehicle demand and use is one of many ways planners can reduce the county's carbon emissions. However, most do not realize that the right-of-way can be designed to contribute to building a climate resilient community while simultaneously sequestering carbon from our atmosphere. Sequestration is critical to drawing down the escalating carbon in our atmosphere.

The right-of-way is an opportunity area for bolstering carbon sequestration, cooling the streetscape and community, and proving enhanced ecological benefits that bring nature back to the urban landscape. Green infrastructure is a network of nature-based solutions such as stormwater management, trees and vegetation, and porous pavements. Its components provide multiple ecological benefits to cool streets and communities, improve air and water quality, beautify the landscape, and provide vegetation that supports the survival of animal and insects as they live and migrate through the community. These affordable elements are integral for designing a resilient, healthy, safe, and economically viable future in the face of climate change.

Recommendations

- Provide streets and open space through the planting of native canopy trees prioritizing lower income areas, the Green Loop, and the hottest streetscape areas (see map).
- During street renovations and routine replacements consider installing smart street elements such as: solar lighting, solar metering, solar crosswalks, LED lighting, electric vehicle charging portals, and/or other technologies that emerge.
- Implement cooling strategies into all streetscape plans during the site planning process, and street renovation and improvement projects. Cool Streets Recommendations will be included in the Design Guidelines.
- Encourage car-free, flexible, and car-lite streets through flexible streets, road diets, alternative modes of transportation, and bike/vehicle sharing programs.
- Encourage more vehicle charging stations than currently required on private property and within the right-of-way (ROW) where appropriate to support a growing electric vehicle demand.



Greenhouse Gas Modeling

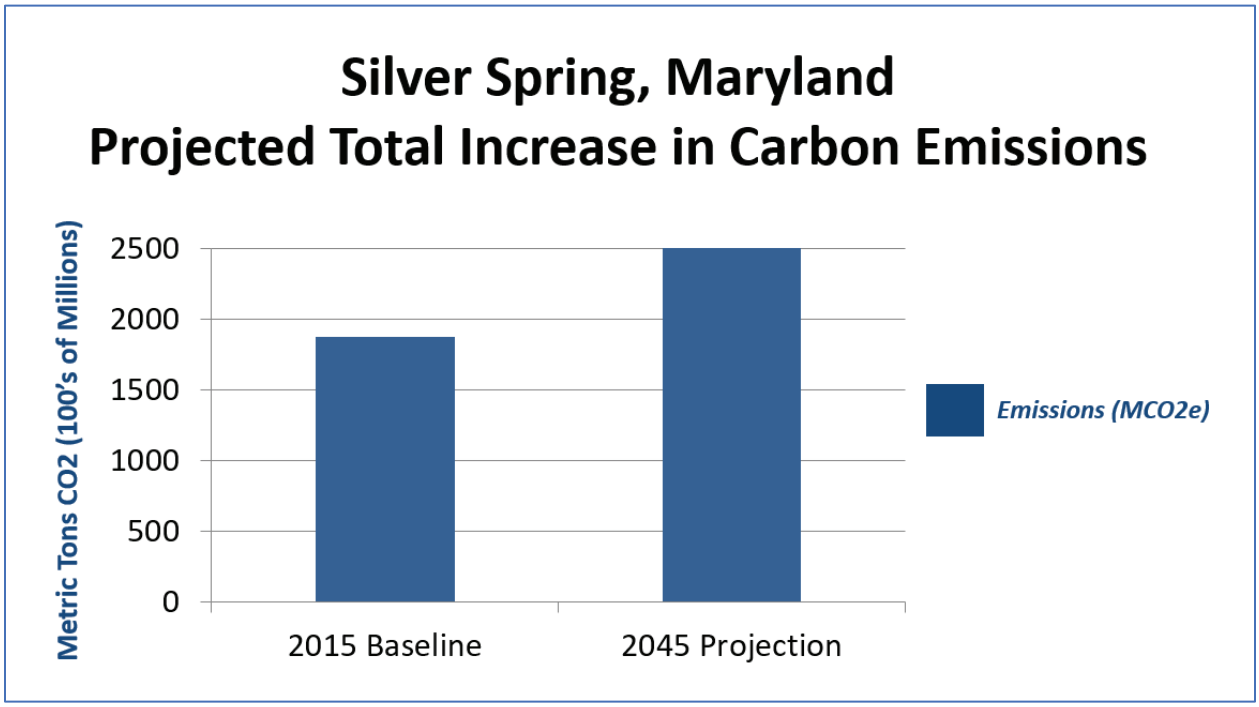
Montgomery County Code Chapter 18A-15 requires the Planning Board to model the carbon footprint of planning areas as part of Sector Plans. Another law (Montgomery County Code Chapter 33A-14) requires the Planning Board to estimate the carbon footprint of areas being master planned, and to make recommendations 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, motorcycles, etc. Results are given for the total life of the development from construction to demolition and are given in metric tons of carbon dioxide equivalents (MTCO2e).

The Sector Plan focuses on areas that are most likely to redevelop which will increase the numbers of housing units and non-residential spaces. Population and use are intended to increase, smart growth policies such as increased density, transit options, and the construction of energy efficient buildings will be constructed. However, the model being used today was developed in King County, Washington in 2007. It is outdated and does not take into consideration new energy efficient building materials and requirements, the rise of electric vehicles, and energy efficient non-electric vehicles. Therefore, we need to state that the numbers shown do not reflect true carbon forecasting. Forecasting and carbon modeling have become quite complex and can often take months if not years of full staff dedication. The forecast below may or may not reveal actual carbon outputs. The results of the carbon analysis show an increased greenhouse gas emission above the existing conditions. However, when considered population increases the carbon emissions per capita will likely decline.

Recommendations for reducing energy demand and use are woven throughout the content of the Sector Plan. Some significant carbon reduction recommendations include building efficiencies, increased alternative modes of transportation, increased density, and increased tree and vegetation to sequester carbon and reduce heat island effect.



Carbon Analysis Methodology

MNCPPC currently uses a greenhouse gas model developed by King County, Washington. The inputs are derived from national averages, and wherever possible we have substituted Montgomery County data obtained by the Planning Department's Research and Technology and the Transportation Division. The results are reported in terms of the equivalent effect of a given volume of carbon dioxide ("carbon dioxide equivalents").

To project total emissions for the Silver Spring Sector Plan, the spreadsheet model considered embodied energy emissions, building energy emissions, and transportation emissions. The model documentation defines embodied emissions as “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, motorcycles, etc.

Inputs for Silver Spring Sector Plan include the numbers and types of housing units and the square footage of different categories of retail, commercial, and public buildings. The model was run once using 2015 data to establish baseline results. The model was run again using housing units, and commercial and retail space projected to develop under the sector plan (2045) to estimate future greenhouse gas emissions. The model estimates emissions over the life of the development, and results are given in metric tons of CO2 equivalents. The actual outcome of the model is higher than the reality due to continuous changes in technology, energy efficiencies, and alternative energy sources.

To project total emissions for an area, the spreadsheet model also considered embodied energy emissions, building energy emissions, and transportation emissions. The model documentation defines embodied emissions as “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, motorcycles, etc.

The emissions model does not calculate and future carbon offsets from either best management practices, vehicle and/or building efficiencies or conversions to electric, or other unknown carbon reductions. The estimates from the existing methodology assume “business as usual” when projecting emissions.

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