Appendix D:
Environment

Takoma Park
MINOR MASTER PLAN AMENDMENT

Takoma Park Minor Master Plan

Content

Resources

References

1. Resiliency and Adaptation

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 the effects of climate change requires planning on dozens of fronts, but in general, environmental resiliency falls into 2 buckets: for resiliency and adaptation. Climate Resiliency is the capacity to anticipate, cope, and manage anticipated climate impacts. Climate adaptation refers to actions to prepare for, mitigate, and adjust to the projected impacts. Both are essential to strengthen the capacity of communities to thrive in the face of 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. Similarly, in 2014 Takoma Park approved their Sustainability Energy Action Plan (SEAP) which also aims to reach net zero by 2035. These aspirational initiatives could steer the community towards reduced climate impacts and increased climate resiliency. As land use planners the Takoma Park Minor Master Plan (Plan) 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 and an adaptive capacity to help citizens and nature adapt to a changing world. It merges climate solutions with all land uses and development recommendations at all local scales.

Planning staff have worked to understand the environmental conditions of the plan area to make recommendations that will improve and mitigate past egregious environmental actions. Through environmental mitigation it's possible to reduce the effects of extreme heat, flooding, habitat, and biodiversity loss, and even fossil fuel consumption to improve Takoma Park's environmental resiliency while increasing the quality of life and place for its citizens. Staff reviewed the following existing County and city plans to learn its history, existing conditions, and initiatives to align, support, and sometimes exceed their recommendations.

- Montgomery County Climate Action Plan, June 2021
- Thrive Montgomery 2050
- Montgomery County Hazardous Mitigation Plan 2018
- Montgomery County Department of Transportation Sustainability Plan
- Takoma Park approved their Sustainability Energy Action Plan (SEAP) 2014
- Takoma Park's Executive Summary 2020 Climate Emergency Response Act from Nuclear Free to Fossil Fuel Free
- Takoma Park's Sustainable Maryland Community Certification
- City of Takoma Park Flood Mitigation Plan, 2009

[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.

- City of Takoma Park Housing and Economic Development Strategic Plan
- Toole Design, Maple Avenue Complete Streets Design, 2021
- Takoma Park Resilience and Adaptation Memo, 2019
- Takoma Park Sustainability Catalog, 2017
- Takoma Park Stormwater Management Funding and Programs, 2016
- Takoma Park's Tree Canopy Assessment, 2022
- City of Takoma Park 2020 Climate Emergency Response Resolution, 2020-6
- 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

2. 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 can create chronic physical and economic stress, may elevate utility costs, and increase cases of heat stroke, respiratory and heart conditions, allergies, and bronchial infections.

Urban planners can assist in alleviating some of these inequities by equalizing the distribution of 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 benefits. Many recommendations strive to improve environmental equity through Nature Based Solutions, new building energy efficiencies, access to local food, cleaner water, and cooler outdoor spaces.

2a. Nature Based Solutions and Sequestration

Nature-Based Climate Solutions (NbCS) are sustainable planning, design, and engineering practices that integrate natural features into the landscape to mimic nature in the built environment. They provide many human, climate, and ecological services to mitigate heat, sequester and store carbon, improve air and water quality, improve mental and physical health, and build a more climate resilient and equitable community. Simultaneously they create green habitat corridors that support wildlife, and foster connections between people.

NbCS can be broadly applied and are recommended for all individual public and private properties, parks, neighborhoods, and streetscapes. They include but are not limited to forest, tree, shrub, and native plantings, bioretention facilities, gardens, vegetated open spaces, soil restoration, and green roofs. The Plan recommendations include numerous NbCS for their multi-beneficial performance capacities, versatility, affordability, and ease of installation. They often overlap with other sectional recommendations for transportation, parks, open space, and urban design.

NATURE BASED DESIGN SOLUTIONS

3. Conditions and Goals

3a. Tree Canopy Analysis

The overall tree canopy cover for the Plan area is 43-percent but within the high-density residential and institutional properties its only 26-percent (see map below). The presence of trees and nature in developed areas has proven to enhance people's mental and physical health, commerce, property values, desirability, children's attention, and imagination, and more. Ecologically, trees increase climate resiliency, reduce the effects of heat island, cools streets and landscapes, 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.

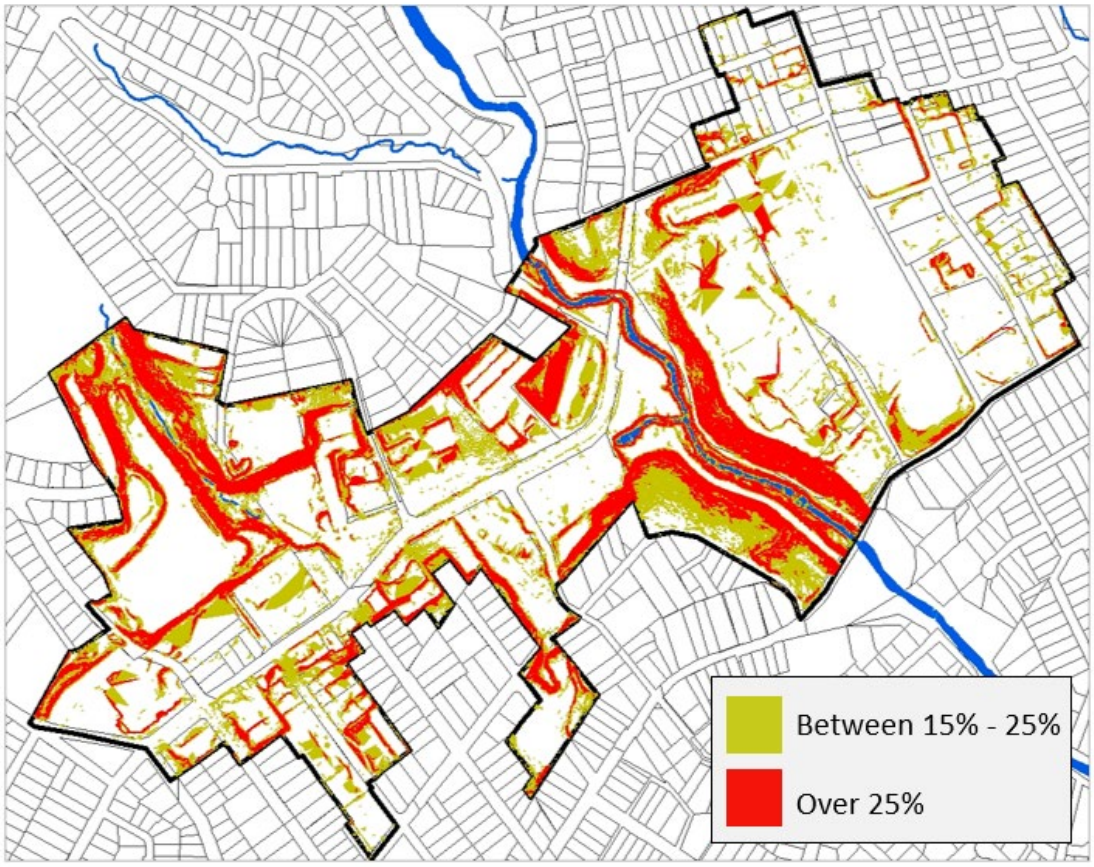
While there are a lot of trees within the plan area, many on both private and public property are young (under 50 years old) and on steep slopes with (see map below) with invasive species strangling their trunks and smothering their leaves prohibiting photosynthesis. Younger trees underperform larger trees regarding their capacity to sequester carbon, release oxygen, and reduce runoff. They also struggle to survive and establish in a hot, paved urban environment and are more vulnerable to heat stresses, disease, drought, wind, storms, and mortality.

The Plan recommendations aim to increase tree canopy cover within the developed areas and within the right-of-way as well restore the existing forests and tree clusters on steep slopes through the redevelopment process. Increased tree canopy cover will also be achieved through the implementation of Nature-Based Solutions (NBCS) on every parcel of land as its developed.

The tree canopy goals of the Plan are:

- Reduce urban heat island temperatures, increase tree canopy cover, and improve climate resiliency through the planting and distribution of Nature-Based Climate Solutions.
- Increase carbon sequestration capacities through stratified vegetative plantings on public and private property.
- Achieve 45 percent tree canopy coverage for the plan area on both public and private property.
- Increase plant biodiversity, pollination capacity, and beneficial wildlife habitats
- Stabilize and restore forested steep slopes on private property through the redevelopment process.

Forest or Wooded Steep Slopes



3b. 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 extreme weather event and it will be exacerbated as planet temperatures rise. Major increases in death, hospitalizations, and emergency room visits have been documented 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.

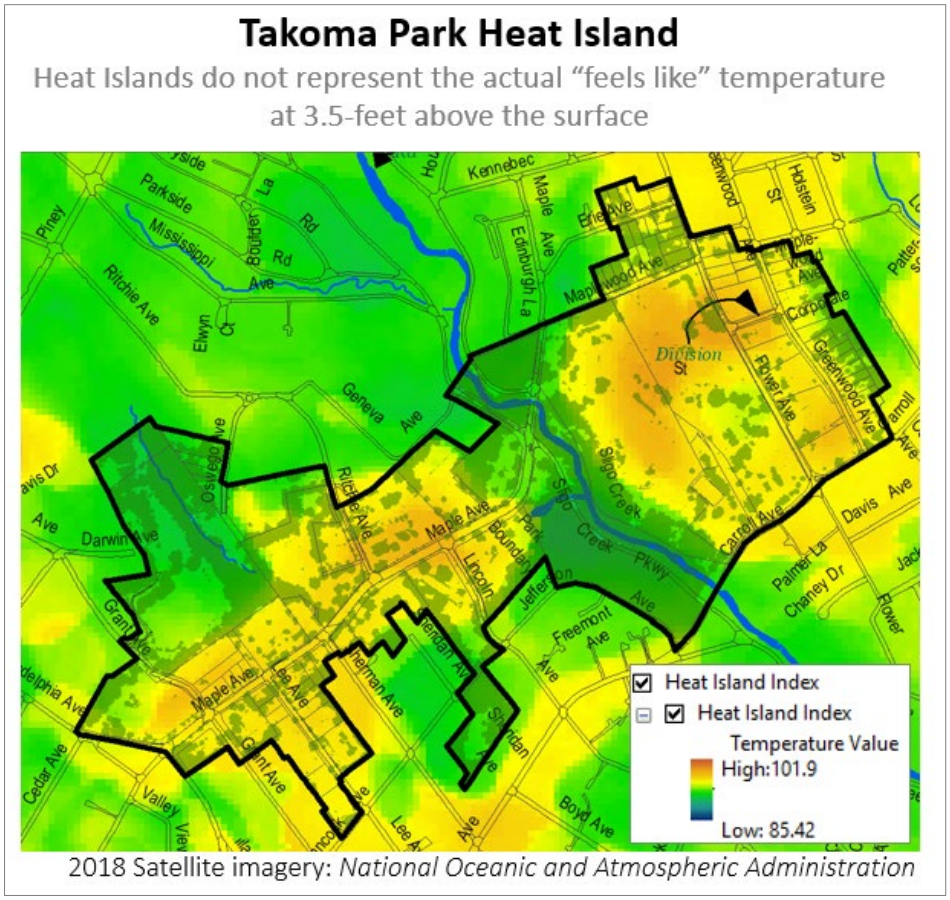
3c. Heat Islands & Universal Thermal Climate Index

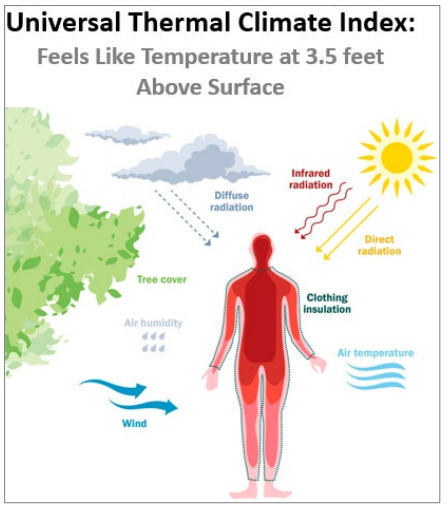
Heat Islands are areas with substantially warmer atmospheric temperatures than its shaded surroundings. They are created by a combination of radiating heat from a high impervious surface cover, humidity, vehicle, building and generator emissions, and the absence of vegetation that would provide evaporative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

Heat Island temperatures do not reflect the Universal Thermal Climate Index (UTCI) temperatures. UTCI temperatures are those experienced at the human level -at 3.5 feet above the surface. They can be 10-30+ degrees hotter than heat island temperatures. High temperatures are a concern because of

potential health risks from heat exposure and the increased formation of air pollutants, ground-level ozone, or smog. It can also affect indoor energy loads and consumption due to elevated indoor temperatures.

The heat island maps shown below is from data collected through the National Oceanic and Atmospheric Association in the summer of 2018. The temperature data are colored in shades ranging from green (coolest areas) to red (warmest areas). The areas with trees, patches of woods, and parks are significantly cooler than areas with dark impervious pavements and buildings.





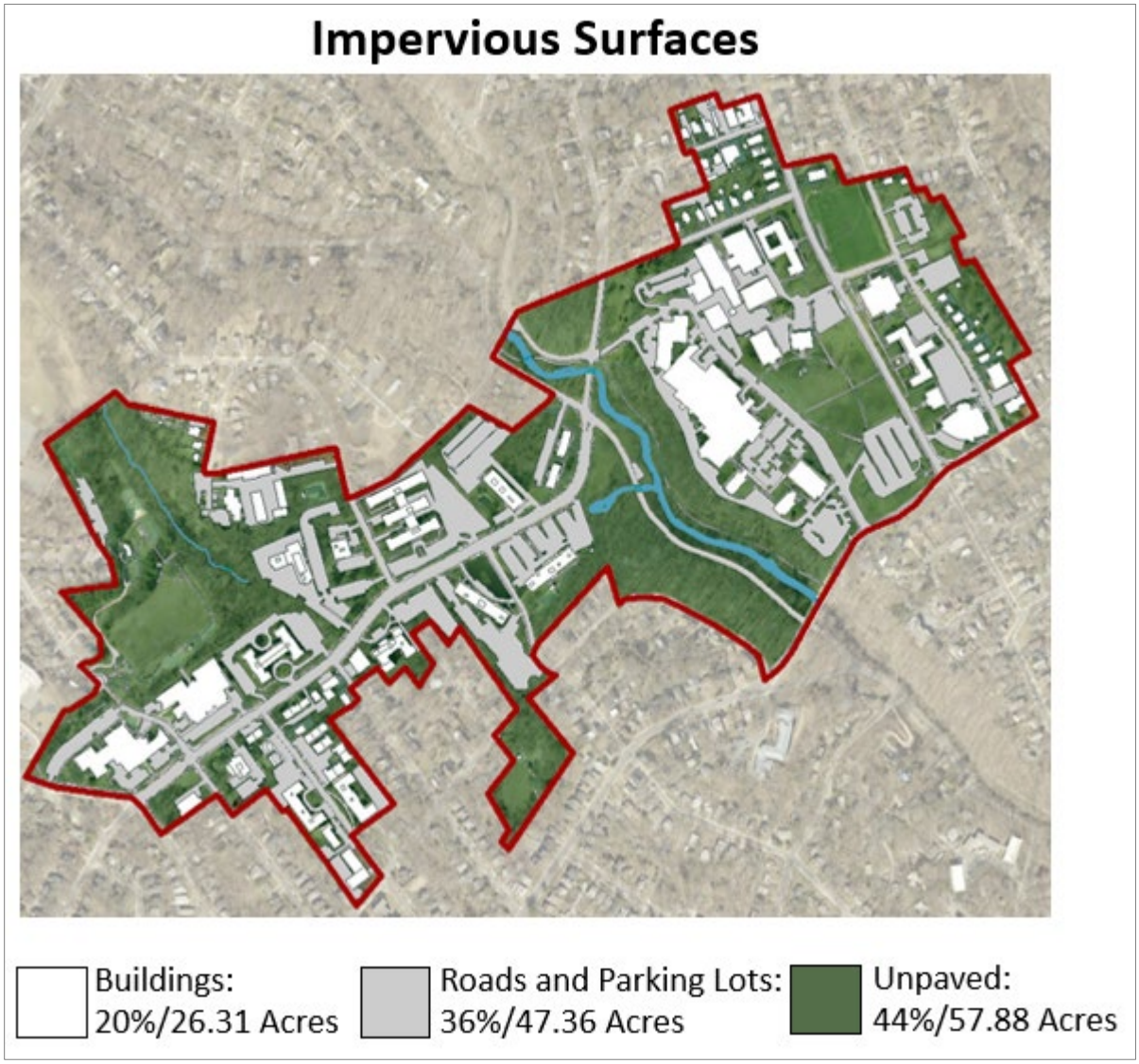
3d. WATER

3.d.i. Impervious Cover

Impervious cover refers to anything that prevents water from soaking into the ground. Examples include parking lots, sidewalks, buildings, and streets. Impervious surfaces have many environmental consequences such as increased heat island effect, escalated surface temperatures, increased sediment and pollutant runoff, curtailed groundwater recharge, and the slow release of water from saturated soils into streams, wetlands, or other water bodies. When a surface is impervious stormwater sweeps across it taking surface 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 flows directly into Sligo Creek. These discharges cause increased stream surges, stream bank erosion, algae blooms, reduced aquatic life,

and reduced water quality. Research has shown that when impervious cover reaches 10-25%, major alterations in stream morphology occur that can significantly reduce habitat quality. At greater than 25% impervious cover, streams suffer from loss of habitat, floodplain connectivity, and bank stability, as well as decreased water quality.

In the plan area nearly 48-percent is impervious predominantly within the high density residential and commercial areas. Consequently, this contributes to the poor water quality within the lower Sligo Creek watershed. The goals of the plan seek to reduce impervious.



3.d. ii. Water Quality and Stormwater Management

As noted above, the plan area has a nearly 48-percent impervious surface cover with limited stormwater management to compensate its effects. Consequently, all debris, oils, and contaminants flowing across the impervious surfaces are discharged into Sligo Creek. The Montgomery County Department of Environmental Protection monitors water quality in all county watersheds. The classified Sligo Creek

watershed as having poor water quality. This is not solely due to the runoff from the plan area however it is a contributor to stream pollutants.

Increases in precipitation intensity and extreme storms from climate change are anticipated. To reduce further degradation of water and stream quality, reducing impervious surface cover and stormwater treatment facility construction is critical. While it is not possible to require grandfathered private property owners to fund and construct stormwater management facilities on their current property, all new development for projects disturbing 5,000 square/feet or greater must comply with the City requirements.

The City's Stormwater Management Program has a utility fee which pays for the capital costs, design, and maintenance of new and existing stormwater infrastructure and bioretention facilities within public areas and city owned rights-of-way. The program supports stream restoration, the green street program, and the stormwater management permit process for all new construction. New construction must comply with the Maryland Department of Environment, chapter 19, Sediment and Erosion Control regulations. Presently, waivers to compliance is allowed in Takoma Park. The Plan recommendations discourage waivers through the following language: Maximize stormwater management practices and minimize deviation from Chapter 19 of the County's Stormwater Management requirements.

Further opportunities for increased stormwater management are within the right-of-way. In time, as county and city roads are renovated modern stormwater management systems such as green infrastructure and NBCS are constructed, water quality should improve.

The Plan's water quality goals are:

- Reduce untreated stormwater runoff and potential flood rates
- Reduce impervious surface cover on existing and new development
- Increase onsite stormwater management
- Improve runoff water quality

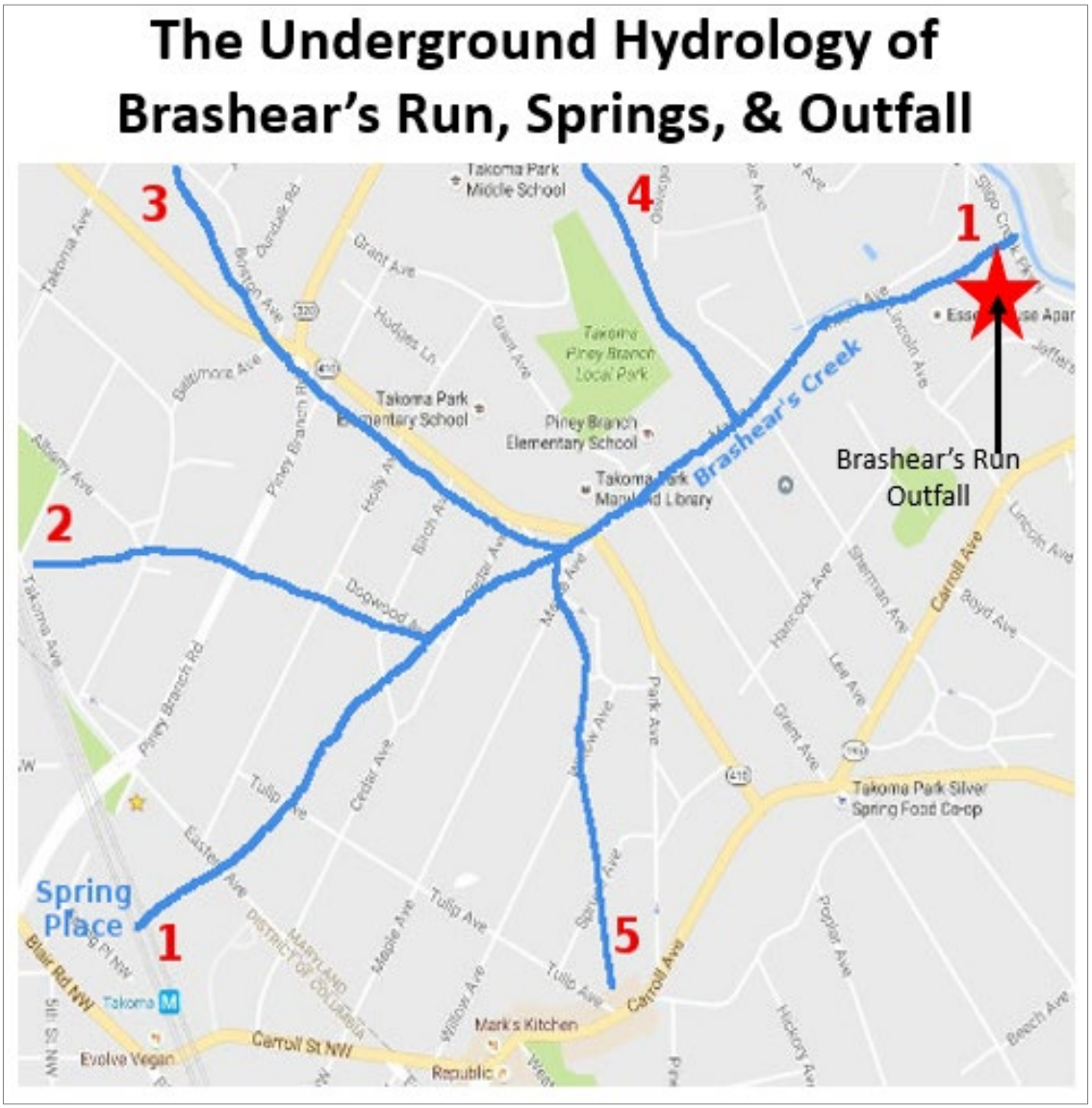
3.d.iii. Brashear's Run and the Underground Drainage Network

Brashear's Run once flowed through Takoma Park. It was an important aquatic system for the neighborhood with at least five known vibrant feeder springs and seeps as water sources (see map below). Over decades, the entire aquatic system was channeled into an underground conveyance network.

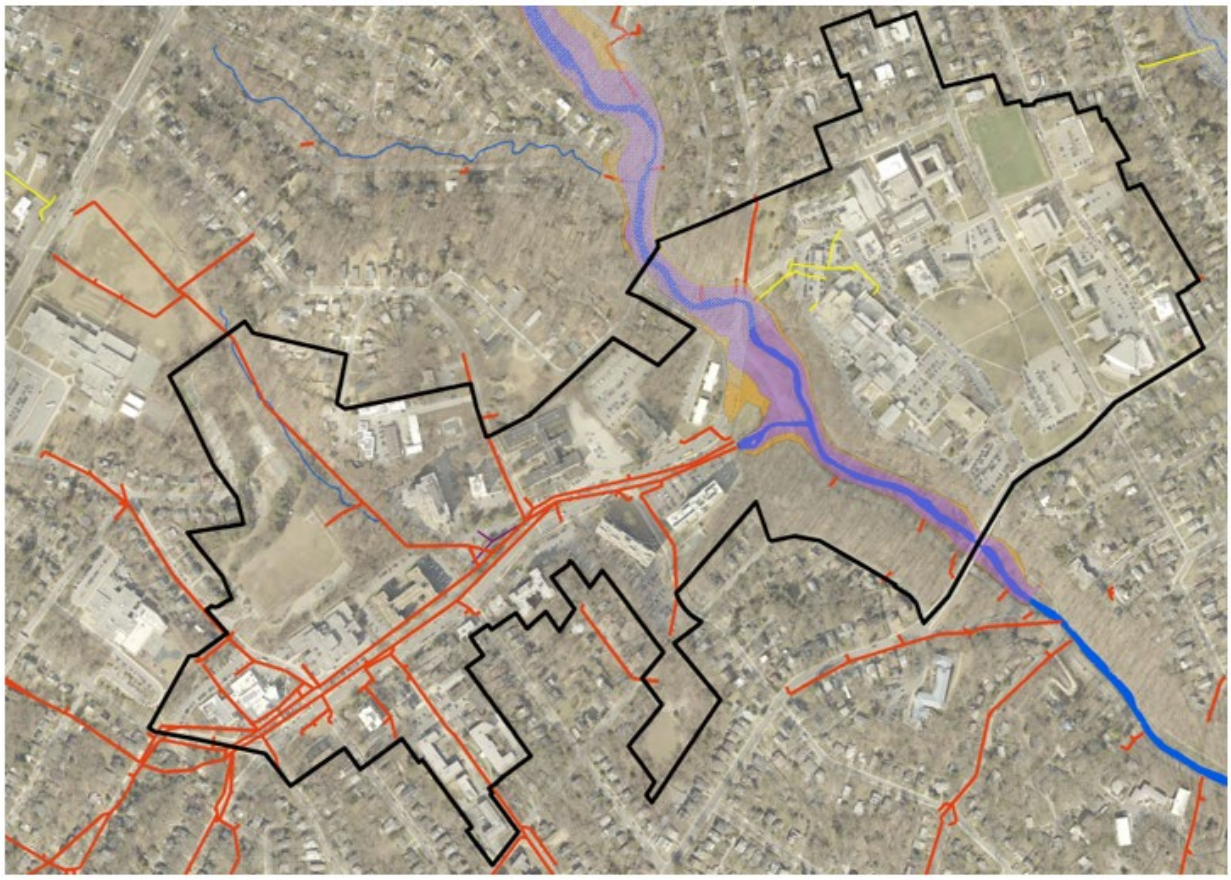
The mainstem now flows under the Takoma Park Metro Parking lot, Eastern, Tulip, and Dogwood Avenue where it meets the second feeder stream beginning at Belle Ziegler Park. The third feeder stream runs along Philadelphia Avenue in North Takoma Park, with another beginning at the top of Tulip and Carroll Avenue. The fifth, has a least one spring in the ravine between the County's Piney Branch Park and Heffner Park where it flows roughly between Piney Branch Elementary School and the Park Ritchie Apartments.

Maple Avenue has a second network of pipes conveying stormwater runoff from streets, parking lots, and private and public property (see map below). Both networks daylight into an outfall on parkland at the intersection of Sligo Creek Boulevard and Maple Avenue. The underground pipe networks are large with above ground setback requirements for periodic maintenance and upgrades. Additional requirements

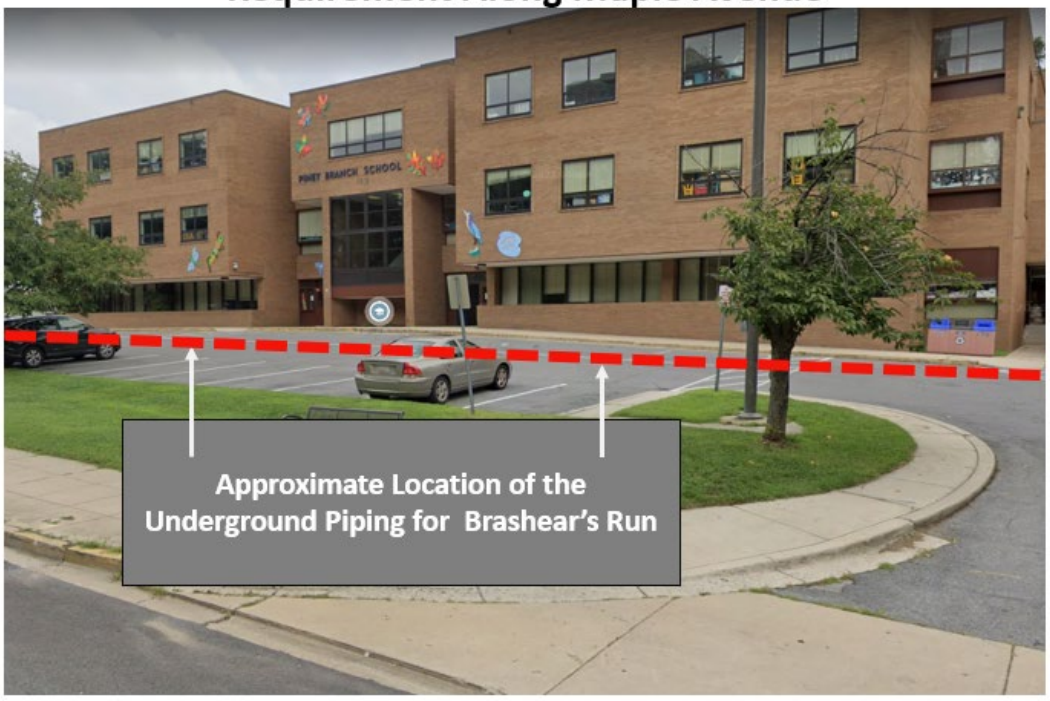
according to the City of Takoma Park Flood Mitigation Plan, 2009 is a 100-year flood setback. This may not prohibit building within the floodplain. For example, the Takoma Park Community Center has a County approved flood wall able to hold back a 100-year flood should there ever be one. Note that pre-existing structures are subject only to the codes that exist at the time of construction and when there are major additions to structures, they need to be brought up to the new code's standards. These are the primary reasons for the excessive building setbacks and surface parking along Maple Avenue between Philadelphia and Lincoln Avenue.



Underground Stormdrain & Brashear's Run Network



Approximate Location of Underground Piping and Setback Requirement Along Maple Avenue



Flooding

The 2009 City of Takoma Park Flood Mitigation Plan outlines the city's floods, risks for floods, and makes mitigation recommendations that are consistent with the requirements of Code 44 of Federal Regulations part 78.5 - Flood Mitigation Plan Development. It states that Takoma Park has had numerous incidents of flooding, but none would be considered major. Most incidents are the result of flash flooding from sudden, short-lived rainstorms and storm water management issues.

The Flood Plan mentions concern for potential flooding along Maple Avenue (from Philadelphia to Lincoln). The potential flooding "comes from a relic/buried tributary (Brashear's Run) to Sligo Creek. If the drainage area above Maple Avenue were to experience a significant rainfall event in a very short period of time, the potential for flooding exists. To reduce flood risk and assure safety several buildings between Philadelphia Avenue and Lincoln Avenue may be at risk have or may be required to construct flood as required by County permitting agencies.

Drought and Water Supply

Drought and water supply are climate concerns for the county. According to representatives within the Washington Suburban Sanitary Commission (WSSC) and as noted in the Montgomery Hazardous Mitigation Plan water supplies should be quite sufficient for Takoma Park. However, it is anticipated that beginning in and/or around the year 2040 water supplies may become a countywide 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.

ENERGY

Burning fossil fuels, including their extraction and refinement is the leading cause of climate change. More than 80-percent[2] of Takoma Parks greenhouse gas emissions come from residential, municipal, and commercial building inefficiencies. To meet the County's Net Zero Carbon goals by 2035, it is critical to reduce emissions and consumption of non-renewable resources. 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.

Through the implementation of a stricter building codes, policies, and advances in green technology, Takoma Park can expect greenhouse gas reductions from buildings to decline over time. Programs such as the City's Climate Emergency Declaration Resolution, the Sustainability and Climate Action Plan, the Climate Action Plan, and the Maryland Renewable Energy Portfolio Standard also support and strive for reduced embodied energy, demand, and emissions reductions. Together these policies, initiatives, and strategies will keep Takoma Park on track to reaching net zero emissions.

The Plans Building Energy goals include:

- Support the city and county's net zero carbon emissions goals by 2035.
- Support and encourage maximizing energy efficiency on all new development.
- Support and encourage the use of regenerative, renewable energy.

[2] The State of Sustainability in Takoma Park: https://takomaparkmd.gov/newsletter/the-state-of-sustainability-in-takoma-park/

Energy Resiliency

The ability of a community to provide clean, reliable energy in the face of power outages, availability, or transmission disruptions is a component of 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 in the face of an emergency all buildings should have a source of local renewable energy such as solar, geothermal, micro-grids, and other dependable electricity sources.

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 an essential supportive resource. 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. The recommendations support the construction of onsite energy hubs in case of emergencies as backup energy and energy storage. Additionally, there is a local emergency shelter at the Community Center on Maple Avenue.

Food Security

Only recently have urban planners begun to address and advance food security, sustainable local agriculture, and their essential role in supporting food systems. This is due to a movement to improve health and food equity nationally. The Montgomery County Food Council's 2017 Montgomery County Food Security Plan envisions all people having access to safe, sufficient, and nutritious food. The vision was highlighted during the COVID-19 pandemic when the food supply chain was affected and not all citizens had access to reliable, affordable, and nutritious food. As a result, there is a been rise in demand for local food sufficiency including urban agriculture, agricultural, and food related entrepreneurial resources.

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. This includes greater opportunities for local urban agriculture and food processing. The Plan recommendations support and encourage these local agriculture opportunities by permitting commercial food kitchens, food processing, and rooftop farm uses by right in the Plan area and CR zones. It also supports food forests and urban agriculture efforts that have numerous associated benefits that improve the environment, stimulate local businesses development, provide social engagement opportunities, increase biophilia and carbon reductions (from transportation & sequestration), decreased food costs, increases pollination, restores soil, and improves habitat.

The recommendations align with the goals of multiple county and city initiatives and policies including: the Montgomery County Climate Action Plan, the Sustainability Plan, THRIVE Montgomery 2050, Managing Maryland's Growth: Planning for the Food Systems, and Sustainable Maryland- Takoma Park. The overall goals of the Plan are:

GOALS

- Support access to affordable, nutritious food for all residents.
- Support local food processing, storage, and kitchen space.
- Support access to reliable long-term urban agricultural opportunities

Transportation

Vehicles relying on combustible fuel account for 41% of carbon emissions in the county. Reducing carbon burning vehicle use and making cleaner, noncombustible alternative modes of transportation accessible will reduce carbon and other greenhouse gas emissions. Access to safe pedestrian mobilities such as walkways and bikeways will simultaneously encourage use and aid in driving down emissions.

The right-of-way road network covers a large part of the plan landscape. In addition to mobility and transportation, it's an opportunity area for the installation of a variety of Nature Based Climate Solutions to treat stormwater runoff, sequester and store carbon, reduce surface and air temperatures, and create green corridors that attract people while improving habitat connectivity and biological diversity.

The goals of the recommendations put forth in the Plan are:

- Reduce vehicle miles travelled per capita.
- Enhanced ecological services within the right-of-way.
- Reduce thermal temperatures.
- Create shaded green canopy corridors along Maple Avenue linking to Sligo Creek Stream Valley and into and through the Adventist Campus and residential neighborhoods.

CLIMATE ASSESSMENT

The Climate Action Plan (CAP) is Montgomery County's strategic plan to cut greenhouse gas (GHG) emissions 80% by 2027 and 100% by 2035 compared to 2005 levels. With a mission this aggressive, in July 2022, the County Council approved the Climate Assessment Bill (3-22) to better understand the anticipated impacts of proposed legislation and land use decisions on climate change. It requires planning staff to assess the climate impacts of each master, sector, and zoning plan. It is one of a series of legislative activities aimed to drive more climate-informed decision making and GHG reductions for the county.

The Climate Assessment is a separate document from the appendix and when completed in late June or July 2023 will be available online at the Montgomery County Planning Department website under Takoma Park Minor Master Plan.

RESOURCES

4. Takoma Park/Sligo Creek Native Species Woody and Perennial Planting List-

Native Tree and Perennial Species Within Parks and Takoma Park	
Tree species best for the Sligo Creek/Takoma Park Area.	Red maple, Virginia creeper, Southern arrowwood, American holly, common Winterberry holly, Flowering dogwood, Grape, Sweetbay magnolia, common Highbush blueberry, Elderberry, Rose, Spicebush, tassel-white, waxmyrtle, White oak, black cherry, northern red oak, tulip poplar, black gum, sassafras, white ash, mockernut hickory, southern arrowwood, black oak, pignut hickory, ironwood
Herbaceous Species for moist to dry sun	Rudbeckia laciniata, Rudbeckia triloba, Symphyotrichum lateriflorum, Symphyotrichum pilosum, Asclepias syriaca, Solidago juncea, Solidago rugosa, Penstemon digitalis, Oenothera fruticose, Salvia lyrate, Tridens flavus
Herbaceous Species for moist to wet sun	Lobelia cardinalis, Eutrochium fistulosum, Verbesina alternifolia, Symphyotrichum puniceum, Asclepias incarnata, Coleataenia anceps, Eupatorium perfoliatum, Euthamia graminifolia, Pycnanthemum muticum
Herbaceous Species for moist to dry shade	Eurybia divaricate, Solidago caesia, Elymus spp., Helianthus divaricatus, Elephantopus carolinianus, Agastache nepetoides, Anemone virginiana, Geranium maculatum
Herbaceous Species for wet to moist shade	Cinna arundinacea, Packera aurea, Boehmeria cylindrica, DIchanthelium clandestinum, Lobelia cardinalis

5. Attachment: Virginia Tech Soil Profile Rebuilding. SPR-Spec-full. 2012

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Sustainability and Urban Planning

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