Montgomery Planning

CLIMATE ASSESSMENT FOR PEDESTRIAN MASTER PLAN

PURPOSE OF CLIMATE ASSESSMENTS

The purpose of the Climate Assessments is to evaluate the anticipated impact of master plans and zoning text amendments (ZTAs) on Montgomery County's contribution to addressing climate change. These assessments will provide the County Council with a better understanding of the potential climate impacts and implications of proposed master plans and ZTAs, at the county level. The scope of the Climate Assessments is limited to addressing climate change, specifically the effect of land use recommendations in master plans and ZTAs on greenhouse gas (GHG) emissions and carbon sequestration, and how actions proposed by master plans and ZTAs could improve the county's adaptive capacity to climate change and increase community resilience.

While co-benefits such as health and cost savings may be discussed, the focus is on how proposed master plans and ZTAs may impact GHG emissions and community resilience.

SUMMARY

The Montgomery County Planning Department staff reviewed the Pedestrian Master Plan using the variables identified below. The assessment uses a qualitative rather than a quantitative approach, as the recommendations in the plan largely identify changes to policy and design that are difficult to quantify, instead of specific infrastructure.

For each set of variables, the list below identifies whether the expected impact is positive or negative.

Greenhouse Gas Emission Related Variables

- Transportation Emissions: **Positive**
- Building Embodied Emissions: **Negative**

Sequestration and Drawdown Related Variables

- Land Cover Change and Management: **Indeterminate**

Adaptive Capacity and Resilience Related Variables

- Exposure-Related Factors: **Negative**

- Sensitivity-Related Factors: **Indeterminate**
- Adaptive Capacity Factors: **Positive**

While the plan's effect on specific factors or variables may be negative at certain time scales, in totality, the plan will have a **slight to moderate positive impact** on the county's goals of addressing greenhouse gas emissions, carbon sequestration, and ensuring the resilience and adaptive capacity of our communities.

BACKGROUND AND PURPOSE OF THE PEDESTRIAN MASTER PLAN

The Pedestrian Master Plan is the first countywide plan in Montgomery County to make recommendations to improve the pedestrian experience in a holistic way. An important element in the county's 2017 *Vision Zero Action Plan* and 2021 *Climate Action Plan*, the Pedestrian Master Plan supports the *Thrive Montgomery 2050* goal to "develop a safe, comfortable and appealing network for walking, biking and rolling." The plan documents the pedestrian experience in Montgomery County today, and makes recommendations in line with national and international best practices so being a pedestrian here is even better in the years ahead.

The plan envisions a county where walking (and rolling using a mobility device) is safer, more comfortable, more convenient and more accessible for pedestrians of all ages and abilities.

VARIABLES THAT COULD AFFECT THE ASSESSMENT

The following variables could be affected by recommendations in the Pedestrian Master Plan. Depending on the nature and magnitude of changes to these variables, the effects may result in positive, negative, or neutral impacts to the county's ability to meet its greenhouse gas reduction goals, draw down excess carbon in the atmosphere, create adaptive capacity to deal with climate change impacts, and improve community resilience to climate-related disruptions.

Greenhouse Gas Emission Related Variables

- Transportation Emissions: Vehicle Miles Traveled (VMT); Number of Vehicle Trips; Non-vehicle Modes of Transportation; Public Transportation Use; Electric Vehicle Infrastructure.
- Building Embodied Emissions: Pavement Infrastructure.

Sequestration and Drawdown Related Variables

- Land Cover Change and Management: Area of Forest; Area of Non-forest Tree Canopy; Area of Green Cover.

Community Resilience and Adaptive Capacity Related Variables

- Exposure-Related Factors: Activity in Flood Risk Areas; Activity in Urban Heat Island; Exposure to Other Hazards (e.g., storms, wind).
- Sensitivity-Related Factors: Change to Forest Cover; Change to Non-forest Tree Canopy; Change to Quality or Quantity of Other Green Areas; Change to Impacts of Heat (e.g., cool pavements); Change in Perviousness; Change to Water Quality or Quantity; Change to Air Quality.
- Adaptive Capacity Factors: Change to Accessibility or Prevalence of Community and Public Spaces; Change to Emergency Response and Recovery Capabilities; Change in Community Connectivity; Change in Distribution of Resources and Support.

ANTICIPATED IMPACTS

The Montgomery County Planning Department anticipates that the Pedestrian Master Plan will have slight to moderate positive impacts on the county's goals of reducing greenhouse gas emissions, increasing carbon sequestration, and ensuring the resilience and adaptive capacity of our communities as described in more detail below.

GREENHOUSE GAS EMISSION RELATED VARIABLES

TRANSPORTATION EMISSIONS: POSITIVE EFFECT

Vehicle Miles Traveled (VMT)

Positive Effect: The Pedestrian Master Plan recommendations aim to increase walking rates and pedestrian satisfaction, enhance pedestrian safety, and create a comfortable, connected, convenient, just and equitable pedestrian network. Making it easier, safer, and more direct to be a pedestrian in Montgomery County will make walking a more viable mode of transportation for more trips and more types of trips. This will reduce vehicle miles traveled from the level it would otherwise reach as pedestrian mode share increases.[1]

Number of Vehicle Trips

Positive Effect: The Pedestrian Master Plan recommendations aim to increase walking rates and pedestrian satisfaction, enhance pedestrian safety, and create a comfortable, connected, convenient, just and equitable pedestrian network. Making it easier, safer, and more direct to be a pedestrian in Montgomery County will make walking a more viable mode of transportation for more trips and more types of trips. This will reduce the number of trips made by motor vehicles across the county.[2]

Non-Vehicle Modes of Transportation

Positive Effect: The Pedestrian Master Plan recommendations aim to increase walking rates and pedestrian satisfaction, enhance pedestrian safety, and create a comfortable, connected, convenient, just and equitable pedestrian network. Making it easier, safer, and more direct to be a pedestrian in Montgomery County will make walking a more viable mode of transportation for more trips and more types of trips. By making walking a more realistic option for residents and visitors, it will be easier to use public transit, micromobility or bicycle as well.[3]

Public Transportation Use

Positive Effect: The Pedestrian Master Plan recommendations aim to increase walking rates and pedestrian satisfaction, enhance pedestrian safety, and create a comfortable, connected, convenient, just and equitable pedestrian network. Making it easier, safer, and more direct to be a pedestrian in Montgomery County will make walking a more viable mode of transportation for more trips and more types of trips. An improved pedestrian environment also makes public transit use more realistic for more people by allowing safer and more direct access to transit stations. It is expected that the short-term benefits of implementing the plan will be limited due to the difficulty in changing entrenched travel behavior and challenges of retrofitting existing infrastructure, but as implementation advances, the positive impacts will become more pronounced.[4]

Electric Vehicle Infrastructure

Positive Effect: It is possible that expanded and improved pedestrian infrastructure could replace some trips by electric vehicles, reducing the expenditure of battery energy and the energy to charge batteries. Current impacts are probably quite small, due to a fraction of all vehicles being EVs, and a fraction of those EV trips avoided. The significance of the reductions could increase as the number of EVs in use increases.

Negative Effect: The location of pedestrian improvements envisioned by the Pedestrian Master Plan may be in conflict with existing or future electric vehicle charging infrastructure in the right-of-way. Plan Key Action B-1g seeks to affirm that the Montgomery County Department of Transportation can remove curbside electric vehicle charging infrastructure to allow transportation facilities like sidewalks or bikeways to be constructed. This is not anticipated to be a widespread issue, but in locations where the construction of sidewalks or bikeways is in conflict with electric vehicle charging infrastructure, those charging stations would be removed, and may make it more difficult for electric vehicle owners without driveways or off-street parking living along certain county roads to charge their vehicles. This may dissuade a small number of people from purchasing electric vehicles, leading

to increased greenhouse gas emissions from continued internal combustion engine motor vehicle usage. The magnitude of this impact is very small and even when the recommended policy is adopted, there would not be immediate effects.

BUILDING EMBODIED EMISSIONS: NEGATIVE EFFECT

Pavement Infrastructure

Negative Effect: An increase in Pavement Infrastructure is inherent in building out the pedestrian network the Pedestrian Master Plan envisions. The construction of these new and wider sidewalks leads to greenhouse gas emissions, both in the production of the pavement materials and in the transportation of those materials to the project site. While new and improved sidewalks can potentially repurpose space currently paved for motor vehicles (and reduce the need for expanded roadway capacity), minimizing the creation of additional imperviousness, the negative greenhouse gas emissions impacts will remain. Because these new and improved sidewalks will encourage more walking activity and reduced VMT, the more immediate greenhouse gas emissions impact from construction may be negative, but over the long term, they will catalyze reduced emissions.

SEQUESTRATION AND DRAWDOWN RELATED VARIABLES

LAND COVER CHANGE AND MANAGEMENT: INDETERMINATE EFFECT

Area of Forest

Negative Effect: To some degree, this plan may result in a decrease in forest area given that some new pedestrian connections constructed in response to plan recommendations are likely to traverse forestland and require the removal of trees. The carbon stored in this vegetation will be released into the atmosphere unless the wood is used to make furniture, construction materials or other semi-permanent products. There will not be immediate effects from the adoption of the Pedestrian Master Plan. Any negative impacts would occur over the lifecycle of the plan as transportation agencies build new pedestrian infrastructure in these areas.

Area of Non-Forest Tree Canopy

Positive Effect: The Pedestrian Master Plan has specific recommendations (Key Actions B-6a and B-6b) to increase Area of Non-Forest Tree Canopy by encouraging the planting of street trees,

particularly along busier roadways in Equity Focus Areas within the county.[1] There will not be any immediate impacts from the adoption of the Pedestrian Master Plan. Instead, as the recommended policies and programs are developed and funded, the benefits will begin to accrue. As more and more street trees are planted and advance into maturity, their ability to sequester carbon will increase and the initial investments will bear fruit.

Area of Green Cover

Negative Effect: The Pedestrian Master Plan encourages the construction of new sidewalks and the widening of existing sidewalks to more comfortable widths. If sidewalks are not being constructed within the existing roadway footprint, they will likely reduce existing green cover.

COMMUNITY RESILIENCE AND ADAPTIVE CAPACITY VARIABLES

EXPOSURE-RELATED FACTORS: NEGATIVE EFFECT

Activity in Flood Risk Areas

Negative Effect: By encouraging additional pedestrian activity, Pedestrian Master Plan may increase pedestrian activity in flood risk areas. Flood risks are increased where pedestrian paths lie in or near stream valleys, floodplains and low-lying areas. Pedestrian infrastructure should be designed to account for these impacts, incorporating trees and stormwater treatments into the facilities, avoiding low-lying areas where possible, and elevating infrastructure out of flood-prone areas where necessary.

Activity in Urban Heat Island

Negative Effect: By encouraging additional pedestrian activity, Pedestrian Master Plan may increase pedestrian activity in urban heat island areas. Urban heat islands are concentrated areas of buildings and pavement, lack of vegetation and shade, and restricted air circulation where heat is absorbed and ambient temperatures are elevated.

[1] Equity focus areas include populations with less access to wealth and resources than the general population. Among the outcomes of this wealth disparity is that fewer people in Equity Focus Areas have access to an automobile (see Racial Equity Profile, Montgomery County, Office of Legislative Oversight Report 2019-7 Microsoft Word - Cover Page 2019-7.docx (montgomerycountymd.gov)), and are therefore more likely to need to walk to get where they are going, including to bus stops and other public transportation hubs. This exposes more people to climate hazards such as extreme heat. Often these communities suffer from underinvestment in public infrastructure and facilities.

Positive Effect: The Pedestrian Master Plan has specific recommendations (Key Actions B-6a and B-6b) to increase shade along pedestrian pathways by encouraging the planting of street trees, particularly along busier roadways in Equity Focus Areas within the county. Additionally, Key Action B-6c encourages county agencies to better understand how different surface materials, textures, and colors can help mitigate the urban heat island effect.

Exposure to Other Hazards (e.g., Storms, Wind)

Indeterminate Effect: By encouraging additional pedestrian activity, Pedestrian Master Plan may increase pedestrian activity during extreme weather and wind events. However, delayed pedestrian travel to avoid these events is most likely.

Unshaded pedestrian facilities also subject users to high temperatures during extreme heat events.

Somewhat offsetting the negative effects above, the Pedestrian Master Plan has specific recommendations (Key Actions B-6a and B-6b) to increase shade along pedestrian pathways by encouraging the planting of street trees, particularly along busier roadways in Equity Focus Areas within the county. Additionally, Key Action B-6c encourages county agencies to better understand how different surface materials, textures, and colors can help mitigate the urban heat island effect. Because the Pedestrian Master Plan is largely a policy document, the specific effects of plan recommendations on these variables cannot be simply distilled, but the nature of impacts is expected to be mixed.

SENSITIVITY-RELATED FACTORS: INDETERMINATE EFFECT

Change to Forest Cover

Negative Effect: To some degree, this plan may result in a decrease in forest area given that some new pedestrian connections constructed in response to plan recommendations are likely to traverse forestland and require the removal of trees. The carbon stored in this vegetation will be released into the atmosphere unless the wood is used to make furniture, construction materials or other semi-permanent products. There will not be immediate effects from the adoption of the Pedestrian Master Plan. Any negative impacts would occur over the lifecycle of the plan as transportation agencies build new pedestrian infrastructure in these areas.

Change to Non-Forest Tree Canopy

Positive Effect: The Pedestrian Master Plan has specific recommendations (Key Actions B-6a and B-6b) to increase Area of Non-Forest Tree Canopy by encouraging the planting of street trees,

particularly along busier roadways in Equity Focus Areas within the county. There will not be any immediate impacts from the adoption of the Pedestrian Master Plan. Instead, as the recommended policies and programs are developed and funded, the benefits will begin to accrue. As more and more street trees are planted and advance into maturity, their ability to sequester carbon will increase and the initial investments will bear fruit.

Change in Quality or Quantity of Other Green Areas

Negative Effect: The Pedestrian Master Plan encourages the construction of new sidewalks and the widening of existing sidewalks to more comfortable widths. If sidewalks are not being constructed within the existing roadway footprint, they will likely replace existing green cover.

Change to Impacts of Heat (e.g., cool pavements)

Positive Effect: Pedestrian Master Plan Key Action B-6c encourages county agencies to better understand how different surface materials, textures, and colors can help mitigate the urban heat island effect. As these concepts permeate streetscape design and construction countywide, heat impacts due to sidewalk construction should decrease.

Change in Perviousness

Negative Effect: One strategy to increase the number of people walking is to build new sidewalks and improve existing ones. Building new sidewalks and widening existing sidewalks will increase the amount of impervious surface countywide unless these sidewalks are constructed where roadway or other hardscape exists today.

Change to Water Quality or Quantity

Negative Effect: Increasing the amount of impervious surface could decrease water quality by making it more difficult for rainfall to infiltrate into the soil, increasing runoff to streams and other waterways.

Positive Effect: At the same time, the mode shift from driving to walking and public transit envisioned by the Pedestrian Master Plan could improve water quality by marginally reducing the automotive oils and particulates from driving that end up in the local water system after rain events.

Change to Air Quality

Positive Effect: Reducing motor vehicle trips and providing more transportation options for more people will improve air quality by minimizing pollutants and airborne particulates from internal combustion engines, braking, and tire wear.

ADAPTIVE CAPACITY-RELATED FACTORS: POSITIVE EFFECT

Change to Accessibility or Prevalence of Community and Public Spaces

Positive Effect: The Pedestrian Master Plan envisions safer, more accessible, and more direct pedestrian connections across the county. These connections will reduce barriers for people of all ages and abilities to access community and public spaces.

Change to Emergency Response and Recovery Capabilities

Positive Effect: The Pedestrian Master Plan envisions safer, more accessible, and more direct pedestrian connections across the county. The improved pedestrian network creates options that could facilitate emergency response and disaster recovery. Recommendations within the plan aim to improve roadway safety and help achieve Vision Zero. Reducing the number of traffic crashes should also lower the demands of emergency responders.

Change to Community Connectivity

Positive Effect: The Pedestrian Master Plan envisions safer, more accessible, and more direct pedestrian connections across the county. The increased pedestrian infrastructure will improve the ability for people to connect to other transportation systems and to local businesses and services that provide basic needs and employment, and facilitate the social connectedness that provides community cohesiveness and support networks.

Change to Distribution of Resources and Support

Positive Effect: The Pedestrian Master Plan envisions safer, more accessible, and more direct pedestrian connections across the county. One of the main goals of the plan is to create an equitable and just pedestrian network. While there are specific recommendations aimed at prioritizing Equity Focus Areas for improved environmental amenities, the plan also prioritizes where future pedestrian

and bicycle capital improvements should be constructed using equity as a key component. If this prioritization approach is followed, resources and support should be distributed more equitably in the future and in ways that address historic inequities.

RELATIONSHIP TO GREENHOUSE GAS REDUCTION AND SEQUESTRATION ACTIONS CONTAINED IN THE MONTGOMERY COUNTY CLIMATE ACTION PLAN (CAP)

The Transportation Vision of the Montgomery County *Climate Action Plan* (CAP) is to safely, affordably, and sustainably move people and connect places, and includes reducing the use of personal automobiles and increasing active transportation options such was biking, walking, and micromobility services. To achieve this, the CAP includes Recommended Action T-1 to "Expand Public Transit" and Recommended Action T-2 to "Expand [the] Active Transportation and Micromobility Network," both with estimated medium GHG reduction potential.

The CAP vision for Carbon Sequestration is that "Montgomery County has conserved and enhanced its nature-based solutions, including forest, meadow, and wetland ecosystems, greenspaces, and trees, while reversing carbon dioxide emissions. The county is committed to continuing to enhance the wide array of benefits from these resources." Included in this vision is to "Retain, increase, and restore terrestrial ecosystems including forests, meadows, wetlands, green spaces, and urban trees." Recommended actions include S-1 "Retain and Increase Forests," S-2 "Retain and Increase Tree Canopy," and S-3 "Restore and Enhance Meadows and Wetlands." The CAP does not specify a GHG reduction potential for this action since it is geared toward sequestration rather than GHG reduction.

The Pedestrian Master Plan also responds to the goals and recommendations in *Thrive Montgomery 2050*, the General Plan for Montgomery County. Thrive includes the transportation recommendation to "Develop a safe, comfortable, and appealing network for walking, biking, and rolling." The environmental section identified climate change as a key focus for planning in Montgomery County, including reducing GHG emissions and addressing impacts of the changing climate.

AMENDMENTS OR ADDITIONAL RECOMMENDATIONS

There are no amendments or additional recommendations as a result of this assessment. The Pedestrian Master Plan supports comfortable walking environments and will work in conjunction with Thrive Montgomery 2050 and area master plans/design guidelines that specify public realm improvements to address heat island effect and other climate impacts.

SOURCES OF INFORMATION, ASSUMPTIONS AND METHODOLOGIES USED

The climate assessment for the Pedestrian Master Plan was prepared using the methodology for master plans contained within the Montgomery Planning staff report *CLIMATE ASSESSMENT OF*

ZONING TEXT AMENDMENTS AND MASTER PLANS and supplemented by information in the Montgomery County *Climate Action Plan* and *Thrive Montgomery 2050* and reports from the Montgomery County Office of Legislative Oversight's Office of Racial Equity and Social Justice. Additional information about the Climate Assessment of master plans and ZTAs can be accessed at https://montgomeryplanning.org/planning/climate-assessment-of-zoning-text-amendments-and-master-plans/

[1] Frank, L., Greenwald, M., Winkelman, S., Chapman, J., and SS. Kavage, Carbonless footprints: Promoting health and climate stabilization through active transportation, Preventive Medicine, Volume 50, Supplement, January 2010, Pages S99-S105

[2] According to Montgomery County's Climate Action Plan (page 147), private vehicle trips will also need to be reduced to 60% of total trips, which is a 15% reduction from the County's 2018 vehicle mode share, to achieve the County's GHG reduction goals.

[3] Maibach, E., Steg, L., and J. Anable, Promoting physical activity and reducing climate change: Opportunities to replace short car trips with active transportation, Preventative Medicine, Volume 49, Issue 4, October 2009, Pages 326-327

[4] Cervero, R., Walk-and-Ride: Factors Influencing Pedestrian Access to Transit, Journal of Public Transportation, Vol 3, No 4, 2001.