ATTACHMENT C

Montgomery Planning

DRAFT CLIMATE ASSESSMENT FOR THE UNIVERSITY BOULEVARD CORRIDOR 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 the 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 Board anticipates that The University Boulevard Corridor Plan will have moderate negative impacts and slight to moderate positive impacts on the county's goals of addressing greenhouse gas emissions, and slight positive and negative impacts on carbon sequestration. While the University Boulevard Corridor Plan will have both positive and negative impacts on resilience and adaptive capacity, on balance Planning Staff believes that there will be an overall positive impact on ensuring the resilience and adaptive capacity of the University Boulevard communities.

BACKGROUND AND PURPOSE OF THE UNIVERSITY BOULEVARD CORRIDOR PLAN

The University Boulevard Corridor Plan covers approximately 3.5 miles of University Boulevard (MD 193) East and West between the Capital Beltway (I-495) and Amherst Avenue. This Plan focuses on developing a multimodal corridor that supports safe, accessible, and healthy travel options and connects vibrant communities with a diverse range of housing options, supported by bus rapid transit (BRT). In addition, it also envisions a new range of residential housing typologies for existing detached residential properties and new infill development on larger institutional and commercial properties.

Recommendations are provided for land use, zoning, urban design, housing, transportation, parks and trails, historic resources, public open space, community facilities, and the environment.

VARIABLES THAT COULD AFFECT THE ASSESSMENT

The following climate-related variables that were considered in this assessment as impacted by the Master Plan. Climate related variables include the various greenhouse gas reduction, sequestration, resilience, and adaptive capacity activities in the climate assessment checklists (Tables 1 and 8) contained in the *Climate Assessment Recommendations for Master Plans and Zoning Text Amendments in Montgomery County*.

CLIMATE-RELATED VARIABLES

Transportation- Vehicle miles traveled by type, Number of trips, Non-vehicle modes of transportation, Public transportation use, Electric vehicle infrastructure access.

Building Embodied Emissions – Building certifications, Building square footage, Building life span, Pavement infrastructure, Material waste produced, Use of green building materials.

Energy – Electricity usage, Electricity efficiency.

Land Cover and Management – Area of forest, Area of non-forest tree canopy, Area of green cover, Implementation of nature-based solutions.

RESILIENCE-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, Change in perviousness, Change in stormwater management system treatments, Change to water quality or quantity, Change to air quality, Infrastructure design decisions.

ADAPTIVE CAPACITY-RELATED VARIABLES

Change to accessibility or prevalence of community and public spaces, Change to emergency response and recovery capabilities, Change in access to transportation, Change to accessibility or prevalence of local food sources and other goods, Change in availability or distribution of economic and financial resources, Change to community connectivity, Change in distribution of resources and support.

OTHER VARIABLES

Other variables include the number and frequency of events at each permitted site, transportation options, and where the sites are located.

ANTICPATED IMPACTS

GREENHOUSE GAS EMISSIONS, CARBON SEQUESTRATION, AND DRAWDOWN

Greenhouse Gas Emissions Quantitative Assessment Summary

The University Boulevard Corridor Plan is anticipated to have moderate negative impacts and slight to moderate positive impacts on greenhouse gas emissions. The Quantitative Assessment estimates that total greenhouse gas emissions in the University Boulevard Corridor Plan area will be approximately 35% higher at buildout than the emissions from buildout under the existing zoning and previous master plan recommendations. This is because the University Boulevard Corridor Plan proposes to increase zoning density of properties along and near University Boulevard to create opportunities to increase the supply of smaller, more affordable residential units through redevelopment of existing single-family lots. While this is a much more efficient use of land, the increase in residential units will require additional energy for heating, cooling and lighting and for transportation to, from and within the UBCP area. Because emissions are directly associated with energy use, more emissions will result. Larger numbers of people living within the Plan area will also generate larger amounts of material waste, and there are emissions associated with the creation, transport, and disposal of those materials.

Breaking out the components of the emissions assessments, building energy use generates substantially more greenhouse gas emissions than any other source, followed by building waste emissions, then transportation emissions and emissions associated with embodied building energy. Building energy emissions and transportation energy emissions are typically responsible for the largest share of greenhouse gas emissions, but the relative proportion of building energy to transportation energy emissions is more skewed toward building energy emissions in the UBC Plan compared to other recently analyzed master plans. While the Quantitative Assessment does not provide definitive answers about why the emissions proportions looks different in the UBC, reviewing the existing and proposed land use characteristics and the way the Quantitative Tool calculates emissions may help interpret the results.

The University Boulevard Corridor Plan area is strongly dominated by single-family houses, which tend to use more energy per square foot than more compact building forms, so it is logical that building energy uses would generate the greatest emissions. The UBC Plan area also exhibits many of the characteristics of a “complete community” when the influence of the Wheaton urban node on the western end of the UBC plan area is considered. The Wheaton node gives UBC residents easy access to grocery stores, a shopping mall, restaurants and other goods and services that supply basic needs. The University Boulevard Corridor Plan area also includes several schools including two high schools. The University Boulevard Corridor also provides transportation alternatives including robust bus service and access to the Wheaton Metro Station. This combination of factors should lead to shorter trips and a reduced need to travel far by car to reach schools and employment centers, and to obtain basic necessities. Since the Quantitative Tool calculates transportation-related ghg emissions on

Vehicle Miles Traveled, it is reasonable that the transportation emissions fraction of the total emissions in the UBC would be comparatively lower.

While the UBC Plan area projects increased emissions, the total emissions are relatively smaller when compared to larger master plan areas that are more spread out, and that contain high energy land uses such as hospitals or research facilities that use large amounts of computing power.

These greenhouse gas emissions estimates are based on average figures for similar building types, land uses and transportation systems in comparable regions. Emissions estimates include existing buildings, transportation systems, and processes for the creation and disposal of material waste. The emissions projections also assume that the energy being consumed continues to be generated through the burning of fossil fuels. Transitioning to clean energy is the key to eliminating greenhouse gas emissions from our buildings and transportation systems.

The University Boulevard Corridor Plan includes numerous recommendations to increase the energy efficiency of buildings, generate more renewable energy on site, enhance public transit options, and create high-quality pedestrian and bicycle facilities to shift the predominant transportation modes away from single-occupant petroleum-fueled vehicles. In addition, the UBC Plan's recommendations to create opportunities for more housing options should place more residents in and should reduce the number of vehicle trips and distances traveled and allow more people to get to their desired destinations by non-motorized means. All of these recommendations in the UBC Plan should contribute to reductions in greenhouse gas emissions.

These changes will be taking place within a larger context of new initiatives and policies already being enacted by other County agencies that will result in requirements for greater building energy efficiency, provision of public transit, and transitioning to clean, renewable energy. As these programs are implemented, the emissions associated with energy use throughout the Plan area should decrease.

Carbon Sequestration/Drawdown Quantitative Assessment Summary

The existing forest, non-forest tree cover, and green space areas sequester and store around two percent of the total carbon emissions in the UBC Plan areas. While these amounts are a fraction of the total ghg emissions, they are not inconsequential, storing over 117 million metric tons of carbon dioxide equivalents in the Plan area. Loss of these resources typically results in an emission of CO2 if the trees being removed are not converted into semi-permanent products, such as wood furniture. The UBC Plan recommends making the University Boulevard Corridor into a "Cool Corridor," increasing the tree canopy and other green infrastructure along the roadway. Increasing the forest and non-forest tree cover will result in additional sequestration and carbon storage.

The additional contributions of forest, tree cover and green space to climate change mitigation through heat reduction associated with shading, evapotranspirational cooling, and changes in reflectance cannot be quantified with our current tools, although methods of quantifying some of

these benefits are being explored. These natural resources have many additional benefits that are considered in the Climate Assessment sections covering Climate Adaptation and Resilience.

Greenhouse Gas Emissions, Carbon Sequestration, and Drawdown Qualitative Discussion

Transportation Emissions

The UBC Plan is anticipated to have both positive and negative impacts on transportation emissions. Since this is an area targeted for growth in the County, focusing especially on creating opportunities for new housing, the number of residential units are expected to increase within the Plan area, along with a slight increase in non-residential uses. The additional workers and residents are projected to increase the total number of trips and vehicle miles travelled in the Plan area with a corresponding increase in transportation emissions.

However, the expansion of non-motorized transportation alternatives including wider, better sidewalks and enhanced bicycle lanes and should increase the number of trips taken by zero emission modes. The Plan's approach to growth, featuring a mix of uses in compact developments created through infill development and redevelopment, will facilitate reductions in vehicle miles traveled and make non-motorized alternatives more feasible. The implementation of a new BRT route will enhance public transit alternatives improving lower-emission options for people commuting to, from, and within the Plan area. Transportation modeling indicates that per capita VMT will decrease under the recommendations of the UBC Plan.

Building Embodied Emissions

Given the planned growth, total building square footage will increase. As long as the energy used to build and operate these buildings is generated by burning fossil fuels, projected greenhouse gas emissions will increase commensurate with the increase in building square footage. Increased numbers of residents and workers are expected to generate increased material waste.

Building lifespan is anticipated to have both positive and negative impacts on greenhouse gas emissions, although the overall impact may be more positive. Some redevelopments may require knocking down existing buildings, shortening their lifespan and increasing building material waste. However, new buildings with longer life expectancy will be added, and some buildings may be repurposed or retrofitted, increasing their useful life.

Likewise, pavement infrastructure is anticipated to have both positive and negative emissions impacts. Some new pavement will be added for roadways and non-motorized vehicle infrastructure. In other places, infill development will replace surface parking lots with new buildings. The University Boulevard Plan includes recommendations to minimize pavement wherever possible.

Energy

More residential units, more non-residential square footage, more residents and more workers will all result in the increased use of electricity. Increased on-site generation of clean, renewable energy will help limit the increase in greenhouse gas emissions from building energy use.

The University Boulevard Plan includes recommendations for moving development toward the goal of net-zero emissions by increasing energy efficient building orientations and designs, and by including on-site renewable energy generation and more efficient HVAC and lighting systems.

COMMUNITY RESILIENCE AND ADAPTIVE CAPACITY QUALITATIVE DISCUSSION

The University Boulevard Corridor Plan is anticipated to have slight negative and slight to moderate positive impacts on community resilience and adaptive capacity.

Community Resilience

The guiding document, *Climate Assessment Recommendations for Master Plans and Zoning Text Amendments in Montgomery County* notes that Community Resilience is the inverse of vulnerability (pg. 27), and therefore organizes the Community Resilience and Adaptive Capacity checklist into measures of vulnerability based on Exposure-Related Factors and Sensitivity-Related Factors, as well as identifying additional factors that contribute to Adaptive Capacity.

Exposure-Related Factors

Montgomery County identifies road sections that could be affected by high water. In the UBC plan area, University Boulevard at Sligo Creek may be at risk of flooding from extreme precipitation events. Since the UBC Plan proposes to increase use of University Boulevard by both motorized and non-motorized modes, more people could be exposed to flooding where the road crosses the stream. This should be considered when doing facility planning for future road improvements.

The Plan will increase activity in urban heat island areas because the growth of residences and employment in the area will increase the number of people in the heat islands. Heat mapping completed by Montgomery County has identified heat island areas with the Master Plan boundaries, and these are typically areas of development with sparse tree canopy. The University Boulevard Plan includes recommendations to reduce heat impacts in these areas.

Increased numbers of people will be exposed to other climate hazards such as storms and wind simply as a result of the growth of the area, but not specifically due to other actions of the Master Plan.

Sensitivity-Related Factors

Sensitivity-Related Factors include changes to land cover and climate impacts can increase or decrease the effects of hazard exposure.

Most of the Sensitivity-Related Factors could have both positive and negative impacts on adaptation and resilience in the University Boulevard Corridor Plan, depending on the outcome of each project that is developed or redeveloped in the Plan area.

Changes to forest cover, non-forest tree canopy, and the quality or quantity of other green areas may occur on a project-by-project basis. Forest, non-forest tree canopy and other green areas may be lost or added to a site through the site design and development process. The most significant forest areas in the UBC exist within the portion of Sligo Creek Stream Valley Park that passes through the Plan area, and should largely be protected. Non-forest tree canopy may occur on both public and private properties, and within road Right-of-Way. Plan recommendations to include native shade trees and landscaping in the University Boulevard cross-section could potentially add up to an additional 10 acres of tree canopy. Additional street trees could be added along other roads through the area. Discussions with both the Department of Parks and Montgomery County Public Schools indicate that they either currently have plans or are open to recommendations to add tree canopy on their properties. It is currently unclear to what extent redevelopment of private properties under the Plan recommendations will affect the amount of tree canopy in the Plan area. The plan recommends that tree canopy be added through redevelopment whenever possible.

Likewise changes in perviousness will occur from project to project. Reducing imperviousness is another recommendation of the University Boulevard Corridor Plan. In some cases, impervious areas such as parking lots may be replaced with buildings and infrastructure needed to accommodate development without substantially increasing imperviousness. Pervious green spaces may also be incorporated into sites that are currently largely impervious. Replacement of single-family houses with multi-unit residences may increase imperviousness on private properties.

Changes to impacts of heat will be both positive and negative and will respond primarily to the changes in green cover, tree canopy cover, and perviousness on a project by project basis as noted above. Implementing the master plan recommendations to increase tree cover and green cover and to reduce imperviousness wherever possible during the regulatory review process should result in greater mitigation of heat impacts. Additional positive impacts to heat mitigation will accrue through greater use of more heat reflective surfaces and cool roofs, as well as implementation of street tree recommendations in the *Complete Streets Guidelines*.

Changes to stormwater management treatments will also occur from project to project. The overall change should be positive, as areas with little or no stormwater treatment systems or with older systems are redeveloped with new stormwater treatment systems.

Staff anticipates that changes to water quality and quantity will be mixed. While some new developments will add impervious surfaces, some of the developments will also incorporate new stormwater treatment systems, green areas and tree cover that should intercept, infiltrate, and filter water that is not currently being treated before running off. Planned improvements to University

Boulevard will include stormwater management treatment facilities not currently present in the road right-of-way.

Staff anticipates that changes to air quality should be more positive than negative. While vehicle trips are projected to increase, expanding the electric vehicle charging infrastructure should facilitate the shift away from the internal combustion engine vehicles that are primarily responsible for air pollution in the area. Additionally, the expanded public transit and non-motorized vehicle transportation systems will allow more trips to be taken with little or no air pollution impact, especially given the County's move toward a fleet of electric powered buses. Increasing the mix of uses can help shorten trips. Finally, increasing non-forest tree canopy and other vegetated areas will help filter out some of the air pollutants.

Staff anticipates that Infrastructure Design Decisions will have a slight overall positive impact on resiliency and adaptive capacity. New and enhanced transportation infrastructure will facilitate movement and offer more transportation alternatives within and through the Plan area. Infrastructure designs will add more street trees, tree canopy and stormwater treatment facilities to reduce heat impact, improve air and water quality, and handle runoff from storms.

Adaptive Capacity Factors and Community Resilience

Adaptive Capacity Factors facilitate community connectedness and cohesiveness and improve the accessibility of critical resources including food and monetary resources, making it easier for both the community and individuals to withstand and adapt to climate-related impacts. These overlap with factors that enhance community resilience, which is the sustained ability of a network of people to use available resources to withstand, recover from, and adapt to future climate hazards.

Changes to accessibility or prevalence of community and public spaces are anticipated to have a positive impact on adaptive capacity. The University Boulevard Plan includes several parks and schools where people can gather, interact, and form connections that will foster community cohesiveness. Plan recommendations should improve the ability of residents to access these facilities. In addition, this Plan recommends new publicly accessible open spaces on key properties, such as WTOP and Safeway, which may redevelop in the future. This would expand the number of community and public spaces serving the community.

Changes to emergency response and recovery capabilities should improve somewhat as minor improvements in street grid connectivity and additional pedestrian and bicycle connections will improve emergency access within the Plan area.

As noted above, changes in access to transportation should definitely improve through the improvement of transit corridor connections, increased bicycle and pedestrian facilities, and a finer street grid will increase both transportation options and access.

Positive change in accessibility or prevalence of local food sources and other goods is supported by Plan recommendations to support new local farming opportunities, including community gardens and creating a new farmers' market for the Plan area. The Plan also supports efforts by the Department of Health and Human Services and other County agencies to implement neighborhood-level strategies to address food insecurity and other local sources for food production.

The Transportation System Performance Metrics anticipate that access to jobs by automobile will increase by 1% and access to jobs by transit will increase by 11% under the recommendations of the University Boulevard Corridor Plan. This should improve the availability or distribution of economic and financial resources as opportunities for employment for residents in the Plan area.

Staff anticipates that the UBC Plan will enhance and facilitate community connectivity through the provision of attractive new public spaces and programming that will bring people together, promoting civic engagement and the formation of support networks within the community.

This Plan recommends additional child daycare and senior services as new development occurs in the area. This should improve the distribution of resources and support in the community. Additionally, improvements in the transportation infrastructure, including improved non-auto and transit options, should improve access to community facilities both within and near the Plan area.

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

The CAP details the effects of a changing climate on Montgomery County and includes interagency strategies to reduce greenhouse gas emissions and climate-related risks to the county's residents, businesses, and the built and natural environment.

The CAP includes 86 climate actions as a pathway to meet the county's ambitious climate goals while building a healthy, equitable, and resilient community. Each county department has responsibilities for specific climate actions that are relevant to the work of that department. The following section provides a list of the CAP action items relevant to Montgomery Planning and addressed within the University Boulevard Plan. While it is not possible to know the rate of implementation, development, funding, or other implications, each action item was rated high, medium, or low for its potential to reduce GHG gasses or sequester carbon.

Clean Energy Actions

- E-3: Promote Private Solar Photovoltaic Systems. Medium. The Plan promotes the use of on-site alternative energy systems for all development, private and public.
- E-4: Public Facility Solar Photovoltaic Installations and Groundwork. Medium. The Plan promotes the use of on site alternative energy systems for all development, private and public.

Building Actions

- B-7: Net Zero Energy Building Code for New Construction. Medium. The Plan supports achieving Net Zero energy emissions.

Transportation Actions

- T-1: Expand Public Transit. High. There are recommendations for increasing access, stations, stops, and frequency of public transit.
- T-2: Expand Active Transportation and Micro-mobility Network. High. There are recommendations to construct bicycle lanes, improve sidewalks, and increase access, stations, and frequency of public transit.

15

- T-8: Transportation Demand Management. High. There are many recommendations intended to influence people's transportation choices and reduce use of single occupancy vehicles.

Carbon Sequestration Actions

- S-1: Retain and Increase Forests. High (for forest retention), Low (for increase in forest). Retention and expansion of forest and is recommended.
- S-2: Retain and Increase Tree Canopy. Medium. Recommendations include increasing tree canopy cover on open space, within the right-of-way, and on new development.

Climate Adaptation Actions.

- A-18: Expanded Community Gardens. High. Recommendations support community garden expansion.
- A-7: Green Public Spaces. High. All development, public space, and the right-of-way should include native tree and vegetative plantings.
- A-10: Green Infrastructure. High. Green infrastructure is essentially the same as Nature-Based Design Solutions and the terms are used interchangeably. It is recommended for new development and road retrofits.
- A-15: Water Supply Protection. High. The Plan makes recommendations to protect watersheds that contribute to the County's water supply.

RECOMMENDED AMENDMENTS

The Climate Assessment Act requires the Planning Board to offer appropriate recommendations such as amendments to the proposed University Boulevard Corridor Plan or other mitigating measures that could help counter any identified negative impacts through this Climate Assessment: To Be Determined through Planning Board Work Sessions.

SOURCES OF INFORMATION, ASSUMPTIONS, AND METHODOLOGIES USED

[The climate assessment for The University Boulevard Corridor Plan was prepared using the methodology for master plans contained within the *Climate Assessment Recommendations for Master Plans and Zoning Text Amendments in Montgomery County, December 1, 2022*.]