ENVIRONMENTAL RESOURCES PLAN

INTRODUCTION

The Upper Rock Creek Planning Area is in the center of the Upper Rock Creek watershed. The Upper Rock Creek watershed includes the headwaters of Rock Creek, which flows through the center of the County and into Rock Creek Park in the District of Columbia. One of the first stream valley parks established in Montgomery County, Rock Creek remains a keystone of the park system.

The Rock Creek watershed is one of very few watersheds in the County that have low-density uses in its headwaters and large areas of parkland to protect key natural resources. Both contribute to high quality stream conditions and habitats. The two main branches of Upper Rock Creek, the mainstem and North Branch, maintain Use III and IV conditions, supporting coldwater habitat that is suitable for trout populations. Lakes Frank and Needwood are formed by dams on these two streams before they join. The lakes were created to control sediment and reduce downstream flooding. They also offer fishing and boating.

In 1980, the *Functional Master Plan for Conservation and Management: Rock Creek Basin* prepared the background modeling and identified policy recommendations and actions to protect Rock Creek. The 1985 Upper Rock Creek Master Plan emphasized environmental considerations by significantly reducing zoning densities, especially north of Muncaster Mill Road. The concerns included avoidance of additional impacts from sewer line construction in the stream valleys, protection of stream buffers on private development with conservation easements and stormwater management. The following goal re-establishes this emphasis in this master plan amendment and refines the approach on two key properties based on new information.

Goal: Maintain existing high stream quality and manage the impacts of human activity on the Planning Area's natural resources

BACKGROUND

The natural resources that protect high quality stream conditions and habitats include significant wetlands along streams, large mature forest stands, and important groundwater resources. (See also the *Environmental Resources Inventory for the Upper Rock Creek Watershed*, 2000, available separately.) The extensive stream valley parklands that embrace many of these resources are the main reason that the healthy environment can be maintained. In addition to the protection provided by parkland, the low-density nature of the existing development in the Planning Area (especially above Muncaster Mill Road) limits its impact on the stream quality. Future development on the remaining vacant land will affect both the stream quality and the habitat of the Upper Rock Creek watershed.

The high water quality in the Upper Rock Creek watershed depends on the natural forests and wetland resources that remain in the watershed. In addition, the habitats themselves are important given the size and maturity of forest stands and the presence of diverse ecological communities. Much has been achieved in environmental protection and regulation since the 1985 Comprehensive Amendment to the Upper Rock Creek Master Plan. Many of the environmental recommendations of that plan have been addressed by countywide regulations and programs, and no longer need to be included in this Plan. These include practices related to stormwater management, conservation easements, agricultural uses, and stream buffer protection. The current status of these programs as they affect the environmental resources is explained in detail in the *Environmental Resources Inventory for the Upper Rock Creek Watershed* (January, 2000). Also, much of the parkland recommended in the 1968 Master Plan and 1985 Amendment has been acquired. Air quality remains a regional issue that is addressed in this Plan largely by improving accessibility to alternative forms of transportation, such as buses, bikeways, and trails.

The major environmental resources are examined and recommendations included in the following sections. In some sections, the Upper Rock Creek watershed is considered in two parts: the mainstem of Rock Creek in the western part of the Planning Area, and North Branch in the eastern part. The western part of the Planning Area is in the mainstem subwatershed and the eastern part is in the North Branch subwatershed. (See the Water Resources section of this chapter for a complete description and maps.) The potential impact of various road options is discussed in the Appendix and recommendations for avoidance and minimization included.

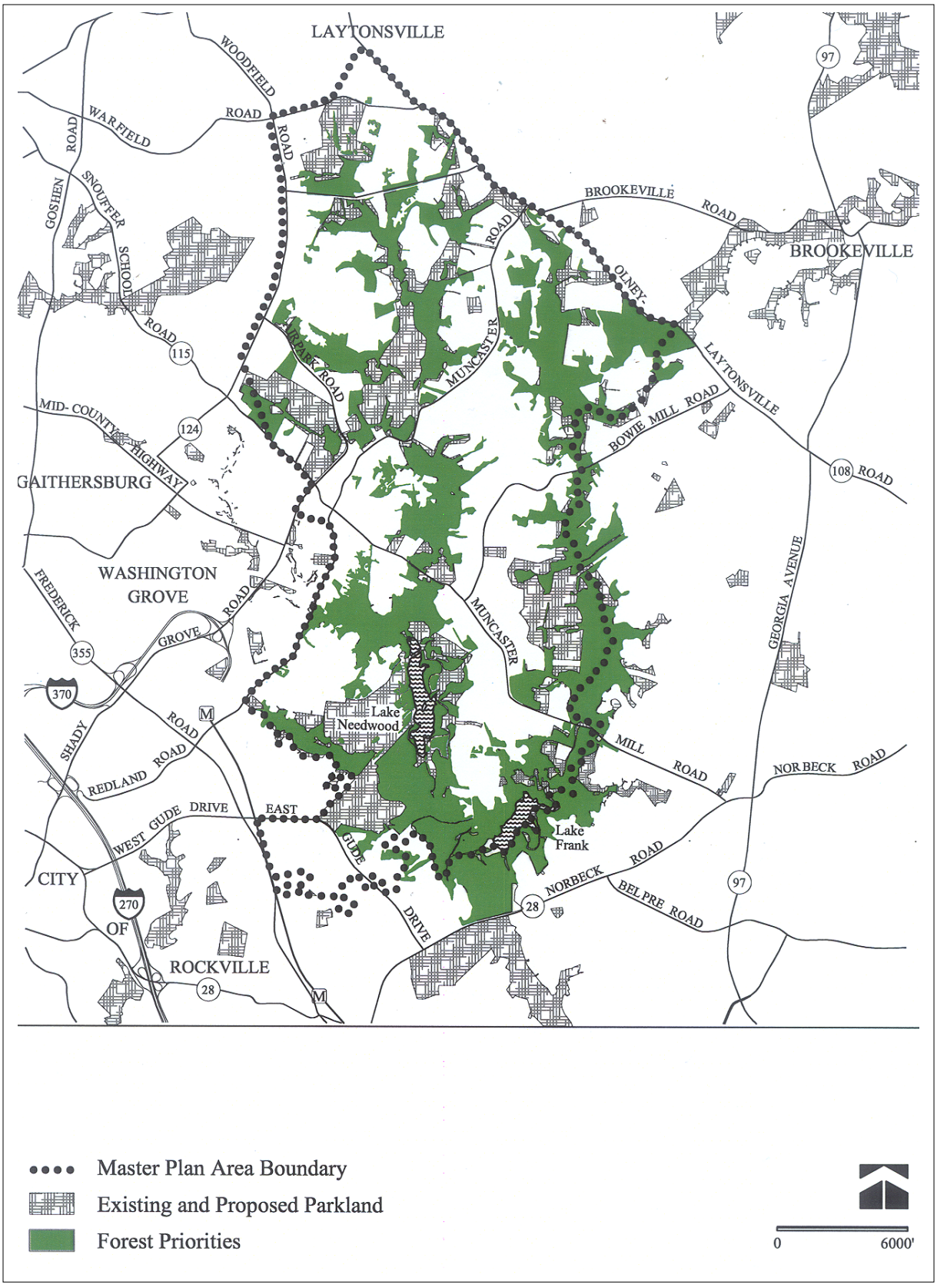
FOREST RESOURCES

The Upper Rock Creek watershed is rich in forest habitat, with almost 5000 acres of public or privately-owned forest. The Planning Area contains about two-thirds of the total forest in the watershed, over 3100 acres. More than 30 percent of the Planning Area is forested, a higher percentage than other areas of the Residential Wedge. This area is unique for the extraordinary amount of forest in patches or stands large enough to support interior forest dwelling species. In addition, the large amount of forest in stream buffers and in the headwaters helps to sustain the high water quality.

The forest resources in the Planning Area were evaluated and priorities set according to the size of forest stand, amount of interior habitat, associated stream resources, and other factors. Each forest stand was given a priority and preservation strategies for each were tailored according to its importance and the ability of the current zoning and regulations to protect it. These findings were instrumental in developing recommendations for cluster zoning in the headwaters of the North Branch of Rock Creek.

In addition, areas were identified where reforestation of forest gaps would significantly enlarge or enhance interior forest stands and areas of inadequate stream buffer. New forest planting in these areas at time of subdivision or as part of park improvements will greatly enhance the habitat and water quality benefits of existing forest.

FOREST RESOURCES



Recommendations

- Preserve priority forest areas on the Freeman property through parkland acquisition or dedication.

- Maximize protection of priority forest area on the Dungan property and in the adjacent biodiversity area through park acquisition, dedication, and conservation easements as part of development on the Dungan property.

- Protect forest areas on other developable properties to prevent fragmentation of upland forests and to preserve forested stream valley buffers.

- Protect priority forest preservation areas on parkland to minimize fragmentation of upland forest and preserve forested stream valley buffers.

- Restore forest in stream buffers and forest gap areas as part of development plans.

- Restore the stream buffer forest on key park properties including Muncaster and Laytonia Recreation Parks and the Agricultural Farm Park.

- Restore forest to enhance park resources on newly acquired parkland.

- Encourage reforestation of lands protected through conservation easements and on private property.

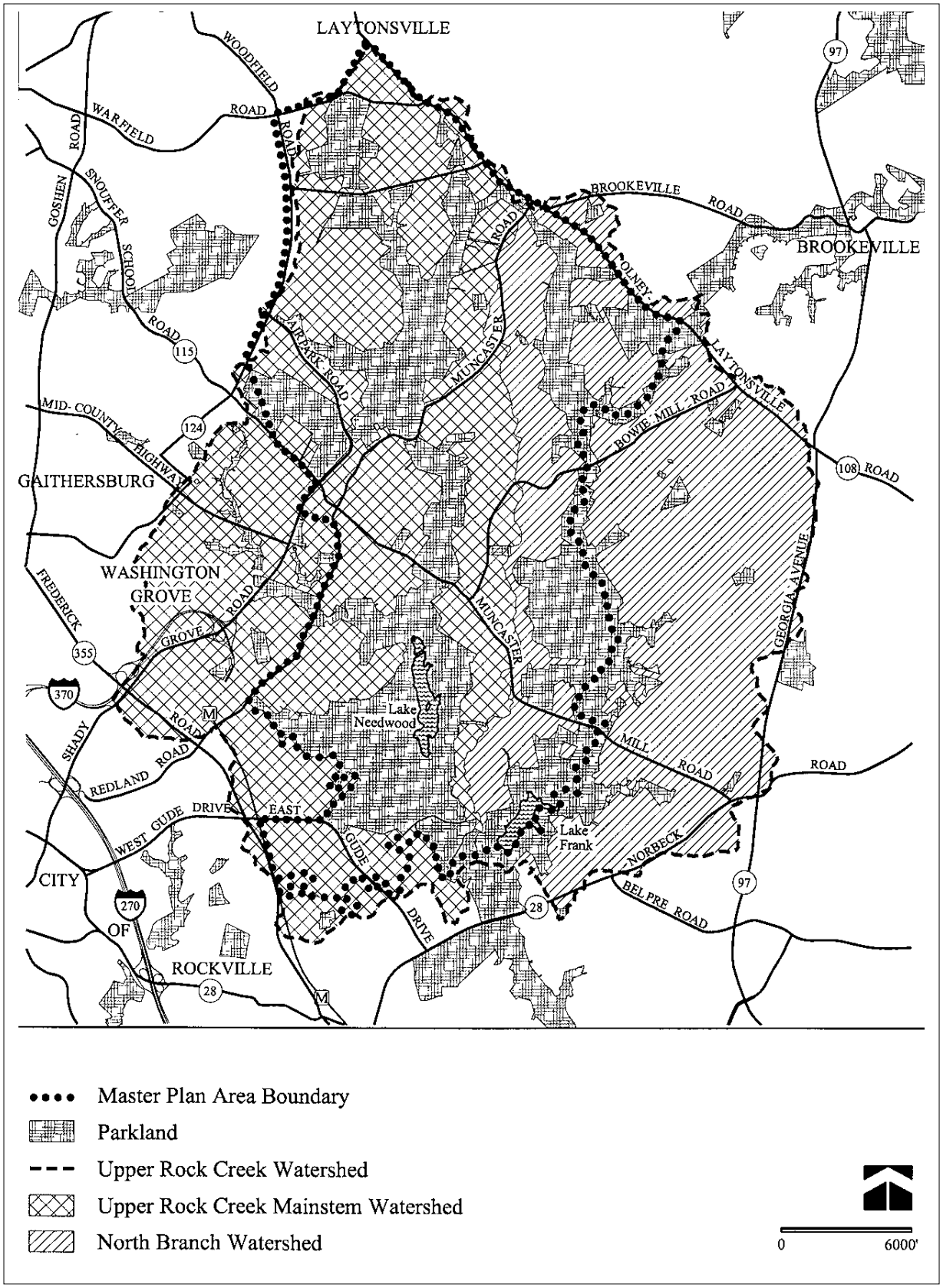
Wetland Resources

Wetlands account for approximately 740 acres, or 6.5 percent of the total acreage of the Upper Rock Creek Planning Area. Most of these wetlands are concentrated in the headwater areas and floodplains of the Upper Rock Creek mainstem, the North Branch of Rock Creek, and tributaries to these two streams. While both the Upper Rock Creek mainstem and the North Branch contain many excellent wetlands, the North Branch in particular harbors a rich variety of high-quality wetlands. The combination of large forested wetlands, high-quality scrub-shrub and emergent wetlands, and large vernal pool areas make the wetlands of the North Branch especially valuable for the provision of habitat for aquatic, semi-aquatic, and terrestrial life forms.

Recent concern within the scientific community about the global decline of amphibian populations increases the value of good amphibian breeding habitats both along the North Branch and mainstem of Rock Creek. Maintenance of these high values requires protection of the natural conditions that support those values. Forested wetlands with high wildlife values can only be maintained by keeping the surrounding forest intact. These and other types of wetlands depend on hydrologic conditions that support saturated soil conditions.

The construction of sewer lines in stream valleys often adversely affects wetlands. The potential for this impact was instrumental in the 1985 Master Plan's recommendation for prohibiting sewer service in stream valleys north of Muncaster Mill Road in the Planning Area, and adopting the lower densities. The concern for wetland resources continues to guide the land use

UPPER ROCK CREEK WATERSHED



recommendations in this Plan. The remaining large properties were all examined by the Washington Suburban Sanitary Commission to determine the potential alignments for provision of sewer service. Those that required disturbance of stream buffers and wetlands were not considered for sewer service in this Plan. Cluster development was only considered when it could preserve intact wetland and forest complexes that support specific wetland functions.

Recommendations

- Protect wetlands in the Planning Area by creating conservation easements through the regulatory process or through park acquisition.

- Minimize adverse impacts to wetland systems due to disturbance, fragmentation, or reduction of water supporting these systems.

- Preserve the high quality of priority wetlands by protecting the wetlands, protecting or enhancing the land immediately surrounding these wetlands as natural areas, and placing appropriate uses on the land draining to these wetlands to maintain adequate surface and groundwater flows to the wetlands.

- Protect wetland resources on the Freeman property and on the Hendry and Casey properties through parkland dedication.

- Protect wetland resources on smaller undeveloped properties through conservation easements.

- Restore wetlands on key park properties including Muncaster and Laytonia Recreation Parks and the Agricultural Farm Park.

- Encourage wetland creation in appropriate locations on land protected in conservation easements and on other private land.

UNUSUAL ECOSYSTEMS AND RARE PLANTS

Identification and protection of areas that contain diverse biological species are responses to concerns regarding rare, threatened, and endangered species of plants and animals. While no federally-endangered species are known to exist in the Upper Rock Creek watershed, several species of plants considered as rare, threatened, endangered or watchlist species are present. The Appendix to this Plan includes a list of rare, threatened, and endangered plants in the watershed.

Five biodiversity areas have been surveyed by the Maryland Department of Natural Resources in the Planning Area. The Pope Farm area supports an open canopy wetland of state significance. It supports an extensive population of small bedstraw (*Galium trifidum*), a regionally rare species, once thought to exist no longer in Maryland. The wetland is particularly impressive during late summer when numerous goldenrods, asters and cardinal flowers bloom. Needwood North extends north from Lake Needwood and west along Mill Creek almost to Shady Grove Road. This is a good quality, maturing forest dominated by mixed hardwoods. Many very large oaks and tulip poplars occur on the slopes along Mill Creek, a rarity in Montgomery County. The

Lake Frank biodiversity area surrounds Lake Frank and extends northward to Muncaster Mill Road. It consists of a well-developed shoreline community including a large population of toothcup (*Rotala ramosior*) and a forest containing many shingle oaks (*Quercus imbricaria*), both watchlist species. The North Branch area extends north from Muncaster Mill Road along the stream valley to Norbeck Country Club. This is a good quality, maturing forest that supports larger trees with wide-spreading canopies suitable for forest interior dwelling species, as well as a well-developed understory. At least four watchlist species occur here including shingle oak (*Quercus imbricaria*) and chinquapin (*Castanea pumila*). A large floodplain wetland occurs here containing a diversity of wetland plants. The North Branch Valley area is at the easternmost headwaters of the North Branch extending beyond the Planning Area into Olney.

The approach to protection of these areas (which are already in parkland) is to minimize disturbance to the ecology as much as possible. When similar conditions occur on adjacent private land, these areas should be evaluated for the same features and protected as a buffer to the biodiversity areas in parks. Buffer areas should be protected and enhanced to compliment the biodiversity area, providing additional habitat, if appropriate. Any park facilities should be limited to trails, and alignments chosen to avoid or minimize impacts.

Recommendations

- Minimize impacts to these biodiversity areas due to disturbance, fragmentation, or damage to buffer areas.

- Avoid damage to groundwater resources for biodiversity areas resulting from excessive or unnecessary imperviousness.

- Enhance protection through additional forest preservation, particularly adjacent to the North Branch biodiversity area.

- Enhance the quality of the forest and wetland resources through restoration, particularly the lower North Branch area above Muncaster Mill Road.

WATER RESOURCES

Protecting the water resources of the Upper Rock Creek watershed is critical. The entire area is considered the headwaters of the larger Rock Creek watershed that extends into the District of Columbia, and the northern portion of the Upper Rock Creek Planning Area contains the headwaters of two large tributaries, the Mainstem of Rock Creek and the North Branch of Rock Creek. The Planning Area contains exceptionally healthy aquatic ecosystems. In addition, most of the streams flow into Lakes Needwood and Frank in Rock Creek Regional Park. The water quality of these lakes is directly affected by the nutrients and sediments delivered by the streams. County and statewide efforts to improve water quality in tributaries have influenced the general approach to water resource protection in the Upper Rock Creek watershed. These efforts include the 1983 Chesapeake Bay Agreement and subsequent agreements, the 1992 State Planning Act, and the 1997 Smart Growth Act, which gives financial incentives to local governments to promote concentrated growth and avoid sprawl.

Montgomery County has undertaken a number of other measures to protect water quality. The 1998 *Countywide Stream Protection Strategy* (CSPS) evaluated water quality conditions throughout the County, placing each subwatershed in a management category with corresponding tools to address varying stream conditions. While the quality of most streams above Muncaster Mill Road in the Planning Area are classified as good to excellent, the subwatersheds to the west of the mainstem of Upper Rock Creek are influenced by significant development along Shady Grove and Woodfield Roads. Outside the Planning Area, the more densely developed tributaries on the east side of the North Branch of Rock Creek in the Olney Planning Area are in fair condition.

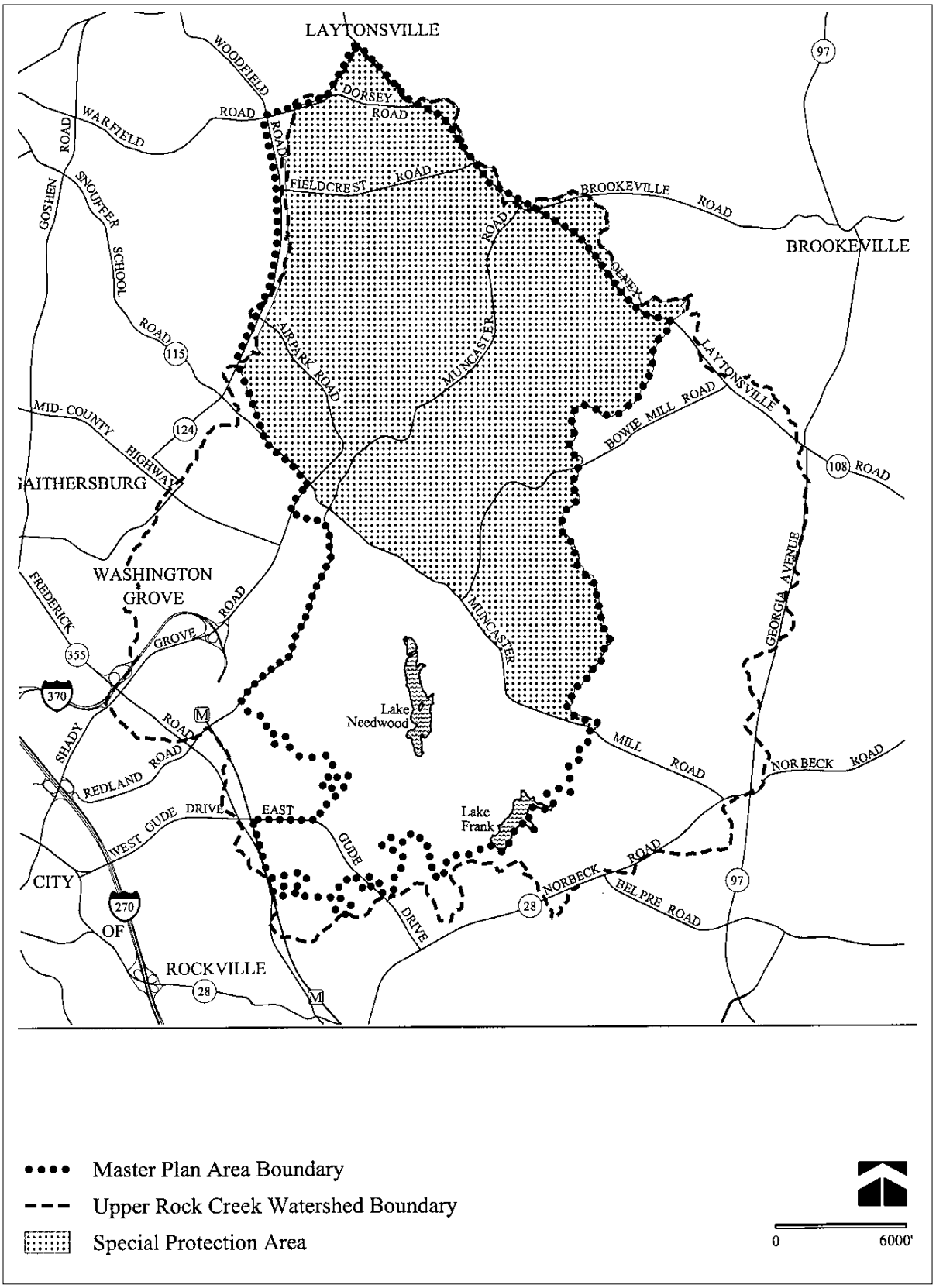
The CSPS designates most of the Planning Area north of Muncaster Mill Road as a watershed protection area requiring a special level of protection. Due to the sensitivity of the resource and the magnitude of the existing and planned development, some level of enhanced watershed management is necessary beyond typical environmental guidelines, sediment control and stormwater management requirements. Management strategies recommended in the CSPS and employed in this Master Plan include: expanded stream valley park acquisition or dedication, increased forested buffer requirements, expanded protection for wetland recharge and hydrology, and impervious surface reduction strategies. The Montgomery County Department of Environmental Protection has developed a restoration plan for the Upper Rock Creek watershed and has proposed several projects to restore stream sections and retrofit stormwater management facilities.

This Master Plan designates the Upper Rock Creek watershed within the Planning Area north of Muncaster Mill Road as a Special Protection Area (SPA). Some of the properties included in the SPA are specifically discussed in this Master Plan; others are not mentioned by name. All properties shown within the boundaries of the map on page 47 are designated as part of the SPA with the exception listed below. The existing water resources, including the Use III stream and associated forests and wetlands, are of high quality and unusually sensitive (see additional text in this chapter describing each resource). The proposed land uses have the potential to threaten these resources in the absence of special water quality protection measures that are closely coordinated with land use controls. The water quality review process would provide an opportunity to establish water quality goals for each development prior to design, provide better performance overall of best management practices through use of a sequential treatment strategy, and monitor water quality before, during and after construction to determine the effects of the development.

The North Branch Rock Creek watershed and a small part of the Mainstem extend beyond the Planning Area into Olney. The designation of the SPA exclusively for areas within this Master Plan leaves more than half of the North Branch watershed outside the SPA. (The need to designate portions of the Olney Planning Area as an SPA will be considered during review of the Olney Master Plan.) Existing and new development will continue to influence the water quality of the North Branch, and to a lesser extent, the Mainstem. With this designation, the primary SPA benefit will be in protecting the small tributaries of the North Branch that are directly affected by the major new development projects within the SPA.

A very small, developed portion of the Mainstem Rock Creek watershed extends beyond the Upper Rock Creek Planning Area west of Woodfield Road in the I-270 Corridor. This area is not recommended for inclusion in the SPA.

SPECIAL PROTECTION AREA



Protection of groundwater in Use III and Use IV stream systems is essential to the health of the cold water habitat. Groundwater is the source of the cold, clear water that feeds the stream between storms and moderates the warmer, often sediment-laden water delivered to the stream over the surface of the ground during storms. Groundwater can also be contaminated by use of fertilizers on agricultural and residential land, as well as by use of septic systems over time. While a study by the Maryland Geological Survey (*Influence of Ground Water on Nitrate Loads of Streams in the Upper Rock Creek Basin, Montgomery County, Maryland, Maryland Geological Survey, 2000)* did not find a statistically significant correlation of high nitrate levels from septic systems in the Upper Rock Creek watershed, the assumptions made by Chesapeake Bay and state models include a nutrient load delivered by septic systems over time.

The 1985 Amendment to the Master Plan recommended implementation of many watershed management techniques that have now become standard practice in the Upper Rock Creek watershed and throughout the County. Environmental guidelines for stream buffer, floodplain and wetland protection are used for all new development. Conservation easements are consistently applied to forest conservation and stream buffer areas through the development process. Sediment and erosion control and stormwater management practices have been improved, including adoption of the state manual for stormwater management. Stormwater management waivers are given infrequently, usually for highly urbanized sites or areas already served by a regional stormwater management facility. The concerns about cluster development associated with lots smaller than 25,000 square feet are diminished due to changes in stormwater management practices. In-stream and wet ponds are rarely approved, especially in cold water (Use III and Use IV) streams. Regional stormwater management ponds are no longer used. However, a potentially significant adverse impact of cluster subdivisions remains: construction in stream valleys of new sewer lines that can disrupt and damage fragile riparian corridors.

Minimizing imperviousness is one of the best methods for assuring protection of water resources, especially in headwaters areas. Evidence clearly indicates a causal relationship between the overall level of watershed imperviousness, water quality and the health of the aquatic community within receiving streams. The cluster recommendations in this Plan are estimated to result in a lower impervious surface than the existing large lot zoning. In the residential zones, all types of development—residential, institutional or special exception—should be regulated to achieve the same relatively low levels of imperviousness. An imperviousness cap mandates a level of impervious surface coverage to sustain the current quality of the streams in the area north of Muncaster Mill Road. The analysis of projected imperviousness indicates that if new development on sewer is held to 8 percent hard surface imperviousness, the stream quality should be maintained. A cap should be established in Upper Rock Creek through an environmental overlay zone as part of the Sectional Map Amendment.

Recommendations

- Designate a Special Protection Area for the Upper Rock Creek watershed within the Planning Area north of Muncaster Mill Road.

- Establish an environmental overlay zone for all new development with sewer service within the Special Protection Area to implement an 8 percent imperviousness cap and to maintain low imperviousness levels throughout the watershed.

- Designate a Special Protection Area for the Upper Rock Creek watershed within the Planning Area north of Muncaster Mill Road.

- Establish an environmental overlay zone for all new development with sewer service within the Special Protection Area to implement an 8 percent imperviousness cap and to maintain low imperviousness levels throughout the watershed.

- New land uses should avoid the need for new sewer lines in stream valleys.

- New development must employ all planning and zoning options, and design techniques to reduce imperviousness. Such techniques include:
    - Use of the cluster development option, which can include buildings with smaller footprints on smaller lots with shorter driveways;
    - Locating houses at the front of the building envelope to reduce driveway lengths;
    - Use of narrower street sections and minimization of sidewalks;
    - Use of shared driveways where feasible and reduction of driveway lengths through design;
    - Avoiding curbs and gutters on secondary streets and use of swales that can guide runoff towards pervious areas;
    - Use of "donuts" or reduced radii that can limit imperviousness of culs-de-sac.
    - Preservation of land areas with high infiltration capacity for use as infiltration facilities or natural recharge areas.

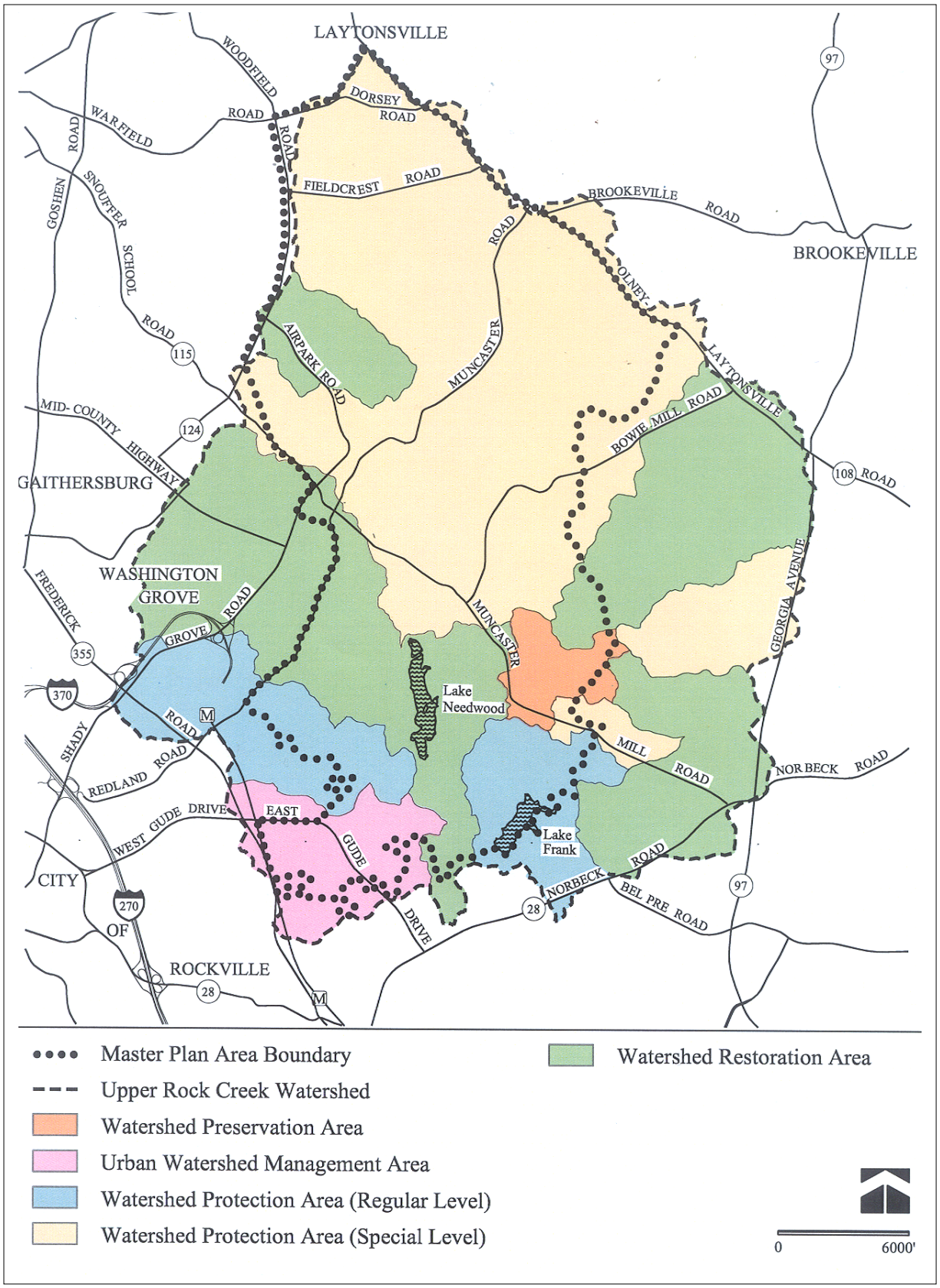
WATERSHEDS AND STREAM VALLEYS

The two major tributary watersheds in Upper Rock Creek have different characteristics and are affected in different ways by land use decisions. A statistical model that predicts potential stream condition based on projected land conditions (percent imperviousness, number of road crossings of streams, and amount of wetlands) was used to determine the potential impact of various land use scenarios. The land use scenarios ranged from providing sewer to all undeveloped properties, to reducing the zoning below that of the existing zoning. The results of the modeling are summarized below.

Rock Creek and North Branch are Use III streams above Muncaster Mill Road, and below Muncaster Mill Road are Use IV streams. Use III streams, or "Natural Trout Waters" are waters that are capable of supporting natural trout populations, including propagation, and their associated food organisms. Streams of this quality are relatively rare in the County; the Use III area is one of six such areas. Use IV includes cold or warm waters that have the potential for, or are capable of, holding or supporting adult trout for "put and take" fishing. These streams are managed as special fisheries by periodic stocking and seasonal catching.

The following sections evaluate these tributaries using stream quality as an indicator of overall environmental health. Stream quality impacts are also used to establish the relative importance of these areas and the effects of land use decisions.

UPPER ROCK CREEK WATERSHED MANAGEMENT CATEGORIES



North Branch Rock Creek

The North Branch of Rock Creek in the eastern part of the Planning Area flows southward from MD 108. It crosses Bowie Mill and Muncaster Mill roads, then flows into Lake Frank before joining the mainstem near Avery Road. The North Branch is the more sensitive tributary of the two in the Upper Rock Creek watershed. While there are large forests and wetlands in the headwaters, the medium-density development that is present in Olney further east puts considerable pressure on the stream. Protecting the headwater resources in a natural, undeveloped state is critical to sustaining the cold water habitat of the stream.

A very important biodiversity area of forest and wetlands is located just north and south of Muncaster Mill Road. The streamside habitat of the North Branch forms a significant part of this habitat for a considerable length of the stream. Groundwater recharge feeds the wetlands, small tributary streams, and springs that contribute to the high quality of this area. Protection of the undeveloped areas of the North Branch drainage on the Dungan and Casey properties is essential to the health of the biodiversity area. Several areas on the Casey property, while not delineated wetlands today, may have been wetlands prior to farming. These wetlands and adjacent forest areas could be restored to provide additional water quality and habitat benefits.

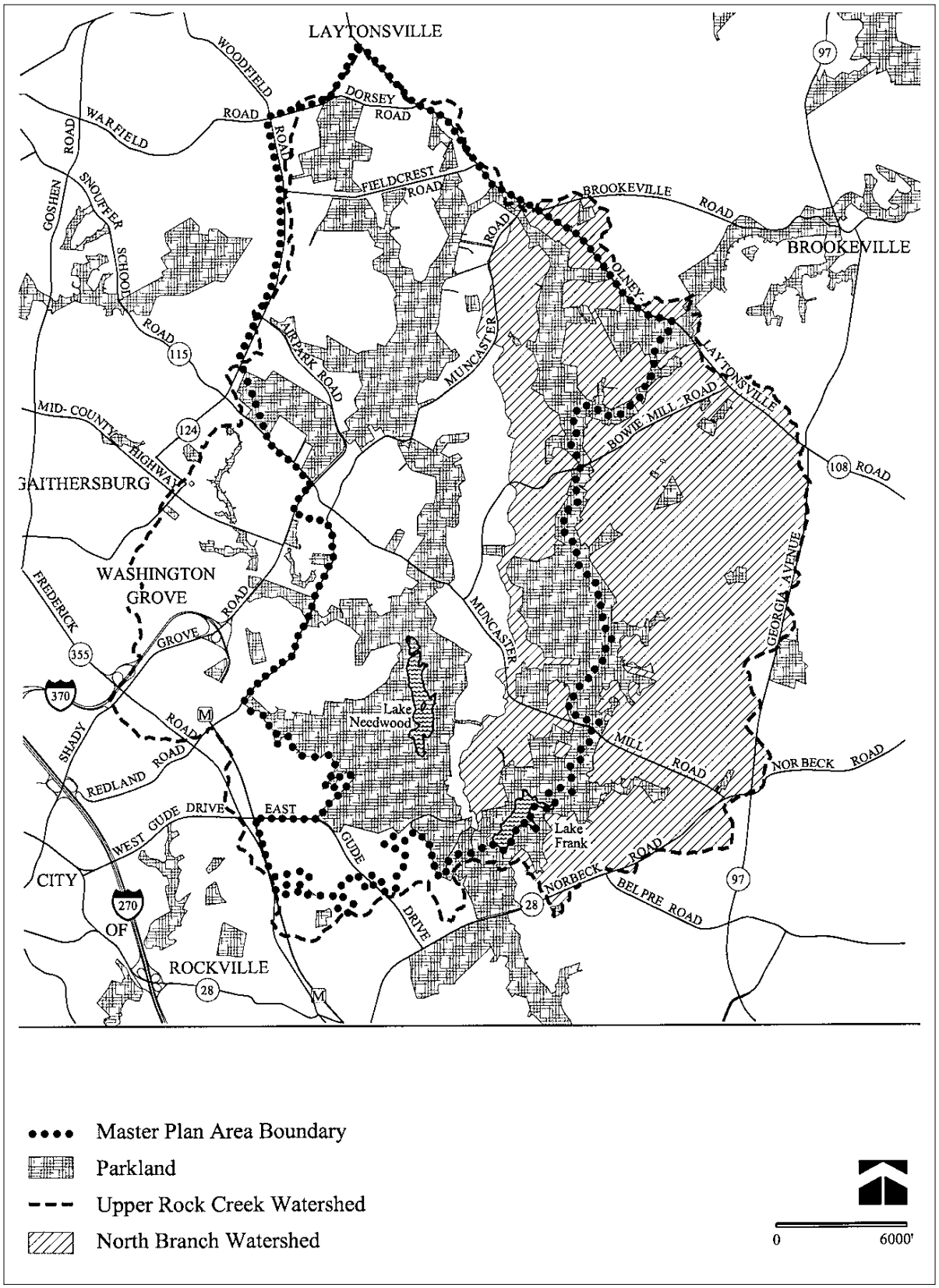
Many scenarios were modeled to determine the potential for changes to imperviousness and their possible effect on stream conditions. The most significant differences were projected in the headwaters tributaries. While all scenarios maintained good stream conditions, both the existing zoning (RE-1 without sewer) and the provision of sewer to one-acre densities on the Freeman, Dungan, and Casey properties resulted in clearly lower stream condition values within the "good" range than did limited sewer options at lower densities (RE-2C and RE-2).

The protection approach for the North Branch of Rock Creek is to reduce the potential imperviousness as much as possible while retaining large, contiguous areas in their natural, undisturbed state without extending new sewer lines through stream buffers. Preservation and restoration of upper headwaters on the Freeman properties, as well as preservation and restoration of key tributaries to the biodiversity areas in the downstream areas are of particular importance.

The 1985 Plan included a recommendation for extending Cherry Valley Drive across the North Branch of Rock Creek to connect with Muncaster Mill Road. This connection would have significant impacts on the stream and the North Branch biodiversity area.

The resources on the Dungan property were identified in the *Legacy Open Space Functional Master Plan* (2001) as being suitable for inclusion in the Legacy Open Space program as a Class I Natural Resources property. It was designated as such for its concentration of shingle oaks (a state watchlist species) and its ability to buffer the adjacent biodiversity area from the effects of non-native invasive species. This Master Plan retains a portion of the property for a master planned road right-of way. Much of the shingle oak stand as well as the buffering capability of the forest stand will be diminished by the master planned roadway.

UPPER ROCK CREEK NORTH BRANCH WATERSHED



Recommendations

- Remove Cherry Valley Drive extended from the master plan to reduce impact on the North Branch Biodiversity Area and the North Branch stream.

- Acquire the Dungan property as parkland or retain low density zoning without sewer service, maximize protection of the forest buffer, small tributaries, springs, and wetlands, especially those adjacent to the North Branch Biodiversity Area through the development process.

- Align and construct any future bikeway or trail in the North Branch along a route with the least disturbance to the natural resources in existing and proposed parkland, with special attention to maintaining a closed forest canopy.

- Maintain low density development.

- Require use of wastewater pump stations to provide community sewer service to the portions of the Casey property that drain to North Branch.

- Seek dedication of additional parkland along the east and south sides of the Fraley East property to provide additional stream buffer in parkland through the development process.

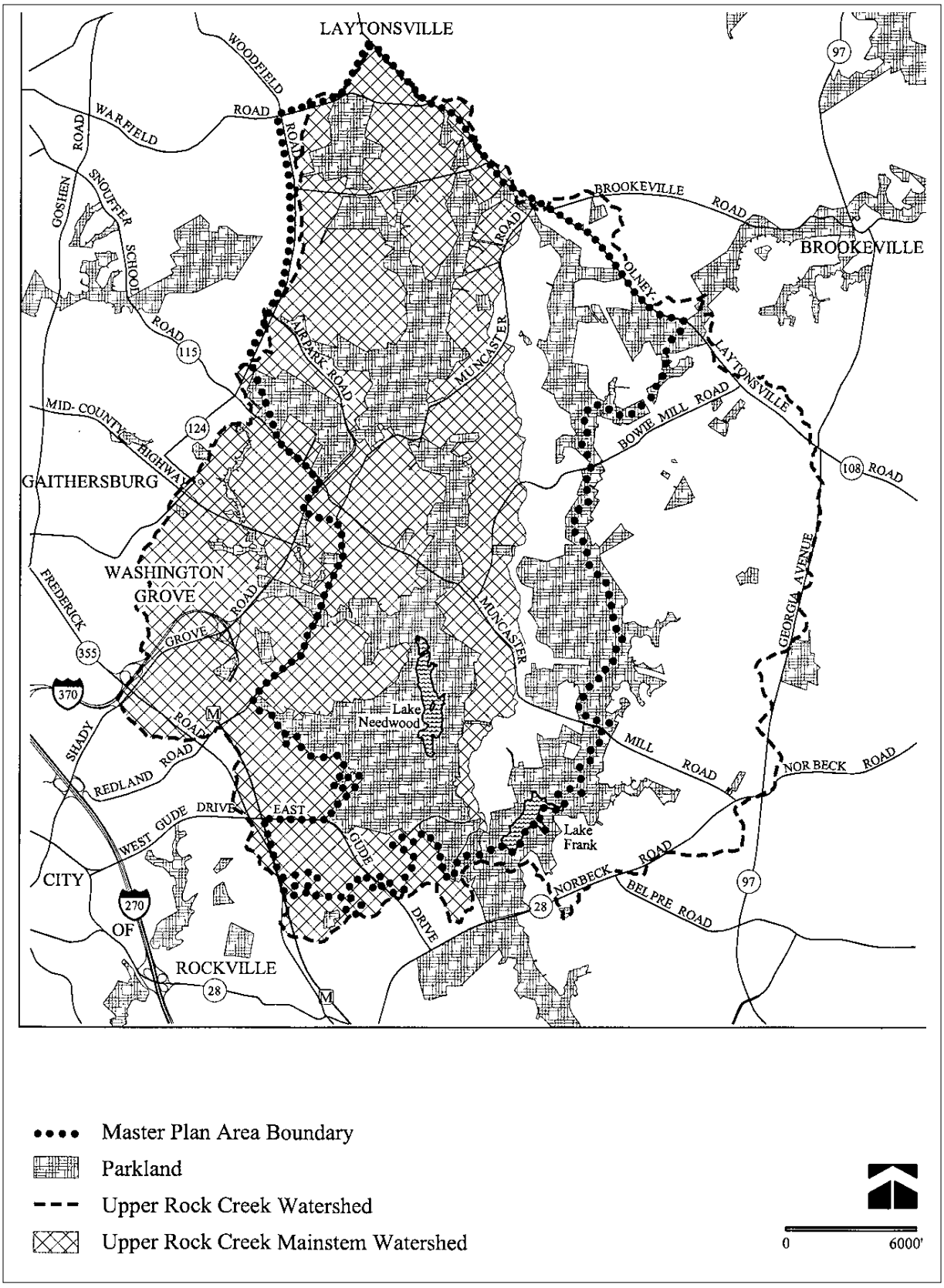
- Cluster development on the Freeman property to protect the existing forested areas on the east and west side, as well as the unforested stream buffer and wetlands on the north side of the property. Dedicate the protected area as parkland. Reduce the potential density to limit imperviousness on the site.

- Support Department of Environmental Protection efforts to restore streambanks in the North Branch north of Muncaster Mill Road.

Rock Creek Mainstem

The mainstem of Rock Creek occupies the western part of the Planning Area and flows southward from headwaters areas north of Fieldcrest Road across Muncaster and Muncaster Mill Roads and into Lake Needwood. This high quality coldwater stream is protected by relatively low density development in its headwaters. While higher levels of imperviousness exist in the tributaries that have their headwaters along MD 124, where non-residential land uses occur, the stream's mainstem remains in good condition all the way to the lake. The stream valley has a wide floodplain and many wetlands, and is very sensitive to disturbance. New sewer lines should be avoided in this area.

UPPER ROCK CREEK MAINSTEM WATERSHED



Because most of the watershed has been developed in low density residential uses and the land that is proposed for new development is relatively far downstream, all scenarios show similar effects on the stream condition, with the mainstem remaining in good condition regardless of the development scenario. Densities on properties in the mainstem should be consistent with the densities on similar properties. Where existing sewer lines can be used, contiguous open space should be maximized by clustering development away from the sensitive North Branch tributaries.

The large, undeveloped properties in the mainstem (two of which, the Hendry and Fraley properties are discussed in detail in the land use chapter) have only small amounts of environmental resources remaining after years of agricultural use. Most of these resources are in areas that will be protected through the application of environmental guidelines at time of development. In the case of the Hendry property, some wetland and forest areas remain that are important to include as parkland, and this Plan revises the proposed parkland boundary from the 1985 Master Plan to protect more of the stream-related resources and free more developable land.

Recommendations

- Acquire portions of two forested stream buffers on the Hendry property as part of any residential subdivision of the property. Protect remaining stream buffers on the property with a conservation easement on individual lots.

- Provide sewer to the portion of the Casey property draining to the mainstem through existing lines in Muncaster Mill Road near Magruder High School and in Bowie Mill Road. Cluster most development on the portion draining to the mainstem.

SEWER SERVICE POLICIES

A critical policy related to water quality is the provision of community sewer service. In general, Montgomery County's water and sewer policies allow the provision of sewer service only to those areas zoned for moderate to dense development that require community service. Typically, medium and low zoning densities are used to protect the natural environment by minimizing development impacts. Low and some medium density areas are typically dependent on septic suitability, often resulting in actual development yields well below the maximum allowed by the zoning. Extending sewer lines into these areas has the potential to allow development density at or near the zoned maximum, to disrupt the environment and to provide arguments for further extensions and greater density. One of the greatest challenges facing the Upper Rock Creek watershed and this Master Plan is to develop compatible land use and sewer service recommendations that serve to protect the planning area's environmental quality.

Providing community sewer service to relieve failed septic systems can help to minimize groundwater contamination. However, the provision of community sewer service can damage sensitive habitat and water resources by facilitating development to the maximum zoning density. While extensions along stream valleys are designed to minimize direct environmental impacts, they can alter the characteristics of streams and stream buffer habitat and modify the natural hydrologic system due to wetland fragmentation. Lines that must cross streams or parallel them within the stream buffer can be troublesome if eroding stream channels expose sewer mains and manholes, leaving them more susceptible to damage.

Community sewer service in the Planning Area is primarily provided through trunk lines that parallel the mainstem and the North Branch of Rock Creek. The trunk sewer line in the mainstem of Rock Creek originates south of Muncaster Mill Road and collects flows from neighborhoods to the west along Needwood and Redland roads, and Crabbs Branch Way, as well as from the industrial areas around Southlawn Lane. A tributary main to the east collects flows from Sequoyah Elementary School, Magruder High School, and Montgomery Hospice at Casey House in addition to the Winters Run community. This main would receive additional flows from the Casey and Woodlawn properties. This trunk skirts Lake Needwood, then continues down the Rock Creek stream valley and conveys flows into the District of Columbia sewerage system and ultimately to the Blue Plains Wastewater Treatment Plant.

The North Branch trunk sewer originates near the Norbeck County Club and receives flows from communities in Olney via a tributary main along Williamsburg Run. The trunk sewer serves areas of western Olney and northwestern Aspen Hill, to the east of North Branch. The system also receives flows from two wastewater pumping stations. The North Branch wastewater treatment system serves Norbeck Grove, north of Bowie Mill Road, and was constructed to avoid gravity main construction along North Branch. The second station receives flows from the Hawlings River watershed in Olney. The North Branch trunk sewer skirts Lake Frank, then joins the mainstem trunk sewer.

Some areas along and east of Woodfield Road receive community sewer service through the Great Seneca Creek sewerage system. A wastewater pumping station serves the Sheffield community along Airpark Road, and pumps flows through a force main to the Great Seneca system. Several institutions and the light industrial area at Lindbergh Drive use individual pump systems to send flows into the Seneca system.

The community sewerage system is for the most part operated and maintained by the Washington Suburban Sanitary Commission (WSSC). A small part of the Master Plan Area, adjacent to the City of Rockville, is within the area intended for service by the City. The section of the Land Use Plan on the WINX property has further information.

The County's policies on the provision of community sewer service are governed by the *Water and Sewer Plan* the County's *General Plan*, master plans, the state's smart growth policies, and other policy documents. Master plans recommend where service is to be provided, generally in areas of dense development, consistent with *Water and Sewer Plan* policies. In lower density wedge areas, sewer is generally provided only where cluster options are specifically recommended in the master plan and the developer proposes cluster development.

The 1985 Plan recommended that community sewer service not be extended north of Muncaster Mill Road in the Upper Rock Creek Planning Area except under limited circumstances. Subsequent to the adoption of the 1985 Plan, the County approved the provision of sewer service north of Muncaster Mill Road to schools, churches, other institutions and the Sheffield development. These cases were approved either under the conditions for sewer service established by the 1985 Plan, under Comprehensive Water and Sewer Plan policies addressing private institutional facilities and public facilities or under the Council's consideration of hardship conditions. This has resulted in a need to redefine the sewer envelope and to consider whether it is appropriate to use these new lines to achieve master plan goals.

This Plan relies on existing zones and septic development in areas where large lots are the most desirable or the only way to maintain compatibility and where sensitive environmental resources can be preserved in existing regulatory buffers with easements on private lots. Where there are significant amounts of sensitive resources that should be protected in an undeveloped state and where community sewer service is available without disturbing significant portions of nearby stream systems, the Plan recommends RNC zoning and expansion of the sewer envelope.

In order to protect key natural resources in the North Branch, this plan recommends the provision of community sewer service to implement cluster development options for the Freeman, Casey and Woodlawn properties. This will allow important forests and wetlands to be protected in common open space. This plan further promotes and supports development proposals that minimize the need for sewer main construction along sensitive stream valley buffers, relying instead on sewer construction along new or existing roads and other rights-of-way, especially in the North Branch watershed.

Where the recommendations of this Master Plan and the policies of the Comprehensive Water and Sewer Plan do not support the provision of community sewer service, development will occur, as feasible, using private, on-site sewerage systems. Septic and other on-site sewage disposal systems are permitted and regulated by the County's Department of Permitting Services.

Recommendations

- Provide community sewer service in the Planning Area generally in conformance with Water and Sewer Plan service policies. This will generally exclude areas zoned for low-density development (RE-1 and RE-2) not already approved for service from further extension of community service.

- Extend sewer service to areas proposed for optional method development in the RNC Zone in the Planning Area.

- Prohibit extensions of new sewer mains in the stream valleys of the mainstem north of Muncaster Mill Road and in the North Branch, north of the confluence of Williamsburg Run.

- Allow extension of community sewer service to these existing and proposed public facilities located in the RE-1 Zone: the Pope Farm Nursery, Muncaster Recreational Park, and facilities intended for the Laytonia Recreational Park.

COMMUNITY WATER SUPPLY SYSTEMS AND SERVICE POLICIES

Community water service is widely available throughout the eastern and western parts of the Planning Area. Water service also is available in selected areas in the northern part of the Master Plan Area, including areas near MD 108 where the County extended service to properties in the vicinity of the Oaks Sanitary Landfill. WSSC provides community water service to the Master Plan Area. A small part of the Master Plan Area, adjacent to the City of Rockville, is within the area intended for service by the city. The section of the Land Use Plan on the WINX property has further information.

The County has proposed the extension of community water service to the Town of Laytonsville, just beyond the northern tip of the Master Plan Area. This will provide greater availability of water service in the northernmost part of the Master Plan Area, where WSSC's ability to provide service is now constrained by water system pressure limitations.

Water and Sewer Plan water policies allow for the provision of community water service throughout the majority of the Master Plan Area. The Plan's policies generally require the provision of community water service to areas zoned for moderate to high-density development, and allow for the consideration of water service on a case-by-case basis to areas zoned for lower density one- and two-acre development, and for five-acre cluster development. Some lower density areas that initially developed using private, on-site wells are unlikely to receive community service for the foreseeable future. In addition, some areas now within the community water service envelope initially developed using and continue to use individual wells. On-site well water supply systems are permitted and regulated by the County's Department of Permitting Services.

Recommendation

- Continue to address the provision of community water service in the Planning Area consistent with Comprehensive Water Supply and Sewerage Systems policies.

AIR QUALITY

The 1985 Upper Rock Creek Master Plan did not discuss air quality as an issue. However, since that time ground-level ozone has proven to be a serious regional air quality issue.

The Washington metropolitan region, which includes all Montgomery County, is a non-attainment area for ground-level ozone. The federal Environmental Protection Agency (EPA) has downgraded this area from a "serious" to a "severe" non-attainment area for ground-level ozone. In recent years, the area has exceeded the one-hour ozone standard, on average, five days each summer. Federal air quality laws permit an average of only one violation per summer at a monitor location.

In 1997, the EPA strengthened ozone and particulate matter standards in light of new scientific evidence that federal standards were insufficient to protect public health. As a result, the one-hour ozone standard has been replaced with a stricter eight-hour standard, and the particulate matter standard has been supplemented with 24-hour and annual limits for very small particulate matter. In recent years, there have been an average of 31 violations of the new eight-hour standard.

Ground-level ozone is an invisible gas formed when two pollutants, volatile organic compounds (VOC) and nitrogen oxides (NOx), react in sunlight. The primary sources of these pollutants are utilities and other industries, motor vehicles, small gasoline powered engines, and small businesses using solvents, cleaning solutions, paints, and insecticides. Motor vehicles account for 30 percent to 40 percent of the pollutants that cause ozone in the Washington region.

After they are emitted, these pollutants can travel miles before reacting to form ozone. On a typical summer day, more than half of the ozone-causing pollutants in the Washington region come from sources outside the region, including other states, hundreds of miles away. Likewise, sources in the Washington area emit pollutants that travel and eventually affect ozone concentrations in other regions and states.

Despite the downgrade in classification, the Washington region continues to make considerable progress in reducing VOC and NOx emissions through actions of federal, state, and local governments. The biggest improvements have come from technological advances in motor vehicle inspection and maintenance programs, vapor recovery nozzles at service stations, reformulated gasoline, reformulated surface coatings, and new federal emission standards for both small and large engines. The Washington region's air quality plans also set an upper limit on the overall number of tons of pollutants that motor vehicles can emit in the region. The region's Transportation Improvement Program and Constrained Long-Range Plan must conform to this limit.

These new standards pose additional challenges for reducing air pollution not only in the Washington region, but nationwide. To meet those challenges, EPA has taken several important actions. First, it is requiring 22 states in the eastern third of the country to substantially cut their NOx emissions to reduce the amount of pollutants that drift from state to state. Each state can decide how emissions will be reduced, but most are expected to focus on utilities and industrial plants that generate electricity with coal.

Second, the EPA has established a National Low-Emission Vehicle Program to further reduce the amount of pollutants emitted from the ever-increasing number of cars. Car manufacturers have voluntarily agreed to build cars with more stringent tailpipe emission standards, and each state will have the opportunity to adopt the new standards and implement the program.

Third, to supplement the voluntary program, the EPA is proceeding to implement new emission reduction standards for diesel trucks, buses, and off-road heavy equipment, requiring manufacturers to produce motor vehicles that are 77 percent to 95 percent cleaner than those on the road today. Finally, the nation's refiners will be required to reduce gasoline sulfur levels by 90 percent. These efforts will significantly reduce emissions of VOC, NOx, and particulate matter.

The Washington region is preparing and implementing ozone reduction strategies in the form of a State Implementation Plan (SIP). This SIP is a multi-jurisdictional master plan and program for attaining air quality standards. Once approved by EPA, it is enforceable through state and federal laws.

Since ozone is an area-wide phenomenon and a multi-jurisdictional strategy is needed, it is essential that Montgomery County do its part. At the countywide level, some very important initiatives should include: 1) transportation demand management (TDM) strategies that influence people to reduce motor vehicle trips and miles traveled, 2) installation of less-polluting engines and control equipment in the county fleet of vehicles, 3) use of pollution prevention techniques by power plants and other local industries, and 4) cash incentives to residents who purchase vehicles and machinery, such as boats and lawn mowers, that have less polluting engines.

At the master plan level, the following recommendations are the most appropriate for the Upper Rock Creek area:

- Support strategies to reduce air pollution, including placing a high priority for funding for transportation demand management (TDM) projects and programs, such as:

    1. New and improved network of sidewalks and bikeways.

    2. Enhanced bus services, including new routes, higher frequency of buses, improved pedestrian access to transit stops, more bus shelters, and real-time bus information for bus customers via electronic displays at bus stops and portable hand-held devices.

    3. Priority bus lanes on major roads, such as the ICC, Mid-county Highway and Georgia Avenue.

    4. Park-and-ride lots along major roads in nearby areas for carpools, vanpools, and transit users.

    5. New development and redevelopment designed to minimize the need for motor vehicle trips and to prevent conditions that may create local air pollution nuisances.

NOISE

Noise levels in the Planning Area are affected by the area's proximity to three major state roads, and proximity to a busy general aviation airport across MD 124. The issue of airpark noise was examined as part of the 1985 Plan and the recommendations are unchanged from that Plan. The impact on noise conditions of increased traffic from proposed road projects in the southern part of the Planning Area is examined in this Plan.

Protection from excessive noise helps maintain the community as a desirable place to live and work, and to experience a high quality of life. Effective noise compatibility planning involves the placement of noise compatible land uses in the highest noise locations, and application of noise mitigating measures and site design techniques where necessary to meet appropriate exterior noise guidelines. Guidelines for compatibility can be found in the *Staff Guidelines for the Consideration of Transportation Noise Impacts in Land Use Planning and Development* (June, 1983).

Aircraft noise is another source of noise affecting the community. The nearby Montgomery County Airpark on the west side of MD 124 is a busy general aviation airport with more than 140,000 operations in 2000. The Airpark is predominantly used by single engine aircraft, but also includes twin engine, turboprop, and corporate jet aircraft in its function as a designated reliever for National Airport. The airpark's approach, departure, and touch-and-go (circular) patterns brings planes at lower altitudes to the area surrounding Airpark Road in the western portion of the Planning Area. While the areas of most significant noise impact off the end of the runway are developed in compatible industrial and park uses, residences anywhere under the Airpark's flight patterns can expect to experience the effects of aircraft overflights on a continuing basis.

All new and redevelopment should also be designed to meet the property line standards contained in the adopted County Noise Control Ordinance (Chapter 31B of the County Code) as a minimum. The Ordinance controls noise emanating from one property to another, exclusive of noise from public rights-of-way.

Recommendations

- Design new development and redevelopment to meet appropriate noise guidelines and ordinances to prevent conditions that may create local noise impacts.

- Maintain non-residential land uses in the area surrounding the airpark to avoid potential noise impacts.