ENVIRONMENT

INTRODUCTION

This element provides guidance for achieving a balance between the need to protect the environment, while planning for the orderly development and redevelopment of the county. The objectives and policies listed below have been designed to help decision makers implement policies and regulations regarding the use of land that will conserve and restore a legacy of natural resources.

In order to describe the environmental issues that are relevant to the development and redevelopment of land in Fairfax County and to formulate policies to address those issues, it is appropriate to review the context of environmental planning within this largely urban and suburban community. The expectation for the preservation, management, and rehabilitation of meaningful components of the county's environmental heritage should be high, given the large number of people who live here and the importance of local environmental resources to the quality of life.

The opportunities and limitations on what may be achieved through environmental planning are affected by past actions and by the county's function as a home and employment center to a large number of people. Because thousands of acres of forest and agricultural land have been converted to urban and suburban development since the 1950s, the ability to achieve environmental protection goals simply by limiting future development no longer exists. The current scarcity of certain environmental amenities focuses current and future environmental planning efforts on the conservation of remaining resources and the rehabilitation of degraded environments.

BOARD OF SUPERVISORS GOALS

Fairfax County has adopted two goals, "Environmental Protection" and "Open Space" that relate to conservation of the natural environment. These Goals read as follows:

> **Environmental Protection** - The amount and distribution of population density and land uses in Fairfax County should be consistent with environmental constraints inherent in the need to preserve natural resources and to meet or exceed federal, state and local standards for water quality, ambient air quality and other environmental standards. Development in Fairfax County should be sensitive to the natural setting, in order to prevent degradation of the county's natural environment.
>
> **Open Space** - Fairfax County should support the conservation of appropriate land areas in a natural state to preserve, protect and enhance stream valleys, meadows, woodlands, wetlands, farmland, and plant and animal life. Small areas of open space should also be preserved in already congested and developed areas for passive neighborhood uses, visual relief, scenic value, and screening and buffering purposes.

In addition, three other goals, "Quality of Life," "Land Use" and "Transportation," cite the need to protect the environment. The Fairfax County Goals reflect the belief of the community that environmental protection and preservation are overarching components of the quality of life. The Goals demonstrate an understanding of the interdependence of decisions regarding private development, transportation, and public works with the environment. Decisions made about the scale, location, and type of human activity on the landscape affect, and are affected by the natural environment.

COUNTYWIDE OBJECTIVES AND POLICIES

Protecting the human and natural environment in Fairfax County is complicated by the many different categories of concerns that are called "environmental". Solving environmental problems is further complicated by the environmental impacts that may result from efforts to resolve other major topical concerns, such as land use, transportation, recreation, and public facility issues. Many topics that have secondary environmental components are considered elsewhere. This Element of the Plan focuses primarily on environmental concerns which impact, or are impacted by, the development of land.

Environmental concerns have been grouped into three broad categories for consideration:

- Environmental pollution,
- Environmental hazards, and
- Environmental resources.

These categories have been selected to recognize that issues pertaining to the environmental impacts of past development, the hazards posed by both human made and natural environmental constraints, and the management of our environmental heritage are somewhat distinct categories.

Many of the environmental policies listed below will be implemented on a case by case basis as land is developed or redeveloped. These policies should be applied as appropriate to both private and public development. Development proposals should not be approved unless and until issues generated by the application of these policies have been resolved.

ENVIRONMENTAL POLLUTION

Our decision to occupy and alter Fairfax County's landscape has resulted in increased volumes and concentrations of specific pollutants in the air, in surface and ground waters, and in the soil. These pollutants can harm both the natural and the human environment.

In recognition of the impacts of human activity on the environment, most existing regulatory authority to protect the environment has been focused on the control of pollution.

Although Fairfax County does not have to contend with the more serious forms of pollution associated with heavy industry, the conversion of land to urban uses and our dependence on the automobile have resulted in unacceptable amounts of pollution.

Air Quality

Air quality in Fairfax County and in the Washington, D.C. area in general has been improving. However, the region has not yet attained federal air quality standards for ozone and fine particulate matter. In April 2004, the metropolitan Washington, D.C. area was designated by the U.S. Environmental Protection Agency as a moderate non-attainment area for the eight-hour ozone standard, and in December 2004, the region was designated as a non-attainment area for fine particulate pollution.

High ozone concentrations can adversely affect human health. The Washington, D.C. area has not met the EPA standard for ozone since that standard was established. High ozone concentrations result from the interactions of oxides of nitrogen (NOx) and volatile organic compounds (VOCs) with sunlight (See Figure 1). In the Washington, D.C. area, major sources of

NOx emissions include motor vehicles, utilities and other stationary sources, and non-road construction vehicles. Significant quantities of NOx are also transported into the Washington, D.C. area from areas to the south and west. Major sources of emissions of VOCs include motor vehicles, lawn and garden equipment and small area sources such as surface coatings and solvent use.

There are a variety of sources of fine particulate matter in the Washington, D.C. area, including motor vehicles, point sources (primarily power plants), construction sites, commercial/industrial businesses, tilled fields, unpaved roads and the burning of wood. Other fine particulate matter can form in the air from chemical reactions of gases released from motor vehicles and point sources. While no exceedances of fine particulate standards have been recorded in Fairfax County as of 2007, the county is included within the regional nonattainment area. Exposure to high concentrations of particulate matter can adversely affect human health, particularly for sensitive populations.

High carbon monoxide (CO) concentrations are also harmful to human health. While high CO concentrations can potentially occur in "hot spots" near points of traffic congestion, Fairfax County is considered to be in attainment of federal carbon monoxide standards. Other monitored air quality indicators in Fairfax County comply with state and federal standards.

The development of plans to identify emission control measures that will be necessary to bring the region into compliance with ozone and fine particulate matter standards is being pursued at the regional level by the Metropolitan Washington Air Quality Committee. Ozone control strategies have focused largely on federal and state controls on point source emissions, motor vehicle emissions, evaporative VOC emissions from refueling operations, surface coatings, solvents, industrial/automotive repair activities and open burning restrictions. However, transportation control measures designed to improve traffic flow, reduce vehicle miles traveled and/or reduce vehicle trips have also been incorporated into these strategies. Additional local actions can have air quality benefits but have not, as of 2007, been incorporated into emissions reduction strategies. These actions include: "smart growth planning" that supports transit use and nonmotorized transportation; integrated pest management (which can reduce evaporative VOC emissions); transportation demand management efforts; enhanced bicycle and pedestrian access to transit stations; parking management; the application of "green building" practices; and urban tree canopy expansion efforts. Many of these practices can be applied during the land development process.

Tree preservation and planting efforts can also have air quality benefits. While trees can emit VOCs, they also remove gaseous and particulate air pollutants through absorption and deposition. Trees also reduce ambient air temperatures through evapotranspiration and shading; cooler temperatures lower the potential for ozone formation. Shading by trees can also reduce energy use in buildings and reduce evaporative emissions from parked motor vehicles. Tree preservation and landscaping efforts that stress the planting of trees and low-maintenance vegetation can reduce mowing, thereby reducing emissions associated with maintenance.

Objective 1: Preserve and improve air quality.

Policy a. Establish land use patterns and transportation facilities that encourage the use of public transportation and reduce trip lengths to reduce emissions of oxides of nitrogen, carbon monoxide, and hydrocarbons from automobiles. Consistent with other Land Use and Transportation objectives, support and encourage the following during the reviews of development proposals, particularly for proposals in mixed use centers:

- The concentration of growth in mixed-use, transit-oriented centers in a manner that will optimize the use of transit and non-motorized trips and minimize vehicular trips and traffic congestion.

- In mixed-use developments, the provision and orientation of working, shopping, and recreational opportunities in close proximity to residences in a manner that will minimize motor vehicle use.

- The provision of facilities to support transit use (e.g., bus shelters, park-and-ride lots).

Policy b. Implement transportation strategies that reduce auto travel, minimize dependence on single-occupant automobiles and improve traffic flow, thereby reducing auto emissions. Consistent with other Land Use and Transportation objectives, support and encourage the following during the reviews of development proposals, particularly for proposals in mixed use centers and for development proposals with the potential to cause substantial increases in auto-related air pollutants:

- Incorporation of telework options, flexible work schedules, transit use incentives, ridesharing/carpooling programs, shuttle buses and other transportation demand management measures.

- Provision of infrastructure, facilities and/or programs (e.g., on-site transportation coordinators) to support telework efforts and other transportation demand management measures.

- Development of parking management strategies in transit station areas to encourage transit and high-occupancy vehicle use and minimize single occupant vehicle trips.

- Establishment of and/or participation in transportation management associations.

- The location, design and construction of trails, dedicated bicycle lanes and crosswalks to facilitate nonmotorized transportation among residential uses, transit facilities, commercial areas, public facilities and recreational opportunities.

- The provision of facilities that support nonmotorized transportation, such as bicycle parking facilities and changing/shower facilities in office buildings.

Policy c. Support air quality improvement through tree preservation, tree planting and sensitive landscaping practices. Support and encourage the following during the reviews of development proposals:

- Maximization of tree preservation consistent with planned land use and good silvicultural practices.

- Maximization of tree planting/tree cover restoration consistent with planned land use and good silvicultural practices.

- Pursuit of energy-conscious landscaping efforts such as the planting of trees to provide shading of buildings during the summer months.

- Preservation and/or planting of trees to shade parking lots, thereby reducing heating of parked vehicles and associated evaporative emissions.

- Planting of street trees within road medians and along thoroughfares where consistent with safety.

- Pursuit of landscaping practices that optimize the planting of native species of trees, shrubs and other vegetation in a manner that minimizes the need for mowing and other maintenance activities, particularly during the hotter months of the year.

- Minimization of applications of pesticides with reactive VOC content through integrated pest management approaches to pest control.

Policy d. Support energy conservation, minimization of indoor air pollution and other green building practices consistent with Objective 13 of this section of the *Policy Plan*.

Policy e. Support the application of episodic pollution reduction measures that can be applied when air quality conditions are predicted to be poor.

Policy f. Support the use of low-emissions maintenance and landscaping equipment.

Policy g. Apply state of the art technology toward the minimization of emissions from stationary sources of air pollution.

Policy h. In cooperation with federal, state and regional agencies, bring Fairfax County into compliance with federal primary and secondary national air quality standards as soon as practicable.

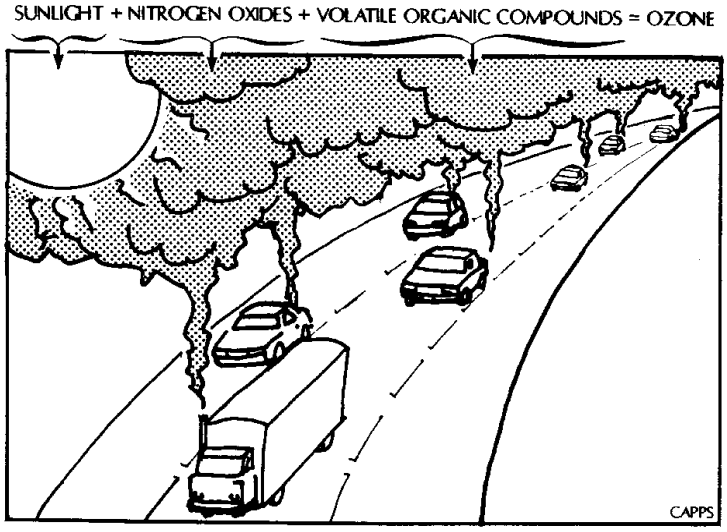


FIGURE 1

Water Quality

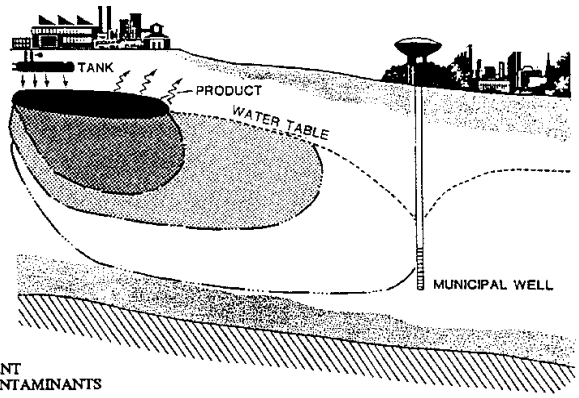
Some Fairfax County streams and lakes are characterized by poor water quality. The Department of Public Works and Environmental Services (DPWES) maintains a monitoring station at Kingstowne and monitors storm sewer outfall discharges to assess the impact of urban development on the county's water resources. In addition, DPWES monitors ecological conditions within county streams as part of the Fairfax County Stream Protection Strategy Study and through the countywide Stream Physical Assessment program, in support of watershed management planning efforts. The Fairfax County Department of Public Works and Environmental Services also routinely monitors surface waters throughout the county for pollutants and water quality indicators such as fecal coliform bacteria, dissolved oxygen, phosphorus, and nitrate nitrogen. Fecal coliform bacteria concentrations frequently exceed state water quality standards.

The core of Fairfax County's Environmental Quality Corridor (EQC) system is its stream valleys. Streams provide habitat for aquatic species and are an integral component of stream valley habitat systems. Streams also serve to replenish water sources that may ultimately provide drinking water and are places of natural beauty, that provide recreational and aesthetic opportunities, contributing to the quality of life in Fairfax County. Much of the county's parkland consists of stream valley parks, and much of the county's existing and planned trail system is located near streams. Land use and development activities have the potential to degrade the ecological quality of streams through the direct transport of pathogens and pollutants, as well as through hydrologic changes that can alter the character of flow in streams, resulting in alterations to stream morphology (e.g., stream bank erosion). The protection and restoration of the ecological quality of streams is important to the conservation of ecological resources in Fairfax County. Therefore, efforts to minimize adverse impacts of land use and development on the county's streams should be pursued.

The Occoquan Reservoir, one of Fairfax County's principal sources of drinking water, and many smaller impoundments in the county are highly stressed due to the impacts of urban stormwater runoff.

Point source pollution from sewage treatment plants and heavy industry is not currently a problem in the county. Care should be taken to anticipate and prevent ground and surface water contamination.

There are approximately 12,000 single-family residences and businesses that are served by individual well water supplies in Fairfax County. The county's well monitoring program is limited. Little is known about the potential for hazardous materials and leaking underground storage tanks to contaminate these wells. (See Figure 2.)



EXAMPLE OF MOVEMENT
OF GROUNDWATER CONTAMINANTS

Source: Rothschild, Edward R., 1988, "Underground Storage Tank Management," p. 64, in Geraghty and Miller, Inc., 1988, The Fundamentals of Ground-Water Contamination, Fall 1988/Winter 1989 Seminar notes.

FIGURE 2

Objective 2: Prevent and reduce pollution of surface and groundwater resources. Protect and restore the ecological integrity of streams in Fairfax County.

Policy a. Maintain a best management practices (BMP) program for Fairfax County and ensure that new development and redevelopment complies with the county's best management practice (BMP) requirements.

Policy b. Update BMP requirements as newer, more effective strategies become available.

Policy c. Minimize the application of fertilizers, pesticides, and herbicides to lawns and landscaped areas through, among other tools, the development, implementation and monitoring of integrated pest, vegetation and nutrient management plans.

Policy d. Preserve the integrity and the scenic and recreational value of EQCs when locating and designing storm water detention and BMP facilities. In general, such facilities should not be provided within EQCs unless they meet one of the following conditions:

- They are consistent with recommendations of a watershed management plan that has been adopted by the Fairfax County Board of Supervisors; or
- They will:
  - Either:
    - Be more effective in protecting streams and better support goals of watershed management plans than stormwater management measures that otherwise would be provided outside of EQCs; or
    - Contribute to achieving pollutant reduction necessary to bring waters identified as impaired into compliance with state water quality standards or into compliance with a Municipal Separate Storm Sewer System (MS4) permit in a manner that would be more effective and/or less environmentally-disruptive than approaches that would be pursued outside of EQCs;

  and

  - Replace, enhance and/or be provided along with other efforts to compensate for any of the EQC purposes, as described in Environmental Objective 9, Policy a below, that would be affected by the facilities.

When stormwater management facilities within the EQC are determined to be appropriate, encourage the construction of facilities that minimize clearing and grading, such as embankment-only ponds, or facilities that are otherwise designed to maximize pollutant removal while protecting, enhancing, and/or restoring the ecological integrity of the EQC.

Policy e. Update erosion and sediment regulations and enforcement procedures as new technology becomes available. Minimization and phasing of clearing and grading are the preferred means of limiting erosion during construction.

Policy f. Where practical and feasible, retrofit older stormwater management facilities to perform water quality functions to better protect downstream areas from degradation.

Policy g. Monitor the performance of BMPs.

Policy h. Protect water resources by maintaining high standards for discharges from point sources.

Policy i. Monitor Fairfax County's surface and groundwater resources.

Policy j. Regulate land use activities to protect surface and groundwater resources.

Policy k. For new development and redevelopment, apply better site design and low impact development (LID) techniques such as those described below, and pursue commitments to reduce stormwater runoff volumes and peak flows, to increase groundwater recharge, and to increase preservation of undisturbed areas. In order to minimize the impacts that new development and redevelopment projects may have on the county's streams, some or all of the following practices should be considered where not in conflict with land use compatibility objectives:

- Minimize the amount of impervious surface created.
- Site buildings to minimize impervious cover associated with driveways and parking areas and to encourage tree preservation.
- Where feasible, convey drainage from impervious areas into pervious areas.
- Encourage cluster development when designed to maximize protection of ecologically valuable land.
- Encourage the preservation of wooded areas and steep slopes adjacent to stream valley EQC areas.
- Encourage fulfillment of tree cover requirements through tree preservation instead of replanting where existing tree cover permits. Commit to tree preservation thresholds that exceed the minimum Zoning Ordinance requirements.
- Where appropriate, use protective easements in areas outside of private residential lots as a mechanism to protect wooded areas and steep slopes.
- Encourage the use of open ditch road sections and minimize subdivision street lengths, widths, use of curb and gutter sections, and overall impervious cover within cul-de-sacs, consistent with county and state requirements.
- Encourage the use of innovative BMPs and infiltration techniques of stormwater management where site conditions are appropriate, if consistent with county requirements.
- Apply nonstructural best management practices and bioengineering practices where site conditions are appropriate, if consistent with county requirements.

- Encourage shared parking between adjacent land uses where permitted.

- Where feasible and appropriate, encourage the use of pervious parking surfaces in low-use parking areas.

- Maximize the use of infiltration landscaping within streetscapes consistent with county and state requirements.

Policy l. In order to augment the EQC system, encourage protection of stream channels and associated vegetated riparian buffer areas along stream channels upstream of Resource Protection Areas (as designated pursuant to the Chesapeake Bay Preservation Ordinance) and Environmental Quality Corridors. To the extent feasible in consideration of overall site design, stormwater management needs and opportunities, and other Comprehensive Plan guidance, establish boundaries of these buffer areas consistent with the guidelines for designation of the stream valley component of the EQC system as set forth in Objective 9 of this section of the *Policy Plan*. Where applicable, pursue commitments to restoration of degraded stream channels and riparian buffer areas.

Policy m. Support watershed management planning and consider any watershed management plans that are adopted or endorsed by the Board of Supervisors as a factor in making land use decisions.

Policy n. Optimize stormwater management and water quality controls and practices for redevelopment consistent with revitalization goals.

Policy o. Ensure that development and redevelopment sites that have been subject to contamination by toxic substances or other hazardous materials are remediated to the extent that they will not present unacceptable health or environmental risks for the specific uses proposed for these sites and that unacceptable health or environmental risks will not occur as a result of contamination associated with nearby properties.

Development proposals should implement best management practices to reduce runoff pollution and other impacts. Preferred practices include: those which recharge groundwater when such recharge will not degrade groundwater quality; those which preserve as much undisturbed open space as possible; and, those which contribute to ecological diversity by the creation of wetlands or other habitat enhancing BMPs, consistent with state guidelines and regulations.

Proposals that include the use or storage of hazardous materials should provide adequate containment facilities, monitoring, and spill prevention strategies to protect surface and groundwater resources consistent with state regulations. Site investigations and remedial actions, as appropriate, should be pursued to ensure that site contamination on or near properties subject to development proposals will not present unacceptable health or environmental risks.

Programs to improve water quality in the Potomac River/Estuary, and Chesapeake Bay will continue to have significant impacts on planning and development in Fairfax County. There is abundant evidence that water quality and the marine environment in the Bay are deteriorating, and that this deterioration is the result of land use activities throughout the watershed.

In order to protect the Chesapeake Bay and other waters of Virginia from degradation resulting from runoff pollution, the Commonwealth has enacted regulations requiring localities within Tidewater Virginia (including Fairfax County) to designate "Chesapeake Bay Preservation

Areas", within which land uses are either restricted or water quality measures must be provided. Fairfax County has adopted a Chesapeake Bay Preservation Ordinance pursuant to these regulations.

The more restrictive type of Chesapeake Bay Preservation Area is known as the "Resource Protection Area (RPA)." With a few exceptions (e.g. water wells, recreation, infrastructure improvements, "water dependent" activities, and redevelopment), new development is prohibited in these areas. In Fairfax County, RPAs include the following features:

- water bodies with perennial flow;
- tidal wetlands;
- tidal shores;
- nontidal wetlands contiguous with and connected by surface flow to tidal wetlands or water bodies with perennial flow;
- a buffer area not less than 100 feet in width around the above features; and
- as part of the buffer area, any land within a major floodplain.

The other, less sensitive category of land in the Preservation Areas is called the "Resource Management Area (RMA)." Development is permitted in RMAs as long as it meets water quality goals and performance criteria for these areas. These goals and criteria include stormwater management standards, maintenance requirements and reserve capacity for on-site sewage disposal facilities, erosion and sediment control requirements, demonstration of attainment of wetlands permits, and conservation plans for agricultural activities. In Fairfax County, RMAs include any area that is not designated as an RPA.

A *Chesapeake Bay Supplement* has been prepared to address a range of issues related to water quality protection and is incorporated by this reference as part of the Comprehensive Plan. This Supplement includes a map of the county's Chesapeake Bay Preservation Area components as well as discussions and analyses of water quality issues as they relate to pollution sources, infill development, redevelopment, shoreline erosion control, and shoreline access.

Objective 3: Protect the Potomac Estuary and the Chesapeake Bay from the avoidable impacts of land use activities in Fairfax County.

Policy a. Ensure that new development and redevelopment complies with the county's Chesapeake Bay Preservation Ordinance, as applied to Chesapeake Bay Preservation Areas adopted by the Board of Supervisors as generally depicted in Figure 5 of the *Chesapeake Bay Supplement* to the Comprehensive Plan, as may be amended by the Board of Supervisors.

Policy b. Support the analysis and recommendations contained in the *Chesapeake Bay Supplement* to the Comprehensive Plan.

Policy c. Where tidal shoreline erosion control measures are needed, apply techniques that are consistent with the "Guidelines for Tidal Shoreline Erosion Control Measures" in the Environment Appendix.

Policy d. Boating and other tidal shoreline access structures should be sited, designed, and constructed in a manner that minimizes adverse environmental impacts. Where county approval of tidal shoreline access structures is needed, the following guidelines should be consulted and considered in the decision-making process: the Chesapeake Bay Program's document entitled "Chesapeake Bay Area Public Access Technical Assistance Report;" and the following guidelines issued by the

Virginia Marine Resources Commission; "Shoreline Development BMPs," "Wetlands Guidelines," and "Subaqueous Guidelines."

Policy e. Support efforts to mitigate or compensate for losses of wetlands near the area(s) of impact.

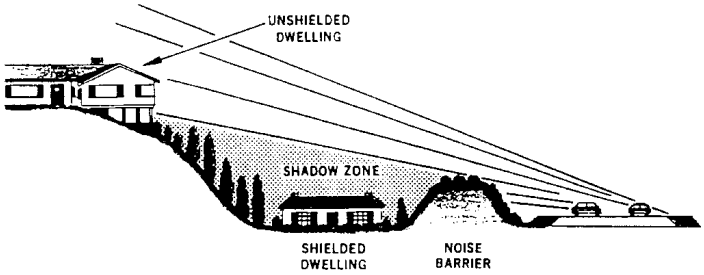
Noise

Transportation generated noise impacts the lives of many who live in the county. Some county residents are subjected to unhealthful levels of noise from highway traffic, aircraft operations and railroads, including WMATA's Metrorail (See Figure 3). Federal agencies with noise mitigation planning responsibilities have worked with the health community to establish maximum acceptable levels of exposure (Guidelines for Considering Noise in Land Use Planning and Control). These guidelines expressed in terms of sound pressure levels are; DNL 65 dBA for outdoor activity areas, DNL 50 dBA for office environments, and DNL 45 dBA for residences, schools, theaters and other noise sensitive uses. While the federal guidelines consider all land uses to be compatible with noise levels below DNL 65 dBA, they are not proscriptive as they relate to local land use decisions. Further, it is known that adverse noise impacts can occur at levels below DNL 65 dBA and that there may be variability among communities in responses to such noise.

Objective 4: Minimize human exposure to unhealthful levels of transportation generated noise.

Policy a: Regulate new development to ensure that people are protected from unhealthful levels of transportation noise.

Policy b: Reduce noise impacts in areas of existing development.



EFFECT OF ACOUSTIC BARRIER

Explanatory Note: This figure illustrates the function of an accoustical barrier. The shadow zone indicates a mitigated area that is sheltered by a noise barrier and is therefore relatively quiet.

Source: American Association of State Highway and Transportation Officials, 1985, Guide on the Evaluation and Attenuation of Traffic Noise, p. 2.

FIGURE 3

New development should not expose people in their homes, or other noise sensitive environments, to noise in excess of DNL 45 dBA, or to noise in excess of DNL 65 dBA in the outdoor recreation areas of homes. To achieve these standards new residential development in areas impacted by highway noise between DNL 65 and 75 dBA will require mitigation. New residential development should not occur in areas with projected highway noise exposures exceeding DNL 75 dBA. Because recreation areas cannot be screened from aircraft noise and because adverse noise impacts can occur at levels below DNL 65 dBA, in order to avoid exacerbating noise and land use conflicts and to further the public health, safety and welfare, new residential development should not occur in areas with projected aircraft noise exposures exceeding DNL 60 dBA. Where new residential development does occur near Washington Dulles International Airport, disclosure measures should be provided.

LIGHT POLLUTION

Increasing urbanization requires that care be taken to reduce unfocused emissions of light and that efforts be made to avoid creating sources of glare which may interfere with residents' and/or travelers' visual acuity.

Objective 5: Minimize light emissions to those necessary and consistent with general safety.

Policy a. Recognize the nuisance aspects of unfocused light emissions.

ENVIRONMENTAL HAZARDS

Unlike some parts of the United States, Fairfax County is not subject to major natural disasters such as earthquakes, or major forest fires. However the county is not free of natural and human made hazards to new and existing development.

There are hazards to property in some areas of the county posed by wet or unstable soils. Marine clay soils found in the eastern part of the county and shrink-swell clay soils found primarily in the western area can cause foundation failures, cracked and shifting walls, and in extreme cases, catastrophic slope failure. Asbestos bearing soils may pose a health risk to construction workers requiring special precautions during excavation.

Objective 6: Ensure that new development either avoids problem soil areas, or implements appropriate engineering measures to protect existing and new structures from unstable soils.

Policy a: Limit densities on slippage soils, and cluster development away from slopes and potential problem areas.

Policy b: Require new development on problem soils to provide appropriate engineering measures to ensure against geotechnical hazards.

There is a hazard to people and property posed by potential failure of any one of the several larger dams in Fairfax County. The "Fairfax County Dam Safety Committee" oversees the development of emergency action plans for county owned dams and reviews the emergency plans for private dams. These plans will be activated in the event of a dam failure. Nevertheless, should a

dam fail, there is a potential flood impact area down stream of the dam that may put a small number of people and property at risk.

Objective 7: Minimize the exposure of new development to the potential of flood impacts.

Policy a: Prohibit new residential structures within flood impact hazard areas.

Fairfax County is crossed by several major gas and petroleum pipelines. Ruptures of these lines could cause environmental degradation from spillage, or could result in a fire or explosion with the possibility of loss of life.

Objective 8: Minimize the exposure of county residents to potential pipeline ruptures and explosions and avoid hazards from electrical transmission and distribution facilities.

Policy a: Ensure pipeline safety and minimize the hazards associated with gas and petroleum pipelines through improved construction inspection and quality assurance during construction and by requiring appropriate construction practices and building setbacks. This could be done in a variety of ways, including but not limited to the following:

- prohibiting the planting of new trees and the corresponding intrusion of side growth of new trees within the easements;
- limiting the crossings over and under the pipelines to those structures deemed necessary for infrastructure improvements; and
- limiting the uses allowed within any pipeline easement.

Policy b: There exists a potential hazard to surface and ground water resources due to a leak or spill accident from petroleum or natural gas transmission pipelines. The potential hazards should be identified and should be minimized to the greatest extent feasible through emergency planning and planning for the location of future lines.

- The county should identify critical surface and ground water resource areas in the vicinity of pipelines, and the pipeline operators should prepare contingency plans for emergency response in case of an accident.

Policy c: Regulate new development to minimize unnecessary human exposure to unhealthful impacts of low level electromagnetic fields from electrical transmission lines.

ENVIRONMENTAL RESOURCES

The third category of environmental issues addresses the protection, preservation, and restoration of environmental resources. These issues reflect a need to conserve or restore appropriate examples of the county's rapidly disappearing natural landscape, to protect and manage its ecological resources, and to provide visual relief in the form of natural vegetation between adjacent and sometimes incompatible land uses.

The county continues to lose open space, much of which has been cumulatively significant for environmental resources. "Open space" land, as distinguished from developed land, includes parks, conservation areas, private open space, and vacant land. The quantity of land included within these categories has diminished by more than 30 percent from 1975 to 1995, and is now less than 77,000 acres. Although not all open space land is ecologically significant or appropriate for preservation, the data indicate a loss of some of Fairfax County's environmental resources, and a fragmentation of remaining ecologically significant land. Large tracts of natural land are especially scarce in the more urban inner part of the county. However, several areas of low density development and some ecologically significant areas remain.

Low density zoning is a valuable conservation tool. However, as a single measure it is not an adequate means to conserve our resources. As currently prescribed in the Zoning Ordinance, neither conventional, nor cluster subdivision regulations are preserving the quality of the landscape that these low density zoning districts were enacted to protect.

It is desirable to conserve a portion of the county's land in a condition that is as close to a predevelopment state as is practical. A conserved network of different habitats can accommodate the needs of many scarce or sensitive plant and animal species. Natural open space also provides scenic variety within the county, and an attractive setting for and buffer between urban land uses. In addition, natural vegetation and stream valleys have some capacity to reduce air, water and noise pollution.

Objective 9: Identify, protect and enhance an integrated network of ecologically valuable land and surface waters for present and future residents of Fairfax County.

Policy a: Identify, protect and restore an Environmental Quality Corridor system (EQC). (See Figure 4.) Lands may be included within the EQC system if they can achieve any of the following purposes:

- Habitat Quality: The land has a desirable or scarce habitat type, or one could be readily restored, or the land hosts a species of special interest. This may include: habitat for species that have been identified by state or federal agencies as being rare, threatened or endangered; rare vegetative communities; unfragmented vegetated areas that are large enough to support interior forest dwelling species; and aquatic and wetland breeding habitats (i.e., seeps, vernal pools) that are connected to and in close proximity to other EQC areas.

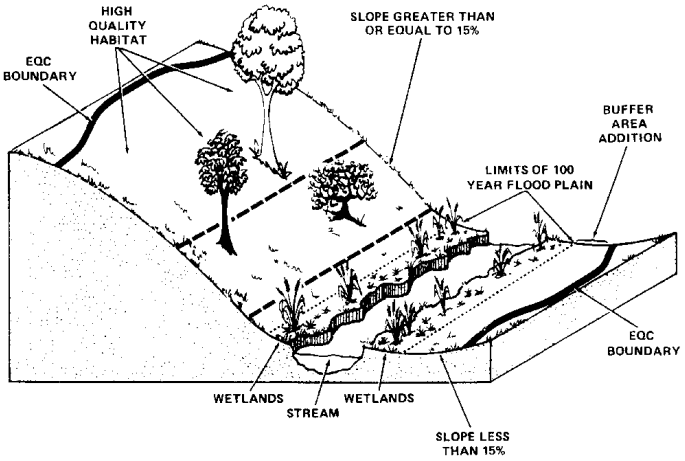
- Connectivity: This segment of open space could become a part of a corridor to facilitate the movement of wildlife and/or conserve biodiversity. This may include natural corridors that are wide enough to facilitate wildlife movement and/or the transfer of genetic material between core habitat areas.

- Hydrology/Stream Buffering/Stream Protection: The land provides, or could provide, protection to one or more streams through: the provision of shade; vegetative stabilization of stream banks; moderation of sheet flow stormwater runoff velocities and volumes; trapping of pollutants from stormwater runoff and/or flood waters; flood control through temporary storage of flood waters and dissipation of stream energy; separation of potential pollution sources from streams; accommodation of

stream channel evolution/migration; and protection of steeply sloping areas near streams from denudation.

- Pollution Reduction Capabilities: Preservation of this land would result in significant pollutant reductions. Water pollution, for example, may be reduced through: trapping of nutrients, sediment and/or other pollutants from runoff from adjacent areas; trapping of nutrients, sediment and/or other pollutants from flood waters; protection of highly erodible soils and/or steeply sloping areas from denudation; and/or separation of potential pollution sources from streams.

The core of the EQC system will be the county's stream valleys. Additions to the stream valleys should be selected to augment the habitats and buffers provided by the stream valleys, and to add representative elements of the landscapes that are not represented within stream valleys. The stream valley component of the EQC system shall include the following elements (See Figure 4):



A TYPICAL
ENVIRONMENTAL QUALITY CORRIDOR

Source: Fairfax County Office of Comprehensive Planning

FIGURE 4

- All 100 year flood plains as defined by the Zoning Ordinance;

- All areas of 15% or greater slopes adjacent to the flood plain, or if no flood plain is present, 15% or greater slopes that begin within 50 feet of the stream channel;

- All wetlands connected to the stream valleys; and

- All the land within a corridor defined by a boundary line which is 50 feet plus 4 additional feet for each % slope measured perpendicular to the stream bank. The % slope used in the calculation will be the average

slope measured within 110 feet of a stream channel or, if a flood plain is present, between the flood plain boundary and a point fifty feet up slope from the flood plain. This measurement should be taken at fifty foot intervals beginning at the downstream boundary of any stream valley on or adjacent to a property under evaluation.

Modifications to the boundaries so delineated may be appropriate if the area designated does not benefit any of the EQC purposes as described above. In addition, some disturbances that serve a public purpose such as unavoidable public infrastructure easements and rights of way may be appropriate. Disturbances for access roads should not be supported unless there are no viable alternatives to providing access to a buildable portion of a site or adjacent parcel. The above disturbances should be minimized and occur perpendicular to the corridor's alignment, if practical, and disturbed areas should be restored to the greatest extent possible

In general, stormwater management facilities should not be provided within EQCs unless they meet one of the following conditions:

- They are consistent with recommendations of a watershed management plan that has been adopted by the Fairfax County Board of Supervisors; or

- They will:

  - Either:
    - Be more effective in protecting streams and better support goals of watershed management plans than stormwater management measures that otherwise would be provided outside of EQCs; or

    - Contribute to achieving pollutant reduction necessary to bring waters identified as impaired into compliance with state water quality standards or into compliance with a Municipal Separate Storm Sewer System (MS4) permit in a manner that would be more effective and/or less environmentally-disruptive than approaches that would be pursued outside of EQCs;

  and

  - Replace, enhance and/or be provided along with other efforts to compensate for any of the EQC purposes, as described above, that would be affected by the facilities.

When stormwater management facilities within the EQC are determined to be appropriate, encourage the construction of facilities that minimize clearing and grading, such as embankment-only ponds, or facilities that are otherwise designed to maximize pollutant removal while protecting, enhancing, and/or restoring the ecological integrity of the EQC.

The following efforts within EQCs support the EQC policy and should be encouraged:

- Stream stabilization and restoration efforts where such efforts are needed to improve the ecological conditions of degraded streams. Natural channel

design methods should be applied to the greatest extent possible and native species of vegetation should be used.

- Replanting efforts in EQCs that would restore or enhance the environmental values of areas that have been subject to clearing; native species of vegetation should be applied.

- Wetland and floodplain restoration efforts.

- Removal of non-native invasive species of vegetation from EQCs to the extent that such efforts would not be in conflict with county ordinances; such efforts should be pursued in a manner that is least disruptive to the EQCs.

Other disturbances to EQCs should only be considered in extraordinary circumstances and only where mitigation/compensation measures are provided that will result in a clear and substantial net environmental benefit. In addition, there should be net benefits relating to most, if not all, of the EQC purposes listed above that are applicable to the proposed disturbances.

Preservation should be achieved through dedication to the Fairfax County Park Authority, if such dedication is in the public interest. Otherwise, EQC land should remain in private ownership in separate undeveloped lots with appropriate commitments for preservation. The use of protective easements as a means of preservation should be considered.

When preservation of EQC land is achieved through the development process it is appropriate to transfer some of the density that would otherwise have been permitted on the EQC land to the non-EQC portion of the property to provide an incentive for the preservation of the EQC and to achieve the other objectives of the Plan. The amount of density transferred should not create an effective density of development that is out of character with the density normally anticipated from the land use recommendations of the Plan. For example, town homes should not normally be built adjacent to an EQC in an area planned for two to three dwelling units per acre. Likewise, an increase in the effective density on the non EQC portion of a site should not be so intense as to threaten the viability of the habitat or pollution reduction capabilities that have been preserved on the EQC portion of the site.

Policy b. To provide an incentive for the preservation of EQCs while protecting the integrity of the EQC system, allow a transfer of some of the density from the EQC portion of developing sites to the less sensitive areas of these sites. The increase in effective density on the non-EQC portion of a site should be no more than an amount which is directly proportional to the percentage of the site that is preserved. Overall site yield will decrease as site constraints increase. Maximum density should be determined according to a simple mathematical expression based upon the ratio of EQC land to total land. This policy is in addition to other plan policies which impact density and does not supersede other land use compatibility policies.

The retention of environmental amenities on developed and developing sites is also important. The most visible of these amenities is the county's tree cover. It is possible to design new development in a manner that preserves some of the existing vegetation in landscape plans. It is also possible to restore lost vegetation through replanting. An aggressive urban forestry program could retain and restore meaningful amounts of the county's tree cover.

Objective 10: Conserve and restore tree cover on developed and developing sites. Provide tree cover on sites where it is absent prior to development.

Policy a: Protect or restore the maximum amount of tree cover on developed and developing sites consistent with planned land use and good silvicultural practices.

Policy b: Require new tree plantings on developing sites which were not forested prior to development and on public rights of way.

Policy c: Use open space/conservation easements as appropriate to preserve woodlands, monarch trees, and/or rare or otherwise significant stands of trees, as identified by the county.

Objective 11: Promote the use of open space/conservation easements as tools to preserve environmental resources.

Policy a: Use open space/conservation easements for the preservation of Environmental Quality Corridors, Resource Protection Areas, and other environmentally sensitive areas such as land along the Potomac and Occoquan Rivers.

Policy b: Use open space/conservation easements to preserve open space in already developed areas in order to provide natural areas, protect environmentally sensitive resources and preserve wildlife habitat in an urban or suburban context.

ENVIRONMENTAL COORDINATION

Fairfax County has many regulations and policies designed to protect the environment and conserve our ecological resources. Environmental coordination is a remaining area of concern. In the final analysis, an environmental policy or a regulation that applies to development will only achieve the desired effect if it is identified at the time of application review, enforced during development, maintained after development is over, and monitored for continued performance.

Fairfax County does not have an integrated environmental management program. The responsibility for environmental planning, monitoring and enforcement is spread throughout the county government. This administrative structure has resulted in a fragmented and inconsistent application of resources to environmental protection in Fairfax County. For example, several different county agencies are responsible for environmental monitoring. Many of these monitoring programs are quite modest. There is no central data base regarding environmental pollution. The individuals responsible for enforcing environmental regulations often have many additional enforcement responsibilities.

Objective 12: Improve the identification and mitigation of environmental impacts, and the monitoring and enforcement of environmental policies as applied to land disturbing activities.

Policy a: Require both public and private development proposals to identify environmental constraints and opportunities and demonstrate how environmental impacts will be mitigated.

Policy b: Establish a centralized environmental planning and monitoring function with responsibility for coordinating the actions of individual county agencies to effect a comprehensive program to preserve and improve the environment.

RESOURCE CONSERVATION AND GREEN BUILDING PRACTICES

The energy shortage in the United States in the 1970s highlighted the finite nature of our natural resources. Since the 1970s, efforts have been pursued at the federal level to enhance energy efficiency and the efficient use of water resources. While such efforts are best addressed at the federal level, local efforts to conserve these resources should be encouraged. Recent events and trends have highlighted the increasing need for energy and resource conservation and efficiency, greenhouse gas reduction and green building practices. Many jurisdictions are now engaging in community energy planning and other strategies to best use available resources.

The "green building" concept provides a holistic approach to the reduction of adverse environmental impacts associated with buildings and their associated facilities and landscapes.

Objective 13: Design and construct buildings and associated landscapes to use energy and water resources efficiently and to minimize short- and long-term negative impacts on the environment and building occupants.

Policy a. In consideration of other Policy Plan objectives, encourage the application of energy conservation, water conservation and other green building practices in the design and construction of new development and redevelopment projects. These practices may include, but are not limited to:

- Environmentally-sensitive siting and construction of development;
- Application of low impact development practices, including minimization of impervious cover (See Policy k under Objective 2 of this section of the *Policy Plan*);
- Optimization of energy performance of structures/energy-efficient design;
- Use of renewable energy resources;
- Use of energy efficient appliances, heating/cooling systems, lighting and/or other products;
- Application of best practices for water conservation, such as water efficient landscaping and innovative wastewater technologies, that can serve to reduce the use of potable water and/or reduce stormwater runoff volumes;
- Reuse of existing building materials for redevelopment projects;
- Recycling/salvage of non-hazardous construction, demolition, and land clearing debris;
- Use of recycled and rapidly renewable building materials;

- Use of building materials and products that originate from nearby sources;

- Reduction of potential indoor air quality problems through measures such as increased ventilation, indoor air testing and use of low-emitting adhesives, sealants, paints/coatings, carpeting and other building materials;

- Reuse, preservation and conservation of existing buildings, including historic structures;

- Retrofitting of other green building practices within existing structures to be preserved, conserved and reused;

- Energy and water usage data collection and performance monitoring;

- Solid waste and recycling management practices; and

- Natural lighting for occupants.

Encourage commitments to implementation of green building practices through certification under established green building rating systems for individual buildings (e.g., the U.S. Green Building Council's Leadership in Energy and Environmental Design for New Construction [LEED-NC®] or the U.S. Green Building Council's Leadership in Energy and Environmental Design for Core and Shell [LEED-CS®] program or other equivalent programs with third party certification). An equivalent program is one that is independent, third-party verified, and has regional or national recognition or one that otherwise includes multiple green building concepts and overall levels of green building performance that are at least similar in scope to the applicable LEED rating system. Encourage commitments to the attainment of the ENERGY STAR® rating where available. Encourage certification of new homes through an established residential green building rating system that incorporates multiple green building concepts and has a level of energy performance that is comparable to or exceeds ENERGY STAR qualification for homes. Encourage the inclusion of professionals with green building accreditation on development teams. Encourage commitments to the provision of information to owners of buildings with green building/energy efficiency measures that identifies both the benefits of these measures and their associated maintenance needs.

Policy b. Within the Tysons Corner Urban Center, Suburban Centers, Community Business Centers, Industrial Areas and Transit Station Areas as identified on the Concept Map for Future Development, unless otherwise recommended in the applicable area plan, ensure that zoning proposals for nonresidential development or zoning proposals for multifamily residential development incorporate green building practices sufficient to attain certification through the LEED-NC or LEED-CS program or an equivalent program specifically incorporating multiple green building concepts, where applicable, where these zoning proposals seek at least one of the following:

- Development in accordance with Comprehensive Plan Options;
- Development involving a change in use from what would be allowed as a permitted use under existing zoning;
- Development at the Overlay Level; or
- Development at the high end of planned density/intensity ranges. For nonresidential development, consider the upper 40% of the range between by-right development potential and the maximum Plan intensity to constitute the high end of the range.

Where developments with exceptional intensity or density are proposed (e.g. at 90 percent or more of the maximum planned density or intensity), ensure that higher than basic levels of green building certification are attained.

Policy c. Ensure that zoning proposals for residential development that are not otherwise addressed in Policy b above will incorporate green building practices sufficient to attain certification under an established residential green building rating system that incorporates multiple green building concepts and that includes an ENERGY STAR Qualified Homes designation or a comparable level of energy performance. Where such zoning proposals seek development at or above the mid-point of the Plan density range, ensure that county expectations regarding the incorporation of green building practices are exceeded in two or more of the following measurable categories: energy efficiency; water conservation; reusable and recycled building materials; pedestrian orientation and alternative transportation strategies; healthier indoor air quality; open space and habitat conservation and restoration; and greenhouse gas emission reduction. As intensity or density increases, the expectations for achievement in the area of green building practices would commensurately increase.

Policy d. Promote implementation of green building practices by encouraging commitments to monetary contributions in support of the county's environmental initiatives, with such contributions to be refunded upon demonstration of attainment of certification under the applicable LEED rating system or equivalent rating system.

Policy e. Encourage energy conservation through the provision of measures which support non-motorized transportation, such as the provision of showers and lockers for employees and the provision of secure short-term and long-term bicycle parking facilities for employment, retail, institutional, and multifamily residential uses.

Policy f. Encourage applicants involved in public-private partnerships where land is leased or provided by the county to meet or exceed county guidelines for green building certification for capital projects.

Policy g. Encourage provision of or readiness for charging stations and related infrastructure for electric vehicles within new development and redevelopment proposals, particularly for residential where other opportunities are not available.

Policy h. Encourage and participate in periodic regional and local evaluations of the outcomes achieved through the application of sustainable land use principles and technology, in coordination with the energy and resources providers and industry. Such evaluations should be based on pooled, anonymous-source data, and should provide information helpful in decisions regarding the costs and benefits of green practices, including evaluations focused on innovative approaches and technology.

APPENDIX 1

GUIDELINES FOR TIDAL SHORELINE EROSION CONTROL MEASURES

Measures to control erosion along the county's tidal shoreline are often pursued in order to protect adjacent property. Where county approval of tidal shoreline erosion control measures is needed, the following guidelines issued by the Virginia Marine Resources Commission should be consulted and considered in the decision-making process: "Shoreline Development BMPs," "Wetlands Guidelines," and "Subaqueous Guidelines." Consistent with these documents, shoreline protection structures should only be pursued where there is active, detrimental shoreline erosion which cannot be otherwise controlled, and such structures should be constructed in a manner that minimizes adverse wetlands impacts.

Shoreline stabilization approaches that apply biological techniques, using native plant species, are preferred where such approaches are consistent with the best available technical guidance, which may include guidance provided by the Virginia Marine Resources Commission, the Virginia Institute of Marine Science, and the Shoreline Erosion Advisory Service. Unless otherwise advised through such guidance, the following preferences, as refined from guidance developed by the Hampton Roads Planning District Commission and subsequently recommended for broader application in tidal areas by the Division of Chesapeake Bay Local Assistance of the Virginia Department of Conservation and Recreation (formerly the Chesapeake Bay Local Assistance Department), should be applied, where feasible, in determining the appropriate approaches to shoreline stabilization (with practices listed in decreasing order of preference):

Areas with Low Erosion Rates (< 1 ft/yr.)
(low energy shorelines with an average fetch exposure of <1 nautical mile)

1. Vegetative stabilization with or without bank re-grading
2. Revetments
3. Bulkheads

Areas with Moderate Erosion Rates (1- 3 ft/yr.)
(medium energy shorelines with an average fetch exposure of 1-5 nautical miles)

1. Vegetative stabilization with/or without bank grading
2. Revetments
3. Breakwaters
4. Groins*
5. Bulkheads

Areas with Severe Erosion Rates (> 3 ft/yr.)
(high energy shorelines with an average fetch exposure of > 5 nautical miles)

1. Relocation (of threatened structures)
2. Revetments
3. Breakwaters
4. Groins*
5. Seawalls

*Groins may not be appropriate in riverine conditions or where they may impede navigation.