BACKGROUND

INTRODUCTION

OVERVIEW OF FAIRFAX COUNTY

Fairfax County's geographic location, with its relationship to Washington, D.C., has been a significant factor in the County's historic development. Alexandria and Arlington have direct access to the District of Columbia and can be considered as inner ring suburban areas, while most of Fairfax County is a second-level or outer ring suburb with some large areas remaining rural in character. For the past two decades, Fairfax County has been strongly shaped by its predominant function as a bedroom community for government employment centers located in Arlington and Washington.

Within Virginia, Fairfax County's 630,443 residents (1983 estimate) make it the most populous political subdivision of the Commonwealth. Fairfax grew from 18,000 persons at the turn of the century to 22,000 in 1920, and almost 41,000 just before the Second World War. Then came the growth explosion—from less than 100,000 in 1950 to one-quarter million in 1960, to more than 630,000 residents in 1983. Thus, its rapid urbanization has made Fairfax County distinctive within the state.

HISTORY OF PLANNING AND ZONING

The history of planning and zoning in Fairfax County began with the adoption of the first zoning ordinance in March 1941, while in June of that year, the County's first rezoning request was heard. The rezoning caseload from the first case filed in 1941 until 1958-59 totalled over 1,600.

The first attempt at master planning took place in 1954 when a proposal was made by a consultant to the Board of Supervisors. This plan was rejected, and the County staff was directed to prepare a revision. A six-part plan was formulated between 1955 and 1958, and the residential density section was adopted in September 1958. Between 1958 and 1961 all other sections, except the one dealing with transportation, were also adopted. The transportation section was never formally approved. In addition to the plan, a zoning ordinance was adopted in 1959.

Planning and zoning actions taken by the County during this period were significant in several respects. First, comprehensive plans had been completed for the entire County. These plans then served as the basis for a comprehensive zoning ordinance which was adopted countywide. This was the first and only time planning and zoning have been coterminously related to each other on a countywide basis.

Subsequent to the adoption of the plan and ordinance, however, legal action was initiated, challenging the County's action in the so-called Freehill Amendment, which had uniformly zoned the rural area of the County for two-acre development. The immediate result of the decision by the Virginia Supreme Court was the reduction of rural lot sizes to one acre, with certain two-acre areas requested by citizens.

From 1960 to 1970, the Washington metropolitan area was the fastest growing major metropolitan area in the United States. Its population grew more than three percent per year during that decade, adding three-quarters of a million new residents to its 1960 population of 2,076,610. The growth of the region, however, was not spread evenly among the jurisdictions.

Fairfax County grew at a rate nearly twice that of the metropolitan area as a whole; the rate for Fairfax County was slightly higher than the rate for Montgomery County, but lower than the rate for Prince Georges County.

From 1970 to 1975, Fairfax grew at a slightly lower rate than in the previous decade, but absorbed a large share of the region's growth. This reflected moratoria in other jurisdictions and the lack of a moratorium in Fairfax at the beginning of the period and a continuing pressure for new housing. Fairfax absorbed about half the region's growth instead of a fair share of 25 percent. Constraints were imposed two years earlier in the Maryland counties which contributed to the growth in Fairfax.

An economic base study was prepared as a means of developing forecasts which could be used in the development of the plan. A basic assumption of that study was that the County's fair share of regional population growth would continue to be about 25 percent. Based on this assumption, the County would grow to about 857,000 over a ten-year period.

However, monitoring of growth over the 18 months prior to adoption of the countywide plan, indicated that population growth was slowing down and it was estimated that the County population would not reach 857,000 until 1990.

More recent analysis by the County and other agencies revised the 1990 forecast downward to 685,900. This signifies a reduction of 171,100 persons from the original Comprehensive Plan forecast of 857,000, a decline of 20.0 percent. In keeping with County policy, the County staff will continue to monitor growth, and revisions to forecasts will continue to be made on an annual basis.

One set of activities that is of major importance in future growth rates is the Metropolitan Growth Policy Program of the Council of Governments. This program is endorsed and strongly supported by the County. The objectives of the program are to develop growth policies that encourage and promote an equitable distribution of growth within the region. As this program progresses, the forecasts of population growth in the County will change in response to new regional growth forecasts as well as to regional policies and agreements.

From the milestone period of 1958-59 until 1975, more than 2,800 new rezoning cases were filed. In response to these intense development pressures, substantial numbers of plans, plan amendments, and special planning studies of all kinds were prepared by County staff. While the 1959 *Zoning Ordinance* was a great improvement over the 1941 ordinance, it was subsequently amended more than 230 times.

In 1969, the Board of Supervisors felt that the *Zoning Ordinance* required complete revision. The Zoning Ordinance Study Committee (ZOSC) was established in March 1970 and in November 1974 the ordinance which ZOSC proposed was adopted in principle. On June 12, 1978, the Board of Supervisors took final action to adopt the provisions of the *Zoning Ordinance* with an effective date of August 14, 1978. The ordinance was recodified on October 18, 1982 and is a cornerstone of the planning implementation process.

The decade of the seventies was marked by increasing concern among citizens and public officials regarding the problems associated with rapid and generally uncontrolled population growth. Increased understanding of the ways in

Plan Overview

The Comprehensive Plan implements major policy recommendations contained in the *Countywide Alternatives* document produced in 1974 and the four area plans. Key elements of the Plan emerged through the active involvement of County citizens.

Among the fundamental concepts of the Plan are:

- the preservation and protection of existing stable communities;
- encouragement of planned development centers;
- increased reliance on mass transit systems; and
- protection of sensitive environmental areas.

Economic analysis provides recommendations which:

- support major employment centers at Tysons, Dulles, and the I-495 and I-95 corridors;
- identify areas suitable for long term basic employment in order to avoid incompatible land use encroachment; and
- cluster commercial areas in order to avoid strip development.

Public facility investment is recommended which:

- reduces public facility cost by encouraging planned development;
- promotes increased service through public investment in neighborhood parks, schools and other facilities;
- insures adequate capacity to meet both long term and short run needs; and
- implements objectives of the adopted Plan in timing public facilities to meet expected growth.

Countywide housing recommendations include strategies which:

- preserve the integrity and quality of existing neighborhoods;
- provide for the conservation of selected neighborhoods through programs designed to upgrade housing quality;
- provide for the provision of a full range of housing opportunities for persons of all incomes; and
- promote open space and structural quality through the plan implementation process.

Environmental analysis of the County addressed the need to:

- include air quality as an important factor in land use development;
- protect water quality and quantity throughout the County;
- implement environmental quality corridors (EQCs) as an innovative approach to open space preservation and protection of natural resources;
- stem physical environmental hazards, such as steep slopes and slippage-prone soils, which are constraints to future development; and
- encourage plan implementation procedures which incorporate design sensitivity on a site-specific scale.

Transportation strategies embodied in the Comprehensive Plan include:

- encouragement of travel on major facilities and minimization of the use of local residential streets for commuter traffic;
- recognition of the need to improve access in the outer areas of the County where existing facilities are poorest and where an increase in demand will cause the greatest deficiency;
- support for Metro through feeder bus systems with corresponding roadway improvements; and
- introduction of new administrative processes for initiation and implementation of transportation improvements.

which growth affects the cost of public facilities and services, and the negative impacts it may have on ecological systems, challenged the assumption that growth per se is good for the County.

While adoption of the Comprehensive Plan represents a major milestone in the program to give Fairfax County an effective system of growth management, it is recognized that the Plan is merely a milestone. Much remains to be done. Implementation tools must be further developed and improved. The Plan must continue to be updated and maintained on an annual basis.

Major metropolitan development issues remain serious obstacles to improved planning. The strong centralization of federal employment in Washington, D.C., creates a burden on the road network which may be beyond the capacity of present implementation resource allocations to meet. Employment centers must develop in the western sections of the County to diminish the transportation demands on the eastern sections of the County. These types of major development issues must be addressed in the months and years to come. Through the Comprehensive Plan, analytic methods, and programming procedures, the County will be in a strong position to achieve the growth management objectives established by the County's Board of Supervisors, Planning Commission, and citizens.

The PLUS Program

Fairfax County responded to these urban problems through creation in 1973 of PLUS (Planning Land Use System). PLUS evolved from the commitment by Fairfax County's Board of Supervisors to the concept of managed growth to achieve improved quality in urban development and services.

The Board's initial effort to achieve these objectives, the 1972 pause for planning, was struck down by the Circuit Court soon after its initiation. A second staff effort, the *Five Year Plan* developed in 1972, sought to indicate how and where growth could occur at minimum cost. Because this plan did not address vital environmental and transportation issues, it was not adopted. However, the plan did substantially improve the County's data base and set forth logical standards and criteria to guide capital facilities planning.

The Board of Supervisors initiated PLUS in February of 1973. The Board adopted a resolution which directed the establishment of a task force on comprehensive planning and land use controls which was to develop a program to achieve improved planning and growth management. The preliminary recommendations of the task force were discussed at two public work sessions of the entire Board of Supervisors, staff and citizen representatives. The second meeting was broadcast on educational television. At this meeting, the Board of Supervisors approved in principle the general recommendation to implement a comprehensive planning program, later designated PLUS. The entire proposed program* received public review and comment at a public hearing in June 1973.

PLUS began to implement its objectives in July 1973. The keystone of the program was the updating of the countywide plan and 14 district plans. Included were development of a capital improvement program, a moratorium on rezoning actions and site plan/subdivision plat approvals, adoption of a new zoning ordinance, environmental assessment requirements, and an adequate public facilities ordinance. The final report of the task force outlined the overall objectives of PLUS:

> The basic approach to planning must be changed. In the past, planning has been static—concerned with past trends and proposed ideal land patterns. Today, especially in urban areas, planning must be dynamic, responsive, and systematic. The issue is not whether traditional planning concerns about master plans should be continued; they obviously must. However, recent trends in advanced management systems can provide a direction to improve planning in Fairfax County. A higher level of quantitative analysis, drawing on a computer-based information system and explicit objectives and criteria for measurement, must be introduced as the central element in the planning process. The planning function must be an ongoing responsibility of top management and must integrate all municipal activities affecting development in a single coordinated process.

The PLUS mandate was truly broad, and the program received enormous attention from the County's public officials, citizens, and staff.

PLUS Components and Concepts

In the Fall of 1973, efforts began toward simultaneous preparation of updated countywide and area plans. To provide a logical process, the County grouped the 14 planning district plans into four areas, as follows:

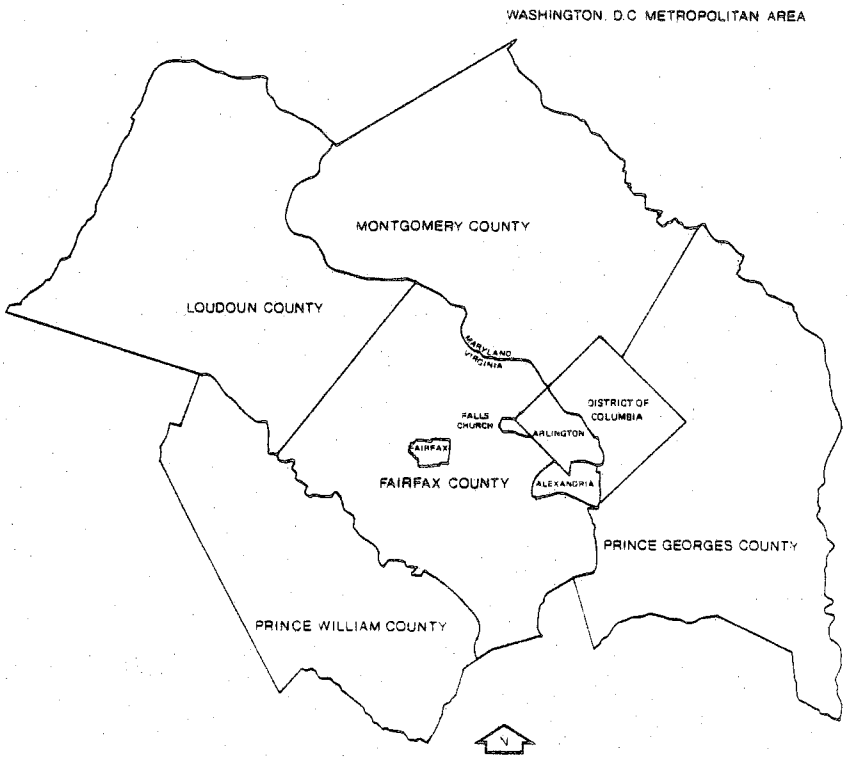
- Area I — Annandale, Baileys, Jefferson and Lincolnia
- Area II — McLean, Vienna and Fairfax
- Area III — Pohick, Bull Run and Upper Potomac
- Area IV — Lower Potomac, Mount Vernon, Rose Hill and Springfield

As the analysis of existing conditions was being completed in these areas, the countywide issues were also being studied. A major step toward defining a specific land use approach was the publication of the *Countywide Plan Alternatives* document in September 1974. This publication reaffirmed the interim development and redevelopment policies adopted earlier by the Board of Supervisors and recommended several development concepts which were to guide the preparation of the area plans. This was a direct result of both the countywide alternatives analysis and the area plans.

The most important growth management concept of the plans was the use of planned development centers as focal points for future growth. As an alternative to sprawl, this development concept was designed to increase local employment, to decrease reliance on the private automobile by reducing the length of work trips and making mass transit facilities more easily accessible, to reduce pressure for development in environmentally sensitive areas and to lower costs by more efficient provision of public services.

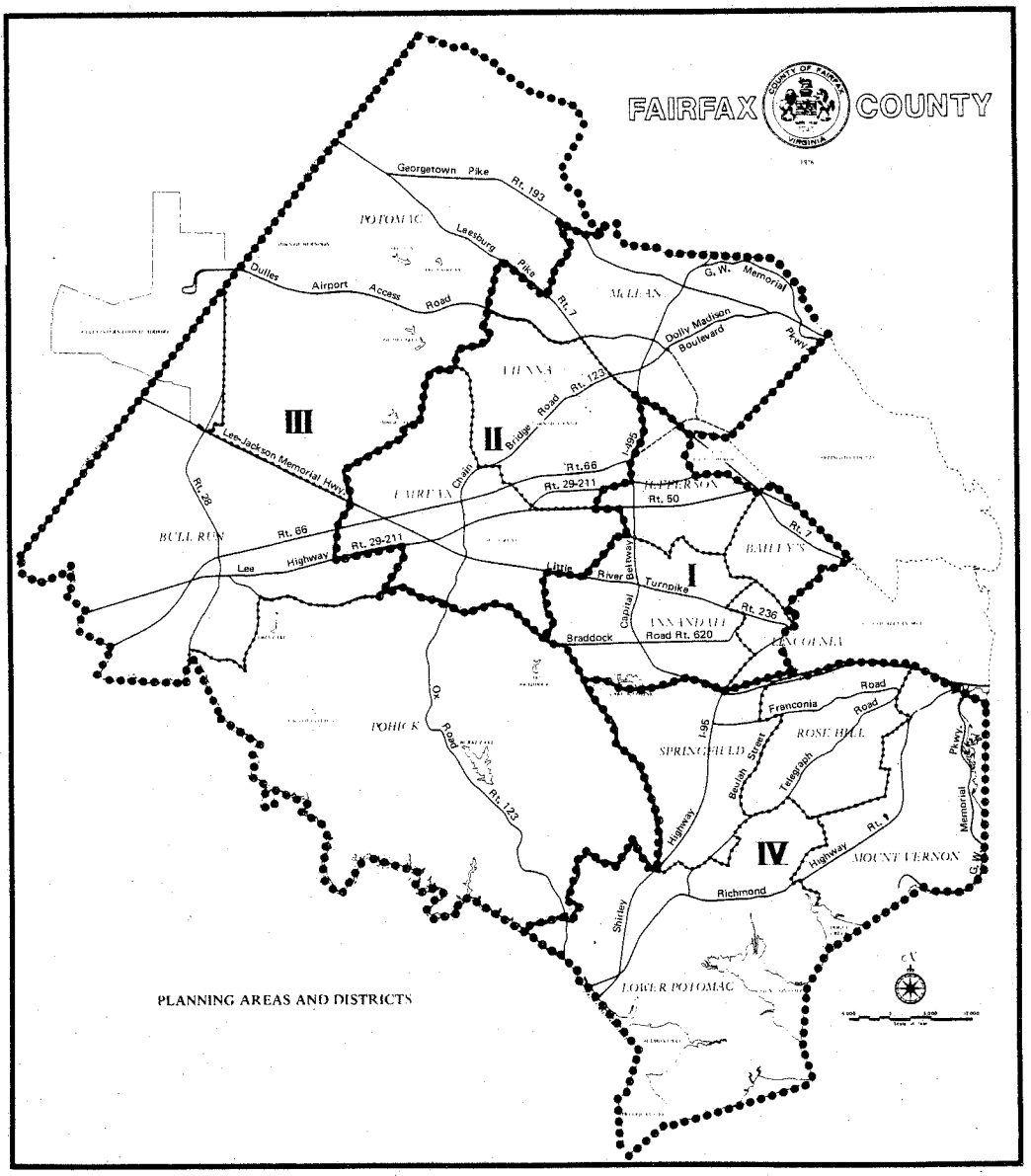
Environmental quality corridors (EQCs) were another major growth management concept of the countywide and area plans. EQCs represent an innovative approach toward integrating open space, recreational areas, historic sites, stream valleys, wetlands, wildlife habitats, and conservation areas into a single network. The EQC concept builds upon environmental needs to protect and properly use the land of Fairfax County. Substantial analysis has been and continues to be conducted on EQCs. The key aspect is that land has many characteristics important to the balanced environment of Fairfax County. Some land is appropriate for public use, while other types of land must be preserved free from human impacts. As the characteristics of EQCs are better defined, appropriate uses and functions can be identified and the needed acquisition and land protection methods can be determined. The Environmental Quality Advisory Council, the Stream Valley Board, County agencies and citizens have devoted substantial attention to these issues.

Another significant conceptual issue is the fair share of regional growth. The population projections which form a basis for land use recommendations and other recommendations in the area and countywide plans and the economic projections in this document represent Fairfax County's



*Proposal for Implementing an Improved Planning and Land Use Control System in Fairfax County. (Final report of the Task Force on Comprehensive Planning and Land Use Control, Fairfax County, May 1973.)

PLAN	DATE OF ADOPTION
AREA I	June 16, 1975
AREA II	August 25, 1975
AREA III	June 30, 1975
AREA IV	July 28, 1975
COUNTYWIDE	September 8, 1975



fair share of growth to the year 1990. A regional total was calculated utilizing several urban growth models which take into account the growth patterns of the past 20 years, projecting 15 years into the future. On a preliminary basis, approximately 25 percent of total metropolitan growth has been allocated to the County. This figure was, in turn, allocated to the planning areas, and also used for other countywide projections. It is understood that this figure is subject to the development of an optimum growth policy for the region as a whole in cooperation with other local governments and will be conditioned by the County's ability to provide adequate public facilities for its population.

Only through acceptance of fair share can the County approach the legal problems of growth management. Certainly, the data used in calculating appropriate fair share should receive careful review and evaluation by policy makers and citizens. Further, annual plan reviews must continue to monitor population trends to reflect accurately facts about demographic conditions and metropolitan growth developments.

Citizen Participation

A major distinguishing aspect of the countywide planning effort under the PLUS program was widespread and effective citizen participation. County residents had a major role in the planning process and a significant impact on its output through their interaction with County government.

Sixteen general planning task forces of County citizens were organized along planning district and magisterial district boundary lines. In addition, a low/moderate income task force and a building industry and related professions committee were formed. Staff of the Office of Comprehensive Planning was assigned to work directly with the citizen task forces in a liaison/advocate role to help facilitate communication and interaction with County government.

Citizen participation was obtained in many ways. Regular district and area task force meetings were supplemented by a series of meetings convened by individual supervisors in their districts, and by three citizen forums that drew between 400 and 700 persons. In addition to the meetings, a flow of information was provided to County residents through mailings of tabloids and letters identifying and explaining major policies and significant work elements. To ensure that a total spectrum of citizen attitudes and opinions throughout the County would be heard, a countywide citizen attitude survey was utilized. The survey was conducted by Response Analysis Corporation of Princeton, New Jersey, under contract with the Washington Center for Metropolitan Studies. A total of 846 citizens were contacted and their opinions solicited on 88 general County issues. Questions in the survey attempted to elicit opinions both about specific services which the County government does or might provide, and about the social and economic dimensions of past, present and anticipated development patterns in the County.

The citizen task forces, trade associations, and public interest groups responded constructively to draft materials, interim reports and studies, and to solicitations for their reactions to emerging policies. Even more significant, they initiated recommendations and suggested policies and guidelines. The efforts of the citizens on the task forces and other groups, as well as those interviewed in the survey, had a significant effect on the formulation of the Comprehensive Plan.

Implementation Process

Strategies for implementation were another important component of the PLUS growth management concept. Earlier plan-making efforts have been plagued by the static nature of the plans themselves. As a snapshot of a single idealized future, they have been frequently outdated by changing circumstances. While the Plan provides a current, updated baseline, an implementation process must be used which ensures its ongoing vitality.

Tools to be used in this process include the Zoning Ordinance, comprehensive rezoning and remapping, and an annual plan update cycle supported by the Capital Improvement Program, the project impact evaluation system (PIES), and a parking management plan and program, among others. The timing of growth is also influenced by the judgment of the Planning Commission and the Board of Supervisors regarding the ability of public facilities to service growth adequately. Development of these tools proceeded simultaneously with development of the area plans.

Adequate Public Facilities and Time-Phased Growth

When setting the preliminary groundwork for the PLUS program in 1973, the Board of Supervisors adopted an interim development and redevelopment policy establishing adequate public facilities as a primary County objective and a constraint on new development phasing. The policy states: "Growth in the County should be held to a level consistent with available, accessible and adequate public facilities as well as with rational plans to provide new public facilities." This basic policy remains a valid guide to future development in Fairfax County.

Public facilities compose the basic infrastructure needed to support future development. Thus, the planning and programming of these facilities are critical to the regulation of the timing and location of growth. Transportation and sewer and water facilities, for example, must be present before new development is in place. Thus, public facilities are a major factor in the County's efforts to improve the quality of new growth and to integrate new development logically into the County's land use patterns.

Development of the capability to require adequate public facilities was the most important goal of the PLUS program. By establishing the ability to time- phase growth, the County would move to a position of reducing the undesirable impacts of growth. This is in contrast to regulating development through other means such as zoning, which can only be applied to development requests on a case-by-case basis. Without an adequate means for the County to influence development the cumulative impacts of growth including the general pace and overall pattern of land uses are left to the private market.

The County's adequate public facilities policy is essential to the basic objectives of the PLUS program. This policy can assist the County in:

- preservation of valuable open space and protection of natural resources through implementation of environmental quality corridors;
- encouragement of quality development and avoidance of potential problems in land use incompatibilities;
- establishment of sound capital and operating costs by meeting service demands through ordered development patterns; and
- pursuit of the objective of high transit usage by assuring that land use developments are coordinated with transportation improvements.

These objectives rest at the heart of the County's efforts to improve future development.

Fairfax County, as one of the most rapidly urbanizing counties in the United States, has experienced a vast array of development problems resulting from scattered, uncoordinated development patterns. The symptoms of uncoordinated development are overcrowded roads, drainage problems, air pollution and many other typical aspects of urban living. Citizens have demanded better planning systems to prevent recurrence of the typical suburban problems which continue to plague many residents.

Development of the implementing tools to assure adequate public facilities is most essential and yet the most complex feature of the current planning program in Fairfax County. There has been considerable discussion of an adequate public facilities ordinance. Such an ordinance would be a regulatory device based on standards for public facilities which would control when new development could occur. Fairfax County studied extensively the Ramapo system and considered its possible application in Fairfax County. The adoption of an adequate public facilities ordinance can be considered as an approach to solve many of the urban problems currently being experienced. However, public facilities planning and the provision of an adequate public facilities policy requires the establishment of plans and programming systems in order to provide the basis for regulation under an ordinance once it has been legally sanctioned. Therefore, Fairfax County approached the issue of adequate public facilities in several ways.

The first step in moving toward the adequate public facilities objective was the formulation of updated comprehensive plans. It was essential that reasonable plans be established in order to provide a basis for public facilities programming and evaluation. Fairfax County reached this point with the formulation and presentation of the four area plans and the countywide plan. The annual review process systematizes the maintenance of these land use plans in order to avoid the necessity of massive plan redesign that characterized previous planning efforts.

The second step was the development of the capital improvement programming process. In 1974, the County published its first Capital Improvement Program. This program was substantially limited to current capital improvement commitments since the plans were still being formulated at that time. In 1975, the *FY1975 - FY1979 Capital Improvement Program* was published as the first developed on the basis of the updated plans.

The Capital Improvement Program is the product of an established annual process which implements County standards for public facilities and coordinates these standards with long range fiscal planning. Adoption of the Capital Improvement Program on an annual basis is a major step toward a sound adequate public facilities system in Fairfax County.

The third step was improvement of public facilities evaluation methodologies. The Comprehensive Plan and the Capital Improvement Program are currently based on standards and criteria for public services. However, the County is moving rapidly toward the improvement of public facilities evaluation methodologies. Further refinement of these methodologies will improve the County's ability to deal more effectively with the provision of public facilities to time phase growth. As these methodologies become more precise and the County gains greater experience in the alternative methods of public facilities evaluation, the final basis for adequate public facilities is established. Because of the legal constraints in the field of land use control in Virginia, the comprehensive development of adequate public facilities methodologies is imperative prior to adopting a new ordinance in this area.

The Comprehensive Plan recommends vigorous implementation of the adequate public facilities strategies being followed by Fairfax County. This approach can be fully realized through maintenance of the Comprehensive Plan, effective use of the Capital Improvement Program and reliance upon improving public facilities evaluation methodologies. In addition, the County should refine public facilities standards for application in Comprehensive Plan reviews and development plan evaluations. Currently these standards are being applied in the planning process, and in project impact analysis for rezoning cases. These standards should be finalized as explicit criteria to be followed and as a basis for land use regulation.

Board of Supervisors Policies

On August 6, 1973, the Board of Supervisors approved 16 interim development and redevelopment policies designed to serve as the basic framework for developing the long-range comprehensive plan process. Following an initial series of public forums from November 1973 through January 1974 and after extensive review, the validity of these policies was reaffirmed in October 1974. They have continued to serve as guidance throughout the program. They are listed below:

Policy 1: Quality of Life—Fairfax County is committed to improving the quality of life through local and regional comprehensive planning and development control systems, which facilitate the effective allocation of public resources and shape development patterns.

Policy 2: Regional Growth—Fairfax County should attempt to control and direct its growth in accordance with a regional optimum growth policy, based on quality of life and environmental constraints. Within that framework, and within the County's financial capabilities of providing adequate public facilities, the County should accept its fair share of the region's growth.

Policy 3: Environmental Constraints on Development—The amount and distribution of population density and land uses in Fairfax County should be consistent with the environmental constraints inherent in the need to preserve natural resources and meet federal, state and local water quality standards, ambient air quality standards and other environmental standards.

Policy 4: Growth and Adequate Public Facilities—Growth in the County should be held to a level consistent with available, accessible, and adequate public facilities as well as with rational plans to provide new public facilities. The County's development plans should take into account financial limitations and administrative constraints associated with increased need for public facilities. Growth should take place at a rate the County can afford.

Policy 5: Adequate Public Services—Fairfax County is committed to provide a high level and quality of public services for its citizens. Development plans should take into account financial limitations and administrative constraints associated with expanded demand for public services.

Policy 6: Housing Opportunities—All who live and/or work in Fairfax County should have the opportunity to purchase or rent safe, decent housing within their means. The County's housing policy shall be consistent with the Board's support of the Metropolitan Washington Council of Government's fair share formula.

Policy 7: Employment Opportunities—Fairfax County should encourage employment opportunities with the objective of steadily increasing the proportion of people working and living in the County and of reducing the distance between place of residence and place of employment.

Policy 8: Programs and Facilities for Quality Education—In order to insure quality education, Fairfax County should provide flexible public educational programs and facilities which effectively meet student and community needs.

Policy 9: Culture and Leisure Time Activities—Fairfax County should provide full opportunity for all residents to make constructive use of their leisure time through regional and local systems of safe, accessible and enjoyable parks, recreational and cultural programs, both active and passive, and the preservation of areas of historic significance.

Policy 10: Transportation—Fairfax County should encourage the development of accessible transportation systems designed to move people and goods efficiently through advanced planning and technology with minimal environmental impact and community disruption. Regional and local efforts to achieve a balanced transportation system through the development of rapid rail, commuter rail, expanded bus service and reduction of excessive reliance upon the automobile should be the keystone policy for future planning and facilities.

Policy 11: Private Sector Facilities—Fairfax County should encourage the development of appropriately scaled and clustered commercial and industrial facilities to meet the need for convenient access to good services and employment.

Policy 12: Open Space—Fairfax County should support the conservation of appropriate land areas in a natural state (including small open spaces in already congested and developing areas for passive neighborhood uses, visual relief, scenic value and screening and buffering purposes) to preserve, protect and enhance stream valleys, meadows, woodlands, wetlands and plant and animal life through a combination of an acquisition program, a tax policy, the police power and other appropriate means.

Policy 13: Revitalization—Recognizing its commitment to sustain and improve the quality of life, Fairfax County should encourage the revitalization of older areas of the County where present conditions are inconsistent with these policies, and prevent the encroachment of commercial and industrial development on residential areas.

Policy 14: Property Values—Fairfax County should investigate methods to recapture portions of increased property values created as a result of public actions.

Policy 15: Financial Planning and Management—Fairfax County should support equitable systems of taxation and user charges necessary to implement all its policies, recognizing its obligations to provide services and facilities to both established and new developments, and to attract desirable business and industry.

Policy 16: Preserving Existing Residential and Open Space—Growth should take place in accordance with criteria and standards designed to preserve, enhance and protect existing residential areas and open space, such as farmland, and achieve an orderly and aesthetic mix of residential, commercial/industrial facilities and open space without compromising the existing quality of life of existing residential development. Densities and heights in excess of those compatible with these goals should be discouraged. Nothing in this policy shall be construed to be incompatible with Policy 6: Housing Opportunities.

POPULATION AND DEMOGRAPHIC PATTERNS

HISTORY OF GROWTH

Between 1960 and 1970, Fairfax County grew at twice the rate of the entire Washington metropolitan area with an annual growth rate of 8.2 percent. County population increased by 205,378 persons over the decade, nearly equalling the total 1960 County population. Development occurred unevenly throughout the County. Areas located outside of the Beltway exhibited far more rapid rates of development than those lying within the Beltway. However, the amount of development occurring in some of the eastern, more urbanized areas exceeded that in the western sections of the County.

Between 1970 and 1980, the County grew by an estimated 172,300 persons, reflecting an average annual increase of 17,200 persons or an annual growth rate of 3.1 percent. Consequently, it appears that the County has grown at a slower rate over the last ten years than during the previous decade.

In comparison to the region, growth in Fairfax appears to be higher than in other jurisdictions during this period. Population forecasts prepared by the Metropolitan Washington Council of Governments indicate that Fairfax has taken a large share of the region's growth during the 1970-1980 period. This reflects moratoria in other jurisdictions and lack of a moratorium in Fairfax at the beginning of the period and a continuing pressure for new housing.

During the period 1970-1980, the Council of Governments projected that Fairfax County accounted for 55 percent of the population growth in the region, as compared to 26 percent in each of the preceeding two decades. At the same time, Montgomery County accounted for an estimated 25 percent of the regional growth, while Prince Georges County accounted for only 4 percent. Population growth in Prince Georges County showed a significant turnaround during the 1970s. Whereas Prince Georges County was the fastest growing jurisdiction in the region during the 1960s and accounted for 39 percent of the population increase, it is projected that the County grew by only 12,400 persons over the ten-year period 1970-1980. It is quite clear that, during the 1970s, population growth shifted from the Maryland side of the Potomac River to the Virginia side. According to COG projections, this trend is expected to continue for the immediate future.

Population Growth in the Three Major Counties of the Washington SMSA 1950-1980

	1950-60	1960-70	1970-80
Washington SMSA	568,762	784,513	313,400
Fairfax County	150,340	205,378	172,300
Share of SMSA	26%	26%	55%
Montgomery County	176,527	181,881	77,200
Share of SMSA	31%	23%	25%
Prince Georges County	163,213	303,172	12,400
Share of SMSA	29%	39%	4%

Sources: U.S. Census of Population for 1950, 1960, and 1970. Metropolitan Washington Council of Governments, Cooperative Forecasting Program, 1980.

POPULATION

Nearly 70 percent of the County's growth during the 1970-1980 period, or 120,000 persons, can be attributed to net in-migration. This extensive in-migration affects not only the amount of growth occurring in the County, but also the composition of the population since in-migrant households tend to be younger, smaller, and have a lower median income than nonmigrant households.

The demographic processes which have been at work in Fairfax County over the past decade have resulted in significant changes to the County's age distribution. Results from a household survey conducted by the Office of Research and Statistics show that the percentage of persons in the younger age groups has continued to decline, while the percentage of persons in the older age groups has continued to exhibit sizable increases. In 1970, approximately 32.8 percent of the population was under 15 years of age while by 1980 the percentage had declined to 22.8 percent. At the same time, percentage of persons in the childbearing age group of 25-44 increased from 29.1 percent in 1970 to 34.3 percent in 1980.

All of these changes in the County's age structure have resulted in a significant increase in the median age. In 1970, the median age was 25.2 years, one of the youngest in the metropolitan area. By 1980, the median age had increased to 29.1 years. In terms of median age, Fairfax County now exhibits characteristics similar to the older area jurisdictions in 1970.

The dominant trend in marital status of County residents between 1970 and 1980 has been toward a reduction in the proportion of persons in the population who are married and a concomitant increase in the proportion who are either divorced or separated. Fairfax County continues, however, to have a large proportion of married persons.

With respect to the social distribution in Fairfax County, the most significant change to occur between 1970 and 1980 is the increase in the percentage of persons in the categories of Oriental and other. At the same time, the proportion of whites, blacks and Spanish has declined. In 1970, Orientals comprised only 0.4 percent of the population, while, according to survey results, they now comprise 2.2 percent. Together with persons classified as other, Orientals currently outnumber blacks 3.3 percent to 3.1 percent. With these increases, the proportion of Spanish and whites has declined to 1.0 percent and 93.6 percent, respectively.

Analysis of County demographic data reveals that the County is an affluent, rapidly growing, rapidly urbanizing suburban jurisdiction whose growth has and will present many challenges to the provision of County services and facilities. Evaluation of the impact of population dynamics is an essential factor to consider in anticipation and management of future County development.

HOUSEHOLD SIZE

Between 1970 and 1980, the average household size declined from 3.51 percent to an estimated 2.98 persons. The rapid decrease in average household size can be attributed to well-publicized declining fertility rates and increases in the number of proportion of one-person households, both of which reflect the rising number of single, divorced and separated persons in the population.

Largely due to declining household size, a phenomenon which has been occurring nationally, the growth of households in Fairfax County has been occurring at a more rapid rate than the growth of the total population. Between 1970 and 1980, households increased by 63 percent, as compared to a 38 percent increase in the population. Impacts of this trend compound the strains placed on County services and facilities implied by population growth alone.

Fairfax County has attracted a disproportionately large share of the high-income families moving into the area. Since 1969, median family income has increased from $15,707 to an estimated $41,600 in 1981.

The median number of school years completed in Fairfax County increased from 12.9 years in 1970 to approximately 16.0 years in 1980. As of 1980, an estimated 94 percent of the population 25 years of age and over had completed high school and 50 percent of those had four or more years of college. At the same time, the number and proportion of persons with less than a high school education has declined.

Fairfax County's population has consistently shown the highest mobility among the major suburban jurisdictions within the SMSA. Each year almost 25 percent of the household heads experience a change of residence. A majority of these persons moved into the County from other jurisdictions, while nearly 40 percent had simply changed dwelling units within the County.

CHANGES IN GROWTH RATE

There are several major factors which directly or indirectly affect the County's rate of growth. In developing a forecast, or sets of forecasts, assumptions are made about these factors and how they influence the rate of growth. The major factors are listed and discussed below:

Regional Economy

The economic growth of the region is the greatest single factor in the growth of the County. With the federal government as the basic industry of the Washington area, the regional economy changes in response to changes in the amount of federal growth in Washington. The increase in federal employment has been dropping off in the last few years, but it is assumed that future growth will be between 5,000 and 8,000 per year.

Household Size

Household sizes in Fairfax County have been decreasing in recent years and are expected to continue this trend until possibly leveling off in the early 1980s. The average size has dropped from 3.87 in 1960 to 3.51 in 1970, to an estimate of 2.98 in 1980. An average size of 2.83 is assumed for 2000 and afterward. The average size can have a significant effect on the total population. A more critical factor in the plans, however, is the number of dwelling units, which is more directly related to demands for public facilities and services than is population. The average household size decline in Fairfax County has two components. First, there is the nationwide decline in both family and household sizes, which is attributable to demographic factors. Secondly, as Fairfax County acquires a greater percentage of smaller multifamily housing units which are suitable for smaller households, the effect is to reduce the County's overall average household size.

This decline may be countered to some extent by economic factors. As the cost of living goes up and the standard of living goes down, more persons will either double up or choose not to form new households due to cost considerations. It is not known whether this counter-effect will merely reduce the rate of average household size decline in future years, or whether it could in fact reverse the decline.

Housing Units

Fairfax County housing inventory is changing in structural mix while expanding in magnitude. Amid a general long-term trend toward construction of multifamily units in the County, in which the proportion of multifamily units increased from 9.2 percent in 1960 to 29.1 percent as of January 1975, recent construction activity has shown a high proportion of single-family units. Whereas building permits were issued on an average of

4,000 multifamily units per year between 1970 and 1974, only 1,165 multifamily units were authorized during 1979. An analysis of the composition of the housing development pipeline as of January 1979, indicates a continuation of this trend toward construction of single-family units. As of January 1979, single-family detached units comprised nearly 57 percent of all units in the pipeline as compared to 16 percent for multifamily units. No major changes in the County's housing mix is forecasted between 1980 and 2000.

The forecasts used within the Plan were developed through the Council of Governments cooperative forecasting program. In developing the forecasts, historical trends from 1950 to 1978 were examined and extrapolated to the year 2000. Under this assumption, Fairfax County will continue to account for a
gradually increasing share of the total population in the region. Because the County's forecasts are developed from population forecasts for the entire region, should the regional forecasts change in coming years, the forecasts for Fairfax County may also have to be revised. Annual growth will continue to be monitored in order that forecasts can reflect changing short-term trends.

AREA I

Planning Area I, in general, is very representative of the entire County in its demographic character. Area I now contains nearly 30 percent of the County's population; it is one of the slower growing areas of the County. It is, on the whole, about average with respect to income and educational attainment.

The major difference between Area I and the remainder of the County is the high proportion of rented units in this area, causing it to have a very transient population.

Population and Density

The growth rate of Planning Area I has declined rapidly since 1960. During the decade 1960 to 1970, the area grew at a rate of six percent per year—about the same rate as the entire County. Since 1970, the growth rate of the County has nearly halved to about 3.1 percent per year. As shown in Table 1, the growth rate in Area I, however, has declined substantially more to slightly less than one percent per year.

Population and Average Annual Growth Rate

	Area I		County	
Year	Population	Ann. Rate	Population	Ann. Rate
1960	78,352		248,897	
1970	144,859	6.2	455,021	6.0
1980(proj)	155,100	0.7	626,600	3.1

But, this area has grown so rapidly in the past that, despite its slowed growth rate, it currently holds nearly 25 percent of the County's population. In fact, this area absorbed six percent of the County growth between 1970 and 1980. When one considers that this planning area represents less than nine percent of the County's total land area, the reduced growth rate assumes less importance. The growth rate is reduced at least in part because of the large base upon which it is calculated. Although Area I is one of the slower growing areas of the County, it is important to note that parts of it are still growing.

The growth in each of the planning districts which comprise Area I has varied significantly.

Population and Growth Rate

Planning District	1970 Population	1980 Population	Growth Rate
Annandale	63,000	69,900	11.0
Bailey's	30,000	33,700	12.3
Jefferson	41,000	41,200	0.5
Lincolnia	11,000	10,200	-7.3

While the Baileys and Annandale Planning Districts were growing at modest rates, the Jefferson Planning District was hardly increasing at all, and Lincolnia Planning District's population was actually declining. The number of housing units in these two districts was actually increasing; the population decline was caused by the reduced average number of persons in each unit.

The population density likewise varies substantially within this planning area, although the entire area is much more densely populated than the County as a whole.

Population Density, 1970, 1980

Planning District	Population Per Acre 1970	Population Per Acre 1980
Annandale	6.2	6.9
Bailey's	8.2	9.8
Jefferson	7.9	8.3
Lincolnia	6.4	5.9
Plng. Area I	7.0	7.6
Fairfax County	1.9	2.6

Household Size

The relationship between household size and marital status is more clear than is the relationship between owner/renter status and marital status. The median household size in Area I was 3.1 persons per household; this compares to a countywide median of 3.4. Thus, each 100 units generates eight percent fewer persons, or 26 fewer actual people, in Area I than in the County as a whole.

The household size varies quite a lot within the area.

Median Household Size

Planning District	Median Household Size, 1970
Annandale	3.6
Bailey's	2.5
Jefferson	3.1
Lincolnia	2.9
Area I	3.1

Baileys Planning District, with the highest proportion of singles, had the lowest median household size.

Racial Composition

Contrary to the declining general countywide trend, the black population held constant as a portion of the total population of Area I. In 1960, 2,400 black persons represented slightly more than three percent of the total Area I population. By 1970, 4,500 blacks lived in this area, representing the same proportion. This indicates net in-migration of black population to Area I over that period.

Age-Sex Distribution

Whereas the median age countywide remained constant from 1960 to 1970, in Area I the median age increased considerably. This was a result of changes in several age groups:

- A large decrease occurred in the proportion of persons less than ten years of age.
- In general, there were large increases in the proportions of persons aged 20 to 34 and 45 to 64.

Thus, the area was aging considerably, holding relatively fewer children in 1970 than it had in 1960.

The median age did not increase equally in each of the planning districts:

In the Baileys and Lincolnia Planning Districts, the median age increased very little; in the Annandale and Jefferson Planning Districts, however, it increased nearly three years for both men and women.

Median Age

	1960		1970	
Planning District	Male	Female	Male	Female
Annandale	23.6	25.8	27.3	28.8
Bailey's	25.8	26.1	26.1	27.0
Jefferson	22.8	25.8	25.8	26.0
Lincolnia	22.4	25.0	23.6	25.9
Area I Total	23.8	25.9	25.2	26.6

In this highly transient area (with a higher proportion of apartments than other areas of the County), the age distribution is not remaining constant. People moving out are being replaced, in general, by persons older than themselves.

In all planning districts of Area I except Baileys, the large gap between median ages of males and females was substantially reduced between 1960 and 1970. A closer examination of the age structures reveals that in 1960 the differential median age was largely due to a much larger proportion of women than of men aged 25 to 34. By 1970, the age structures of men and women throughout the area had become very similar.

Socioeconomic Characteristics

With a median family income of $15,700 in 1969, Area I appears to be representative of Fairfax County, which had the same median income level.

The income levels within the area, however, were divergent, with Baileys, Jefferson, and Lincolnia Planning Districts all having median incomes of about $14,500, and the Annandale Planning District showing a median of $17,500.

The same relationship held with educational levels in this area. In 1970, the adults of the former three planning districts had completed, on the average, 12.7 to 12.9 years of school. In the Annandale Planning District, however, the median number of years of school completed was 14.0.

AREA II

Area II grew at an average rate of 3.7 percent per year during the period 1970 to 1975. Contrary to the general County trend, the Fairfax Planning District, within the area, actually grew faster during that period than it did from 1960 to 1970. The area experienced net out-migration of blacks causing a significant decrease in the proportion black. Area II had a median family income about $2,000 above that of all of Fairfax County. According to the 1970 Census, average educational level of its adult citizens is more than one half of a year above the general County level.

Population and Density

Area II is the fastest growing urbanized area in the County. The growth rate did not decline in the 1970-1980 period (over the 1960-1970 period) as it did in the other highly urbanized areas, Area I and Area IV. The following table compares the growth rate and population of Area II to that of all of Fairfax County.

Population and Average Annual Growth Rate

	Area II		County	
Year	Pop.	Ann. Rate	Pop.	Ann. Rate
1960	59,000		248,897	
1970	112,000	6.4	455,021	6.0
1980 (proj.)	139,600	2.2	626,600	3.1

Area II is currently absorbing a smaller portion of the County's growth than it did during the 1960s. Between 1960 and 1970, one quarter of all the County's added population was located in Area II, whereas from 1970 to 1980 only 17 percent located in this area. At this point in time, Area II, which forms 17 percent of the total land area of

the County, holds 23 percent of the population.

Each of the planning districts has not grown at the same pace.

Population by Planning District

Planning District	1970 Population	1980 Population	Avg. Ann. 1970-1980 Growth Rate
Fairfax	23,000	31,800	3.3
McLean	47,000	58,400	2.2
Vienna	38,000	49,300	2.6

Fairfax Planning District has recently begun to grow very rapidly, while the McLean and Vienna Planning Districts have grown more slowly since 1970 than before.

Fairfax Planning District, however, has more room to grow, as shown by the differences in density among the planning districts.

Population Density

Planning District	Population Per Acre 1970	1980
Fairfax	1.9	2.7
McLean	2.8	3.5
Vienna	3.4	4.5
Planning Area II	2.7	3.5
Fairfax County	1.9	2.6

Household Size

There is some correlation between the distribution of adults according to marital status and the median household size in Area II. Fairfax Planning District, with its high proportion of married persons, also has a relatively high median household size.

On the whole, Area II has 30 percent more persons in each household than does the County.

Median Household Size, 1970

Planning District	Median Household Size
Fairfax	3.7
McLean	3.5
Vienna	3.3
Jefferson North	2.9
Planning Area II	3.5
Fairfax County	3.4

Racial Composition

The percent black in Fairfax County's population declined slightly more than one percentage point between 1960 and 1970. In Area II, though, it declined by more than 2 points, from 3.8 percent black in 1960 to 1.7 percent in 1970. The greatest decline was in the Fairfax Planning District, but all three districts experienced a decline. The absolute number of blacks in the area declined in a negligible amount, indicating net out-migration of blacks from this area during that period.

Age-Sex Distribution

As reflected in the median age, the age distribution of Area II has not differed greatly from that of the entire County. The median age of Area II increased slightly from 1960 to 1970, however, while the median age for the County remained constant.

Median Age

Planning District	1960 Male	1960 Female	1970 Male	1970 Female
Fairfax	25.5	25.9	25.1	23.3
McLean	23.0	25.7	26.6	28.2
Vienna	26.4	25.2	23.2	25.5
Jefferson North	21.7	27.0	25.6	25.0
Planning Area II	24.5	25.5	25.0	25.9

Although the median age of the area increased slightly, changes were more significant in the individual planning districts. In Fairfax Planning District, the median age of males decreased only slightly between 1960 and 1970, but that of females decreased by more than 2.5 years. The trend was in the opposite direction in the McLean Planning District, where the median ages of women and men increased from 2.5 to 3.6 years, respectively. In the Vienna Planning District the trend was inconclusive; the median age of men declined and that of women increased. In the Jefferson North Community Planning Sector, the median age of males increased by 3.9 years while that of females decreased by 2.0 years.

Marital Status

Planning Area II is fairly representative of the entire County in its proportion of married and single persons. A slightly higher proportion of men and a slightly smaller proportion of women are currently married than in the County as a whole.

Marital Distribution, 1970 (%)

Marital Status	Planning Area II Male	Planning Area II Female	Fairfax County Male	Fairfax County Female
Married	71.8	68.1	70.6	70.0
Single	25.8	23.5	26.9	21.7
Widowed or Divorced	2.4	8.4	2.5	8.2

The slightly smaller proportion of married women is partially explained by the relative excess of adult women living in this area. In the County as a whole there lived 99 adult men for every 100 adult women in 1970, but in Area II there were only 93 adult men for each 100 women. The excess of women were single, as shown in the accompanying table.

Jefferson North Community Planning Sector had a lower proportion of married persons, both male and female, than any of the other districts, as shown in the accompanying table. Fairfax Planning District, on the other hand, had a very high proportion of married persons.

Marital Status, 1970 (%)

Planning District	Male Single	Male Married	Female Single	Female Married
Fairfax	23.5	74.7	21.8	71.3
McLean	26.7	71.0	24.2	67.1
Vienna	25.9	71.2	23.1	67.3
Jefferson North	25.2	70.7	27.2	64.1
Planning Area II	25.8	71.8	23.5	68.1

Socioeconomic Characteristics

Area II is unique in its educational and income levels. With a median family income of $17,700 in 1970, its families earned about $2,000 per year more than families in the entire County. The difference was greatest in the McLean Planning District, where the median income was $18,800 per year. The median income of none of the districts in Area II fell as low as that of the County as a whole ($15,707); in the Fairfax Planning District the median was $17,200; in the Vienna Planning District, $16,800; and in the Jefferson North Community Planning Sector, $16,200.

The educational level, closely related to income level, of Area II was also higher than that of the entire County in 1970, but the difference is not as noticeable as with income. The median number of years of school completed by persons aged 25 and over was 13.5 in Area II, compared to 12.9 in the entire County. Within the area the median ranged from 12.8 years in Vienna to 13.9 years in McLean.

AREA III

Planning Area III is growing far more rapidly than the rest of the County; more rapidly, in fact, that the County as a whole has ever grown. The strains of growth and the resultant social change must be considered in any determination of the planned future for this area. Area III is a very affluent, well-educated area of the County, although there are significant differences between sections of the area.

The area also differs from the rest of the County in that it is a far more family-oriented section, with a very high proportion of married couples and relatively high fertility.

Population and Density

Although Planning Area III includes nearly 52 percent of the County's acreage, it now contains only about 26 percent of the County's population. Nevertheless, Area III is rapidly outpacing the remainder of the County in terms of population growth.

On January 1, 1980, the total population of Area III was 156,800 persons, more than triple the 1970 figure of 48,683. The growth of Area III compares to the County as follows:

Population and Average Annual Growth Rate

Year	Planning Area III Population	Planning Area III Growth Rate	Fairfax County Population	Fairfax County Growth Rate
1960	17,396		248,897	
1970	48,683	10.3	455,021	6.0
1980 (proj)	156,800	12.4	626,600	3.1

While Area III absorbed 15 percent of the County's growth between 1960 and 1970, 68 percent of County growth from 1970 to 1980 went to this part of the County. Area III clearly includes the current growth centers in Fairfax County. Although the western part of the County cannot be expected to sustain such a rapid growth, it will certainly experience continued high growth pressures.

Growth is not a constant throughout the area; rather, it is concentrated in particular areas. Some areas experienced virtually no increase in population and density, while other area increased sixfold. Two areas—one north of Lincoln-Lewis-Vannoy and one west of Lorton Reformatory—experienced negligible growth. On the other hand, Springfield and Reston were high growth centers. A point of caution is well taken here, for the increases in these areas are from very low density to just low density. Baileys Planning District, for example, had an overall density of 8.1 persons per acre in 1970, compared to 0.4 in all of Area III.

Within Area III are communities of varying size and of unique socioeconomic makeup, so an overall view of this area will not adequately demonstrate the diversity within it. These smaller areas, with their respective 1970 and 1975 populations are as follows:

Average Annual Growth Rate

Community	1970 Population	1975 Population	Avg. Annual Growth Rate
Centreville	13,051	20,400	9.4
Chantilly	8,553	11,500	6.3
Clifton	4,840	5,600	3.2
Great Falls	7,363	9,100	4.5
Herndon	4,620	9,600	15.3
Navy-Vale	3,991	7,800	14.1
Ponick	14,792	34,100	17.6
Reston	8,315	27,600	25.2

Household Size

Closely related to marital status is household size. With such a high proportion married, Area III generates a relatively large number of people for a small number of households. The median house-

hold size in Area III in 1970 was 3.7 persons per household, ten percent higher than the countywide average of 3.4 persons per household. A dwelling unit in this part of the County generates ten percent more persons, on the average, than one in other parts of the County.

Of course, this varies within the area from a low household size of 3.3 in Reston (with its relatively high number of apartments) to a high of 4.1 persons per household in the Pohick. The respective median household sizes of the communities are as follows:

Median Household Size, 1970	
Community	Median Household Size
Centreville	3.7
Chantilly	3.8
Clifton	3.8
Great Falls	3.7
Herndon	3.5
Navy-Vale	3.8
Pohick	4.1
Reston	3.3

Age of Housing Structures

With some exceptions, the development of Area III has been quite recent. Among all units built through the year 1970, the majority were built between 1965 and 1970. This is a new part of the County, as far as development is concerned; over half of the housing stock was created in the latter half of the decade of the 1960s. This rapid development caused many problems which are only now being health with—sprawl patterns of development, air and water pollution, and pressures for public facilities not previously needed.

Some parts of the area have more historical depth to them, however, as shown by the different times of development:

Community	Median Year Housing Structures Built
Centreville	1967
Chantilly	1965
Clifton	1953
Great Falls	1957
Herndon	1959
Navy-Vale	1958
Pohick	1966
Reston	1968

Clifton, where 50 percent of the housing stock was built before 1953, has certainly been subject to fewer of the pressures of growth than an area such as Reston or Centreville, which developed rapidly in the late 1960s. Data for the areas of Herndon and Great Falls are somewhat deceptive, for these two areas have experienced very rapid growth since 1970.

Racial Composition

Planning Area III had slightly fewer than 2,000 blacks living in it in 1970, forming 4 percent of the total population. This proportion was slightly higher than the countywide average of 2.6 percent (excluding Lorton and Fort Belvoir).

Whereas the total population of Area III was growing at an average annual rate of 10 percent from 1960 to 1970, the black population was growing at a much lower rate—1.4 percent per year. This rate was much lower than the growth rate of the entire County's black population in that period.

Not only have blacks moving into Fairfax County not settled in Area III, the black population is actually moving out of the area. Because natural increase would have caused a rate of increase of 2.3 percent per year, a rate of 1.4 percent indicates net out-migration. The black population added only about 250 persons over the decade.

The racial composition varied, however, from a low of 1.4 percent black in the Pohick area to a high of 8.6 percent in the community of Clifton as shown:

Community	Percent Black, 1970
Centreville	3.5
Chantilly	2.1
Clifton	8.6
Great Falls	3.5
Herndon	2.5
Navy-Vale	3.3
Pohick	1.4
Reston	5.7

Certain of these figures have changed greatly since the 1970 Census, so such data must be treated with caution. Nevertheless, the range of ethnic diversity demonstrates the varied history of these different areas.

Age-Sex Distribution

The overall ratio in Area III is .97; i.e., for every 100 females, there are 97 males in this area. A ratio of .97 is average because of different rates of mortality among males and females. The overall sex ratio is altered in small areas only by unusual phenomena, such a high rates of male or female in- or out-migration. Rural areas, for example, may experience relatively high out-migration by their female population causing a larger number of men than women to remain. On the other hand, if the area of concern is a rapidly growing one, it may have much larger number of men than of women moving in.

Although the sex ratio in all of Area III is typical, the differences between communities is enlightening:

Community	Sex Ratio, 1970
Centreville	1.02
Chantilly	1.02
Clifton	1.04
Great Falls	.96
Herndon	.96
Navy-Vale	1.01
Pohick	.99
Reston	.99

A higher sex ratio (indicating more men than women) indicates a low degree of urbanization of a particular community. In such a rapidly changing area, though, these relationships cannot be expected to continue; with development will come a more even distribution of the sexes.

On the whole, Area III is slightly younger than the remainder of the County, with a median age of 24 (compared to a median age of 25 countywide). The area has a fairly representative proportion of aged (persons 65 and over), comparable to the County average of 3 percent of the population. However, while the entire County has only about 33 percent of its population under age 15, in Area III about 37 percent of the population falls in that category.

It is apparent, then, that many fairly young couples with children have been moving to this area. This fact is supported by swelling school enrollment and high fertility in this part of the County. The preponderance of single-family homes on relatively large lots make this area an attractive one in which to raise a family.

The median ages within this area vary somewhat, with the highest being in the Great Falls portion; the lowest in the Pohick:

Community	Median Age	
	Male	Female
Centreville	25.4	25.3
Chantilly	25.2	25.4
Great Falls	28.7	29.0
Clifton	23.7	25.3
Herndon	24.1	24.7
Navy-Vale	24.0	25.2
Pohick	19.4	22.9
Reston	25.7	25.3

Median age is an indicator not only of the type of housing available, but also of the relative affluence of an area and the general character of a community. For example, the level of affluence of an area such as Great Falls makes it difficult for young couples to be able to afford to live there. As a result, a high median age with a more uniform population tends to settle in the area. Showing an opposite trend is the Pohick, with a very low median age. This represents a greater mix of all ages and social classes.

Marital Status

Planning Area III is characterized by a higher proportion of married persons than is true in general through Fairfax County. This fact would be expected from the previous discussion and, more importantly, from an examination of the types of housing available. The area, for the most part, being far from the urban core, does not yet have major concentrations of apartments or townhouses. Area III differs from the County in the following manner:

	Area III		Countywide	
	Male	Female	Male	Female
% Single	23.0	19.7	26.9	21.7
% Married	74.5	73.1	70.6	70.0

Within the area, the martial characteristics differ substantially:

	Male		Female	
Community	% Single	% Married	% Single	% Married
Centreville	18	80	14	81
Chantilly	19	79	16	80
Clifton	30	66	25	65
Great Falls	27	71	25	67
Herndon	24	72	20	68
Navy-Vale	29	68	22	69
Pohick	24	74	22	73
Reston	19	79	17	76

Centreville, Chantilly, and Reston have the highest proportion of married persons in their populations, with fully 15 percent more married there than in Clifton, for example.

Socioeconomic Characteristics

With a 1969 median income of $15,700 of families as well as persons not living with relatives, Area III can be said to be substantially more affluent than the County as a whole. Residents of the County had a median income level of $13,800 in that year.

However, the communities within this area were widely divergent in income levels, ranging from a low of $12,000 in Herndon to a high of $20,000 in Great Falls. These levels represent some of the widest differences in the County, all within the same planning area. These differences point out the most tangible evidence of the diversity within small areas of Fairfax County.

The median income levels of the major communities in Planning Area III were the following:

Community	Median Income, 1969
Centreville	$15,500
Chantilly	$16,200
Clifton	$13,600
Great Falls	$20,000
Herndon	$12,000
Navy-Vale	$14,800
Pohick	$17,000
Reston	$17,000

A similar variability appears with respect to educational attainment of the citizens in Area III. Whereas the median number of years of school completed in the entire area was 13.2 years, in actuality that varied from a low of 12.3 years in Clifton to a high of 16.1 in Reston.

Community	Median Number of Years of School Completed by Adults, 1970
Centreville	13.0
Chantilly	13.4
Clifton	12.3
Great Falls	14.3
Herndon	12.4
Navy-Vale	12.5
Pohick	14.3
Reston	16.1

It is interesting to note that education levels do not exactly match income levels; that is, although Great Falls had the highest income level, it did not reflect the highest average level of educational attainment. In this area, all communities have much higher levels of education and income than in the entire County, and, by a wide margin, than all of the United States.

The socioeconomic picture of Area III, then, is one of a general level of affluence and high education, but with pockets which vary substantially from the general pattern.

AREA IV

Most of the demographic characteristics of Area IV are substantially distorted by the existence of a very large institutional population in the Lower Potomac Planning District. When that district is omitted in data summaries of the area, Area IV emerges as being fairly representative of the entire County in such demographic characteristics as age, marital status, and household size.

The area is an older area of settlement, and thus is somewhat more densely populated than the rest of the County.

The major differences between this area and the remainder of the County arise from the stability of this area and its very slow rate of growth.

Population and Density

Area IV, as a whole, has been growing more slowly than the entire County for the two decades; in the period 1970 and 1980, that differential increased. While the County grew by 3.1 percent a year, Area IV grew at slightly less than 1 percent per year.

Population and Average Annual Growth Rate

Year	Planning Area IV Population	Planning Area IV Annual Growth Rate	Fairfax County Population	Fairfax County Annual Growth Rate
1960	92,000		248,897	
1970	153,000	5.1	455,021	6.0
1980 (proj)	162,400	0.6	626,600	3.1

However, the growth pattern within Area IV is quite variable. In the Lower Potomac Planning District, the population has actually decreased slightly since 1970. This reduction of persons has resulted from the countywide trend of declining household size. In the Lower Potomac Planning District, the smaller number of persons in each housing unit has not been counteracted (as it has in most other parts of the County) by an increased number of units.

On the other hand the Springfield, Mount Vernon and Rose Hill Planning Districts have grown nearly 1 percent a year since 1970.

Population

Planning District	Population 1970	Population 1980	Average Annual Growth Rate
Lower Potomac	22,000	17,400	-2.3
Mount Vernon	77,000	86,600	1.2
Rose Hill	22,000	24,200	1.0
Springfield	33,000	34,200	0.4

Household Size

Area IV is also representative of the entire County with respect to household size. Both had an average household size in occupied units of 3.5 persons per unit. In Area IV, household size declined the same amount in that period.

Household size, however, varies substantially within the area, with Mount Vernon Planning District having by far the smallest average size. This reflects the large percentage of rental units in this district.

Household Size by Planning District, 1970, 1974

Planning District	Average Household Size 1970	1974	Percent Change 1970-1974
Lower Potomac	3.7	3.2	-13.5
Mount Vernon	3.1	2.9	- 6.5
Rose Hill	3.7	3.5	- 5.4
Springfield	3.7	3.4	- 8.1

Racial Composition

Area IV had over 6,500 blacks living in it in 1970, forming 4 percent of the total population. This proportion is slightly higher than the countywide average of 3.5 percent black.

Whereas the total population of Area IV was growing at an average annual rate of 5 percent from 1960 to 1970, the black population was growing only 2 percent a year. Thus, while Area IV had a large black population, it grew more slowly than did the entire County's black population, which grew 3 percent a year in that period.

In fact, if the Lower Potomac Planning District were not considered, the black population grew at about 3 percent a year in the remaining districts of Area IV. This consideration is useful because of the distorting effect of the institutional populations of Fort Belvoir and Lorton in the Lower Potomac Planning District. It appears that blacks were moving into Area IV, although at a relatively slow rate.

Percent Black by Planning District

Planning District	Percent Black, 1970
Lower Potomac	18.2
Mount Vernon	3.5
Rose Hill	0.5
Springfield	0.2
Area IV, Total	4.4
Countywide	3.5

Age-Sex Distribution

The median age of Area IV increased slightly from 1960 to 1970.

In the Lower Potomac and Springfield Planning Districts, the median age actually decreased slightly. Although both these district had a smaller proportion of very young children in 1970 than in 1960, the lower median age was caused by relative increases in young persons—those aged 15 to 24 in the Lower Potomac Planning District and 10 to 19 in the Springfield Planning District.

The large differential between the median ages of men and women did not change much in this period, even increasing slightly in the Springfield Planning District.

Median Age by Planning District, 1960, 1970

Planning District	Median Age 1960 Male	1960 Female	1970 Male	1970 Female
Lower Potomac	23.2	22.3	22.4	21.1
Mount Vernon	24.1	25.3	25.3	25.4
Rose Hill	22.1	25.1	22.9	25.4
Springfield	23.0	25.2	22.5	25.1
Area IV, Total	23.3	24.8	23.8	25.0
Countywide	25		25	

Marital Status

The distribution of adults according to their marital status in Area IV is significantly distorted by the large proportion of single males in the Lower Potomac Planning District. The data in the following table show the proportion of adults in each marital category; figures in parentheses leave out the Lower Potomac Planning District.

Marital Distribution, 1970 (Percent)

Marital Status	Planning Area IV Male	Planning Area IV Female	Fairfax County Male	Fairfax County Female
Single	30.9 (24.6)	21.1	26.9 (24.6)	21.7
Married	66.5 (72.9)	70.9	70.6 (72.9)	70.0
Widowed or Divorced	2.6 (2.5)	8.0	2.5 (2.5)	8.3

There is only slight variation in marital status within this planning area, with the exception of the one district (Lower Potomac). On the whole, the single and married persons are fairly evenly distributed in this area.

Marital Status by Planning District, 1970

Planning District	Percent Married Male	Married Female	Single Male	Single Female
Lower Potomac	44.2	78.9	52.7	18.2
Mount Vernon	72.6	70.0	24.6	21.4
Rose Hill	72.2	72.4	25.6	21.2
Springfield	74.2	72.4	24.2	21.2

Socioeconomic Characteristics

With a median family income of $14,400 in 1969, Area IV fell significantly below the countywide level of $15,707. The income levels within the area were dissimilar: only Springfield Planning District had a higher median income level than the County as a whole.

Median Family Income and Median Years of School Completed by Planning District

Planning District	Median Family Income, 1969	Median Years of School Completed, 1979
Lower Potomac	$ 8,800	12.3
Mount Vernon	$14,300	12.8
Rose Hill	$14,100	12.5
Springfield	$16,800	13.3

The same relationship held with educational levels as with income levels. Adults living in the Springfield Planning District had, on the average, completed the most years of school, and those in the Lower Potomac Planning District had completed the fewest.

ECONOMIC DEVELOPMENT AND EMPLOYMENT

FAIRFAX COUNTY AND THE REGIONAL ECONOMY

Employment growth in Fairfax County is historically dependent on the Washington metropolitan area economy. Unlike most metropolitan areas, the primary export industry of the Washington economy is services provided by government or by the private sector in conjunction with government programs. The primary function of the goods-producing sectors of the economy is to serve the population and industry within the local market area.

These unique characteristics have resulted in a remarkable economic stability for the Washington area and for Fairfax County. During periods of a strong national economy and during periods of recession, unemployment rates of the region and of the County are consistently below those of the nation. For example, in 1979, while the national unemployment rate was 5.8 percent, the rates for the Washington SMSA and Fairfax County were 4.5 percent and 3.0 percent respectively. In 1982 the County had an unemployment rate of 3.8 percent compared with 5.8 percent for the SMSA and 9.7 percent for the nation.

FEDERAL CIVILIAN EMPLOYMENT SHARE OF TOTAL NON-AGRICULTURAL CIVILIAN EMPLOYMENT IN THE WASHINGTON SMSA—1950—1981[1]

	Non-Agricultural Civilian Employment	Federal Civilian Employment	Federal Civilian Share
	(thousands)	(thousands)	(percent)
1950	592	227	38
1955	652	230	35
1960	746	236	32
1965	935	277	30
1970	1,185	322	27
1975	1,337	347	26
1980	1,593	366	23
1981	1,603	360	22

[1] U.S. Department of Labor, Bureau of Labor Statistics

Despite the continuing importance of federal government activity in the area during the post-World War II period, federal civilian employment has not risen as rapidly as other sectors of the economy.

The federal employment share of civilian employment has declined from 38 percent in 1950 to 22 percent in 1981. The accompanying non-federal employment increased share is due largely to growth in two employment sectors: 1) services; and 2) trade (wholesale and retail). Local government employment has also provided a significant share of total employment growth during the past 30 years.

Expansion of these sectors is largely due to population growth and urbanization which together produce greater demands and a wider selection of trades and services, as well as more state and local government activity. Furthermore, increases in federally-funded research and development have generated more private service activity in the area.

Since 1950, employment in wholesale and retail trade has declined in the District while the suburban share of the regional total has increased rapidly from 22 percent in 1950 (25,000) workers 79 percent in 1981 (245,000 workers). Part of this phenomenon may be traced to the decline in the importance of central business district retail activity and the increase in importance of the suburban regional mall. Employment in state and local governments and in the service industries has been increasing at slower rates in the District than in the suburbs, while at the same time, the suburban share of the SMSA in these sectors has increased rapidly. Other sectors of employment are remaining relatively constant in the District while growing steadily in the suburbs.

In effect, the suburbs are becoming urbanized. The increasing at-place employment (e.g., employment opportunities available within the County) together with multifamily dwellings are creating higher densities, new patterns of land use and greater demands for services. Fairfax County has been playing a major part in these trends.

EMPLOYMENT TRENDS IN FAIRFAX COUNTY

Following the general suburban pattern, Fairfax County has been increasing its share of regional employment. Based on data from the Virginia Employment Commission, Fairfax County had a total at-place employment of some 40,000 in 1960, representing 5.4 percent of the region. By 1970, the County's employment increased to over 97,000 for 8.2 percent of the regional total, and in 1980 its employment of 193,000 represented 11.3 percent of the region.

It is interesting to compare Fairfax County's relationship in this region with that of neighboring Montgomery County, Maryland. There are a great many similarities, particularly regarding the socioeconomic characteristics of their populations, and the topography and quality of their land. Although Montgomery County appears to be at a more advanced stage of development, perhaps its more recent trends can provide an indication of Fairfax County's future. In 1960, Montgomery County had at-place employment of 87,000, a level not approached by Fairfax County until 1968. Montgomery County's 1960 share of regional employment was 10.5 percent or almost double that of Fairfax County. By 1980, Montgomery County employment was 302,000 or 17.6 percent of the region, compared to Fairfax's 11.2 percent, indicating that Fairfax County has been closing the gap.

A major portion of Montgomery County's employment growth since the early 1960's took place in the I-270 corridor. This area was targeted for economic development by county planners, and successfully marketed by the private sector.

Fairfax County is in an excellent position to attract increasing shares of regional growth in the future, perhaps approaching or exceeding those of Montgomery County. The County has a greater variety of potential industrial areas and therefore can offer greater site choices. In addition, Fairfax County's key industrial areas that are still open for development are closer to the regional core than those which are still available in Montgomery County, most of which are along the outermost portions of I-270.

ECONOMIC GROWTH

One of the basic goals stated by the Board of Supervisors is that Fairfax County should be willing and able to accept its fair share of the Washington metropolitan regional growth. In order to accomplish this goal, the County must encourage quality growth that offers financial stability. From a financial viewpoint, the County must balance future land uses through the planning process to create a stable tax revenue flow that can pay for the quality of services desired. Future development of business and industry will be a major determinant of the financial stability of the County.

There are special advantages to encouraging growth in business and industry in Fairfax County:

1. Creation of a larger tax base with generally lower expenditures required by such uses produces surplus revenues which can pay for services required by County residents.
2. Employment opportunities are generated in the County enabling more County residents

EMPLOYMENT TRENDS OF SELECTED ECONOMIC SECTORS IN THE WASHINGTON D.C. SMSA, DISTRICT OF COLUMBIA AND SUBURBS, 1950-1981
(in Thousands of Persons)

	Year	Total Civilian Employment	Construction	Manufacturing	Transp. & Public Utilities	Wholesale and Retail	Finance, Insurance & Real Estate	Services	Federal Civilian Employment
Washington SMSA	1950	592	40	26	40	115	30	82	227
	1960	746	51	36	44	147	40	137	236
	1970	1,185	70	46	61	229	67	255	322
	1975	1,337	73	49	64	254	76	310	347
	1980	1,593	82	58	71	302	90	430	366
	1981	1,603	76	59	72	309	92	447	360
District of Columbia	1950	434	22	19	30	90	24	66	164
	1960	467	21	20	28	84	28	93	168
	1970	560	20	19	31	80	33	136	196
1975	1975	576	20	15	29	65	33	145	224
	1980	616	13	15	26	64	34	182	229
	1981	612	12	15	26	64	34	187	225
Suburbs	1950	158	18	7	10	25	6	16	63
	1960	279	30	16	16	63	12	44	68
	1970	625	50	27	30	149	34	119	126
	1975	761	53	34	35	189	43	165	123
	1980	977	69	43	45	238	56	248	137
	1981	991	64	44	46	245	58	260	135
Suburban Share of SMSA (Percent)	1950	27	45	27	25	22	20	20	28
	1960	37	59	44	36	43	30	32	29
	1970	53	71	59	49	65	51	47	39
	1975	57	73	69	55	74	57	53	35
	1980	61	84	74	63	79	62	58	37
	1981	62	84	75	64	79	63	58	38

SOURCE: Fairfax County Office of Comprehensive Planning, based on data from U.S. Department of Labor, Bureau of Labor Statistics: Employment and Earnings, States and Areas (selected issues).

to work within the County. (New population will move into the County as the regional economy grows, so Fairfax should try to capture as much of the future economic growth as possible.)

3. Properly located business and industrial centers may help produce a more efficient transportation system and less harmful commuting patterns.

4. Less congestion and more energy savings can be encouraged by locating new employment centers in Fairfax County where the labor force resides.

5. Economic development along major corridors leading into the metropolitan core such as the I-95 corridor can provide employment opportunities for County residents and can also intercept the labor force moving into the core from outlying counties.

In the summer of 1983 Fairfax County, in cooperation with other member jurisdictions in the Metropolitan Washington Council of Governments, completed Round III of the COG Cooperative Forecasting Program. The program resulted in new forecasts of population, households and employment for the region and its component counties and cities. The new forecasts for Fairfax County, which were presented to the Board of Supervisors in July of 1983, are as follows:

1. The population in Fairfax County is expected to increase from 596,000 in 1980 to 741,900 in the year 2000, an increase of 24.3 percent. By 2010, the population is forecasted to exceed 765,000.

2. Households are expected to increase more rapidly than population—over 46 percent—from 205,200 in 1980 to 300,800 in the year 2000. Between 2000 and 2010 an additional 31,500 households are expected in Fairfax County, for a total of 332,300 at the end of the forecast period. The forecasts also show that average household size will decline from 2.88 in 1980 to 2.43 in 2000 and 2.27 by 2010. This trend reflects several factors including lower birth rates resulting in smaller families, and a continuing tendency for young adults and the elderly to maintain one person households.

3. As is shown in the accompanying tables, at place employment within Fairfax County could range from a low of 328,000 to a medium of 386,000 and a high of almost 444,000 by the year 2010. These forecasts compare to an estimated 193,000 people working in the County in 1980, and represent compound annual growth rates of 1.8 percent, 2.3 percent, and 2.8 percent respectively.

It is important to emphasize that the employment projections represent the capture of alternative but reasonable shares of regional economic development.

The economic impacts of such development should not go untested. Therefore, the County will conduct an analysis on all major development proposals to assess the impact of such proposals. It should be kept in mind, also, that along with cost/revenue analysis, there should be environmental, transportation, and other forms of impact analysis, and the findings may not always agree.

FAIRFAX COUNTY EMPLOYMENT FORECASTS BY SECTOR LOW
Round III Cooperative Forecasting

	1970	1975	1980	1985	1990	1995	2000	2005	2010
Agriculture	679	621	600	600	600	600	600	600	600
Contract Const.	7,684	9,286	17,268	10,000	10,000	10,000	10,000	10,000	10,000
Transp. & Util.	1,616	4,496	7,734	12,600	15,300	16,000	16,900	17,500	18,100
Manufacturing	3,815	6,096	8,702	10,700	12,700	12,700	12,700	12,600	12,400
Trade	**18,877**	**32,450**	**46,153**	**57,400**	**62,800**	**64,000**	**65,800**	**66,600**	**67,300**
Retail	16,766	27,500	41,110	48,500	53,600	54,500	55,900	50,500	57,000
Wholesale	2,111	4,950	7,043	8,900	9,200	9,500	9,900	10,100	10,300
Finance, Ins. & Real Est.	5,002	6,402	13,097	16,200	20,100	23,800	24,300	24,700	24,900
Services	**15,336**	**28,581**	**52,387**	**70,600**	**91,500**	**112,600**	**124,100**	**131,300**	**142,300**
Personal	1,424	1,912	2,946	3,600	3,700	3,700	3,800	3,900	3,900
Hotel/Motel	389	983	1,354	1,700	2,000	2,300	2,400	2,500	2,700
Auto. & Misc. Repair	704	1,235	1,623	1,800	1,900	1,900	2,000	2,000	2,000
Recreation	600	1,128	1,904	2,300	2,700	2,700	2,000	2,800	2,800
Business & Professional	12,219	23,323	44,560	61,200	81,200	102,000	113,100	120,000	130,900
Government	**29,637**	**37,302**	**43,833**	**45,800**	**45,300**	**45,100**	**43,500**	**43,200**	**42,400**
Federal	12,789	14,034	14,832	14,800	14,800	14,800	14,800	14,800	14,800
State	1,404	2,823	4,383	5,800	6,000	6,100	6,300	6,400	6,400
Local	15,444	20,445	24,618	25,200	24,500	24,200	22,400	22,000	21,200
Other Non.-Manuf.	386	545	1,007	1,100	1,300	1,400	1,500	1,600	1,600
TOTAL	81,425	125,739	192,781	225,000	259,600	286,200	299,400	308,100	319,600

FAIRFAX COUNTY EMPLOYMENT FORECASTS BY SECTOR MEDIUM
Round III Cooperative Forecasting

	1970	1975	1980	1985	1990	1995	2000	2005	2010
Agriculture	679	621	600	600	600	600	600	600	600
Contract Const.	7,684	9,286	17,268	11,500	11,500	11,500	11,500	11,500	11,500
Transp. & Util.	1,616	4,496	7,734	12,900	16,200	17,300	18,400	19,500	20,600
Manufacturing	3,815	6,096	8,702	10,800	13,300	14,800	16,500	16,900	17,400
Trade	**18,777**	**32,450**	**46,153**	**57,700**	**64,300**	**66,900**	**69,800**	**71,400**	**71,200**
Retail	16,766	27,500	41,110	48,700	54,900	56,900	59,400	60,700	61,200
Wholesale	2,111	4,950	7,043	9,000	9,400	10,000	10,400	10,700	11,000
Finance, Ins. & Real Est.	5,002	6,402	13,097	16,200	20,600	24,900	29,700	30,300	30,600
Services	**15,336**	**28,581**	**52,387**	**72,700**	**97,100**	**126,000**	**151,700**	**165,400**	**179,400**
Personal	1,424	1,912	2,946	3,600	3,800	3,900	4,100	4,200	4,200
Hotel/Motel	389	983	1,354	1,700	2,100	2,500	2,900	3,000	3,200
Auto. & Misc. Repair	704	1,235	1,623	1,800	1,900	2,000	2,100	2,100	2,100
Recreation	600	1,128	1,904	2,300	2,700	2,800	3,000	3,000	3,100
Business & Professional	12,219	23,323	44,560	63,300	86,600	114,800	139,600	153,100	166,800
Government	**29,637**	**37,302**	**43,833**	**45,900**	**46,600**	**47,500**	**47,500**	**46,600**	**46,200**
Federal	12,798	14,034	14,832	14,800	14,800	14,800	14,800	15,200	15,400
State	1,404	2,823	4,383	5,800	6,200	6,400	6,700	6,800	6,900
Local	15,444	20,445	24,618	25,300	25,600	26,300	26,000	24,600	23,900
Other Non.-Manuf.	386	545	1,007	1,100	1,400	1,600	1,800	1,800	1,900
TOTAL	81,425	125,739	192,781	229,400	271,600	311,100	347,500	364,000	379,400

Employment Location Criteria

Decisionmakers utilize several criteria when looking for the best location for their particular needs. Those most often considered, are:

1. The use of existing economic development as a catalyst for attracting future economic development; i.e., existing centers of activity can promote both expansion within and new centers nearby.

2. The availability of transportation access and attractiveness; i.e., proximity to the District of Columbia from future Metro sites and major ground transportation corridors, as well as proximity to Dulles and National Airports and the Southern or RF&P Railroads.

3. The location of labor force and product markets; i.e., business and industry require locations which are accessible to their source of labor and to consumers of their products.

4. The locations of local-serving commercial activity (i.e., food and drug stores) are more directly related to the population which they serve. Therefore, distance and travel time to these types of economic activity are of great importance. Fairfax County must consider these criteria when planning locations to accommodate future economic development.

Potential Economic Growth

Fairfax County enjoys several features which enable it to satisfy the locational criteria identified above. (1) Its position in the metropolitan area which contains the seat of the United States Federal Government is a significant feature which sets this region apart from all others. This can be of particular importance to those industries or associations which must maintain contacts with the government. (2) Within the region, Fairfax has Dulles Airport, a major international airport which is being promoted as a catalyst for economic activity in its immediate vicinity as well as along major approaching highways. (3) Major corridors connecting Washington to points south and west go through Fairfax County. Routes 50, 7, 29-211 and more importantly I-95 and I-66 are routes of major ground transportation to which business and industry are attracted. These routes not only enhance the ability to deliver goods and services, but they also enhance the local and regional prox-

FAIRFAX COUNTY EMPLOYMENT FORECASTS BY SECTOR HIGH
Round III Cooperative Forecasting

	1970	1975	1980	1985	1990	1995	2000	2005	2010
Agriculture	679	621	600	600	600	600	600	600	600
Contract Const.	7,684	9,286	17,268	13,000	13,000	13,000	13,000	13,000	13,000
Transp. & Util.	1,616	4,496	7,734	13,200	17,200	18,500	20,000	21,500	23,000
Manufacturing	3,815	6,096	8,702	10,900	13,900	16,100	20,300	21,300	22,500
Trade	**18,877**	**32,450**	**48,153**	**58,400**	**65,900**	**70,200**	**73,600**	**76,500**	**76,800**
Retail	16,766	27,500	41,100	49,400	56,200	59,800	62,600	65,200	65,100
Wholesale	2,111	4,950	7,043	9,000	9,700	10,400	11,000	11,300	11,700
Finance, Ins. & Real Est.	5,002	6,402	13,097	16,400	21,100	26,200	31,300	36,600	36,600
Services	**15,336**	**25,581**	**52,387**	**73,700**	**102,700**	**139,500**	**179,400**	**199,500**	**216,400**
Personal	1,442	1,912	2,946	3,600	3,900	4,100	4,300	4,500	4,500
Hotel/Motel	398	983	1,354	1,700	2,200	2,700	3,200	3,600	3,800
Auto. & Misc. Repair	704	1,235	1,623	1,800	2,000	2,100	2,200	2,300	2,300
Recreation	600	1,128	1,904	2,300	2,800	3,000	3,100	3,300	3,300
Business & Professional	12,219	23,323	44,560	64,300	91,800	127,600	166,600	185,800	202,500
Government	**29,637**	**37,302**	**43,833**	**46,200**	**48,200**	**50,200**	**50,400**	**50,300**	**49,700**
Federal	12,798	14,034	14,832	14,800	14,800	14,800	14,800	15,600	16,000
State	1,404	2,823	4,383	5,900	6,300	6,700	7,000	7,300	7,300
Local	15,444	20,445	24,618	25,500	27,100	28,700	28,600	27,400	26,400
Other Non.-Manuf.	386	545	1,007	1,200	1,400	1,700	2,000	2,100	2,200
TOTAL	81,425	125,739	192,781	233,600	284,000	336,000	390,600	421,400	440,800

imity of employment locations to residences of the labor force. (4) Fairfax will have six stations in the regional rapid rail transit system. These stations offer locational opportunities for those industries to which metro-rail linkages may be an advantage. (5) Fairfax County provides one of the most highly skilled and educated professional labor forces in the U. S. This labor force provides a continuing attraction to the types of High-tech industries which have traditionally located in the Washington Metropolitan area.

Although these attractive features exist, the County should remain cognizant of the potential impediments to new development. At times, in the past, centers for economic development have lacked major public facilities needed to encourage and facilitate economic growth. The most dominant impediment has been transportation congestion at prime employment locations. Transportation problems could weaken the market and discourage expansion, or even completion of employment centers. Just as the County should remain cognizant of its attractive features, it should also be aware of potential detractions.

In the private sector, business and industry often lack flexibility in their location evaluations. For example, in the past, dry cleaning trucks picked up and delivered to families in the surrounding neighborhood, but today, each family does its own pick-up and delivery; most businesses do not give preference to the four-rider commuter in their employee parking lots, and gas stations normally select intersection locations when shopping centers locations may be preferable to the County. These examples illustrate inflexibilities of business and industry which must be changed in the future. Marketing and commuting patterns of business and industry need to be changed to match changing technologies in land use planning and transportation; i.e., mass transit.

Fairfax County also lacks an adequate cross section of labor force to meet the total requirements of business and industry. Secondary skills and lower income labor are needed to match the highly skilled labor force that already exists in the County. The lack of housing for lower-income labor forces in the County forces them to locate outside the County, which in turn places heavier impacts on ground transportation, increases pollution, etc. In addition, minimum attention to vocational training in manual skills adds to the problem.

Often in considering economic growth, other land uses are given higher priority over business and industry. When such trade-offs are considered, locational requirements for nonresidential development are more severe than for residential development, in the sense that centralized locations are required to conduct business. A dispersed labor force must have adequate access to its place of work; therefore, business and industry require sites with good access to roads and major transportation corridors.

COMMERCIAL ACTIVITY

Commercial activity is generally defined as retail and service industries and office activities which serve a local market. This includes neighborhood, community, and regional shopping centers; free-standing and highway-oriented commercial space; and professional, insurance, bank, and real estate offices.

For concept planning in Fairfax County, commercial space has been divided into two basic categories: (1) that space which is region-serving, and (2) that space which is local-serving. Region-serving commercial space includes the major regional shopping malls such as Springfield, Tysons Corner, and Fair Oaks. Free-standing commercial space includes single-store operations such as lumber yards, auto dealerships and home improvement centers. Local-serving commercial space includes food and drug stores and beauty and barber shops, typically found in neighborhood and community shopping centers.

The data in the following table reveals that there are about 2,200 acres of vacant commercially zoned land in Fairfax County. This land is approximately evenly divided between that which is zoned for office use and that which can accommodate retail facilities. In some instances, retail zoned land may not be suitably located to adequately fulfill future retail service needs of new population growth. Therefore, new sites may have to be zoned in more marketable locations. Future planning efforts must consider alternative uses for existing zoning which may not be viable for retail development.

This may suggest a need for rezoning of nonessential commercial strips to other uses. Revitalization of older existing commercial centers may also free up underutilized commercial land. Alternative uses for excess vacant or underutilized commercial properties might include office infill of retail centers and/or medium-to-high intensity residential. Such uses would tend to maintain property values and improve the viability of the existing retail commercial facilities.

The following table shows the relationship of local-serving commercial retail land use to population.

SUMMARY OF COMMERCIALLY ZONED LAND IN USE AND VACANT IN FAIRFAX COUNTY

	Existing Land Use			Vacant Zoned Commercial		
Planning District	Office	General Commercial	Total	Office	General Commercial	Total
Annandale	111	178	289	26	12	38
Baileys	74	207	281	26	23	49
Jefferson	207	124	331	398	26	424
Lincolnia	14	98	112	14	19	33
Area I TOTAL	406	607	1,013	464	80	544
Fairfax	124	189	313	80	64	144
McLean	1,336	260	1,596	64	156	220
Vienna	221	271	492	129	19	148
Area II TOTAL	1,681	720	2,401	273	239	512
Bull Run	41	155	196	64	192	256
Pohick	44	170	214	12	60	72
Potomac	390	322	712	220	154	374
Area III TOTAL	475	647	1,122	296	406	702
Lower Potomac	4	45	49	26	63	89
Mount Vernon	74	361	435	14	141	155
Rose Hill	28	30	58	52	48	100
Springfield	51	304	355	15	65	80
Area IV TOTAL	157	740	897	107	317	424
TOTAL	2,719	2,714	5,433	1,140	1,042	2,182

SOURCE: Fairfax County Office of Research and Statistics: *Standard Reports* 1983.

LOCAL SERVING RETAIL COMMERCIAL LAND USE AND RELATIONSHIPS TO POPULATION BEING SERVED AS OF JANUARY, 1983

Planning District	Local Serving Retail Commercial Land Use (acres)	Population (thousands)	Acres per (1,000 persons)
Annandale	76	65.5	1.2
Baileys	63	30.6	2.0
Jefferson	65	35.0	1.9
Lincolnia	32	9.4	3.4
Area I Total	235	140.5	1.7
Fairfax	4	32.7	0.1
McLean	53	55.9	0.9
Vienna	100	48.3	2.1
Area II Total	157	136.9	1.1
Bull Run	85	25.4	3.3
Pohick	120	88.2	1.4
Potomac	116	82.3	1.4
Area III Total	321	195.9	1.6
Lower Potomac	3	18.4	0.2
Mount Vernon	177	81.3	2.2
Rose Hill	14	23.0	0.6
Springfield	87	34.5	2.5
Area IV Total	281	157.2	1.8
County Total	994	630.5	1.6

NOTE: The disparity in these figures from those used previously is due to exclusion from this table of data on region-serving, highway-oriented, and office commercial uses. This table represents only local-serving shopping centers and stores.

Demand Projections of Local-serving Commercial Activity

Commercial space required for local-serving needs is expected to increase in Fairfax County in direct proportion to population growth. The demand is generally composed of retail and service facilities in neighborhood and community centers. Space requirements can expect to be in the range of 15 to 20 sq. ft. of gross leasable area per person, developed at floor area ratios in the 0.25 to 0.3 range.

Area I

Area I is located on the borders of Falls Church, Arlington County, and Alexandria. It is reasonable to assume that shopping facilities in Area I also serve nearby residents in those jurisdictions, and that County residents do some of their shopping in adjoining non-County areas. The ratio of local commercial land use of 1.7 acres per thousand population is in line with the Countywide average of 1.6 acres per thousand, indicating self-sufficiency of local commercial services.

In the future, the commercial demand from other jurisdictions is not expected to grow and it can be assumed that it will stabilize at the existing level. Since most of the future growth in Area I is not located in close proximity to the built-up commercial areas near the other jurisdictions, it is recommended that the commercial establishments be drawn into more compact shopping areas, and some vacant commercially zoned land, which is not needed for that use, be considered for other uses.

It may be desirable to instigate revitalization efforts in certain older commercial areas of Area I. This could be undertaken using the mechanism of special improvement districts, or other mechanisms which will be under study by the County. Revitalization programs would encourage improvement of existing public and private properties and facilities and encourage assembly and use of vacant or underutilized sites.

In existing commercial districts of Area I, new business, serving the needs of a changing population, would help revitalization. However, expansion of commercial zoning should be discouraged. It may be desirable to downzone some excess strip commercial areas to medium-density residential uses while allowing variances for current uses. This would not create a taking of vested interests, but would prevent expansion or rebuilding of any commercial structures. Medium-density residential development should be used to provide a transition zone between commercial and single-family residential areas.

Area II

The ratio of commercially utilized land to population in Area II is 1.1 acres per thousand, approximately 30 percent lower than the Countywide ratio of 1.6. The Area II ratio reflects 157 acres of land serving a 1983 population of 136,900.

The individual district ratios are even more disparate. The Vienna Planning District, for example, has a ratio of 2.0 because of the extensive strip commercial on Route 123 which now serves Vienna, Fairfax, and many Upper Potomac Planning District residents. Other districts have substantially lower ratios of commercial acreage to population.

The Fairfax Planning District has a 0.1 ratio, which is far below the County average. However, the present needs of the residents are adequately served by facilities in the City of Fairfax. The McLean Planning District, which has a ratio of 0.9, cannot be explained as easily.

Area III

The existing ratio of commercially utilized land to population in Area III is 1.6 per thousand, the same as the Countywide average. There are 321 acres of local-serving commercial serving a population of 195,900. Area III is where the overwhelming majority of future County population growth will occur. Therefore, it will be necessary to identify the best locations for new commercial development to serve the expanding market. Care should be taken to avoid strip development along the major roads in Area III.

Area IV

The existing ratio in Area IV of commercially utilized land to population is slightly higher than the County as a whole. There are 281 acres of local-serving commercial and a population of 157,200, which yields a ratio of 1.8 acres per thousand persons. Within Area IV, Rose Hill and Lower Potomac Districts have ratios of 0.6 and 0.2 respectively, while Mount Vernon and Springfield have ratios of 2.2 and 2.5 respectively. This disparity may be partially explained by the general character and trend of development in these districts. The Lower Potomac and parts of Rose Hill Planning Districts are less densely developed and more rural in character. The Mount Vernon and Springfield Planning Districts are more densely developed and have a considerable amount of commercial strip development.

As Lower Potomac and Rose Hill Planning Districts develop residentially, there will be greater pressures to develop commercial space because of the smaller amount of commercial space that now exists. Additionally, the increased congestion of roads caused by growth will change market areas and increase demand for commercial space in the growth areas. Perhaps the greatest challenge in commercial planning in Area IV, however, is in revitalizing the commercial strip developments along the Route 1 corridor and in the Springfield areas. County policy should encourage improvement in these areas, including possible rezoning of excess vacant or underutilized land to accommodate other high density office or residential uses. Such development could reinforce existing markets and improve the viability of existing centers.

Concentration, intensification and renewal/refurbishing of existing commercial strips and centers should also free up additional underutilized commercial land. This suggests a need for rezoning of nonessential commercial parcels to other uses. Some zoning to commercial districts may take place because the existing commercially zoned vacant parcels are not adequately located to serve future growth.

BASIC EMPLOYMENT

Basic employment is comprised of jobs in industries which serve regional, national and international markets. In the Washington area the growth of basic employment is closely associated with trends in federal government employment, as well as changes and locational shifts of industry in the U.S. as a whole. Virtually all basic employment activities in Fairfax County are accommodated on land zoned for office and industrial uses.

Construction companies and utilities often have main offices and equipment storage sites in industrially zoned areas, although, in these industries, on-site employment is limited. Wholesale and various services generally require storage areas for products, usually in single-story buildings with truck bays. Research and development activities including pure research as well as some limited design and manufacturing of prototype products, also utilize industrial land. To a large extent, these activities locate in industrial areas because of stringent zoning laws which prohibit their operation elsewhere. However, in Fairfax County, experience shows that significant amounts of office development occur on industrially zoned land.

Employment categories which tend to locate in major office building concentrations include finance, insurance, and real estate; federal and state government; professional offices; and nonprofit and trade associations. However, the categories other than government include national and regional offices as well as local-oriented business. Many of the businesses serving the local population will locate in the major office concentrations while others will locate in or near shopping areas closer to the residential areas.

Each of these types of economic activity makes location choices contingent upon being able to serve a geographical area much broader than Fairfax County—mainly locations that have major transportation networks and access to the remainder of the metropolitan area and the Eastern United States. Firms in these categories have tended to cluster in a few major areas because they provide the desired locational factors.

The following table summarizes the status of zoned industrial land in Fairfax County, distributed among the County's four planning areas and their component planning districts. According to the data there are almost 9,800 acres of land zoned for industrial use in the County. Of this total, about 4,800 acres or 49 percent are in use. It should be pointed out, that in some areas of the County, vacant zoned land exists which may not be competitive in the market place due to constraints such as poor accessibility, poor topography, and other reasons.

Importance of Highway Accessibility

The pattern of industrial development in Fairfax County, the Washington area, and elsewhere in the United States demonstrates the importance of highway accessibility to industrial site selection.

Industry in Fairfax County has concentrated along I-495. The developed sites are almost exclusively near interchanges with other major highways. Further development is taking place at Reston, along the Dulles Access Road, because of its proximity to the Dulles Airport. More recently development has begun to occur along the I-66 corridor in the newly planned Fairfax Center area. The early activity at Reston is also partly due to a dynamic promotion effort on the part of the developer, tied with a unique national reputation enjoyed by Reston during its earlier years.

In other parts of the Washington metropolitan area, locations along major highways have been important for industrial development; in Montgomery County, the main catalyst for industrial growth has been I-270 and in Prince Georges County, growth has occurred along I-495 and the John Hanson Highway. The Boston metropolitan area has experienced phenomenal industrial growth, and most of it has been located along the Boston Beltway, I-128.

Excellent highway location is usually greatly enhanced by airport vicinity location. Virtually all industries around major airports in the United States such as Chicago, Detroit and Atlanta have located along interstate or other major highways leading to the airports. However, an airport itself is not as much a catalyst for economic development as it is a catalyst for highway development, which in turn attracts industrial growth. Industries still must be served by truck routes and easy automobile access for their employees.

HIGHWAY FRONTAGE OF USEABLE LAND PLANNED AND/OR ZONED FOR INDUSTRIAL AND MAJOR COMMERCIAL USE IN FAIRFAX COUNTY

Area	Land in Use	Zoned	Vacant and Useable Planned/ Not Zoned	Total	Total Frontage
Reston Dulles Corridor	7,400	32,000	16,000	48,000	55,400
Tysons					
Dulles Access	4,400	6,000	300	6,300	10,700
Beltway	7,600	3,000	—	3,000	10,600
Merrifield					
I-66	1,100	600	—	600	1,700
Beltway	3,000	4,600	—	4,600	7,600
South Beltway	7,700	2,600	—	2,600	10,300
I-95 South	16,700	10,500	300	10,800	27,500
Fairfax Center	3,800	600	11,500	12,100	15,900
Centreville	—	2,500	700	3,200	3,200
Countywide Total	51,700	62,400	28,800	91,200	142,900

SOURCE: Office of Comprehensive Planning

It is to the County's advantage, from the standpoint of promoting economic development, to have improved access to the Dulles Airport Access Road as well as improvements to that roads' linkages with Routes 7, 50, I-66, and I-95. The jurisdiction which has the advantage of first-rate highway access in the vicinity of Dulles Airport will hold an advantageous position for attracting a large share of the economic growth that will come to the Washington area.

Importance of Highway Frontage and Visibility

Frontage on major highways and visibility from these highways have also proven to be significant factors in attracting industry to Fairfax County. This is particularly true of research and development establishments, many of which put a high value on the prestige and institutional advertising advantages of sites which are visible to passing traffic. It should be emphasized, however, that highway visibility is not synonymous with strip development. The following table presents the availability of frontage along major highway corridors associated with land planned and/or zoned for industrial, office, and basic commercial uses in Fairfax County. The data shows some 142,900 feet, of which 51,700 feet or 36% are in use. Of the remaining 91,200 feet of frontage, it should be emphasized that the most desirable is that which is closest to interchanges where the combination of high visibility and easy accessibility exists. It is not unusual for land with frontage—but away from interchanges—to remain vacant for long periods of time, while interchange sites located elsewhere are being occupied.

SUMMARY OF ZONED INDUSTRIAL LAND IN FAIRFAX COUNTY BY PLANNING DISTRICT

Planning District	In Use	Vacant	Total Zoned
Annandale	478	106	584
Baileys	9	3	12
Jefferson	179	24	203
Lincolnia	125	73	198
Area I Total	791	206	997
Fairfax	114	107	221
McLean	297	180	477
Vienna	220	88	308
Area II Total	631	375	1,006
Bull Run	1,109	1,555	2,664
Pohick	51	84	135
Potomac	871	1,318	2,189
Area III Total	2,031	2,957	4,988
Lower Potomac	428	307	735
Mount Vernon	101	—	10
Rose Hill	185	92	277
Springfield	704	1,069	1,773
Area IV Total	1,327	1,468	2,795
Countywide Total	4,780	5,006	9,786

SOURCE: Office of Comprehensive Planning
Office of Research and Statistics

LAND USE

LAND USE PATTERNS

A major element in the formulation of the Comprehensive Plan is an understanding of the possible limits to development in the County and the subsequent distribution of this development to each of the fourteen planning districts. Fairfax County, including the Towns of Clifton, Herndon and Vienna, comprises approximately 262,800 acres of which 233,863 are classified into various zoning and land use categories. The remaining 28,437 acres are in roads, water and small areas of land that cannot be developed.

As of January 1983, 43.8 percent (102,422 acres) of the County's developable land was in actual residential or residential-related use. Approximately 87 percent of this acreage was in use for single-family dwelling units. A total of 5,514 acres, or 2.4 percent, are in commercial/retail-related uses and 8,260 acres, or 3.5 percent, are in industrial use. Park and recreation-related land uses account for 10.0 percent (23,350) of all developable land in the County. The public land use categories, which include post offices, fire stations, police stations, correctional institutions, military installations and cultural/educational activities, require 21,401 or 9.2 percent of the total. Vacant land and other natural uses make up the remaining 72,916 acres, or 26.1 percent, of the County's developable land.

Existing and Developing Land Use Patterns

Fairfax County's land use pattern reflects a land development history similar to that of many metropolitan suburbs. A rural county until after World War II, it became a prime area for low-density residential development due to a backlog of demand for new housing, and FHA mortgage insurance availability for suburban single-family detached units. A few apartments were built, primarily in the Arlington Boulevard and Richmond Highway corridors. As the population grew, commercial and industrial zonings were granted to provide shopping amenities as well as to broaden the county tax base. With continuing growth pressure, residential land prices increased and developers began leapfrogging over small vacant tracts in the eastern portion of the County to build large subdivisions in more remote locations where land costs were less prohibitive.

Townhouses began to appear in the late 1960s as an answer to a demand for less expensive single-family housing and smaller units. Townhouses met the need of many families desiring a suburban location while retaining the income tax advantage of home ownership. Multifamily construction increased by the late 1960's, especially in the Leesburg Pike corridor between Baileys Crossroads and Seven Corners and near several Beltway exits.

This development pattern created a number of problems. Uniform low-density residential development throughout most of the County makes public transportation inaccessible for a large number of citizens. Primary dependence on the automobile, combined with lagging road construction and road improvements, led to traffic congestion along major arterials. Land was absorbed with inadequate provision for needed open space. Leapfrog development necessitated placement of public facilities in remote locations while excess capacity still existed in neighborhoods nearer the metropolitan core, a situation which strained the County's fiscal capacity both in terms of capital investment and levels of service.

However, Fairfax County adopted two progressive zoning mechanisms during the 1960s which improved the quality of its land use pattern. The cluster development concept allowed low-density subdivisions to be built on smaller lots in order to provide sizable local-serving open space. The planned residential community (PRC) zone which permitted Reston to be built proved that large-scale planned development with a mix of housing types combined with employment opportunities was a feasible alternative to conventional suburban development.

Nevertheless, technological advances, economic considerations, environmental awareness, energy scarcities, a new social consciousness and major court decisions require that land use patterns of the past be reconsidered in light of these changes. Of major concern is how new land use patterns can be planned and implemented with minimal adverse impact on existing stable neighborhoods while also preserving environmental and other features of the County which contribute to the quality of life residents presently enjoy.

Growing environmental awareness means not only more rigid development controls in floodplains and stream influence zones, but a whole range of additional factors which must be addressed, including efforts to protect air quality. In Fairfax County, automobile emissions are the major pollutants of air. Continued primary dependence on the automobile because of uniform low-density development requires construction of new roads to accommodate the resultant traffic and results in more photochemical oxidants in the air due to an increase in vehicular usage. Where roadway level of service is reduced through increased traffic congestion, ambient carbon monoxide levels rise. If air quality is to be improved in the County, automobile emissions must be reduced by a combination of actions including technological advancement, increases in mass transit usage and by provision of employment and shopping opportunities in walking or biking proximity to residential land uses.

Energy scarcities discussions often focus on the potential declining availability and increasing cost of gasoline. However, the recent increases in electrical, gas and heating oil bills raise serious questions about the future marketability of large single-family detached homes, which tend to be less efficient in energy usage than smaller multifamily or attached homes.

In earlier days, the suburbs were commonly considered the exclusive preserve of the affluent. Now it is generally recognized that no community can function efficiently or equitably unless it provides a broad range of housing for its teachers, firemen, policemen and others. The County cannot expect to continue to be attractive to office employers and industries which broaden its tax base if nearby housing is not available for middle-income employees as well as for highly paid professionals. Both enlightened self-interest and a growing body of law mandate provisions for a mix of housing prices to serve all levels of household incomes.

For an increasing proportion of households, housing costs in the County are out of reach. In 1983, the median sale price of housing in Fairfax County was $103,600.

All these considerations would indicate that future land use patterns should concentrate more development in higher density nodes where public transportation is a feasible alternative to the automobile, where employment and shopping opportunities are nearby and where a mix of housing types and prices are available.

Comprehensive planning of the land use pattern using a flexible, easily updated approach can direct growth into appropriate arrangements, sensitive to the ever changing conditions of the future.

RECENT HISTORY OF LAND ABSORPTION

In the eight years between the initial adoption of the completely revised Comprehensive Plan in 1975 and 1983, approximately 25,500 acres of vacant land were absorbed by developments and new rights-of-way in Fairfax County. This figure somewhat understates development activity as underutilized land has decreased about 2600 acres during the period. Underutilized land is defined primarily as very large residentially-planned parcels which are listed on the land records as improved because there is a single-family house on the property. Using a computer program, the amount of such acreage subject to additional development within the Plan density/intensity guidelines can be estimated.

Excluding the impact of underutilized land, for which details are not available, the land which was developed from 1975 to 1983 represented 26 percent of the 97,000 acres vacant in 1975.

The existing land use for 1975 and 1983 as shown in Table 1 and the change in the vacant land inventory by planning district as set forth in Table 2 are derived from data published annually since 1975 by the Fairfax County Office of Research and Statistics in a document entitled Standard Reports.

During the 1975-1983 period 31 percent of the vacant land which was absorbed by development went into public or quasi-public use—parks, schools, fire stations, churches and similar uses. Nearly one-third, or 8,236 acres, of vacant land was devoted to single-family detached dwelling unit lots; 6 percent of the land was absorbed by townhouse and apartment developments, and almost 10 percent by commercial and industrial uses. The remaining 5542 acres was used for new or widened rights-of-way.

Pohick Planning District had the largest amount of vacant land absorbed during the period—9968 acres. Upper Potomac Planning District absorbed the second largest amount—6819 acres. These two planning districts combined absorbed 66 percent of the vacant land which was developed in the County in the eight year period. Since these two districts accounted for only 45 percent of the vacant land absorption during the 1964-1974 decade, the current figures show the westward movement of new development.

Annandale Planning District absorbed 51 percent while Bailey's Planning District absorbed 43 percent of its inventoried vacant land. Eight of the fourteen planning districts absorbed over 30 percent of their vacant land. In the Annandale Planning District 43 percent of the vacant land was utilized for public and quasi-public uses, 34 percent for single-family detached housing and 17 percent for townhouse and apartment developments. In the Baileys Planning District 37 percent of the vacant land was utilized for commercial use and 18 percent for single-family detached housing.

Development for which a building permit has been secured has been classified as committed within the Plan context on the presumption that construction is almost certain irrespective of whether building has actually commenced. In cases where the developer has filed a preliminary or final site plan or subdivision plat with the County, development is considered anticipated. County records on committed and anticipated development are maintained on a unit rather than an acreage basis. However, by using average densities by type of residential structure it is possible to estimate the amount of land which would be absorbed if all committed and anticipated development were completed.

Table 1

EXISTING LAND USE, FAIRFAX COUNTY
1975 and 1983

Land Use	1975	1983	Change	% Land Absorption
Residential				
Single-family	88,616	96,852	+ 8,236	32.3
Townhouse	1,188	2,353	+ 1,165	4.6
Apartment	2,976	3,217	+ 241	1.0
Commercial	3,578	5,547	+ 1,969	7.7
Industrial	2,097	2,574	+ 477	1.9
Public and Quasi-Public	43,957	51,816	+ 7,859	30.8
Vacant	96,993	71,504	- 25,489	
Sub-Total	239,405	233,863	- 5,542	
Estimated Right-of-Way	15,955	21,497	+ 5,542	21.7
Estimated Total County	255,360	255,360	0	
Housing Units				
Single-family	105,274	134,025	+ 28,751	
Townhouse	20,008	39,704	+ 19,696	
Apartments	47,687	56,317	+ 8,630	
Total Units	172,969	230,046	+ 57,077	

Developers have indicated through the filing of site plans, subdivision plats and building permit applications, their intent to build 50,919 residential units on an estimated 17,085 acres. Despite commonly accepted national predictions that future construction will involve a smaller percentage of single-family detached housing than in the past, the 1983 committed and anticipated residential development consists of 29,821 such units or 59 percent of all the proposed units. This contrasts with 43 percent in 1974. However, the increase and what it might mean with respect to land absorption should be viewed with caution since it may only reflect a backlog of incompleted subdivisions caused by the 1982-1983 recession.

Approximately two thirds of the presently committed and anticipated residential development (33,800 units) is scheduled for Area III which includes the Bull Run, Pohick and Upper Potomac Planning Districts. The location of these units is almost equally divided among the three planning districts. Sixty-eight percent of the total units proposed for Area III are single-family detached structures.

Nonresidential committed and anticipated development includes all construction except dwelling units—office buildings, fast food establishments, shopping centers, churches, schools and rapid transit stations. Because several buildings with differing land uses may be proposed for a single parcel of land and because nonresidential development may be committed or anticipated for construction on only a portion of the parcel with utilization of the full parcel at some uncertain future date, it has proved difficult to assign a realistic land area to this type of development. Various techniques are being studied but a satisfactory method has not yet been developed.

Table 2

VACANT LAND: FAIRFAX COUNTY 1975 AND 1983
BY PLANNING DISTRICT (IN ACRES)

Area	Vacant Land 1975	Vacant Land 1983	Decrease*	Percent Vacant Land Used 1975-1983	Percent Countywide Land Absorption
Area I					
Annandale	1,449	716	733	50.6	2.9
Baileys	465	265	200	43.0	0.8
Jefferson	1,093	680	413	37.8	1.6
Lincolnia	501	353	148	29.5	0.6
Subtotal	3,508	2,014	1,494	42.6	5.9
Area II					
Fairfax	4,147	2,540	1,607	38.8	6.3
McLean	5,309	3,583	1,726	32.5	6.8
Vienna	2,695	1,719	976	36.2	3.8
Subtotal	12,151	7,842	4,309	35.5	16.9
Area III					
Bull Run	14,587	14,605	+ 18	- 0.1	0.0
Pohick	28,018	18,050	9,968	35.6	39.1
Upper Potomac	23,76	916,950	6,819	28.7	26.7
Subtotal	66,374	49,605	16,769	25.3	65.8
Area IV					
Lower Potomac	5,167	4,800	367	7.1	1.4
Mount Vernon	2,022	1,621	401	19.8	1.6
Rose Hill	4,255	2,766	1,489	35.0	5.8
Springfield	3,516	2,856	660	18.8	2.6
Subtotal	14,960	12,043	2,917	19.5	11.4
TOTAL	96,993	71,504	25,489	26.3	100.0

*Vacant land acreage is the net change betwen 1975 and 1983. Note that there has been relatively little development in Bull Run District; the increase in vacant land probably results from demolitions.

UNDEVELOPED LAND

Most of the development in Fairfax County has occurred in the past 20-30 years. In 1953, 41,000 acres were considered to be developed. By 1964, a land use study of the County revealed 61,000 developed acres, an increase of 61 percent for the eleven year period. Current statistics (1983) indicate 142,000 developed acres (or 120,000 acres if the underutilized land concept is applied). The suburban development which followed World War II was concentrated in areas near the Arlington County and Alexandria City lines, and along major transportation corridors such as Richmond Highway, Columbia Pike, Arlington Boulevard and Leesburg Pike. Lack of sewer availability constrained growth in outlying areas except for low-density single-family housing on land which could support septic systems. As time passed, sewer service areas expanded and a substantial portion of the land east of Route 123, excluding the Pohick watershed, was developed. Substantial development of the Pohick watershed area began with the opening of the Lower Potomac Treatment Plant.

Table 3

COMMITTED AND ANTICIPATED GROWTH
RESIDENTIAL DEVELOPMENT
FAIRFAX COUNTY, JANUARY 1973

Type of Unit	No. of Units	Average Density Per Acre	Estimated Land Absorption
Single-family	29,821	2	14,910
Townhouse	15,841	8	1,980
Apartment	5,257	27	195
Total	50,919		17,085

Outer County

In 1983 nearly 70 percent of the remaining vacant land, or 50,000 acres, and 71 percent of the land classified as underutilized was located in Area III which, with the exception of the Pohick watershed, lies entirely west of Route 123.

The Upper Potomac Planning District has grown substantially over the past twenty years despite the fact that its major corridors of access to employment centers in the eastern County, Arlington and downtown Washington have been along congested Routes 7 and 50. Growth has been stimulated by the development of the urban clusters of Reston and Herndon which has included employment opportunities in industrial and commercial firms which have located in these clusters. The imminent opening of the Dulles parallel lanes, the completion of the I-66 from the Beltway to the Potomac River and the Dulles Airport Access Road extension from Route 123 to I-66 will combine to improve immeasurably the access from the Upper Potomac Planning District to all parts of the metropolitan area. This same improved road network is serving as a catalyst for substantial development on industrially-planned land in the vicinity of Dulles Airport.

The northern portion of the Pohick and eastern portions of the Bull Run Planning Districts both have access to employment opportunities in Fairfax City and will further benefit from those jobs created as development progresses in the vicinity of the Fair Oaks shopping center at the junction of I-66 and Route 50. Bull Run Planning District residents who live in the Centreville core and near access points to I-66 have already benefitted by the extension of I-66 from the Beltway to the Potomac River. They are able to easily reach employment centers in Manassas and will be only a few minutes drive from the terminal Orange Line Metro station at Nutley Street

when it opens in 1986. The southeastern portion of the Pohick Planning District is close to Fort Belvoir which provides a substantial amount of civilian employment.

A substantial amount of vacant land in Area III is located in areas which are neither served by public water nor public sewer and for which no sewer treatment facilities are programmed or planned. Development of much of this land is further constrained because it is located in watersheds which flow into the Occoquan Reservoir where water quality standards must be maintained and some soils are unsuitable for septic field siting. For these reasons and the general environmental sensitivity of much of the Occoquan basin area, a large segment was comprehensively rezoned to five acre lot development—in 1982.

The amount of vacant acreage in Area III overstates its development potential since approximately 6000 acres are in floodplain and substantially more land adjacent to Difficult Run, Bull Run, Popes Head Creek and Pohick Creek as well as the Occoquan River has slopes in excess of 15 percent. The potential adverse environmental impacts from building activity in such areas offer significant constraints to any intensive development.

Inner County

The remaining 22,000 acres of vacant land are located in Areas I, II and IV which until recently have offered better access to the employment concentrations in downtown Washington and substantial suburban employment opportunities as well as better access to public transportation. However, at least half of this undeveloped land area is along the Difficult Run and its tributaries or in the Lower Potomac Planning District where the constraints to intensive development are similar to those in Area III mentioned above. The vacant land in the urbanized portions of these planning areas is typically found in relatively small parcels which might be suitable for medium- or high-density construction or custom-built single-family detached housing. Multifamily development, however, is frequently incompatible with the neighborhoods within which the vacant land lies. On the other hand, custom-built homes exceed the cost of tract homes of the single-family detached type. Persons contracting for such construction are frequently not attracted to neighborhoods of older housing.

With some minor exceptions, most of the large masses of remaining undeveloped land in the inner part of the County is land which has been passed over because of development problems. Nevertheless, two of the more notable holdings, the 600 acre Chiles tract at the intersection of Route 50 and the Capital Beltway, and the 1300 acre Lehigh tract south of Franconia and Rose Hill have both recently entered the development pipeline.

With the exception of the land along Difficult Run and in the Lower Potomac Planning District, the vacant land inventory in the inner portion of the County probably understates development potential. The growth of the metropolitan area has pushed up land prices to the extent that land values along the eastern perimeter of the County are frequently out of line with the types and intensity of uses on the land. The economics of this situation plus the facts that some of the buildings are becoming deteriorated and the area has the potential for good public transportation service may foreshadow redevelopment at higher densities and intensities.

Table 4

COMMITTED AND ANTICIPATED NONRESIDENTIAL DEVELOPMENT FAIRFAX COUNTY, JANUARY 1983

Planning Districts	Structures Committed	Structures Anticipated
Area I		
Annandale	6	18
Baileys	4	6
Jefferson	8	11
Lincolnia	5	6
Area II		
Fairfax	7	8
McLean	16	19
Vienna	23	35
Area III		
Bull Run	8	5
Pohick	11	14
Upper Potomac	26	35
Area IV		
Lower Potomac	4	5
Mount Vernon	6	14
Rose Hill	3	5
Springfield	33	36
Total	160	217

TRANSPORTATION

Introduction and Organization

The transportation elements of the Comprehensive Plan are organized into three sections. Section I (Background and Analysis) describes the purpose of the transportation plan, the process employed to develop future travel forecasts, and the conclusions reached by analyzing these traffic projections. Of particular interest in Section I are a description of the underlying concepts embodied in the transportation plan and an overall summary of the major issues associated with the plan.

Section II (Recommendations) contains the specific countywide, area, and sector recommendations as well as information on the implementation of these plans. The purpose of this section is to present a detailed summary of all the planned transportation recommendations and a description of the programming procedures that will serve to implement them.

Section III (Appendix) includes background information of a more technical nature than that found in Section I. The primary topic of the section is travel demand and how it is related to the land use elements of the Comprehensive Plan, as well as how recent growth in the County has affected travel demand forecasts over the past few years.

The following paragraphs provide a summary of the major issues associated with the Fairfax County transportation plan. These issues relate to the purpose of the plan, the major concepts embodied in the plan, and the technical foundation of the plan. The major findings resulting from the technical evaluation of travel demand are summarized. Finally, the process by which the plan is implemented is discussed. *It is highly recommended that users of this plan consider this information in interpreting the recommendations.*

Purpose

The Fairfax County transportation plan is a guide to the development of a transportation system to meet the long-range needs of Fairfax County. This guide is intended to serve many functions. It forms the basis for the development of programs for the allocation of funds by regional and state agencies which have the statutory authority to build and operate the transportation system. It assists the County in making land use decisions and in obtaining important right-of-way and other contributions toward the provision of these facilities. Finally, it provides a vehicle for informing the general public of the long-range transportation needs of the County.

Further information regarding the administration of the transportation system in Fairfax County and the provision of improvements to that system is contained in Section II of the Comprehensive Plan in the discussion of the implementation process.

Concepts Embodied in the Plan

In recognition of projected travel needs, community concerns, and the policies of the Board of Supervisors, the transportation plan incorporates a number of significant features. It reflects a higher level of transit service than currently envisioned by WMATA toward reducing potential highway needs. It does not attempt to fully accommodate projected travel to and from Washington, D.C. and the regional core. It encourages the creation of high-capacity radial corridors using existing facilities. It emphasizes the improvement of roadways in the western and southern areas of the County where most new development is planned. It also emphasizes the improvement of roads in the circumferential direction in these areas. Finally, it encourages the creation of an arterial roadway network intended to provide for major traffic movements. A more extensive discussion of functional classification, including the adopted functional classification for roads in Fairfax County, is found in Section II (Recommendations).

Technical Foundation

The transporation plan has been developed through the use of computer models to forecast future travel in the Washington, D.C., metropolitan region. Satisfactory technical analysis is an important element of the plan since federal and state acceptance is contingent on the consideration of future regional travel needs through an accepted forecasting process. The transporation plan has been approved by the regional Council of Governments (COG) and has been incorporated where appropriate into the long-range regional transportation plan. Further information regarding the traffic forecasting process is included in Section III (Appendix).

Underlying Assumptions

Projected levels of future development for all of the jurisdictions in the region formed the basis for the development of future travel forecasts. Various analyses have been made both in the preparation of this plan and in subsequent regional activities for 1990 and 1995. *It is extremely important to emphasize that these development projections are not for the ultimate build-out, or full development of Fairfax County. Development of such magnitude will most probably create even greater travel needs than those reported herein.* Because these conditions will not occur within the next 20 years, however, it is extremely speculative to attempt to assess their impacts.

It has also been assumed that the full 101-mile Metro-rail system will be complete and operational. This system includes routes to Vienna, Franconia/Springfield, and Huntington in Fairfax County. A very extensive feeder bus network, with appropriate facility improvements, was also assumed in the preparation of this plan. This assumed level of transit service far exceeds the magnitude of feeder bus service contemplated by WMATA upon completion of the Metro-rail system. Continued increases in transit operating deficits, and the associated subsidy paid by the County may reduce the likelihood of such service improvements. Of course, continued increases in gasoline costs and potential future shortages could have the opposite effect.

Major Findings of the Travel Demand Forecasts

The paragraphs which follow provide a summary of the major findings resulting from the forecasting of future travel. Major characteristics of this travel, as well as the impacts on the transportation system, are presented.

Future Travel Characteristics. The analysis conducted in the preparation of this plan indicated that general travel patterns were most affected by the distribution of development throughout the region. In contrast, variations in the transportation system appeared to make very little difference in these overall travel needs. This finding has been subsequently corroborated in work by COG at the regional level.

This finding has important implications for future transportation planning. A general review of the committed and planned growth patterns of Fairfax County provides a very useful basis for the evaluation of future travel needs. Most of the County's growth will occur in the western and southern areas where the existing transportation facilities are poorest. Although substantial increases in employment in the County are forecast, the regional core (Washington, D.C., and parts of Arlington and Alexandria) will remain as the single greatest concentration of jobs in the region.

These two trends will reinforce existing travel patterns to a very large degree. Thus, it does not appear that drastic changes in commuting patterns will occur in the foreseeable future, although travel entirely within the County will increase significantly. Moreover, the total magnitude of travel will increase as the number of households in the County increases. This growth is planned to be substantial. Vehicle miles of travel is also likely to increase as low-density residential development continues in the outer fringes of Fairfax County, and in Loudoun County and Prince William County. This continuation of residential development will also create significant and noticeable increases in the need for circumferential travel. These needs will be generated by additional business, commercial, and other activity centers in the developing areas.

Impacts of Future Travel Needs on the Transportation System

The projected future travel demand will have major impacts on the transportation system. These impacts will be manifested in several ways.

Transit. The transit system will carry much of the increase in travel for work which is oriented to the regional core. Metro-rail will be heavily used; if the optimistic assumptions made in this plan are realized, most seats will be occupied by the time the trains cross the Beltway. Even under more realistic assumptions regarding feeder service, trains approaching Rosslyn and the Pentagon will have many standees. Transit will not, however, play a major role in the accommodation of work trips in the circumferential direction, trips for non-work purposes, or trips in outlying areas.

Highways. Even accounting for transit, auto travel will increase substantially and place additional burdens on the highway system. Automobile usage will progressively increase as the distance from the core increases. These increases will be most dramatic in the outer and central areas of the County where transit is poorest, but they will also exist at the Beltway and inner areas. With the existing highway system already operating at capacity at the Beltway, these increases will result in a further deterioration of the level of service provided by the highway network.

In assessing the plan, it was originally estimated that only 75 percent of the travel demands crossing the Beltway was met. With the subsequent approval of the extension of I-66 as a restricted carpool/high occupancy vehicle facility during peak hours, this inadequacy will be somewhat reduced. However, the *magnitude of travel demand is so great that meeting it in its entirety does not appear to be economically feasible under present funding sources or environmentally sound.* Faced with these issues, the reconsideration of alternative land use patterns at the regional and local level would appear to be warranted.

Section III (Appendix) provides additional information with respect to the travel demand forecasts.

Implementation of the Transportation Plan

The provision of transportation facilities has generally followed their need. Much of this lag results from the scarcity of funds for necessary improvements. In addition, the lengthy time period required to complete the planning, design, and approval process associated with major public capital investments also contributes to this delay. Thus, the appearance of a recommendation on the

adopted transportation plan does not assure its implementation in a timely fashion. Short-range road improvement programs covering a six- and ten-year period are developed jointly with the Virginia Department of Highways and Transportation (VDH&T) to guide the actual scheduling and funding of priority projects. Because of these lengthy lead time requirements it is essential for these programs to maintain a high degree of stability from year to year. The ambitious transit capital improvements included in the plan are also subject to severe funding constraints. In order to implement the facilities recommended, a continuing commitment of resources on the federal, state and local levels will be necessary. A further more detailed discussion of the transportation implementation process is presented in Section II (Recommendations).

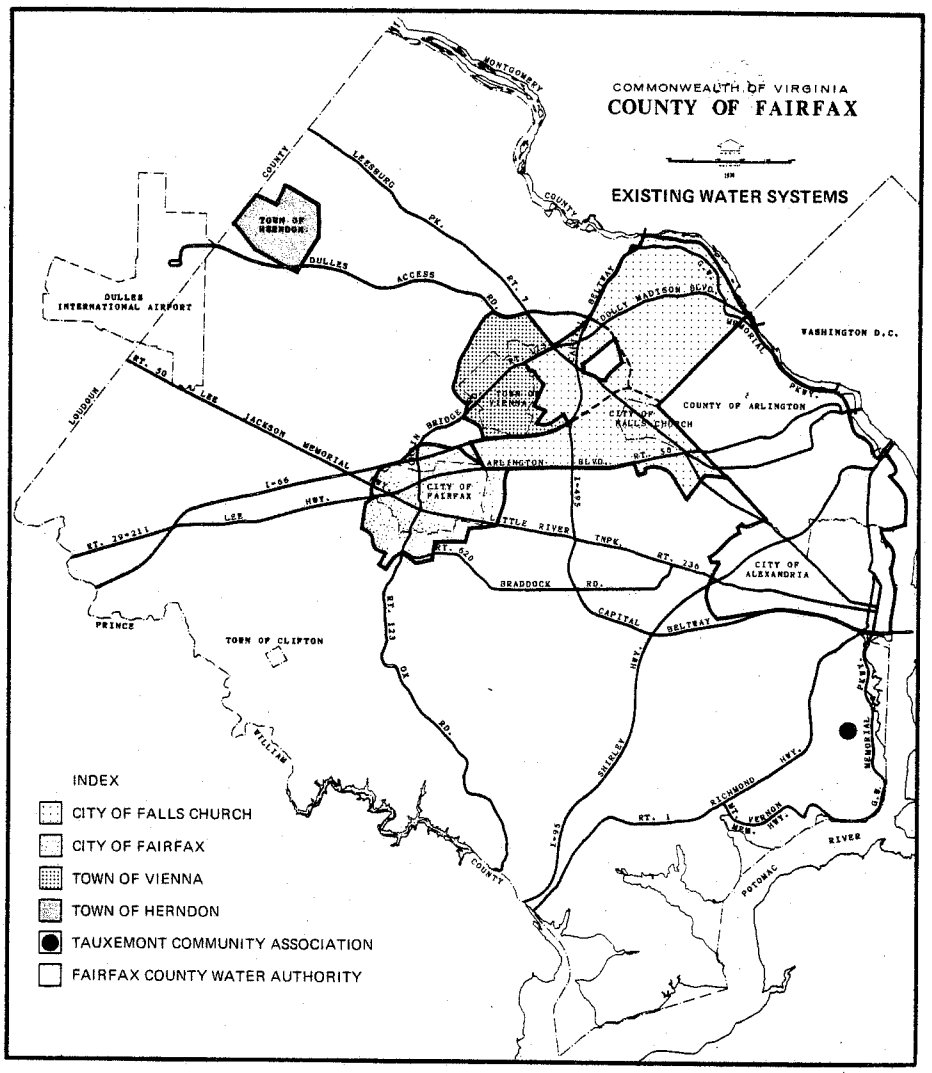
PUBLIC FACILITIES AND SERVICES

Fiscal as well as physical planning is needed to ensure that public facilities are properly matched with identified needs and available resources. County policies, goals, and objectives address the issue of attaining and maintaining adequacy of public facilities.

An effective mechanism for guiding the provision of public facilities is capital improvement programming.

Capital improvement programming is a continuous process that selects and sequences public capital projects over a period of years to facilitate efficient use of the County's financial resources and coordinate County development with development by others. Capital Improvement Program (CIP) activities include specification of capital projects the County plans to undertake during the 5-year planning period, estimation of project costs, and determination of appropriate methods of financing. The first year of the CIP generally serves as the fiscal year's capital budget. Recommended capital improvements are being reviewed and evaluated for inclusion in the 5-year Capital Improvement Program. Most recommended projects will ultimately become part of the County's Capital Improvement Program.

The following discussion examines the current status of various County public facilities compared with present and projected demands described in each area. A detailed project-by-project evaluation with accompanying breakdowns of capital facility expenditures is contained in the CIP.



WATER SUPPLY

Residents of Fairfax County receive public water service from one of three water agencies: Fairfax County Water Authority, City of Fairfax Department of Water and Sewer Services, and the Falls Church Department of Public Utilities. The Towns of Vienna and Herndon, while operating their own water distribution systems, purchase water from the Cities of Falls Church and Fairfax, respectively. In terms of building major capital facilities to meet water supply needs, the towns are dependent on these two water agencies. Using recent estimated averages, the Fairfax County Water Authority serves 66 percent of Fairfax County residents on public water, Falls Church serves 26 percent, the City of Fairfax four percent, and the remaining four percent of the residents receive water from their own individual wells.

Water Sources and Facilities

Fairfax County Water Authority

Sources of Water. Principal sources of water are the Occoquan River and the Potomac River. The Occoquan River is impounded by two dams located near Occoquan, Virginia. The lower dam impounds a relatively small reservoir containing approximately 55 million gallons (MG). The upper dam impounds the primary water supply reservoir containing about 11 billion gallons.

As presently developed, the impounded supply has a dependable yield of approximately 67.5 million gallons per day (MGD). The Potomac River at the Authority intake is not impounded. Supplementary sources of water include 22 wells and the purchase of water from the Cities of Fairfax and Falls Church, Town of Vienna, Loudoun County and Arlington County.

Treatment Facilities. Occoquan: Treatment of raw water is provided in three interconnected plants at the Occoquan Reservoir with a combined maximum capacity under permit of 111.6 MGD. Six treated water reservoirs, containing 6.4 MG, are located at the treatment plants. Twenty pumping units providing a maximum installed capacity of 122 MGD deliver water to the transmission and distribution system. Potomac: the initial phase of construction of the Potomac River water supply facilities resulted in an increase of 50 MGD in maximum daily capacity. The Potomac plant has a treated water reservoir with a capacity of 5.5 million gallons. Five pumping units providing a maximum firm installed capacity of 52 MGD deliver treated water to the transmission and distribution system. Initial operation of these facilities commenced in 1982. These facilities will allow the Authority to meet the maximum daily needs of its service area until about 1995.

Pumping Stations: Twenty-six booster pumping stations, with installed capacities ranging from 0.12 to 42.0 MGD, maintain operating pressures throughout the service area.

System Storage: A total of 21 MG are stored in 41 distribution system reservoirs at various locations in the service areas. Principal facilities include 9 MG in three standpipes near Annandale, 5 MG in two standpipes at Gum Springs, 4.4 MG in three standpipes at Penderwood, and 1 MG in an elevated tank at the Fairfax County hospital.

Transmission and Distribution Facilities: There are approximately 1,793 miles of 2-inch to 48-inch diameter water mains in the system. The distribution system is interconnected at 69 locations with 12 other water systems in Northern Virginia.

City of Fairfax Department of Water and Sewer Services

Sources of Water. Fairfax City owns and maintains two water reservoirs in Loudoun County. They are two miles apart and are located about seven miles northwest of Sterling Park. Goose Creek Reservoir holds about 200 million gallons (MG). Beaverdam Creek Reservoir impounds about 1.3 billion gallons. Beaverdam Creek Reservoir ensures the city a four-month supply against drought and low flow in Goose Creek.

Treatment Facilities. The city's treatment plant with a capacity of 12 MGD is located at Goose Creek.

Pumping Stations. The city has a pumping station located at Goose Creek which delivers water to the transmission and distribution system.

System Storage. Three storage tanks (9 MG total) are maintained in the city to equalize water pressure.

Transmission Facilities. The city's water transmission line runs 22 miles from Goose Creek to the City of Fairfax along the abandoned W&OD railroad right-of-way and parallels Hunter Mill Road.

Falls Church Department of Public Utilities

Sources of Water. Falls Church buys treated water from the U.S. Corps of Engineers via a

36-inch connection to the Dalecarlia filter plant located on MacArthur Boulevard in the District of Columbia. The Corps obtains its raw water from the Potomac River at Great Falls.

Treatment Facilities. None.

Pumping Stations. Five pumping stations with total capacity of approximately 27 MGD.

System Storage. Ten storage facilities with a total capacity of approximately 11 MG.

Transmission and Distribution Facilities. Approximately 330 miles of pipe ranging from two inches to 42 inches.

Existing and Projected Service Levels

Fairfax County Water Authority

The present and projected near-future populations served and to be served by FCWA are:

	1983	1988
Fairfax County	452,600	504,700
Alexandria	107,000	116,000
Prince William County	97,800	115,100
Total	657,400	735,800

In order to meet projected future demands, the Authority evaluated a number of alternatives for providing additional water supply capacity. Based on these evaluations, the Authority concluded that the most reliable and cost-effective alternative, in terms of capital and operating costs was the construction of an independent supply from the Potomac River. All construction related to this additional supply has either been completed or is nearly completed.

The initial phase of construction of the Potomac River water supply facilities resulted in an increase of 32 MGD in average daily capacity and 50 MGD in maximum daily capacity. Initial operation of these facilities began during the summer of 1982. These facilities will allow the Authority to meet the maximum daily needs of its service area until 1995.

City of Fairfax

The Goose Creek water system of the City of Fairfax serves a population of approximately 80,000—53 percent in the City of Fairfax and Fairfax County with the remainder divided between Loudoun County and the Town of Herndon.

In order to accommodate the projected demands on the water system, the City of Fairfax enlarged their existing treatment facility at Goose Creek from 6 MGD to 12 MGD. The recently completed Beaverdam Creek Reservoir, in conjunction with Goose Creek Reservoir, is presently capable of providing a safe yield of 12 MGD.

Falls Church

The Falls Church water system serves a population of about 114,000 with 11,000 in the City of Falls Church and 103,000 in Fairfax County excluding the Town of Vienna. By 2000, the system will serve a projected population of over 200,000.

In order to accommodate this projected increase in service population, Falls Church installed a new 30 MGD pump station near Chain Bridge Road on the existing 36-inch supply main from Dalecarlia. This pump station installed in 1977 will provide increased system demands until approximately 1985.

WATERSHEDS AND DRAINAGE

Rapidly urbanizing watersheds present a myriad of potential problems. Construction activity can generate sediment at hundreds of times the normal rate. Impervious pavements increase both the volume of stormwater runoff and the magnitude of peak flood flows. Runoff from urban areas is often highly polluted with pesticide and nutrients as well as oils and toxic metals. The net result of these problems is that water quality is seriously degraded, property damage is excessive and in many instances the aesthetic quality of natural areas is destroyed.

Existing Conditions

For planning purposes, Fairfax County can be broken into 31 separate watersheds. These are of two types—those that are highly developed at the present time and those that are expected to undergo considerable development during the next 10 years. The first category includes Dead, Pimmit, Four Mile, and Cameron Runs, and Belle Haven, Little Hunting, Dogue, and Accotink Creeks, and comprises about 36 percent of the County. Included in the second group are Horsepen, Sugarland, Nichols, Difficult, Scotts, Bull, and Cub Runs; Pohick, Kane, High Point, and Mill Branch; and the eight small sheds draining directly into the Occoquan Reservoir. This represents about 64 percent of County land area. The two watershed types have distinctive characteristics and will be discussed separately.

Developed areas are often subject to periodic flooding and erosion damage from high stream velocities. Those areas near the mouths of streams particularly suffer from the effects of rapid upstream runoff and high flood peaks. Without some form of remedial measures, this undesirable situation will continue.

Land Treatment and Control

The planning objectives are to be met in part by construction of land treatment measures and enforcement of the County's ordinance for erosion and siltation control. Attention must also be paid to the polluting characteristics of urban and agricultural runoff such as heavy metal, oils, nutrients and pesticides. The County will participate through the Water Resources Planning Board of COG in a study of such effects on the quality of the receiving stream.

Land treatment measures include, among other things, reduction of erosion on remaining agricultural land through selective planting and cultivation; on nonagricultural land, through control measures such as grasses and legume rotation, grassed waterways, pasture and hayland renovation planting and management; and on miscellaneous lands, including developed and underdeveloped lands, through plantings on critical areas, debris basins, ditch and bank seeding, diversions, reforestation and rapid acceleration of old field succession and other mechanical and vegetative measures developed by Fairfax County in concert with the Soil Conservation Service.

In the development of the Comprehensive Plan, a regional watershed planning approach was suggested. The most pertinent issue which this regional approach suggests is that present zoning classifications do not adequately address the goals of watershed planning. For example, even excluding highly constrained areas like floodplains, stream valleys, and steep slopes, rural large-lot zoning (e.g., five-acre lots) may not be possible or desirable in certain segments of a watershed. The extent and character of headwater regions, septic tank limitations, soil erodibility, and aquifer recharge areas might all suggest .2 dwelling unit per acre in one segment of the watershed (i.e., in a higher density, cluster-type development), while the remainder would be preserved as open space.

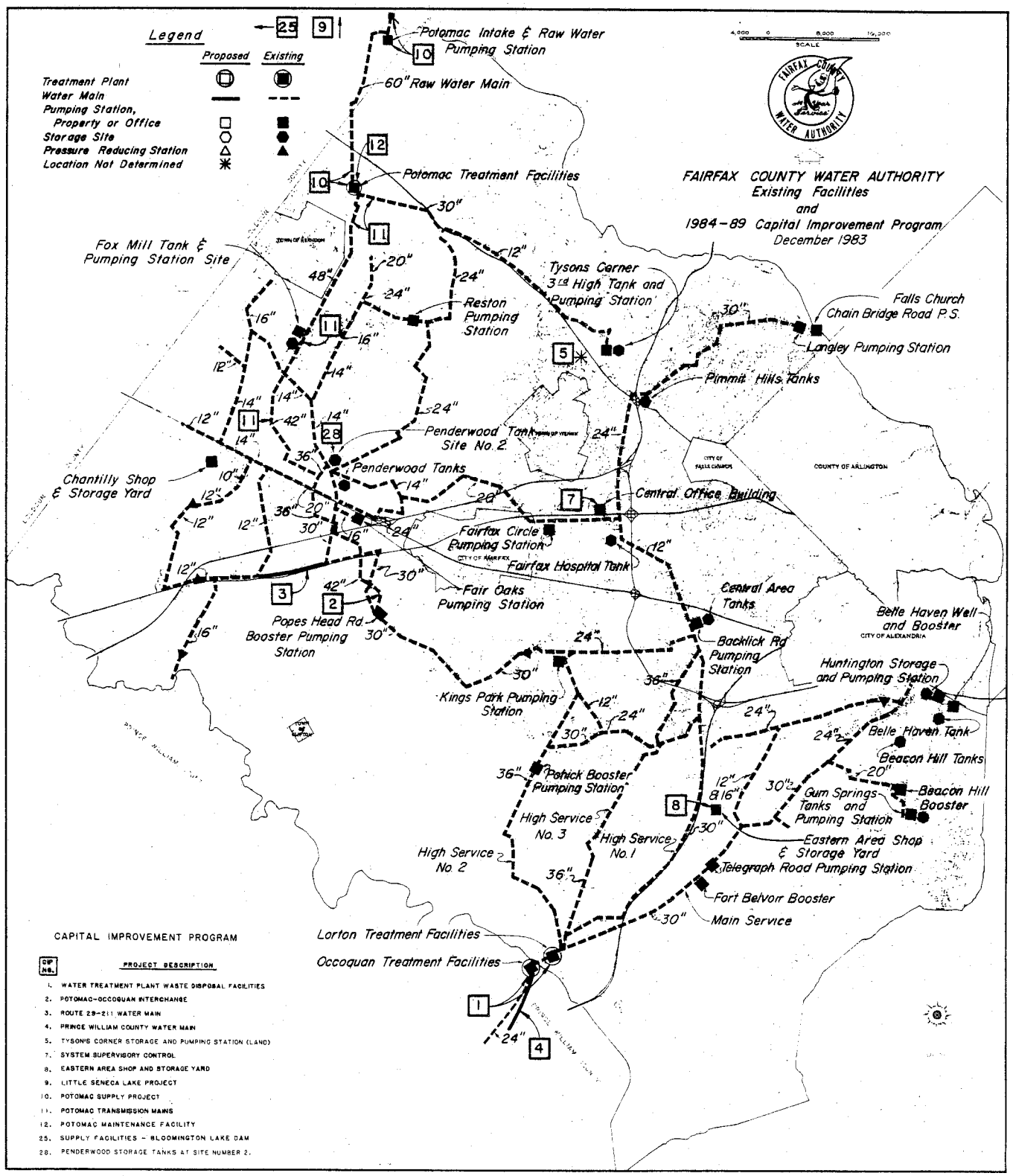
The effective relationship of land use to water quality planning requires areawide quantitative analyses (i.e., development runoff ratios, development stream enlargement ratios, allowable load limits for point and nonpoint discharges, etc.). Such an approach will focus on the carrying capacity of water resources as a major constraint on intensity of land development. Next steps include establishment of criteria such as acceptable threshold water quality and quantity impact levels. Desired discharge locations and volumes can then be determined on the basis of water quality standards and acceptable wasteload allocations for receiving waters. Once the discharge limitations are known, it will be possible to adjust to the population growth and land development that can be accommodated within each planning district. Water resource carrying capacity will be considered, along with other criteria (i.e., public services, transportation accessibility, and other environmental constraints), to keep the plans and controls up to date.

Recent Studies and Programs

Due to the enactment of progressive development controls, recent development has had less of an impact on the natural drainage system. A sediment control ordinance has been adopted as well as requirements for drainage improvements in new developments. This effort recognizes the responsibility of upstream development to the downstream inhabitants of a watershed.

As a result of a study undertaken in 1971, the County has developed a comprehensive master plan for storm drainage. This master plan consists of two primary elements: an immediate action plan and a future basin plan. The immediate action plan identified and proposed solutions for existing drainage problems, while the future basin plan developed proposals for the drainage system that will be required as the County continues to develop. As a means of implementing these plans, storm drainage bond referenda were approved in 1971 and 1980.

In addition to the development of an overall drainage management plan and work program, several other actions should be noted. The Pohick Creek watershed plan was developed and implemented in cooperation with the Soil Conservation Service and the Northern Virginia Soil and Water Conservation District. The plan is unique in that it was not proposed to deal with existing flooding problems nor to enhance and restore lands to permit future development. Instead, it is a supplement to the overall development plan for the area to be converted rapidly from a nearly natural rural condition to an area of comparatively intensive urbanization. The plan was developed to permit full advantage to be taken of the flood control structures in planning recreational facilities. It does not propose to alter the 100-year floodplain delineation. Application of this process to other watersheds in developing areas is under study.


Legend
Proposed
Existing
Treatment Plant
Water Main
Pumping Station, Property or Office
Storage Site
Pressure Reducing Station
Location Not Determined
SCALE
FAIRFAX COUNTY WATER AUTHORITY
FAIRFAX COUNTY WATER AUTHORITY
Existing Facilities
and
1984-89 Capital Improvement Program
December 1983
Potomac Intake & Raw Water Pumping Station
60" Raw Water Main
Potomac Treatment Facilities
Fox Mill Tank & Pumping Station Site
Tysons Corner 3rd High Tank and Pumping Station
Reston Pumping Station
Falls Church Chain Bridge Road P.S.
Langley Pumping Station
Pimmit Hills Tanks
Penderwood Tank Site No. 2
Penderwood Tanks
Chantilly Shop & Storage Yard
Central Office Building
Fairfax Circle Pumping Station
Fairfax Hospital Tank
Fair Oaks Pumping Station
Popes Head Rd Booster Pumping Station
Central Area Tanks
Belle Haven Well and Booster
Backlick Rd Pumping Station
Huntington Storage and Pumping Station
Kings Park Pumping Station
Belle Haven Tank
Beacon Hill Tanks
Beacon Hill Booster
Patrick Booster Pumping Station
Gum Springs Tanks and Pumping Station
High Service No. 3
High Service No. 1
High Service No. 2
Eastern Area Shop & Storage Yard
Telegraph Road Pumping Station
Fort Belvoir Booster
Main Service
Lorton Treatment Facilities
Occoquan Treatment Facilities
CAPITAL IMPROVEMENT PROGRAM
CIP NO. PROJECT DESCRIPTION
1. WATER TREATMENT PLANT WASTE DISPOSAL FACILITIES
2. POTOMAC-OCCOQUAN INTERCHANGE
3. ROUTE 29-211 WATER MAIN
4. PRINCE WILLIAM COUNTY WATER MAIN
5. TYSONS CORNER STORAGE AND PUMPING STATION (LAND)
7. SYSTEM SUPERVISORY CONTROL
8. EASTERN AREA SHOP AND STORAGE YARD
9. LITTLE SENECA LAKE PROJECT
10. POTOMAC SUPPLY PROJECT
11. POTOMAC TRANSMISSION MAINS
12. POTOMAC MAINTENANCE FACILITY
25. SUPPLY FACILITIES - BLOOMINGTON LAKE DAM
28. PENDERWOOD STORAGE TANKS AT SITE NUMBER 2.

SANITARY SEWERAGE SYSTEMS

Provision of adequate sewerage capacity at a rate consistent with [illegible] objectives is essential to Comprehensive Plan implementation. In an environment of strong overall growth, such as has been experienced by Fairfax County, inadequate treatment capacity in one location will inevitably divert growth to other parts of the County where capacity is available. Achievement of the growth targets put forward in the Comprehensive Plan, therefore, involves a [illegible] for the various sewer service areas.

The map of approved sewer service areas provides basic guidance for the location of future development. Within these areas, facilities either have been installed or are anticipated that will serve development requiring public sewer. Establishment of new service areas requires affirmative action by the Board of Supervisors. Proposed expansions of the approved sewer service area will be in accord with planned land uses as shown on the Comprehensive Plan map and the existing and planned extent of the sanitary sewerage system.

The delineation of the sewer service area boundary is determined to include the immediately adjacent area which can be served by the smallest allowable gravity lines installed in accord with the normal engineering practices which will result in the safest and most cost-effective operation and, further, any extension of a sewer line across the surface drainage divide of an approved sewer service area shall not exceed a distance of 400 feet nor a manhole depth of 12 feet without approval by the Board of Supervisors.

Fairfax County provides sewer service to its citizens through a system of over 2,000 miles of sewer lines, numerous pumping stations and two treatment plants owned and operated by the County. Additional treatment capacity is provided by contractural agreements with the District of Columbia, Alexandria, Arlington County and the Upper Occoquan Sewage Authority (UOSA). During the 1980's, the County will continue to provide both increased treatment capacity and improved effluent quality. Additional plant capacity will be required to serve projected residential and nonresidential growth. Stringent water quality standards require the greater treatment efficiency provided by advanced secondary treatment.

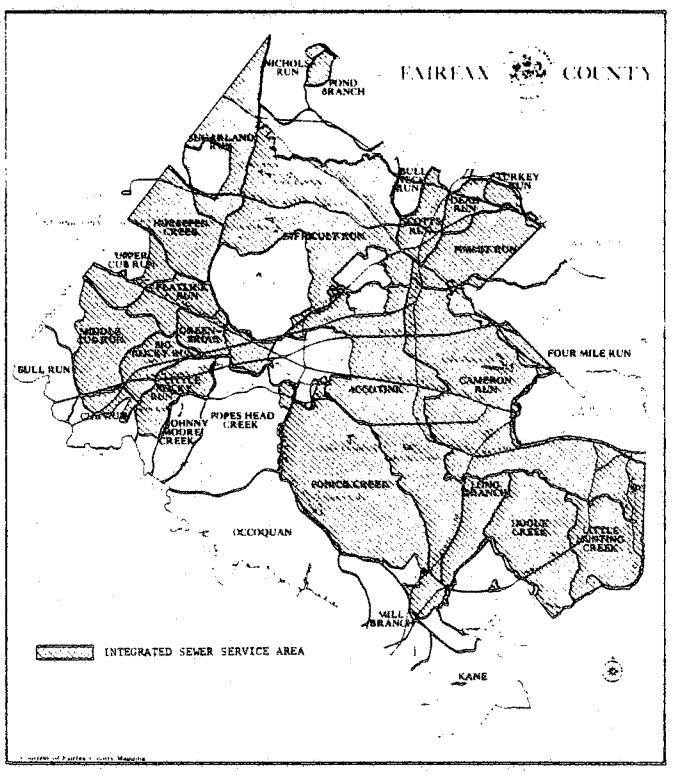
Fairfax County has all but completed the program of plant expansion and upgrading that was begun in the early 1970's. This program was directed at pollution problems in the Potomac River and was comprised of three major elements: (1) creation of a single treatment complex at the Lower Potomac plant to treat flows from the Accotink, Pohick, Dogue and Little Hunting Creek watersheds and Fort Belvoir; (2) installation of pumping facilities at the Westgate treatment plant to divert flows from the Cameron Run and Belle Haven watersheds to the Alexandria treatment plant; and (3) expansion and upgrading of the District of Columbia treatment plant at Blue Plains. With the exception of the Little Hunting Creek pumpover which was deferred by the State Water Control Board in 1978, this program has been completed.

The current status of the County's wastewater treatment system, both County-owned and treatment by contract, is described in the following paragraphs.

Lower Potomac Treatment Area. The Lower Potomac treatment plant serves the Accotink, Pohick, and Long Branch drainage basins. In addition to flows originating within the County, the plant also treats sewage from the City of Fairfax and part of the Town of Vienna. Lower Potomac was put on line in 1970 and had an initial design capacity of 18 million gallons per day (MGD) which was subsequently increased to its present rating of 36 MGD of advanced secondary treatment.

Projected usage of the Lower Potomac plant by 1990 will exceed the available 36 MGD capacity. Expected growth within the natural drainage area plus planned pumpovers exclusive of the Difficult Run pumpover will account for all programmed capacity. Pumping from Difficult Run has begun and by 1990 could generate between nine and ten MGD. Thus, total 1990 flows could approach 46 MGD. The delay in completing the Little Hunting Creek pumpover provides the County with some short-term flexibility in meeting the treatment needs in the Lower Potomac service area. However, regardless of a final solution for the Little Hunting Creek plant, additional capacity in the post-1990 time frame will be required at the Lower Potomac plant.

Alexandria Treatment Area. The Cameron Run and Belle Haven watersheds and the City of Falls Church are served by the Alexandria treatment plant. The Alexandria plant is owned and operated by the Alexandria Sanitation Authority and a portion of its capacity is contractually allocated to



SUMMARY OF EXISTING AND PROGRAMMED WASTEWATER TREATMENT CAPACITY

		Existing Conditions		Additions Programmed FY1985-1989		
Treatment Plants	Service Areas (Shed(s))	Treatment Level	Fairfax Capacity (MGD)	Treatment Level	Fairfax Capacity (MGD)	Online
D.C. Blue Plains	Pimmit, Dead, Scott & Turkey Runs Difficult Run[1], Sugarland Run, and Horsepen Run	Advanced Secondary	16.026	Advanced Secondary	13.974	1987
Arlington County	Four Mile Run	Advanced Secondary	3.90	—	—	—
Alexandria Authority	Cameron Run Belle Haven	Advanced Secondary	32.40	—	—	—
Lower Potomac (County)	Accotink[2], Pohick Creeks & Long Branch	Advanced Secondary	36.00	Advanced Secondary	18.0	1988
Little Hunting Creek (County)	Little Hunting Creek	Advanced Secondary	6.60	Abandoned 1988 by Pumping to Lower Potomac		
UOSA	Upper Occoquan	AWT	5.45	AWT	2.72	1986

[1] Capability ultimately exists to direct 10MGB to the Accotink Shed.
[2] Capability exists to divert 4.4MGD to the Cameron Run Shed.

Fairfax County. The Alexandria treatment plant has been expanded and upgraded to provide 54 MGD of advanced secondary treatment capacity. Fairfax County is allotted 32.4 MGD of capacity at Alexandria. By 1990, flows from Cameron Run, Belle Haven, and Falls Church should approach 24 MGD which will leave Fairfax County with unused capacity for several years beyond that time. By reactivating the Braddock Road and Keene Mill Road pumping stations, the County has the capability to divert some flows from the Accotink sewershed to Alexandria. These diversions will increase the County's wastewater management alternatives in the entire eastern portion of the County.

Blue Plains Treatment Area. With a capacity of 309 MGD, the District of Columbia treatment plant at Blue Plains is the largest plant in the area. In addition to the District of Columbia, it treats flows from Maryland, Virginia, and several federal installations. Wastewater originating in the Sugarland Run, Horsepen Creek, Difficult Run, Scotts Run, Dead Run, Turkey Run, and Pimmit Run watersheds are treated at Blue Plains. Fairfax County is presently allocated 16.026 MGD at the plant but by 1990 flows of about 23 MGD are projected. In order to meet this projected shortfall, a pumpdown from Difficult Run was constructed. This project will allow the County to honor its projected commitments through 1990. As discussed in the Lower Potomac section, the diversion of flows from the Difficult Run watershed will require capacity beyond 36 MGD at the Lower Potomac plant. Expansion of the Lower Potomac plant to 54 MGD is programmed in the CIP.

Arlington County Treatment Area. The Arlington County treatment plant serves that portion of Fairfax County within the Four Mile Run watershed. The plant has recently been expanded and upgraded to 30 MGD of advanced secondary capacity. Fairfax County now handles 3.9 MGD at the Arlington plant and the projections for 1990 indicate that this is sufficient.

Upper Occoquan Treatment Area. The southwestern part of Fairfax County is served by a regional plant owned and operated by the Upper Occoquan Sewage Authority. This plant became operational in 1978 and replaced five small treatment plants in Fairfax County (Greenbriar, Big Rocky Run, Flatlick Run, Upper Cub Run, and Middle Cub Run) and six in Prince William County. It has a design capacity of 22.5 MGD but due to reliability requirements is certified to operate at 15.0 MGD. Fairfax County's initial share of plant capacity was 30.83 percent but during 1978 the County purchased additional capacity from Manassas Park which brought the County's share of plant capacity up to 36.33 percent. The County's current capacity in the plant is 5.5 MGD.

Looking to the future, there are two major issues facing the sanitary sewerage system. A balance must be struck between the necessity of maintaining high levels of water quality and the cost, in terms of both money and other resources, of achieving these goals. To a similar end, consideration will be given to inspecting, repairing and maintaining the system at acceptable service levels. In many instances, modest annual expenditures for system upkeep will enable the County to avoid costly, major rehabilitation in the future.

SCHOOLS

After a period of extensive and dynamic growth in student membership during the 1950's and 1960's, Fairfax County student membership experienced more modest growth in the early 1970's reaching a peak membership during the 1975-76 school year. Fairfax County student membership decreased by 2,281 students from 1975-76 to 1976-77, by another 2,524 students from 1976-77 to 1977-78, and by an additional 2,715 students from 1977-78 to 1978-79. In contrast to the growing levels of decline in student membership experienced from 1975-76 to 1978-79, student membership decreased by only 1,489 students from 1978-79 to 1979-80, and by only 1,229 students from 1979-80 to 1980-81. From 1980-81 to 1981-82, membership decreased by 2,468 students; and from 1981-82 to 1982-83, membership decreased by 1,677 students.

The decline in student membership is attributed to the graduation of more students in one year than are received the next year. For example, the 1982 graduating 12th grade class of 10,566 students was replaced in the membership pipeline by only 6,916 new kindergarten students in the fall of 1982, resulting in a decline in replacement of 3,650 students. Offsetting the decline in replacement is the net in-migration of students to the Fairfax County public schools. The marked changes in the decline of student membership are the result of at least two factors: (1) changes in kindergarten membership and (2) changes in net in-migration of students to the Fairfax County public schools.

The elementary, intermediate, and high school projections are a summation of school-by-school projections which are based on a review of membership trends and take into consideration current and projected residential development within current school attendance areas.

The decrease in student membership has not been evenly distributed across the school division. Schools in the more developed and stable areas of the County have experienced a decline in membership which has not been offset by the net in-migration experienced in the growing and developing areas.

A summary of 1987-88 school-by-school projections by school administrative area and for the County show that administrative areas I and II serve sections of the County that are predominantly developed and stable, while administrative areas III and IV serve sections of the County that are experiencing the majority of residential development.

The need for new schools and additions to existing schools is determined by available capacity. Capacity is an estimate of the number of student spaces available within an educational facility and takes into account (1) educational specifications for elementary, intermediate, and high schools; (2) program requirements; and (3) appropriate pupil-teacher ratios. Kindergarten instructional areas are assigned a capacity of 50 spaces to reflect the two half-day sessions with a pupil-teacher ratio of 25:1 for each session. Variations in the age and design of school facilities, and the use of available space for purposes other than those provided for in the derivation of capacity estimates, may increase or decrease actual capacity. In addition, changes in the allocation of space for educational programs within a school may cause the capacity to vary from year to year.

The same capacity considerations that determine the need for new facilities also generate recommendations for which schools are surplus to the education facility needs of the school system. The beneficial use of these surplus schools and properties, either from the standpoint of adaptive reuse, leasing, or disposal as a marketable asset, has become increasingly important with the closing of schools in areas of the County which have experienced a sharp decline in student membership.

Fairfax County public school sites that have been declared either temporarily or permanently surplus are appropriate for activities allowed by right, special exception or special permit under the underlying zoning categories (or a category allowing the same density) of the school sites when they are compatible with all nearby residential areas. Specifically, activity related to such uses shall not adversely impact the adjoining

Table 1

ACTUAL AND PROJECTED STUDENT MEMBERSHIP[1]
FAIRFAX COUNTY PUBLIC SCHOOLS

Year (9/30)	Head Start	Elementary (K-6)	Intermediate (7-8)	High (9-12)	Special Education[2]	Total
1982	222	55,976	21,345	40,755	4,213	122,511
1983	303	54,194	20,845	40,593	4,627	120,562
1984	307	54,480	19,381	41,058	4,627	119,853
1985	307	56,403	18,053	41,390	4,627	120,780
1986	308	59,147	17,640	40,452	4,627	122,174
1987	308	62,129	17,605	38,812	4,627	123,481

[1] Five-year school-by-school projection
[2] Includes preschool special education

Table 2

SUMMARY OF 1988-89 SCHOOL-BY-SCHOOL PROJECTIONS
BY SCHOOL ADMINISTRATIVE AREA[1] AND COUNTY
FAIRFAX COUNTY PUBLIC SCHOOLS

	School Administrative Area[1]				
	Area I	Area Ii	Area III	Area IV	Total
Head Start	60	90	103	50	308
Elementary (K-6)	13,054	12,537	18,895	17,643	62,129
Intermediate (7-8)	3,716	3,510	4,599	5,780	17,605
High School (9-12)	8,278	9,078	10,126	11,330	38,812
Special Education[2]	1,382	1,124	1,162	959	4,627
Total	26,495	26,339	34,885	35,762	123,481

[1] School administrative areas differ in geographical boundaries from planning areas for the Comprehensive Plan.
[2] Includes preschool special education.

residential community in terms of: traffic, vehicular access, parking requirements, lighting, signing, outside storage, length and intensity of outside activity, or general visual impact.

A major thrust in school planning is the continued reduction of inequities between the County's newer and older schools. The major objectives of the renewal program are:

- to make the older school buildings operationally functional and in compliance with current safety and other standards; and
- to improve the ability of the school physical plant to support the educational program.

It is not an objective of the renewal program to make older physical plants look like newer schools. Rather, the thrust of the recommended renewal program is to make maximum utilization of existing facilities, and to provide operationally sound buildings which are functional and attractive, and which can support the educational program. Renewal of older schools includes upgrading of the physical plant and provision of facilities required by the instructional program of Fairfax County public schools. The same educational specifications used as a guide in the construction of new schools are used in planning renewals, although a school's original building design will be preserved to minimize cost. Renewals extend the useful life of the building for 20 or more years.

The work to be done varies according to the needs of the building. Typically, the elementary school renewal will include construction of a small (3,500 square foot) gymnasium; remodeling of space for media centers, music programs, and resource teachers; and other building improvements and site work as necessary.

The intermediate and high school renewals will include new ceilings and lighting, upgrading of electrical service, and completion of code requirements. Additional work, in accordance with the educational specifications for intermediate and high schools, will depend on the needs of the building. Typically, it will include improvement of auditoriums, media centers, science labs, and vocational facilities.

Eighty elementary schools, thirteen intermediate schools and nine high schools have been surveyed to evaluate and rate the physical condition of the facilities in accordance with predetermined criteria. These criteria included interior and exterior condition; adequacy of mechanical and electrical systems; adherence to handicapped requirements; OSHA, NFPA, and BOCA code requirements; and security. The same elementary schools were reviewed by the school division's Department of Instructional Services to determine facilities required to support the instructional program in accordance with the School Board's approved educational specifications for Fairfax County schools.

Renewal of seven elementary schools (Beech Tree, Braddock, Clermont, Graham Road, Hollin Meadows, Mount Eagle, and Westlawn) and two high schools (Marshall and Woodson) was funded in the 1981 bond referendum. Additional individual renewal projects will be identified prior to a request for funding. Identification of projects will depend upon building and instructional program evaluation, and School Board policy and assessment of need at the time of the funding request. Funds have been included in the CIP to support the renewal of an additional eighteen elementary, four intermediate, and four high schools.

The Fairfax County public schools system currently has 159 public schools consisting of 116 elementary schools (kindergarten through sixth grade), 20 intermediate schools (seventh through eighth grade), 20 high schools (ninth through 12th grade) and 3 secondary schools (seventh through 12th grade). An additional three facilities are used as special education centers.

Recent activity has included construction of the Forestville, White Oaks, and Terra-Centre Elementary Schools, and the Rocky Run and Langston Hughes Intermediate Schools; renewals at Centreville, Churchill Road, Kent Gardens and Woodley Hills Elementary Schools, Glasgow and Longfellow Intermediate Schools and Fort Hunt and McLean High Schools. Additions have been constructed at Sunrise Valley, White Oaks, Fox Mill, and Clearview Elementary Schools.

HUMAN SERVICES

The human services program addresses needs in three primary categories: health facilities, mental health and retardation, and social services.

In the health facilities category, the Fairfax County Health Department operates six public health offices located at Baileys Crossroads, Mount Vernon, Falls Church, Fairfax, Springfield and Herndon. Hospital facilities in the County include DeWitt Army Hospital at Fort Belvoir, Commonwealth Doctors Hospital, Fairfax Hospital and Mount Vernon Hospital and ACCESS, an ambulatory care and emergency service facility in Reston. The nonmilitary hospitals and ACCESS are owned by the County and operated by Fairfax Hospital Association, a nonprofit corporation, under leases with the County.

In the mental health and retardation category, the Fairfax-Falls Church Services Board operates three mental health centers; a residential treatment center for disturbed adolescent boys (Fairfax House); Oakton Arbor group home for girls; a residential drug treatment facility for adolescents (Crossroads); an alcoholism outpatient clinic; an alcoholic halfway house in Chantilly (New Beginnings); five group homes and seven group apartments for the mentally retarded; three group homes and 11 satellite apartments for recovering mental patients; a group education treatment home for children; and a shelter for battered women. Two other major facilities located within the County are the Northern Virginia Training Center for the Mentally Retarded and the Northern Virginia Mental Health Institute. Both are operated by the Virginia State Department of Mental Health and Retardation.

In the social services category, the Department of Social Services provides public assistance and social services to children and adults in Fairfax County and the Cities of Fairfax and Falls Church. The department operates from three offices—the main office on University Drive, a branch office on Leesburg Pike at Baileys Crossroads, and a branch office on Route 1 in Mount Vernon.

The possibility of using excess school space to meet human service needs is an aspect of human services planning that deserves continued investigation. A day care center has been established in the surplus Annandale Elementary School and additional space within the school is currently being used for a senior citizens center. A senior citizen nutrition program, an afterschool day care program, and evening and weekend recreation programs have also been extending the use of existing operating schools.

Based on declining enrollment trends, it is expected that excess space in operating schools or total buildings will continue to become available for uses other than educational ones. This is especially true of facilities located in the older, more developed sections of the County. Every effort should be made to evaluate excess space in operating schools or surplus space in entirely empty buildings for its potential use in satisfying human services needs.

No capital projects in the human services area have been programmed in recent years. This has occurred primarily because the County has continued to rely on the localized neighborhood provision of needed services through leased facilities.

The proposed capital program for human services for Fairfax County includes the relocation of the Crossroads residential facility. Crossroads currently operates a 40-bed residential drug treatment program at 5801 N. Kings Highway. The facility and property is leased from the Washington Metropolitan Area Transit Authority (WMATA). The lease is on a month-to-month basis pending completion of the Huntington Metro Station and subsequent need for the property. Site location in the southern part of the County for a new, relocated facility is suggested because of available and suitable County-owned land. In October of 1982, a trailer housing ten additional beds, was added to the program. Although this addition has accommodated a portion of the waiting list, at least fifty percent of the waiting list will not be served. Statistical projections based upon past admissions demonstrate a continued and increased demand for residential services. The size of the proposed facility is approximately 8,800 square feet and is estimated to be completed in 1986.

CRIMINAL JUSTICE

Prior to the late 1970's, the Fairfax County Courthouse and jail were the major criminal justice facilities in the County. Housed within the courthouse were the Circuit Court, General District Court, Juvenile and Domestic Relations District Court, and related administrative functions. However, due to rapidly increasing judicial and correctional demands, the County has constructed several other facilities. The first of these was the Adult Detention Center (ADC) on the central County complex in Fairfax in 1978. The County has also completed renovation of a portion of the old jail to serve as a pre-release center.

In April of 1982 the County completed construction of the Judicial Center adjacent to the ADC. The Judicial Center houses both the Circuit and General District Courts. In addition, seven violations bureaus associated with the General District Court are decentralized throughout the county in police district substations and governmental centers.

The County has a wide range of juvenile justice facilities associated with the Juvenile and Domestic Relations District Court. There are two regional offices, one in McLean and one in Mount Vernon; and there is a girls' probation home located on Lee Highway in Fairfax. Alternative House, which houses runaways, three group homes, and the Northern Virginia Regional Detention Home are other facilities associated with the juvenile justice system. In 1982 two additional facilities opened: a juvenile detention center on the central County complex and a boys' probation home on Shirley Gate Road.

The primary issue facing the County's criminal justice system during the 1980's is the provision of adequate inmate capacity at all levels of detention. Even though completed in 1978, the Adult Detention Center (ADC) has proved to be inadequate to meet current demands. There are two reasons for this inadequate capacity. First, the number of sentenced offenders requiring maximum security detention has continued to grow. In addition, nonviolent offenders must also be housed in the ADC due to the lack of detention alternatives. The Board of Supervisors responded to this situation in 1981 by establishing a task force to study various alternatives to incarceration. The task force recommended a three-phase approach to existing and projected requirements for correctional facilities. For sentenced offenders requiring maximum security detention and persons awaiting trial, expansion of the ADC was proposed. For nonviolent sentenced offenders, it was determined that the maximum security environment of the ADC was a costly detention alternative. To meet this need, a medium security correctional camp was found to be more desirable from both a cost and rehabilitation standpoint. A minimum security pre-release

center was also recommended as a transitional step to integrating sentenced offenders back into the community.

New or expanded facilities will also be required by the Juvenile and Domestic Relations District Court for both judicial and detention needs. The Juvenile and Domestic Relations District Court are housed in the original Fairfax County Courthouse. The building is in need of considerable renovation to bring it up to modern standards for environmental control and space utilization. However, the building structure is sound and it is a valuable resource for administrative and judicial space.

As in the case of adult offenders, the need for juvenile detention space continues to grow. By the end of the decade, there will be a need for approximately 22 additional secure detention spaces for juveniles. There will also be a future need for a nonsecure facility to shelter both children in need of services (CHINS) and less serious delinquent offenders who do not require secure detention.

The future space needs of the Juvenile and Domestic Relations Court will be met by use of the old County courthouse. However, in order to effectively utilize this space, considerable renovation work will be required. This work will include a new heating, ventilation, and air conditioning (HVAC) system, barrier-free accessibility and facilities, fire detection and suppression equipment and repartitioning of space. This project was the subject of a $5.12 million bond referendum that was approved by the voters in November, 1980.

COMMUNITY CENTERS

A variety of centers and programs exist in the County, offering leisure time activities and services for Fairfax County residents. Assistance is also offered in organizing youth (teen) clubs, aiding community groups in leisure time planning and development, and providing speaker and/or slide presentations on departmental programs to interested citizen groups.

Various programs are offered at the community centers during the entire year for Fairfax County residents of all ages. These programs include playgrounds, teen activities, senior adult clubs, athletic teams, hobby and adult education classes, and adult and family nights. The community centers are located in the Baileys, Lincoln-Lewis-Vannoy (Braddock), Gum Springs, Huntington, James Lee, Zion Drive (David R. Pinn), Herndon, Reston and McLean areas of the County.

PUBLIC SAFETY

During the 1980's, Fairfax County will continue to demand the timely delivery of modern efficient public safety services. Maintenance of an adequate level of service will require facility improvements of three general types: construction of a new facility to provide improved service levels; construction of a new facility to replace temporary rented or substandard quarters; and renovation and/or expansion of existing facilities.

The present system of fire and rescue services in the County consists of 29 fire stations, a training center, and a communications center. Existing stations have been located based on response time and distance criteria promulgated by the National Board of Fire Underwriters and the Insurance Services Office. County fire stations are also augmented by two cooperative agreements for emergency response. On November 20, 1978, Fairfax County and the City of Fairfax approved a general services agreement which included a new contract for the provision of fire and rescue services. Under the terms of the new agreement, the City of Fairfax will continue to serve those portions of the County which are adjacent to the city on its northern, western, and southern borders and had been served in the past by Company #3 before it was acquired and operated by the City of Fairfax. The Northern Virginia Regional Response Agreement provides for fire and rescue response on the basis of the closest station, regardless of jurisdictional boundaries. In both the Lincolnia and Franconia-Telegraph areas, this agreement ensures an adequate level of coverage by either the City of Alexandria or existing County stations.

Fairfax County police administration is decentralized into seven district police stations at Chantilly, Franconia, Groveton, Mason, McLean, Reston and West Springfield. Central administration offices are housed in the police administration building at the central governmental complex in Fairfax, while training activities take place at the Northern Virginia Criminal Justice Academy in the former Fairfax elementary school in the City of Fairfax. With the exception of the Chantilly and Reston facilities, police activities are combined with other services in new governmental centers constructed in recent years. Recommendations for construction of the new governmental centers were based on the County's policy of extending government services to County residents through decentralization, replacing inadequate police facilities and the experience gained over the past eight years with the four existing governmental centers. Sufficient space for police will include areas for administrative offices, detention facilities, roll call and report writing rooms, locker and washroom facilities, office and interview rooms, offices for special justices and storage space. Additional space for other governmental services is proposed for juvenile and domestic relations court, assessments and voter registrar, inspection services and district supervisor. Each of the facilities was evaluated on the basis of accessibility to the public, the effect of extension of services on agency production, and the interrelationships between agencies and access needed to central working files.

The County constructed an animal shelter in 1975 to provide holding and processing areas for unwanted and stray dogs and cats. The shelter also provides administrative space and a classroom for humane education. The increasing number of stray animals which must be handled at the shelter will necessitate additional space for this facility.

Three vehicle maintenance facilities provide service to the County's public safety fleet. The West Ox facility was constructed in the early 1970's and is structurally and functionally adequate. The Jermantown Road garage requires some renovation work to meet all code requirements but should not receive extensive funding prior to a possible decision to relocate the facility. The Newington garage requires extensive renovation to meet building code requirements and expansion of the physical plant to meet increased service demands.

Five facilities are proposed during FY 1984-FY 1988 for the upgrading of fire and rescue services in the County. A station in Oakton will provide improved response to the developing commercial areas in the vicinity of I-66 and Route 123. The Pohick fire station will serve the developing residential areas in the vicinity of Pohick and Hooes Road. A station is also planned near Dulles Airport which will be located so as to be responsive to the industrial development around the airport as well as residential development in the area. The Navy-Vale fire station will be relocated to Route 50 near West Ox Road and will jointly occupy a site with the police department. Expansion and improvement at the County's fire training center off West Ox Road is also scheduled during this time. With the exception of the Pender station, all fire and rescue projects will be funded from the proceeds of the 1980 public safety bond referendum which was approved in November 1980.

New police substations will be constructed at Pender and in Reston to replace existing leased facilities at Chantilly and Isaac Newton Square. The McLean Governmental Center will be expanded and extensively remodeled to provide improved police functions and additional space for the district supervisor. A new firearms training facility at the Popes Head Road training site will be constructed.

LIBRARIES

Since 1962 the Fairfax County public library system has grown from two permanent regional libraries to four regional libraries, ten community libraries, five neighborhood libraries, one bookmobile, one outreach van equipped for the handicapped and elderly, three portable mini-libraries, and talking book service. In addition, the library system provides its users reciprocal borrowing privileges with libraries in Montgomery and Prince Georges Counties in Maryland; Virginia libraries in Arlington, Loudoun, and Prince William Counties, Alexandria and Falls Church Cities; and the District of Columbia Public Library. The expansion of the library system was financed through a $5,160,000 bond issue approved by voters in 1966. All of the bonds from this referendum had been sold by the spring of 1980.

In the fall of 1979 the Fairfax County Library Board of Trustees authorized a long-range space needs study. The study entitled *Public Library Space, Fairfax County, Virginia: A Study, with Recommendations, of the Physical Facilities/ Space Needs of the Fairfax County Public Library to the Year 2000* was undertaken by HBW Associates. As a final recommendation, HBW Associates recommended that the County eliminate the large central library component of the regional library service concept. The rationale for the recommendation was threefold:

- Fairfax County's pattern of cluster development provides no central area or "downtown" in which a central library might be logically located;
- it would be very expensive to construct and operate a new central library in the future, and;
- there is an absence of public transportation to any central location in the County.

Therefore, HBW Associates proposed the allocation of most of the special collections to the regional libraries and the construction of an administrative/support services center would house library administration, technical support services, limited special collections and county-related and public services and would be centrally located.

In January of 1980, the library Board of Trustees accepted the study as a planning tool and approved a two-part capital construction program which reflects an increased emphasis on regional libraries. Part I of the program consists of eight projects that were initially approved for funding in FY1981 with revenues from bonds sold in 1980 and the balance of the library construction fund. The projects included in Part I are:

Library	Description
Central Regional	Remodel Design
Centreville Regional	Site Acquisition
Dolley Madison	Renovation
Lorton Community	Site Acquisition
Pohick Regional	Site Acquisition
Two Porto-Structures	Acquisition
Reston Regional	Design
Tysons Pimmit Regional	Design

Site acquisition for the Centreville regional and Lorton community libraries has been completed and the two porto-structures have been constructed.

Part II of the capital program provides for the completion of the five ongoing projects from Part I:

Library	Description
Central Regional	Renovation
Dolley Madison	Renovation
Pohick Regional	Design and Construction
Reston Regional	Construction
Tysons Pimmit Regional	Construction

On August 4, 1980, the Board of Supervisors authorized funds for the purchase of three prefabricated portable library structures which have been erected at three different sites in the County. One structure was erected in the Fair Oaks mall shopping center and opened on November 22, 1980. A second structure was erected in the Burke Centre area, and opened in January, 1982. The third structure is located in the Great Falls Grange Park and opened in July, 1982. The source of funds for this project was bonds authorized by the 1966 library bond referendum, in the amount of $562,000.

Land acquisition for the Centreville regional library was completed in 1982. This project provided only for land acquisition for a facility to be designed and built in the future. The site selected is located at the intersection of Lee Highway (Route 29) and Machen Road in Centreville.

A joint Lorton library, Community Action Center and public park project, provided for the land acquisition of an 8.5 acre tract in 1981. The actual facilities will be designed and constructed in the future.

PARKS AND RECREATION

Since their establishment in 1950, the Fairfax County Park Authority has acquired over 14,000 acres of parkland including 290 individual parks. Funds to carry out these capital improvement programs were provided through bond referenda approved by the voters in 1959, 1966, 1971, 1977, and 1982. Currently, almost one-half of operating funds are raised by revenue-producing facilities in the system; additional funding for the operation and maintenance of parks are appropriated annually by the Board of Supervisors. Grants from state and federal governments supplement funds on a limited basis; however, gifts/donations from individuals, community organizations, corporations, and foundations are an increasingly important source of funding for community improvements.

The existing and proposed system of Fairfax County parks attempts to establish full opportunity for all residents and visitors to make constructive use of their leisure time through the provision of recreational and cultural programs within safe, accessible and enjoyable parks. Additionally, the park system serves as the primary public mechanism for the preservation of environmentally sensitive land and water resources and areas of historic significance. Parklands to be acquired shall usually be classified in one of the categories listed below. However, the list is not restrictive since citizen needs, both present and future, may require acquisition of combination park types or ones that differ from all the categories listed below.

- Regional and County parks are normally 200 acres or greater in size. Both provide countywide service, while regional parks are designed to serve the Northern Virginia region. Service is defined by conservation objectives, by the range of experience potentially offered by this large size such as golfing, camping, boating and nature education and by the length of stay by the user which may be a full day or longer.
- District parks are about 100 acres in size and are designed to provide areawide service to several sections of the County and to support an extended days visit such as an afternoon. District parks consist of both natural resource areas and user areas similar to their larger counterparts. However, they are primarily developed for active recreation, having facilities such as ballfields and tennis courts and/or a special facility such as a recreational center.
- Community parks, the most common park category, are designed to serve people living in their immediate vicinity for short term visits such as after school or after work. Community parks generally range in size from five to 25 acres. Facilities provided on a fully developed community park may include ballfield, multiuse court, tennis court, and picnic area.
- Stream valley parks include land lying in the floodplain and associated slopes exceeding 15 percent. Development is limited mainly to trails with emphasis on conservation.
- Historic parks contain buildings, resources or areas of historic/prehistoric interest that should be preserved for public use and education.

Determination of the need for community-serving parks is partly based on an adopted standard of 8.5 acres of community-serving parkland for every 1,000 persons within the service area of a park. Service areas of community parks are considered to be the area within a ¾ of a mile radius in more rural sections of the County.

Development projects, on the other hand, have been emphasized to better balance the proportion of developed and undeveloped parks, particularly in the urbanized areas of the County. Standards recommended by the National Recreation and Parks Association guide the planning of recreation improvements. With past emphasis on acquisition, the great bulk of land owned by the FCPA is unimproved.

Conservation proposals are designed to further the protection and preservation goals of the FCPA. The conservation aspect of the program is balanced with certain facility development proposals for specific activities such as interpretation of our natural environment.

County park projects reflect a continued interest in larger serving, multiuse park areas strategically located throughout the county for easy access. These parks also reflect the revenue potential of the park system, which assists in defraying general fund operating budgets while at the same time offering services such as golf, boating, camping, swimming, rides, and food services.

Stream valley acquisition and trail development for hiking, biking, and equestrian purposes follow the stream valley policy adopted by the Park Authority, the countywide trails plan, and the concept of environmental quality corridors.

1982-83 marks the completion of a 5-year program begun in the summer of 1977. This program has provided for the development of over 600 new facilities and the addition of 3,150 acres of parklands through purchase, dedication and donation. Accomplishments of the last 5 years include:

- a 70 percent increase in community park acquisitions and improved facilities;
- new recreation center/pool complexes at Lee, Mount Vernon and Providence District Parks which provide year-round recreational opportunities;
- two new nature centers, one at Hidden Pond, one at Huntley Meadows;
- an auditorium at Hidden Oaks;
- many interpretive trails and exhibits to expand our natural horizons;
- the opening of Frying Pan Farm Park activities center for equestrian and other multi-purpose programs;
- the opening of Green Spring Farm Park horticulture center;
- new athletic field complexes in community, district and County parks;
- stream valley sites acquired in environmentally sensitive areas which have significantly expanded the County's environmental quality corridor system; many stream valley trail connections in the valleys are completed or underway; and
- completion of historic restoration projects at the Wakefield Chapel, Dranesville Tavern and Cabell's Mill/Walney Visitors Center in Ellanor C. Lawrence Park which will preserve key elements of our cultural heritage. Frying Pan Farm Park school house is now being rehabilitated.

Northern Virginia Regional Park Authority

Fairfax County was one of three local governments which helped to found the Northern Virginia Regional Park Authority (NVRPA) in 1959 under the Virginia Park Authorities Act. Now six jurisdictions are members: the counties of Arlington, Fairfax and Loudoun and the cities of Alexandria, Fairfax and Falls Church. The NVRPA exists to plan, acquire and develop and operate a system of regional parks for Northern Virginia's citizens to supplement and augment their own facilities. Regional parks are distinguished from county and local parks in two ways:

- they are designed to appeal to and serve the board-based population of the entire Northern Virginia region; or
- the Regional Authority may assume projects which a single jurisdiction could not undertake alone. The Washington and Old Dominion Railroad Regional Park which extends through Alexandria, Arlington, Falls Church, Fairfax and Loudoun Counties is an example of a project which has region-wide characteristics.

The NVRPA now owns 8,400 acres, approximately 7,000 acres of it in Fairfax County. It serves a population of almost one million people.

NVRPA now operates 11 parks in Northern Virginia: Bull Run, Bull Run Marina, Fountainhead, Sandy Run, Pohick Bay, Carlyle House Historic Park, Potomac Overlook, Upton Hill, Algonkian, Red Rock, and the W&OD Railroad Regional Park, the Occoquan Regional Park, and the Hemlock Overlook environmental studies center.

In its conservation role, NVRPA is involved in implementing portions of the environmental quality corridors concept (see Table 14) which defines an open space land system in the County designated for long-term protection. In this role, NVRPA is charged with acquisition of the shoreline properties along the Potomac, Bull Run, and Occoquan Rivers, while the Fairfax County Park Authority is charged with acquiring land along the county's interior stream valleys.

Due to financial, political, logistical and other constraints, NVRPA has found it necessary to develop a phased, prioritized project implementation program based upon the following criteria: environmental and ecological qualities, recreation user potential, accessibility, public demand, historical demand, scenic or other aesthetic or intangible qualities, urgency (imminence of loss), cost, inflation patterns, potential for outside funding assistance, revenue-producing potential, operational costs, and readiness-to-go status.

In view of the current economic climate, the Regional Park Authority will improve and upgrade existing regional parks instead of undertaking major new regional park projects. The $8 million bond referendum share from Fairfax County, when

matched by funds from the other five jurisdictions, will enable the Regional Park Authority to carry out a $14 million program over a five year period.

The Regional Park Authority proposes to acquire approximately 200 additional acres of land, most of them small in-holdings or parcels adjacent to existing parks, at a cost of $1.2 million. Land acquisition accounts for about 9 percent of the capital improvement program for NVRPA.

Seventy-five percent of the regional park bond funds will be used to develop facilities within existing parks. The new facilities will be revenue procedures that will pay their own operating costs and not pose an additional financial burden on taxpayers.

The Regional Park Authority is now completing a 5-year capital program begun in 1977. Most of the projects identified in that program have already been accomplished, with others in various stages of implementation.

Of that amount, approximately $1.3 million has been paid to retire land acquisition bonds issued in prior years. NVRPA is now debt-free. $11.1 million has been invested in the acquisition of approximately 1,400 acres of parkland. During the 5-year period, the Authority will have accomplished various development projects valued at approximately $16.5 million.

Perhaps the most notable project accomplished during the past 5 years has been the acquisition and development of the former Washington and Old Dominion Railroad (W&OD) right-of-way for conversion into a linear park. It is already one of the more prominently used parks in Northern Virginia.

ENVIRONMENT

AIR QUALITY

General

This section of the Comprehensive Plan is provided in order to assist planners and developers from both the private and public sectors of the County in their efforts to achieve orderly growth—while maintaining and protecting a healthy environment. The methodology used in working to attain this goal can best be described as falling in the following categories:

- understanding federal, state, and local laws as they apply to the quality of the air we breathe;
- definition of pollutants as presently addressed in existing legislation; and
- the resources, both human and material, that are necessary to monitor and analyze the quality of ambient air, enforce the law, and support County planners in their efforts to develop the County while protecting the health and welfare of its residents.

The air quality issue for Fairfax County and the rest of the Washington metropolitan area is primarily the result of land use patterns and the resultant transportation system. As the dominant land use pattern evolved from rural to suburban, leap-frog residential developments promoted heavy dependence on the automobile as the principal form of mobility. Because of the extensive use of the auto, emissions of air pollutants have resulted in recurrent air pollution episodes during which health-related air quality standards have been exceeded. Other pollutant sources, such as industry, have had a minimal effect on County air quality due to relatively light industrial development and emission control programs which strictly regulate the amount of pollution which may be emitted.

Basically two air quality problems have been identified. One problem, photochemical oxidant formation, is a major regional air quality concern and is related to the emissions associated with automobile use. Monitored data from the air quality sampling stations at Lewinsville, Massey, Seven Corners and Mount Vernon confirm the existence of photochemical oxidant concentrations in violation of air quality standards. As vehicle use has increased, emissions of pollutants which form photochemical oxidants, hydrocarbons and oxides of nitrogen similarly increased. The relationship of automobile use to oxidant levels has been considered in the area plans through the planned development centers which will be serviced by mass transit and which will promote employment and commercial service opportunities near residences. Lower density land uses were proposed in areas between development centers. In addition, a sophisticated concept of land use and transportation planning has been proposed which is viewed as a method to implement federally mandated air quality management programs and standards.

The second air quality problem is carbon monoxide (CO) buildup as it relates to congestion on key roadways operating at or above capacities. Queuing, or stop and go traffic operation, generally results in increasing carbon monoxide concentrations within the immediate vicinity of the roadway or intersection. The possibility of hot spot development at already overloaded intersections in eastern Fairfax County, Alexandria, and Arlington County was identified during the area planning process. Analysis of this potential problem will be incorporated into the review of all projects. Possible mitigation actions include denial of construction permits, modification of proposed land uses, and traffic flow improvements via a number of highway design alterations. However, if the improvement of highways and intersections results indirectly in promoting the use of the private automobile, the primary regional pollution problem, photochemical oxidants, could become more serious.

Legal Criteria

At the federal level, land use decisions are influenced by provisions of the Clean Air Act of 1963 (and its amendments). At the state level, the provisions of Chapter 1.2, Title 10, *Code of Virginia* of 1950 (as amended), have been promulgated as Regulations for the Control and Abatement of Air Pollution. Within Fairfax County, the *Air Pollution Control Ordinance* appears as Chapter 103 of the 1961 *Code of Fairfax County, Virginia*, as amended. An understanding of the fundamental purpose of each of these legal and policy directives is necessary if the planner is to grasp the significance and necessity of applying air quality standards to the decision-making process in the business of land use control.

A review of the essential elements of each of these three governing directives is now in order:

1. The opening section of the Clean Air Act reads as follows:

> Sec. 101. (a) The Congress finds—
>
> (1) that the predominant part of the nation's population is located in its rapidly expanding metropolitan and other urban areas, which generally cross the boundary lines of local jurisdictions and often extend into two or more states;
>
> (2) that the growth in the amount and complexity of air pollution brought about by urbanization, industrial development, and the increasing use of motor vehicles, has resulted in mounting dangers to the public health and welfare, including injury to agricultural crops and livestock, damage to and the deterioration of property and hazards to air and ground transportation;
>
> (3) that the prevention and control of air pollution at its source is primarily the responsibility of states and local governments; and
>
> (4) that Federal financial assistance and leadership is essential for the development of cooperative federal, state, regional and local programs to prevent and control air pollution.
>
> The purposes of this title are—
>
> (1) to protect and enhance the quality of the nation's air resources in order to promote the public health and welfare and the productive capacity of its population;
>
> (2) to initiate and accelerate a national research and development program to achieve the prevention and control of air pollution;
>
> (3) to provide technical and financial assistance to State and local governments in connection with the development and execution of their air pollution prevention and control programs; and
>
> (4) to encourage and assist the development and operation of regional air pollution control programs.

2. Reflecting the intention of the Congress, the Board of Supervisors, in promulgating a list of 16 interim policies to guide future planning in Fairfax County, identified the first three of the 16 policies in recognition of environmental goals. These policies are:

- Policy 1: Quality of Life—Fairfax County is committed to improving the quality of life through local and regional comprehensive planning and development control systems, which facilitate the effective allocation of public resources and shape development patterns.
- Policy 2: Regional Growth—Fairfax County should attempt to control and direct its growth in accordance with a regional optimum growth policy, based on quality of life and environmental constraints. Within that framework, the County should accept its fair share of the region's growth.
- Policy 3: Environmental Constraints on Development—The amount and distribution of population density and land uses in Fairfax County should be consistent with the environmental constraints inherent in the need to preserve natural resources and meet federal, state, and local water quality standards, ambient air quality standards and other environmental standards.

Definition of Pollutants

In order to respond to the U.S. *Code*, and to permit a clear understanding of the 7 pollutants now being controlled by the Commonwealth of Virginia, the State Air Pollution Control Board has defined these pollutants as follows:

1. Suspended Particulate consists of finely divided particles that remain in the air for extended periods. Because of the small size of suspended matter, it can be inhaled into the lungs and may affect health.
2. Sulfur Dioxide (SO_2) is a gas resulting mainly from the burning of coal and oil. High concentrations of sulfur dioxide combined with high suspended particulate levels may constitute a health hazard.
3. Nitrogen Dioxide (NO_2) is a gas resulting from the operation of the internal combustion engine and other sources. It is significant as an air pollutant because of its role in smog formation.
4. Carbon Monoxide (CO) is a gas resulting from the incomplete combustion of fossil fuels. The principal sources are motor vehicles.
5. Photochemical Oxidants (Ozone) are produced by the reaction of nitrogen oxides and reactive organic compounds in the presence of sunlight. Photochemical oxidants produced in this manner have been linked with irritation of the mucous membrane in humans, plant damage, and the deterioration of materials.
6. Hydrocarbons are organic compounds containing only hydrogen and carbon. These compounds are most frequently created as a result of the incomplete combustion of fossil fuels.
7. Lead is emitted to the atmosphere by engines burning leaded fuel and by certain industries. Airborne lead is associated with particles ranging between 0.1 and 5.0 microns in diameter.

Air Quality Standards

As for the actual air quality standards currently being enforced, they have been set and published by the Environmental Protection Agency (EPA) as the implementing agency of the U.S. Congress. The national standards have been adopted by the Virginia State Air Pollution Board as state standards, and by the Fairfax County Board of Supervisors as County standards. Primary ambient air quality standards define levels of air quality which the EPA Administrator judges to be necessary—based on air quality criteria and allowing an adequate margin of safety, to protect the public health. Secondary standards define levels of air quality which the Administrator judges necessary, based on air quality criteria, to protect the public welfare from any known or anticipated effects of an air pollutant. The standards that relate to gas data included in this report are listed in micrograms per cubic meter (ug/M^3) and parts per million (ppm). Since gas data reported in the

tables are reported as parts per million, the standards given in parts per million should be used to evaluate data. (Figure 1)

Figure 1
NATIONAL AMBIENT AIR QUALITY STANDARDS

	Primary Standard		Secondary Standard	
	µg/M³	ppm	µg/M³	ppm
Sulfur dioxide				
annual arithmetic mean	80	0.03	1300*	0.5*
24-hour concentration	365*	0.14*		
3-hour concentration				
Suspended particulate matter -				
annual geometric mean**	75		60	
24-hour concentration	260*		150*	
Carbon Monoxide -				
8-hour concentration	10,000	9.0*	Same as primary	
1-hour concentration	40,000	35.0		
Ozone (photochemical oxidants)***	235	0.12	Same as primary	
Hydrocarbons (non-methane)	Standard has been rescinded			
Nitrogen dioxide				
annual arithmetic mean	100	0.05	Same as primary	
Lead -				
maximum arithmetic mean averaged over a calendar quarter	1.5		Same as primary	

*Not to be exceeded more than once a year.
**The geometric mean (rather than the arithmetic mean) is used when measuring suspended particulates. This procedures was established to minimize numerical aberrations which result in the unusual cases where extremely high particulate readings are recorded, i.e., forest fires or dust storms.
***No more than one exceedant day, on the average, per year over the most recent three calendar years. An exceedant day contains one or more hourly concentrations greater than 235 ug/M³ (0.12 ppm). Revised 1978

Resources

In order to maintain and operate an effective air pollution control system, four specific elements are involved:

1. A thorough and frequently updated emission inventory. This inventory is compiled by identifying every known source of pollution throughout the County; i.e., residential, industrial, and commercial (the point sources), together with the mobile emitters (line sources). The problem of maintaining an accurate inventory becomes complicated when an effort is made to collect and analyze the pollutants emanating from complex or indirect sources, such as shopping centers or arenas which, by design, attract people and, therefore, vehicles.
2. An efficient monitoring network which, when combined with a meteorological capability, produces the data which form the basis of air quality inputs to land use plans.
3. A mathematical dispersion model to insure that emission standards and air quality standards are mutually consistent with one another.
4. The human resources needed to enforce the law, update the existing emission inventory, analyze the monitored data, program the model, and provide go or no-go answers to planners and developers.

Criteria Used in Developing an Air Quality Resources Conservation and Allocation Plan

The air analysis for any locality is conducted in much the same manner as any other planning analysis. The language may be different, but there is no air pollution control mystique and the concept is easily understood. The air analysis section of the Comprehensive Plan contains the following five basic steps:

1. Establishing air quality baseline for the planning area.
2. Defining the tolerance of the planning area toward receiving additional pollutant emissions as a function of air quality standards, existing air quality, and air quality maintenance policies.
3. Determining acceptable industrial and transportation activities which may be added to existing land use as a function of the pollutant tolerance of the planning area and generalized pollutant emission rates.
4. Distributing industrial and transportation land use within comprehensive land use plan(s) using generalized dispersion patterns of major air pollution sources and spatial patterns of existing air quality to locate land use activities.
5. Evaluating the air quality impact of the plan(s), modifying land use as required by compliance evaluation with the air quality standards.

These five steps can be presented in analytical form as shown in Figure 2.

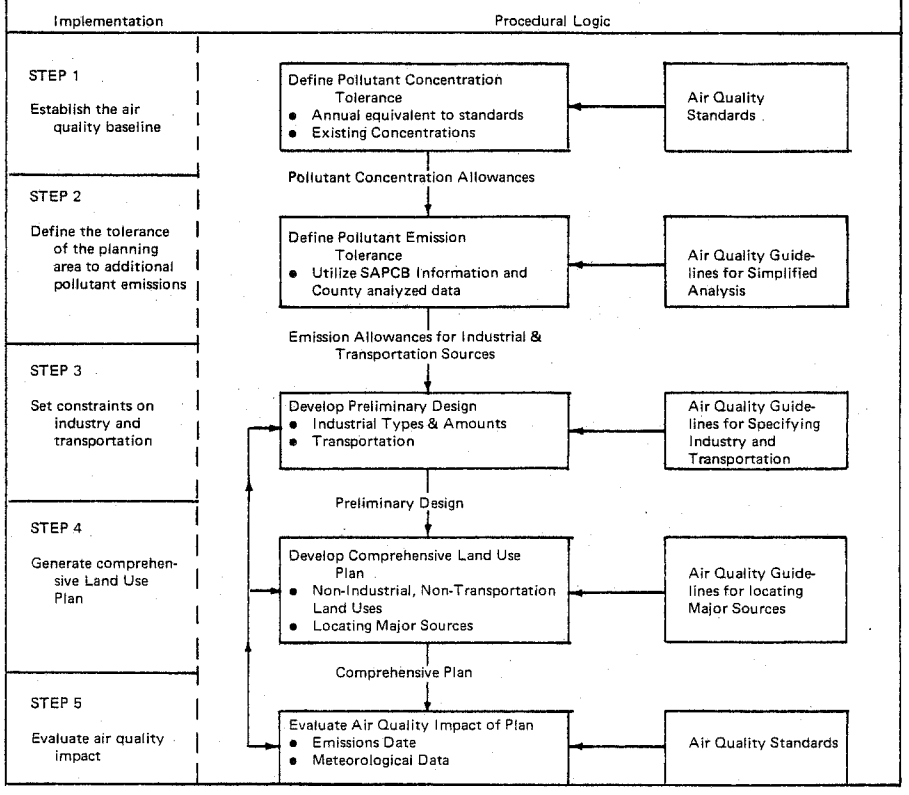
Development Impact Examples

1. The Plan must consider the projected growth in population and include the ancillary items which will affect air quality (roads, housing, commercial development, etc.).
2. Where private utility sources are projected, consider their impact on air quality vis-a-vis the utilization of public utility services.
3. The probable consequences (trend) of growth and development for the region as well as the community should be stated.
4. Location and rate of development along with total development must be considered in order that the impact of projected direct and indirect sources for each pollutant can be stated.
5. Development which is heavily dependent on the automobile (or which for other reasons poses threat of air quality) may indicate a potential for degrading areas not now thought to be critical to ambient air quality.
6. Areas where there is already high air pollution should not be released for development. For example, the heavy traffic on most interstates in urban areas generates significant amounts of carbon monoxide and hydrocarbons. Impact development of such areas must consider not only the traffic but also the impact of development at interchanges and accesses to main arterial highways. This secondary development is most important from an air pollution control point of view.
7. Considerations concerning size and location of industrial parks, open spaces, urban renewal, etc., should not only concentrate on amount of pollution or lack of pollution associated directly therewith, but also the indirect effects, such as induced automobile traffic or public transportation. This factor will not only impinge on the amount of pollution, but also the energy utilized. Normally, any process that conserves energy reduces pollution.

Industrial Sources of Pollution

Several major point sources of pollutants are located throughout Fairfax County. These sources are industries involved in concrete and asphalt batching operations, manufacturing, heavy oil users, and fuel storage facilities. Major additional

Figure 2 **AIR QUALITY PLANNING STRATEGY**



sources of pollutants near these plants could result in violations of air quality regulations. See Figure 3.

Consideration of sites for additional industrial uses should be made only after careful study of the probable impacts resulting from adding particulate pollutant sources to the existing situation. This is particularly important when Federal and State requirements for nondegradation of air quality are recognized. These pollution sources are presently regulated under emission control programs which are designed to assure that ambient air quality standards will not be exceeded as a result of their operations. Air quality management, through land use planning, mandates changes in the industrial location and control process to consider areas already experiencing high, though allowable, pollutant levels as being particularly sensitive. While not precluding industrial land uses in these areas, the effect of this concern is to allow only clean industry into these sensitive areas.

Figure 3 **MAJOR INDUSTRIAL SOURCES OF POLLUTANTS**

PLANNING AREA	PLANNING SECTOR	MAP GRID	SOURCE
I	J9	40-3	Concrete batching plant
	B4	62-3	Concrete batching plant
	B2	61-2	Heavy oil user
	B5	51-3	Heavy oil user
II	V1	49-3	Fuel storage tanks
	J10	40-3	Concrete batching plant
	F6 (Fairfax City)	48-3	Asphalt batching plant
	F6 (Fairfax City)	58-1	Fuel storage plant
III	UP6 (Herndon)	10-4	Concrete batching plant
	BR5	64	Concrete batching plant
	BR5	64	Asphalt batching plant
	BR5	64	Stone quarry
	P5, P6, P7	77-3	Concrete batching plant
IV	LP1	112	Quarry Asphalt batching plant
	LP5	109-3	Heavy oil use
	S5, S6	99-3	Concrete batching plant
	S7	90-2	Fuel Storage tank farm Manufacturing

Construction Sources of Particulate Matter

Soils which have been disturbed and whose vegetative cover has been removed during construction are subject to wind erosion and man-made transport (i.e., by vehicular traffic), and therefore result in increased localized particulate levels. Site clearing control should be focused on assuring that a minimum of soil cover is removed and that cleared areas are stabilized as soon as possible.

Transportation-Related Pollution

Development of western Fairfax County and its attendant traffic generation will cause many existing roads to be congested; then, queuing at intersections will result in a sharp increase in carbon monoxide emissions and concentrations in the immediate vicinity of the roadway (within 160 feet or less). Generally speaking, roadways which experience stop and go traffic, designated level of service F, are likely to be locations of highest CO concentrations.

The following road segments are expected to reach service level "F" in 1990:

1. Area II
   - Old Dominion Drive (Route 309) between Route 123 and Arlington County
   - Several locations along Dolley Madison Boulevard (Route 123) between Nutley Road and George Washington Parkway, especially at Tysons Corner and Old Dominion Drive
   - Leesburg Pike (Route 7) between Route 123 and I-495
   - Gallows Road (Route 650) between Lee Highway and Arlington Boulevard
   - Several locations along Arlington Boulevard (Route 50) especially at Gallows Road, Graham Road, Annandale Road and Seven Corners
   - Several locations along Lee Highway (Route 29), especially at Nutley Road
   - West Ox Road (Route 608) at Route 50
2. Area III
   - Braddock Road (east of Burke Lake Road)
   - West Ox Road (near the intersection with Waples Mill Road)
   - Route 7 (east of Colvin Run Road)
   - Reston Avenue (near South Lakes Drive)
   - Route 50 (near Pender)
   - Route 28 (between I-66 and Route 29)
   - Route 123 (at Butts Corner)
   - Route 193 (at Great Falls Park)
   - Route 28 (at Sully Plantation)
   - Route 123 (at Fairfax City line)
   - Rolling Road (north of Burke Lake Road)
   - Burke Lake Road (west of Rolling Road)
3. Area IV
   - I-95 (all)
   - Route 1 (Hybla Valley to Penn Daw)
   - Van Dorn Street (all)
   - Telegraph Road (Franconia Road to I-495)
   - Backlick Road (Annandale to Fort Belvoir)

Land Use Patterns and Pollution

It has been axiomatic in the field of air quality control that dispersing sources of pollutants through land use planning will result in lower concentrations of pollutants and generally acceptable air quality conditions. While this approach has merit under some circumstances, it is not applicable to the Washington metropolitan area in general or to Fairfax County in particular. The result of dispersing residential and commercial development increases the distance traveled for work trips to the employment centers in the District and its immediate environs. In addition, there is a limited number of feasible through access routes to the urban center, causing high levels of peak hour directional flows of traffic. These flows result in the highest incidence of air pollution, particularly photochemical oxidants, in the eastern portion of the County, which is currently the focus of 55% of all peak hour trips. Further, dispersed residential development is more difficult and economically feasible to serve by mass transit, resulting in greater reliance on the private auto than in more concentrated developments.

Therefore, while dispersed development may be a land use planning technique appropriate to some areas, the design and control of land use in Fairfax County must take other forms which demonstrate a greater sensitivity to air quality issues.

Meteorological Considerations

As stated previously, meteorology plays a major role in the analysis of air quality. For this reason the following considerations should be understood by those who will use the Fairfax County Air Quality Annual Summary. This treatment of countywide meteorological conditions is of necessity generalized because of the limitations of the currently available data base and the lack of an automated capability for manipulating it. It is not possible at this time to regionalize the conclusions or to specify area peculiarities except in qualitative terms.

Neutral stability is the most frequently occurring stability condition on an annual basis, approximately 48% of the time. Stable to extremely stable conditions, those conditions associated with air stagnation, can be expected about 20% of the time with a slight increase in frequency in the summer and fall and a lesser frequency in winter—December, January and February.

"Mixing depths" (a measure of the volume available for pollutant dispersion) and "mean wind through the mixing layer" (a measure of the ventilation rate for the rate of transport of pollutants) vary with both time of day and season of the year. The shallowest mixing depths occur in the early morning hours of summer and fall (on the order of 1,200 feet), and the greatest (on the order of 5,000 feet) during spring and summer afternoons. The highest mean layer winds are experienced in the afternoon period in winter and spring; the lowest during summer and fall mornings. In summary, meteorologically adverse air pollution conditions can be expected about 20% of the time from June through November with some amelioration in the afternoons. On an annual basis, the most frequent surface wind conditions are winds from the south (170 degrees through 190 degrees) at 7 to 8 miles/hour. Winds with a significant easterly component (wind from 010 degrees through 170 degrees) occur only about 30% of the time. Fairfax County is, therefore, upwind of the Washington metropolitan area 70% of the time and transport of air pollutants from that source should be a minor contributor to pollutant levels in Fairfax County.

Conclusion

The air quality impact of any land use plan can be soundly predicted only on the basis of detailed calculations specific to the particular plan. Although the foregoing estimates are not sufficiently detailed to serve as bases for particular planning actions, they are based on the best empirical information available and do indicate several feasible types of analytical projection. In particular, they indicate severe potential problems with ozone throughout the area and with carbon monoxide in limited local areas. Particulate levels in local areas are marginal but, with continuous effort, should be controllable within the limiting standard.

To improve air quality and to alleviate potential future problems, planning efforts must continue to use the following benchmarks when developing the air quality annex to a land use or County development plan:

1. The rate and total amount of pollution increase that will be allowed during the operation of the plan.
2. A priority list of areas that are recommended for various types of growth and development from an air analysis point of view.
3. The designation of areas where development will not occur; e.g., floodplains, swamps, historic sites, etc. The location and size of these areas and their position relative to industrial areas, town centers, etc., can impinge directly on air quality.
4. Central city traffic congestion resulting in high carbon monoxide and hydrocarbon emissions be alleviated by one or more of the following:
   - Improved public transportation combined with fringe parking.

- Improved traffic flow in the core area including prohibition of automotive traffic in very narrow streets.

5. Until such time as clean-burning fuels are available to power automotive transportation, all feasible steps to reduce vehicle miles traveled (VMT) should be taken.

6. In areas where pollution levels frequently reach or exceed legal standards, requests for new pollution-causing construction should identify existing sources of pollution that can be eliminated as a tradeoff.

AREA I

The purpose of this summary is to provide a rudimentary basis from which to analyze the air quality impacts of potential land use plans in Area I. The approximate ranges of pollutant levels in the area on an annual average basis are identified, and points at which standard limits are approached or exceeded are noted.

Area I is fairly well-developed, primarily for residential use, but has a number of commercial areas and very limited industrial development. All parts of the region are under the strong influence of major traffic arteries serving a much larger area. These arteries include Route 7, Columbia Pike, and Shirley Highway (I-95) on the east and I-495 (Beltway) on the south, west and west central. East-west corridors include Routes 29 and 50 in the north, Route 236 in the central part, and Braddock Road in the south.

Air Quality Monitoring Coverage

A monitoring station at Seven Corners, near the intersection of Routes 7 and 50, continuously records nitrogen oxides, carbon monoxide, ozone, sulfur dioxide, hydrocarbons, wind direction and speed, and rainfall. Suspended particulates are monitored at Routes 29 and 7 in Falls Church, on Route 7 south of Baileys Crossroads, on Route 236 in Annandale, and just outside the Area in Springfield near the intersection of I-95 and I-495. SO_2 and NO_2 are monitored at the Baileys Crossroads and Springfield sites. Data from continuous monitors at Lewinsville (McLean) and Massey (Fairfax City) and in Mt. Vernon make possible regional generalizations from the Seven Corners station.

Current Air Pollution Levels (Mean Annual)

The quality of air in Area I can now be presented in terms of analysis conducted regularly since 1974. The standards are those established by federal, state, and local laws:

Ozone (O_3) (Photochemical Oxidant). Ozone is the most severe air pollution problem in Fairfax County, and the one least amenable to local control. Concentrations tend to be regional rather than local phenomena. Meteorological phenomena (inversion, stagnation, etc.) allow photochemical pollutants to accumulate and diffuse over regions to the extent of the whole metropolitan area. Similarly, the solar radiation that drives the photochemical (smog-producing) reactions is regional rather than local in character.

The standard for ozone concentration is a one-hour average of 235 $\mu g/M^3$, which should not be exceeded on the average more than one exceedant day per year. Figure 4 shows the number of exceedant days per year since 1974 for each O_3 monitor operating in the County.

Area I, as represented by the Seven Corners O_3 monitor, has shown a substantial decrease in the number of exceedant days since 1975. Maximum one-hour concentrations declined to a level of 274 $\mu g/M^3$ (0.140 ppm) in spite of increased traffic volumes. However, exceedance of the standard still occurs.

Ozone causes eye and respiratory irritation and reduced lung function, is toxic to many plants and weakens such materials as rubber and fabrics.

Figure 4
NUMBER OF "UNHEALTHFUL DAYS"

Station	YEAR 74	75	76	77	78	79	80	81
Seven Corners	6	22	23	3	3	4	3	1
Engleside/ Mt. Vernon	1	13	11	0	0	2	5	3
Massey	5	16	11	1	1	9	4	0
Lewinsville	6	18	6	4	7	2	3	1

An "Unhealthful day" is a day in which the National Ambient Air Quality Standard was exceeded (see Figure 1).

Hydrocarbons (HC). Certain types of hydrocarbon compounds react with Nitric Oxide under the influence of ultra-violet light (sunlight) to form ozone, nitrogen dioxide and other deleterious materials. The total hydrocarbon content of ambient air is analyzed and reported in two parts; methane, which does not participate significantly in the complex reactions that characterize photochemical oxidation, and all other (non-methane) hydrocarbons, an unknown fraction of which participates critically in the ozone reactions. Pending resolution of this unknown, federal and state standards for non-methane hydrocarbons have been rescinded. As the hydrocarbons are not hazardous per se, principal interest is in their precursor role in ozone formation.

Nitrogen Dioxide (NO_2). Nitrogen dioxide is a respiratory irritant and, in high concentrations, can cause severe lung damage. The limiting standard is 100 $\mu g/M^3$ annual average, and in Area I, the annual average is calculated at 54 $\mu g/M^3$. As both dwelling unit and automotive sources contribute to NO_2 formation, it is possible that levels may approach 70 (annual average) where high population density occurs in depth along very heavily traveled traffic arteries.

Sulfur Dioxide (SO_2). Sulfur dioxide is harmful to structural materials and living plant and animal tissues, apparently through formation and reaction of sulfuric acid. These effects are synergized by suspended particulate matter. The principal source here is combustion of space-heating fuels. In Area I, SO_2 is not a major problem. Concentrations range from 30 in the Annandale Planning District to 36 in Baileys, but under present conditions in the Area as a whole, the annual average is not likely to exceed half of the 80 $\mu g/M^3$ standard.

Carbon Monoxide (CO). Carbon monoxide is formed principally by incomplete combustion of hydrocarbon fuels, as occurs in internal combustion engines. Although it is fairly short-lived becuase of its chemical activity, meteorological and topographic factors can cause temporary accumulation of high local concentrations. The controlling standard in Area I is the maximum average concentration over an 8-hour period, which should not exceed 10 mg/M^3 more often than once per year. The maximum 8-hour concentration for Area I is calculated at 7.40 mg/M^3. This is directly comparable with the 10 mg/M^3 standard. Note that these figures are for ambient conditions some hundreds of feet away from any strong source of CO. Special "pocket" studies, in a heavily overloaded intersection with consistent traffic stagnation during rush hours, have shown that the 8-hour standard is already exceeded in such situations.

Suspended Particulates. Suspended particulates may consist of dust, smoke, and other solid and non-volatile liquid particles small enough to suspend readily in the air. The minimum collectable size is a fraction of a micron. Particulate matter soils materials and may cause respiratory irritation and materials corrosion either by its direct action or by serving as a carrier of damaging substances absorbed or absorbed by it. Suspended particulate concentrations will average at or slightly above 50 $\mu g/M^3$ (annual geometric mean) in the central and western parts of Area I, well away from major traffic arteries. The controlling Federal standard is 60 $\mu g/M^3$.

AREA II

This statement describes the air quality in Area II in terms of the major air pollutants identified by the Federal Environmental Protection Agency (EPA). The purpose is to provide a rudimentary basis from which to analyze the air quality impacts of potential land use plans. Area II is comprised of the McLean, Vienna, and Fairfax Planning Districts. Except for the northern and northwestern edges, the area is almost completely developed, mostly with single-family detached residences. Overall, the housing density is about one dwelling unit per acre, and few one-square-mile areas average more than three dwelling units per acre. There is substantial commercial development, principally in the Route 123 corridor from McLean through Fairfax City and along Route 7 in the vicinity of Tysons Corner. There is little industrial development. Traffic patterns are dominated by Route 495, but east-west arteries such as Route 7, Route 123, Route 66 and Routes 29-50 (combined) carry loads exceeding 30,000 vehicles per day in some sectors.

Air Quality Monitoring Coverage

Monitoring stations established during 1974 in the Lewinsville area of McLean and in the County enclave (Massey) in southwestern Fairfax City continuously record nitrogen oxides, carbon monoxide, ozone, sulfur dioxide and suspended particulates. Data from these stations are correlated with data from similar continuous monitoring stations at Seven Corners and at Mt. Vernon to establish regional generalizations.

Suspended Particulates, SO_2 and NO_2 are also monitored in Vienna and near Route 123 at the north edge of Fairfax City. Similar particulate monitors near but outside Area II are west of Great Falls village, and in Falls Church. Meteorological data are recorded continuously at the Fire Training Center west of Fairfax City and at the Lewinsville and Great Falls stations, and supplemented with data from the National Weather Service stations at Dulles and National Airports. Lead is monitored at Lewinsville.

Current Air Pollution Levels

Ozone (O_3). The standard for ozone concentration is a one-hour average of 235 $\mu g/M^3$ which should not be exceeded more than one exceedant day per year, on the average, over the most recent three calendar years. Although the standard is still exceeded in Area II, the number of exceedant days per calendar year has decreased at both the Massey and Lewinsville stations since 1975. Possible explanations for the trend in decreasing ozone levels may include improved emission controls, larger fraction of traffic with emission controls, lower compression ratios leading to decreased NO_2 emissions and fuel transfer vapor recovery systems to minimize hydrocarbon emissions. Meteorological conditions may also have played a role. Whether or not the trend will continue depends on the balance of these aforementioned factors.

Hydrocarbons (HC). As indicated in the Area I section, hydrocarbon concentration is a notably unreliable indicator of harmful pollution. The primary interest is in their role in photochemical oxidation reactions. No federal standard for hydrocarbons is in effect, however. Fairfax County is collecting hydrocarbon data in Area II to ensure a continuous record of trends for potential application to resolution of the present uncertainties.

Nitrogen Dioxide (NO_2). The limiting standard is 100 $\mu g/M^3$ annual average and, in Area II, the overall annual average is calculated at 44 $\mu g/M^3$. In

the relatively undeveloped areas (e.g., east of Great Falls Park or north and west of Vale Road and Hunter Mill Road), the annual average concentration is slightly above 40 $\mu g/M^3$. At the other extreme, areas along I-495 may run between 55 and 70 $\mu g/M^3$. Typical high-concentration locations include Dunn Loring between Cedar Lane and I-495, and River Oaks east of Route 495 and north of Route 193. Midway between McLean and Falls Church, the average is a little over 49, and southeast of Fairfax City, between Route 236 and Braddock Road, it is 57 $\mu g/M^3$.

The foregoing calculations are for ambient levels averaged over areas of more than 300 acres, and do not reflect more localized concentrations. In the immediate vicinity of major highways the averages are higher; for example, at a distance of 200 feet from a 25,000 vehicles/day highway the average is about 200 $\mu g/M^3$ above ambient levels.

Sulfur Dioxide (SO_2). In Area II, SO_2 is not a major problem. The limiting standard is 80 $\mu g/M^3$ annual average, and the comparable figures for Area II range from less than 27 along the northwest edge (Great Falls Park or Vale Road areas), through 28-29 in the Dunn Loring and River Oaks areas to 35 between McLean and Falls Church.

Carbon Monoxide (CO). The controlling standard in this area is the maximum average concentration over an 8-hour period, which averages should not exceed 10 mg/M^3. The maximum 8-hour concentration for Area II is 13 mg/M^3 which exceeds the federal standard. This concentration should, however, be compared with the annual mean concentration which averages all hourly CO levels for the year and not just the maximum 8-hour level. The annual mean CO concentration for Area II is 1.5 mg/M^3, substantially below the 10 mg/M^3 standard. This level helps illustrate the periodic peaking and rapid attenuation characteristic of carbon monoxide. However, the federal standard only applies to the maximum 8-hour concentration. Note that these figures are for ambient conditions averaged over several hundreds of acres. As with NO_2, a "nearness" factor for major highways must be be added to the ambient averages. For example, a point 150 feet from the edge of Route 7, a half mile or so west of Route 123, will average more than 3 mg/M^3 above ambient. At the same distance from I-495, north of the Dulles Access Road, the average should be elevated between 6 and 7 mg/M^3 above ambient. This latter estimate is, however, subject to substantial potential deviation because the valley in which the highway is located may induce air stagnation and wind anomalies leading to high CO accumulation pockets or high-ventilation areas with low concentrations. Carbon monoxide is not an irritant and has little or no effect on plants or materials. However, it reacts in the blood stream to deprive the heart and brain of oxygen. Moderate concentrations significantly reduce brain function, and high concentrations can be lethal.

Suspended Particulates. Suspended particulates concentrations average at or below 48 $\mu g/M^3$ (annual geometric mean) in the northern and central sections of Area II. In the southern part of the area, near Fairfax City, there is a mild concentration "hill" of approximately 55 $\mu g/M^3$, apparently related to the concentration of highways (viz. Routes 123, 66, 29-50 and 236). Overall, ambient particulate levels in Area II tend to be under the 60 $\mu g/M^3$ standard by a value of about 5-10 $\mu g/M^3$.

Lead. Lead monitoring was recently initiated at Lewinsville. Preliminary results indicate that lead concentrations are well under the N.A.A.Q.S.

Effects of Residential Development on Air Quality

To illustrate the sensitivity of particular pollutant levels to residential development, a 2,000-housing unit development is hypothesized in a one square mile area north of Vale Road and west of Hunter Mill Road. It is further assumed that this development might be increased from the present 27 $\mu g/M^3$ to any value between 27 and 40 $\mu g/M^3$, depending upon the method of space heating used.

The NO_2 concentration should increase some 30%, from 44 to 57 $\mu g/M^3$. The maximum high 8-hour concentration of CO would increase 60% to about 21 mg/M^3. The "nearness" adjustment for NO_2 and CO close to the Hunter Mill access road would be doubled, reflecting the approximate doubling of traffic density on this road. Suspended particulate concentrations would approach, but probably not exceed, the standard 60 $\mu g/M^3$ during construction, but should subsequently drop back to approximately 48 $\mu g/M^3$.

AREA III

This statement describes the air quality in Area III in terms of the major air pollutants identified by the federal Environmental Protection Agency (EPA). The purpose is to provide a rudimentary basis from which to analyze the air quality impacts of potential land use plans. Area III is comprised of the Potomac, Bull Run, and Pohick Planning Districts. It is a strip roughly 5-6 miles wide along the western side of the County from the Potomac River on the north to the grounds of the D.C. Department of Corrections on the south. Recent development, principally residential and commercial, has been extensive throughout the area. In the Pohick Planning District, east of Route 123, this development has been high density. Substantial residential and commercial development has also occurred in the Bull Run Planning District around Centreville and in the Upper Potomac Planning District in the vicinities of Herndon and Reston. Otherwise the area is largely low density. The principal highways are Route 7, Baron Cameron Avenue, and Dulles Access Road in the north; Routes 28, 50, 66 and 29 in the west; and Route 123 in the south.

Air Quality Monitoring Coverage

Suspended particulate samplers, SO_2 and NO_2 bubblers in or immediately adjacent to the Area, are located west of Great Falls, on Cub Run south of Dulles Airport, and on Route 123 at Lorton. A particulate sampler without bubbler operates in Herndon. The Massey monitoring station in southwest Fairfax City, approximately one mile from the area, continuously records nitrogen oxides, carbon monoxide, ozone and sulfur dioxide, and samples suspended particulates. Data from three other similar stations in the County enable regional generalizations from the Fairfax station. Meteorological data are continuously recorded at the Great Falls site, at the Fire Training Center on West Ox Road, and on Route 123 south of the Lorton site. Lead is measured at Great Falls.

Current Air Pollution Levels

Ozone (O_3). The standard for ozone concentration is a one-hour average of 235 $\mu g/M^3$, which should not be exceeded more than one exceedant day on the average per year, over the most recent three-year period. The table of number of exceedant days, shown in Area I, indicates a pattern of decreasing exceedances since 1975. The same pattern would apply to Area III ozone levels. Moreover, in the western portions of Area III where a lesser degree of development and traffic is prevalent, even lower concentrations of ozone would be expected. In the eastern areas of Pohick, Bull Run and Upper Potomac Planning Districts ozone concentrations would more closely approximate those measured at Massey (Fairfax City) which have occasionally exceeded the federal standard since 1974.

Hydrocarbons (HC). As indicated in the Area I section, total hydrocarbon concentration is a notably unreliable indicator of harmful pollution, and no analysis has been developed.

Nitrogen Dioxide (NO_2). The limiting standard for NO_2 is 100 $\mu g/M^3$ annual average and, in Area III, the overall annual average is calculated at 40 $\mu g/M^3$. In the least-developed areas (e.g., the northernmost corner of the County and the area south and southwest of Clifton), the annual average concentration is about 37 $\mu g/M^3$. At the other extreme, the Burke area, with a dwelling unit density between 15 and 20 times that found in the area between I-66 and Route 29 west of West Ox Road, shows a concentration of close to 60 $\mu g/M^3$ which is still substantially below the Federal standard.

The foregoing calculations are for ambient levels averaged over areas of more than one square mile, and do not reflect more localized concentrations. In the immediate vicinity of major highways the averages are higher. For example, at a distance of 150 feet from I-66 east of Centreville, the average is about 6-7 $\mu g/M^3$ above the ambient level.

Sulfur Dioxide (SO_2). In this area, SO_2 is not a severe problem. The limiting standard is 80 $\mu g/M^3$ annual average, and the comparable figure is less than 27 in the sparsely populated areas north of Herndon/Reston, west of Centreville, and south of Butts Corner. The highest levels may be expected in the Herndon/Reston and Burke areas, but they should not exceed 40 $\mu g/M^3$.

Carbon Monoxide (CO). The controlling standard in this area is the maximum average concentration over an 8-hour period, which average should not exceed 10 mg/M^3 more often than once per year. Although no CO monitor is directly located in Area III, the Massey monitor can be used as an indicator of trends throughout Area III. For example, the maximum 8-hour CO level at Massey was 11.01 mg/M^3 would be expected for ambient CO conditions (with the exception of the developed portion of Area III—Reston/Herndon, Centreville, Burke, etc.). As with NO_2, a "nearness" factor for major highways must be added to the ambient averages. For example, the average monthly 8-hour high at a point 100 feet from Baron Cameron Avenue north of Lake Anne will be over 4.5 mg/M^3 higher than the comparable ambient figure. With these averages it is very likely that the standard 10 mg/M^3 will be exceeded during at least one 8-hour period in a year. However, the probability of a second 8-hour average above 10 mg/M^3 (i.e., a violation of the standard) is marginal. That is, a violation could occur at this point, but is by no means certain.

Suspended Particulates. Suspended particulates in Area III vary greatly from district to district. For example, in Great Falls in the Upper Potomac Planning District, levels average 47 $\mu g/M^3$. The western portions show lower concentrations, such as Cub Run, which averaged 38 $\mu g/M^3$. However, a western area of the Upper Potomac Planning District (Herndon) with more residential development averaged 56 $\mu g/M^3$. This is directly comparable with the 60 $\mu g/M^3$ standard. Localized high concentrations are superimposed on the foregoing pattern in areas of current construction activity—stone quarry/crusher operations, concrete batching/mixing sites, etc. This is evidenced from particulate levels of 59 $\mu g/M^3$ at Lorton, in close proximity to a major stone quarry operation. As long as such spot sources are adequately controlled, Area III should have few problems staying within 60 $\mu g/M^3$ standard.

Lead. Lead monitoring was recently initiated at Great Falls. Preliminary results indicate that lead concentrations are well under the N.A.A.Q.S.

Effects of Residential Development on Air Quality

To illustrate the sensitivity of particular pollutant levels to residential development, a 1,200-housing unit development is hypothesized southwest of Centreville between I-66 and Route 28. It is further assumed that this development would add 3,000 vehicle trips per day on Route 28 south and 1,800 trips per day on I-66 east. In such a situation the average SO_2 concentration in the square mile containing the development might be increased

from the present 27 $\mu g/M^3$ to any value between 30 and 35 $\mu g/M^3$ depending upon the method of spaceheating used. The NO_2 concentration should increase some 14%, from 40 to 46 $\mu g/M^3$. The maximum high 8-hour concentration of CO should increase nearly 20% to about 13 mg/M^3. The "nearness" adjustment for NO_2 and CO would be increased approximately 17% along Route 28 south and 5-6% along I-66 east, reflecting the increased traffic density. Suspended particulate concentration a year or so after completion of construction should be below 45 $\mu g/M^3$. During construction the effective annual rate may be held well within standard by assiduous application of conventional dust-limiting techniques.

AREA IV

This statement describes the air quality in Area IV in terms of the major air pollutants identified by the federal Environmental Protection Agency (EPA). The purpose is to provide a rudimentary basis from which to analyze the air quality impacts of potential land use plans. Area IV is comprised of the Springfield, Rose Hill, Mt. Vernon, and Lower Potomac Planning Districts. It has an extremely wide range of development intensities, ranging from the quasi-wilderness of Gunston Hall/Mason Neck to a traffic density of 600 daily vehicle miles per acre in Springfield (averaged over 600 acres containing the intersection of I-95 and I-495) and a housing density of nearly 7 dwelling units per acre in the upper Telegraph Road/Route 1 area (averaged over the 700 acres of census tracts 18 and 19). The principal highways are I-95 running north-south in the west-central area, Route 1 in the south and east-central, and I-495 running east-west along most of the north boundary. A substantial part of the industrial development of the County lies along the I-95 and I-495 corridors.

Air Quality Monitoring Coverage

A monitoring station on Route 1 in the Mt. Vernon area continuously records nitrogen oxides, carbon monoxide, ozone, sulfur dioxide and suspended particulates. Suspended particulates, SO_2 and NO_2 are also monitored in the Springfield commercial center (Brandon Avenue), at the Westgate Treatment Plant in Belleview, on the South Post of Ft. Belvoir and on Route 123 at the D.C. Department of Corrections. Meteorological data is obtained from Davison Field (Ft. Belvoir) and National Weather Service. Mechanical weather stations supply weather information for the Mt. Vernon, Ravensworth and Occoquan areas. Data from continuous air monitors at Lewinsville (McLean), Massey (Fairfax City) and Seven Corners enable regional generalizations from the Mt. Vernon station.

Current Air Pollution Levels

Ozone (O_3). The standard for ozone concentration is a 1-hour average of 235 $\mu g/M^3$, which should not be exceeded on the average of more than one exceedant day per year. As is indicated in the table in the discussion of Area I, Area IV continues to show the same decreasing trend in number of exceedant days per year as the remainder of the County. The Engleside ozone monitor in 1977 and 1978 recorded no ozone levels over the standard. Improved emission controls, a larger fraction of traffic with emission controls, fuel transfer vapor recovery systems and meteorological conditions may have played a role in these reductions. Whether or not the trend will continue depends on the future balance of these contributing factors.

Hydrocarbons (HC). As indicated in the Area I section, total hydrocarbon concentration is a notably unreliable indicator of harmful pollution, and no analysis has been developed.

Nitrogen Dioxide (NO_2). The limiting standard is 100 $\mu g/M^3$ annual average and, in Area IV, the overall annual average is calculated at 56 $\mu g/M^3$. This figure reflects strongly the large areas of Gunston Hall/Mason Neck, and Ft. Belvoir (Lower Potomac Planning District) with averages of 43 $\mu g/M^3$ or less. In the Mount Vernon Planning District north and west of Fort Hunt the level is about 51; in the upper Telegraph Road/Route 1 section, the level rises to 58, and in the high-traffic-density area of Springfield, the current annual average is within a few percent of the 100 $\mu g/M^3$ standard. The foregoing calculations are for ambient levels some 500 to 1000 feet from any major traffic artery. In the immediate vicinity of major highways, the averages are higher; for example, at a distance of 200 feet from a 25,000 vehicles/day highway, the average is some 3-4 $\mu g/M^3$ above ambient levels.

The sensitivity of NO_2 concentration to residential development is indicated by the following hypothetical example. If a housing development were established on Telegraph Road in the relatively undeveloped area below Franconia, sufficient to generate 3,000 trips per day divided between upper Telegraph Road and Route 1, and 1,000 trips per day on the adjacent section of Route 495, the ambient NO_2 levels in that area would increase about 1 $\mu g/M^3$, and the adjustment for nearness to Telegraph Road would be increased by about 10%. If this development contained 2,000 dwelling units, the ambient levels in its surrounding square mile might well increase from the present 58 to some 68 $\mu g/M^3$.

Sulfur Dioxide (SO_2). In Area IV, SO_2 is not a major problem. The limiting standard is 80 $\mu g/M^3$ annual average, and the comparable figures for Area IV range from less than 35 in the Lower Potomac Planning District, through 30 in Fort Hunt and 34 in Springfield, to 34 in the upper Telegraph Road/Route 1 area. The effect of new residential development would be almost entirely determined by the heating fuel used.

Carbon Monoxide (CO). The controlling standard for carbon monoxide is the maximum average concentration over an 8-hour period, which average should not exceed 10 mg/M^3. The maximum 8-hour concentration, calculated using Engleside/Mt. Vernon data, is 12 mg/M^3. CO concentrations above the standard occurred during three 8-hour periods in 1978 and during two 8-hour periods in 1977. However, in 1978 the annual arithmetic mean concentration for Engleside was only 1.5 mg/M^3 exemplifing the intermittent peaking characteristic often shown by carbon monoxide. Such behavior is determined primarily by meteorological conditions. As with NO_2, a "nearness" factor for major highways should be added to the ambient averages. For example, a point between 150 and 200 feet from the edge of Route 95 a mile or so south of I-495 will average some 3 mg/M^3 above ambient.

Suspended Particulates. Suspended particulate concentrations average at or below 40 $\mu g/M^3$ in the Mason Neck area. The average increased to approximately 44 in the Fort Belvoir area, and to 50 in Mt. Vernon, close to Route 1. In the extreme western portion of the Lower Potomac Planning District, near Lorton, levels average close to 60 $\mu g/M^3$ with heavy influence from I-95 and I-495. Westgate shows lower concentrations of approximately 49 $\mu g/M^3$. The federal standard for particulates, which should not be exceeded, is 60 $\mu g/M^3$.

Lead. Lead monitoring was recently initiated at Springfield. Preliminary results indicate lead concentrations to be well under the N.A.A.Q.S.

Note: For specific air quality information in Fairfax County, see the countywide summary of analyzed data. Copies of this report can be obtained from the Health Department (691-2541).

WATER QUALITY AND QUANTITY

General

Because of the character of Fairfax County's natural environment, water quality and quantity are of the utmost concern. During the survey of existing conditions particular emphasis has been placed on the issue's regional or watershed aspects since the problem can be dealt with most efficiently and effectively at that level. Land use patterns and intensities play a significant role in determining the water quality and quantity of a watershed.

Water quality concerns center around three topics in Fairfax County—the continued degradation of the County's primary water supply in the Occoquan Reservoir basin; surface and groundwater contamination by malfunctioning septic tanks and sanitary sewer lines, and concentrated domestic animal wastes; and general stream degradation by stormwater runoff.

The Occoquan Reservoir, forming the boundary between Fairfax and Prince William Counties, has been the unintended recipient of pollutants generated within the Occoquan watershed. Excessive sedimentation, agricultural-related waste loadings, urbanization within both the Fairfax and Prince William County portions of the watershed, and wastewater treatment plan effluents are contributors to the accelerated eutrophication of the Occoquan. Maintenance of the reservoir as a public water supply for Fairfax County is questionable unless protective strategies relating to land use patterns, construction site sediment control, improved wastewater treatment and innovative stormwater management are implemented.

Contamination of surface or subsurface waters by human and animal wastes is another water quality concern in the County. Sewer line breaks, malfunctioning septic tanks and nonpoint discharges of animal wastes are the principal contributors to high fecal coliform counts. Of the 126 monitoring stations operated by the County Health Department, none was found to have poor water quality as defined by the yearly average fecal coliform count. However, as these stations are sited for the purpose of monitoring the operation of septic fields, they are not comprehensive as to parameters monitored nor do they coincide with all County watersheds. Close monitoring of watersheds that develop using septic tanks, testing on-site soil suitability and incorporating geologic survey data during the land use planning and review process should greatly improve the County's ability to control this threat to water quality.

Other water quality problems in Fairfax County are largely the result of land use decisions and practices rather than contributions by major point sources such as industrial plants. The primary sources of stream pollution are development impacts, such as siltation from soil erosion and pollutants (such as petroleum from roads and parking areas transported by stormwater runoff), heavy metals, toxic substances and nutrients from organic matter. These pollutants, along with pathogenic organisms, render some County streams unfit for human contact.

The impact of land use on water quantity occurs in several ways. Paving and construction of impervious surfaces have resulted in increased water runoff to streams, causing abnormally high flood levels as well as increased bank scour and erosion. Damage to property as well as public safety problems result. In largely developed watersheds, stormwater management to improve water quality will present agonizing and expensive decisions. Treatment costs stagger the imagination due to the tremendous volumes of water that must be processed. However, developing watersheds provide an opportunity for new approaches to the solution of this problem.

Water supply, another aspect of water quantity, has not yet reached the crisis stage for Fairfax County. However, as urbanization continues in the Washington metropolitan region, stretching surface water supplies beyond population demands, groundwater may become a critical resource. Unfortunately, past development has paid little attention to this issue. To that extent, recharge areas have already been preempted by roads and buildings. As more specific geologic data become available to the County, land use patterns will have to be altered if these recharge areas, and hence the groundwater resource, are to be preserved.

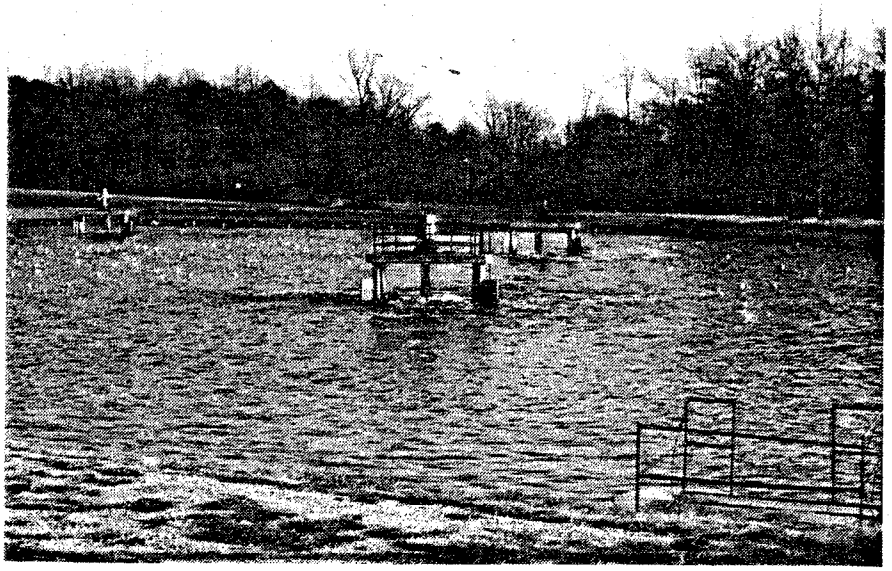
The state of the art in hydrologic planning suggests the use of density (i.e., low density = low runoff; high density = high runoff) as the mechanism to address water quality and quantity concerns like stream channel migration, bank scour and general degradation by pollutant laden stormwater. The plans developed during PLUS attempted to follow this guidance when land uses were allocated to presently undeveloped or lightly developed areas. Counterbalancing this purely physical pattern, however, are the realities of marketability and transportation access. Thus, when good transportation access dictates a strong marketability factor for land, the implications of high runoff rates in sensitive stream headwaters frequently play a minor role. Therefore, at this point in time, the plans most often reflect the market factor over the water quality issue.

During project site review, however, every effort can be made to minimize hydrologic alterations with the application of innovative approaches to stormwater management, like those to be suggested in the Parsons, Brinckerhoff, Quade and Douglas (PBQD) master drainage plan for Fairfax County. This is the emphasis that the project impact evaluation system (PIES) brings to the plan implementation process. On-site retention and natural drainage features will be used to the greatest extent possible for projects zoned in the sensitive headwaters areas. Other measures to minimize hydrologic damage include the use of permeable paving materials, clustered development to reduce impervious acreage and on site storage/evaporation ponds.

The optimal solution for water quality and quantity issues, though, involves application of both the PIES analysis and the watershed planning method outlined in the area plans. This is especially true for Area III where a relatively large number of undeveloped watersheds are experiencing development pressures. The schematic watershed shown on the accompanying sketch suggests a hydrologically sensitive development pattern which minimizes the water quality/quantity impacts throughout the watershed. Nonstructural stormwater management systems like rock filters, overland nonchannel flow and vegetative nutrient filters are related potential solutions to nonpoint source water quality problems. This approach to stormwater management offers an alternative to traditional treatment methods that may possibly be more cost effective, while ensuring compliance with the Section 208 area-wide waste management requirements of the federal Water Pollution Control Act amendments of 1972.

Watershed land use planning is essentially an environment carrying capacity approach to land use and water quality planning. It is possible to work toward identification of appropriate technological and land use strategies within a given watershed by defining acceptable waste load allocations (impacts) to receiving waters. The Stream Valley Board contract to Battelle Columbus Laboratories is facilitating this type of planning for Fairfax County. Parsons, Brinckerhoff, Quade and Douglas's work on stormwater management should provide other necessary information in this context. Finally, the existing Pohick PL566 program is a type of watershed land use planning already present in the County; projecting the urbanization required by predicted population growth, it provides partially for water quality/quantity control via watershed impoundments (flood control, sediment control, water storage and recreation).

Recent studies have demonstrated that nonpoint sources of pollution contribute to deteriorating water quality in the Occoquan Reservoir. This diffuse source of land use related pollution has taken new significance with the completion of the Upper Occoquan Sewage Authority (UOSA) advanced waste water treatment plant. The 1978 opening of the UOSA plant mitigates a major point source of pollution in the Occoquan. Therefore,



water quality problems in the future will be influenced substantially by pollutant loads associated with stormwater runoff. The *Occoquan Basin Study*, completed in March, 1982, addresses this stormwater related water pollution problem and makes related recommendations. A synopsis of the study which served as a basis for many recommendations of the Plan for land uses and policies affecting the Occoquan Reservoir watershed in Fairfax County is located at the beginning of the Area III section of the Plan.

Potential Reservoir and Impoundment Sites

Watershed impoundments affect both water quality and water quantity, since their uses include flood control, water storage, sediment control and recreation. In Areas II and III they are particularly significant, not only in view of the already existing Pohick PL566 program, but also because these areas of the County contain most of the remaining viable sites.

The sites presently mapped reflect the *Occoquan Watershed Impoundment Study* (Northern Virginia Planning District Commission, Soil Conservation Service, 26 February 1973) and the Fairfax County Water Resource Study (1970) as well as recent follow-up sessions with the Fairfax County soils scientist and Northern Virginia Soil and Water Conservation District personnel. As a minimum, the most viable sites should not be preempted prior to PBQ&D's completing the County's master drainage plan. In that same context, another recommendation is to designate a task force (members to include Public Works, Environmental Affairs, Environmental Management, Fairfax Authority, Northern Virginia Planning District Commission, PBQ&D, etc.) to determine first whether these sites are desirable from a regional standpoint and secondly, priorities, types of use and means of land acquisition. The main concern is to ensure that these sites and the issues involved are discussed in a timely manner.

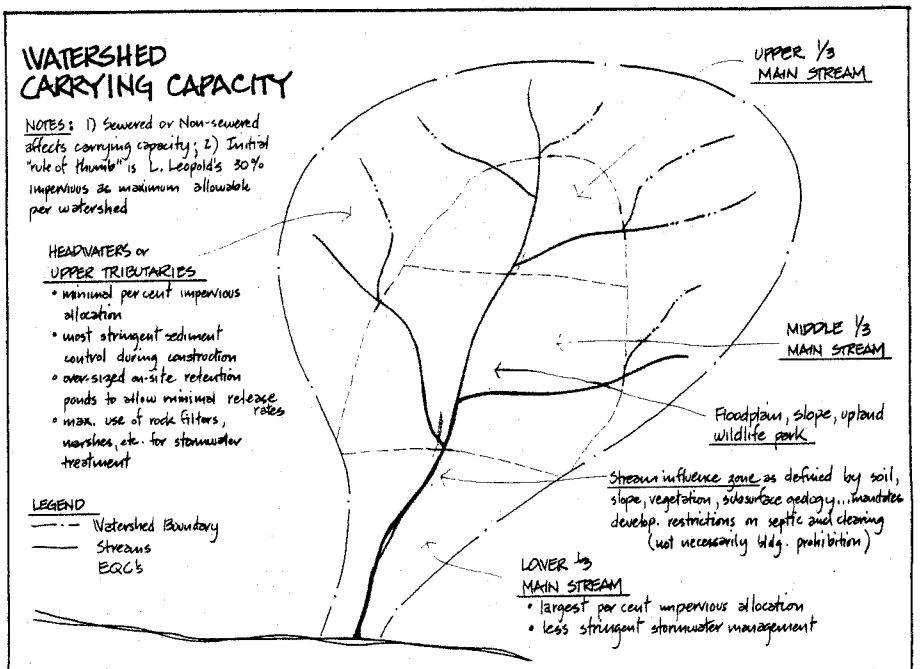
Watershed Land Use Planning

The most pertinent issue which this regional approach suggests is that present zoning classifications or intent do not adequately address the goals of watershed planning. For example, even excluding highly constrained areas like floodplains, stream influence zones and steep slopes, rural large-lot zoning (e.g., 5-acre lots) may not be possible or desirable in certain segments of a watershed. The extent of headwater regions, septic tanks limitations, soil erodibility and aquifer recharge zones might all suggest that such .2 dwelling unit per acre development should occur in one segment of the watershed (i.e., in a higher density, cluster-type approach), while the remainder would be preserved as open space. Even with such a cluster-type approach, the apparent density should not be so high as to disturb the character of this type of development.

Necessary identification, mapping, and planning for environmentally sensitive areas should be handled at the watershed scale because of the extensive functional and geographic interdependencies of ecological systems. Realistically, not all environmentally sensitive areas can be preserved in their natural state as open space, but strategies should be planned at regional levels (e.g., in Area II, to limit development to those forms which reduce potential damage to the sensitive areas).

Equally important, relating land use to water quality also requires some quantitative analyses (i.e., development/runoff ratios, development/stream enlargement ratios, allowable load limits for point and nonpoint discharges, etc.) which go beyond a mapping approach. Ultimately, this regional approach should use the carrying capacity of water resources as a primary constraint on the preparation of a land use plan for Area IV.

Some of the next steps are to establish criteria such as acceptable threshold water quality and quantity impact levels. On the basis of water quality standards and acceptable waste load allocations for receiving waters, desired discharge locations and volumes are determined. Once the discharge limitations are known, it is then possible to convert to the amount of population growth and land development which can be accommodated within each planning district. This water resource carrying capacity is then considered, along with other plan preparation criteria (i.e., public services, transportation accessibility, other environmental constraints, etc.), to update the land use and controls.



Watershed land use planning is essentially an environmental carrying capacity approach to land use and water quality planning. It is possible to work toward identification of appropriate technological and land use strategies within a given watershed by defining acceptable waste load allocations (impacts) to receiving waters. The Stream Valley Board contract awarded to Battelle Columbus Laboratories is facilitating this type of planning for Fairfax County; Parsons, Brinckerhoff, Quade & Douglas's work on stormwater management should provide other necessary information in this context. Finally, the existing Pohick PL 566 program is a type of watershed land use planning already present in the County; projecting the urbanization required by predicted population growth, it provides partially for water quality/quantity control via watershed impoundments (flood control, sediment control, water storage, recreation.)

Potential Dam Failure Impact Areas

The issue of dam safety in the United States has recently been highlighted by several dam failures in which extensive property damage and loss of life has occurred. These factors prompted the United States Government to enact the National Dam Safety Program during the 1970's. Under this program all major dams in the United States were inspected by the Corps of Engineers and the findings of any deficiencies brought to the attention of the individual state governments.

In Virginia the program was coordinated through the State Water Control Board (SWCB) and resulted in the inventory of 27 existing dams in Fairfax County meeting the minimum size requirements for this program. It also led the State of Virginia to establish its own Dam Safety legislation with corresponding State Water Control Board Regulation #9, Impounding Structure Regulations. Under these regulations, the SWCB has jurisdiction over all the major dams in Fairfax County. Two requirements of the Virginia Dam Safety Program affect land use planning in Fairfax County.

The first item concerns the extent of development downstream from a dam that would be inundated during a dam failure situation. The SWCB regulations require that a large dam with substantial development downstream have a spillway capacity adequate to pass the Probable Maximum Flood (PMF) without overtopping the dam which could lead to failure. The PMF is defined as the maximum flood resulting from the most severe combination of meteorological and hydrological conditions that can reasonably be expected in a given area.

The land use involvement with this criteria is that, if extensive development occurs downstream from an existing dam, then the size of the dam's spillway may require enlargement if it cannot pass the PMF without overtopping. If a development occurs, then the dam owner is responsible for either addressing a solution to upgrade the dam and spillway, or, possible consideration for removal of the dam from the watercourse to eliminate its hazard potential. The possibility for downstream loss of life and property damage will increase if the dam owner fails to rectify the situation. In addition, earthen dams have the potential for failure from internal erosion which can occur any time and is not necessarily related to a storm event. Therefore, development downstream from any existing dam has an increased potential for flood damage.

The second item concerns the SWCB requirement that dam owners prepare an Emergency Action Plan to evacuate people from the downstream dam failure areas in the event of a failure caused by both storm water overtopping the dam and from internal erosion. The County is required to implement the Emergency Action Plans after they are developed by the dam owners. In time of an emergency, significant public resources are required to carry out the evacuations. Less development in the dam failure areas will reduce the extent of an evacuation that would need to be carried out by the public agencies involved and, thereby, reduce the amount of required public

resources needed during these emergency situations.

By delineating the downstream dam failure areas in the Comprehensive Plan, the County and the development community can more effectively plan to minimize development in these downstream areas and provide for the public safety and welfare as well as reduce the utilization of public resources required during an emergency dam failure situation. The accompanying map shows the approximate location for the existing and proposed major dams in Fairfax County. In addition, the extent of these downstream dam failure impact areas are shown on the 1" = 2000' comprehensive land use plan map. More detailed information is available from the Department of Environmental Management (DEM), Design Review Division and the Department of Public Works, Utilities Planning and Design Division.

OPEN SPACE AND ENVIRONMENTAL QUALITY CORRIDORS

Suburbanization in Fairfax County has inadequately reflected the social and economic costs associated with the degradation and loss of the amenities of open land. Forests and other natural vegetation, songbirds and other wildlife, open fields and pastures, and historic homes and scenic roads are of increasing social, economic, and psychological value to increasing numbers of Fairfax County residents, especially as they observe the growing scarcity of these resources.

Undeveloped land provides visual relief from the concentration of urban development and creates opportunities for outdoor recreation and education, while at the same time serving many ecological functions. Natural features of the landscape such as flat open fields, wooded slopes, and rolling hills are important to the interrelationships between water quality and quantity, vegetative resources and wildlife habitats. Wooded slopes, for example, while providing cover for animals also slow the rate of runoff into streams thereby making the stream a more suitable habitat for aquatic species, and decrease damage from floods. The problems associated with developing open space, especially those that are environmentally sensitive, are complex.

Definition and Preservation of Environmental Quality Corridors

In order to preserve open space in the County in the form, location, and extent necessary to provide protection for ecologically sensitive areas, valuable resource preservation, and visual amenities that are important to County citizens, the environmental quality corridor (EQC) system is recommended as the open space system for the County. Adapted from a concept advanced by the noted landscape architect, Professor Philip Lewis of the University of Wisconsin, the EQCs are based on stream valleys—streams, their floodplains, wetlands, shoreline areas, and steep valley slopes. These form a continuous linear network of open space within each watershed of the County and include most of the ecologically sensitive areas of the County as well as valued natural and visual resources. They also serve to link other important open space resources such as prime wildlife habitats, citizen identified environmental resources, historic features, public and private parks, agricultural and forest lands, and other natural and cultural resources.

The EQC system has two major components — sensitive lands EQCs and resource protection EQCs. The definitions and preservation benefits of these EQC components differ and are outlined below.

Sensitive Lands EQCs

This component of the EQC system is comprised of the lands which are most sensitive to development and which, at the same time, present the greatest environmental hazards to development. In Fairfax County these lands are found mostly along streams and rivers. Here, in these ecologically sensitive stream valleys, erosion and sedimentation can most directly affect stream water quality. These stream valleys provide some of the County's richest and rarest vegetation and wildlife. Prime wildlife habitat is provided here, too, and erosion from cleared steep valley slopes can be severe. Here, too, are found a great many development hazards, such as flooding, poor soil bearing strength for building support, wetness that can cause wet basements and soggy lawns, and high erosion and landslide potential on steep slopes. These stream valleys are also visual amenities which can provide buffers between conflicting land uses and opportunities for nature-oriented recreational activities such as hiking and bird watching. Clearly these sensitive lands are appropriate for preservation in open space.

Lands along streams included in sensitive lands EQCs are as follows—all 100-year floodplains, all floodplain soils and soils adjacent to streams which exhibit a high water table and poor bearing strength or some other severe development constraints, wetlands, steep slopes greater than 15 percent adjacent to the above floodplains, soils, steep slopes, and wetlands and, at a minimum, where the above floodplains, soils, steep slopes and wetlands cover only a narrow area, a buffer on each side of the stream or water body designed to prevent sedimentation of the stream or water body.

The 100-year floodplains are chosen as a basic component of the sensitive lands EQC since these areas are recognized by County ordinance and by federal regulation as the areas where flooding is a significant hazard and where development, which could be damaged by flooding, should not occur. While some development, such as parking lots, may not be damaged by shallow flooding, such development can still have adverse impacts on streams since eroded soil during clearing and construction and surface pollutants after construction, which are washed off during rain storms and floods, can directly impact stream water quality. In addition, the 100-year floodplain is often where the rich wet soils are found which promote heavy plant growth and provide excellent wildlife habitat. The 100-year floodplains are often acquired by the Fairfax County Park Authority for stream valley parks.

Floodplain soils, high water table and poor bearing strength soils and soils with severe development constraints (marine clays) adjacent to streams are also included in sensitive lands EQCs. These soils are poorly suited to development and include Fairfax County soils numbered 1, 2, 3, 5, 11, 12, 13, 30, 31, 33, 89, 92, 117, and 118, as well as soils numbered 39, 68, 84, 85, 90, 110, and 112 when these soils are found within the 100-year floodplain or are found to be extremely wet. While other soils in the County have high water table and moderate bearing strength problems, these other soils can be developed and problems avoided with relatively inexpensive engineering solutions. The soils included in sensitive lands EQCs, on the other hand, impose severe problems on development, and there is a likelihood that even extensive engineering measures will not adequately solve the wetness and bearing strength problems they present. As discussed for the 100-year floodplain, these soils provide a good medium for rich plant growth and excellent wildlife habitat.

As part of the implementation of the Fairfax County Wetlands Zoning Ordinance, tidal wetlands, both vegetated and nonvegetated have been mapped on the Official Zoning Map. These wetlands are recognized by the County as "an irreplaceable natural resource which, in its natural state, is essential to the ecological system of the tidal rivers, bays, and estuaries of the Commonwealth. This resource is essential for the production of marine and inland wildlife, waterfowl, finfish, shellfish and flora; is valuable as a protective barrier against floods, tidal storms and erosion of the shores and soil within the Commonwealth; is important for the absorption of silt and of pollutants; and is important for recreational and aesthetic enjoyment of the people for the promotion of tourism, navigation and commerce." For these reasons, tidal wetlands delineated by the Wetlands Overlay District are included in sensitive lands EQCs.

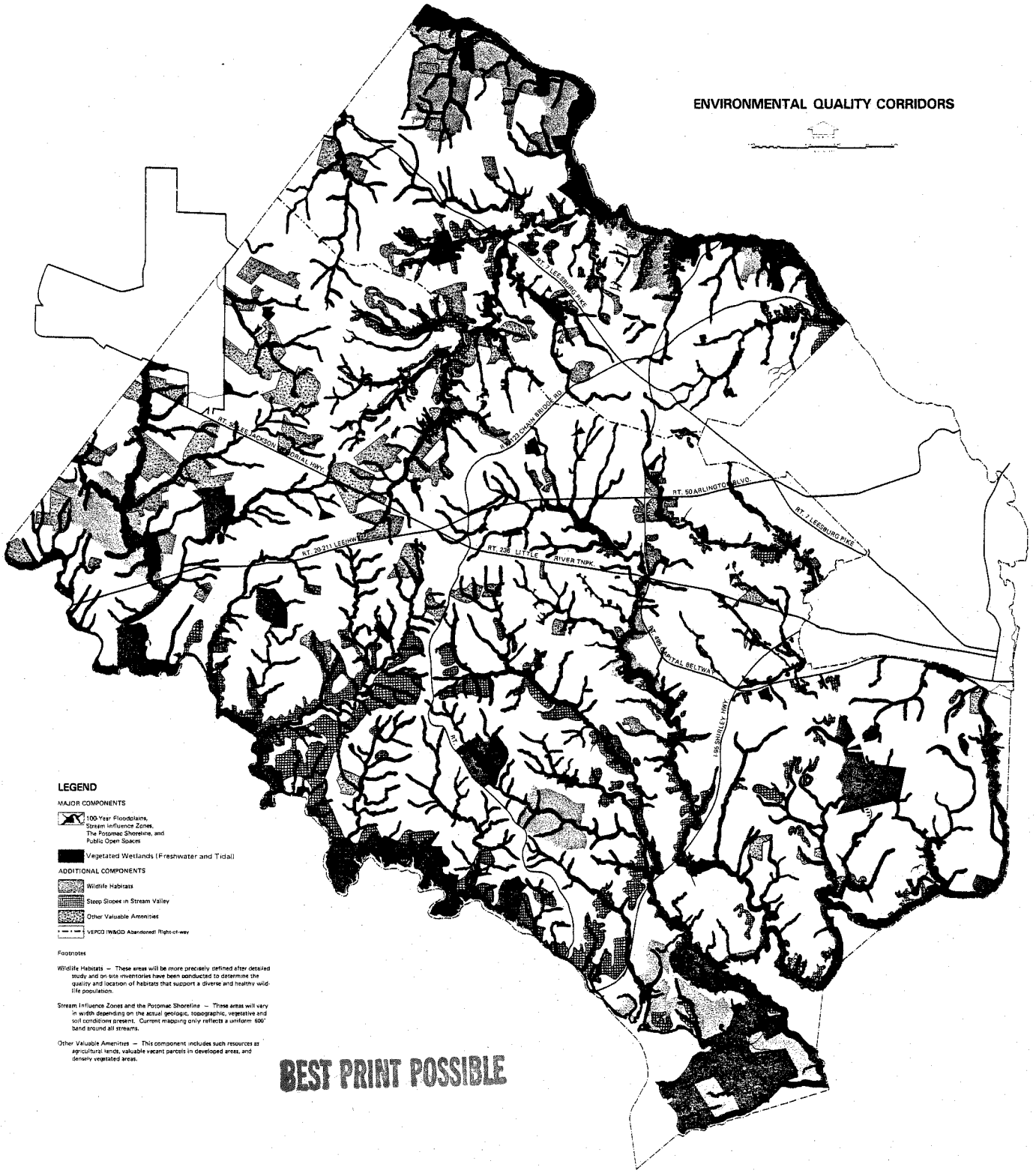
Fresh water marshes in the County are mapped on County topographic and soils maps. These wetlands provide the same kinds of environmental benefits as tidal wetlands. They are especially important where they occur next to streams since it is here that they are likely to have the most beneficial impacts in absorbing flood waters and where development is most likely to have an adverse impact on stream water quality. Fresh water wetlands are included in sensitive lands EQCs where they are found adjacent to streams.

Areas with steep slopes, defined as those greater than 15 percent, are added to the system whenever they occur along streams. Construction on these slopes often involves extensive clearing and grading resulting in soil erosion and the introduction of sedimentation pollution into the adjacent stream. Steep slopes are also prone to land slides. Their preservation in natural vegetation is necessary to protect the aesthetic quality of the stream valley. And for this reason, they are often included in the Park Authority's stream valley parks. In order to protect stream water quality, prevent erosion and land slide problems during and after construction, and provide visual amenities, steep slopes are included in the sensitive lands EQCs.

An EQC system including the above mentioned lands is likely to contribute greatly to the protection of the stream water quality, streamside vegetation, and good habitat for both aquatic and terrestrial wildlife. However, in some areas the 100-year floodplain, poor soils, and steep slopes together provide only a very narrow open space buffer along the stream. This buffer may not always be wide enough to protect the stream from sedimentation and extreme temperature changes as well as provide a corridor wide enough for effective wildlife habitat. In these areas it is recommended that some additional land outside the floodplain, poor soil and steep slope area be included in the EQC. The U.S. Forest Service[1] has developed an empirical formula for computing the naturally vegetated buffer strip width needed to trap all eroded material before it can reach the stream in areas such as Fairfax County receiving an average rainfall of twenty inches or more:

Buffer width = 50 + (4 x percent slope) in feet

[1]U.S. Forest Service. *Forest Land Erosion and Sediment Evaluation.* Forest Service Handbook, NA, FSA 3509. Upper Darby, PA.: U.S. Forest Service 1972. Also, Hartung, Robert E. and Kress, James M., *Woodlands of the Northeast Erosion and Sediment Control Guides.* Broomall, PA.: U.S. Department of Agriculture, Soil Conservation Service, Northeast Technical Service Center, 1977. Also, U.S. Department of Transportation, *Environmental Assessment Notebook Series: Highways, Notebook 4, Physical Impacts.* Washington, D.C.: U.S. Government Printing Office, 1975.



The Forest Service uses this as a guide to determine appropriate steam buffer widths to be maintained during logging. The U.S. Department of Transportation uses this as well as a guide in the environmental impact analysis of construction projects. If such a buffer strip is provided on either side of Fairfax County's streams, it is likely that the streams would be provided a great deal of protection from sedimentation caused by erosion from nearby clearing and construction. A buffer strip according to this formula should always be provided at a minimum in all sensitive lands EQCs. The sensitive lands EQC boundary is thus determined by this formula when the land encompassing the floodplain, floodplain and poor soils, wetlands and steep slopes forms an open space strip narrower than the minimum buffer strip calculated by the formula. Where the floodplain, floodplain and poor soils, wetlands and steep slope areas extend beyond this minimum buffer strip, they should be used to determine the boundary of the sensitive lands EQCs.

This minimum buffer provides not only protection from sedimentation of streams, it may also preserve enough streamside vegetation to provide the shading needed to prevent wide fluctuations in water temperature and thereby provide a more healthy environment for aquatic wildlife. A California study[2] of streams in moderately steep sloped areas found that a buffer width of approximately 90 feet is necessary to protect stream aquatic organisms from the adverse effects of sedimentation and temperature changes An EQC as defined herein including floodplains, poor soils, steep slopes and the calculated buffer widths in most cases would provide at least this wide a buffer for perennial streams. Such a buffer would also provide habitat for many species of terrestrial wildlife, although large species, such as deer may need wider buffers.

The sensitive lands EQCs as defined above form the basic framework for the environmental quality corridor system upon which the resource protection EQCs may be added.

Resource Protection EQCs

The resource protection EQCs include those valuable open space resources in the County which are important for protection in their existing states but which, unlike most sensitive lands EQCs, can support some appropriate use. These include public parks, private recreation and conservation areas, historic sites and districts, utility rights-of-way and abandoned railroad beds, citizen identified environmental resources, wildlife habitats, agricultural and forest lands, and other open space lands.

Public parks in upland areas where they are not a part of the sensitive lands EQCs, are an important component of the resource protection EQCs since they provide recreational opportunities; nodes of more intense recreational activity connected by the trails in the sensitive lands EQC corridor. Many of the large parks also provide excellent wildlife habitat and can serve as refuges for some of the larger species. Private recreation and conservation areas complement the public park system.

Historic sites and historic districts are also included in the EQC system since they will enhance the cultural and aesthetic value of the recreation system within the EQCs.

Utility rights-of-way and abandoned railroad beds (such as the Washington and Old Dominion) can be used for hiking, biking and riding trails, and, if managed correctly, can provide useful wildlife habitat and wildlife travel corridors.

A study of citizen identified environmental resources, conducted during the summer of 1974, was helpful in locating specific resources that are available to the community. Approximately 75 percent of these resources fall within or are adjacent to the sensitive lands EQCs. Surveys of citizen-valued environmental resources should be updated periodically.

Wildlife is abundant in Fairfax County since there is still a great deal of vacant land. Identification of the prime wildlife habitat remaining is necessary for the planning of an open space system which serves to provide a healthful environment for wildlife in the County. The sensitive lands EQCs provide a great deal of wildlife habitat, though they are too narrow in some areas to provide good habitat or even travel routes for the larger species such as deer. Wildlife specialists suggest that corridors 600 feet wide (300 feet on either side of the stream) may provide adequate travel routes for some of the large species. Such wide corridors should be provided between large parks and identified prime wildlife habitats identified.

Agricultural and forest lands may also be included in the resource protection EQCs. Lands desirable for preservation should be identified. These lands provide many benefits to the County is their existing state—benefits such as pleasant visual open space, the provision of useful products, habitats for wildlife, moderation of flooding and stream bank erosion, beneficial impacts on air quality, and quiet.

Levels of Protection

The two components of the environmental quality corridor system merit different levels of protection from development and use because of their differing natures and purposes for preservation.

Sensitive Lands EQCs

These lands are sensitive to development and with few exceptions are to be preserved in undisturbed natural open space containing only recreational trails designed to have a minimal environmental impact on the land and water. It is recognized, however, that some intrusions, such as road and utility crossings and stormwater management structures, will have to be allowed periodically in these EQCs. These intrusions should be minimized. Of particular importance is the avoidance of siting roads and utility rights-of-way parallel to streams since this can have extremely adverse physical and visual impacts. There is also room for some compromise in the development of steep slopes and marine clays. Where steep slopes cover extensive areas and are relatively unlikely to slide, some buildings could be allowed on those steep slopes farthest from the stream if adequate measures are taken to minimize grading, clearance of vegetation, and erosion, and if the floodplain, floodplain soils, and minimum buffer width calculated from the U.S. Forest Service formula are preserved in undisturbed open space. Marine clays may also be built upon in special cases where the design of the development has been approved by the County Geotechnical Review Board. It should be noted that protection for tidal wetlands are presently set forth in Part 9 of Article 7 (Wetlands Overlay District) of the Fairfax County Zoning Ordinance. Tidal wetlands are protected from most development by this district. Activities proposed in tidal wetlands must be reviewed by the Fairfax County Wetlands Board.

Resource Protection EQCs

These EQCs may be more intensely used than the sensitive lands EQCs as long as they remain in relatively low-intensity open space use which serves the purpose for which the land is being preserved. Those lands in public ownership or under public regulation, such as public parks and designated historic sites and districts are protected by government management programs and regulations. For example, lands and buildings within historic districts are protected from development or redevelopment which would adversely affect their historic value through enforcement of the provisions of the historic overlay districts regulations within the *Zoning Ordinance.*

The level of protection for some of the resource protection EQCs wil be determined in more detail as programs for their protection are developed. For example, the wide wildlife corridors (600 feet recommended) would be best protected in undisturbed open space, though low-density residential development at .2 unit per acre or lower would provide fairly good protection of these lands as wildlife habitat. Agricultural and forest lands would be best protected in agricultural and forest use with no nonfarm related residential, commercial, or industrial development allowed. Such a level of protection may be difficult to achieve for all agricultural and forest lands remaining in the County.

Implementation Techniques

The identification of open space lands which are desirable to preserve is only one step in the process. Implementation of the program is the crucial step. Some implementation techniques are being used successfully by the County. Others require further study. Some of the tools presently used are:

1. Purchase in fee simple of sensitive lands EQCs and parklands by the Fairfax County Park Authority. (The Northern Virginia Regional Park Authority has also purchased a great deal of parkland in the County. State and federal parks add to the public park system as well.)
2. Acceptance by the Fairfax County Park Authority of the dedication of open space land within clustered subdivisions and other development projects.
3. Dedication to homeowners' associations by developers of permanent open space land within cluster subdivision as a result of the development process.
4. Enforcement of the County floodplain ordinance. Under this ordinance some development meeting certain engineering and flood-proofing standards can occur in the floodplains if the base flood elevation is not raised. However, most or all of the floodplain is usually retained in undisturbed open space as a result of the enforcement of this ordinance.
5. Enforcement of County zoning regulations within historic districts. These are further described in the history section of the Plan.
6. Acceptance by the County of open space easements (scenic and conservation) from private homeowners. The County holds several easements for scenic lands, especially along the Potomac River.
7. Establishment by the County of agricultural and forestal districts pursuant to the Agricultural and Forestal Districts Act, as amended, Chapter 36 of Title 15.1 of the *Code of Virginia.* Lands included in these districts:
   - are eligible for a deferral of local real estate taxes, pursuant to Chapter 15 of Title 58, Article 1.1 of the *Code of Virginia;*
   - bare protected from local ordinances, such as odor and noise ordinances that may restrict farm practices; and,
   - may not be developed to a more intense use than the existing use while the lands remain in the district without prior approval of the board.

The law also requires that land use decisions regarding lands surrounding the district take into account the existence of the district and its purposes and restricts the acquisition of land by governments or public service corporations for public facilities: the extension of loans, grants, or other funds by such governments and corporations for nonfarmer development; and the creation of special taxing districts for nonfarmer purposes. The

[2]Erman, Don C.; Newsold, J. Davis; and Roby, Kenneth B., *Evaluation of Streamside Bufferstrips for Protecting Aquatic Organisms.* Davis, California: California Water Resources Center, 1977.

effects of the establishment of a district are specified in Sections 15.1-1511 and 15.1-1512 of the *Code of Virginia*. The establishment of agricultural and forestal districts represents one method for preserving these resource protection EQCs.

Other implementation tools which have received little use or merit further study include:

1.Expansion of an existing County agency's role or the creation of a new County agency to provide comprehensive protection and management for open space lands. This agency could become more highly involved in the acquisition of open space easements, purchase and lease back of agricultural lands, purchase of critical natural areas and wildlife habitats, acceptance of dedication of gifts, and management of the County open space holdings as a multipurpose open space system which provides recreation opportunities, scenic amenities, water quality protection, vegetation and wildlife habitat preservation and enhancement, as well as other benefits.

2. Establishment of environmental quality corridor overlay districts to regulate development and encourage good management practices within various portions of the EQCs. The regulations in these districts might, for example, provide standards and criteria for the management of homeowners' association open space or for the clearing of vegetation and construction of buildings, roads, and parking lots within wildlife corridors. Enabling legislation may be needed.

3. Utilization of available federal and state funds for open space acquisition, trail construction, and wildlife habitat restoration, etc.

4. Coordination with private conservation organizations, such as the Nature Conservancy and the American Farmland Trust, to acquire selected parcels of critical natural areas, wildlife habitats, and prime farmland.

5. Development of new funding sources for open space fee simple and easement acquisition through such methods as a real estate transfer tax, capital gains tax, etc. Enabling legislation in many cases will be needed.

6. Strengthening of existing County ordinances, such as the floodplain ordinance.

7. Consideration during the land use planning process of land use and development intensity issues on a watershed basis in order to provide protection of the environmental quality of streams and EQCs. Land uses and use intensities outside the EQCs can affect the environmental quality within EQCs adversely. Avoidance or mitigation of these adverse impacts is needed to provide the most beneficial EQC system possible.

VISUAL POLLUTION

The visual character of that part of the County's landscape which has not yet been severely impacted by urbanization is created largely through the combination of dense, deciduous forest vegetation, rolling landforms, and a network of streams and stream valleys. The capacity of this landscape to absorb alteration without losing its visual character is critical and should be a planning consideration for the County. Sensitive architectural and landscaping programs as well as careful project layouts can produce aesthetically interesting development patterns. Failure to do so will result in a somewhat barren landscape not unlike the urbanized parts of the County and Arlington, areas which once shared the visual quality of the County's existing rural areas.

NOISE POLLUTION

In the last 20 years concern for environmental quality has continued to grow. Along with air and water pollution, noise pollution has been recognized as a serious problem.

In the Noise Control Act of 1982 as amended, the federal government recognized excessive noise as detrimental to the public health and welfare. Some of the adverse impacts associated with excessive levels of noise include both temporary and permanent damage to the inner ear and thus to hearing, high blood pressure, stress to the human body and aggravation of existing disease, possible threats to human fetal development, impairment of skill learning in children and task performance in adults, aggravation of adverse mental health symptoms, and affects on both quantity and quality of sleep.[1]

In addition to these adverse impacts, a recent poll conducted by the U.S. Bureau of the Census revealed that noise is considered to be the most undesireable neighborhood condition—more irritating than crime or deteriorating housing[2] A recent survey of Fairfax County residents determined that noise is viewed on par with water pollution and second only to air pollution as a major concern.

Federal Support to State and Local Activities

In the same legislative action that recognized noise as a hazard to health, the Environmental Protection Agency (EPA) was directed to "publish information about the levels of noise requisite to protect the public health and welfare with an adequate margin of safety." This directive resulted in EPA's production of a report entitled *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare* (1974). Based upon this report and other research, EPA has proposed ambient community noise-level goals which consider protection of the public health an welfare as well as the cost and technical feasibility of achieving reductions of noise levels in the community. These goals have been used directly or modified slightly by other federal agencies, such as the Department of Housing and Urban Development and the Federal Highway Administration, in their implementation of agency regulations regarding the provision of healthful housing and the prevention of adverse transportation impacts.

In June 1980, the Federal Interagency Committee on Urban Noise, representing five federal agencies (Environmental Protection Agency, Department of Housing and Urban Development, Veterans Administration, Department of Defense, Department of Transportation) developed planning guidelines on the compatibility of land uses with environmental noise levels for use by state and local government. These guidelines, incorporated into a publication entitled *Guidelines for Considering Noise in Land Use Planning and Control*, represent the most current, best available information for noise-compatible land use planning. These guidelines can be appropriately applied to all noise sources, especially transportation sources, a major contributor to ambient noise levels in the community.

Fairfax County Efforts

Fairfax County has a history of demonstrated concern about excessive noise and its impacts on the community. For several years, the County has had in effect an ordinance concerned with controlling both nuisance and stationary source noise impacts on adjoining properties.

In more recent years and in response to trends of increasing noise levels due to urbanization, Fairfax County has been involved in planning for noise compatible land use in relationship to transportation noise sources. Recognizing that the adverse impacts of transportation noise can be mitigated, the County's Plan sets forth policies which speak to planning for noise compatible land use in the vicinity of highways, railroads, and Dulles Airport and the need to provide mitigation measures (i.e., acoustical treatment to structures, site layout, noise attenuation barriers/berms, etc.) so that the use can be made compatible with ambient noise from transportation sources.

In addition to general Plan policies, the County has adopted Plan and zoning amendments to implement an airport noise compatibility program as part of the *Occoquan Basin Study* implementation package. The plan policies and ordinance amendments are based upon the federal noise compatibility guidelines noted above. Since these guidelines can be appropriately applied to all noise sources, these guidelines have been used and will continue to be used to guide decisions about noise compatibility and mitigation measures for excessive noise levels from all noise sources. For details about aircraft noise and for further guidance on noise compatibility, see Land Use Planning Within the Dulles Airport Noise Impact Area in the Area III section of the Plan.

In recent years, our nation has experienced significant adverse economic and environmental impacts resulting from dependence on foreign and domestic nonrenewable energy resources. These experiences have served to establish energy conservation as a well-accepted public goal. Energy conservation has popularly come to mean the reduction of total energy demand resulting from increased efficiency and greater use of renewable energy sources.

Energy conservation is an important community concern in Fairfax County. County efforts in energy conservation are evidenced in the work of the 1977 Energy Conservation Task Force, the Citizen's Advisory Committee for Energy, appointed in 1978, and the continuing efforts of the Offices of Energy and Emergency Services, Comprehensive Planning, and Transportation. Even with these efforts, comprehensive energy conserving goals are yet to be fully incorporated into the planning and development review processes.

On October 20, 1981, *Energy Conscious Development, Options for Land Use and Site Planning Regulations*, a report prepared for the County under a U.S. Department of Energy contract, was accepted by the Board of Supervisors. This study examines the energy impacts of County land use and development policies. In addition, it describes a program consisting of 15 basic options to promote greater energy conservation through changes in County land use and transportation planning, and development regulations. An energy use profile was developed which describes total energy consumption by the use and by the type of energy consumed. This profile confirms the findings of an earlier Burke Centre study which found that over two-thirds of total energy con sumption in the County is for residential and transportation uses. These findings emphasize the need to direct County efforts toward energy conservation in land use, transportation and site planning, and in building design and materials.

It is clear that if the County wishes to set energy conservation as a high priority, consideration should be given to the development of more detailed evaluation criteria and a strong incentive system.

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[1] "Noise: A Health Problem" Environmental Protection Agency, Washington, D.C., March 1984.

[2] "A Balanced Approach to Noise Control" by Douglas Costle, *EPA Journal*, Washington, D.C., October 1979.

PRELIMINARY GEOLOGIC EVALUATION OF AREAS

Area I

Area I straddles the boundary between the Coastal Plain unconsolidated sediments and the Piedmont crystalline rocks. This boundary is also known as the fall line, the imaginary line drawn through the low falls or rapids on major streams that form a barrier to navigation at the contact of the Coastal Plain and Piedmont.

Coastal Plain deposits of clay, silt, sand and gravel occur mainly in the southeastern part of Area I, principally beneath interstream upland surfaces. As some of the clays and silty clays shrink when dry and swell when wet and are potentially landslide-prone, careful delineation of their areal distribution and composition is necessary to evaluate hazards. Where swelling clays occur at or near the surface, especially on steep natural slopes or where slopes are artificially cut, a situation of potential instability is present. A related factor is the distribution of the sand and gravel capping upon which a hard pan soil may be present which can effectively prevent percolation of water into the clays. Finally, the distribution of southeastward tilted sand and gravel layers interbedded with or underlying the clays may bear on the pollution of recharge zones for potential aquifer beds for groundwater in adjoining areas to the southeast.

The crystalline areas of the Piedmont contain a great variety of rocks, from massive granite to banded gneiss to thinly layers schists. All of the rocks beneath the upland surface are weathered to some extent, and the mantle of soft, clay-rich material (saprolite) may exceed 100 feet in thickness in some areas. Each rock type yields saprolite and soils with radically different physical and chemical characteristics. In some localities hard, fresh, unweathered bedrock is exposed at or near the surface, as along some river gorges. A few of the potential constraints or hazards to certain types of development occur in areas of shallow bedrock, highly erodible areas of steep slopes and thick soil and saprolite, areas of poorly drained saprolite with excessive swelling clay content, and areas where the bedrock surface slopes steeply toward nearby surface drainage (potential pollutants).

Stream valleys transect the Piedmont and Coastal Plain provinces, sloping gently from northwest to southeast across Area I. In addition to posing constraints on certain types of development in floodplains, the direction and slope gradient on the adjacent bedrock surface, presence or absence of terrace gravels, depth of alluvial fill, and potential contamination of surface or ground waters by undesirable effluents are also recognized as potential hazards.

Area II

Area II lies mainly in the Piedmont province underlain by crystalline rocks, except for an outlier of Coastal Plain sediments near Tysons Corner which occupies about 2 or 3 square miles (less than 10 percent of the area).

The Coastal Plain strata consist chiefly of unconsolidated and iron-cemented sands and gravels with lesser amounts of silt and clay. They cap the highest area of Fairfax County and overlie and are surrounded by crystalline rocks which are generally weathered to form saprolite. Because of their limited thickness and areal extent, and as they are disconnected from the main body of Coastal Plain strata to the east, they are not of significance in relation to groundwater. Also, no major areas of slide-prone clays have been identified. The only potential hazard to orderly planning and development is the possibility of a perched water table above the main gravel capping.

One of the best exposures of the angular unconformity separating gently dipping unconsolidated Coastal Plain sediment above from weathered to almost fresh vertically foliated metamorphic rocks below is present in Area II. It is exposed in a road cut on the north side of Chain Bridge Road (Route 123) immediately west of Beltway (I-495) Exit 11. As a nearly perfect example of a classic textbook geologic structure, it might be considered for preservation for geologic and educational purposes.

The crystalline rocks of the Piedmont contain a great variety of rocks, from massive granite to thinly foliated schists. Most of the rocks beneath the upland soils are weathered to some extent, and the weathered mantle of soft, porous, clay-rich material (saprolite) may exceed 150 feet in thickness in some areas. Each rock type yields saprolite and soils with radically different chemical and physical properties, which directly bear on their filtration and absorption capacities. In some localities hard, fresh, dense, unweathered bedrock is exposed at or near the surface, mainly along some river gorges but also on upland surfaces underlain by quartz veins or serpentinite. Potential constraints or hazards to certain types of development are present in areas of shallow bedrock (although these may be potential quarry sites if rock type is favorable), highly erodible areas of steep slopes and thick soil and saprolite, areas of poorly drained saprolite with high content of swelling clays, and areas where the bedrock surface slopes steeply towards nearby surface drainage. Basic research on saprolite is needed to attempt to define limits of density for septic tank drainage fields where the volume of sewage input depends on the maximum absorption capacity, which in turn is dependent on the nature and volume of filterable material. As the groundwater system is open ended, that is, not dependent on a confined aquifer, only infiltrated rain and surface water provide local recharge. Thus every area of contaminated input should be regarded as a potential pollutant.

Stream valleys transect the Piedmont upland in Area II with the headwaters and upper reaches of most of the drainages of Fairfax County located herein. In addition to posing constraints to certain types of development in floodplains, geologic information is pertinent to evaluating potential reservoir sites, the direction and slope gradient on the adjacent bedrock surfaces, presence or absence of terrace gravels, depth of alluvial fill, and potential contamination of surface or groundwater by undesirable effluents, all of which are recognized as possible natural hazards. As overburden is often thin over fresh bedrock along stream valleys, opportunities for siting readily concealed quarries for rocks favorable for crushed stone (granite, serpentinite) or building stone (gneiss, metagraywacke) may be present in some localities.

Area III

Preliminary geologic field studies show the eastern part of Area III to be underlain by a variety of metamorphosed crystalline rocks of the Piedmont, and the western part to be underlain by younger Triassic sedimentary rocks. The Triassic rocks consist of shale sandstone and conglomerate, which are locally intruded and baked by igneous rocks. The crystalline rocks of the Piedmont are usually deeply weathered to a clay-rich saprolite, locally as much as 120 feet thick; the Triassic rocks are rarely weathered to depth greater than 15 feet. Although all rocks are fractured and jointed, the intensity of fracturing and jointing is highly variable.

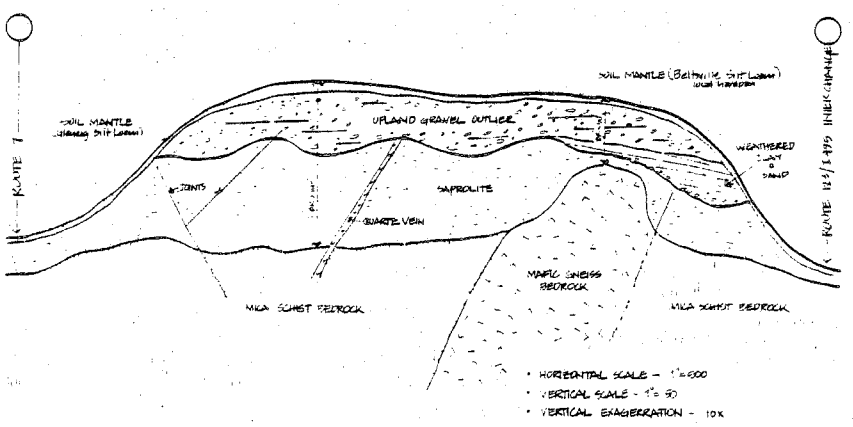
Large bodies of igneous rock in Area III are a valuable source of crushed stone and require careful evaluation of any proposed land use that may affect full utilization and development of this resource. In addition, planning for sequential use of abandoned quarries must consider both topographic and geologic-structural constraints.

Most Triassic rocks are not highly porous and groundwater recharge is apparently via a complex nonuniform network of bedding plane partings, joints, and fractures, this network forming an aquifer system. Because the Triassic rocks are a potential source for large supplies of groundwater for municipal and industrial uses (both Manassas and Leesburg obtain municipal water supplies from deep wells in Triassic rocks), careful geologic evaluation should be given to any land use proposal that might possibly lead to either chemical or biologic contamination of groundwater. This is especially critical in the Triassic rocks because of the complex groundwater movement and general paucity of thick saprolite cover that might provide the high absorption capacity that would filter out particulate biologic contaminants.

Floodplains in Area III are periodically inundated. This poses problems for many kinds of land use in stream valleys. Especially hazardous is the potential for contamination of groundwater and surface water by biologic and chemical effluents. At the present time potential pollution hazards exist where several sewage disposal plants are located in floodplains.

Steep slopes flanking some stream valleys are potentially unstable, and soils and weathered bedrock are highly erodible and pose geologic constraints on land use.

TYSON'S CORNER GEOLOGIC CROSS-SECTION



Area IV

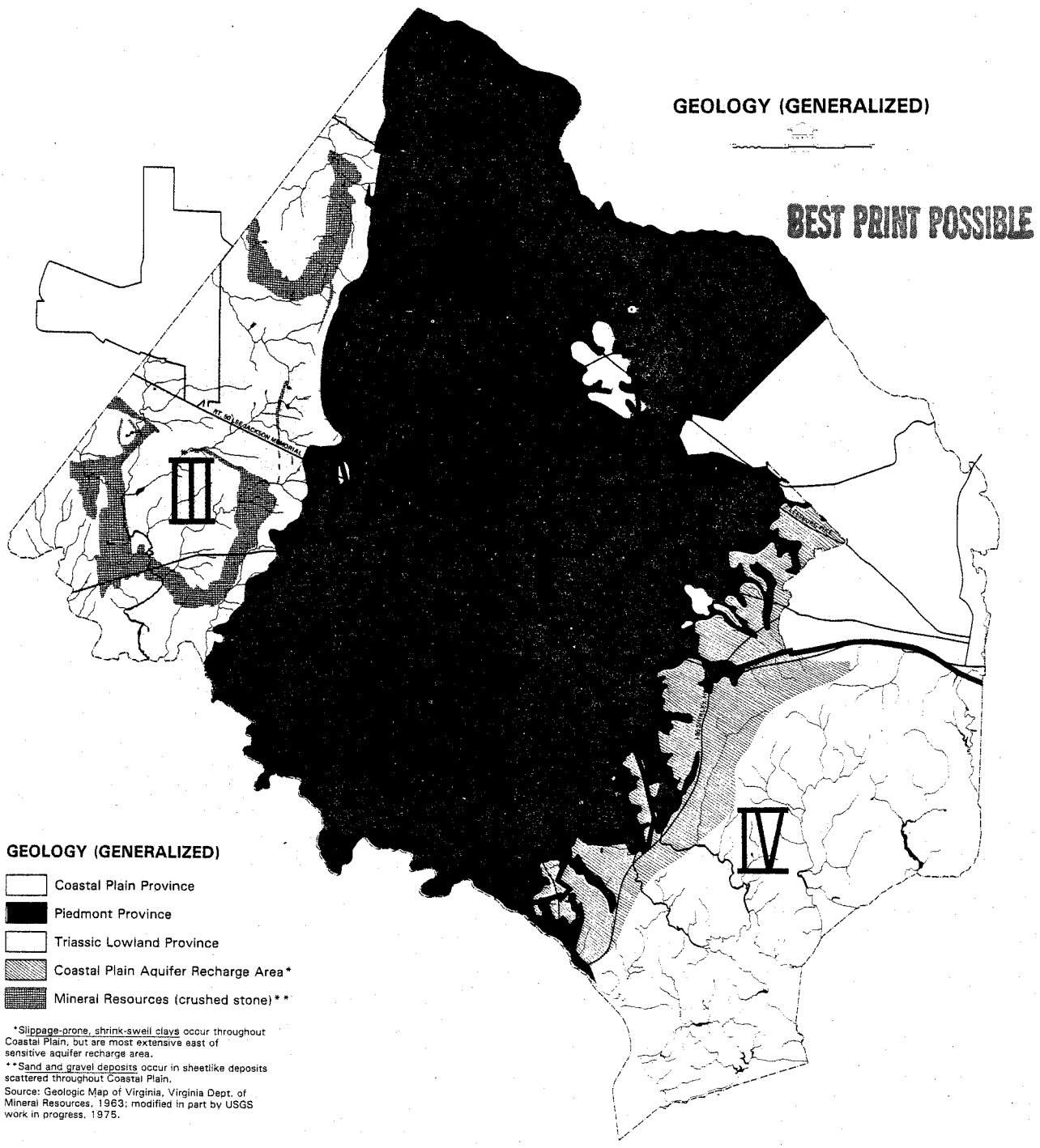
Preliminary field work indicates that in Area IV, seven to ten square miles of land west of I-95 are underlain by metamorphosed crystalline rocks. This is the Piedmont province. The remainder of Area IV is the Coastal Plain province, where coarse gravel caps overlie Cretaceous-age sand and clay beds, which in turn lie upon the ancient metamorphic rock surface. Hybla Valley and the southern part of Mason Neck are part of an old Potomac River channel. The surficial material in these areas is relatively young river sediment. Its thickness has not been determined; at least some of the clay is nonswelling.

The beveled bedrock surface dips to the southeast at a rate of 50 to 100 feet per mile. The Cretaceous sediments were deposited in overlapping river deltas on that surface, and dip from 30 to 100 feet per mile. The gravel caps generally dip about 30 feet per mile, also to the southeast, but there are occasional steep steps in the gravel surface.

Groundwater is most readily recharged in the western part of Area IV (west of Mason Neck and Hybla Valley) where Cretaceous sand is more abundant than Cretaceous clay. Cretaceous sand beds are important aquifers at a depth of over 300 feet in eastern Fairfax County and points to the east of the County. Downward movement of water is inhibited by hardpans in the gravel caps. (A clay unit commonly overlies the gravel; it is of approximately the same age. The hardpan occurs in either the gravel or the overlying clay.)

Landslides in parts of Area IV are evidence of a widespread potential problem—the slippage-prone swelling clays of Cretaceous age. The clay outcrop map prepared in 1974 by the County soils scientist shows areas where montmerillonitic clay and silty clay are within five feet of the surface. Preliminary geologic mapping suggests that the clay is likely to be within 30 feet of the surface throughout the Coastal Plain part of Area IV. Landslides are more likely on steeper slopes, but lateral pressure exerted by swelling clay on foundations occurs even in flat terrain.

Sand and gravel have been quarried from much of the area between I-95 and Route 1. The deposits include gravel caps, Cretaceous sand, and weathered bedrock (crystalline saprolite).



MINERAL RESOURCES

The Fairfax County ordinance was amended by the Board of Supervisors in 1961 to establish a natural resource overlay district which recognized, protected and authorized the extraction of sand and gravel resources. The major emphasis of the natural resource overlay district was to allow for the extraction of major sand and gravel resources in the Franconia/Lehigh area. An additional purpose was to reduce the negative impact of truck traffic, noise, visual and air pollution on neighboring subdivisions and secondary roads.

In 1971, the natural resource overlay district was amended to include crushed stone resources as well as sand and gravel. Additional changes included a five year extension of the Franconia/Lehigh natural resource overlay zone. During 1976, all existing and future sand and gravel extraction permits were terminated. Crushed stone extraction is still permitted pending the rezoning of land to a natural resource overlay district and the approval of a Group I special use permit.

The need for construction materials in Fairfax County is increasingly apparent from sharply rising construction costs, despite the fact that many of the needed rock and mineral resources are available within the County.[1] If these resources are to be developed with an attendant savings in construction costs, there must be both an awareness of the extent of environmental disruption accompanying their development, and a balancing of that disruption against the higher costs of imports. A decision to use or not use an available resource depends on many factors, including the possible environmental disruption to air, water, the landscape and local communities. However, wise planning and regulation in advance of extraction can reduce or avoid anticipated damages. As urbanization expands into rural or undeveloped areas, potential mineral deposits may be preempted, unless such deposits are recognized and preserved in the land use planning process. Extraction of rock or sand and gravel may be only a temporary stage in efficient land use planning. After extraction, the land can be restored to agriculture, used for recreational areas, building sites, or possibly solid waste disposal.

If the option of ensuring the future availability of construction materials in Fairfax County is selected, a series of actions is required in advance of extraction. First, future needs must be forecast and analyzed; second, potential resource sites of adequate size must be identified, inventoried, classified and ranked; third, resources sites with economic potential must be protected from preemptive land uses, although interim temporary uses are possible pending future extraction; and fourth, reclamation plans for sites of depleted resources should consider sequential land uses (such as for recreation or solid-waste disposal) that take advantage of the topographic, hydrologic, and geologic characteristics of each site. This analysis should consider the need to reserve adequate space for processing plants, access roads, buffer zones, and utility corridors for high-load electrical lines. Effective protection of resources presently remote from urban acres may depend on the preparation of land use plans long before development is scheduled to occur.

The rock and mineral resources of Fairfax County are used as sources for construction material, highway fill and building stone.[2] The map titled Potential Mineral Resources shows the rock and mineral resources available within the County. Past and present quarries, pits, and mines are also shown on the map and keyed to a locality list. During 1975-76 diabase was quarried for rip-rap, fill and crushed stone; granite was quarried for aggregate, crushed stone, rip-rap, and fill; and sand and gravel were extracted for construction uses. Resources necessary for future construction include adequate quantities of crushed stone and sand and gravel at or near the surface and located close to the area of use. The County has large reserves of some industrial materials, but new extraction sites may be needed to fulfill economically the requirements of future construction.

Minor deposits of metallic or nonmetallic minerals are distributed throughout Fairfax County, but these occurrences are mainly of historical, mineralogical, or geological interest.

Listed below are more detailed descriptions of the rock and mineral resources found in Fairfax County. The major categories are crushed stone, sand and gravel, and minor deposits of historic interest; within each category, the resources are listed in terms of relative importance as a viable resource.

Crushed Stone

Diabase

Diabase, a dark colored igneous rock suitable for crushed stone, underlies much of western Fairfax County and extends into adjacent Loudoun County. Diabase makes excellent aggregate because it is tough, has uniform texture, and is resistent to chemical weathering. Crushed diabase is used principally as binder-filler for asphalt paving, as base course for highways, for road metal, and for concrete aggregate.

The near-surface part of the spoon-shaped diabase body that surrounds Herndon covers approximately six square miles in Fairfax County, about 60 percent of which is partly urbanized. About 40 percent of a similar body near Centreville, an area that covers approximately eight square miles in Fairfax County, is urbanized, partly urbanized or otherwise committed to parkland and other uses (Locality 1). A square mile area excavated to a depth of 50 feet contains about 130 million tons of diabase suitable for crushed stone or about 35 years supply at current rates of consumption in the County.

Baked Zone

The baked zone forms a belt of altered sedimentary rocks surrounding the diabase rock bodies. The baked zone averages about one-half mile wide and is present along the inner and outer margins of the diabase bodies at Herndon and Centreville. Baked silt-stone and shale have been locally used as a source of fill and roadbed material, and several quarries in Loudoun County produce part of their crushed stone output from this zone. However, it should be noted that engineering tests are required at each potential quarry site to ascertain whether required characteristics are present in the rocks.

Granite

Granite is quarried from the moderately foliated Occoquan Granite near Occoquan, Virginia (Locality 2). In 1976 the quarry covered 10 acres, was 350 feet (107m) deep, and had an anticipated life of about 10 years at current rates of production. The chief use is for aggregate, crushed stone, rip-rap and fill. Similar granites crop out near the surface in southern Fairfax County, but core-drilling and engineering tests are required to ascertain acceptable quality. Much of the area underlain by granite is mantled by a blanket of saprolite (weathered rock) as much as 100 feet (30m) thick.

Serpentinite

Serpentinite was formerly quarried for crushed stone and aggregate at a small, long-abandoned quarry on Leigh Mill Road near Great Falls (Locality 5). Similar material quarried in nearby Montgomery County, Maryland, was the chief source of crushed stone in 1975. In Fairfax County, serpentinite occurs chiefly in narrow, elongate tabular bodies; the largest of these, near Reston, is partly urbanized. Most narrow bodies and the borders of the large bodies are sheared and may contain fibrous asbestos. Therefore, they are unsuited as a major future source of crushed stone.

Building Stone

Abandoned quarries in schist, gneiss, greenstone and granite are widely scattered throughout Fairfax County (Localities 4, 6, 7). The bedrock exposed in the quarries is foliated and jointed, characteristics that undoubtedly facilitated quarrying. The rock was reportedly used locally for flagstone, building stone, veneer, slate, fill and rip-rap. Extensive reserves of rock similar to that formerly quarried remain at shallow depth, but many accessible sites are now used as streamside parks and for residential developments. Extensive areas of Occoquan granite are readily accessible in southern Fairfax County, should greater use of this attractive stone become desirable.

Sand and Gravel

Upland and Coastal Plain Deposits

Sand and gravel were formerly dug from numerous pits in the eastern part of the County. The upland area formerly blanketed by extensive sand and gravel deposits, which exceed 20 feet in thickness, was about 33 square miles. Gravel and sand were removed from about 2 square miles and about 25 square miles in the deposits are urbanized, leaving about 6 square miles of material potentially available for use.

In some areas beneath these upland sand and gravel deposits, the Cretaceous-age (a million years old) sand and pebbly sand deposits of the underlying Coastal Plain sediments were formerly dug for local use as construction materials.

Sand-sized quartz-rich material that formed as saprolite on deeply weathered Occoquan granite has been dug at Fort Belvoir west of Accotink Creek. Large areas underlain by similar material remain.

Alluvium

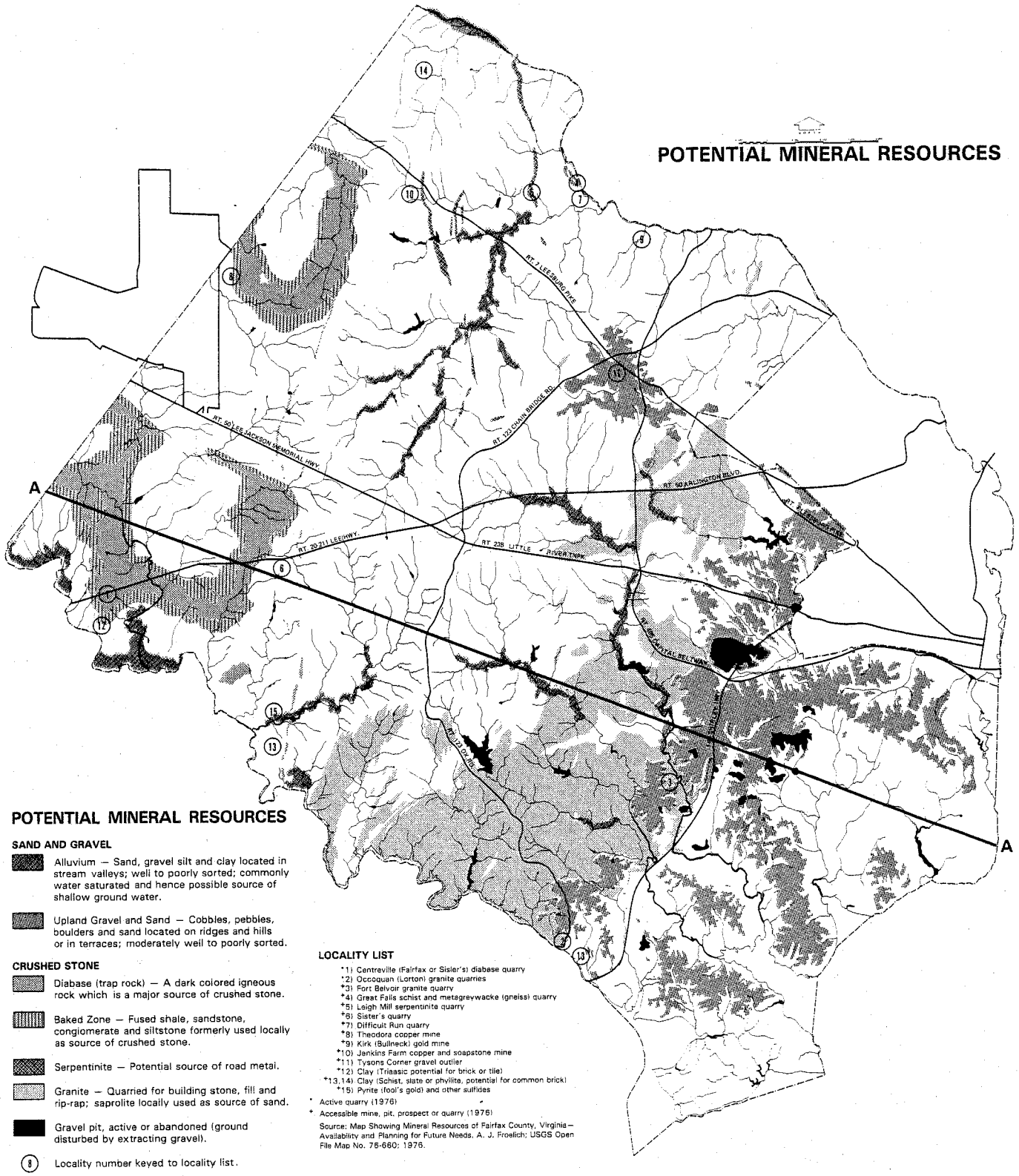
Sand and gravel deposits of limited extent are present along the Occoquan and Potomac Rivers, Difficult Run and Pohick, Popes Head, and Accotink Creeks. The alluvial deposits probably average 20 feet thick and contain much clay and silt. Clean, quartz-rich, sandy alluvium is common in stream deposits draining areas underlain by Occoquan granite, as in South Run and Sandy Run. Any plan to extract these deposits must be weighed against the scenic values, recreational uses, and effects on surface water quality of the rivers and creeks. Perhaps more importantly, these deposits may contain a significant volume of clean, potable, shallow groundwater which is relatively secure from airborne pollutants and possibly suitable as an emergency supplemental supply of drinking water.

[1] "Sand and gravel is a low cost commodity, but its transportation cost is high. Generally, the truck transportation charge for a 15 to 20 mile haul equals the cost of a ton of gravel at the plant. This illustrates the importance of having sand and gravel extraction operations close to urban areas, where most construction is taking place." *Natural Features of the Washington Metropolitan Area*, Metropolitan Washington Council of Governments, January 1968; p.10.

[2] The following statistics indicate the quantities of sand and gravel used in contemporary construction:

- 95 percent of asphalt is sand and gravel.
- 70 percent of concrete is sand and gravel.
- 90 percent of a concrete block is sand and gravel.
- An average house uses 50 to 100 tons of sand and gravel.
- A subdivision street one block long uses 400 to 600 tons of sand and gravel.

Natural Features of the Washington Metropolitan Area; Metropolitan Washington Council of Governments. January 1968; p. 10.



POTENTIAL MINERAL RESOURCES

SAND AND GRAVEL

Alluvium — Sand, gravel silt and clay located in stream valleys; well to poorly sorted; commonly water saturated and hence possible source of shallow ground water.

Upland Gravel and Sand — Cobbles, pebbles, boulders and sand located on ridges and hills or in terraces; moderately well to poorly sorted.

CRUSHED STONE

Diabase (trap rock) — A dark colored igneous rock which is a major source of crushed stone.

Baked Zone — Fused shale, sandstone, conglomerate and siltstone formerly used locally as source of crushed stone.

Serpentinite — Potential source of road metal.

Granite — Quarried for building stone, fill and rip-rap; saprolite locally used as source of sand.

Gravel pit, active or abandoned (ground disturbed by extracting gravel).

(8) Locality number keyed to locality list.

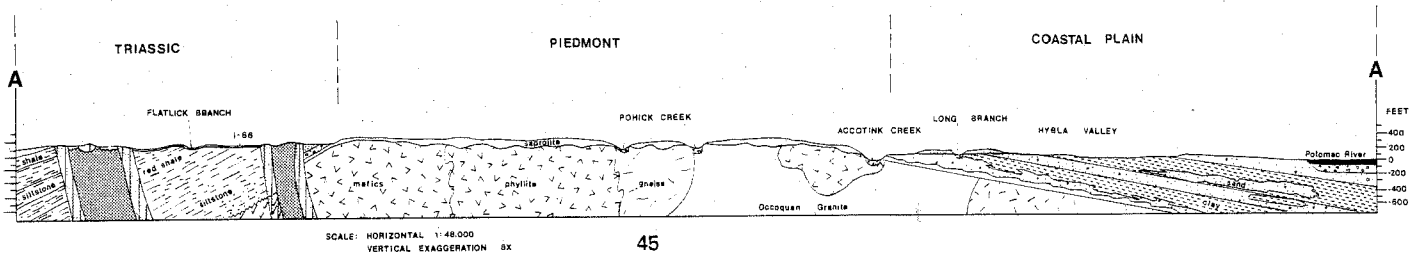
LOCALITY LIST

*1) Centreville (Fairfax or Sisler's) diabase quarry
*2) Occoquan (Lorton) granite quarries
*3) Fort Belvoir granite quarry
*4) Great Falls schist and metagreywacke (gneiss) quarry
*5) Leigh Mill serpentinite quarry
*6) Sister's quarry
*7) Difficult Run quarry
*8) Theodora copper mine
*9) Kirk (Bullneck) gold mine
*10) Jenkins Farm copper and soapstone mine
*11) Tysons Corner gravel outlier
*12) Clay (Triaasic potential for brick or tile)
*13,14) Clay (Schist, slate or phyllite, potential for common brick)
*15) Pyrite (fool's gold) and other sulfides

* Active quarry (1976)
+ Accessible mine, pit, prospect or quarry (1976)

Source: Map Showing Mineral Resources of Fairfax County, Virginia—Availability and Planning for Future Needs, A. J. Froelich; USGS Open File Map No. 75-660; 1976.

SCHEMATIC GEOLOGIC AND MINERAL RESOURCES CROSS SECTION FAIRFAX COUNTY, VIRGINIA



Minor Deposits of Historic Interest

Gold

Gold was mined underground from quartz veins in schist bedrock and saprolite and from alluvial placer workings at the Kirk Mine on Bullneck Run (Locality 9) between 1890 and 1939. Gold flakes were panned from stream gravel in Bull Run about 300 meters south of Route 66.

Copper

Copper carbonates, silicates, and sulfides were mined on a small scale in the 1880's at the Theodora copper mine near Herndon (Locality 8). Other minor disseminated copper occurrences are common in the baked zone adjacent to diabase intrusives near Chantilly, but none are known to have been mined. Malachite is associated with serpentinite at Jenkins Farm Prospects (Locality 10).

Iron

Various forms of iron ore are magnetite, hematite and pyrite (fool's gold). Magnetite is reportedly associated with chlorite and chromite in serpentinite near Dranesville and in the abandoned quarry (Locality 5) on Leigh Mill Road. Pyrite and other sulfide minerals are disseminated in metamorphic rocks exposed in the railroad cut near Clifton (Locality 15).

Talc

Talc, derived from soapstone, was prospected and mined locally at the Jenkins Farm Prospects (Locality 10) and near Turkey Run north of George Washington Memorial Parkway. Talc is associated with serpentinite and chrysotile asbestos, as well as chlorite and minor iron and copper minerals.

Clay

Commercial clay deposits or potential deposits are not common in Fairfax County. The Cretaceous-age Potomac group of the Coastal Plain contains abundant clay beds, but they are highly expansive and unsuited to brick manufacture due to their high montmorillonite content, montmorillonite being a mineral which swells when wet and shrinks when dry. Fresh and weathered red Triassic shale, which may be suitable for light-weight aggregate or in the manufacture of common brick, terra cotta pipe, and tile products, is fairly common south of Dulles Airport. Specific localities sampled are near the I-66 crossing of Bull Run (Locality 12). Some areas of saprolite on slate and schist may provide clay of satisfactory characteristics for common brick (Localities 13, 14). Clay derived from deep weathering of the Quantico slate was formerly dug near Lorton.

ENVIRONMENTAL GEOLOGY STUDY OF FAIRFAX COUNTY

The U.S. Geological Survey environmental geology study is a multifaceted project designed to provide timely geologic and hydrologic information in a form useful to planners, developers, engineers, decision makers, and citizens concerned with the County's earth environment. From its inception in July 1974, the project has involved cooperation between some of the United States Geological Survey staff and the Fairfax County Office of Comprehensive Planning staff. In addition, the U.S. Geological Survey has contributed very significant amounts of funding and professional man-years to the study. Upon completion of the project in 1977, a series of maps at 1:48,000 (the County planning scale—about one inch = ⅔ mile) will be issued to show earth science factors important for rational planning and management of the environment. Types of maps include landforms, geology, surface materials, base of saprolite (depth to bedrock), mineral resources and those related to aquifer recharge and groundwater supply.

Much of the geologic work to date has involved assembly and compilation of available geologic soils and water-well data; however, new geologic field work was recently completed by three teams of professional geologists in all parts of the County, as existing information was inadequate for environmental analysis. Selected preliminary quadrangle maps at the 1:24,000 compilation scale have been released to open-file as completed. To date twenty-four such maps or studies have been turned over to the Fairfax County Department of Environmental Management, the principal depository.

The study is also utilizing new approaches to topical problems not systematically addressed in this area before, such as shallow refraction seismic surveys and electrical resistivity surveys to determine depth to hard rock and thickness of overburden or depth to groundwater. Auger and core drilling and engineering tests of recovered surface and subsurface materials are underway. New and very detailed aeromagnetic and aeroradioactivity surveys have been flown to aid in the geologic analysis. Laboratory analysis of samples includes engineering tests, X-ray diffractometry of clays, quantitative mechanical analysis of sands, thin-section preparation, and petrographic examination of saprolite and crystalline rocks.

DEVELOPMENT HAZARDS

The issue of physical hazards include those environmental constraints of natural systems which are either inherently hazardous to human life or hazardous to human life and health by specific human action. If significantly altered by land development, both types produce undesirable social and economic costs. Major hazards to, or constraints on, development which have been identified in Fairfax County include floodplains, wetlands, slippage prone shrink-swell soils, highly erodible soils (especially those on steep slopes), septic limitations of soils, and aquifer recharge areas. Countywide maps of these features are located in the map section of this plan.

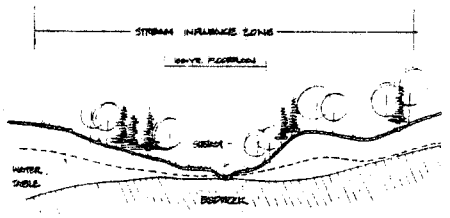
Land with these conditions is more costly to develop than unconstrained land and therefore it is often the last vacant land to be developed in any given area. However, as population increases, pressure to develop even these constrained lands will mount such as the heavy siltation of Lake Accotink and the Occoquan Reservoir, or the structural damage caused by construction on slippage soils. A detailed geologic survey now under way in Fairfax County will facilitate not only the avoidance of these hazard areas, but also the proper location of hazardous land uses like sanitary landfills and sludge disposal sites.

Because of their radically different physical properties, planning responses to these hazards will naturally differ. An issue-by-issue discussion follows for each of the hazard features.

Floodplain and Stream Influence Zones

Because development on floodplains is hazardous, they are not shown for any residential, commercial, or industrial land uses on the area plans. Adjacent to these areas, however, are stream influence zones. These are arbitrarily defined as areas within 300 horizontal feet of either side of a stream, or the 100-year floodplains, whichever is greater (recognized authorities in planning hydrology suggest a distance of between 50 and 300 feet for a stream influence zone).

A stream influence zone differs from the stream valley (see glossary) only in scope. The latter, delineated primarily on the basis of topography, is the more comprehensive, whereas the stream influence zone (along with floodplains) may be thought of as the most sensitive area within a stream valley. As suggested previously, this zone can be delineated once additional physical characteristics (geologic, soils, vegetation) are analyzed.



Specific application of the concept in Fairfax County will reflect site conditions such as depth to and slope of bedrock, soil types, slope, and vegetative cover, as indicated by the illustration. These conditions will be mapped upon completion of several research contracts under way in the County. Development within stream influence zones may be allowable given considerable care to minimize vegetation removal, grading and filling. Again, the risk of adverse impacts on water quality motivates the suggestion of this set of development controls.

Wetlands

Wetlands are a unique, valuable, and irreplaceable natural resource, serving as a habitat for mammal species of spectator value, and for many species of fish and waterfowl. They also serve to moderate extremes in water flow, aid in the natural purification of water, and maintain and recharge groundwater resources. Their definition is a hydrologic one. Consequently, virtually no development which alters the hydrologic regime of these areas can be permitted if they are to be preserved. Planning these areas for parklands, as in Sectors MV2 and MV6 of Area IV, has been recommended and generally is an acceptable method for wetland preservation.

Soils

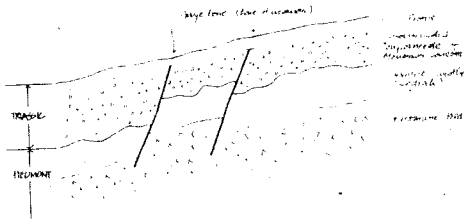
Slippage-prone shrink-swell soils are evaluated for precise project hazard in the County's Department of Environmental Management, using the guidelines for the preparation of geotechnical studies. Modifications of the land use recommendations, restriction of development or new engineering requirements for foundations constructed in or near these areas may be mandated to avoid additional structural and/or yard damage.

Steep Slopes

Steep slopes with or without erosion-prone soils require that the utmost erosion control measures be enforced during development in accordance with the erosion-sediment control ordinance and tree ordinance. This is especially important since these slopes generally coincide with water features thereby almost guaranteeing excessive sedimentation. The planning response has been to guide low-density development to these areas so as to minimize the number of projects which could adversely impact stream quality.

Faults

A fault is a zone of broken material between differing rock strata along which vertical, diagonal and/or horizontal movement has occurred. In Fairfax County, faults of relatively small displacement, trending north-northeast, are common along the contact or boundary between the Piedmont and Triassic lowland geologic provinces. For example, a fault has been identified approximately one mile due north of the Reston Avenue —Baron Cameron Avenue intersection; another has been located near the U.S. Geological Survey National Center. Although the faults in this area are not active, they contain zones of weakness, i.e., gouge zones where rocks acted on each other (grinding, crumbling) during the faulting process. The size of these gouge zones varies depending on the rock types. Even so, because bearing capacity is very

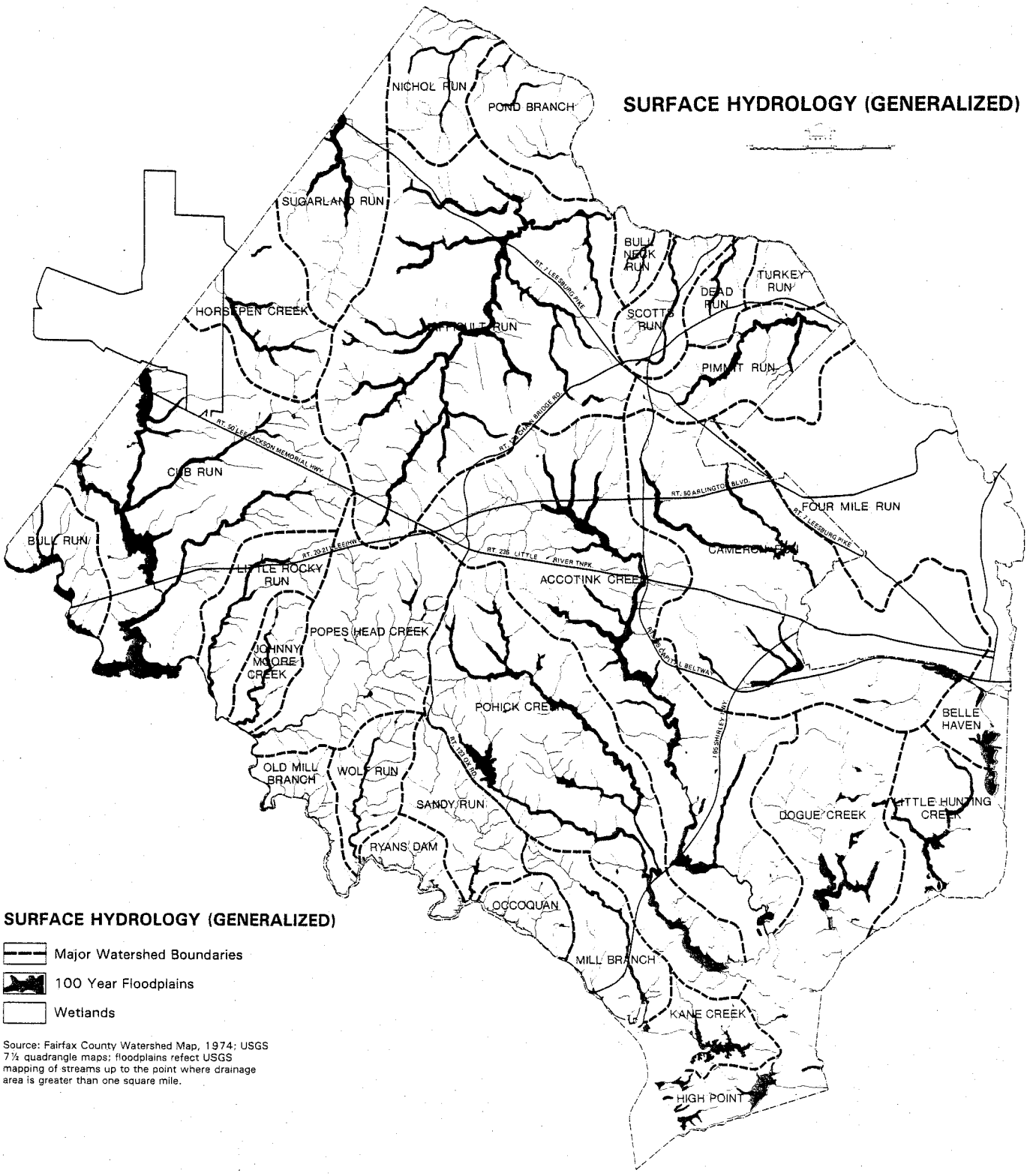


poor in proximity to these zones, all large structures should undergo extensive subsurface evaluation prior to location and construction in such areas.

Septic Suitability

Septic field limitations are presently evaluated on a site-by-site basis through the County Health Department. In addition, geological studies being performed in the County will suggest cumulative maximum safe development densities for areas presently classified as suitable for individual fields. The effectiveness of these findings will be a function of the County's ability and desire to install sanitary sewers and of the extent of septic-limited areas which are developed to their maximum safe overall density. The general planning response for areas with severe limitations for septic fields has been treatment as low-density development.

SURFACE HYDROLOGY (GENERALIZED)



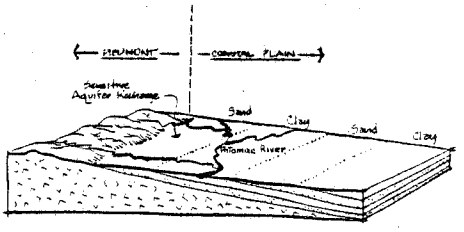
SURFACE HYDROLOGY (GENERALIZED)

- Major Watershed Boundaries
- 100 Year Floodplains
- Wetlands

Source: Fairfax County Watershed Map, 1974; USGS 7½ quadrangle maps; floodplains refect USGS mapping of streams up to the point where drainage area is greater than one square mile.

Transmission Pipelines

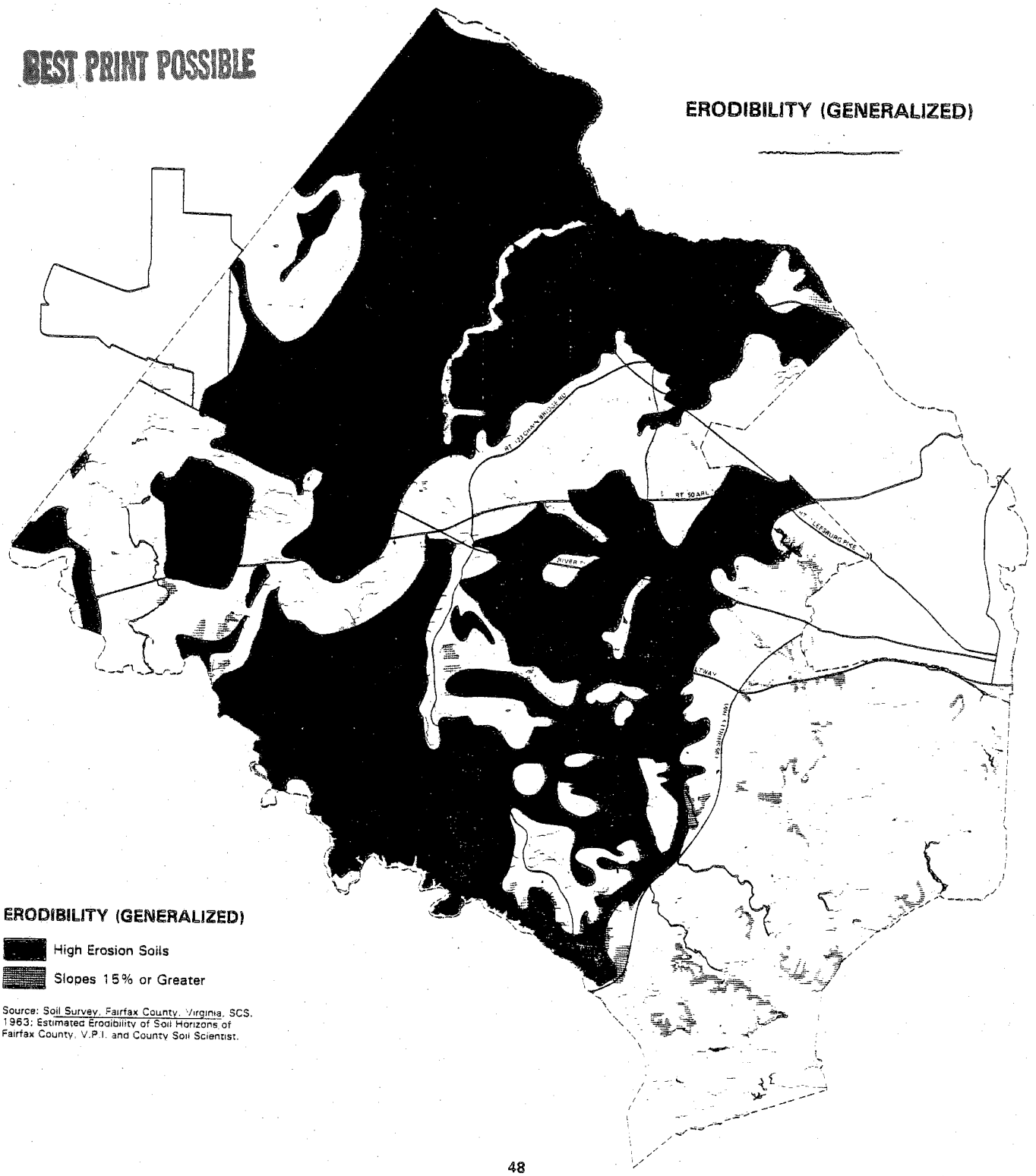
The transportation of natural and other gas and petroleum products and other hazardous liquids through the County in high pressure pipelines presents a potential danger to human life and to the natural environment despite rigid federal safety regulations. The County is concerned for the safety of its residents, labor force and visitors and protection of the environment as may be endangered by the presence of these pipelines and has adopted guidelines for the location of new pipelines and the separation of new development from existing pipelines.



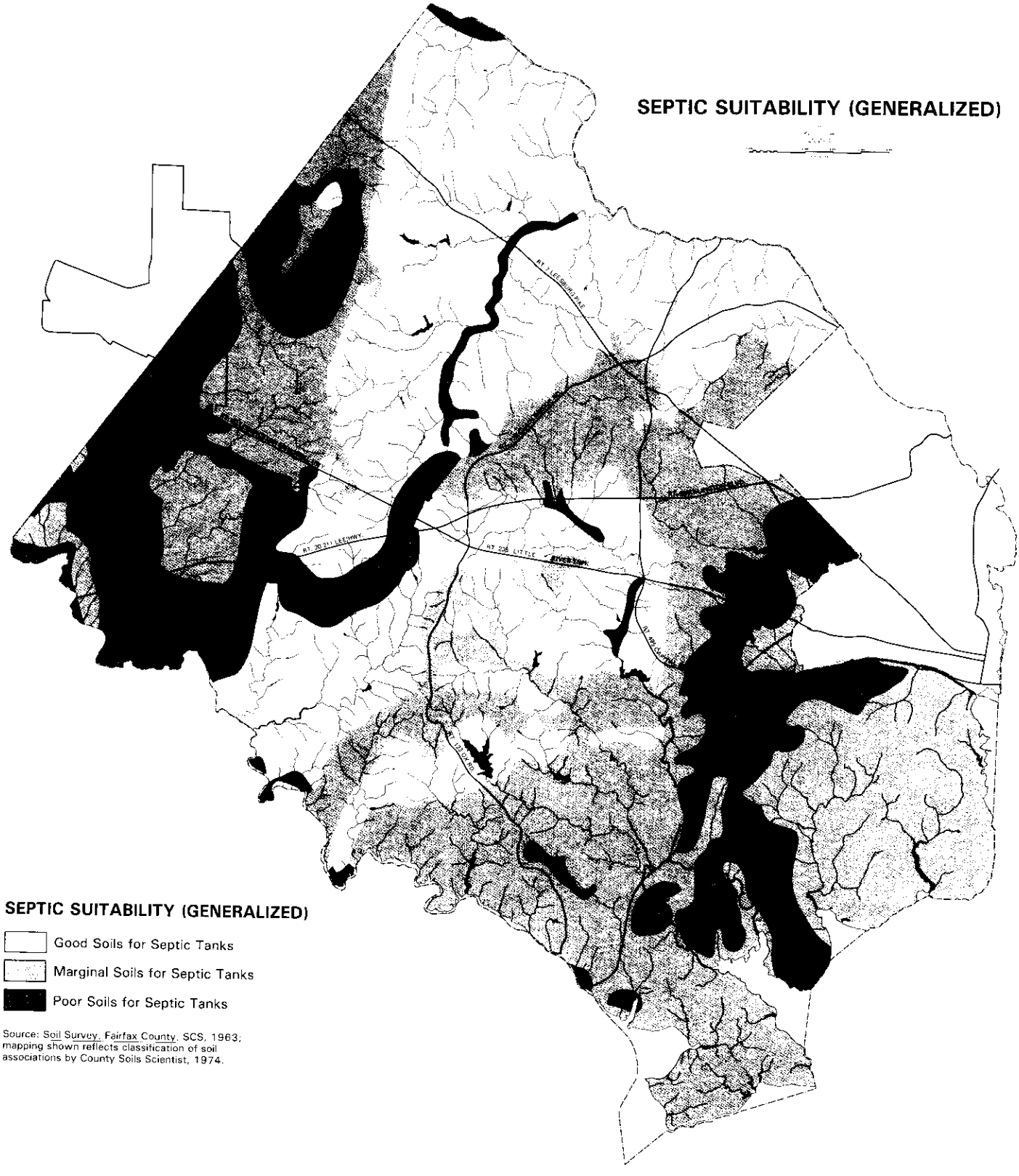
SKETCH – COASTAL PLAIN GEOLOGIC STRUCTURE

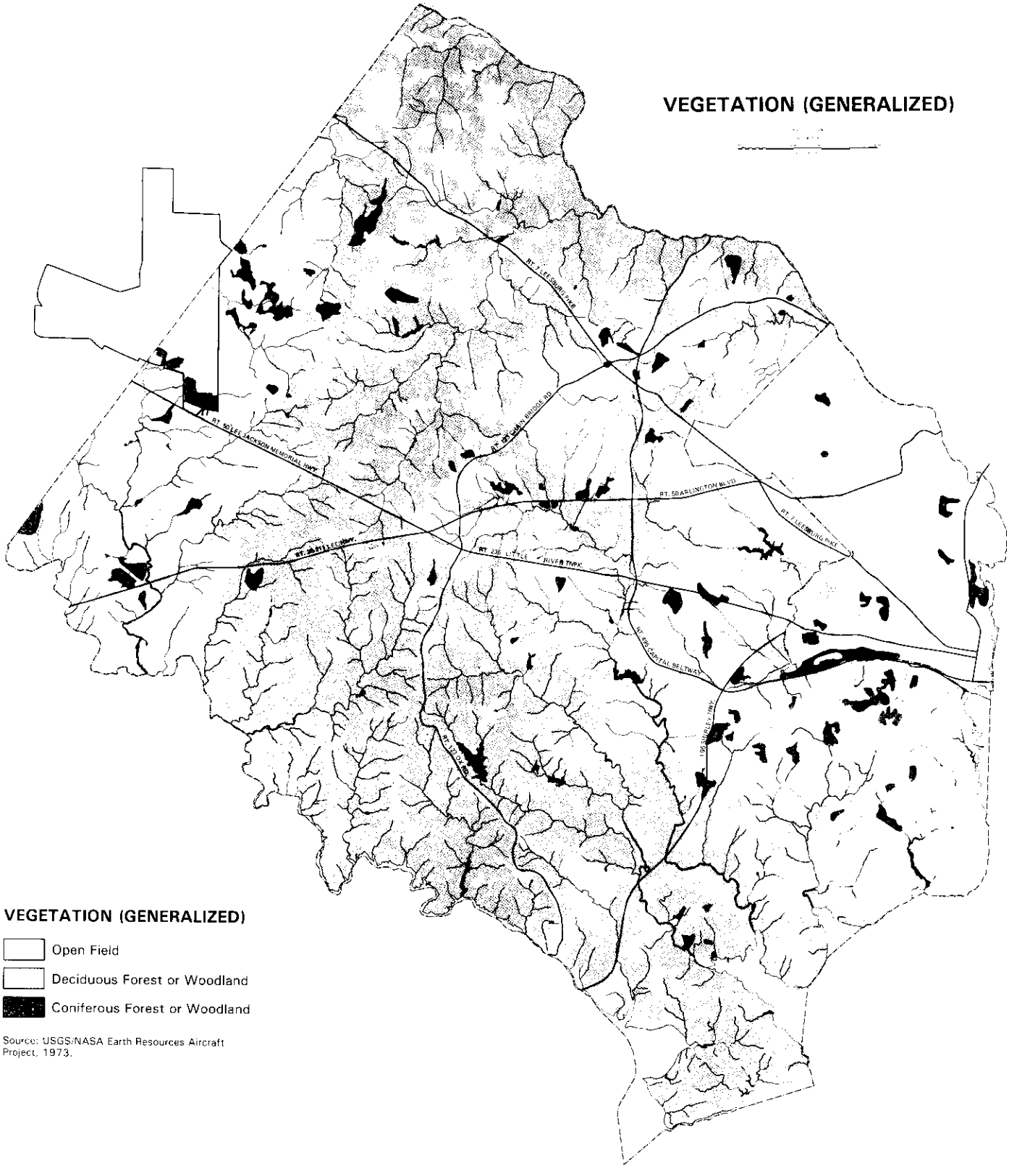
Aquifer Recharge Areas

Aquifer recharge areas are the link between surface and groundwater. As surface water systems come closer to being inadequate to satisfy public water demand, groundwater resources will become more valuable. (Unfortunately, we are now, and have been, foreclosing on this option.) Excessive impervious surfaces of roads and parking lots and septic field construction over recharge areas threaten the groundwater yield and its quality. New ordinances and radical changes in land use patterns will be necessary in order to protect these recharge areas.



Source: Soil Survey, Fairfax County, Virginia, SCS, 1963; Estimated Erodibility of Soil Horizons of Fairfax County, V.P.I. and County Soil Scientist.


SEPTIC SUITABILITY (GENERALIZED)
RT. 50
RT. 211 LEESBURG PIKE
RT. 29-211 LEE HWY
RT. 236 LITTLE RIVER TPKE
RT. 123
RT. 1
SEPTIC SUITABILITY (GENERALIZED)
Good Soils for Septic Tanks
Marginal Soils for Septic Tanks
Poor Soils for Septic Tanks
Source: Soil Survey, Fairfax County, SCS, 1963; mapping shown reflects classification of soil associations by County Soils Scientist, 1974.


VEGETATION (GENERALIZED)
RT. 7 LEESBURG PIKE
RT. 50 ARLINGTON BLVD
RT. 236 LITTLE RIVER TURNPK
RT. 495 CAPITAL BELTWAY
VEGETATION (GENERALIZED)
Open Field
Deciduous Forest or Woodland
Coniferous Forest or Woodland
Source: USGS/NASA Earth Resources Aircraft Project, 1973.

HOUSING

GENERAL

In July 1973, Fairfax County had almost 160,000 dwelling units. This represented a 600 percent growth of housing during the past 20-25 years. The 1950-60 growth rate exceeded 150 percent, while in 1960-70, this decreased to slightly below 100 percent. Housing in Fairfax County has grown at a faster rate than that of the SMSA (Standard Metropolitan Statistical Area—see glossary for definition). Fairfax grew at approximately three times the rate of the region in the 1950-60 decade, while in the 1960-70 decade, the County's housing units grew at twice the rate of growth of that for the total SMSA housing supply.

In terms of housing units added, Fairfax County's share of total SMSA units was fairly constant during the 1950-60 and 1960-70 decades, which was slightly over 20 percent of the total. Since 1970, however, Fairfax County's share of SMSA housing additions has risen to more than 33 percent through 1975. (The next highest contender, Montgomery County, claimed only 23 percent of the SMSA share in the same period.)

The housing mix in Fairfax County in 1970 compared to that for the SMSA showed that the County predominated in single-family units—73 percent compared to 54 percent for the SMSA, and lagged behind in multifamily units relative to the SMSA (26 percent for the County, compared to 45 percent for the region). The percentage of units in mobile homes or trailers was negligible in both cases.

In 1970, almost 65 percent of Fairfax County's housing units were owner-occupied, compared to about 45 percent of the SMSA units. For the 1950-60 decade, both Fairfax County and the region showed a similar rise in the percentage of owner-occupied units. During the 1960-70 decade, the trend was reversed with a more noticeable drop for Fairfax County than was the case for the SMSA as a whole. Rental units in Fairfax County had risen from about 24 percent in 1960 to almost 36 percent by 1970. Comparable figures for the SMSA were about 50 percent in 1960 and 54 percent in 1970.

The median value of owner-occupied units in Fairfax County in 1970 was about 125 percent of that for the SMSA as a whole ($35,400 compared to $28,200); the median rent in Fairfax County in that year was almost 115 percent of that for SMSA ($164 versus $135).

In 1970, approximately 35 percent of Fairfax County's households were paying over 25 percent of their income for gross rent. This is almost the identical percentage as that for the SMSA's renter households.

The percentage of overcrowded units (more than 1.01 persons/room) in Fairfax County, dropped from 9 percent to 4 percent between 1960 and 1970; the comparable rates for the SMSA as a whole were 10 percent and 7 percent for 1960 and 1970.

In terms of work/residence relationship, only 35 percent of the Fairfax County residents were working in their own County in 1970. This was among the lowest percentages for all jurisdictions in the region. On the other hand, approximately 65 percent of all jobs located in Fairfax County in 1970 were held by Fairfax County residents. This was about midway in the spread of SMSA jurisdictions (with a high of about 90 percent of Prince William County and a low of about 10 percent for Falls Church).

Housing Inventory

The following text and tables illustrate the various components of the housing inventory in Fairfax County.

The Housing Units by Tenure table shows the tenure for 1950, 1960, 1970 and 1976. The tenure table shows a 216 percent increase in owner-occupied units in Fairfax County during the 1950's, only a 62 percent increase during the 1960's and a 36 percent increase during the 1970-76 period. Renter occupied units increased 80 percent in the 1950's, 197 percent in the 1960's, and 36 percent from 1970 through 1976.

A comparison of the tenure distribution of the SMSA and Fairfax County shows that Fairfax County's housing stock has been increasing at a much faster rate than the SMSA's. During the 1960's, the region's owner-occupied units increased 38 percent while Fairfax County's increased 62 percent, a considerably lower rate for both than in the preceding decade. The renter-occupied units for the same period increased 57 percent in the region and 197 percent in Fairfax County, both more rapidly than in the preceding decade.

Fairfax County's actual percentage share of the region's housing stock by tenure was:

	1950	1960	1970
Owner-Occupied	9	17	20
Renter-Occupied	4	5	9

Thus, while Fairfax experienced a large increase in renter-occupied units during the 1960's, its share of the region increased only four percentage points, still comprising less than 10 percent of the total regional stock.

HOUSING UNITS BY TENURE, FAIRFAX COUNTY, 1950-1976

	1950 [1]		1960			1970			1976 [2]		
	No.	%	No.	%	% Change 1950-60	No.	%	% Change 1960-70	No.	%	% Change 1970-76
All Dwelling Units	26,558		69,184		161	130,793		89	177,200		35
All Occupied Units	24,317	100.0	65,245	100.0	168	126,516	100.0	94	172,200	100.0	36
Owner-Occupied	15,791	64.9	49,933	76.5	216	81,061	64.1	62	110,200	64.0	36
Renter-Occupied	8,526	35.1	15,312	23.5	80	45,455	35.9	197	62,000	36.0	36
Vacant	1,283	5.0	2,325	3.4	81	4,277	3.3	84	5,000		17

Source: Table 24, **The Fairfax County Profile**

[1] 1950 County housing includes Fairfax City.
[2] Estimates prepared by ORS and OCP staff.

HOUSING UNITS BY TYPE OF STRUCTURE, FAIRFAX COUNTY, 1950-1976

	1950		1960			1970			1976		
Type of Structure	No.	%	No.	%	% Change 1950-60	No.	%	% Change 1960-70	No.	%	% Change 1970-76
Single-Family Detached	19,011	71.6	57,823	83.6	204	89,439	68.4	55	105,700	59.7	18
Attached	1,185	4.5	2,972	4.3	151	6,427	4.9	116	19,400	10.9	202
Multi-family	5,394	20.3	6,948	10.0	29	33,207	25.4	378	49.700	28.0	50
Mobile Homes	968	3.6	1,438	2.1	49	1,695	1.3	18	2,400	1.4	42
TOTAL	26,558	100.0	69,181	100.0	160	130,768	100.0	89	177,200	100.0	35

Source: Office of Research and Statistics, **The Fairfax County Profile**

The Housing Units by Type of Structure table shows unit type for the period from 1950 to 1976. A significant change in the predominance of single-family units has occurred since 1950, as shown in the housing units. In the 1960-70 decade, the single-family percentage share of the total stock dropped 15.2 percentage points from 83.6 percent to 68.4 percent. In the six-year period of 1970-1976, a decline of 8.7 percentage points caused the portion to drop to 60 percent.

Single-family attached units showed an increase from 4.3 percent of the stock in 1960 to 4.9 percent in 1970, and further very substantial increase to 10.9 percent in 1976. The single-family attached classification includes townhouses, duplexes, and multiplexes.

Multifamily units include all apartments. Such units formed 10 percent of the total supply in 1960; the share then increased to 25.4 percent in 1970 and 28 percent in 1976.

The largest changes in the various types of structures occurred during the decade of the 1960's; the increases were largest among multifamily units. Since 1970, there has been only a 35 percent increase among all units.

During the 1960's, apartments were the major unit type built, while in the first half of the 1970's, the townhouse type of structure has shown the greatest percentage increase.

HOUSING COST TREND, 1950 - 1974

Value	1950	%	1960	%	1970	%	1974	%
Total Owner-Occupied	12,900	100.0	46,861	100.0	77,643	100.0	119,000	100.0
Less Than $5,000	701	6.0	538	1.1	130	0.2	—	—
$5,000-9,999	1,875	16.0	1,590	3.4	389	0.5	—	—
$10,000-14,999	3,767	32.1	7,228	15.4	988	1.3	10,000[1]	8.3
$15,000-19,999	3,014	25.7	12,972	27.7	4,352	5.6	—	—
$20,000-24,999	2,376	20.2	11,376	24.3	7,969	10.3	—	—
$25,000-34,999	—	—	8,023	17.1	21,329	27.5	4,000[2]	4.2
$35,000 or More	—	—	5,134	11.0	42,486	54.6	105,000[3]	87.5
Not Reported	1,167	—	—	—	—	—	—	—
Median	$22,309		$27,208		$40,524		$ 49,594	

Sources: 1950-1970: Based on Table 33, **The Fairfax County Profile**
1974: Fairfax County, Office of Research and Statistics, **Standard Reports**, January 1974, adjusted to constant 1973 dollars.

Notes: [1] Less than $30,000.
[2] $30,000 to $35,000.
[3] $35,000 or More.

Data shown in constant 1973 dollars.
Percentages for 1950 based on total of reported houses.

DISTRIBUTION OF RENTAL UNITS						
	1960		1970		Change	
Contract Rent	No.	%	No.	%	No.	%
$0-39	400	2.6	200	0.4	−200	−52
$40-59	900	5.9	200	0.5	−700	−74
$60-79	1,500	9.7	500	1.2	−1,000	−65
$80-99	3,500	23.0	1,200	2.7	−2,300	−66
$100-119			12,300	27.6		
$120-149	4,800	31.5	17,000	38.1	24,500	510
$150 or More	3,300	21.5	11,300	25.4	8,000	244
No Cash	900	5.8	1,800	4.1	900	108
TOTAL:	15,200	100.0	44,500	100.0	29,300	192
Median	$142		$192			

Source: Based on data from **U.S. Census of Housing, 1960**, HC(1), No. 48 Va., and COG Fourth County Tape, Table 122.

Note: Data shown in constant 1973 dollars.

Sales Housing

Fairfax County also has had a drastic increase in the cost of home ownership during the past decade. The Housing Cost Trend table shows the distribution of owner-occupied units within Fairfax County since 1950.

It is apparent from the large increases in the number of units valued above $25,000 that Fairfax contributed a large amount of the higher cost housing to the region between 1960 and 1970.

While there have been significant shifts towards the higher housing value categories over the two decades, the most drastic increases have occurred since 1970. In 1970, about 55 percent of the housing stock was above $35,000 in value and just four years later, almost 88 percent of the stock is valued above $35,000.

Cooperative and Condominium Housing

In a cooperative, each household buys a share or stock in the development, sharing the responsibilities for ownership and operation of the development. In a condominium, each household purchases a housing unit, but jointly owns the common facilities through a condominium association which owns the common land, buildings, and other facilities. Both forms of ownership can be utilized with any type of structure; however, they are most commonly used in apartments, occasionally in townhouses, and rarely in single-family developments.

In Fairfax County, there are 406 cooperative units: 33 percent are townhouses, 6 percent are garden apartments, and 61 percent are high-rise.

Condominiums are a relatively new phenomenon to the Washington SMSA. There are no condominiums shown in the 1970 Census, but in 1975, in Fairfax County, there are 11,600 such units. Eighty-five percent of the condominiums were newly constructed while 15 percent were converted from previous rental complexes. Of the total condominiums in the County in 1975, 32 percent are townhouses, 43 percent are garden apartments, and 25 percent are high-rise apartments.

Rental Housing

The following table shows the distribution of renter-occupied units by contract rent for 1960 and 1970. The units rented below $100 per month are decreasing in number while those above $100 per month are increasing. A significant comparison is appropriate between these data and regional rental data. The regional rental units show a 23 percent increase in the under $40 rent range, while Fairfax County shows a 52 percent decrease in that same range. While the largest increase at the regional level is 212 percent at the $120-$150 rent range, Fairfax County had a 510 percent increase at the $100-$150 range.

The Rent Range Distribution table shows the percentage distribution for the major rental complexes in Fairfax County. It compares rent to bedroom size for 1975. (This, however, cannot be compared to the rental tables for 1970, because the 1975 data do not include renter-occupied units in ownership projects as do the 1970 figures.) The highest percentage of the units (26.1 percent) is in the $225-250 rent range, and 64.3 percent of those units have two bedrooms. (The median rent for efficiencies is $189, for one bedroom units is $213, for two-bedroom units is $243, three-bedroom units have a median rent of $300, and four-bedroom units are above $350.) Almost half (49 percent) of the rental units are two-bedroom units.

Housing Condition

Fairfax County's housing deficiencies are shown in the following table. The County had 4,006 overcrowded housing units or 6 percent of the region's overcrowded units, compared to 14 percent of the region's total housing stock. Over half of such units in the County are renter-occupied.

Fairfax County has 2,075 units lacking adequate plumbing-12 percent of the total region's units lacking adequate plumbing. Fifty-five percent of these units are owner-occupied.

Of the dilapidated units, 41 percent are renter-occupied; at least one quarter are vacant. Fifty-one percent of the total deficient units are owner-occupied, 46 percent are renter-occupied, and 3 percent are vacant. The total 6,400 deficient units constituted less than 5 percent of the 1970 total housing stock.

Subsidized Housing

In 1975, the County Redevelopment and Housing Authority owns or leases 320 units in eight locations for low-income families. About two-thirds of these units contained 2 or 3 bedrooms-27 percent were efficiency or 1-bedroom units, and only 7 percent contained either 4 or 5 bedrooms. The grouping ranged between 10 (leased) units to 97 RHA-owned units.

Moderate-income housing units constructed either under federal 221(d)3 or 236 programs numbered 2152 units-in thirteen locations. (The range of groupings was from 74 units, as the smallest concentration, to a high of 300 units.) Two- and three-bedroom units accounted for 71 percent of all moderate-income units; 20 percent were of efficiency or 1-bedroom size; and only 9 percent contained 4 bedrooms. There were no larger units than the 4-bedroom units.

The Existing Subsidized Housing Units table shows the number of subsidized units, the percentage distribution, and the relationship between the subsidized units and the housing stock in each planning district.

As of November 1976 public housing units in Fairfax County totaled 442 units, of which 294 are owned by the Authority and 148 are leased. Fifty-one percent of these units are occupied by families; 39 percent by large families; and 10 percent by elderly and/or handicapped households.

Pending public housing resources include 110 new construction units, all of which will be Authority owned. Of these units, 89 percent will be for large families and the remaining 11 percent for smaller families.

Under various federal programs such as sections 202, 221-d-4 and 236, over 2,000 units have been constructed in Fairfax County for moderate-income families. Fifty-four percent of these are occupied by small families; 39 percent are occupied by large families; .07 percent by elderly persons. An additional 901 units have been proposed for elderly households. And, a total of eight units have been built under section 235 in the Gum Springs community for small and large families.

A total of 998 units are under construction. In addition, there are 737 additional units with a federal and/or state mortgage commitment. Once contructed, 70 percent of these units will be for elderly households; 13 percent for families; and 16 percent for large families.

Estimated Current Housing Need

The major components utilized to articulate housing needs are units lacking adequate plumbing, overcrowded units, units needed to house commuters, and over-burdened renters. Some of the figures are taken directly from the 1970 Census while others are estimated by staff. This estimation is generally very conservative, and although the housing need may be substantially greater than articulated here, it is felt that it would take considerable effort to meet just these conservative estimates.

Units Lacking Adequate Plumbing

Because of the relative newness of the housing stock in Fairfax County, substandard housing is not as major a need as in other jurisdictions. However, there are pockets of substandard housing, as well as scattered deteriorated housing, along some of the County backroads.

Although the 1970 Census did not evaluate substandardness of housing, it did enumerate the number of units that lacked adequate plumbing. Even though there have been estimates of substandard units for this determination of need, the number of units lacking plumbing will be suffi-

Rent Range Distribution by Unit Size, January 1975						
Rent Range	Efficiency	1-Bedroom	2-Bedroom	3-Bedroom	4-Bedroom	Total %
<150	18.3	11.7	6.3	0.5	--	8.4
$150-175	48.2	25.9	9.7	0.4	--	16.0
$175-200	28.8	37.1	22.1	2.9	--	26.3
$200-225	4.7	19.0	33.7	6.9	--	24.7
$225-250	--	5.3	17.4	29.2	--	13.1
$250-275	--	0.7	6.6	34.7	2.3	6.6
$275-300	--	0.2	3.2	17.9	0.4	4.9
$300+	--	0.1	0.1	7.5	97.3	--
TOTAL %:	100.0	100.0	100.0	100.0	100.0	100.0

OCP calculated median = $233

Source: Fairfax County, Office of Research and Statistics.

Note: Data shown in constant 1973 dollars.

Inventory of Housing Deficiencies in Fairfax County, 1970				
	All Units	Owner-Occupied Units	Renter-Occupied Units	Vacant
Median Year Structure Built	1961	1960	1963	--
No. Dilapidated Units with Plumbing	353	121	145	87
No. Units without Plumbing	2,075	1,151	783	141
No. Overcrowded Units with Plumbing	4,006	1,979	2,027	--
Total Deficient Units	6,434	3,251	2,955	228
Total Number of Units	130,793	81,061	45,455	4,277
% of Units Deficient	4.9	4.0	6.5	5.3

Sources: 1. U.S. Department of Commerce, **Census Tracts, 1970** PHC(1)-226.
2. **Metropolitan Washington Council of Governments, Fourth Count Housing Summary Tape,** Table 60.
3. U.S. Department of Commerce, **Plumbing Facilities and Estimates of Dilapidated Housing, 1970** HC(6).

cient. The 1970 Census indicated that 2.075 housing units in Fairfax County lacked adequate plumbing. That constituted only 1.6 percent of the total housing stock in 1970. Of the 2,075 housing units, 1,681 are occupied by households with incomes below $15,000 a year.

Overcrowding

Approximately 4,592 overcrowded households were listed in the 1970 Census as containing more than 1.01 persons per room. Of this number, 330 units also lacked adequate plumbing. This leaves a net need of 4,262 units to alleviate overcrowding. That constituted only 3.3 percent of the housing stock in 1970.

Commuters

A large sector of the housing need is required by commuters; i.e., persons who live in other jurisdictions but work in Fairfax County. Many of these workers provide much needed services for the residents of the county. The greatest percentage of incoming commuters are from Prince William County (21 percent), Alexandria City (18 percent), and Arlington County (16 percent), for a total of 55 percent of the commuters.

The two largest employment jurisdictions for Fairfax County residents are the District of Columbia (40 percent) and Arlington County (26 percent), for a total of 66 percent of the out commuters. Sixty-eight percent of the persons commuting into the County earn under $10,000 annually, and another 20 percent earn between $10-$15,000 annually. A total of 88 percent of the incoming commuters earn under the 1970 median income level for Fairfax County. Sixty-eight percent of the commuters are males as opposed to 31 percent female. Fifty-five percent of the commuters are either male or female heads of households. It would be a conservative estimate to state that approximately fifty percent of the 33,293 commuters 16,647) would have a family income below the Fairfax County median.

Since there are no surveys available to indicate location preference of potential County residents, certain assumptions have been made. It is felt that due to the oil embargo of a year ago, and rising gasoline prices, locating close to one's place of employment will become a more viable consideration than has been the case in the past. For the sake of this discussion, it is assumed that one-third of the commuters would remain outside of the County. 50 percent of the 33,293 commuters (16,647) would housing in Fairfax County near their place of employment. This figure equates to 7,399 households, using an average of 1.5 workers per household.

Past Production

From 1960 to 1970, 61,603 housing units were added to the total stock while 572 of those units or 0.9 percent were subsidized for lower income citizens. From 1970 to 1975, subsidized housing increased to almost 5 percent of the housing produced.

The Alternative Production Schedule illustrates the relationship between production and the housing needs that have been identified. If the County were to continue to produce subsidized housing units at its past rate of approximately 300 units per year, it would take 45.7 years to produce the 13,736 units identified as needed in 1970. On the other hand, the County would have to produce 1,374 units per year to fulfill the identified needs by the 1990 target date of the Area Plans.

Major Housing Issues

Despite substantial growth, evidence shows that a number of issues in the housing system remain. The major ones are identified as follows:

- exclusion of below-market income households;
- distribution of low- and moderate-income households;
- use of manufactured housing;
- neighborhood conservation; and
- new growth areas.

Existing conditions and trends are generally identified from studies completed by PLUS staff and hearings held with citizens in regard to the PLUS program.

Exclusion of Below-Market Income Households

The most noted characteristic in housing today is cost. The cost of all housing units has increased sharply in recent years. The cost of purchasing or renting a housing unit in Fairfax County has become a major concern to many citizens, not just low- and moderate-income persons. The median house value in 1970 was approximately $35,000; in 1975 the median sales price was $59,000, 68.6 percent increase.

An accepted rule of thumb is that in Fairfax County, a housing unit can be afforded whose sales price is two and one-half times the annual income of the purchaser. In 1969, the median annual income for family residents of Fairfax County was $15,707.

While the median has undoubtedly increased since then, it would require a 65 percent increase in constant dollars over the four years to match the increase in housing costs. Median family income increased by 44 percent from 1959 to 1969, a 10-year period.

As a further indication of housing cost difficulties, preliminary staff studies project that the median cost of sales housing in 1990 will be $106,000 (in 1973 dollars), assuming current trends. The result is a continuing and ever-increasing barrier for all households below the median income level.

While turnover is different from mobility and data are difficult to find, it is apparent that this factor (comprising speculation, upward mobility, changes in family composition, etc.) is contributing to the further shrinking of housing economic mix in the County. Every time a unit is sold, the costs of the transfer as a minimum must be added to the normal market price. Capital appreciation is generally present. Too, few people will want to take less than the cost of replacement housing. Thus units originally selling for $25-$30,000 in a new development aimed at County employees were resold within 18 months in the $40,000 range.

In summary, the rapid rise of housing costs, regardless of cause, in the County has contributed to pricing out of the market, large sections of the potential middle and moderate-income households. If recent trends continue, the County would become disproportionately upper-income with consequent social and economic impacts on the County. From another perspective, it also appears that regardless of slow growth or fast growth, the necessary supply of low/moderate and even median income housing does not happen under market conditions. The County must take affirmative steps to ensure that such housing exists. How has this growth affected the supply of low- and moderate-income type housing? The facts are that such units were a small share of that growth. From 1967 to 1974, 2310 units of subsidized low- and moderate-income units were built in Fairfax County. That is less than 5 percent of the total housing units built during that same period.

Distribution of Low- and Moderate-Income Households

The current need for low- and moderate-income housing has been estimated at 13,342 units-to alleviate 4,262 overcrowded units, 1,681 units lacking plumbing, and 7,399 commuters working in Fairfax County and desiring, but unable, to live in the County. If Fairfax County is to meet this need, policies and standards must be established for locating these housing units. Equitable distribution of low- and moderate-income housing units throughout the County contains two major aspects:

- improving the location of low- and moderate-income housing units as they are constructed and
- linking the development of low and moderate income housing with land development policies, plans, and programs within the County.

The need for the first of these two aspects explains the importance of the second. If an equitable distribution of low- and moderate-income housing resulted from the land development plans and programs in the County, low- and moderate-income housing construction would be raised from its secondary position in the development process and would no longer need be regarded as a burden to attach to the community development process. It is toward this end-an integrated community development process-that the County should direct its housing strategies for improving the distribution of low- and moderate-income housing opportunities.

EXISTING SUBSIDIZED HOUSING UNITS - 1975

	No. of Subsidized Units	Percent Distribution	1975 Total DU's	% of Total Housing Stock
AREA I				
Annandale	0	0	21,361	—
Bailey's	128	5	13,406	0.9
Jefferson	164	7	14,179	1.2
Lincolnia	0	0	4,207	—
AREA II				
McLean	0	0	16,342	—
Vienna	0	0	13,596	—
Fairfax	0(1)	0	9,528	—
AREA III				
Upper Potomac	1,421	59	16,212	8.8
Bull Run	0	0	6,557	—
Pohick	36	1	10,665	0.3
AREA IV				
Lower Potomac	0	0	1,744	—
Mt. Vernon	663	27	28,765	2.3
Rose Hill	0	0	6,793	—
Springfield	0	0	10,123	—
	2,412	(100%)	173,478	(1.4%)

(1)300 units of a 236 moderate income project are not completed, therefore not included in this table.

Housing Need by Area and Planning Districts

	Lacking Adequate Plum'g.	Overcrowded Units	Commuters	Subtotal	%
AREA I					
Annandale	152	326	888	1366	10
Baileys	56	406	518	980	7
Jefferson	82	566	592	1240	9
Lincolnia	10	100	148	258	2
	300	1398	2146	3844	28
AREA II					
McLean	115	343	1553	2011	15
Vienna	135	270	888	1293	9
Fairfax	80	145	296	521	4
	330	758	2737	3825	28
AREA III					
Upper Potomac	183	143	444	770	6
Bull Run	225	94	74	393	3
Pohick	416	102	74	592	4
	824	339	592	1755	13
AREA IV					
Mt. Vernon	294	979	666	1939	14
Lower Potomac	130	338	148	616	4
Springfield	100	208	1036	1344	10
Rosehill	97	242	74	413	3
	621	1767	1924	4312	31
County Total	2075	4262	7399	13736	100%

County residents, apprehensive about the implications of continued growth and increasing demands on the services and facilities within the County, are doubly so in their response to locating low- and moderate-income housing within the County. While most residents acknowledge concern over increasing costs of housing and expect the County to undertake efforts to reduce the continued rapid rise in housing costs, efforts directed to the distribution of governmentally assisted housing are received with continued opposition throughout the County.

Such opposition heightens the County's difficulties in identifying suitable sites for low- and moderate-income housing and makes more difficult the promotion of such housing altogether. Moreover, well-known opposition in areas throughout the County discourages developers and others from pursuing housing development there.

The relationship between place of residence and place of employment has been a long-standing issue in development and planning. From early company towns to current regulations regrading the location of and relocation of federal installations, efforts have been made to match housing and job location.

Disparity between place of residence and place of employment has detrimental effects on the population forced to undertake long commutes, on environmental quality within the County, and on energy conservation programs.

The development of low- and moderate-income housing has been an isolated aspect of community development. Such construction consistently either comes after substantial development has already taken place, as a reaction to overwhelming need, or it is ignored altogether. To achieve the goal of a truly balanced housing supply, Fairfax County must promote the development of low- and moderate-income housing supply through its planning and implementation policies.

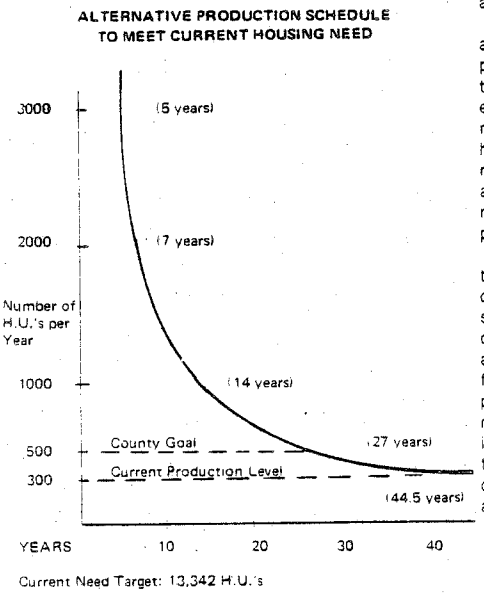
The segmentation of such development concerns further reduces the ability of the County to provide housing opportunities throughout the County to low- and moderate-income households because prime opportunities for such development have been lost. This only serves to increase the difficulties of providing equitable housing opportunities.

Use of Manufactured Housing

During 1976 the staff of the Office of Comprehensive Planning and the Office of Research and Statistics and a Countywide Citizens Task Force undertook a study, *Countywide Modular and Mobile Home Study and Development Program* at the request of the Fairfax County Planning Commission. This study is still in process and the results will be published during 1977. The study addresses the financing and economics of development, location criteria, County policies, ordinance and code requirements and alternative forms of manufactured housing.

HOUSING PRODUCTION TREND
1960, 1970, 1975

	1960	1970	1975
Total HU's	69,184	130,787	170,526
Increase in Total HU's	(+61,603)	(39,739)	
Subsidized Units	0	572	2,412
Increase in Subsidized HU's	(572)	(1,840)	
Subsidized as % of Total HU's Produced	0.9%	4.6%	



Neighborhood Conservation

The housing stock in Fairfax County is relatively new. However, some of the older neighborhoods that were generally built before or during the 1950's are beginning to show deterioration. The most critical housing conditions tend to be scattered individual units or pockets of previously rural, low- and moderate-income communities. The previously rural communities are often in poor condition, inadequately served by public facilities, and are in the path of suburbanization.

These communities are often housing residents who have lived in the County longer than their suburban neighbors, but they will be forced to move out of the County because they cannot afford to repair their homes and/or they cannot afford the taxes resulting from increasing property values. This results in a decrease in home ownership for the low/moderate population of the County.

Several neighborhoods in various parts of the County were developed in the post-war boom and served as starter homes for many new residents after World War II. Over the years, as affluence increased, lower income households found these areas a sufficient resource. But during more recent years, these previously moderate-priced units are inflating completely out of reach of low/moderate income families. In some cases, the housing units have undergone substantial rehabilitation, but other units need some remodeling and repair. In either case, these starter home neighborhoods no longer sell at moderate prices, thus they are not a low/moderate cost housing resource. Also, families of moderate- to middle-income who were hoping to buy up to a newer and perhaps larger house are presently finding themselves trapped by accelerated prices and interest rates.

These neighborhoods are appreciating in value, as opposed to depreciating. The problem of an appreciating housing market has to be discussed in two aspects. The first aspect is the control of the escalation of rents. The former situation is the most complex in terms of a solution. Ownership housing prices cannot be controlled after the first resale without major changes in our philosophical and legal basis of private ownership. Controlling rental escalations is feasible by use of subsidy programs.

Commercial development in the County seems to begin with a shopping center at the crossroads of two or more major roads. Residential subdivisions occurred nearby, and as the years pass, commercial uses often expand into the residential areas. There have apparently been no incentives for commercial and business development to expand vertically; therefore, it sprawls into the neighborhoods. There are several major community business areas which include previous residential structures that have been converted or strip commercial developments beginning to move along the major roads from the core of the district.

With the expansion of nonresidential activities into residential areas, neighborhood decline results. Residential units that are not properly buffered from nonresidential uses tend to physically decline. The one major exception is when the residential uses are integrated into the overall development; but in Fairfax, the major confrontation is between single-family units and nonresidential uses.

Some of the older neighborhoods are beginning to show the first signs of deterioration. These areas were developed during the post-war housing boom and have problems partially due to the development practices of that period. The physical problems need corrective or preventive maintenance, in addition to a need for coordination of public services.

The County should begin to place emphasis on development of neighborhood conservation programs.

To combat the deterioration and inadequate public facilities found both in the post-war subdivisions and in the previously rural low- and moderate-income housing areas mentioned earlier, the County is participating in the federal community development block grant program. Neighborhood improvement programs, designed to preserve and upgrade these communities, have been adopted for the Huntington, Baileys and Lincoln-Lewis-Vannoy neighborhoods. Other neighborhoods are under study for inclusion in the block grant program, including Fairhaven, Woodley Hills/Nightingale, and Chapel Acres. The County should continue to support programs and policies that protect and enhance the existing supply of low and moderate cost housing.

New Growth Areas

Fairfax County is a predominantly single-family community; 85 percent of the existing housing is single-family. It is a bedroom community with the major employment being in the District of Columbia.

Past development patterns and unit mix have resulted in the classic urban problems of the 1970's. County residents tend to commute long distances to work. Reliance on the private automobile generates traffic congestion, air pollution, and huge expenses of pavement for parking lots, destroying many natural features and environmental resources.

The development pattern in Fairfax County, not unlike other local jurisdictions, has been small subdivisions developed in a piecemeal fashion, and bypassing large areas, creating leapfrog development which tends to be expensive for the local government. In the past few years, there has been some effort to use planned unit development techniques, but a comprehensive plan for the total development of the County has been lacking.

The most apparent defect of this trend of development is the inability of the County to provide facilities and services in an economic manner within a reasonable time frame.

The lack of mixed housing types limits the consumer selection, thus the low/moderate income family is not able to partake of the American dream in suburbia.

Low densities and relatively little variation in land use limits urban design flexibility. Mass transportation systems also do not function well at low densities and the pedestrian is ignored when development patterns are small and fragmented.

Analysis of Change of Housing Needs

It is a well-known fact that housing problems in Fairfax County are not improving. Both housing suppliers and housing consumers are frustrated not only by increasing demands and needs for housing and by such inconveniences as the growing separation between place of work and place of residence, but also by the exorbitant cost of housing. Injustices for lower income and minority households, as well as increasing hardships for moderate- and even middle-income households are the result.

In a recent housing market analysis, entitled Housing for People, the County Office of Research and Statistics reaches several significant conclusions:

1. Fairfax County's expanding economy carries with it an increase in the diversity of its population. In the past, the County has drawn on the labor force resident outside the County to supply over one-third of its workers. These workers earn lower incomes, and are disproportionately black or female. If the County is going to supply and provide for its own labor force, it will have to provide housing for a more heterogeneous population.

2. Employment in Fairfax County can be expected to continue to grow more rapidly than the population because of a continued decline in household size and an increased labor force participation rate among women.

3. Declining household size is the single most important trend which will have an impact on the housing market. Other important and related trends are increasing income levels, declining fertility, rapidly increasing numbers of elderly, and increasing numbers of elderly, and increasing numbers of young heads of household.

4. Households will continue to grow more rapidly than the population in Fairfax County. The population is projected to increase 44 percent over the next decade at an average annual rate of 3.6 percent. The number of households, however, will increase by 55 percent, or at an average annual rate of 4.4 percent. The difference in the rates of growth of the two will be twice as great as it was during the decade of the 1960's.

5. The demand for housing will not be of the same nature as it has in the past:

- The demand for multifamily structures for smaller households will increase by 95 percent-calling for 5,000 such units per year. The need for townhouse units will also increase rapidly, by 54 percent over the next decade. the need for single-family detached units will be far less, increasing by only 34 percent over the current inventory.
- Also as a result of smaller households, smaller units will be in much greater demand.
- Not only will people be unable to continue to pay for high-priced housing, but changing lifestyles will greatly reduce the need for oversized, energy-consuming housing.
- The need for housing for the elderly will double, while the need for all other housing will only increase by 50 percent.

6. In the future, the tenure of households can be expected to shift greatly toward an ownership market.

7. Because of rapidly increasing housing costs, it is estimated that by 1985, 41,000 households will need some form of public assistance.

To deal with the issues presented in the housing market analysis, two major points need to be stressed.

The first is that the County has not taken an effective coordinative approach to housing, although its efforts to develop a broader role began as early as 1962, when the Board of Supervisors appointed a housing committee. The County's housing problem is far more than a production problem; the housing delivery system has become a complex set of processes, trends, regulations, and actions that no single program could possible alter. It must maximize utilization of every program available to it and form a coordinated program to impact those processes.

The second is that regardless of the growth alternatives—fast or slow—a balanced result cannot occur unless the County provides a full and substantial commitment that is explicit and continuing. Both points are highly interrelated, and their implications are explored more fully in the succeeding discussion of foreseeable trends.

AREA I

Existing Conditions

A countywide survey of housing conditions indicated generally satisfactory housing stock in Area I, with the only exception existing in the Baileys neighborhood analysis area (Sector B4). Some deterioration does exist throughout the area, but it is generally scattered individual units showing signs of decay rather than concentrated neighborhood deterioration. This is particularly true of some of the housing in the subdivisions dating back to the 1940's and 1950's. In some areas under redevelopment pressures, deterioration is a result of absentee ownership.

A neighborhood improvement program and conservation plan has been adopted by the Board of Supervisors for the Baileys area. This document will protect the residential character of the neighborhood and guide any future development. Community development block grant funds are being spent to upgrade public facilities and to provide loans for individual home improvements.

An Office of Comprehensive Planning study on low-income communities indicates that there are two such areas in Area I—the Baileys neighborhood analysis area and the Rosedale Manor garden apartment complex. Wexford Manor and Hollywood Manor are moderate income, federally subsidized projects. They are located in Sector J8 of the Jefferson area. The James Lee apartment complex in Jefferson District was a low- to moderate-income area, but that complex has been converted to a condominium. The current status of that complex is unknown at this point.

The following table indicates the present distribution of low- and moderate-income housing in Area I.

AREA I	Low	Moderate	Total	Total Homeowners	Subsidized as % of Total Homeowners in District
Bailey's	128 (44%)	0	128 (5%)	12,749	1%
Jefferson	0	167 (7%)	167 (7%)	13,280	1.2%
Annandale	0	0	0	20,340	–
Lincolnia	0	0	0	3,916	–
County Total	292 (100%)	2420 (100%)	2712 (100%)	167,541	1.6%

As indicated in the above table, Annandale and Lincolnia have no federally subsidized low/moderate income housing units. Jefferson has no low-income units. Baileys has 128 low, but no moderate-income units. The actual percentage of low/moderate units in Area I is below the countywide percentage.

Under current criteria, all four planning areas generally meet the requirements for the location of low/moderate income housing that was developed in the *Five Year Plan Vol. III, Standards and Criteria.* All four areas are also primarily developed and most of the existing vacant land is relatively expensive.

AREA II

Existing Conditions

A countywide survey of housing conditions indicated generally satisfactory housing conditions in Area II, particularly in the new subdivisions. There are exceptions such as in the Wolf Trap (Dunn Loring), Amanda Place and Seth Williams communities. Scattered deteriorating housing also exists along some of the major routes and back roads in Area II.

Gross current housing needs include units lacking adequate plumbing facilities, overcrowded units, and estimates of units needed by below-median-income commuters. The following table indicates these needs.

AREA II	Units Lack'g. Adequate Plumbing	Overcrowded Units	United Needed By Commuters	Total	%
McLean	115	350	1953	2418	15%
Vienna	135	291	1116	1542	10%
Fairfax*	80	155	372	607	4%
Jefferson North	16	26	+	42	NA
Total	346	822	3441	4609	29%
County Total	2075	4592	9300	15966	100%

*Excludes the City of Fairfax
+Cannot be separated from rest of Jefferson Planning District

Another area of housing need is the over-burdened renter households. These are the households who are paying more than 25 percent of the family income toward rent. The following table indicates the extent of the burden on Area II families.

AREA II	$5,000 families Over-Paying On Rent	$5-10,000 Families Over-Paying On Rent	$10-15,000 Families Over-Paying On Rent
McLean	256	481	203
Vienna	250	347	118
Fairfax*	278	339	68
Jefferson North	39	172	12
Total	823	1339	401 (2563)
County Total	5653	6803	1703 (14159)

*Excludes Fairfax City.

Area II has 16.5 percent of the over-burdened renters in the County.

Existing Housing Costs

The following tables show the distribution of sales units within the three planning districts of Area II. The median values are shown in the following table.

Median values were calculated by OCP staff from January 1974 data in *Standard Reports.*

McLean has the highest median for all housing units in the County.

AREA II	SF	TH	ALL UNITS
McLean	$65,900	$64,500	$65,800
Vienna	57,300	53,800	56,600
Fairfax	64,900	49,400	61,500
Jefferson North	63,000	57,400	62,500
County Median	$57,000	$47,700	$55,100

Existing Rent Ranges

The rental-sales relationship in each of the planning districts is shown in the following table.

AREA II	Rental Units	%	Sales Units	%
McLean	1,856	(12%)	13,724	(88%)
Vienna	1,551	(13%)	10,827	(87%)
Fairfax	2,056	(25%)	6,122	(75%)
Jefferson North	1,311	(63%)	774	(37%)
Total	6,774	(18%)	31,447	(82%)
County Totals	46,277	(28%)	121,264	(72%)

Existing Subsidized Housing

The existing subsidized housing in Area II is shown in the following table.

The Fairfax Planning District is the only district that has subsidized housing; however, the moderate-income project there is in default and has never been occupied.

AREA II	Low Income	Moderate Income	Total	Total Households	Subsidized as % of Total Household in District
McLean	0	0	0	15,938	0
Vienna	0	0	0	13,533	0
Fairfax	0	300(12%)	300(11%)	9,431	3
Jefferson N.	0	0	0	2,328	0
Total	0	300	300	41,230	0.7%
County Totals	310(100%)	2402(100%)	2712(100%)	167,541	1.6%

AREA III

Existing Conditions

A countywide survey of housing conditions indicated generally satisfactory housing conditions in Area III, particularly in the newer subdivisions. There are exceptions such as in the Lincoln-Lewis-Vannoy, Zion Drive, Community Lane, Chapel Acres, and Lorfax Heights communities. Scattered deteriorating housing also exists along some of the major routes and backroads in Area III.

A neighborhood improvement program and conservation plan has been adopted by the Board of Supervisors for the Lincoln-Lewis-Vannoy area. This document will protect the rural-residential character of the neighborhood and guide any future developent. Community development block grant funds are being spent to upgrade public facilities and to provide loans for individual home improvements. Other neighborhoods in Area III are under study for more extensive participation in the block grant program, including the Zion Drive and Chapel Acres communities.

If the existing residents in these areas want such an improvement program, adequate density should be allowed so that the potential development would provide a mixed income community and sufficient units to allow all existing residents of the areas to continue to reside there.

Gross current housing needs include units lacking adequate plumbing facilities, overcrowded units, and estimates of units needed by below-median income commuters. The following table indiates these gross needs. (These figures are taken from the 1970 Census.)

AREA III	Units Lack'g. Adequate Plumbing	Over-Crowded Units	Units Needed By Commuters	Totals	%
Upper Potomac	183	177	558	918	6%
Bull Run	225	146	93	464	3%
Pohick	416	193	93	702	4%
Total	824	516	744	2,084	13%
County Total	2,075	4,592	9,300	15,966	10%

Another area of housing need is the over-burdened renter households. These are the households who are paying more than 25 percent of the family income toward rent. The following table indicates the extent of the burden on Area III families.

AREA III	$5000 Families Overpaying on Rent	$5-10,000 Families Overpaying on Rent	$10-15,000 Families Overpaying on Rent
Upper Potomac	287	294	90
Bull Run	45	50	27
Pohick	83	36	65
Total	415	380	182 (977)
County Total	5653	6803	1703(14,159)

Area III has 69 percent of the over-burdened renters in the County.

Existing Housing Costs

The following table shows the median sales prices for units within the three planning districts within Area III.

AREA III	SF	TH	ALL UNITS
Upper Potomac	$68,300	$48,000	$56,400
Bull Run	$51,900	$39,800	$49,200
Pohick	$60,300	$41,600	$56,800
County Medians	$57,000	$47,700	$55,100

Medians were calculated by OCP staff from January 1974 Data from standard reports.

Approximately 8 percent of Bull Run, 13 percent of Pohick, and 13 percent of Upper Potomac housing stocks are below $30,000, a total of 2979 units. The greatest percentage of these units are in the high $20,000's. These lower valued units tend to be the units that are inadequate.

Most new market housing tends to be expensive, especially the single-family units that are above the county median value.

Existing Rent Ranges

The rental-sales relationship in each of the planning districts is shown in the following table.

AREA III	Rental Units %	Sales Units %	
Upper Potomac	4054 (29%)	9782 (71%)	
Bull Run	296 (5%)	5656 (95%)	
Pohick	0 (0%)	10,536 (100%)	
TOTAL =	4350 (14%)	25,974 (86%)	30,324
COUNTY TOTALS =	46,277 (28%)	121,264 (72%)	167,541

Source: U.D.I.S. Standard Reports

Existing Subsidized Housing

The existing subsidized housing in Area III is distributed in the following way: Upper Potomac has the greatest amount of subsidized units (52 percent) in the County, while Bull Run has no subsidized units and Pohick has less than one percent. The Upper Potomac figures are high because of the inclusion of the Town of Herndon.

AREA III	Low Income	Moderate Income	Total	Total House-holds	Subsidized as % of Tot. Homeowners in District
Upper Potomac	78 (25%)	1343 (56%)	1421 (52%)	13,836	10.3%
Bull Run	0	0	0	5,462	0.0%
Pohick	36 (12%)	0	36 (1%)	10,537	0.3%
Total	114	1343	1457	30,835	4.7%
County Total	310 (100%)	2402 (100%)	2712 (100%)	167,541	1.6%

AREA IV

Existing Conditions

A countywide windshield survey of housing conditions was conducted by the OCP staff in November and December 1973. This survey indicated the degree of deterioration in the total housing stock. The newer subdivisions were in excellent condition, but some of the older residential areas are showing early signs of deterioration. The most critical areas identified from this survey were: Huntington Road, Fairhaven, Jefferson Manor, Trailer Courts, Gum Springs, and Gunston Manor. Scattered housing deterioration also exists on back roads in Area IV.

The Route 1 corridor has been identified by the Redevelopment and Housing Authority as a target area where efforts to improve housing conditions should be concentrated. Toward this end, several communities in the corridor are taking part in the community development block grant program. A neighborhood improvement program and conservaion plan has been adopted by the Board of Supervisors for the Huntington area to preserve the residential character of the neighborhood. Block grant funds will be used to upgrade public facilities and to provide individual loans for home improvements. Woodley Hills/Nightingale Mobile Home Park, Gum Springs, and Fairhaven are also participating in different stages of the community development block grant program. Another need in the Route 1 Corridor is for emergency housing. The County, in conjunction with private social service agencies, should pursue means to house those who are temporarily without a place to live until a more permanent solution can be found for them.

In such an improvement program, adequate density must be allowed so that the potential development would provide a mixed income community and sufficient units to allow all existing residents of the areas to continue to reside there.

Gross current housing needs include units lacking adequate plumbing facilities, overcrowded units, and estimates of units needed by below-median income commuters. The accompanying table indicates these gross needs:

AREA IV	Units Lacking Adequate Plumbing	Overcrowded Units	Units Needed By Commuters	Total	%
Lower Potomac	130	367	186	683	(4%)
Mt. Vernon	294	1,007	837	2,138	(13%)
Rose Hill	97	255	93	445	(3%)
Springfield	100	224	1,302	1,626	(10%)
TOTALS	821	1,853	2,418	4,892	(30.6%)
COUNTY TOTALS	2,075	4,592	9,300	15,966	(100%)

Source: U. S. Census, 1970.

Another area of housing need concerns the plight of the over-burdened renter householder. This is the group whose members must pay more than 25 percent of the family income toward rent. An accompanying table indicates the extent of the burden on Area IV families.

Area IV has 34.1 percent of the over-burdened renters in the County.

AREA IV	$5,000 Families Overpaying On Rent	$5-10,000 Families Overpaying On Rent	$10-15,000 Families Overpaying On Rent	
Lower Potomac	239	87	3	
Mt. Vernon	1,412	1,619	243	
Rose Hill	173	246	30	
Springfield	208	316	259	
TOTALS	2,032	2,268	535	
COUNTY TOTALS	5,653	6,803	1,703	14,159 (100%)

Existing Housing Costs

The following tables show the distribution of sales units within the four planning districts of Area IV. The median values are shown in the following table.

AREA IV	SF	TH	ALL UNITS
Lower Potomac	$41,900	$33,900	$41,300
Mt. Vernon	57,500	41,700	54,600
Rose Hill	49,700	52,500	49,700
Springfield	53,900	52,000	52,800
COUNTY MEDIANS	$57,000	$47,700	$55,100

Note: Medians were calculated by OCP staff from January 1974 data from Standard Reports

Approximately 7 percent or 2,400 of the sales units available in Area IV are below $30,000 in cost.

Existing Rent Ranges

The rental-to-sales relationship in each of the planning districts is shown in the following table.

The rental-to-sales relationship in each of the planning districts is:

AREA IV	Rental Units	(%)	Sales Units	(%)	Total Units	(% of Area IV)
Lower Potomac	114	(7)	1,440	(93)	1,554	(4%)
Mt. Vernon	8,711	(36)	15,598	(64)	24,309	(57%)
Rose Hill	557	(8)	6,177	(92)	6,734	(16%)
Springfield	1,687	(17)	8,255	(83)	9,942	(23%)
TOTALS	11,069		31,470		42,539	
AVERAGES		(26)		(74)		(100%)
COUNTY TOTALS						

The rent ranges for the planning districts in Area IV which contain rental units are shown in the following table.

Area IV Rent Ranges	Bedroom Sizes E	1	1 & D	2	2 & D	3	3 & D	4	Total	(%)
$100	0	0	0	0	0	0	0	0	0	(-)
$100-150	22	177	0	2	0	0	0	0	201	(2)
$150-200	240	1,025	65	526	0	0	0	0	1,856	(17)
$200-250	248	2,660	301	2,936	170	134	0	0	6,449	(58)
$250-300	0	118	0	1,035	261	436	8	0	1,858	(17)
$300-400	0	0	0	329	4	341	31	0	705	(6)
$400+	0	0	0	0	0	0	0	0	0	(-)
TOTALS	510	3,980	366	4,828	435	911	39		11,069	(100)

Existing Subsidized Housing

The supply of existing subsidized housing in Area IV is shown in the following table.

AREA IV	HOUSING UNITS Low Income	%	Mod. Income	%	Total Low & Mod.Units	%	Total Units
Lower Potomac	0	(-)	0	(-)	0	(-)	1,669
Mount Vernon	68	(.2of 1%)	595	(2)	663	(2)	28,779
Rose Hill	0	(-)	0	(-)	0	(-)	6,740
Springfield	0	(-)	0	(-)	0	(-)	10,331
AREA TOTALS	68	(.1of 1%)	595	(1)	663	(1)	47,539
COUNTY TOTALS	310	(.2of 1%)	2,402	(1)	2,712	(2)	167,541
% of COUNTY TOTALS		(22%)		(25%)		(24%)	(28%)

The Mount Vernon Planning District has the second greatest number of subsidized units in the County (24 percent) while the other three planning districts in the area have none.

HISTORY AND ARCHAEOLOGY

In 1742, the County of Fairfax was created by the colonial legislature from the northern portion of Prince William County. At the time of its formation, Fairfax included all of what is now Fairfax, Loudoun, and Arlington counties, and the cities of Alexandria, Falls Church, and Fairfax. In 1791, the Virginia General Assembly ceded what is now Arlington County and the City of Alexandria to the federal government as part of the District of Columbia. This was returned to Virginia, although not to Fairfax County, in 1846.

During the colonial period, the county was primarily agricultural. Its landowners raised tobacco on large plantations with Negro slave labor. The City of Alexandria, the County seat between 1752 and 1800, served as an important colonial port.

Subsequent to 1800, the commercial importance of Alexandria declined, as business shifted to Baltimore and other ports. In addition, an economic and population decline began in Fairfax due to soil exhaustion and westward expansion. This trend began to reverse itself about 1840, when Northern farmers began to move to Fairfax with improved agricultural methods, including the use of animal fertilizer. During the Civil War much military activity occurred in Fairfax County, with Union and Conferderate soldiers occupying and reoccupying various parts of the County.

After 1865, agriculture continued to diversify, as Fairfax became a supplier of grain, fruits, vegetables, and dairy products for the Nation's capital.

In 1925, Fairfax had the highest standing of all 100 Virginia counties in value of dairy products. Suburban development began to be important, as the roads and railroads which had provided the means for reaching the Washington markets began to be used by Fairfax County residents to commute to jobs in Washington, D.C. A great impetus to this development was provided by the rapid growth of the federal government during and after World War II. Fairfax County is now the most populous political subdivision in the Commonwealth of Virginia, although close to two-thirds of its land area is still undeveloped.

Numerous historic structures remain to serve as reminders of a time when Fairfax County was basically a rural county and the home of several of our Nation's early leaders. Most of these structures are described in area plans. A map of the Fairfax County Inventory of Historic Sites is included as part of the Plan.

HISTORIC PRESERVATION

In 1966, the Commonwealth of Virginia amended the *Code* to authorize counties with a population over 240,000 to create historic districts through amendment of the local zoning ordinance. State legislation provides that special zoning regulations may be established for an area including up to a quarter mile radius from the property line of the landmark. In 1967, the Fairfax County Board of Supervisors passed such a zoning amendment designed to protect and enhance the County's historic landmarks. It also established an Architectural Review Board which, in consultation with the Board of Supervisors, has control over construction of and improvement to all buildings, the external appearance of individual properties and demolition of historic buildings within a historic district.

Fairfax County currently has ten historic districts. They are:

- Pohick Church Historic District
- Woodlawn Historic District
- Sully Historic District
- Bull Run Stone Bridge Historic District
- Saint Mary's Church Historic District
- Colvin Run Mill Historic District
- Dranesville Tavern Historic District
- Huntley Historic District
- Langley Fork Historic District
- Robey's Mill Historic District

The Fairfax County History Commission has established an official Fairfax County Inventory of Historic Sites. It is an open-ended list and contains over 200 sites and structures. A short research report on each site prepared by the Office of Comprehensive Planning history staff is on file in the planning office. The Plan contains a map indicating these sites.

Several monographs have been prepared and published on various aspects of the history of Fairfax County. To date, most of these have been studies of historic structures, commissioned as part of an effort to determine whether a certain historic district should be created. In the future, the emphasis will be more topical and will focus on the study of various communities within Fairfax County in an effort to assist in the long-range planning for historic areas of the county.

National Register of Historic Places

The National Register of Historic Places is the official list of the Nation's cultural resources worthy of preservation.

Listing in the National Register:

- makes private property owners eligible to be considered for federal grants-in-aid for historic preservation through State programs;
- provides protection by requiring comment from the Advisory Council on Historic Preservation on the effect of federally assisted projects on these resources;
- makes owners who rehabilitate certified historic properties eligible for federal tax benefits.

The following criteria are designed to guide the States, federal agencies and the Secretary of the Interior in evaluating potential entries.

- The quality of significance in American history, architecture, archeology, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling and association, and:
  - that are associated with events that have made a significant contribution to the broad patterns of our history; or
  - that are associated with the lives of persons significant in our past; or
  - that embody the distinctive characteristics of a type, period, or method of construction, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
  - that have yielded, or may be likely to yield, information important in prehistory or history.

There are at present twenty-two Fairfax County sites listed on the National Register. They are Belvoir Ruins, Colvin Run Mill, Cornwell Farm, Dranesville Tavern, Dulles International Airport, Fairfax Arms, Fairfax County Courthouse and Jail, Gunston Hall, Herndon Railroad Station, Hope Park Mill Complex, Huntley, Langley Fork, Moorefield, Mount Vernon, Mount Vernon Memorial Parkway, Pohick Church, Pope-Leighey House, St. Mary's Church, Salona, Sully, Wolf Trap Farm Park for the Performing Arts, and Woodlawn Plantation.

Fairfax County will continue to propose sites for inclusion in the National Register and will work with the Virginia Historic Landmarks Commission to provide the necessary documentation of each site's historic and/or architectural significance.

Acquisition, Restoration, and Operation of Historic Properties

The Fairfax County Park Authority has acquired such properties as Dranesville Tavern, Colvin Run Mill, and has a 99-year lease on Sully Plantation. It has restored or plans to restore these properties and open them to the public. This is the most expensive means of preserration, and Operation of Historic Properties

The Fairfax County Park Authority has acquired such properties as Dranesville Tavern, Colvin Run Mill, and has a 99-year lease on Sully Plantation. It has restored or plans to restore these properties and open them to the public. This is the most expensive means of preservation since the County pays the cost of purchase and restoration as well as the loss from having the property removed from the tax rolls. A portion of the operational cost is offset by entrance fees. This technique, however, is the only one that will assure that the historic site will be restored and well-maintained. In allowing public access to and special events on the property, it also serves as a valuable educational tool for all those who visit, as well as a pleasant recreational experience for the citizens.

Fairfax County is fortunate in having several structures of national importance which have been saved and maintained by private organizations. Woodlawn Plantation, owned by the National Trust for Historic Preservation, is protected by inclusion in a historic district, as is the Pohick Church. Mount Vernon and Gunston Hall have long since been restored by private societies and certainly merit historic district protection.

Easements

Negotiated historic easements are legal agreements whereby the owner of a historic property agrees to such terms as not tearing down the structure, maintaining its exterior, refraining from dividing and selling the property for development, or similar provisions. In return, the owner is paid a fixed sum of money or is taxed at the rate that would apply if his land were not otherwise developable. An example of the negotiated easement in Fairfax County is the one with the owner of Salona, an early nineteenth century structure near Dolley Madison Boulevard in McLean. The house, outbuildings, and some surrounding acreage were included in a permanent easement, and a large parcel fronting directly on Dolley Madison Boulevard is included in a 10-year easement, guaranteeing that the property will remain undeveloped for that period of time. This devaluation of development potential is reflected in the owner's property taxes.

This technique ensures the protection of the property and is much less expensive than acquisition. It does not, however, ensure that a historic structure will be restored.

Purchase and Lease-Back

This preservation tool can be used by government to ensure that a historic property is protected by certain legal convenants. The County could purchase such a property, and then lease it for a sum to a citizen, company, or organization which would agree to include in the lease restrictions on the possible uses of the property and/or regulations concerning the appearance of the exterior of the building. A variation on the technique is the revolving fund. Under this system, a building is acquired, restored put under restrictive convenant and resold, with the sale money serving as capital for further investment.

The first technique assures preservation but not restoration. Also, much time must elapse for

an initial investment to be repaid. The latter technique assures both preservation and restoration but requires a large initial capital investment. It does, however, return the property to the tax rolls.

Historic District

Creation of a historic district is a tool which may be utilized when a structure or site is of major architectural and/or historic significance and is threatened by pressures of development. This can include the threat of adverse visual impact from proposed development within the quarter mile radius of the boundaries of the property. In a historic district, all alterations to the exterior of a building or proposed demolition of a historic building are under the control of the Board of Supervisors with the advice of the Architectural Review Board.

Historic Roads Protection

The Commonwealth of Virginia has established a category of roads of special historic or scenic interest called scenic highways and historic byways. Old Georgetown Pike, Route 193, was recently named a historic byway and is the first road in the state to qualify under this new program. The designation means that special care will be taken to conserve the unique resources of the road and acts as a deterrent to major widening or improvement.

ARCHAEOLOGICAL SURVEY

The archaeological resources of Fairfax County represent more than 10,000 years of cultural heritage, the entire span of human occupation of eastern North America. Since the Indians of the United States were not literate, insight into their culture history can only be acquired through the archaeological record. Archaeology also provides the means to examine historical phenomena which were not recorded or for which the records have been lost or destroyed.

North American archaeology is currently divided into two categories, prehistoric and historic, both of which are presented on the Fairfax County archaeological survey. Prehistoric archaeologists are primarily concerned with extinct Indian civilizations. They attempt to trace the development and changes in these cultures from the earliest inhabitants of the continent of roughly 10,000 years ago, to the tribes that resided in the area when the first Europeans arrived. The purpose is to study the development of human civilization in its more primitive forms.

Historic archaeologists begin their study with the arrival of the first Europeans. Usually, problems are addressed which have been traditionally ignored by historians or for which there is no historical record. Through the cooperation of a variety of disciplines a valid analysis of the lifestyles of our ancestors can be accomplished.

The drastic changes from an aboriginal, stone age culture, to a broadly scattered plantation-based culture with worldwide trade ties, to a diversified agricultural community, and finally to the dense urban and suburban culture of today have produced a tremendous wealth of archaeological information. This information is important to the full understanding of the County's heritage and the sociological and cultural factors that have gone into creating our modern society.

This resource and information base is increasingly being reduced as a result of the tremendous rate of development in the County. In recognition of the importance of the preservation of these resources, the Board of Supervisors (at the request of the Fairfax County History Commission) established the Fairfax County Archaeological Survey in July 1978.

Archaeological Resources Management

The major responsibility of the Survey is to manage the historic and prehistoric resources of the County. The Survey has adopted a program of preservation and study which is intended to ensure that these buried manifestations of human culture can be considered in planning and development, and interpreted to provide as much insight into the local and American cultural heritage as possible.

A major goal of the Survey is to create an optimum balance between the conflicting interests of economic growth and the preservation of the County's archaeological resources. Recognizing the legitimacy of both of these interests, the Survey is attempting to maximize preservation while simultaneously minimizing its impact on economic growth. To do this it is important for the Survey to identify and evaluate the archaeological resources of Fairfax County; to establish a system for early reconciliation of potential conflicts between economic and preservation interests, and to raise the level of public awareness of the value of archaeological resources.

The Survey has implemented a series of projects, foremost among which is the compilation of an inventory of archaeological sites in the County. The significance of these sites is being assessed so that decisions regarding preservation actions can be made. In conjunction with this project, the Survey is constantly reviewing zoning change requests, preliminary development plan submissions, and conducting field survey and literature reviews of Fairfax County parks. All surveys and reviews involve the examination of historic maps and literature, and comparison of plat maps with a theoretical model of potential prehistoric Indian settlements. Surveys include the on-site examination of project areas by staff archaeologists.

HISTORIC SITES

Area I

The historic sites described below are some of the more significant ones in Area I.

The District of Columbia Boundary Stones

These are sandstone markers erected in 1791 when the site of Washington was first determined. The original area of the District of Columbia was ten miles square and the forty stones were placed at one-mile intervals along the boundary lines. The remains of the stones have all been recovered and are under the protection of the Daughters of the American Revolution. There are three boundary stones in Area I.

Fountain of Faith

On the grounds of the National Memorial Park cemetery is the Fountain of Faith designed by the Swedish sculptor, Carl Milles. A juxtaposition of 38 bronze figures and flowing water, the fountain has as its theme, the joy of reunion after death.

Green Spring Farm

A Fairfax County park, Green Spring Farm's grounds are open to the public. The brick house, dating from the mid-eighteenth century, is the headquarters for the Fairfax County Council of the Arts.

The Mount

This house was built in 1745 by Colonel Robert Lindsay, whose family had emigrated from Scotland in the 1600s. It was originally constructed of log and stone and has been covered with stucco.

Oak Hill

This historic landmark was built about 1780. Located off Wakefield Chapel Road it is one of the few remaining eighteenth-century structures in this heavily developed section of the county.

Area II

One of the County's ten historic districts is within Area II.

Langley Fork Historic District

The Langley Fork Historic District was adopted by the Board of Supervisors in 1980 to protect seven historic sites clustered around the intersection of Old Chain Bridge Road and the Georgetown Pike. They include the Langley Ordinary, Langley Toll House, Gunnell's Chapel, the Langley Friends Meeting House, the Mackall House and Hickory Hill. The cluster is listed on both the Virginia and National Register of Historic Places. Recommendations for development are listed in Sectors M3 and M4 of the Area II Plan.

Other significant sites in Area II are listed below.

Ash Grove

Was built about 1790 on what until 1850 was Fairfax family land. It is one of only two Fairfax family houses still standing in Fairfax County. (The other, Towlston Grange, is also in Area II.) The house is T shaped and covered with white clapboard. The outbuildings include an exterior brick kitchen and a clapboard smokehouse.

The District of Columbia Boundary Stones

There are four District of Columbia boundary stones in Area II. (See description under the listing for historic sites in Area I.)

The Fairfax County Courthouse

Completed in 1800 according to plans by James Wren. This is the third courthouse built since the organization of Fairfax County in 1742. It is a two-story brick building topped by an octagonal cupola. As the county has grown, several additions have been made to the original structure which was restored during the 1960's. The courthouse is on the Virginia Landmarks Register and the National Register of Historic Places.

Langley Ordinary

The Langley name in this area dates from its eighteenth century ownership by Thomas Lee who named it for an ancestral estate in England. The Langley hamlet at the intersection of Georgetown Pike and the Old Chain Bridge Road contained a drover's rest, a toll house, a blacksmith shop, a store, and this mid-19th century building, once used as a tavern, and during the Civil War, as a hospital and headquarters for Union General McCall.

Moorefield

Was the house of Jeremiah Moore, an influential early Baptist leader in Fairfax County. Built about 1790, the frame and clapboard structure is now covered with brick. The structure is adjacent to land programmed for a Metro Station. Efforts are being made to keep the house in its current location and make a suitable use for it.

Salona

Built about 1805, Salona was named for an Italian castle. The name means a place of great hospitality. Salona is the house in which President James Madison took shelter the night in 1814 when the British burned the Capitol and the White House. The house is a two-story brick structure and originally had two wings. Both were destroyed during the Civil War; only one has been rebuilt. The owners of Salona have given the county an easement on the house, the outbuildings, and part of the grounds.

A lengthy research monograph which will provide the information needed to consider the creation of an historic district encompassing Salona is in preparation.

Windover Heights

Built in 1869, is Fairfax County's best example of the Italian Villa style of building, very popular in this country after the Civil War. The asymmetrical character of the design has allowed for harmonious additions in many directions. The house is topped by a square glazed cupola or belvedere.

Wolf Trap Farm

A log, clapboard and stone structure of one and a half stories, was purchased as a country retreat in 1930 by Jouett Shouse. A meeting at Wolf Trap precipitated the initial discussion which led to the creation of the United Nations. In 1966, Mrs. Shouse gave 95 acres of Wolf Trap Farm land and funds for design and construction of an amphitheater to the Department of the Interior which designated the land America's "first national park for the performing arts." An outdoor pavilion and stage designed by John Mac Fayden with a caacity of 3,500 persons was completed in 1971. It is called the Filene Center for the Performing Arts.

Old Georgetown Pike

Route 193, between Route 123 in Langley and Route 7 in Dranesville, was designated by the Virginia Department of Highways as the state's first Virginia Byway. It originated as a buffalo trail, was later a familiar trail for the Susquehannahs and Iroquois, served as a road for the transport of agricultural produce toward Georgetown and Alexandria, and from the early 1800's to 1932, it was a toll road. It is one of the few roads in this area which retains its beauty, character, and historic flavor. The extraordinarily rugged topography of this northern edge of Fairfax County bordering the Potomac River gives this road an unusual scenic quality.

Area III

Area III contains six of the county's ten historic districts.

Saint Mary's Church Historic District

Saint Mary's Church Historic District was created in November, 1972. Its purpose is to protect the environs of this church, the oldest Catholic Church within the present boundaries of Fairfax County. Saint Mary's Church was constructed in 1858 to serve the needs of the Irish immigrants who came to Fairfax County to work on construction of the Orange and Alexandria Railroad. The church is a rectangular white frame structure, topped by a spire with eleven Gothic arched windows, one on each side being filled with stained glass. During the Civil War Second Battle of Bull Run, Clara Barton nursed wounded soldiers in the area around the church and the nearby railroad station, and the American Red Cross has erected a marker in the area. The church is listed on both the Virginia Landmarks Register and the National Register of Historic Places.

Recommendations for development within the historic district can be found in Sectors P1 and P2 of the Area III Plan.

Colvin Run Mill Historic District

Created in March of 1973, this district is located around the intersection of Colvin Run Road and Route 7. The Colvin Run Mill was a custom or merchant mill which ground grain commercially and stored both grain and flour. It was built some time between 1811 and 1830. Part of the west wall is stone and could be a remnant of an earlier mill. The miller's house, built about 1815, can be placed in the transitional period between Federal and Greek Revival styles. The mill and miller's house have been reconstructed by the Fairfax County Park Authority and a small general store has been moved to the property. Colvin Run Mill is listed on both the Virginia Landmarks Register and the National Register of Historic Places. Recommendations for development within the historic district can be found in Sector UP3 of the Area III Plan.

Dranesville Tavern Historic District

Created in March of 1973, this district is located around five acres of land owned by the Park Authority along the south side of Route 7, one mile east of the Loudoun-Fairfax County line. The tavern was built about 1830. It consists of two two-story log cabins which were connected and had a chimney on each end, as well as a connected one-story log kitchen with a chimney. Clapboarding, a new window sash, and plastering were added about 1850, when several other improvements were made. Dranesville Tavern served as a drovers' rest for the busy thoroughfare of Leesburg Pike. It is one of a few remaining examples of the rural Virginia inn or ordinary which served the traveling public of the eighteenth and nineeenth centuries. The tavern was purchased by the Fairfax County Park Authority in 1968 and has recently been restored. The Park Authority hopes to lease the building as a working tavern. The Dranesville Tavern is listed on both the Virginia Landmarks Register and the National Register of Historic Places.

Recommendations for development within the historic district can be found in Sector UP4 and Option 1 of the Area III Plan.

Bull Run Stone Bridge Historic District

Adopted in November of 1972, this district is located along Route 29 near the Prince William County line. The stone bridge over Bull Run was built in the 1820's. Following the Civil War Second Battle of Bull Run in August of 1862, General John Pope's federal troops retreated to Centreville over the bridge and then destroyed it. After the Civil War the bridge was rebuilt and was in use until 1926, at which time Lee Highway was realigned and a wider bridge was constructed. In 1960 a local stone mason restored the bridge to its appearance as photographed early in the Civil War.

Recommendations for development within the Bull Run Stone Bridge Historic District can be found in Sector BR5 of the Area III Plan.

Sully Historic District

Adopted in November of 1972, this district is located along Route 28 near Dulles International Airport. Sully was built in 1794 as a home for Richard Bland Lee, the younger brother of General "Light Horse Harry" Lee, and the uncle of Robert E. Lee. He is credited with a major influence in the establishment of the nation's capital in the Georgetown-Alexandria section of the Potomac River. Sully is a 2½ story house with beaded siding over brick nogging, gable roof without dormers, and exterior brick chimneys. The east wing was added about 1800. The house was recently restored by the Park Authority to its pre-1859 appearance. Sully's outbuildings include a hewn log yard kitchen built before 1794 and now covered with clapboard, a stone house built around 1803, and a smokehouse and office dating from 1794. There is a log schoolhouse on the property which was moved to this site from a farm in Prince William County. Sully is listed on both the Virginia Landmarks Register and the National Register of Historic Places.

Recommendations for development within the historic district can be found in Sector UP7 of the Area III Plan.

Robey's Mill Historic District

Adopted in 1981, this district is located along Pope's Head Road at Piney Branch. The complex consists of a mill, miller's house, tenant house, dairy and smokehouse. It is a rare example of the survival of so many buildings associated with a rural mill site. The buildings date from the early 1800's when they were built as part of the large Hope Park plantation of Dr. David Stuart. Following the Civil War ownership of Hope Park and the mill complex was divided. The mill's greatest period of prosperity was under the early-twentieth century ownership of Frank Robey, whose name is still associated with the property. Robey's Mill is listed on both the Virginia Landmarks Register and the National Register of Historic Places.

Recommendations for development within the historic district can be found in Sector P1 of the Area III Plan.

Other Historic Sites

There are numerous other historic sites in Area III. In October 1974, the History Commission completed its ranking of the Fairfax County Inventory of Historic Sites. Several of the sites with high ranking are mentioned below:

- A. Smith Bowman Bourbon Distillery survives from the days of the town of Wiehle, planned in 1890. The first distillery was located in an old soapstone mill. This is the only licensed bourbon distillery in Virginia.
- Cabell's Mill was built around 1800, was donated to the Park Authority in 1969. The mill and miller's house are set aside for the lifetime use of the occupants. A fine pair of buhr stones is set on end at the rear steps of the mill and a coarse pair is set at the front.
- Dr. Alfred Leigh House was built around 1890 and included two rooms for the doctor's office. The house has dormers, gables with cut-work barge boards and fish-scale shingles, diamond-shape windows and two bay windows, turned posts with brackets on the porches, and unique wooden trim on the major corners in imitation of quoins usually found in older brick and stone buildings.
- Mount Gilead built before 1750, is an excellent example of Potomac River Valley architecture. It has porches along both the back and the front of the house, a sloping roof line with dormers, and chimneys at both ends.
- Hope Park Mill the last existing example of a neighborhood flour mill in Fairfax County, was constructed around 1820. Exterior construction is stone and vertical board and batten. The old mill machinery and guiding stones are intact and are complete except for the water wheel. The Hope Park miller's house was constructed before 1838, is three stories high, and is built into the side of a hill.
- Brimstone Hill built in the early 1800's, was knows as Arundel's Farm during the Civil War and may have been used as a tavern. The Arundel family were Union sympathizers who were instrumental in enabling Union forces to launch a surprise attack on a squadron of Mosby's Rangers.

Area IV

Area IV contains three of the county's ten historic districts.

Woodlawn Historic District

Adopted in May 1971 and readopted in September, 1972, this district is located in the area of the intersection of Route 619 and U.S. 1. The historic district is based on two landmarks: Woodlawn Plantation, owned by the National Trust for Historic Preservation, and George Washington's Grist Mill, owned by the Virginia State Division of Parks. Although they are protected from alteration or demolition by virtue of their ownership, historic districting was necessary to protect them from possible adverse visual impact from commercial development along the Route 1 corridor.

Woodlawn was built between 1800 and 1805 on land willed by George Washington to his favorite nephew, Lawrence Lewis and his wife, Nelly Custis Lewis. The architect was Dr. William Thornton, first architect of the U.S. Capitol. Woodlawn is a brick structure of Georgian style with five-part

Woodlawn Plantation

construction-a central portion with flanking wings and connecting hyphens. Beyond them are a smokehouse and a dairy, linked to the wings with brick walls penetrated by solid doors. Woodlawn is on both the Virginia Landmarks Register and the National Register of Historic Places.

Several other noteworthy structures are in the Woodlawn District. These include Grand View, a simple clapboard structure dating from the mid-nineteenth century when a Quaker company owned Woodlawn, the Woodlawn Baptist Church, completed in 1872 after the land was sold to John Mason, and the Mason house itself. Of special interest is the Pope-Leighey house, a Frank Lloyd Wright structure which was moved to the Woodlawn property in 1964.

Recommendations for development within the historic district can be found in Sectors MV7 and MV8 of the Area IV Plan.

Pohick Church Historic District

Adopted in September, 1969, readopted in 1972 and revised in 1977, this district is located at the intersection of Route 1 and Pohick Road, adjacent to Fort Belvoir.

Pohick Church, a small brick edifice of the Georgian style, was designed by James Wren and constructed between 1769 and 1774 under the direction of Daniel French and George Mason. It was the second church by the name of Pohick built for Truro Parish. The building has an orderly, symmetrical appearance, being built on a rectangular plan with a hipped roof. During the Civil War, both Confederate and Union troops used the church intermittently as a picket post or an outpost. In the 1870's the interior was restored in the Victorian Gothic style. In the 1890's the superintendent of nearby Mount Vernon began directing restoration work which was completed in 1924. A vestry and parish house were added more recently.

Pohick Church is listed on both the Virginia Historic Landmarks Register and the National Register of Historic Places.

Recommendations for development within the Pohick Church Historic District can be found in Sector LP4 of the Area IV Plan.

Huntley Historic District

Adopted in May, 1976, this district is located north of Lockheed Boulevard, south of South Kings Highway and partially east and west of Harrison Lane.

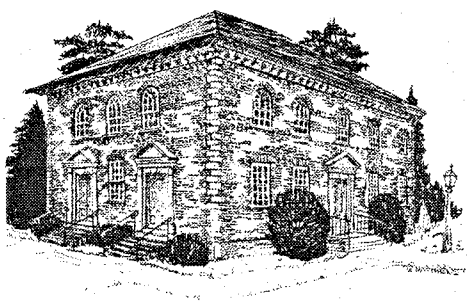
Huntley was constructed about 1820 for Thomson F. Mason, a grandson of George Mason of Gunston Hall. The main house was probably used as a secondary country dwelling for the family. Its architecture contains elements of the Roman Revival style, a popular style during the Federal era. The Huntley property contains a remarkable collection of outbuildings which are valuable architecturally and give a good picture of plantation life in this area during the nineteenth century. The complex also has great potential for archeological investigation. Huntley is on both the Virginia Historic Landmarks Register and the National Register of Historic Places.

Recommendations for development within the Huntley Historic District can be found in Sectors RH7 and MV2 of the Area IV Plan.

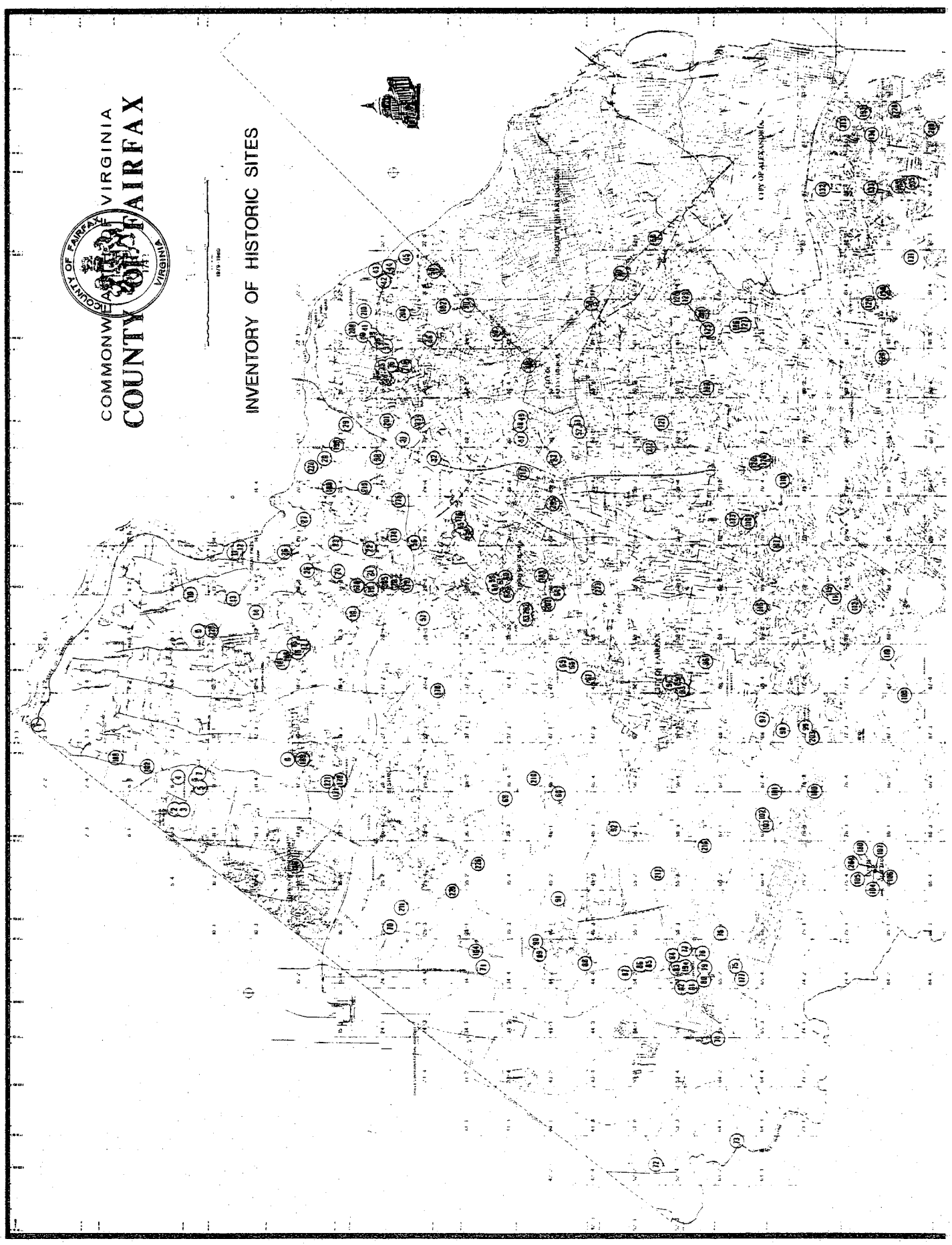
Other Historic Sites

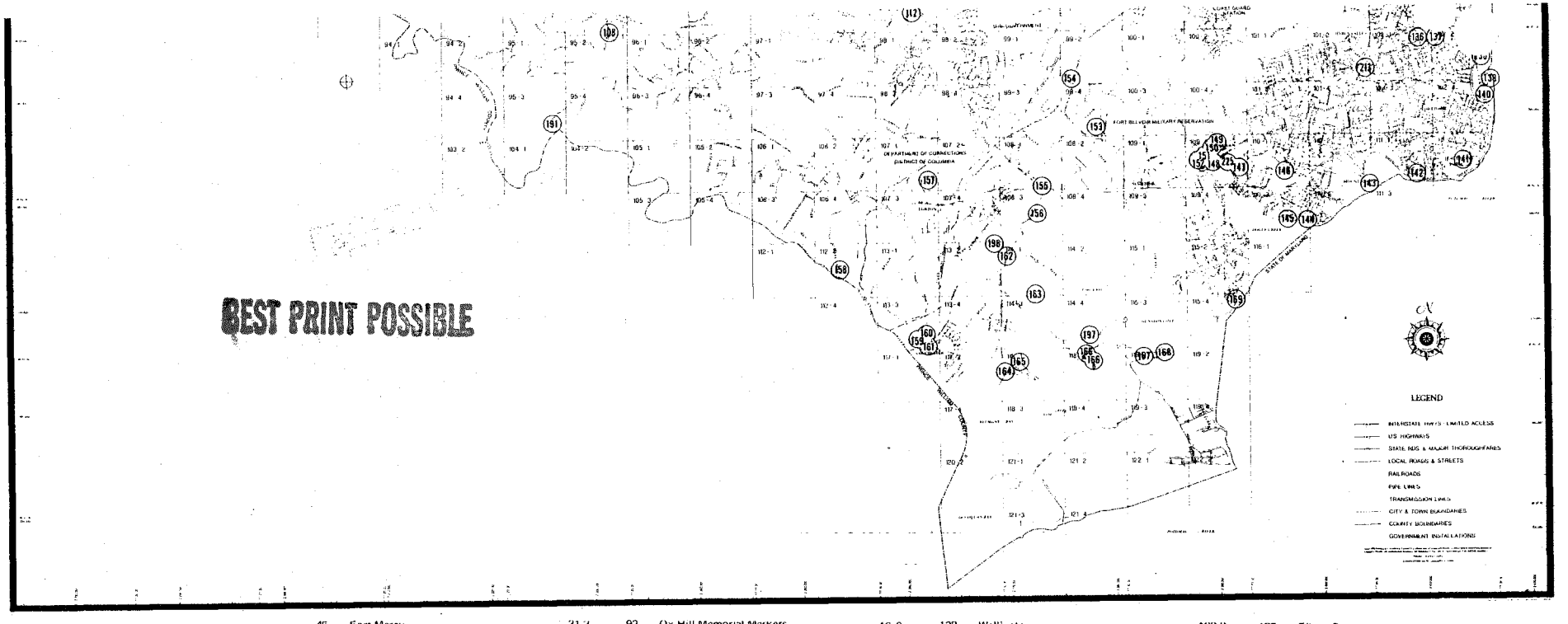
The Fairfax County History Commission maintains an inventory of County sites and structures of historic and architectural significance. The list now contains over two hundred entries. Some of the most representative sites in Area IV are listed below.

- Belvoir (Ruins). It was built about 1741 and destroyed by fire in 1783. It served at one time as the residence of Thomas, Sixth Lord Fairfax, Proprietor of the Northern Neck of Virginia. Belvoir was a spacious mansion built of brick. The grounds had many outbuildings, a large garden, an orchard, and fisheries. Belvoir is on the Virginia Landmarks Register and National Register of Historic Places.
- Colchester Town Archeological Site. Creation of the Town of Colchester was authorized by an act of the Virginia Assembly in 1753. On the Occoquan Creek, Colchester enjoyed a brief period of prosperity as a port town, but was eclipsed by Alexandria and never recovered from a devastating fire. By 1820, the town was almost gone.
- Fairfax Arms (Colchester Inn). Built about 1760, this is one of two early structures still standing on the site of the old port town of Colchester. The one and a half story frame and clapboard structure may have been the Colchester Inn, a popular ordinary where the Truro Parish Vestry is thought to have met on occasion.
- Gunston Hall. A brick house of the Georgian style, was built between 1755 and 1758 as the home of George Mason. It is a simple one and a half story structure, rectangular in shape with massive chimneys at each end. Gunston Hall is owned by the Commonwealth of Virginia and is on the Virginia Landmarks Register and the National Register of Historic Places.
- Mount Air. A two-story frame unit, was built about 1830. The main portion of the house dated from 1859. Many additions and alterations were made in the late 19th and 20th centuries, thus showing the evolution of a house tailored to meet the needs of its occupants over a hundred years.
- Collingwood. Formerly a restaurant, it stands on land which was once part of George Washington's River Farm, one of the five farms which made up the Mount Vernon complex. Washington purchased the land about 1760 from a William Clifton, and a 1937 Work Projects Administration report on the structure states that property was first called Clifton's Terrace. The name Collingwood was not connected with the property until sometime during the nineteenth century. One theory is that the place was named in honor of Admiral Collingwood of the British Navy; the other is that it was named in honor of the Quaker meeting in Collingwood, New Jersey.
- Sherwood Hall. The house on Sherwood Farm was built in 1859 on Mason family land purchased from the owner of Hollin Hall. The structure has some elements of the Italian Villa style. The present owner stated that very little alteration has taken place since the house was built. Work has been limited mainly to the installation of modern plumbing and heating facilities and to shoring up the structure by replacing the original handhewn beams in the basement with steel beams.
- Little Hollin Hall. The name Hollin Hall was first applied to a Thomson family estate in Yorkshire, England. George Mason, III, married Ann Thomson, and this house was named for her family home, though it is not certain when this happened. George Mason, V, who built Gunston Hall, by 1779 had given the Hollin Hall property to his son Thomas Mason, although he was also building a large house for him very close to this site. Thomson Mason and his wife moved to the new house, but it was destroyed by fire about 1812, and they returned to the original house. It was then known as the spinning house because of the Scottish and Irish spinners who had worked in it.
- Mount Vernon. Originally a small cottage built in 1742 for Lawrence Washington, it was enlarged by George Washington between 1757 and 1787 to its present size of two and a half stories with nine bays on the front. It is a frame structure with rusticated sheathing and is of Georgian style. Since 1858, under the ownership of the Mount Vernon Ladies Association, the house has been restored and, wherever possible, furnished to conform to its appearance as Washington knew it. Mount Vernon is on the Virginia Landmarks Register and the National Register of Historic Places.
- Pope-Leighey House. Designed in the 1940's by Frank Lloyd Wright, has numerous features that have been influential in contemporary architecture. Among these are the carport, cantilevered flat roof, radiant heating, and spatial and light concepts. In 1964, the house was donated to the National Trust for Historic Preservation and moved from Falls Church to Woodlawn Plantation. It is on the Virginia Landmarks Register and the National Register of Historic Places.
- Walnut Tree Farm. Also called Wellington, is a two and a half story frame, stucco, and brick house, built before 1760. In 1760, it was sold to George Washington and became part of River Farm, one of the five farms which comprised the Mount Vernon Estate. In 1971, the property gained national attention when the United States State Department refused to allow its sale to the Soviet Union. It is now the headquarters of the American Horticultural Society.
- Union Farm. The Union Farm property was so named by George Washington, who in 1769 joined several pieces of property and created the Union Farm of his Mount Vernon Estate. The property on which the house stands was part of Washington's family inheritance and has been traced back to Charles II's grant to Thomas Lord Culpeper. Washington's 1798 map of his lands indicates a smaller house on the site of the present one. The current owner believes that the present house, built in 1857, incorporated the foundations of this old 16 x 18-foot house. The original owner of the house was John Ballinger, one of the group of Quakers who settled in the Woodlawn-Mount Vernon area between 1846 and 1856.



Pohick Church


COMMONWEALTH OF VIRGINIA
COUNTY OF FAIRFAX
INVENTORY OF HISTORIC SITES



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178	Andrew Chapel Methodist Church	19-4
179	Plantation	28-2
180	Hetzel House	75-4
181	Dr. Alfred Leigh House	12-4
182	Piscataway Farm	6-2
183	Springfield	38-4
184	Turley Hall	34-2
185	Filene Center	28-2
186	Herndon Railroad Station	16-2
187	Hollin Hills	93-3
188	Smith's Chapel	2-4
189	Reston	17-2
190	Shotroff House	20-2
191	Wolf Run Shoals Camp	96-4
192	Spring House	31-3
193	Fort Willard Circle	83-3
194	Civil War Trenches	54-4
195	Stoneybrooke	92-2
196	Indian Spring Farm	113-2
197	Springfield-Cockburn	114-4
198	Colvin Run Community House	12-4
199	Swinks Miller's House	21-3
200	Popkins Farm	93-3
201	Elmwood	30-1
202	Merry-Go-Round	38-3
203	The Fairfax Station	77-1
204	Buckley Brothers Store	75-4
205	Camp Alger Headquarters	49-1
206	Mackall House	22-3
207	Nottoway House	48-1
208	Adams-Nelson-Sewell-Hirst Cemetery	31-1
209	Clark House	61-3
210	Turkey Run Farm	22-3
211	Frying Pan Park	25-1
212	Mount Eagle	83-3
213	Peake Family Cemetery	101-2
214	Tudor Hall	39-4
215	Othman House	30-2
216	Winfield Farm	55-4
217	Woodaman House	55-2
218	Vale Community Center	36-4
219	Spring Hill Farm	20-4
220	Elijah White House	25-3
221	Wiehle House	17-4
222	Holmes Run Acres	59-2
223	Hatmark School	48-4
224	Bull Neck Gold Mine	20-2
225	Otis T. Mason House	109-2
226	Franklin Farm	35-2
227	The Great Falls Grange	13-1
228	Watering Trough	93-1

FISCAL AND FINANCIAL

GENERAL

As development alternatives are evaluated and decisions made regarding future growth in Fairfax County, special attention must be given to the fiscal impact of these decisions. The purpose of this section is to examine the fiscal implications of the Plan, considering recent fiscal trends in Fairfax and other local jurisdictions which are experiencing growth similar to that of Fairfax. This information will form a basis for ongoing research into the effects of various growth strategies on the pattern of County revenues and expenditures. The fiscal analysis of alternatives must be considered in light of population pressures, employment opportunities and environmental and public facilities constraints.

Fairfax County has grown from a rural community in the early 1950's to a highly urbanized County of today. During this period, the County has maintained fiscal stability while expanding rapidly to meet the ever increasing needs of a more sophisticated citizenry and a more complex, urbanized environment. At the same time property assessments have gone up with inflation of property values, as required by law. However, the real property tax rate in this County has gone down to make it one of the lowest effective rates of major jurisdictions in the Washington metropolitan area. In addition, restrained fiscal management has improved the County's bond rating from "baa" to "AA," thus saving current and future taxpayers substantial interest costs on sales over what would have been paid at the old "Baa" rating.

Fairfax County has experienced tremendous population growth during the past two decades. Primarily due to rapid growth of the regional economy, Fairfax County's population was 4.5 times greater in 1970 than in 1950. About 26.5 percent of the Washington metropolitan growth during the past decades has occurred in Fairfax County. The recent growth experience of Fairfax County and the Washington Standard Metropolitan Statistical Area (excluding the recent addition of Charles County, Maryland) are shown in the following table.

In addition to the residential construction which has taken place to house this population, the County has also experienced significant commercial and industrial development to provide services and jobs for its citizens. This has brought about significant growth in the County's assessable tax base.

With the tremendous growth in population and assessable tax base, the County has been able to maintain a very stable real estate tax. In fact, during the last two years the County has been able to reduce its real estate tax rate by 55¢ by $100 of assessed value. The current tax rate of $3.85/$100 is only 10¢ greater than the tax rate for 1960, and reflects a decrease in the property tax rate that no other jurisdiction in the Washington area was able to accomplish this year.

As can be seen from the data in the following table, the total assessed value of taxable property in Fairfax County has grown from $709 million in 1962 to more than $3.5 billion in FY 1975.

Total Assessed Value, 1962-1975

Fiscal Period	Total Assessed Valuation
1962	709,789,496
1963	725,761,562
1964	809,713,034
1965	932,197,088
1966	1,071,084,022
1967	1,153,857,711
1968	1,302,165,492
1969	1,543,724,600
1970	1,713,296,109
1971	1,973,746,124
1972	2,219,787,119
1973	2,604,063,572
1974	3,027,647,058
1975	3,452,709,910

Source: Office of Comprehensive Planning, and Office of Research & Statistics, Fairfax County.

In the table below, a comparison of effective property tax rates (actual rate times assessment ratio) is shown for Fairfax County and several neighboring jurisdictions for FY 1974. It is notable that five of the nine jurisdictions shown had effective rates higher than Fairfax County. For the fiscal years 1975 and 1976, Fairfax County's effective tax rates have been reduced to $1.64 and $1.54, respectively.

Real Property Tax Rate
Fairfax County
1960-1976

Fiscal Year	Real Property Tax Rate*
1960	3.75
1961	3.75
1962	3.00
1963	3.35
1964	3.75
1965	3.75
1966	4.05
1967	4.05
1968	4.05
1969	4.30
1970	4.30
1971	4.30
1972	4.30
1973	4.30
1974	4.30
1975	4.10
1976	3.85

Source: Accountants' Report, County of Fairfax, Virginia (1960-1972), Approved Fiscal Plans, Fairfax County, Virginia (1962-1975), Office of Management and Budget, Fairfax County.

*States in dollars per $100 of assessed value.

Since 1972 the County has been able to reduce its net debt to assessed value ratio from 11.26 percent to 9.10 percent while still providing a relatively high level of service. One effect of such debt ratio reduction has been, as mentioned above, a substantial improvement in the County's bond

Comparison of Assessed Valuation With Net Debt, 1962-1975

Fiscal Period	Total Assessed Valuation	Net Debt	Ratio of Assessed Valuation to Net Debt
1962	709,789,496	64,948,050	9.15%
1963	725,761,562	68,023,920	9.37
1964	809,713,034	73,764,790	9.10
1965	932,197,088	80,680,460	8.65
1966	1,071,084,022	99,133,580	9.25
1967	1,153,857,711	118,256,850	10.24
1968	1,302,165,492	140,927,620	10.82
1969	1,543,724,600	163,015,140	10.55
1970	1,713,296,109	170,626,485	9.95
1971	1,973,746,124	215,561,680	10.91
1972	2,219,787,119	250,072,660	11.26
1973	2,604,063,572	264,908,455	10.17
1974	3,027,647,058	303,225,435	10.01
1975	3,452,709,910	314,225,415	9.10

Source: Office of Comprehensive Planning and Office of Research and Statistics, Fairfax County.

market position. This is particularly remarkable considering the general economic condition of the country and large cities like New York which is on the brink of financial disaster. As in the above table, the County's current ratio of net debt to assessed value is the lowest it's been since 1965 when it was 8.65 percent. The County can maintain this low ratio if it continues to follow its fiscal policies of maximizing pay-as-you-go capital construction and utilizing revenue sharing funds for capital construction as much as possible.

SOUND FISCAL GROWTH AND THE PRELIMINARY PLANS

In preparing the preliminary area plans for Fairfax County, a key objective was to show types of development that would maximize financial and fiscal stability and minimize harmful environmental and transportation impacts. In this respect, several assumptions were made:

- The types of housing needed will be dictated basically by the market according to future population characteristics.
- Costs of services will increase, while land values and income of the County will grow and most likely offset service costs.
- Changing service levels within individual functional areas will undoubtedly change the pattern of expenditures.

Several recent studies have examined the impacts of various growth patterns. Perhaps the most notable is The Costs of Sprawl prepared by the Real Estate Research Corporation for HUD.* It is a study of prototype development patterns, analyzing the costs (advantages and disadvantages) of a variety of mixes ranging from total single-family sprawl up to predominantly high density (high-rise apartments). In virtually every analytical test, clustered development and higher density

*Prepared by Real Estate Research Corp. for the Council on Environmental Quality: Office of Policy Development and Research, Department of Housing and Urban Development; and the Office of Planning and Management, Environmental Protection Agency (April 1974). Emphasis from original report.

Washington and Fairfax County Population Trends

Year	Population WSMSA	Population Fairfax County	Growth of WSMSA	%	Growth of Fairfax County	%	Fairfax Share of WSMSA Growth
1940	1,006,014	40,929[1]					
1950	1,507,848	96,611	501,834	50%	55,682	136%	11.1%
1960	2,076,848	248,897	568,762	38%	152,286	157%	26.3%
1970	2,861,123	455,021	784,513	38%	206,124	83%	26.3%
1975	--	538,000[2]	--	--	--	--	--

Note: 1. Contains Fairfax City, now independent
2. Estimate from Fairfax County Office of Research and Statistics

Source: U.S. Census of Population, 1940, 1950, 1960, 1970.

Comparison of Real Estate Taxes in Metropolitan Area, 1973-1974

Jurisdiction	Tax Rate	Assessment Ratio	Effective Rate
Fairfax County	$4.30 per $100	40% of market	1.72%
City of Alexandria	$4.00 per $100	50% of market	2.00
Arlington County	$3.83 per $100	40% of market	1.53
Fairfax City	$3.98 per $100	50% of market	1.99
Prince William County	$4.70 per $100	33% of market	1.55
City of Falls Church	$3.00 per $100	50% of market	1.50
District of Columbia	$3.32 per $100	55% of market	1.83
Montgomery County, Md.	$3.52 per $100	60% of market	2.11
Prince Georges County, Md.	$4.05 per $100	60% of market	2.43

Source: Office of Management and Budget, Fairfax County.

developments appear to offer advantages over low-density detached housing patterns.

The major conclusion of this study is that "for a fixed number of households," low-density detached housing patterns are "the most expensive form of residential development in terms of economic costs, environmental costs, natural resource consumption and many types of personal costs. . . . These cost differences are particularly significant in terms of those costs borne by local governments." The study further states:

- Economic and environmental costs (as well as resource consumption) are likely to be significantly less at higher densities to house and service a given population. Some personal costs, however, may increase with increasing density.
- While planning results in cost savings, density is a much more influential cost determinant. Clearly, the greatest cost advantages occur when higher density planned developments are contrasted with low-density sprawl.
- Planned development is likely to decrease the total capital cost burden to local government by as much as one-third because a larger proportion of land and facilities for open space, roads, and utilities is likely to be provided by the developers.

Regarding commercial development, the study states:

- Given a constant amount of floor space, shopping center commercial areas will be 20 percent less costly to build and service with roads and utilities than a strip commercial area. Savings are largely due to lower land prices per acre in shopping centers than are found for commercial strips. Smaller savings are found for off-site utility and road costs. Environmentally, the strip compares poorly with the shopping center.

Studies prepared by the Urban Institute and others tend to support these findings. A study recently completed for Arlington County indicates that growth alternatives which encourage higher densities appear to be more fiscally sound than other alternatives which were considered.**

Based on the foregoing studies, the planning staff has recommended in the area plans a pattern of residential development that will achieve a basic fiscal objective of reducing costs. The preliminary plans show a higher proportion of townhouse and multifamily dwellings than presently exist, and make recommendations that encourage clustering.

The preliminary plans for Fairfax County, in recognition of the findings of these studies, have been designed to encourage:

- growth centers with a variety of housing types;
- concentration of commercial growth in centers rather than in strip-commercial development;
- development of urban densities in areas closet to centers of commercial and employment activity and rapid transit stations; and
- the provision of public facilities at appropriate locations to meet the needs of growth.

These recommendations are expected to produce the following beneficial effects:

- reduction of transportation needs relative to those required by continued low-density detached housing patterns;
- reduction of environmental pollution costs; and
- reduction of future school needs, relative to those which would be required by continuing predominance of single-family development.

**Transit Station Impact Analysis, Arlington County Growth Patterns,* December. 1974. Prepared for Arlington County by Peat, Marwick and Mitchell.

Housing Unit Distribution by Type

	Existing Mix		1990 Projections Added		1990 Mix	
	Units	%	Units	%	Units	%
Single-family	101,733	62%	30,534	27%	132,267	48%
Townhouses	17,936	11%	35,114	31%	53,050	19%
Multi-family (Apartments)	43,563	27%	46,842	42%	90,305	38%
TOTAL	163,232	100%	112,490	100%	275,622	100%

Source: OCP, taken from the four Preliminary Area Plans.

Fiscal Implications of the Countywide Plan

Fiscal assessment of the countywide plan was made based on the range of planned development proposals envisioned in the preliminary area plans. These plans presented projected growth in population, land use and economic activity, and the related growth in pubic facilities and other services required to serve County residents adequately now and during the next 15 years. From these projections, estimates were made of expected revenues generated by such growth and the expenditures required for County governmental services. By examining these revenues and expenditures over time, the fiscal implications of land use proposals made in the area plans can be assessed.

The following table outlines the preliminary estimates of anticipated revenues and expenditures for fiscal years 1975, 1980, and 1990 based on the growth presented in the preliminary plans. The following assumptions were used to make the projections shown.

Education. Overhead and administrative costs for education were apportioned among grade levels. A constant per-pupil cost was used for the period of ensure consistency and comparability. The constant per-pupil cost encompasses the assumption of a constant level of educational services.

School enrollments were based on projected school requirements for each planning area in 1990 outlined in each of the area plans, and age distribution estimates of population projections for 1980 and 1990 outlined in the economic base study. Average per-pupil operating costs are average countywide school costs for each grade level and include administrative, overhead, transportation, and special education costs. School debt was calculated from the debt service schedule for existing school debt, utilizing a ten percent capital recovery factor based on a 20-year amortization period.

Parks. Total park and recreation costs are a combination of the operating costs of the Fairfax County Park Authority and the County's share of the costs of the Northern Virginia Regional Park Authority. Operating costs were assumed to be a function of the different types of parkland the population they serve. Where specific recommendations for acquisition were combination of the operating costs of the Fairfax County Park Authority and the County's share of the costs of the Northern Virginia Regional Park Authority. Operating costs were assumed to be a function of the different types of parkland the population they serve. Where specific recommendations for acquisition were identified in the preliminary area plans, per unit cost for each type of parkland was used. The bond cost for acquiring the parkland is included in the countywide debt service cost.

Police. Due to the stabilizing growth in the County's population and income forecasted for 1985, the recent trend of rapidly rising per capita expenditures for police protection were not pro-

Expenditures and Revenue Forecasts for FY 1975, 1980, and 1990
(In Millions of 1975 Dollars)

Expenditures	FY 1975	FY 1980	FY 1990
Education (1)	$ 95.3	$ 110.5	$ 128.1
Library	4.3	5.7	6.7
Parks & Recreation	4.6	6.4	7.5
Administration of Justice	18.9	28.2	49.1
Fire	9.6	14.7	17.6
Health & Social Service (1)	11.5	16.6	20.8
Public Works	5.5	8.1	9.9
Subtotal	149.7	190.2	239.7
General Administrative	32.0	42.6	48.6
Total Operating (2)	181.7	232.8	288.3
Debt Service	24.9	36.8	54.4
Total Expenditures	206.6	269.6	342.7
Revenues			
Real Property Tax	$ 119.8	$ 165.7	$ 229.2
Personal Property	21.3	32.0	41.7
Sales Tax	12.7	14.5	18.1
Utility Tax	17.6	22.0	27.5
BPOL	5.5	7.3	9.0
Land Use	2.4	4.8	7.2
Auto License	4.3	7.5	9.6
Misc. (Exclusive of carryover)	16.7	17.5	17.5
Total Revenues	200.3	271.3	359.8
Total Expenditures	206.6	269.6	342.7

(1) Estimates of FY 75 and projections of FY 80 and FY 85 are net Fairfax County expenditures for Education and Health and Social Services.
(2) Turnover and retirement are assumed to offset merit increments.

Notes: The estimates are made for individual fiscal years.

Growth for the period 76-80 and 81 through 90 is assumed to occur in 1980 and 1990 respectively, and therefore expenditures for debt service are over-estimates.

Debt Service estimates are based on the repayment of principal and interest estimated capital facility expenditures (including Metro expenditures) as of March 1975.

Revenue estimates are based on recent trends in the individual revenue accounts.

Refinement of these projections will be made later this year in the Capital Improvements Program and in an update of this table, following publication of the CIP.

Source - Office of Comprehensive Planning

jected to continue. Through 1980, the average annual increase was estimated to be equal to the increase in per capita expenditures since 1965, ten percent per annum. Thereafter, the growth was estimated at about one-half the increase in the previous five-year period, five percent annually.

Health and Social Services. Expenditure levels have been estimated to be equal to the rate at which the elderly population, people aged 55 and over, is expected to grow, since, usually, it is the elderly who are the major recipients of County social welfare services.

Fire. Fire protection costs per dwelling unit are assumed to remain constant and therefore the growth in expenditures for this category was assumed to be equal to the growth in the number of households.

Public Works. The growth and expansion of these activities are related to the development of land. Expenditures are projected to rise at the rate at which undeveloped acreage is committed or anticipated to develop.

General Administration. The rise in the cost of general administrative work for County government in the preceding decade was between two and four times as high as the real growth in total County expenditures. Real increases in County expenditures tied to specific functions was somewhat less than four percent per year. Based on these two factors, the growth rate in the costs of general County administrative and operating expenditures was estimated to be seven to eight percent.

Based on the projections shown in the adjacent table, facilities required to support the preliminary area plans can be provided while still maintaining a fiscal balance in the County budget. For 1980 and 1985, total revenues of $271.3 and $359.8 million exceed total expenditures of $269.6 and $342.7 million, respectively. The above estimates come from projected residential growth that will require less per capita County expenditures than growth in the past. For example, education expenditures for new growth are expected to increase more slowly as family size and the percent of school-age children to total population decline. However, the statement of fiscal balance requires the following caveats:

- The revenue estimates were based on the existing tax rates (i.e., $3.85/$100 for real property). If the tax rates are changed, the results could change drastically, and it may be assumed that there always will be pressure to reduce tax rates rather than build surpluses.
- It is implicit in the assumptions that inflated costs of government services approximate inflation in revenue producing tax bases. In the short run, temporary inflation in service costs may force tax rates to rise (or service levels to drop) if corresponding inflation in the tax bases which provide revenues does not occur.
- Estimates of costs were based on the existing level of services and programs. If County residents demand new or expanded levels of services, which is typical of growing communities, increased revenues will be required.
- Changes in the preliminary area plans as presented by the staff may affect the fiscal balance of the plan. The fiscal component of the plan must be reconsidered as the area plans are finalized by the Planning Commission and Board of Supervisors.
- The complex issue of operating costs of the County must receive intensive ongoing analysis. The fiscal estimates of the recommended plans must be further evaluated in light of the impacts that changing national economic conditions have on the local economy.
- The County's CIP (Capital Improvement Program) is critical to the long-range fiscal planning of the County and must receive continuing analysis in conjunction with the overall objectives of the countywide plan.

Budget balances are not shown in these figures. Deficits and surpluses and their carryovers in intervening years have not been projected. The importance of this table is to show that cash revenues are projected to come in line with projected expenditures in FY 1980 and FY 1985.

CAPITAL PROGRAMMING

In order to achieve the fiscal balance discussed in the previous section, the County must utilize not only the short-term budget review process but also the Capital Improvement Program process. The process involves the identification of necessary capital projects and identifies their associated costs.

The CIP process was created on July 23, 1973, when the Fairfax County Board of Supervisors adopted a *Proposal for Implementing An Improved Planning and Land Use Control System in Fairfax County*. The Planning and Land Use System (PLUS), which evolved from the Board-adopted framework, directs that a CIP be prepared to guide County growth by staging public facilities over a 5-year period.

The stated objective of the CIP was:

> . . . to plan for an adequate level of public utilities and facilities in accordance with adopted land use plans specifying time and distribution of growth. The Capital Improvement Program will be the primary implementation tool of the adopted County plans . . . (and) the adopted land use plans play a key role in the development of the Capital Improvement Program. The Plans identify for each planning district those areas suitable for residential and commercial development and the Capital Improvement Program translates these goals into public facilities.

Fairfax County can derive considerable benefits from a systematic approach to planning and financing capital projects. These benefits, of course, are not an automatic result of instituting a capital programming process. They depend upon legislative commitment to the program and executive leadership in the formulation and implementation of the program. Some of the more imortant benefits to be derived from a capital programming process include the following:

1. It will assist in the implementation of the Comprehensive Plan. The primary function of the CIP is to serve as a mechanism for implementation of the comprehensive plan. By outlining the facilities needed to serve the population and land uses called for in the plan and by scheduling them over time, it thus guides the public construction program for the future. The investment of funds in public facilities clearly has an impact on the pattern of community development. This can be most clearly seen in the extension of water and sewer lines and transportation networks, but also carries over in terms of schools, parks, fire and police facilities, and the like. Planning for such public facilities and the public announcement of intentions to acquire property or schedule construction of new facilities can do much to influence private development decisions. The CIP is a means of implementing certain aspects of the comprehensive plan, as are zoning and subdivision controls.

2. It will focus attention on community goals, needs, and capabilities. Capital projects can be brought into line with community objectives, anticipated growth, and financial capabilities. By planning ahead for projects, those that are needed or desired can be constructed or acquired. The CIP, once adopted, keeps the public informed about future capital investment plans of the County, and public involvement in the CIP process can provide a mechanism through which previously unidentified needs can be addressed. In addition, knowledge of future capital projects and the financial ability of the County to fund these projects can be a valuable indicator to the private development sector.

3. It will encourage more efficient government administration. Coordination of capital improvements programming by County agencies can reduce scheduling problems, conflicting and overlapping goals, and over-emphasis of any governmental function. Work can be more effectively scheduled and available personnel and equipment better utilized when it is known in advance what, where, and when projects are to be undertaken. Furthermore, advance programming can assist in avoiding the possibility of costly mistakes due to improper project scheduling.

4. It will foster a sound and stable financial program. Sharp changes in the tax structure and bonded indebtedness may be avoided when projects to be constructed are staged over a number of years. Where there is sufficient time for planning, the most economical means for financing each project can be selected in advance. The CIP can facilitate reliable capital expenditure and revenue estimates and reasonable bond programs by looking ahead to minimize the impact of capital improvement projects. The CIP becomes an integral element of the County's budgetary process. When a CIP is adopted, the first year of the program becomes the capital budget which, along with the operating budget, will constitute the County's financial program for the current fiscal year.

ECONOMIC DEVELOPMENT AND EMPLOYMENT

The following goals set forth by the Board of Supervisors relate directly to Economic Development and Employment.

Policy 6: Housing Opportunities. All who live and/or work in Fairfax County should have the opportunity to purchase or rent safe, decent housing within their means. The County's housing policy shall be consistent with the Board's support of the Metropolitan Washington Council of Government's "fair share" formula.

Policy 7: Employment Opportunities. Fairfax County should encourage employment opportunities with the objective of steadily increasing the proportion of people working and living in the County and of reducing the distance between place of residence and place of employment.

Policy 10: Transportation. Fairfax should encourage the development of accessible transportation systems designed to move people and goods efficiently through advanced planning and technology with minimal environmental impact and community disruption. Regional and local efforts to achieve a balanced transportation system through the development of rapid rail, commuter rail, expanded bus service and reduction of excessive reliance upon the automobile should be the keystone policy for future planning and facilities.

Policy 11: Private Sector Facilities. Fairfax County should encourage the development of appropriately scaled and clustered commercial and industrial facilities to meet the need for convenient access to good services and employment.

Policy 12: Revitalization. Recognizing its commitment to sustain and improve the quality of life, Fairfax County should encourage the revitalization of older areas of the County where present conditions are inconsistent with these policies, and prevent the encroachment of commercial and industrial development on residential areas.

The following recommendations are based on policies as stated by the Board of Supervisors, analysis of existing conditions, and estimates of future demands for economic development.

A. The County should identify and reserve land in sufficient supply to support the County's long-range needs for basic employment and regional commercial activities.

B. Projections of short-range basic employment needs (five to ten years) as identified in accordance with Recommendation A, should be supported by Fairfax County through provision of all necessary public facilities. Projection of the five to ten year needs should be updated annually.

C. Zoning applications related to the short-range (five to ten year) needs, as defined in Recommendation B, should be supported by the County.

D. The County should discourage existing commercially-zoned land from leading toward commercial sprawl. This land should be considered surplus commercial land and should be rezoned for use as mediumto high-density residential, for needed public facility space, for other activities that support the existing value of the property.

E. Development adjacent to centers of employment and economic activity should be coordinated with surrounding neighborhoods in such a way as to insure the stability and integrity of both. Transitional land use buffering such as mediumto high-density residential should be used to prevent the spread of nonresidential activity while at the same time fortifying the economic viability.

All buffering shall preserve, maintain, and utilize natural vegetation, particularly trees, as buffers to the maximum extent physically possible.

F. The County should use Metro as a catalyst for economic development and employment growth, by capitalizing on Metro station areas as multiuse activity centers.

The County should consider more flexible densities within walking distance of Metro stations to encourage maximum utilization of development potentials, and provision of a wide variety of residential types and employment opportunities.

The County should encourage federal government occupancy of rental office space in Metro station areas to maximize their attractiveness to a large share of the region's labor force, increase ridership on Metro, reduce traffic congestion, and reduce the need for Metro subsidies.

The area plans and the countywide plan recognize the importance of planning for both access to Metro and the development of Metro station areas. The Area II and Area IV plans as adopted make a detailed recommendation addressing these questions. Consultant studies and staff analysis on the Vienna line and Springfield line Metro stations served as input to the Area II and Area IV plans, respectively.

G. Fairfax County should put a high priority on improving and coordinating those transportation networks which are needed to encourage economic development and employment growth.

Fairfax County and major developers should initiate traffic circulation studies at locations with high economic development potential, aimed at maximizing their economic potential while minimizing their adverse impacts.

H. Fairfax should encourage the in-migration of business and industry into the County and work with other jurisdictions to coordinate developments within the region. The County should work with other local governments through COG to express specific County objectives to GSA and Congress, and to encourage and develop federal legislation to provide for inputs of local governments to GSA policies and change in GSA leasing policy to better consolidate it with County land use plans.

The County should monitor GSA policies closely in order to use them to the County's advantage.

The County should be promoted as a business location to those types of industries not currently in the County which could provide needed job opportunities.

In order to attract employment opportunities for Fairfax County residents the County should participate in efforts to promote industrial development in the region as a whole to national and foreign industries while emphasizing the pros and cons of each industrial area within the region for each type of industry.

The County should assess the potential of the Washington area as a regional and national headquarters center for major corporations, as opposed to New York, Pittsburgh, Atlanta, Miami, New Orleans, Dallas, Houston, etc. The County should capitalize on Washington's strengths, try to overcome weaknesses, and enhance Fairfax County's competitive position within the Baltimore-Washington area.

I. The County and local business and industry should coordinate their efforts to improve the quality of the Fairfax labor force and maximize their utilization.

The County should examine existing and potential national manpower needs and existing and potential local labor force resources. It should delineate job skills which may be lacking in the County and increase educational and technical training in those areas.

The County should encourage use of untapped labor resources and coordinate job opportunity information with other public and private employment agencies in the region.

The County should encourage existing industries to provide flexible job opportunities to meet the needs of the resident labor force, especially with respect to women, retirees, students, and the handicapped. Part-time jobs may be especially appropriate.

J. Fairfax County should support the broader requirements of business and industry by providing adequate housing for its labor force. Housing opportunities for lowand moderate-income families should be increased to provide additional unskilled and semiskilled workers for existing and future industries.

Planned Commercial Office Categories

Generally, the Plan recommendations for commercial office use contained within the individual community planning sectors refer to four categories of office use as follows:

- Transitional low-rise office use. A nonretail low-intensity commercial use which provides an effective transition (e.g., townhouse style) between more intense commercial activity and existing stable or planned residential uses. Such use should be of a scale (height and bulk) and style that is compatible with the adjacent stable or planned residential community. In no case should transitional low-rise office uses exceed three stories in height.
- Low-rise office use. A nonretail low-intensity commercial use which provides an effective transition between higher intensity commercial or industrial uses and residential or transitional low-rise office uses. Such use should be of a scale (height and bulk) and situated on a parcel of sufficient size to ensure compatibility with the adjacent existing and planned uses. In general, mid rise office uses should not exceed six stories.
- High-rise office use. A nonretail, high-intensity commercial use which is located either adjacent to mediumand high-intensity commercial and industrial uses or on a site of sufficient sized to ensure its compatibility with the surrounding existing and planned uses.

Commercial office intensity ranges recommended in the plan and shown on the maps are defined in terms of maximum or favorable building height. Only the lower one of the range is planned as the presumptive appropriate intensity. Intensities may be approved only with the usage of necessary and desirable development criteria and

COMMERCIAL AND INDUSTRIAL ZONING CATEGORIES

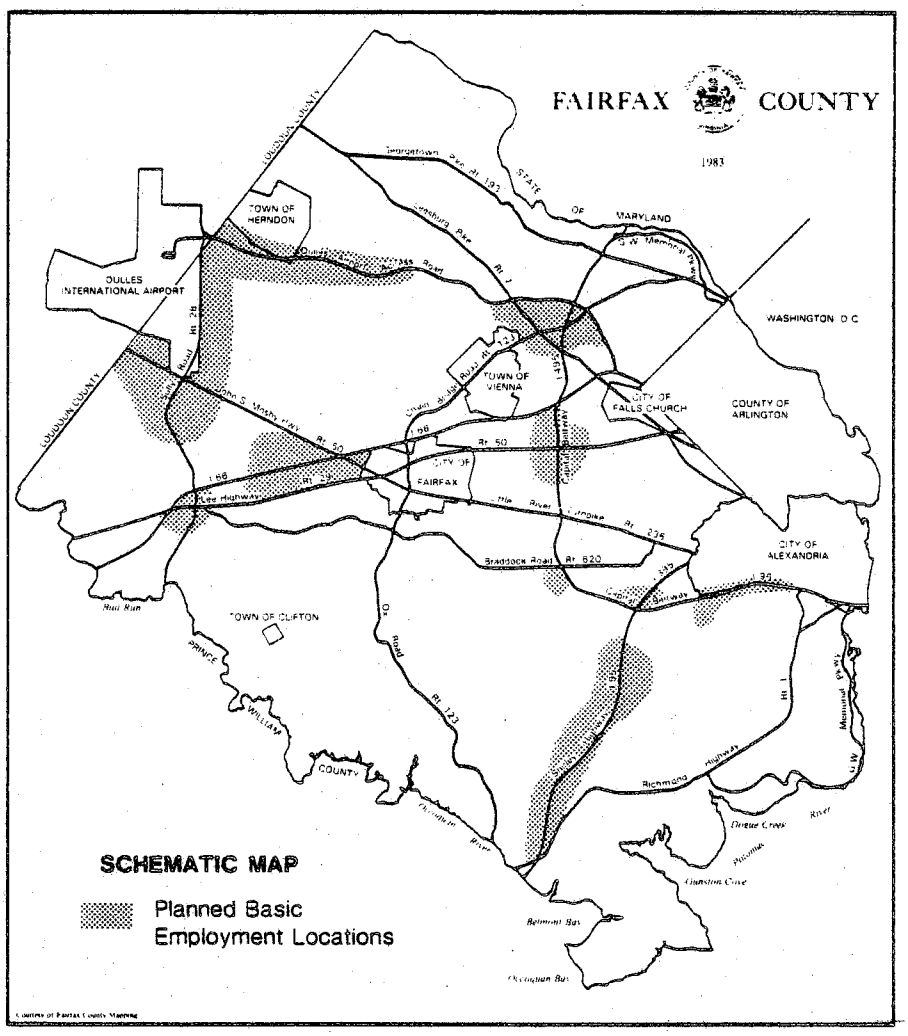
PLANNING DESCRIPTION	1974 ZONING ORDINANCE
Commercial Districts	
Low-Rise Office Transition	C-1
Limited Office	C-2
Office District	C-3
High Intensity Office	C-4
Neighborhood Retail Commercial	C-5
Community Retail Commercial	C-6
Regional Retail Commercial	C-7
Highway Commercial	C-8
Industrial Districts	
Industrial Institutional	I-I
Light Industrial Research	I-1
Industrial Research	I-2
Light Intensity Industrial	I-3
Medium Intensity Industrial	I-4
General Industrial	I-5
Heavy Industrial	I-6

controls as part of the rezoning process. Retail commercial and industrial intensity ranges are defined by specific development criteria and controls as specified in the appropriate zoning ordinance.

Prime locations with potential for basic employment development have been identified and discussed, by the staff, in each of the published area plans. These locations are generally identified in the adjacent map.

It should be recognized that any development proposals for these locations need to undergo analysis of their environmental impact as well as of the public facilities support they will require—particularly transportation, and their potential fiscal impact on the County's budget.

The development of greater employment opportunities is a key to the future of Fairfax County. If the County is to become more self-sufficient in terms of jobs and revenues, the County must take a leadership role in generating employment opportunities through the provision of public facilities necessary for growing business and industry. Without this support many planning objectives of the County cannot be met.



Office Employment Growth in Fairfax County

The nature of the Washington Metropolitan area economy indicates that the major portion of its growth will result from activities which will demand construction of new office space. For analytic purposes, office employment is assumed to comprise the combined totals of Federal civilian employment, Finance, Insurance, Real Estate, and Business and Professional Services, as well as 50 percent of employment in the Transportation and Communications sector of the economy.

Fairfax County's increase in share of the region's office employment is expected to exceed its share of overall employment. For example, the County's share of total regional employment is expected to increase from 13.4 percent in 1980 to a range between a low of 14.1 percent and a high of 15.9 percent by the year 2010. At the same time, however, the County's share of the region's office-type employment can be expected to increase, dramatically, from 8.6 percent in 1980 to a range between a low of 15.4 percent and a high of 19.6 percent by the year 2010. These forecasts are a direct result of the relatively plentiful supply of high quality office sites which Fairfax County enjoys when compared with other regional jurisdictions. For example, while Montgomery County has utilized many of its prime sites along the Beltway and I-270, Fairfax County still has some prime sites on the Beltway (Tysons and U.S. 50/I-495), along the Dulles Access Road and along the I-66 corridor including the sites recently planned in the Fairfax Center Area.

The following table presents the forecasted ranges of incremental growth of office employment as well as estimates of the amount of office space needed to absorb that growth in Fairfax County for the 1980-2010 period. The forecasts assume there will be a need for 275 square feet of space per employee. This is much higher than the 200 square feet per employee usually assumed for urban development. However, it reflects the experience of office development in Fairfax County, based on data provided by the Economic Development Authority.

As the forecasts indicate, new office development in Fairfax County during the 30 year period 1980-2010 can be expected to range from a low of about 27.8 million square feet to a high of some 56.4 million square feet.

Based on the trends of recent years, there is strong reason to believe that the County will achieve the "high" forecasts.

- Fairfax County's employment growth during the late 1970's exceeded the forecasts developed in Round II of the Council of Governments Cooperative Forecasting Program. Total employment, according to the Virginia Employment Commission, exceeded 192,000 in 1980 compared to a forecasted 176,500, a difference of 9 percent. Even more important, however, is the fact that the services sector which largely comprises office activity reached 52,000 in 1980, exceeding the forecasted 42,000 by almost 25 percent.

FORECASTED INCREMENTAL GROWTH OF OFFICE EMPLOYMENT AND RELATED OFFICE SPACE REQUIREMENTS IN FAIRFAX COUNTY FROM 1980 TO THE YEAR 2010

YEAR	Employment (in thousands) LOW	MEDIUM	HIGH
1980-1990	49	56	62
1990-2000	33	59	86
2000-2010	19	30	57
1980-2010	101	145	205
	Space Requirements (in Sq. Ft.)		
1980-1990	13,475,000	15,400,000	17,050,000
1990-2000	9,075,000	16,225,000	23,650,000
2000-2010	5,225,000	9,250,000	15,675,000
1980-2010	27,775,000	39,875,000	56,375,000

SOURCE: Fairfax County Office of Comprehensive Planning derived from forecasts developed for Round III of the Council of Governments Cooperative Forecasting Program.

Industrial Employment

Forecasts developed for Round III of the Council of Governments Cooperative Forecasting Program indicate that Fairfax County can expect a continuing increase in share of the region's industrial employment. The County's 13.1 percent share in 1980 (up from 5.7 percent in 1970) is projected to increase to a range between 18 percent and 20 percent by the year 2000.

Much of Fairfax County industrial employment growth reflects a probable dramatic shift of such economic activities to the suburbs from central areas of the region. This shift probably represents redevelopment of former industrial areas in the City for other uses and the movement of some city industries to outlying locations.

The following table provides estimates of incremental increases in the County's industrial employment, as well as land absorption which can be expected. The estimates are based on an assumed employee to land density of 15 persons per acre. This is typical of the current average densities for wholesale and warehouse and manufacturing activities in Fairfax County.

Although it is likely that new development around Metro stations will be more intense than is generally true of these industrial uses, there may be some opportunities at selected Metro area sites to accommodate some of this growth. Industrial facilities may be in keeping with the character of some of the metro areas and may provide an attraction to labor force in other jurisdictions who can get to their jobs using Metro-rail.

FORECASTED INCREMENTAL GROWTH OF INDUSTRIAL EMPLOYMENT AND RELATED LAND REQUIREMENTS IN FAIRFAX COUNTY FROM 1980 TO THE YEAR 2010

YEAR	LOW	MEDIUM	HIGH
	Employment (in thousands)		
1980-1990	10.0	11.2	12.6
1990-2000	1.5	5.3	9.1
2000-2010	0.7	2.6	4.4
1980-2010	12.2	19.1	26.1
	Land Requirements		
1980-1990	670.0	750.0	840.0
1990-2000	100.0	350.0	610.0
2000-2010	50.0	170.0	290.0
1980-2010	820.0	1,270.0	1,740.0

SOURCE: Fairfax County Office of Comprehensive Planning. Land requirements based on 15 employees per acre.

LOCATIONS FOR ATTRACTING ECONOMIC DEVELOPMENT IN FAIRFAX COUNTY

There are numerous locations in Fairfax County which are planned to attract economic development. The following table identifies these areas and presents acreage estimates of vacant zoned and/or planned land which is most suitable for development (i.e. unencumbered by development constraints such as poor topography, inaccessability, etc.).

PRIME ECONOMIC DEVELOPMENT LOCATIONS IN FAIRFAX COUNTY WITH ESTIMATES OF DEVELOPABLE ACREAGES

Location	Acreage
1. Tysons Corner	300
2. U.S. 50/I-495/Merrifield	450
3. McGuin Tract	95
4. I-95/Shirley Highway	600
5. Metro Station Areas	375
6. Oakton/Flint Hill	54
7. Fairfax Center[1]	800
8. Reston Dulles Corridor	2,000
9. Dulles Chantilly	3,300
10. Centreville[2]	N/A
11. Potential Revitalization Areas[3]	N/A

SOURCE: Fairfax County Office of Comprehensive Planning

[1] Planned for mixed use on about 1250 acres with residential uses consuming approximately one-third of the land capacity making 800 acres effectively office and/or industrial. The numbers reflect the adopted primary commercial development forecasts for the Fairfax Center area.

[2] New plan proposals are under study for the Centreville area.

[3] Several areas are being considered for revitalization in Fairfax County.

These economic development locations are distributed throughout the County's four planning areas.

AREA I

The dominant economic development location in the Jefferson Planning District is the **Route 50/I-495—Merrifield Area**. Although this area straddles three Planning Districts, Jefferson, Fairfax and Vienna, its greatest development potential is in the Jefferson portion.

This area, strategically located adjacent to the Beltway at the interchanges with I-66 and U.S. Route 50 has long been a center for industrial and office activity. While most past development occurred to the west of I-495 between Route 50 and I-66, some key parcels remain vacant. The Chiles Tracts in the northeast and southeast quadrants of the Route 50/I-95 interchange, comprising some 348 acres, are the largest. They were rezoned in 1981 and development for approximately 3.5 million square feet of office space has been approved. Additional parcels in the area, comprising some 80 acres, could probably absorb another 2.5 million square feet, bringing the total new office development to some 6 million square feet. Other vacant land in this area of the County is likely to be developed as infill of industrial uses or as office and residential development oriented to the Dunn Loring Metro Station.

Major transportation improvements designated to accommodate planned development are either underway or planned for this area.

Economic development opportunities in the Annandale District are somewhat limited, when compared to other areas of the County. Some opportunity exists for infill in the **Shirley Industrial Area** located on I-395 north of the Beltway and at the **Ravensworth Industrial Park** on Braddock Road at the Beltway. Additional opportunities may exist in the Annandale CBD, an area which might, in the future, undergo revitalization.

Economic development opportunity in the Baileys District exists in the Route 7 Corridor, a heavily developed commercial strip anchored by 7-Corners and its regional shopping facilities to the west, and Baileys Crossroads—Skyline Center to the east. Skyline Center is a major mixed use complex of high-density apartments, with adjoining retail and office commercial facilities. The successful marketing of office space at Skyline indicates that a market exists which may continue in the area after Skyline is completed. The commercial areas along the Route 7 Corridor may be ready for revitalization, which could open infill development opportunities.

Development opportunities in the Lincolnia District exist at the **Shell Industrial Park** in the northeast quadrant of I-95 and the Beltway.

AREA II

Some of Fairfax County's prime locations for basic employment activities are located in Area II. Two of these, Tysons Corner and Merrifield, have in the past absorbed significant shares of the County's basic employment development. Another, the newly planned Fairfax Center area holds great potential for the future.

Continued development of basic employment in Area II may provide opportunities to intercept labor force from the western portions of the County which now travels to jobs in Arlington and the District of Columbia, and encourage reverse commuting by attracting labor force from the core areas of the SMSA to work in Fairfax County.

Each of these areas straddle the boundaries between Planning Districts both within Area II and with other Planning areas.

Tysons Corner which straddles the border between the McLean and Vienna Districts is the dominant office development area in Fairfax County, with about 10 million square feet of space developed as of 1984. Although office development has been occurring in this area since the early 1960's, some 4 million square feet of the present total was built during the period 1979 through the early part of 1982. There are now approximately 300 acres of land remaining for development, most of which is destined for office use.

Historically, land planned for office and/or industrial uses in the Tysons area has been developed at a ratio of approximately 3 to 1—75 percent office and 25 percent light industrial. However, in the future it is likely that a higher proportion of remaining land will be developed with office uses. One of the major remaining sites, the 117 acre Tysons II tract, is currently being replanned by its owners in preparation for submitting a mixed use proposal to the County.

The Merrifield Area is part of the Route 50/I-495-Merrifield area which was discussed earlier in the section on Area I (Jefferson District). The portion of this area which is in Area II is in the Fairfax Planning District. It includes the area bounded by I-66 on the north, Lee Highway on the south, Prosperity Avenue on the west, and the Beltway on the east.

In recent years, industrial land in the Merrifield area has been absorbed by wholesale, warehouse, and light manufacturing activities at densities of about 12 to 15 employees per acre. Such activities locate here to take advantage of excellent highway accessibility via Routes 50/29, I-66, and the Beltway. Although much of the available land in the existing Merrifield industrial area has been absorbed, some potentially excellent sites are available with frontage on I-66. However, the greatest development opportunities may exist around the planned Dunn Loring Metro Station which is located on I-66 at Gallows Road. The older development areas around the intersection of Gallows Road with Lee Highway may also be ready for revitalization.

The Fairfax Center Area is located west of Fairfax City. It focusses on the Route 50/I-66 interchange, westward to Stringfellow Road. The eastern portions of this area are in the Fairfax Planning District. Most of the 5,000 acre Fairfax Center is in the Bull Run District of Area III. The catalysts for the replanning of this area are the Fair Oaks Shopping Center, and the proposed Fairfax County Government Center.

The adopted Plan for Fairfax Center allows for three possible levels of development: baseline, intermediate, and overlay. The right to develop at the intermediate or overlay levels can be granted on the basis of developer commitment to certain performance standards and for provision of amenities called for in the Plan.

At the overlay level, approximately 1,250 acres of land in this area are proposed for office/mixed with residential development. Prorating the land to the residential/office mix—it is estimated that about 800 acres will be devoted to nonresidential. Planned development would yield approximately 12,500,000 square feet of office and light industrial space. It is reasonable to expect that actual development would occur at a level slightly less than that which the overlay would allow. An estimate of 90% of overlay would generate some 11,300,000 square feet of floor area. Based on experience in locations such as Tysons Corner, it is estimated that about 80% of the space will be pure office space while the remainder is likely to be R&D type industrial uses such as are found in the office parks at Tysons Corner.

Another location of Area II with development potential is the **Oakton/Flint Hill** office area on Route 123, just north of its interchange with I-66. The area contains some 54 acres for office development. Portions have been developed over the past 2 years. Ultimately, development is expected to contain approximately 900,000 square feet of office space based on an average floor area ratio of 0.4. The focal point of this area is the AT&T Long Lines Division facility, directly across Route 123 from the Oakton/Flint Hill Office Center.

Three of Fairfax County's six rapid rail Metro stations are located in Area II. They are the aforementioned Dunn Loring station in the Merrifield area, the West Falls Church Station located near the convergence of I-66, Route 7, and the Dulles Access Road, and the Vienna Station which will be located at I-66 where it interchanges with Nutley Street. All of these locations hold potential for economic development. However, the Vienna station, because of the existence of relatively large pieces of vacant land, and excellent visibility and access from I-66 probably has the greatest potential. Each of these areas are the subject of special studies to determine their ultimate uses.

AREA III

Area III contains four areas with significant economic development potential. These are the Reston/Dulles Access Corridor located along the Dulles Airport Access Road between Hunter Mill Road on the east, and the Airport on the west; the Dulles/Chantilly area which is located along the eastern boundary of the Airport and extends to and includes a large area to the Airport's south; the Centreville area which is located in the I-66 Corridor at the interchanges of that highway with Routes 28 and U.S. 29; and that portion of the Fairfax Center area which is located to the west of the Fair Oaks shopping center in the Bull Run Planning District.

The **Reston/Dulles Access Corridor** contains some 2,000 vacant acres of developable land already zoned or planned for economic development uses. Since its opening in 1964, Reston has developed some 4.5 million square feet of building area devoted to office and high-tech industrial activities. About half of this development has occurred since 1979. An additional 1.1 million square feet comprising some 700,000 square feet of office and 350,000 square feet of light industrial is under construction in 1984. The recent surge in development reflects the opening of the Dulles Access Route to commuter traffic as well as the proximity of Reston to a broad range of housing for employees in the area. Due to its strategic location and the supply of available land, this area along with the adjoining Dulles/Chantilly area provides the longest range potential in Fairfax County.

The **Dulles/Chantilly Area** contains some 3,300 acres of land which is planned and/or zoned for economic development purposes. Although much of this land has been planned for many years, it was not until 1979 that activity actually occurred here. Since that time, over one-half million square feet of light industrial space has been built with more underway in the area south of the Airport, oriented to the Route 50 Corridor. Furthermore, development is continuing at a rapid pace at the Dulles Aerospace Park (next to Redskin Park) along Route 28. Since 1976, this industrial park has experienced development of 1.1 million square feet and is currently developing at a pace of 183,000 square feet per year consuming an average of 16 acres per year. While most other areas of the County are likely to be predominantly developed for office uses, this area is envisioned as having a greater mix of light industrial activities. Development to date supports this assumption.

The **Centreville Area** is currently under study for update of its Master Plan. Currently the area contains some 249 acres of land planned and/or zoned for commercial and industrial uses. The strategic location of Centreville on I-66 with direct access to Dulles Airport via Route 28 offers great potential for economic development. Planning for such development as part of a coordinated growth center which includes residential and support commercial activities and retail and hotel development, would create an attractive alternative to other economic development locations in the County. This would relieve some of the pressure from them and help maintain a greater choice of locations for a longer period of time.

The **Fairfax Center Area** was discussed in the previous section on Area II. It should be pointed out, however, that a major portion of the economic development potential for this newly planned area is located in the Bull Run Planning District of Area III. The major development in this portion of Fairfax Center, the Fair Lakes complex, was rezoned in early 1984, to accommodate some 5.1 million square feet of office, high-tech industrial, retail and hotel development.

AREA IV

Planning Area IV comprises the southeastern portion of Fairfax County, bounded generally by the Beltway on the north, the Potomac River on the east and south, and the corridor along both sides of I-95 on the west. Development of industrial and office sites in Area IV, particularly in the I-95 corridor is expected to provide jobs for residents of that area of the County, as well as create the opportunity to intercept the labor force from jurisdictions to the south which now travels through Fairfax County to jobs in Arlington and the District of Columbia. The major economic development opportunities in Area IV exist in the I-95 (Shirley Highway) corridor and the McGuin tract in the southwest quadrant of South Van Dorn Street with the Beltway in the Rose Hill District. Additional opportunities exist in the Route 1 Corridor, and in the planned community which is proposed for the Lehigh Tract.

The I-95 (Shirley Highway) Corridor extends from the Beltway to the Prince William County line. It contains some 700 acres of the County's developed industrial and office land with the current split of activity approximately 90 percent for industrial use and 10 percent for offices.

Vacant and underutilized land either zoned or planned for such uses total approximately 1,300 acres. However, much of the land has floodplain, poor topography, or poor soil conditions. Existing development is characterized by major concentrations of distribution or light manufacturing. The area has not, in the past, been attractive to research and development, trade associations, and headquarters facilities which tend to make up most of the County's economic growth potential. It appears unlikely that this pattern of attraction will change significantly in the future.

Some of the land in this corridor, however, is in the area adjacent to Springfield Mall or is oriented to the Franconia/Springfield Metro Station. Development in these areas is likely to be predominantly office in keeping with the pattern of development being set along Loisdale Road on the western edge of the Mall.

The **McGuin Tract** is located in the southwest quadrant of the Beltway and South Van Dorn Street. It, along with the Chiles Tracts at Route 50 and I-495 and some of the acreage in the Tysons Corner area, comprises the last significant Beltway-oriented acreage in Fairfax County and, indeed, is part of a rapidly diminishing supply of such land in the entire Metropolitan Area. This tract was replanned during the 1979 Annual Plan Review for office and light industrial development. Since that time, it has attracted considerable interest.

Although the tract contains some marine clay and slippage soils which will undoubtedly present some development problems, it is estimated that some one million square feet of office and industrial uses could be built here. Ultimate development of the tract would probably comprise a 50/50 mix of office and industrial, with office uses accounting for approximately 500,000 square feet of floor area.

The **Route 1 Corridor** extending southward from the Beltway to Fort Belvoir is the subject of revitalization efforts aimed at improving the viability of existing retail commercial facilities and encouraging infill development of offices and other uses to help reenforce existing markets. The revitalization effort is being guided by the Southeast Fairfax Development Corporation. The northern end of the corridor is anchored by the Huntington Metro Station area. Activities in this area are expected to be a catalyst for improvement of the northern corridor. A planned extension of Lockheed Boulevard to the central portion of the corridor is expected to improve east-west access to Route 1, creating the opportunity to increase market accessibility.

The **Lehigh Tract** is the last major piece of land available for development in southeastern Fairfax County (Area IV). This tract has long been the subject of proposals for development as a planned community, comprising a mixture of housing types with retail, office and light industrial uses. As of early 1984, it appears that development activity is imminent in this area. Excellent office opportunities are expected to exist around the location where the South Van Dorn—Lockheed Boulevard extension converges with the planned Springfield By-pass.