ENVIRONMENT

6

Chapter 6

ENVIRONMENT

6.1 INTRODUCTION

The transition of the Shady Grove area from rural to more urban land use makes consideration of the environment an important aspect of the sector plan. Approximately 80 percent of the sector plan area is now open space and pasture land. Projections, however, indicate that the area will be 75 percent developed by 1984, or shortly thereafter.

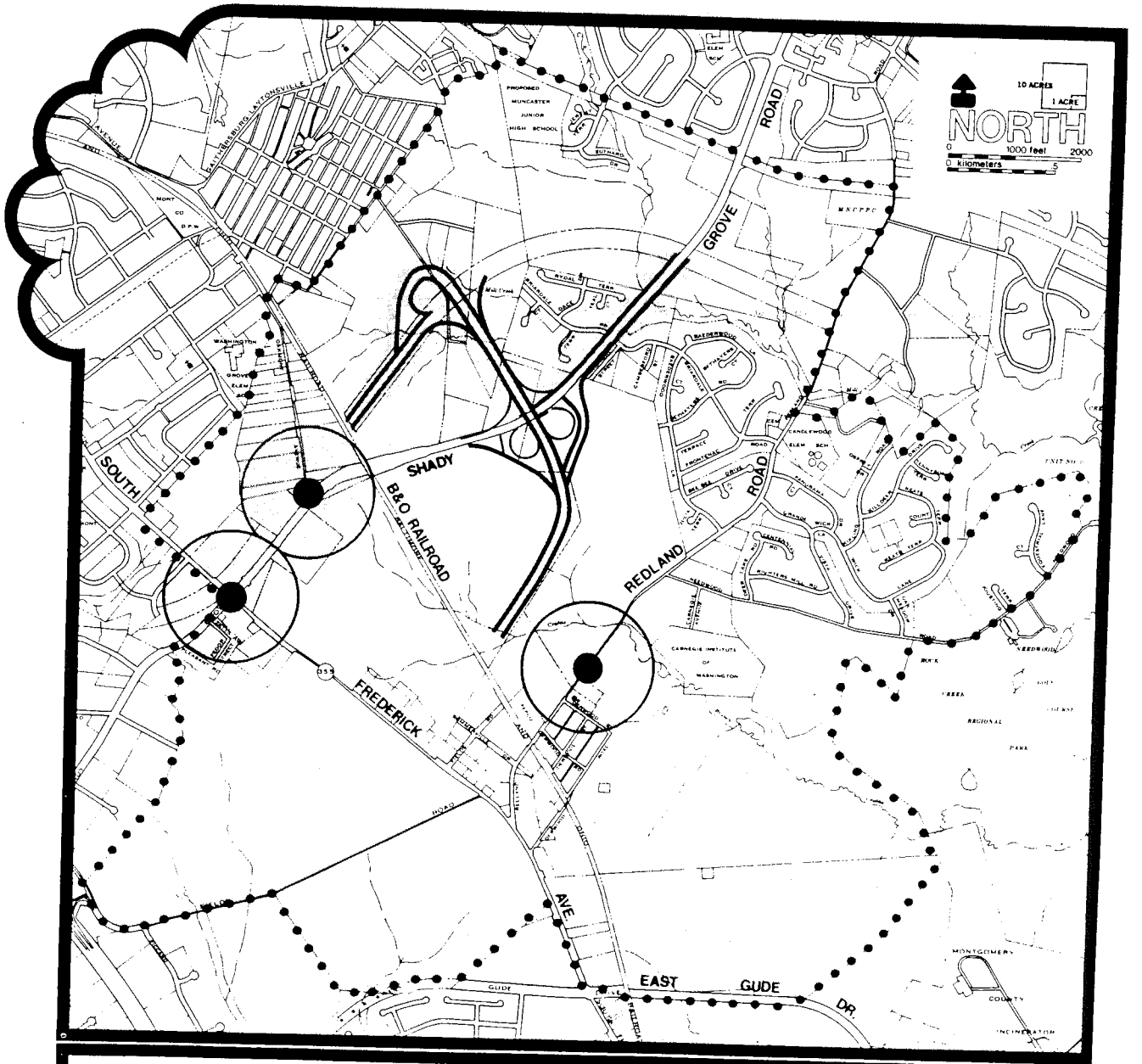
Because most of the Shady Grove sector plan area is still undeveloped, the opportunity exists to effectively integrate conservation of natural resources with the planning process. The native soils, geology, and vegetative cover provide a natural system that can help reduce environmental problems. The construction of buildings in areas of thick and well-drained soils, for example, would result in both lessened construction time and costs. Mature trees, the naturally rolling topography, and areas of exposed bedrock can be incorporated aesthetically into urban design and site development schemes. Furthermore, trees and soils form a natural storm-water management system by storing water during peak rainfall periods and then slowly releasing moisture after the storm abates. This process retards runoff and protects against flooding.

While the development process will require the construction of some storm-water management facilities these structures can be designed to enhance the overall environmental integrity of the area. This requires systems planning and analysis of the ingredients that contribute to a quality environment.

Air and noise problems, while abated to some extent by mature trees, must be controlled chiefly by transportation and land use measures. In Montgomery County, violations of the Federal Clean Air Act result principally from automobile emissions (see Section 6.42, Air Quality). Minimizing the dependence upon private automobiles by encouraging the use of Metrorail, car pools and bicycles will help reduce emmissions of carbon monoxide. Improving roadways and traffic management to minimize congestion will also help protect air quality. As a further protective measure, the location of new residential development along or near major highways should be avoided.

Residential areas should be protected from the potential noise impact of the central processing facility, the Metro storage and inspection yards, and the Metro station parking area by the preservation of open space and the provision of buffering. These areas should also be protected from highway noise, especially that emanating from major intersections. Although no detailed study of noise impact has been made for the Shady Grove area, a study involving estimations of truck traffic volumes and road grades has been performed. This general study provides some indication of future noise levels near selected major highways. The results are shown in Figure 20.

FIGURE 20



Severe Noise Intrusion

Moderate Noise Intrusion

Sector Plan Boundary

Estimated Noise Levels Along Selected Highways

SHADY GROVE SECTOR PLAN

THE MONTGOMERY COUNTY PLANNING BOARD

6.2 PHYSICAL CHARACTERISTICS OF THE AREA

The Shady Grove area is situated entirely within the piedmont province, a region of rolling upland topography with underlying metamorphic crystalline rocks. The surface elevation ranges from 300 to 500 feet above mean sea level. Large areas of bedrock in this planning sector are covered by a blanket of unconsolidated materials consisting of alluvial stream deposits, artificial fill, and saprolite, which is a product of chemical weathering of the bedrock. This unconsolidated overburden ranges in thickness from zero to more than fifty feet, although bedrock is within 20 feet or less of the surface over much of the northern half of the area.

The soils which have developed in the area are generally well drained. The tree cover is limited to small stands of oak and tulip poplars, with some evergreens, generally located within stream valleys and areas of shallow bedrock which have not been farmed or otherwise developed.

6.3 COMPUTER MAPPING PROGRAM

In a cooperative pilot project with the U.S. Geological Survey, the Environmental Planning Division of M-NCPPC employed a computer mapping system for combining environmental information to be used in support of land use decisions. The computer mapping system is used to produce maps showing optimum areas for various types of urban development, based on environmental factors. Various environmental factors were encoded and fed into the computer, using a uniform grid system, each cell, or square, of which was assigned a specific latitude and longitude. This allowed for the retrieval and analysis of data on a geographical basis and for the indentification of the most significant natural physical factors in the area.

6.31 Preliminary Assessment

This initial phase is an assessment of the basic natural environmental conditions of the area. Through the review of environmental data for the Shady Grove area, a preliminary determination has been made of the most significant natural characteristics of the area and of their physical location. Aerial photographs were utilized to determine the location and extent of tree cover.

This preliminary investigation indicates that thickness of overburden, slope, surface water, alluvial deposits, and vegetative cover are the most significant natural environmental factors in the Shady Grove sector plan area. The following is a brief description of the significance of these factors to the planning process:

Thickness of Overburden. Significant portions of the planning area (40 percent) have an overburden thickness, or depth to bedrock, of less than 20 feet. Overburden includes all unconsolidated materials from near the surface down to bedrock. A shallow depth to bedrock could make development less attractive because of increased construction costs. Extensive blasting would be needed for large structures requiring basements.

Slope. Preliminary investigation indicated that certain portions of the planning area have steep slopes. Construction on steep slopes, especially on those

over 15 percent, is unwise both economically and environmentally; the placement of structures on steep slopes is expensive both in terms of construction costs and the provision of services, including access roads and utilities. In addition, the placement of structures in these areas could create storm-water problems by disturbing the top soil and natural vegetative cover.

Surface Water and Alluvial Soils. Development near surface water and flood prone areas should be avoided in order to protect against loss of life and property. Alluvial soils, although not always within present floodplains, also should be avoided due to potential construction problems.

Vegetative Cover. Protection of the vegetative cover, especially mature trees, is a primary environmental concern for the Shady Grove area. As portions of the area have been extensively farmed and grazed, as well as urbanized, much of the natural tree cover has been lost. It is, therefore, important to protect the remaining mature tree cover in order to provide scenic beauty and to retain a buffer between residential and nonresidential land uses. Trees will aid also in protecting against air and noise pollution.

6.32 Analysis

The environmental evaluation of Shady Grove included the development of separate computer print-out maps for each of the pertinent environmental factors (overburden, slopes, surface water and alluvial soils, and vegetative cover). The variable-scale option of the mapping program was used to enlarge computer print-out maps showing thickness of overburden, surface materials, and surface water, making the maps compatible with the M-NCPPC base map (1 inch to 1,000 feet) of the area. This allowed for an easier comparison of data that previously had been transferred manually from smaller scale maps to the M-NCPPC base map.

Slope and vegetative cover source maps were also prepared and encoded. In addition, existing land use was encoded in order to include it in the analysis of the area.

Figures 21 and 22 are sample print-out maps, showing areas of shallow bedrock and mature trees in the Shady Grove area, respectively. Figure 23 shows the computer composite map, developed to indicate suitability for development based on environmental considerations. Factors included in the computerized environmental analysis are the presence of alluvium, shallow bedrock, surface water, and mature trees. Although this example does not include slope conditions, this factor was considered in later analyses. As indicated in the histogram (Figure 24) accompanying the composite map, there is a total of sixteen possible factor combinations.

There is a total of 2592 grid cells (or squares on the grid) within the 18-square-mile Shady Grove environmental analysis zone. Each cell measures 5 seconds of latitude by 5 seconds of longitude and covers about 4.5 acres. Of the total, 1364 cells (52 percent) are developed or committed, and 1228 (48 percent) are undeveloped. A dark overprint symbol has been assigned developed areas in order to exclude these cells from further consideration. Statistics for the composite analysis of the undeveloped area, discussed below, are summarized in Table 3.

Figure 21 Computer Factor Map showing Shallow Bedrock

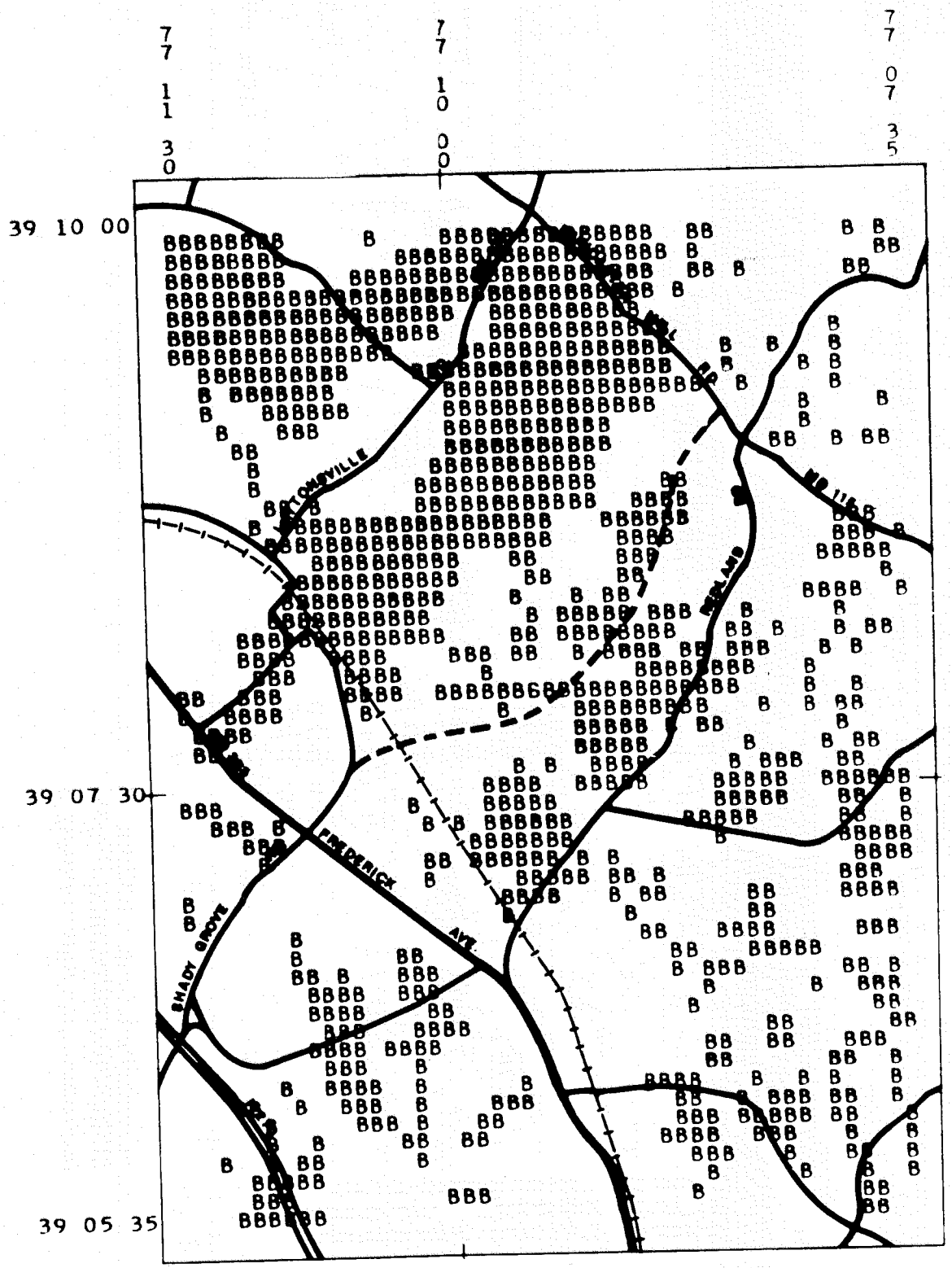


Figure 22 Computer Factor Map showing Mature Tree Cover

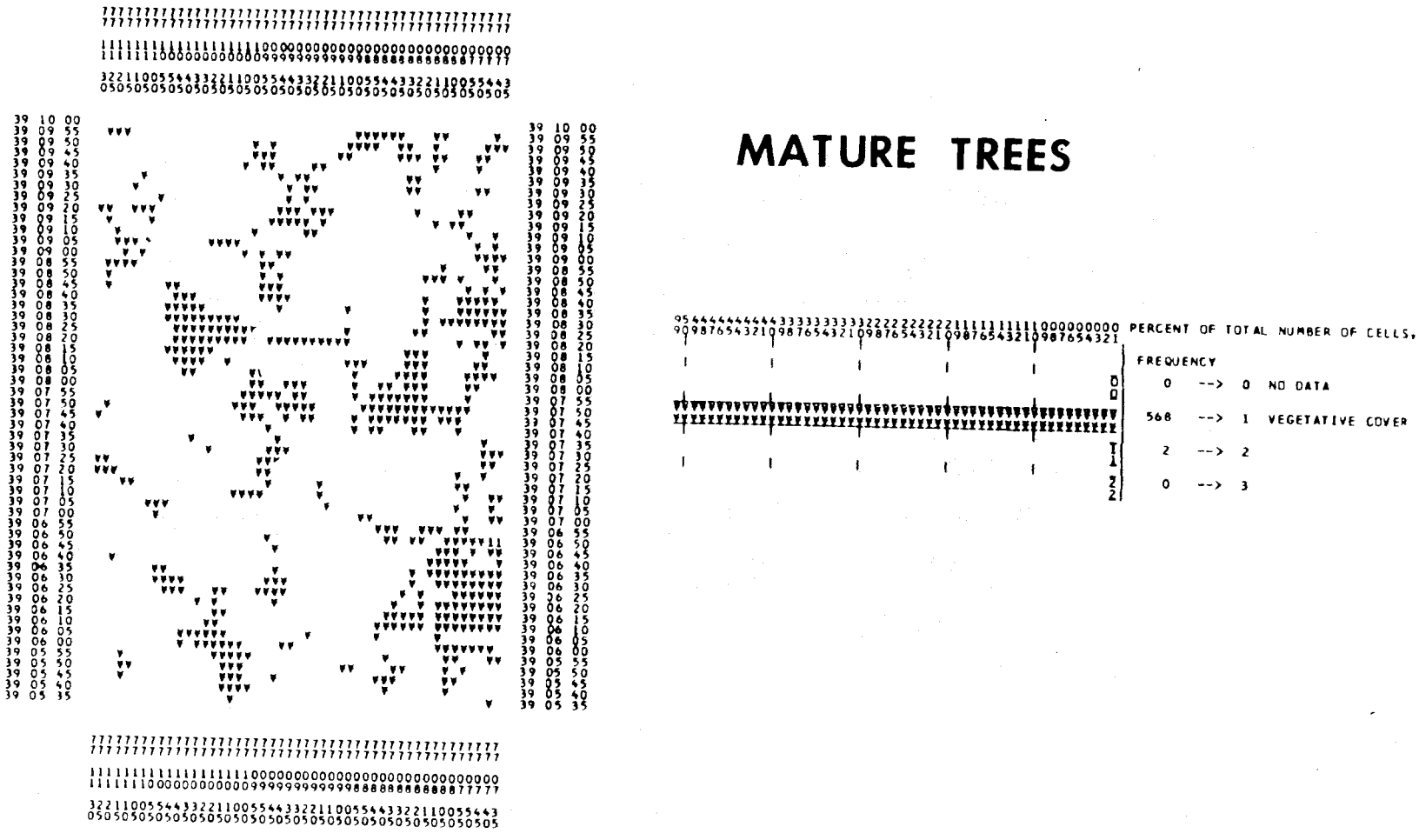


Figure 23 Composite Map with Land Use Overprint

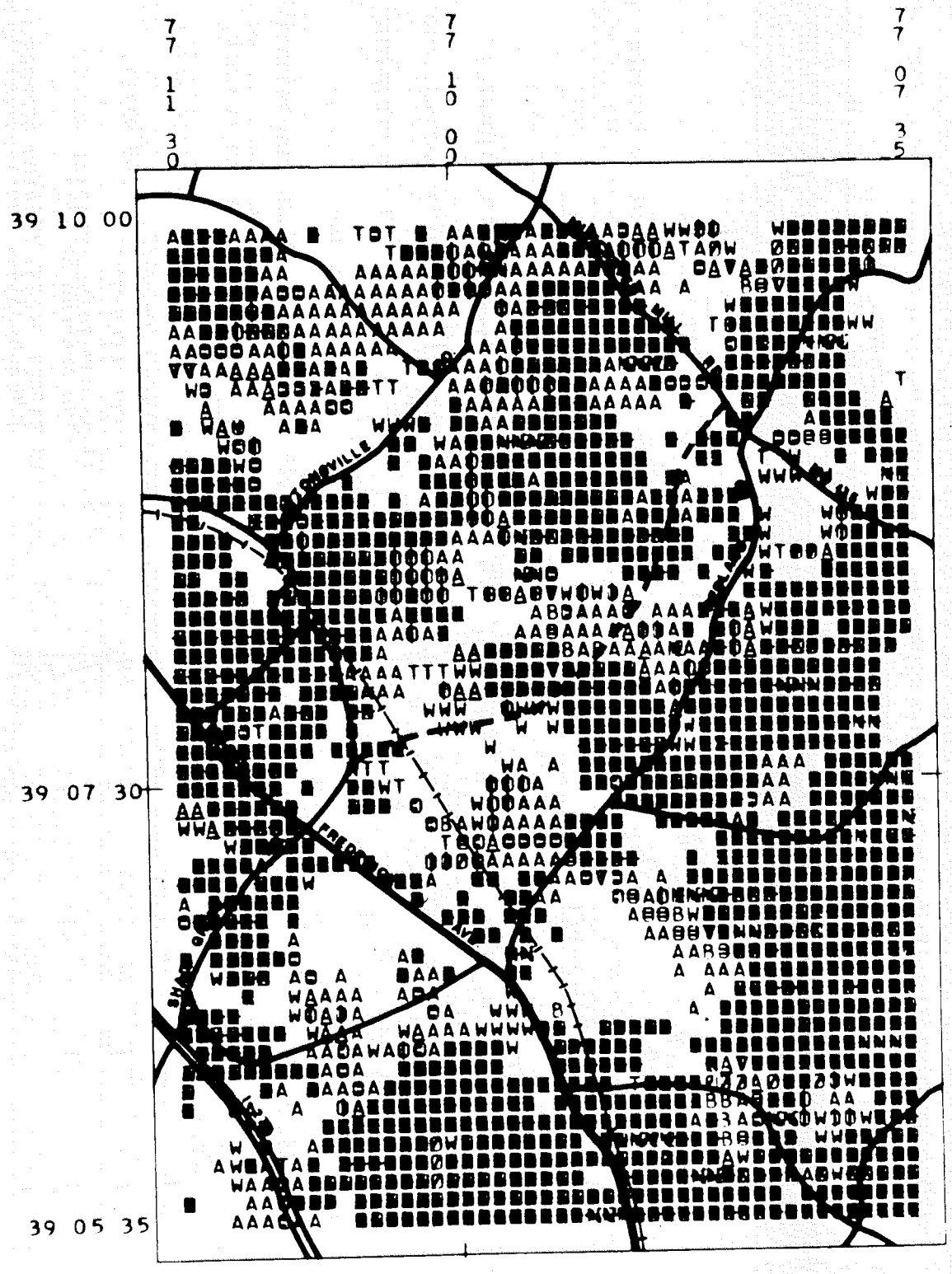


Figure 24 Composite Map Legend and Histogram

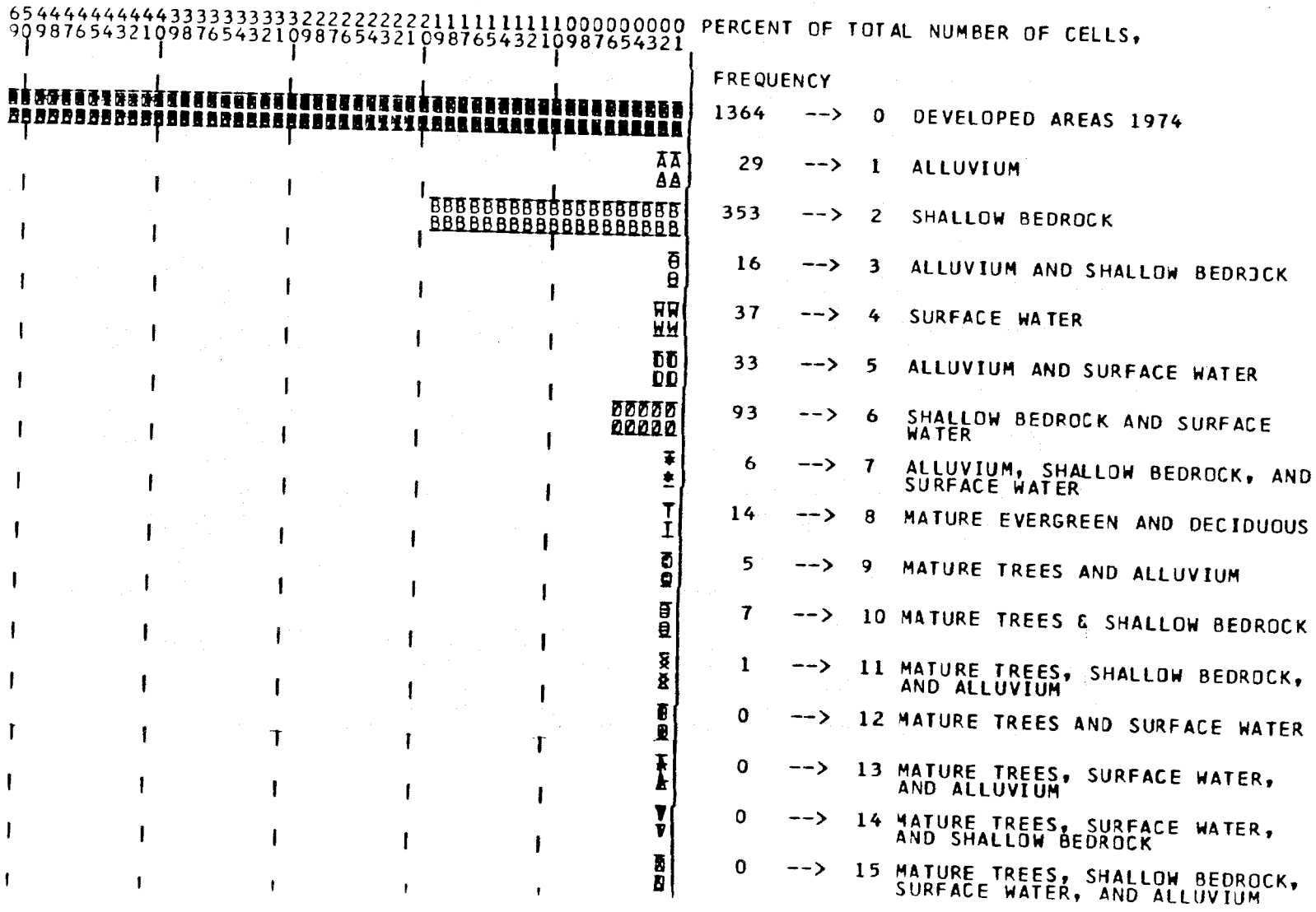


TABLE 3

COMPOSITE MAP STATISTICS, UNDEVELOPED AREA
SHADY GROVE SECTOR PLAN

SINGLE FACTOR	CELL COUNT	PERCENT
Alluvium	29	2.3
Shallow Bedrock	353	28.7
Surface Water	37	3.0
Mature Trees	14	1.0
Subtotal	433	35.0
MULTIPLE FACTORS		
Alluvium and Shallow Bedrock	16	1.3
Alluvium and Surface Water	33	2.6
Shallow Bedrock and Surface Water	93	7.6
All Others	19	1.5
Subtotal	161	13.0
No Factors (white areas on map)	634	52.0
TOTAL	1,228	100.0%

In approximately one-half of the undeveloped area (52 percent), none of the four identified environmental factors occurs. These areas are indicated as clear on the composite map. Assuming that the principal critical environmental factors have been included in the composite analysis, this indicates that one-half of the undeveloped planning area is suited for development.

For 35 percent of the undeveloped area, only one critical environmental factor occurs. By far the most common factor is shallow bedrock, which occurs as a single limiting condition in 28.7 percent of all uncommitted land. Alluvium, surface water, and mature trees occur as single limiting conditions in the remaining 6.3 percent of the undeveloped area.

Provided that other basic environmental requirements are met (for example, sewer service), the presence of only one critical factor indicates that development will have only a moderate impact upon the environment. Careful attention, however, should be given to the type of development planned for a given area. For example, the presence of shallow depth to bedrock may have no significant impact upon detached single-family dwellings without basements, but may require extensive bedrock excavation for major structures. Similarly, the presence of mature trees would favor cluster housing and low-density residential development over large commercial and industrial complexes, which usually require large areas for structures and parking lots and the destruction of any existing mature tree cover.

The remaining 13 percent of the undeveloped land has several critical environmental factors. These include alluvium combining with shallow bedrock (1.3 percent); alluvium with surface water (2.6 percent); and shallow bedrock with surface water (7.6 percent). All other possible combinations total 1.5 percent.

The occurrence of multiple critical factors indicates that development in these areas could have a moderate-to-severe impact on the environment. Development, especially to high-density, is not recommended in these environmentally sensitive areas. However, if additional development is given as an economic reality in sensitive areas, it is desirable that it be clustered on the most suitable land within a cell or group of cells.

6.33 Environmental Analysis and Area Master Plans

A multicolor, transparent master plan overlay of the Gaithersburg Vicinity and Rock Creek Master Plans was developed for the Shady Grove planning area at the scale of one inch to 1000 feet. The master plan transparency was placed over the computer composite map in order to check for agreement and/or conflict between recommended environmental concepts and existing area plans. This comparison reveals that extensive areas planned for low-density residential development are located on land having a shallow depth to bedrock. There should be no significant problems for construction of single-family dwellings without basements and septic tanks. However, where shallow depth to bedrock combines with one or more additional critical environmental factors, care should be taken to protect these areas from intensive development.

With the exception of several valleys indicated on the printout as having a shallow depth to bedrock and surface water, the major planned industrial area is generally suited for development. It is recommended that these sensitive stream valleys be preserved as conservation areas. These are the Crabb's Branch Stream and primary tributaries (see Proposed Land Use Map in backcover).

After conducting the comprehensive computer analysis of the Shady Grove area, a more detailed parcel-by-parcel analysis was made for the primary planning area. This analysis included the use of low-level aerial photography, geology maps, the Montgomery County Soil Survey, and selected site investigations.

6.4 SPECIFIC PROBLEMS

6.41 Storm-Water Management

The proposed sites for Metro development, the county service park, and the central processing facility all lie within the Crabb's Branch Watershed above Redland Road. That portion of the Crabb's Branch Watershed above Redland Road occupies about one square mile (see Figure 25). Besides the public and quasi-public uses, much of the area is planned, zoned, or developed industrially. Storm-water runoff will increase considerably as development takes place on the presently open farmland.

The County has proposed that a storm-water detention pond be built along Crabb's Branch Creek at the location of new Redland-Fields Road. The roadway fill from new Redland-Fields Road would provide the dam for this pond and the pond would act to control runoff so that the flow below Redland-Fields Road would be slightly less than presently exists. Such a facility would also provide the opportunity to develop a method of treating runnoff from the area so as to improve its quality.[1] Presently, the M-NCPPC and the Montgomery County Department of Environmental Protection are jointly studying the entire Crabb's Branch subwatershed. This study is part of a larger study by M-NCPPC of the complete Rock Creek Basin. The purpose of the Crabb's Branch joint study is to determine the nature and extent of problems related to urbanization in the Crabb's Branch Creek and to analyze viable alternative solutions, including the county proposal for an impoundment at Redland-Fields Road.

The industrial runoff impact on Crabb's Branch is important since the proposed Crabb's Branch Stream Valley Park will be located immediately downstream from Redland-Fields Road. This park will border the future residential development on the Mobley and Gude tracts. Due to the topography, orientation of slopes, and location of industrial uses on the opposite side of the parcels, the park will become the focal point of the residential communities.

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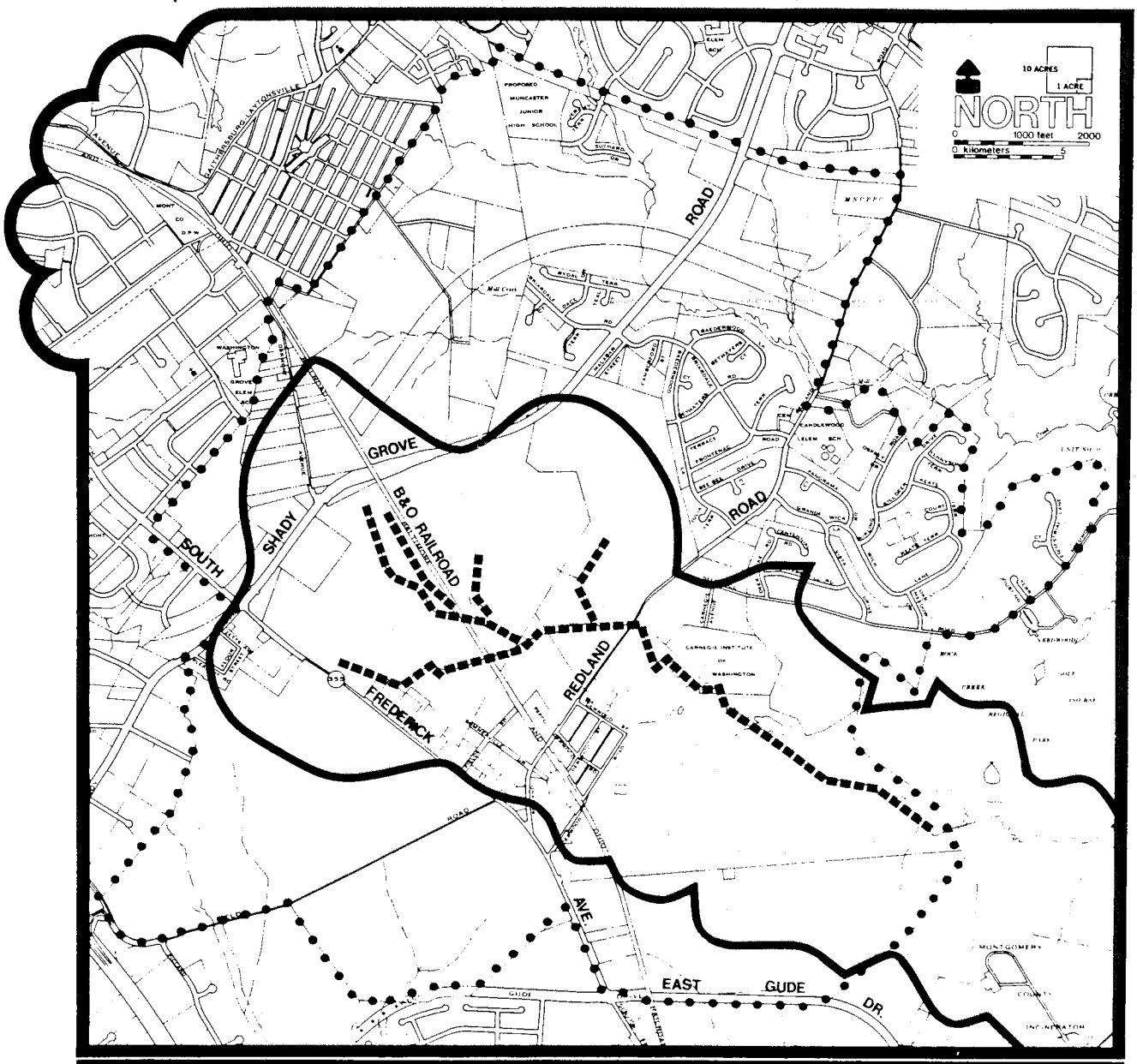
[1] Crabb's Branch Storm Water Management Study: Gannett Fleming Corddry Carpenter, Inc., Harrisburg, PA for Montgomery County Department of Environmental Protection, March, 1975.

FIGURE 25



Sub-Watershed Boundary

Stream Meander

Sector Plan Boundary

Crabbs Branch Sub - Watershed

SHADY GROVE SECTOR PLAN

THE MONTGOMERY COUNTY PLANNING BOARD

It is likely that a stormwater impoundment will be constructed immediately north of Redland-Fields Road. If built, this impoundment should be made part of the County Service Park and come under the Comprehensive Maintenance Agreement. Extensive landscaping will be necessary to buffer the view of this facility.

6.42 Air Quality

The Shady Grove sector planning area is a part of the National Capital Interstate Air Quality Region. The sector plan recognizes the relationship between increased development and increases in traffic. Air pollution is largely a consequence of automobile emissions.

To deal with air pollution in urban areas and to attack the problem in a systematic manner on a nationwide basis, amendments to the Federal Clean Air Act were enacted in 1970. Federal Standards have been established for violations which would affect public health. The State of Maryland also has adopted air quality standards and is proceeding to issue periodic implementation regulations, with Environmental Protection Agency (EPA) approval whenever necessary.

When properly enforced by the Federal, State, regional, and local governments, these standards should achieve improvement in air quality. The Montgomery County Planning Board and the county government will implement regulations issued by the State of Maryland, as a part of the State's air quality implementation plan. These regulations may have a bearing upon the timing, location, and amount of development recommended in the sector plan.

Draft regulations, concerning the review of indirect sources, have been proposed by the Environmental Protection Agency. Indirect sources are buildings, facilities, major roadways, and other installations that generate considerable traffic, thus creating air pollution. The adoption of these regulations has been postponed and can only be considered in the sector plan by noting the draft status and possible future applicability of such regulations. The Montgomery County Planning Board is carefully monitoring the indirect source issue and will adhere to any regulations issued by the Federal and State regulatory agencies.

Other factors influence air quality. The increase of transit usage through the provision of speedy, inexpensive, and comfortable bus service to augment use of the Metro transit facilities will divert many commuters from auto usage. The basic strategy of the sector plan, regarding air quality, relies on an improvement in air quality due to a decrease in the total vehicular miles of travel.

The Washington Metropolitan Area Council of Governments (COG) has a car pool locator service. This encourages the "matching up" of auto commuters having common origins and destinations by computer techniques to reduce total auto trips. This will also tend to improve the air quality.

Although the increase of traffic in the Shady Grove area may adversely affect local air quality, this may be offset by reductions in regional car travel and by the more accessible location of public facilities. The planning board is implementing methods by which air quality considerations can be included as a an integral part of the planning process.

Recommendations

An environmental impact statement (EIS) should be prepared for the outer beltway connection. One of the basic EIS issues to be addressed is the effect of the interchange on the future air quality of the Shady Grove area. Investigations of this issue should include as a minimum:

1. Projection regarding air quality, particularly the amounts of carbon monoxide (CO) anticipated both with and without the outer beltway;

2. Use of analysis techniques capable of modeling the air quality complexities of the limited interchange;

3. Analysis of all major roadways and intersections affected by construction of the outer beltway, including Shady Grove Road, I-270 and Md. 355;

The jurisdiction responsible for construction of the roadway should provide the analysis under environmental impact statement requirements.

Transportation and land use strategies can be used effectively to reduce emissions of carbon monoxide. The following actions are recommended to improve air quality in the Shady Grove Sector Plan area:

1. Complete the construction and improvement of public mass transportation systems, such as the Metro rail facilities, and encourage their use, to improve regional air quality;

2. Minimize the use of private automobiles by a single person for all types of trips by emphasizing the benefits of alternative modes of transportation, such as car pools and bicycles;

3. Improve roadways and traffic management to minimize congestion;

4. Utilize open space and vegetative cover to serve as buffers between air pollution sources and those affected by it.

6.43 Noise

Throughout preparation of the plan the possible negative effects of noise upon living and working environments has been considered. Zoning and land-use recommendations are based, in part, upon noise factors.

A technical noise analysis was performed only at those locations that appeared critical or where traffic volumes were highest. The projected operating conditions of the central processing facility and the Metro station were reviewed to prepare recommendations on noise abatement.

The sector plan recommendations include use of zoning; berming, buffering, or acoustic fencing; and the appropriate siting of buildings to reduce noise impact.

Potential high-level noise generating areas analyzed in depth include the following intersections and roadways:

- Shady Grove Road and Md. 355
- Shady Grove Road and Oakmont
- Crabb's Branch Way and Fields/Redland Road
- Metro access road from Md. 355 to Shady Grove Road
- Metro access road from Shady Grove Road to the Metro station
- Shady Grove Road from Oakmont to the B & O Railroad
- Shady Grove Road from the Metro access road to Briardale Road

Noise analysis was based on noise assessment guidelines published by the U.S. Department of Housing and Urban Development in 1971. The analysis considered the worst possible situation, that is, peak traffic flows, including truck traffic as part of the flow. Noise intrusion levels are classified as severe, moderate, or acceptable.

The intersections analyzed will carry considerable truck traffic--approximately five to ten percent of the total peak-hour flow. The shifting and braking noise of truck traffic that comes from starting and stopping at intersections will result in severe noise intrusion to a distance from the roadway of between 175 and 195 feet (see Figure 20).

The roadway segments analyzed will carry significantly less truck traffic--approximately three to five percent of the total peak-hour flow. Severe noise intrusion will be experienced adjacent to the following roadway segments to the depth indicated:

- Metro access road from Md. 355 to Shady Grove Road: 10 feet from the roadway.
- Metro access road from Shady Grove Road to the Metro station: 20 feet from the roadway.
- Shady Grove Road from Oakmont to the B & O Railroad: 35 feet from the roadway.
- Shady Grove Road from the Metro access road to Briardale Road: 5 feet from the roadway.

Recommendations

The noise-level analyses conducted at intersections and along roadway segments, and projections of noise levels at the central processing facility and

Metro station, have resulted in the following recommendations regarding development and noise abatement.

Intersections

Shady Grove Road and Md. 355

- No residential uses are recommended in the immediate vicinity.

- Development on the southwest corner of Shady Grove and Md. 355 should be either sited and oriented away from Md. 355 or insulated with acoustical material on the Shady Grove Road-Md. 355 side of structures housing workers during the day.

Shady Grove and Oakmont Avenue

- No residential uses are recommended in the immediate vicinity.

Crabb's Branch Way and Fields/Redland Road

- Extensive berming and buffering is recommended because of the intersection's proximity to future residential neighborhoods.

Roadway Segments

Metro connector and access road from Md. 355 to Shady Grove Road:

- Additional right-of-way (highway impact easement area) for the roadway is recommended because of the segment's proximity to residential uses.

- Extensive landscaping and berming within the highway right-of-way and in adjacent privately developed areas are recommended.

Central Processing Facility

It is assumed that noise emanating from truck traffic and outdoor operations at central processing facility will contribute to the excessive noise levels in the Md. 355 and Shady Grove Road area. Therefore, extremely dense berming and buffering of the site, including all access roads, are recommended.

Metro Station

Berming similar to that recommended for the central processing facility is recommended for the Metro station parking areas, which will be the source of ground noise at peak hours.