SECTION II

THE STUDY AREA

The Study Area is the area inside the corporate limits of the City of Charleston as of May 1984, as illustrated on Figure No. 1. The area is bounded on the north by the Ashley River and the City of Charleston/City of North Charleston city limits, on the east by the Cooper River, on the south by the Stono River and the City of Charleston/Charleston County line on James Island, and on the west by the City of Charleston/Charleston County line in the West Ashley area and on Johns Island.

Although the detailed investigations and recommendations developed in this Study have been limited to the area described, the impact of stormwater runoff entering the areas from outside the corporate boundaries has been considered in the evaluations and recommendations. In addition, the stormwater runoff generated from several of the areas must pass through areas outside the City boundaries prior to discharge into one of the several receiving tributaries. The characteristics and capacities of these tributaries have also been analyzed.

To perform the investigations for the study, the areas were divided into individual drainage basins. A drainage basin is an area from which the runoff generated is discharged via one outfall system.

The physical characteristics of each drainage basin within the Study Area influences the quantity of stormwater runoff from the area, and therefore influences the stormwater drainage facilities used to transport that runoff. Physical characteristics include topography, land use, type and extent of development, soil and surface cover, and environmental features. Each of these characteristics and the effect of their influence is described in the following paragraphs.

Topography

Surface elevations within the Study Area range from mean sea level (MSL) to a maximum of 25 feet above mean sea level in the West Ashley area and can be characterized as low-lying, slightly undulating and gently sloping. Surface slopes are generally 1 percent or less, and slope to one of the several rivers or tributaries which surround the area, i.e., Cooper River, Ashley River, Stono River, etc.

Drainage systems have been installed throughout the Study Area and the drainage patterns established by the existing systems have been adhered to in the study. The configurations and limits of the areas drained by each of the existing systems have been determined by field surveys and observations.

The field surveys have resulted in the delineation of 182 separate drainage basins. Each of the basins has one separate outlet to either the Cooper River, Ashley River, Stono River, or James Island Creek, and each has been evaluated independently of adjacent areas. A discussion of each of the drainage basins is presented in Section IV, "Evaluation of Existing Stormwater Drainage Facilities." Section IV contains a detailed description of the limits, characteristics, and existing

drainage facilities, as well as recommended improvements for each of the drainage basins.

The influence of the topography of the Charleston area may be either beneficial or detrimental insofar as stormwater runoff protection is concerned. The flat slopes tend to result in storage of a portion of the rainfall in numerous shallow depressions and also to increase the quantities of rainfall which percolates into the ground. Overland flow velocities are also lower which increases the time for runoff to concentrate at specific points in the collection system. The low ground elevations and the very flat slopes result in areas for which protection is very difficult, especially during storms which occur at or just before high tide. Much of the development within the Peninsular City area is in fact impractical to protect without the use of stormwater pumping stations. The areas which can be protected by gravity flow require much larger diameter conduits than would be required for more steeply sloping areas.

Land Use and Development

The City has been divided into four separate and distinct study areas; (a) Peninsula, (b) West Ashley, (c) James Island, and (d) Johns Island. At present less than 65 percent of the land within the Study Area has been developed. Of those areas which have been developed, approximately 65 percent is designated for residential use, of which about two-thirds is single family dwellings. Single family type dwellings predominate the James Island and West of the Ashley areas, whereas the number of residential and multi-family dwellings is about equal in the Peninsular City area. General business, commercial, and institutional areas constitute approximately 25 percent of the area. These areas are located on the major traffic arteries in the James Island and West Ashley areas. In the Peninsular City area this type of development is diversely located, especially in the area south of the Crosstown Expressway. Industrial development comprises the remaining 10 percent of the area and is concentrated mainly in the northern section of the Peninsular City area above Mt. Pleasant Street.

The area which lies west of Ashley River Road and north of Highway 17 will undergo the greatest amount of transformation in the future. This area is an old phosphate strip mine area and presently is mostly undeveloped. The present runoff collects in the strip mined ridge and valley network and drains slowly to either Church Creek or Long Branch Creek. Development of the area will fill in the valleys and channelize the runoff to one of the receiving tributaries, resulting in increased peak and total flows if floodplain management is not utilized. Hydraulic analysis of Long Branch Creek was performed assuming full development of the drainage area with no floodplain management. The hydraulic analysis of the Church Creek drainage basin was performed assuming present development of the basin with floodplain management requiring future peak discharge equal to present peak discharge. The results of the comparative analysis of these drainage basins are included in Section IV.

Those areas which are presently not developed to potential in the James Island and Johns Island area will require careful planning to assure proper drainage. The majority of the areas will discharge directly to the Stono River or James Island Creek and their development should have a minimal effect on the drainage of the area if adequate facilities are planned for upstream runoff prior to development.

Soils

The soils throughout the Study Area are of marine or fluvial origin and consist of sediments ranging in particle size from clay to fine sand. The Soil Conservation Service and Forest Service of the U.S. Department of Agriculture have conducted extensive studies of the soils within the Study Area. The results of the studies have been presented in reports entitled "Feasibility Study of Requirements for Main Drainage Canals" dated 1963; and "Soil Survey, Charleston County, South Carolina", dated 1971. The locations, descriptions and characteristics of soils within the Study Area have been excerpted from these reports.

During the above referenced studies, soils with distinct characteristics and profiles were identified and classified in accordance with uniform national procedures. They were then placed in associations in which two or more soil types occur in a distinctive proportional pattern. The name of each association consists of the names of its principal soil components arranged in order of most prevalent to least prevalent.

The approximate boundaries of the soil associations which have been identified within the Study Area are shown in Appendix C, along with a detailed description of each. Those soil associations discussed include Chipley-Lakeland, Wando-Seabrook, Kiawah-Seabrook-Dawhoo-Yonges-Hockley-Edisto, Tidal Marsh, Mine Pits-Dumps-and-Made Land.

Several general conclusions can be drawn from the types of soils found in the Study Area:

1. Velocity of runoff from most of the unpaved areas will be slow.

2. A large percentage of the rainfall will percolate into the ground or be absorbed by vegetation.

3. Bottom and side slopes of drainage ditches will be subject to erosion unless protected or unless the velocity of flow is restricted to 2 to 3 feet per second or less.

Environmental Features

The Study Area has numerous environmental features which are of importance to the conduct of the study, and will have significant impact upon future construction. The most important of these are the tidal wetlands and archaeological and historic sites.

Tidal wetlands will probably have the most impact upon the future construction of stormwater drainage facilities. They are important to the environment in that they provide a nursery and source of food for various forms of aquatic life; fish, shrimp, oysters, etc. Wetlands are located along the Cooper River, Ashley River, Stono River and James Island Creek, and are controlled by federal and state law. A project which may disrupt or change the character of these areas must be reviewed and permitted by the U.S. Corps of Engineers and the South Carolina Coastal Council. Not only must a permit be obtained for new construction, but also for any maintenance of existing drainage facilities which will require excavation in these wetland.

Numerous historic and archaeological sites are located within the Study Area. Drainage projects which may in any way affect these areas must be carefully planned to assure their protection. A complete list of historical and archaeological sites may be obtained from the South Carolina Department of Archives and History.

The construction of proposed stormwater drainage projects will also adversely influence air quality and noise levels to some extent. However, the influences will be felt only during construction and will be localized and temporary in nature.