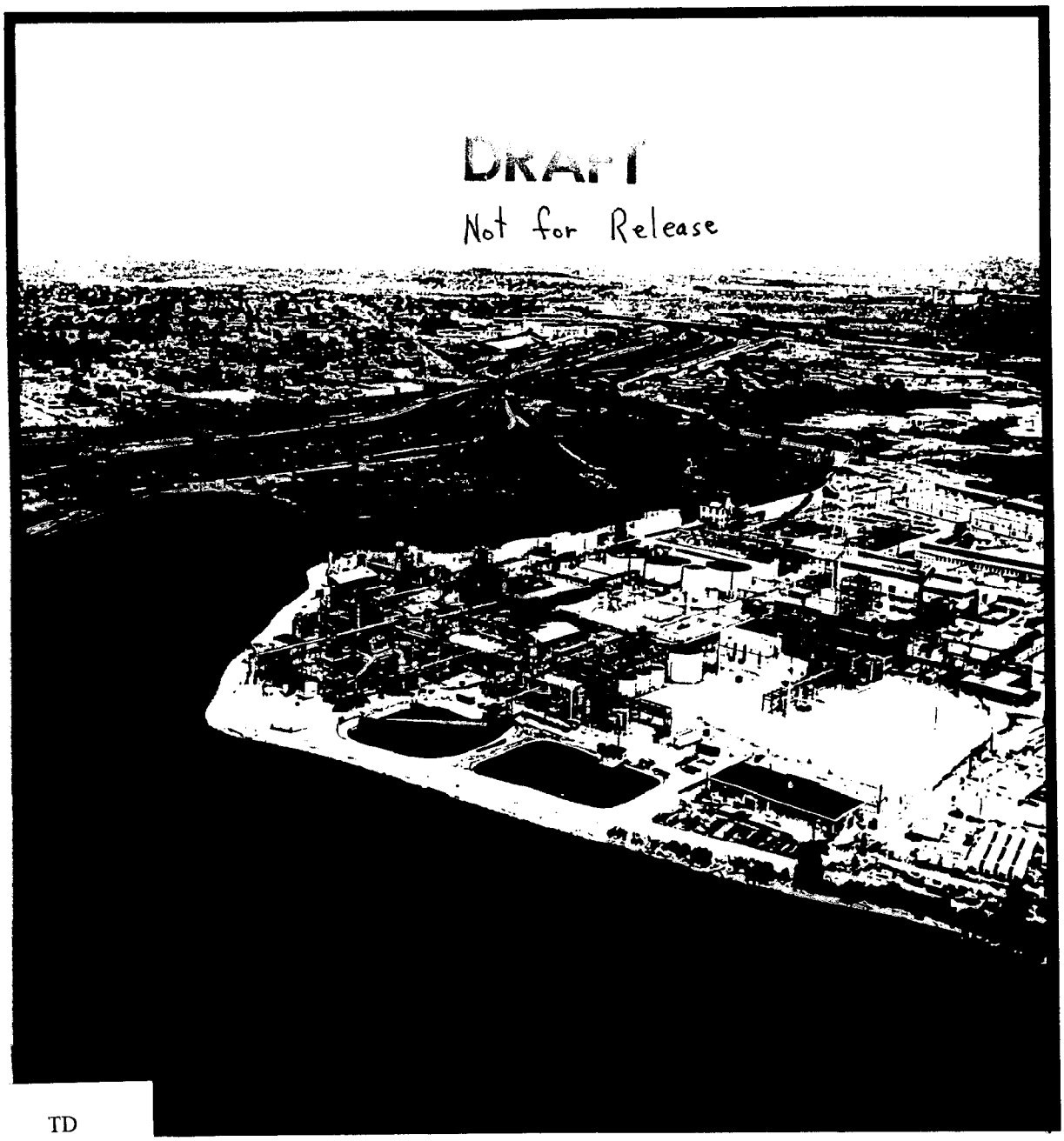
An Environmental Assessment of an Industrial Area

Fairfield – A Waterfront Study



Maryland. Coastal Zone Management Program
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FAIRFIELD WATERFRONT STUDY

DRAFT

Prepared by the
Baltimore City Planning Department
Ernest Freeman, AICP, Director

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JANUARY, 1991

FAIRFIELD ENVIRONMENTAL

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I. EXECUTIVE SUMMARY

Environmental Goals and Objectives

1. Improve Shoreline - Areas that are not bulkheaded can be improved through vegetative plantings and removal of derelict structures. Existing bulkheads can be rehabilitated as properties turn over and are redeveloped.

2. Protect Habitat - Despite the heavy industrial nature of the Fairfield area, some areas of high habitat value exist. It is the goal of this plan to preserve and enhance these areas where feasible.

3. Encourage buffers/wildlife corridors - Existing wildlife habitat can be greatly served by creation of a corridor/buffer system throughout the peninsula. Such corridors and buffers can serve the dual use of increasing habitat values while also improving water quality and drainage.

4. Improve quality of storm water run off - Through the use of a buffer and naturalized drainage system, as well as the EPA stormwater regulations, it is hoped that stormwater quality can be improved.

5. Remove discharges except Patapsco's WWTP - As part of the effort to improve water quality around the Fairfield peninsula, all

all existing NPDES discharges should be tied into the City's Pretreatment program, where feasible.

6. Improve Patapsco's discharge - Planned expansion of capacity, improved treatment operations and construction of a dechlorination plant will all help to improve effluent discharge.

7. Use Offset funds to improve specific areas - Offset funds are available to complete specific projects for wetlands creation and habitat improvements.

Potential Measures for Environmental Improvement

1. Changes to Zoning

There are several alternatives within the zoning code which could be used to address problems resulting from industrial development:

(1) changing to a less intensive industrial zoning category; for example, from M-3 to M-2;

(2) changing the definition of permitted uses within the existing category; for example, eliminating some uses in M-3 or M-2 (this alternative may involve the formation of a new zoning category);

(3) changing which uses are conditional in existing zoning categories;

(4) creating performance standards for certain uses. Land use control changes such as these are now being explored by a task

force representing area community, industry, city, and State officials.

2. Suggested Places to Use Offset Funds

The Fairfield Peninsula contains two significant waterfowl staging and concentration areas - Masonville and Stonehouse Cove.

Since the proposed development for Masonville has been postponed for the present time, it is suggested that efforts be directed to Stonehouse Cove and the intermittent stream which flows into it. As part of this overall assessment, it is recommended that the feasibility of establishing a greenway link with Masonville via an existing intermittent stream be evaluated.

In addition to the on-site mitigation expected to be driven by new development and redevelopment, the City will be working with property owners who wish to use portions of their shore line for enhanced vegetation as a means of achieving overall water quality and wildlife improvements. The City is committed to using offset funds derived from elsewhere or development projects to match the efforts of private property owners to improve shoreline conditions. The City is also prepared to negotiate conservation easements with cooperating property owners to provide property tax relief and to insure that revegetated portions of the City's shoreline remain forever green.

3. Use of Critical Area regulations and Habitat Protection Program to enforce/encourage needed changes

The Baltimore City Habitat Protection Program identifies and locates each of these habitat areas which exists in Baltimore City, establishing protection policies for each.

The open spaces within the Critical Area include approximately 70 acres of high and low marsh habitat in Masonville and a 5 acre undeveloped wooded lot adjacent to and east of Fairfield Homes.

Baltimore City has identified the presence of two general categories of habitats in Fairfield as established in COMAR 14.15.09 and they are the Critical Area 100-foot buffer and historic waterfowl staging and concentration areas. The City is proposing that these areas be designated as Habitat Protection Areas (HPA) and that protective measures be adopted to protect these areas from the adverse impact of development.

4. Stormwater Changes

Urban streets contain many toxic contaminants (non-point source pollution) which enter streams during a storm's peak, and this pollution poses a serious detriment to wildlife. A few potential solutions for reducing these shock loads may include the following:

(a) select roadway sites so as to minimize the area draining directly into the receiving body of water;

(b) utilize low curbs when the road is adjacent to flat, unpaved areas or areas that slope gently away from the street surface. This will facilitate the deposition of the dust and dirt into grass and gravel areas and reduce the rate of deposition in runoff water;

(c) consider the use of porous pavement in areas where the soil type permits it;

(d) intensify and improve street-cleaning operations to reduce urban roadway runoff effects;

(e) design curbs and gutters to facilitate concentration and collection of particulate material;

(f) investigate various approaches to detention and storage of storm runoff and separation of solids from stormwater.

II. BACKGROUND AND OVERVIEW

A. Boundaries of the Study Area

Fairfield is a large, flat peninsula located approximately four miles south of downtown Baltimore. It is surrounded on three sides by water, and is physically separated from adjacent landward neighborhoods by a wide expanse of railroad tracks. (See Figure 1.) Although originally known for farming and cannery operations, the area was converted primarily to heavy industry beginning in the early 1900's.

The total study area included in this report covers 2000 acres; however, much of the content of the report will focus on lands adjacent to the waterfront. The study area is delineated on the east and north by the Patapsco River and on the western side by Frankfurst Avenue. At the intersection of Frankfurst and Patapsco Avenues the boundary line turns east, following Patapsco Avenue to Stonehouse Cove (See Figure 2). Another concentrated area of heavy industry is located adjacent to the study area in Curtis Bay. This area is mentioned from time to time in this report, especially as it contributes to Fairfield's conflicts with adjacent residential areas.

B. Overview of Report

Economic and environmental conditions in the Fairfield area combine to create a wide variety of issues in need of discussion. The type of industry which is concentrated in this area requires large amounts of flat impervious land to operate, and tends to create noxious or

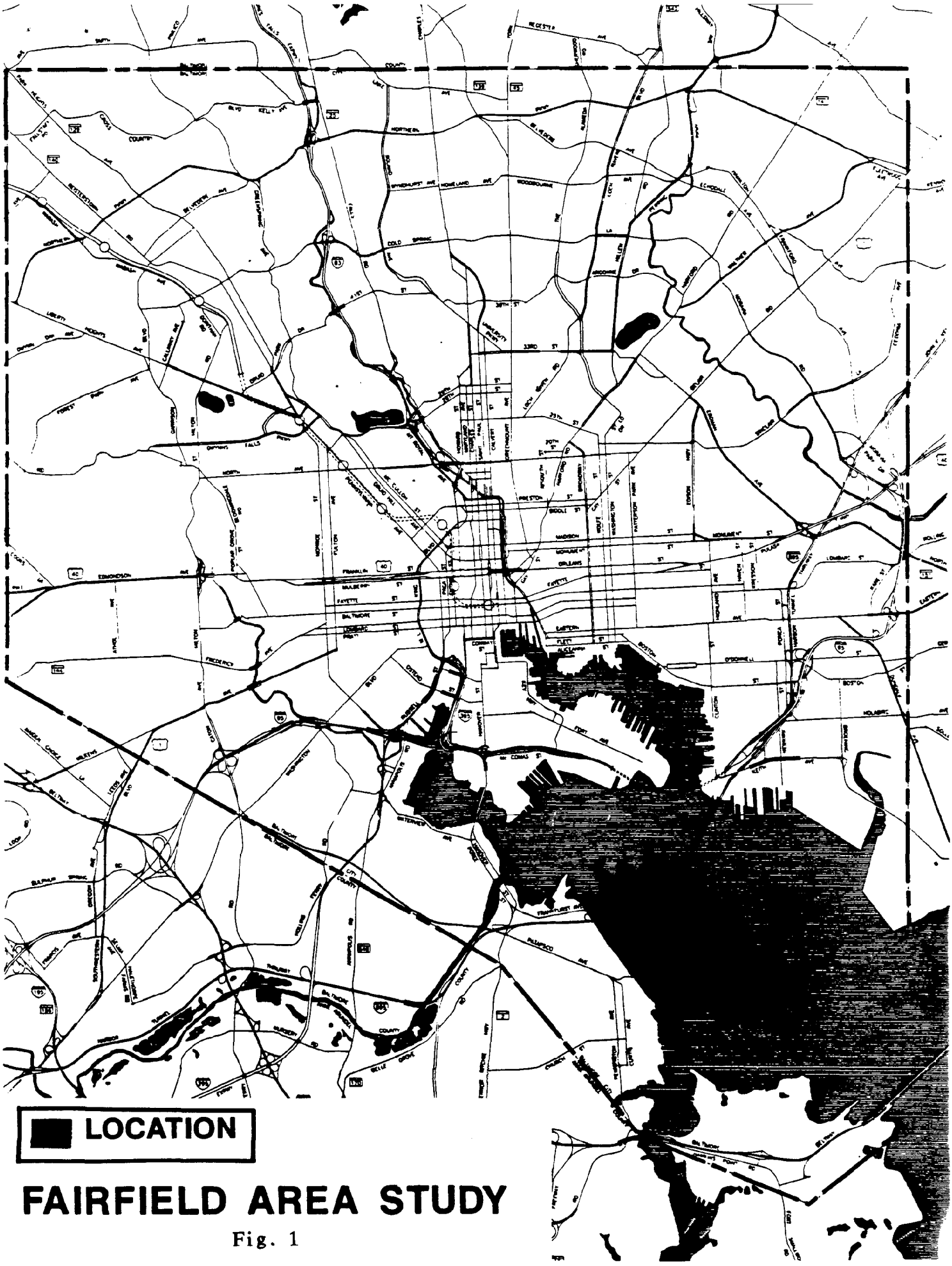
hazardous substances as by-products of their operations. This places the economic growth of Fairfield at-odds with surrounding residential neighborhoods and the environment. To deal with these issues, the City of Baltimore has initiated two studies of the Fairfield area. The first report titled "Strategy for the Fairfield Industrial Area" was completed in a joint effort by BEDCO and the Planning Department, and focuses on economic development issues.

This report will concentrate on environmental issues in Fairfield and propose ways to deal with water quality and habitat issues. This study includes existing and future economic conditions; the environmental condition of the study area, particularly the waterfront; existing environmental legislation and proposed new environmental legislation which will affect the number and type of industrial development in Fairfield; and recommendations for environmental improvement.

C. Historical Background

The first recorded non-indigenous settlement of Fairfield was in 1663 when Paul Kinsey recorded 200 acres of land on the northern shore of Marley Creek. He named the estate Curtis's Neck. Following Kinsey was John Cromwell in 1670, with the recordation of 6000 acres of land north of Marley Creek, encompassing most of the remainder of the study area. Cromwell named his estate Plantation Fairfield.

The Cromwell family sold most of the land south and west of what is now Chesapeake Avenue to the Crisp family in the early 1800's. By the



FAIRFIELD AREA STUDY

Fig. 1

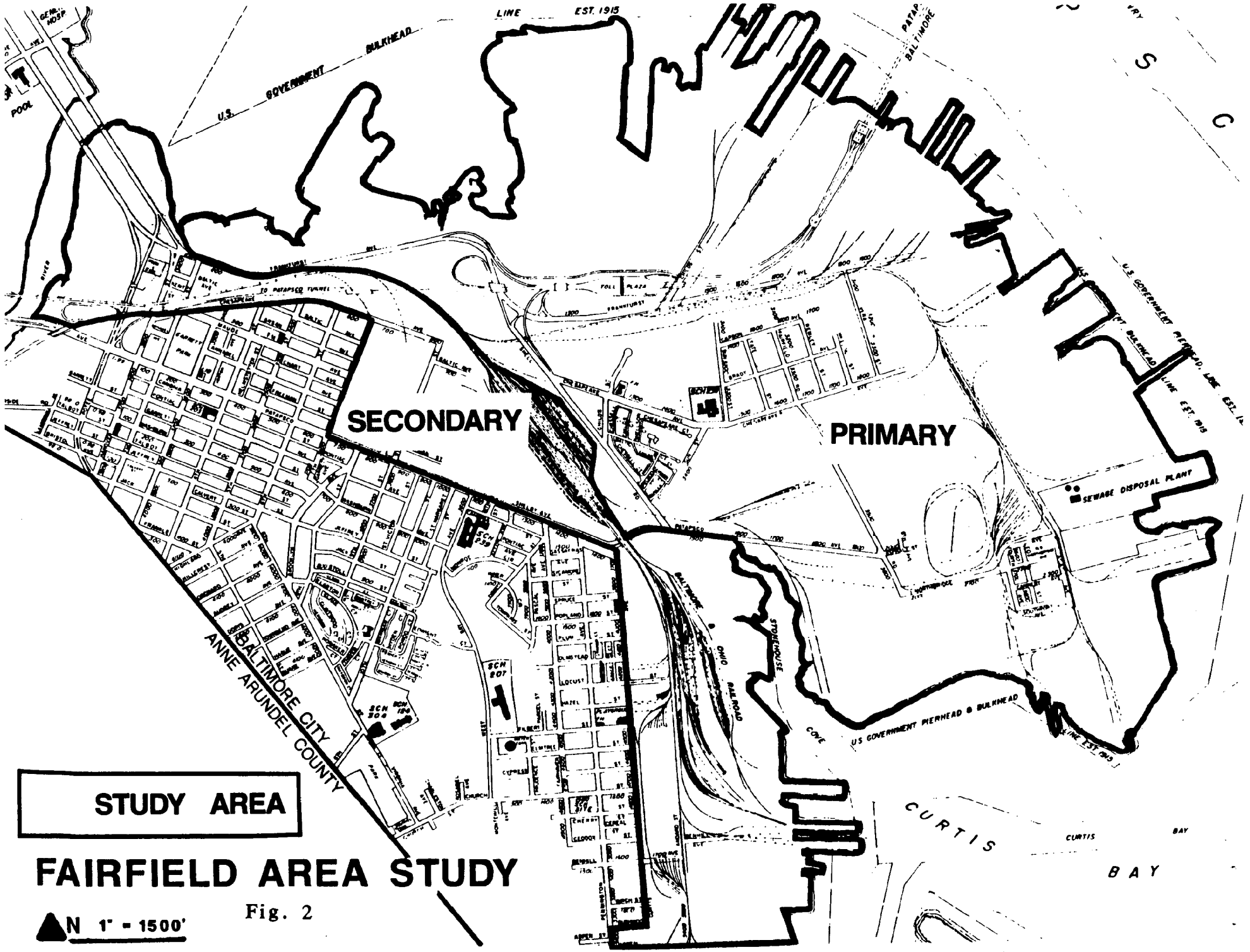

SECONDARY
PRIMARY
STUDY AREA
FAIRFIELD AREA STUDY
N 1" = 1500'
BALTIMORE CITY
ANNE ARUNDEL COUNTY
SEWAGE DISPOSAL PLANT
U.S. GOVERNMENT PIERHEAD & BULKHEAD LINE EST. 1915
CURTIS BAY
STONEHOUSE COVE
BALTIMORE OHIO RAIL ROAD

Fig. 2

mid-1800's, the land to the south became the site of "Freetown," reputed to the be first settlement of free African-Americans in the eastern United States. During this period, land in the study area was devoted to agricultural uses, primarily vegetable and tobacco farming, and cutting timber for maritime uses in the City of Baltimore. Transportation to the City was by ship or road (through present day Linthicum Heights).

In the 1870's, the Patapsco Land Company of Baltimore City (formerly the Patapsco Company) began to promote industrial development in the Stonehouse Cove/Curtis Bay area. Two events enhanced the area's desirability for industrial uses: 1) the construction in 1856 of the Light Street Bridge (and the 1878 removal of its toll), which connected the peninsula to the City of Baltimore, and 2) the construction of the B&O railroad bridge across the Ferry Branch of the Patapsco in 1882. These projects opened the study area for industrial development.

From the 1880's until the onset of World War I, development of industrial and residential uses in the area grew at a rapid pace as steel, chemical, and railroad-related businesses located operations in Fairfield. The industrial development also spurred rapid growth in nearby residential areas with Fairfield, Curtis Bay and Brooklyn gaining the most new residents. By 1893, Fairfield had grown into a town of 260 people.

In 1896, the Martin Wagner Company constructed a fruit and oyster canning plant on part of the site of the present day Patapsco Waste

Water Treatment Plant. Rapid growth of the cannery and associated businesses necessitated the development of company housing (now Wagner's Point) in the area. The cannery closed in 1929 and the site is now occupied by the City's Waste Treatment Plant and Delta Chemical.

The petroleum industry first came to Fairfield in 1906 with the Ellis Company, which was subsequently bought by U.S. Asphalt Refinery Company. Today terminal operations for B.P. Oil, Texaco, Socony-Mobil and American Oil Company are located on the site. Land just to the east of Stonehouse Cove was purchased by U.S. Industrial Chemical and Alcohol Company, the predecessor of FMC Corporation. Other nearby parcels of land were purchased by Shell Eastern Petroleum Products, Prudential Refinery Company, Raisin Monumental Chemical Company, Royster Guano Company, American Bitumals and the Chesapeake Sugar Refinery. The City of Baltimore purchased the site of the Chesapeake Sugar Refinery in 1924 to construct the Patapsco Treatment Plant, a modern version of which occupies the site today.

Land along the northern shore of Fairfield was the last to be developed for industrial uses. Due to the area's proximity to the City of Baltimore and the availability of timber, this section of Fairfield had originally been developed for wharves, ship building, and related uses. Union Shipbuilding was the first large employer to locate on the northern shore of Fairfield. Following it were Maryland Shipbuilding, Maryland Drydock, and Weyerhauser Timber Company.

The study areas were annexed by the City of Baltimore from Anne Arundel County in 1917.

From 1930 to 1940, industrial development in Fairfield was stagnant. With the onset of World War II, however, the U.S. government chose Fairfield as a site for the production of Liberty Ships, making it the largest shipyard on the East Coast. Peacetime functions returned to Fairfield in 1946 with the return of property to its original owners. Although most temporary war worker housing was removed, the City of Baltimore retained Fairfield and Brooklyn Homes for public housing.

The Baltimore Harbor tunnel, which followed along the Ferry Branch of the Patapsco River and through Fairfield was constructed between 1955-1957. It bisected the Fairfield Peninsula separating the Arundel Corporation, Weyerhauser, Maryland Shipbuilding and Drydock and the Bethlehem properties from the petroleum and chemical companies and residential areas to the south.

The 1960's and 1970's were a time of transition for Fairfield. By the 1980's most of the shipyard-related businesses had closed. However, Fairfield's waterfront evolved as new uses took advantage of its deep water access. Shipping rather than shipbuilding again became important in Fairfield. The Island Creek Coal Terminal was developed in 1982 as a major coal export facility. In the same year, Hobelman Port Services purchased 41 acres of land on the north shore, just east of Masonville, and developed an automobile import and storage facility. Hobelman's operations have continued to expand since then.

In the late 1970's, the Maryland Port Administration began planning for a new container terminal to occupy 350 acres in Masonville, on the northern shore of Fairfield. However, construction of the container terminal has been put indefinitely on hold. Reasons for the postponement include the development of another terminal (Seagirt) in the interim, as well as uncertainty over the prospects for the Port of Baltimore's future share of East Coast container traffic. Also, shallow water conditions and the constant input of sediment from the Patapsco make excessive dredging necessary and difficult to maintain. In 1988, MPA purchased the closed Maryland Shipbuilding and Drydock property and developed an auto import facility for Toyota. At the present time, the MPA is trying to market a large section of the property to one or more additional auto importers.

III. EXISTING CONDITIONS

A. Land Use

1. Existing Land Uses

The entire study area is now zoned M-3, heavy industrial. Over the years Fairfield's flatness and its excellent waterfront access have made it attractive to a variety of businesses that require these features: ship building in the past, now replaced largely by marine terminals (especially auto import terminals), water-dependent manufacturing, and petroleum distribution operations. These companies utilize the deep water access for barging large shipments of supplies, and use the flat, isolated land for tank farms. Chemical companies have also been attracted by the area's excellent transportation network, which includes deep water access, interstate highways and railroad lines. (See Figure 3)

Today, three heavy industries dominate the Fairfield Peninsula: petroleum product manufacturing and distribution, chemical manufacturing, and shipping-related industries (auto import terminals, storage areas and trucking operations). Major employers include FMC Corporation, a manufacturer of pesticides and herbicides (320 employees), Vista Chemical, a manufacturer of industrial detergents (190 employees), and Alcolac, a manufacturer of both chemicals for the cosmetic and personal care industry and industrial cleaners (110 employees). Remaining industries include: animal feed and steel drum manufacturing, a

Maryland Toll Authority operation, scrap metal storage, as well as an assortment of small industrial service operations (equipment, construction, auto parts, etc.) (see Figure 4).

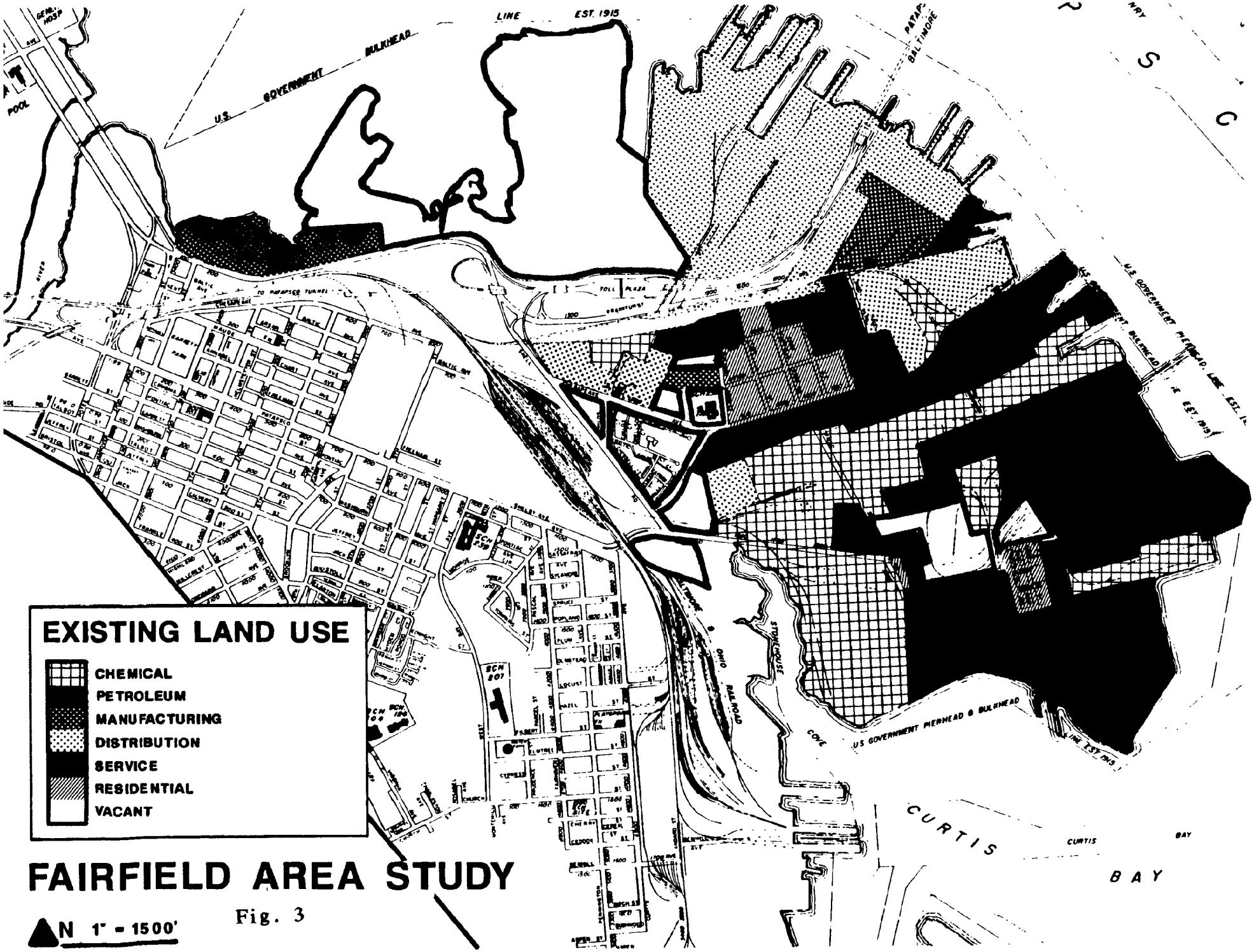
Within this concentration of heavy industry are two extremely small residential enclaves -- Old Fairfield and Wagner's Point. Each of these communities is surrounded by petroleum product distributors, chemical companies and scrap metal dealers. Old Fairfield covers 30 acres and is home to about 12 remaining households -- most of them elderly. Wagner's Point covers about 10 acres and is home to about 235 people. Adjacent to, but outside, the study area are two much larger residential areas, Curtis Bay and Brooklyn, with 5,110 and 19,030 inhabitants, respectively. (See Figure 5.)

2. Infrastructure

This section describes Fairfield's existing infrastructure and identifies any shortcomings which have negative effects on the area's environmental conditions.

Roads

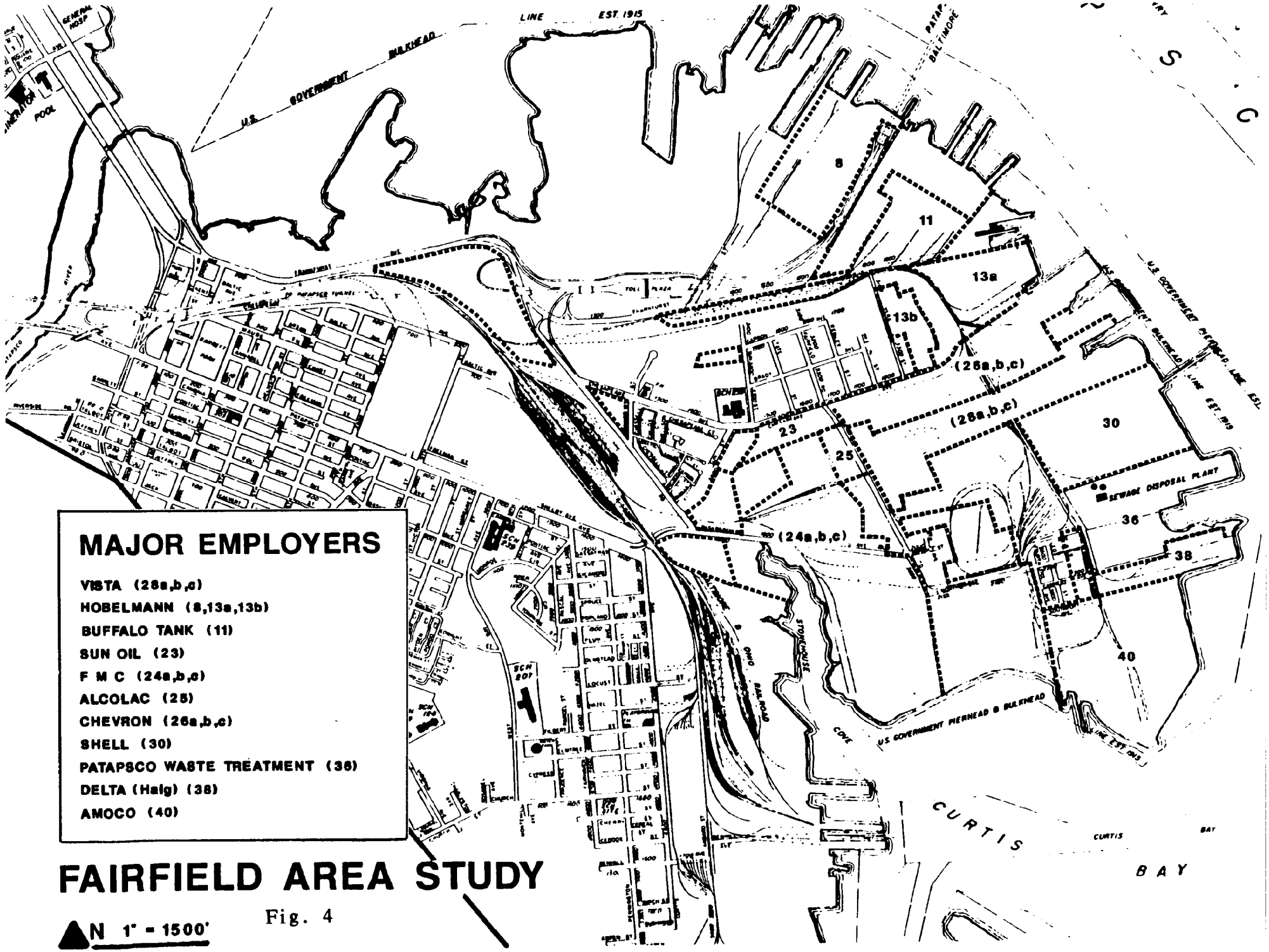
Roads in heavy industrial areas endure constant and severe wear-and-tear from truck traffic. Not surprisingly, the complaint most often voiced by companies during interviews with businesses was road conditions. Table II-A summarizes roadway conditions based on a Planning Department field survey. In addition,



FAIRFIELD AREA STUDY

N 1" = 1500'

Fig. 3



MAJOR EMPLOYERS

VISTA (26a,b,c)
HOBELMANN (8,13a,13b)
BUFFALO TANK (11)
SUN OIL (23)
F M C (24a,b,c)
ALCOLAC (25)
CHEVRON (26a,b,c)
SHELL (30)
PATAPSCO WASTE TREATMENT (36)
DELTA (Haig) (38)
AMOCO (40)

FAIRFIELD AREA STUDY

N 1" = 1500'

Fig. 4

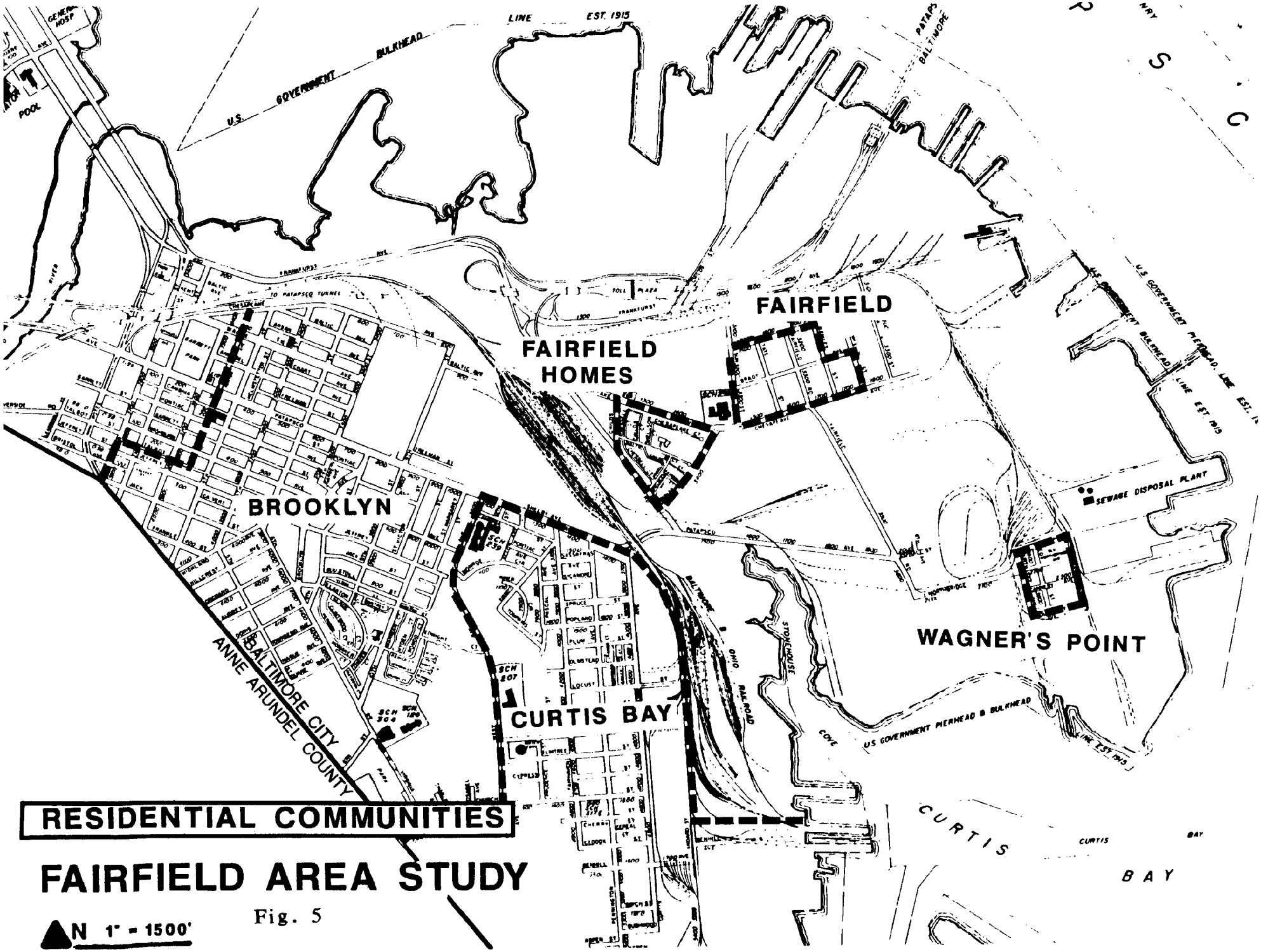

FAIRFIELD
FAIRFIELD HOMES
BROOKLYN
CURTIS BAY
WAGNER'S POINT
SEWAGE DISPOSAL PLANT
ANNE ARUNDEL COUNTY
BALTIMORE
U.S. GOVERNMENT BULKHEAD
U.S. GOVERNMENT PIERHEAD & BULKHEAD LINE EST. 1915
BALTIMORE & OHIO RAILROAD
STONEHOUSE COVE
CURTIS BAY
RESIDENTIAL COMMUNITIES
FAIRFIELD AREA STUDY
N 1" = 1500'

Fig. 5

Fairfield Street Condition Evaluation

Street	From	To	Condition	Importance to Circulation[2]
Brady Avenue	Sun Street	Weedon Street	Poor	3
Carbon Avenue	Sun Street	Remley Street	Poor	3
Chesapeake Ave.	Sun Street	Vera Street	Poor	1
Chesapeake Ave.	Shell Road	Chesapeake Ave.	Poor	1
Childs Street	Shell Road	Chesapeake Ave.	Poor	X
Fairfield Road	Chesapeake Ave.	Carbon Ave.	Poor	3
Remley Street	Chesapeake Ave.	Carbon Ave.	Poor	X
Sun Street	Chesapeake Ave.	Carbon Ave.	Poor	2
Tate Street	Chesapeake Ave.	Carbon Ave.	Poor	X
Weedon Street	Chesapeake Ave.	Brady Ave.	Poor	3
Asiatic Avenue	Southport Ave.	Northbridge Ave.	Fair	3
Cannery Avenue	Fourth Ave.	Northbridge Ave.	Fair	3
Childs Street	Frankfurst Ave.	(Dead End)	Fair	2
Frankfurst Ave.	Shell Road	Childs Street	Fair	1
Frankfurst Ave.	Childs Street	Vera Street	Fair	1
Frankfurst Ave.	Potee Street	Shell Road	Fair	1
Leo Street	Northbridge Ave.	Southport Avenue	Fair	3
Shell Road	Frankfurst Ave.	Patapsco Avenue	Fair	1
Southport Ave.	Fourth Ave.	Northbridge Ave.	Fair	3
Vera Street	Frankfurst Ave.	Chesapeake Ave.	Fair	2
8th Avenue	Asphalt Street	(Dead End)	Good	3
Asphalt Street	Fairfield Road	(Dead End)	Good	3
Childs Street	Chesapeake Ave.	(Cul-de-sac)	Good	3
Fairfield Road	Chesapeake Ave.	Northbridge Ave.	Good	2
4th Avenue	Northbridge Ave.	Southport Ave.	Good	3
Northbridge Ave.	Fairfield Road	Asiatic Ave.	Good	2
Patapsco Avenue	Shell Road	Fairfield Road	Good	1

Table II-A

[2]1=Principal access road; 2=Secondary access road; 3=Local road; X=Future status in question.

deteriorated roads generate sediment carrying pollution often referred to as non-point source pollution.

Based on this information, the top priorities for roadway work are Chesapeake Avenue from Shell Road to Sun Street and from Sun Street to Vera Street, Sun Street from Chesapeake Avenue to Carbon Avenue, all of Frankfurst Avenue (from Potee Street to Vera Street), and Shell Road from Frankfurst to Patapsco Avenue. A more detailed plan and schedule for improving these roads should be developed and included in next year's review of the Six-Year Capital Improvement Plan.

Water

Water service to the study area is provided by the City of Baltimore. The system of mains and feeder lines was developed to serve the entire peninsula for industrial purposes. Water service is also provided to the two residential communities in the primary study area.

Sanitary Sewers

The study area is fully served by the municipal sanitary sewer system. All properties are either already served by the system, or need only to hook into the existing lines that run throughout the peninsula.

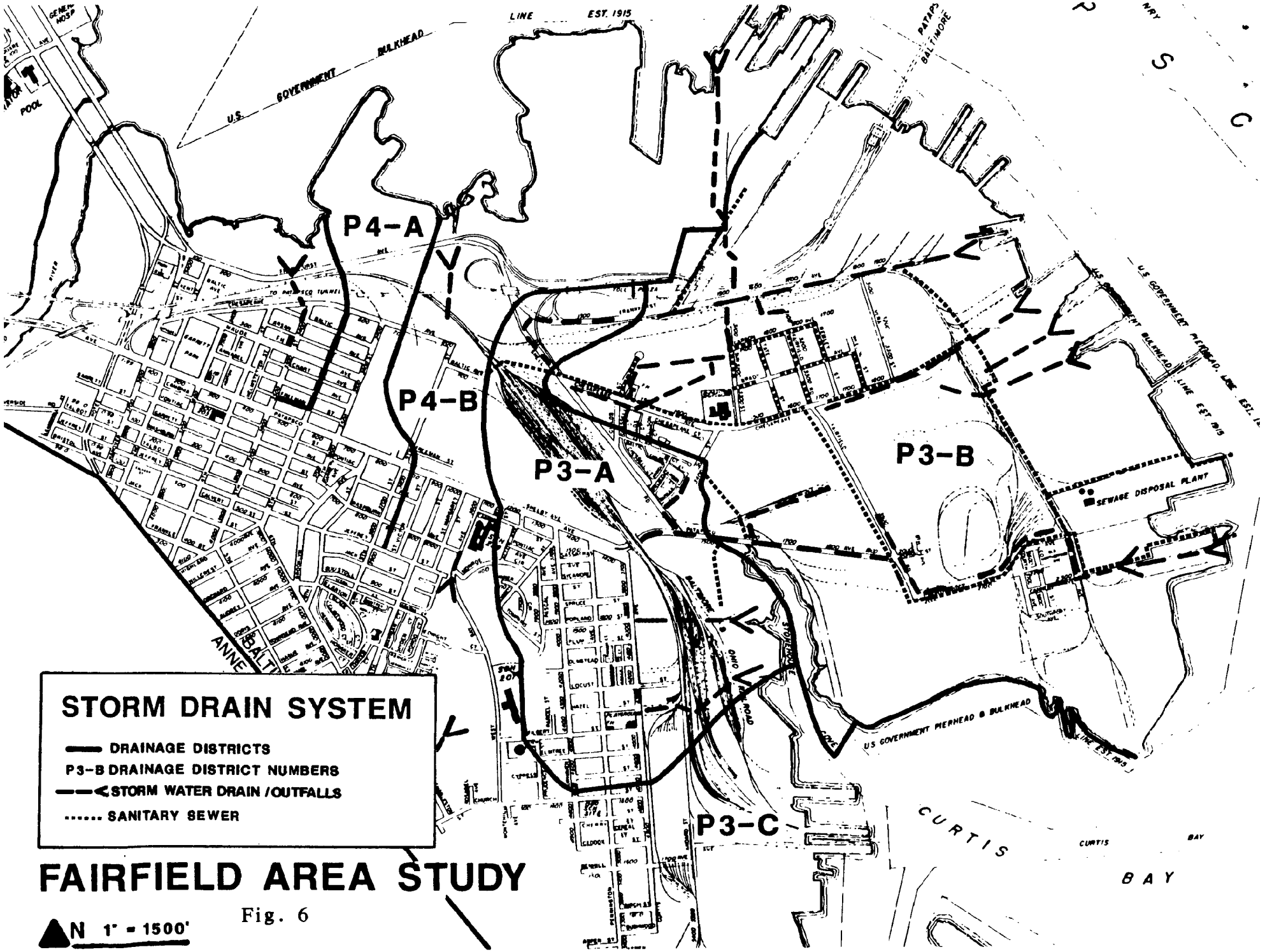
Waste water treatment for the study area is provided by the Patapsco Waste Water Treatment Plant on the lower part of the Fairfield Peninsula. Current capacity at the treatment plant is adequate for existing levels of activity. Capacity of the plant is 70 million gallons per day (MGD) to be expanded to 87.5 MGD in 1992-93. The City shares available capacity with the surrounding counties. Planned capacity should be sufficient to cover service needs into the next century, given current development patterns and pace.

Storm Sewers

The most notable aspect of Fairfield's topography is its almost uniform flatness. The highest point -- Shell Road at Childs Street -- is only 35 feet above sea level, while vast portions of the peninsula rise only 9 to 12 feet above sea level.

Installed during the 1970's, storm sewers are a fairly recent public investment in Fairfield. Storm water management in Fairfield is made difficult by the extremely flat, low-lying nature of the topography, and the compact nature of the soils.

The Fairfield study area is divided into two major drainage basins, identified as P3-B and P3-A on City storm drain maps (see Figure 6). P3-B follows the shoreline of Stonehouse Cove, then continues northward in the vicinity of Shell Avenue to the Masonville area. All land east of this line to the Patapsco



FAIRFIELD AREA STUDY

Fig. 6

River is included in the drainage basin. P3-B contains 8 outfall points. Two flow northward through Masonville, five points discharge along the Eastern side of the peninsula, and one empties at the mouth of Stonehouse Cove. The north and eastern outfalls discharge directly to the Patapsco River.

The drainage basin identified as P3-A is much smaller, and extends out of the study area to include portions of the Curtis Bay neighborhood. This drainage basin contains 4 outfall points. Three drain easterly into Stonehouse Cove, and one northerly through the Masonville property. The stormwater system and drainage patterns will be discussed in more detail in Section II - Drainage.

Summary

In summary, basic utility service to Fairfield appears to be adequate to serve the area with some room for growth. However, the existing storm drainage system must be studied in more detail. Flat areas where drainage is poor and where ponding of water occurs should be addressed. A detention basin and vegetated swale system may improve water quality of stormwater run-off.

3. Environmental Regulations/Existing Conditions

The following section provides an overview of environmental regulations that directly affect many of the industries in Fairfield. The list is not exhaustive, but includes the major regulatory programs. Federal laws which affect most industry includes the Clean Air Act, Clean Water Act, Resource Conservation and Recovery Act, and SARA Title III of 1986. The basic legislative requirements of these laws are described in Appendix I, and firms which fall under their purview will be identified. This information is valuable because it can be used to identify those firms which may be responsible for a greater share of environmental problems.

In addition, there are other federal regulations that require compliance by Baltimore's chemical industries. The Toxic Substances Control Act was enacted in 1976 and remains in force through continuing resolution of Congress. There are two significant areas which affect the chemical industry. Section 5 requires that an industry submit a premanufacturing notice for each covered chemical under the Generic Significant Use Rule (GNUR). The Comprehensive Assessment Information Rule (CAIR) allows the EPA to collect information on 47 chemicals already on a site.

The other two areas of regulatory compliance are OSHA and the Chlorofluorocarbon Protocol. OSHA requires that industries document and label chemicals in the work place under the Hazard Identification Standards. In 1988, the EPA established rules and a schedule for the reduction of production of chlorofluorocarbons to comply with the

provisions of the international agreement to limit such production signed in Montreal in 1987.

The industries must also comply with the laws of the State of Maryland and the City of Baltimore.

a. Air Quality

In 1989, twelve firms in Fairfield required an air quality permit as part of their operations. This number has dropped from sixteen total firms in 1980. The reduction in the number of permits caused the relocation of firms out of the area or changes in operations at permit sites. Tables 2A and 2B provide lists of firms that required air quality permits in 1980 and 1989, and the amount of emissions released by each. Table 2C outlines changes in emissions through the 1980-1989 time period.

Emissions of the 4 major categories of pollutants (particulates, SOx, NOx, CO and Volatile Organic Compounds) were reduced substantially, from 4,970 tons/year in 1989 to 872 tons/year in 1989. The most substantial reduction occurred in the category of Volatile Organic Compounds, which dropped from 2468 tons/year to 297 tons/year. In both 1980 and 1989, FMC Corp. had the largest amount of equipment and released the greatest amount of pollutants into the air. FMC also produced the greatest reduction in emissions, reducing output 1,752 tons/year without reducing the total amount of equipment. All firms

reduced their emissions or operations between 1980 and 1989, except for the Patapsco WWTP and Vista Chemical (Formally Essex Chem). These two operations expanded their capacity during the 80's which increased their level of emissions slightly.

b. Water Quality

The information in this section of the report was obtained from the document Baltimore Integrated Environmental Management Project - Phase II Report, Baltimore Harbor produced in 1987. This document utilizes comprehensive data from a variety of harbor water quality studies conducted over an extended period of time. Unfortunately, much of the data regarding water quality used in the report is old, some of it dating back to 1973. This is because no comprehensive analysis of water quality in the study area has been completed since that time. Compared to other areas of the Harbor, the situation in Fairfield has changed little over time, therefore the data is still useful for the purposes of this report. (Excerpts from the EPA document outlining the data analysis in more detail are provided in Appendix IV of this report.)

The EPA document is based on a matrix system which compares a group of water oriented uses with a list of environmental parameters necessary to sustain such uses. For example, a desired use such as Fish Quantity requires environmental parameters such as low turbidity, and fairly high habitat values. The Report divided the Harbor into thirteen study areas, and assigned values for each use and parameter. Water oriented

1980
ACTUAL EMISSIONS
(tons/yr.)

Company Name	TYPE	Units of Equipment	Particulates	SOX	NOX	CO	VOC
FMC	C	19	47	560	707	25	746
Continental Oil	P	9	40	452	258	33	25
Buffalo Tank	M	3	0	1	0	0	0
Amoco	P	8	17	108	94	21	796
Alcolac Chemical	C	6	1	16	8	2	3
Essex Industrial (Minerec Corp.)	C	10	4	0	0	0	7
Delta Chemical	C	10	30	4	2	0	5
Patapsco Wastewater Plant	S	3	0	1	1	0	18
Mobil Oil	P	1	0	0	0	0	328
B. P. Oil	P	2	4	0	0	0	546
Seaboard Asphalt	P	3	0	5	1	0	2
Fruehauf Trailer	M	2	0	0	0	0	5
Hoblemann Port Services	D	5	0	0	0	0	27
Fraco Coating Company	C	1	18	0	0	0	0
Hoblemann-2000 Chesapeake	D	1	0	0	0	0	1
MD Tire Co.	M	1	0	0	0	0	1
Annual Total		84	161	1,147	1,071	81	2,510

C - chemical
D - Distribution
M - manufacturing
P - petroleum
S - service

Source: Maryland Department of the Environment

TABLE II-B

1989
ACTUAL EMISSIONS
(tons/yr.)

Company Name	TYPE	Units of Equipment	Particulates	SOX	NOX	CO	VOC
FMC	C	19	8	49	183	21	72
Vista Chemical	C	4	3	61	37	6	15
Amoco	P	2	0	5	3	1	1
Rhone Pouleno Specialty Chemicals	C	6	0	7	7	2	0
Delta Chemical	C	9	13	1	0	0	3
Patapsco Wastewater Plant	S	9	5	47	47	30	30
Mobil Oil	P	1	0	0	0	0	75
B. P. Oil	P	1	0	0	0	0	114
Seaboard Asphalt	P	2	0	1	1	0	3
Fraco Coating Company	C	1	18	0	0	0	0
Hoblemann-2000 Chesapeake	D	2	0	0	0	0	1
MD Tire Co.	M	2	1	0	0	0	1
Annual Total		58	48	171	278	60	315

C - chemical
D - Distribution
M - manufacturing
P - petroleum
S - service

Source: Maryland Department of the Environment

TABLE II-C

1980/1989
ACTUAL EMISSIONS
(tons/yr.)

Company Name	TYPE	Units of Equipment	Particulates	SOX	NOX	CO	VOC
FMC	C	19/19	47/8	560/49	707/183	25/21	746/72
Amoco	P	8/2	17/0	108/5	94/3	21/1	796/1
Patapsco Wastewater Plant	S	3/9	0/5	1/47	1/47	0/30	18/30
Mobil Oil	P	1/1	0/0	0/0	0/0	0/0	328/75
B. P. Oil	P	2/1	4/0	0/0	0/0	0/0	546/114
Seaboard Asphalt	P	3/2	0/0	5/1	1/1	0/0	2/3
Fraco Coating Company	C	1/1	18/18	0/0	0/0	0/0	0/0
Hoblemann-2000 Chesapeake	D	0/0	0/0	0/0	0/0	0/0	1/1
MD Tire Co.	M	1/2	0/1	0/0	0/0	0/0	1/1

C - chemical
D - Distribution
M - manufacturing
P - petroleum
S - service

Source: Maryland Department of the Environment

TABLE II-D

TABLE
Water Quality Conditions

Area	Activity	Current Status	Preferred Status
Lower Middle Branch	Fish Quality	2 Slight contamination, occasional lesions	4 Slight tainting (flavor impairment but no measurable contaminants)
	Fish Quantity/Diversity	1 None	4 Moderate numbers, 4+ species
	Habitat	1 Water column and sediments contaminated, no shelter	3 Water column and sediments of acceptable quality but no shelter
	Recreational Crabbing	1 None, or contaminated and sickly	3 Scarce; no more than trace contamination
Middle Harbor	Fish Quality	2 Slight contamination, occasional lesions	3 Slight contamination (exceeds FDA Advisory) no lesions
	Fish Quantity/Diversity	1 None	3 Moderate numbers, 2 to 3 species
	Habitat	1 Water column and sediments contaminated, no shelter	2 Water column acceptable but sediments contaminated and no shelter
	Recreational Crabbing	1 None, or contaminated and sickly	2 Scarce or plentiful; some contamination
Curtis Bay and Creek	Fish Quality	2 Slight contamination, occasional lesions	2 Slight contamination, occasional lesions
	Fish Quantity/Diversity	2 Few fish, 1 to 2 species	3 Moderate numbers, 2 to 3 species
	Habitat	1 Water column and sediments contaminated, no shelter	4 Water column and sediments of acceptable quality but limited shelter
	Recreational Crabbing	3 Scarce; no more than trace contamination	3 Scarce; no more than trace contamination

[See Appendix IV of report for details regarding numerical rating system of habitat]

uses included Fish Quality, Fish Quantity, Habitat, Recreational Boating, Recreational Crabbing, and Swimming. Water Quality parameters include Bacteriological Contamination, Boat Traffic, Dissolved Oxygen, Dredging Frequency, Enrichment, Floating Debris, Sediment Quality, Shore Type, Substrate Type, Turbidity, Vegetative Habitat, and Water Column Metals.

Recreational boating and swimming were not considered to be desired uses in the Fairfield area, and therefore we did not include that data as part of this report.

For each major area of the Harbor, the EPA study established existing levels of water quality for each use category, as well as the necessary improvements needed to meet the level of quality required for each use. A Table with these values is listed in Appendix IV. This Table shows that the waters surrounding Fairfield are of low environmental quality, and do not support a wide range of aquatic species or habitat. Water quality is generally poor in the area of the Lower Middle Branch and the Middle Harbor. (Please note that data covers the entire Lower Middle Branch area across the river to Fort McHenry. Isolated areas of habitat and higher water quality such as Masonville have a tendency to 'wash out' of the statistics.) Sediments in the area are contaminated, the water is generally deep, little habitat exists and the water suffers from low Dissolved Oxygen (DO) and high nutrient and chemical loading from drainage. Water Quality in the Curtis Creek/Bay area is slightly better, with more natural habitat and DO.

There is little or no natural habitat or vegetation along most of the Fairfield shoreline because the area has been bulkheaded. The Masonville property and Curtis Creek are two exceptions, containing shallow areas and some wetlands vegetation. (See section on habitat areas).

Methods of improving the quality of run off and limiting the load of pollutants from Fairfield into the Harbor will be discussed in the final chapter of the report.

Nine industrial operations in Fairfield presently have NPDES permits to discharge to area waters. These include Amoco Oil company, Delta Chemical, Essex Chemical, Vista Chemical, FMC Corporation, Seaboard Asphalt Products, Mobil Oil, Buffalo Tank Co., and the Patapsco Waste Water Treatment Plant. Most firms discharge directly to the Patapsco River (8 firms), but effluent is also released to Curtis Creek, the Cabin Branch and Curtis Bay. There are a total of 18 outfall points in Fairfield.

Most permits cover pollutants in storm water run off, non contact cooling water and other discharges not directly involved in the manufacturing process. Typical items covered in the permits include TSS, COD, and pH. Major exceptions to this are FMC, and the Patapsco Waste Water Treatment Plant. The FMC permit includes 59 different items, most of which are chemicals. The Patapsco Treatment Plant includes nine items.

Violations:

Virtually all of the permit holders have received some violation notices since 1980. In most cases, the number of violations have decreased significantly since the early 1980's. These reductions are probably due to firms entering the City Pre-treatment Program or cut backs in production. FMC Corporation and the Patapsco Waste Water Treatment Plant each have been cited with many violations. The Patapsco Plant has had difficulty removing adequate amounts of chlorine before releasing its effluent. The Plant has entered into a consent agreement with the State, and is in the process of constructing a Declorination Facility, which will be completed by July, 1991. FMC Corporation has violated its permit obligations many times, generally caused by 'glitches' in the waste processing system. FMC must keep a certified technician on staff to operate its waste processing facilities as part of the NPDES permit agreement.

Presently only FMC Corporation is operating with a RCRA Controlled Hazardous Substance Permit. Most other firms have arranged to have wastes stored on the site for a period of time which is within the 'grace period' (30 days) time limits. Firms that recently held permits, but no longer require them include Essex Chemical, Alcolac and Vista Chemical (This list is not exhaustive). Both Alcolac and Essex have reduced their total liability by closing their hazardous waste processing facilities, and shipping the waste out of state for treatment and disposal. FMC produces such a large amount of waste that it is economically feasible for them to process the wastes themselves on site.

c. Critical Areas

In 1984, the Maryland General Assembly enacted the Chesapeake Bay Critical Area Protection Law to restrict new development and redevelopment within 1000 feet of the tidal waters of the Chesapeake Bay. State regulations were promulgated in 1986 and Baltimore City began implementing its local program in 1988. Since this peninsula is surrounded by such waters on three of its sides, this environmental law will have a fairly significant impact on development in Fairfield.

The law also designates all land within 100 feet of tidal waters as the Critical Area Buffer and imposes even greater restrictions on new development and redevelopment within this area.

Under Baltimore's Critical Area Management Program (CAMP) there are essentially two types of mitigation required for development projects. The first is that the project reduce by 10% the amount of pollutants running off the site via stormwater. The second applies only to development projects within the Buffer. All such projects must meet the 10% pollution reduction requirement and mitigate for the impact of the development by either providing mitigation on site or by paying $2.50 for each square foot of Buffer area that is developed or redeveloped.

The restrictions on development within the Critical Area also depend on the particular sub-area in which the project is located. The Critical Area Law requires the City to define these sub-areas based on existing and proposed land uses and development densities. This particular study area falls entirely within the Waterfront Industrial Area and as such

development projects will be subject only to those requirements established in Section III.D.2 of the CAMP and any Best Management Practices imposed owing to the nature of the industrial process or operation involved.

Owing to the relatively large size of most of the waterfront properties in the study area, it is expected that most development projects will be able to provide adequate mitigation on site, thereby introducing water quality and wildlife habitat benefits to improve existing conditions on this peninsula.

To accurately gauge the impact of this law on development projects within the study area, Section III of the CAMP is provided in Appendix II. The complete document may be obtained from the Baltimore City Department of Planning.

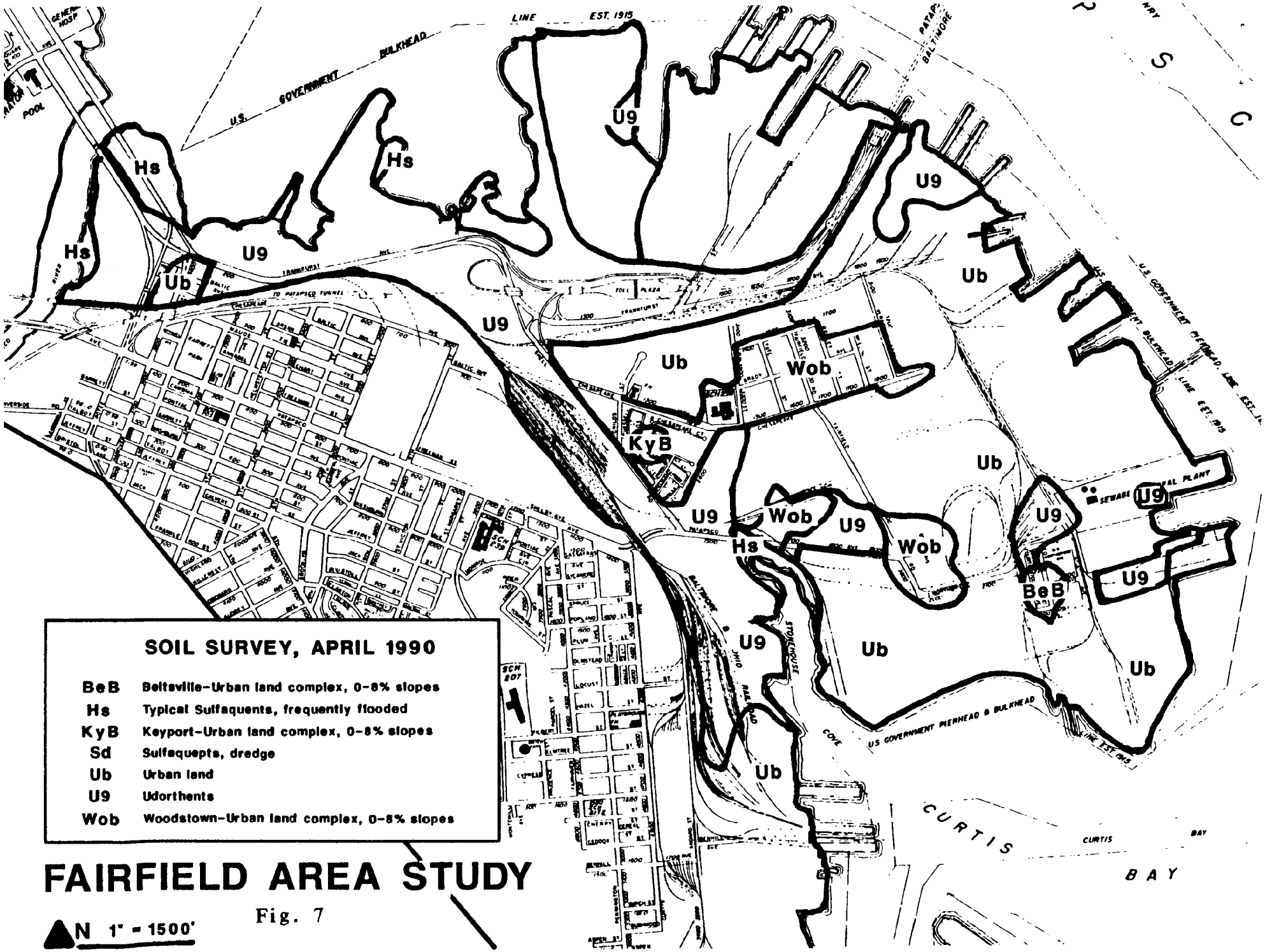
B. Environmental Conditions

1. Soils/Fill

The soils of the Fairfield peninsula have been dramatically altered by human activity over the past 150 years. Originally dominated by a mixture of highly organic, moderately or poorly drained soils, the area now is primarily paved with impervious surfaces. Urban Land (Ub) is now the dominant soil type of the area covering approximately 80% of the land. (See Figure 7.) Ub is defined as areas where "more than 80 percent of the surface is covered by asphalt, concrete, buildings, or other impervious surfaces." The

second most common soil type, 'U9'-Udorthents, covers roughly 10 percent of the study area. This soil type is found primarily in the Masonville area and along the CSX Railroad tracks. These soils are generally made up of earthy fill material which was placed on top of land to provide firm sites for buildings and roads. The fill is not less than 20 inches thick. The remaining 10 percent of the site is a mixture of WoB- Woodstown-urban land complex, KyB- keyport-Urban land complex, and Sd-Sulfaquepts, dredge. Woodstown soil consists of layers of organic loam and silty clay material, with mottling occurring at approximately 20 inches of depth. The Keyport soil is similar, but contains a sandier loam and is better drained. Sulfaquepts which are dredge material are described as very deep, very poorly drained soils developed from sulfur-rich dredged harbor sediments. This soil is found exclusively in the Masonville section of Fairfield, where extensive dredged material disposal has occurred. Finally, two small strips of Hs-Histic Sulfaquents, are located along the water's edge. These soils are almost identical in composition to the Sd-Sulfaquepts, the primary difference being that Hs is inundated for some part of the year.

In summary, the soil classifications for the Fairfield peninsula indicate that the area is primarily flat and poorly drained. Even if asphalt were replaced with a more pervious material, the silt/clay content and compaction of the substrata would make adequate percolation of drainage difficult.



FAIRFIELD AREA STUDY

Fig. 7

2. Stormwater Drainage

Section I, Storm Sewers, provided an overview of the general layout of storm drainage areas in Fairfield. This section of the report will discuss topography and drainage patterns in more detail. Generally, zone P3-B encompasses 3/4 of the study area. This basin includes most of the land east of Shell Road, and includes drainage points to the north, east and south. The majority of these outfall points consist of concrete piping systems that empty directly into the waterway. Only two of the outfalls utilize any overland flow through vegetated swales. This basin drains virtually all of the industry in Fairfield, including FMC Corp., Amoco, Vista Chemical, Shell, Delta Chemical, Port Liberty, Hobelman Properties, Old Fairfield and a portion of Fairfield homes (residential). The second drainage basin serving Fairfield labeled P3-A, drains only the western edge of the peninsula, and includes mostly the CSX Railroad tracks and the Curtis Bay neighborhood. Three outfalls from this area drain into Stonehouse Cove. The fourth outfall empties into the Masonville area through a drainage swale.

Stormwater management in Fairfield is somewhat difficult and often unpredictable. The topography follows no general pattern, varying only slightly. The area containing Fairfield homes and Old Fairfield contains adequate slopes for drainage. From here the peninsula becomes generally flat, with many depressions where

ponding can occur. This is especially true where there are large tank farms.

The historic use of the area for chemical and heavy industry has left the soils and storm systems somewhat soiled with residue. It is not uncommon for hazardous chemicals, oil or other petroleum products to turn up in the drainage systems. (Seen in the State NPDES files).

This combination of factors will make alterations and improvements to the system more complicated.

3. Streams and Wetlands

Despite the dramatic amount of fill, compaction and paving of the Fairfield peninsula, some small areas of wetlands still persist. Most are concentrated along the intermittent stream which feeds Stonehouse Cove, and at its outlet. A couple of small strips of emergent estuarine plants are identified on NWI maps along the southern edge of the FMC property. The presence of these wetlands have not been field verified because the City could not gain access to the property. The NWI maps also indicate that various ponds occur throughout the Fairfield area. These areas should also be field verified, the ponding may result from stormwater and may change when development and grading occur. The NWI maps also indicated that the Masonville property contains some isolated pockets of wetlands. The upland pockets are brackish

and semi-permanent. Many exist because of inadequate diking systems. Extensive mudflats are located just off of the Masonville property.

4. Condition of Waterfront

The Critical Area Management Program of Baltimore City (effective January 1988) requires that the City take measures to prevent or minimize erosion of the shoreline in the Critical Area, which literally means the entire shoreline within the boundaries of Baltimore City.

In accordance with the Critical Area Management Program (CAMP), the City has adopted the following two basic policies in regard to shore erosion protection measures:

(1) Encourage the protection of rapidly eroding portions of the shoreline in the City by public and private landowner, and;

(2) where such measures can effectively and practically reduce or prevent shore erosion, encourage the use of non-structural shore protection measures in order to conserve and protect plant, fish and wildlife habitat.

The problem of shoreline erosion, however, is not as severe in Baltimore City for the mere fact that most of the shoreline, if not all, has either been altered or bulkheaded.

The Department of Planning of Baltimore City conducted an exhaustive survey in October 1986 of the approximately 26 miles of shoreline. This was augmented with aerial photographs taken from the City Police helicopters in summers 1985 through 1989, and other materials obtained from various State and Federal agencies. Only 8.5 miles exist in a "natural" condition, some of which can be found in Stonehouse Cove.

Only three sites with a total of 4,600 linear feet has been identified as having "slight" erosion problems and they are outside the Fairfield Area Study. However, there may be a few sites in the Study area already witnessing erosion problems or may be subject to erosion in the near future. A field survey will need to be conducted to locate and evaluate these sites.

5. Water Depth

The Fairfield peninsula is accessed by two deepwater channels. These are the Fort McHenry Channel and Ferry Bar Channel. (See Figure 8.) The Fort McHenry Channel crosses in a northwesterly direction along the edge of the peninsula. Three private channels extend from the main channel into the Fairfield area serving the Shell, Struever Brothers and Vista Chemical properties. These channels are approximately 35 feet deep. The Ferry Bar Channel provides water access to the northern portion of Fairfield, crossing in an easterly direction above the peninsula's northern face. Two private channels extend to serve the Struever Brothers

property, the Toyota Auto Terminal and the Forest Products company. The water depth in this area is consistently deeper than in other areas of the peninsula, averaging roughly 20 feet up to the existing bulkhead.

Water depth along the edge of dry land is generally shallow, averaging between 1 and 4 feet at mean low tide. The most extensive shallow areas are located at the mouth of the Patapsco River, within Curtis Creek and along the edges of the FMC property at the southwestern edge of the peninsula. In Curtis Creek the shallow ledge drops off approximately 375 feet from the lands edge, sloping to depths of 15 to 21 feet. Coast Guard maps identify a 1200' x 750' section of land in front of FMC area as a 'Spoil Area', with water depth registered at 9 feet mlw. It is not currently known what type of dredge spoil has been placed there.

IV. ECONOMIC DEVELOPMENT/FUTURE ENVIRONMENTAL REGULATIONS

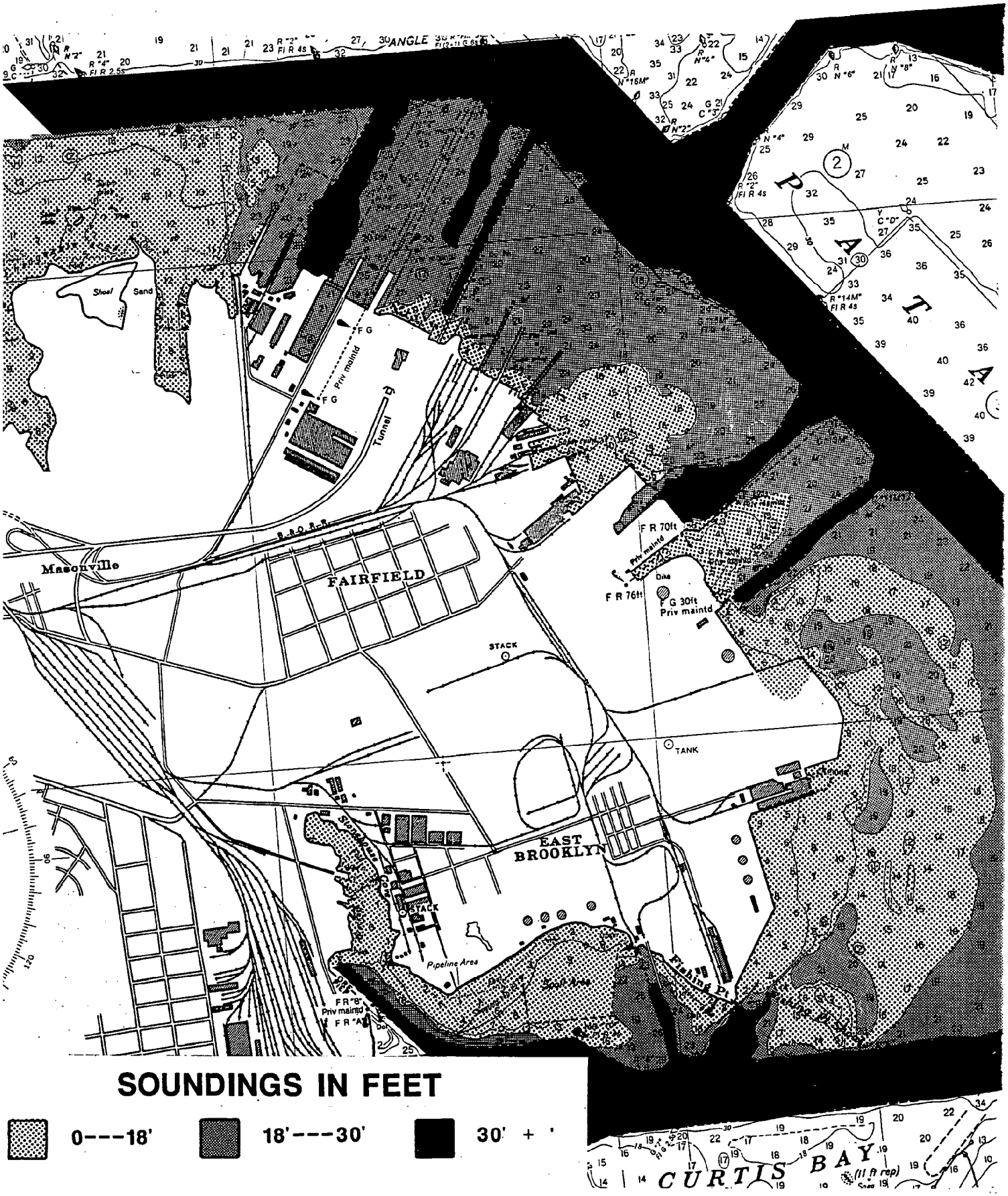
A. Growth in the Critical Area

1. General Growth

Other than existing industry expansion and modernization and with the exception of four major projects described in the following paragraphs, very little economic development activity has occurred in the Fairfield peninsula's extensive critical areas. All the major chemical and petroleum industries have maintained their status quo. The sole exception is Amoco Oil, encompassing a 60 acre site at the southeastern tip of the peninsula. This facility ceased operations as of July, 1990 and is in the process of planning a dismantling and clean-up operation to ready the property for future re-sale or re-use.

2. Port Liberty

In 1989, Buffalo Tank sold 31 of its 38 acres to a private developer who is marketing the site as the "Port Liberty Industrial Center." In an agreement with the City not to permit any recreational marina use, the developers hoped to renovate an existing warehouse into office use along with a boat/tug repair and new boat preparation facility on the property. In a recent development, the owners have begun to negotiate with a used oil recycler for the sale of a 20-25 acre parcel in Port Liberty. The recycling operation would process 75 million gallons per year



FAIRFIELD AREA STUDY

Fig. 8

(mgy) of used motor oil brought in from various waste oil generators along the east coast. This operation would lie within the 100 year floodplain but it would be kept out of the 100 foot critical area buffer. The operator suggested that the plant may be expanded to 150 mgy a few years after start up.

3. Masonville

In 1987 the Maryland Port Administration (MPA) purchased 60.5 acres of land from the Arundel Corporation to augment its container handling operations. Due to the idle capacity at the new Seagirt Terminal in Dundalk and the overall economic slowdown, MPA has decided not to develop this site for the present time. Although Toyota is utilizing part of the property for its auto import distribution center, no major expansion is anticipated.

4. CSX Coal Terminal

In 1983 a coal storage area was built by Island Creek Coal Company on CSX property south of Stonehouse Cove on Curtis Bay. This export terminal can handle up to 12 million tons of coal per year. The coal, used for steam generation, is brought in by 130 car-long unit trains, and is stored in large open piles.

5. Patapsco Wastewater Treatment Plant

In 1924, 29 acres of land at the present site of the Patapsco Plant on Wagners Point was purchased for $115,000. Construction began in 1937 and a new 10 million gallon per day (mgd) treatment plant began operations in 1940. This plant served the Brooklyn, Curtis Bay and Fairfield communities as well as contiguous areas of Anne Arundel County. Residential and industrial customers alike received central sewer service. The plant was later expanded to treat 14 mgd from an enlarged service area which included portions of Baltimore, Anne Arundel, and Howard counties situated within the Patapsco River Valley.

A series of studies and master plans in the late 1950's and 1960's laid the groundwork for the overall planning and design of the present plant. The primary goals were to upgrade the quality of treatment to meet the more stringent water quality requirements for the Chesapeake Bay, and to have sufficient capacity for future growth anticipated in the service area.

In June 1985, the new 70 mgd secondary treatment plant was formally dedicated. More than 90 percent of waste water pollutants are now removed from the sewage flowing to the facility. Current construction totalling $4 million is 90 percent complete. This new Chlorination/Dechlorination system is engineered to control discharged levels of residual chlorine and phosphorus entering the Patapsco River, and to keep pace with growth occurring in the service area. The resultant sludge is burned in the plant's incinerators and the ash is buried in the Quarantine Road landfill.

B. Economic Development Strategies for Fairfield

1. General Scope

The level of future development in Fairfield will be determined by the size and number of developable parcels that are available. A previous study has identified and inventoried such properties and included them in the City's computerized database of industrial development sites. Also, the study revealed some interesting overall trends affecting industries in Fairfield:

- Fairfield's chemical industry is strong presently and is optimistic about the future. This is consistent with national trends, as reported in the 1989 U.S. Industrial Outlook:

  "The strong market for U.S. chemical products, both at home and abroad, is placing a heavy burden on operating capacities. As a result, the industry is expanding its production facilities. The Bureau of Economic Analysis (BEA) of the Department of Commerce estimates that the chemical industry increased its capital expenditures for new plant and equipment by 11.7 percent in 1988, substantially more than the 8.4 percent increase the industry had planned in 1987 to spend in 1988.

- Compliance with environmental regulation is increasingly difficult on companies in Fairfield, since the area is dominated by industries (chemicals and petroleum) that attract close scrutiny by environmental agencies. Almost every company interviewed in these two industries cited the

increasing cost of complying with environmental regulations as a major concern.

- The petroleum industry seems gradually to be adopting a strategy in response to environmental regulation. More and more, different companies are consolidating like operations to achieve economies of scale in complying with environmental laws. For example, two petroleum companies, each of which is engaged in both heating oil distribution and asphalt production, may agree that one company will handle all the asphalt and the other handle all of the heating oil. By doing so, each company has only to comply with one set of environmental regs, rather than two. If this consolidation strategy continues, it could render obsolete some existing facilities, creating redevelopment opportunities and an overall improvement in environmental quality. However, the environmental contamination often associated with such operations certainly will limit redevelopment or require additional clean-up costs.

2. Assessment of City Owned Sites

The City of Baltimore controls two development sites totalling 25 acres that are across from each other on the 1300-1400 blocks of Chesapeake Avenue. Each one is large enough for independent industrial development. Victory Elementary School (closed in June of 1989) sits on a 4.25 acre lot at the northwest corner of

Chesapeake and Sun Streets. The one story brick and block building will probably need to be demolished because conversion to industrial use is very unlikely. There is no current knowledge of environmental contamination on the site. The property does not fall within the State's "critical area." An evaluation of the existing structure for asbestos contamination revealed that there is a small quantity in the boiler room and in the ceiling and floor tiles.

The second of the City-controlled sites is the 20.8 acre Fairfield Homes public housing project which is located just across Chesapeake Avenue to the southwest of Victory Elementary. Originally constructed in 1942 to provide for wartime housing for workers in the nearby shipbuilding industry, the development has been used as public housing since soon after the war. Federal and City officials decided that rather than invest additional funds for extensive housing repairs, it was best to relocate these families and make the site available to the City for industrial redevelopment. It is expected that all remaining residents will be moved out by the early part of 1991. The entire site will need to be demolished. There are currently no known environmental problems with the Fairfield Homes site. The property does not fall within the Critical Area. The market for industrial land in Fairfield is fairly strong based on information about the local real estate market, and the redevelopment of Victory Elementary School and Fairfield Homes seems promising.

The most significant potential complication for redevelopment for both sites is the stormwater management system because of the flatness of the terrain. The Fairfield Homes site is especially complex because the site straddles two drainage areas. Sizable drainage pipes are located nearby and can be utilized, but parts of the public housing site may have to be filled to achieve proper drainage.

3. Old Fairfield City Policy

Old Fairfield is a 30 acre residential enclave surrounded by industry. Today only 12 households remain after many years of steady decline. For years, Old Fairfield has posed a dilemma for the City. Although it was zoned for heavy industry, people still lived there. City policy over the years was to resist resident's demands for essential City services. The City's long standing offer to purchase properties from willing sellers has netted the City a "patchwork quilt" of small parcels each of which is too small to develop. The joint study developed by BEDCO and the Planning Department's Economic Development section identified three options for addressing the situations:

a. Designate Old Fairfield an Urban Renewal Area. Under this scenario, the City would seek to bring about the comprehensive and rapid industrial redevelopment of Old Fairfield by using condemnation powers to assemble and then sell off the land.

b. Continue the current gradual approach to land assembly and make limited capital improvements to improve conditions for the residents who remain. Under this scenario, the City would continue to buy voluntarily offered properties as they become available.

c. Sell the parcels that the City has already acquired and leave redevelopment to the buyer. Under this scenario, the City would work to achieve redevelopment of Old Fairfield by enabling a private party to develop the land. The City would draft an RFP document that would outline the City's goals for the area and would evaluate offers based on their compatibility with these goals.

C. New Federal/Local Regulations Regarding the Environment

1. CLEAN AIR ACT AMENDMENTS of 1990

The following section of the report provides an overview of the recent Clean Air Act amendments, and briefly discusses changes they will create regarding air pollution controls in the Fairfield area.

The current amendments are aimed primarily at Ozone, Volatile Organic Compounds and Nitrogen Oxides. Jurisdictions which exceed EPA standards must comply with new requirements depending on the level of severity of pollution in their area. Baltimore is designated as a Severe Nonattainment area for Ozone

contamination. This designation establishes the following requirements:

- The State must identify 'Major Sources' of Volatile Organic Chemicals (those firms emitting 25 tpy or more) in the City.
- The MDE will require all Major Sources to install Reasonably Available Control Technology (RACT).
- The MDE must require offsets at a rate of 1.3:1

Regardless of a jurisdiction's Air Quality designation, all sources of VOC must reduce their emissions 15 percent by 1996.

Other provisions which may effect industries in Fairfield include additions to the Air Toxic's section of the Act, and requirements for Nitrogen Oxides. The Air Toxic Amendments include a list of 189 chemicals which will be added to those already being regulated. Within one year EPA will establish a list of major sources for each chemical. Firms emitting the pollutants will be required to obtain permits similar to the existing process.

Nitrogen Oxides- provisions are included for controlling the release of nitrogen oxides from new and existing facilities. These sources are subject to the same technological requirements as those required for VOC.

The new Clean Air Act requirements will primarily affect four firms in Fairfield, all of which emit over 25 tpy VOC and Nitrogen

Oxides. These firms include FMC, the Patapsco Wastewater Treatment Plant, BP Oil and Mobil Oil.

These new requirements mandate the State to adapt tighter controls which will result in a 15% emissions reduction within 6 years and 3% annually thereafter until attainment in the year 2007. The requirement to obtain 3% per year emission reductions in the Baltimore area poses a real challenge and will impact these industries financially. The Amendments require States to develop RACT which is an emission limitation for small sources (25 tpy). The bottom line is that these industries will have to spend more dollars for pollution control equipment.

2. CLEAN WATER ACT - Amendments to Storm Water Regulations

The 1990 Clean Water Act amendments require that all jurisdictions with a population over 250,000 people submit a program to the EPA for monitoring and permitting stormwater outfalls. Rather than submit a large number of individual permits, the regulations allow municipalities to apply for one general permit to cover all outfalls.

As part of the permitting process, the City must submit a plan which describes existing facilities, stromwater quality, proposed monitoring programs and the proposed processes for permitting pollutant sources, especially in industrial areas such as Fairfield.

As part of the permitting process, the City will establish drainage basins, sample outfalls, and identify the source of any illicit chemicals or substances. This may not be possible in larger watersheds, and the City will probably focus on high pollutant areas such as industrial areas rather than sampling all outfalls.

3. Critical Area Habitat Protection Requirements - Baltimore City

In addition to the existing Critical Area requirements, certain waterfront properties within the study area will be subject to Habitat Protection Plan requirements. (See figure 9.) These additional requirements are proposed as an amendment to the City's CAMP but have not been, as yet, approved by the Chesapeake Bay Critical Area Commission nor have they been formally adopted by the Mayor and City Council.

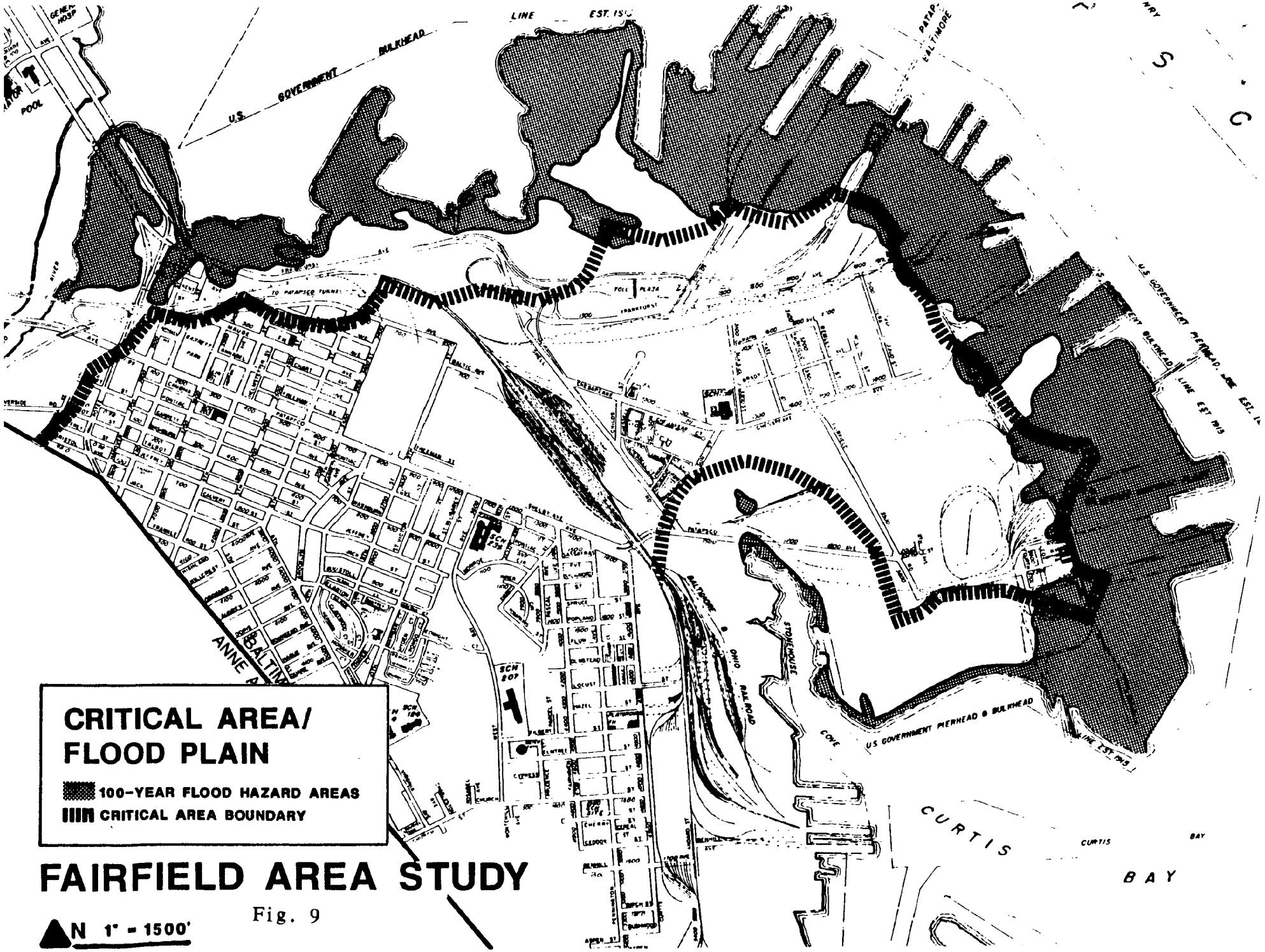
Under terms established by the Chesapeake Bay Critical Area Protection Law and Regulations, Baltimore City is required to prepare and adopt as part of its approved CAMP, special measures to conserve fish, wildlife and habitat where such wildlife is found to exist within the Critical Area. Within the study area, such pockets of wildlife habitat have been identified by various state and federal agencies in two sections of the peninsula. These areas are Masonville and Stonehouse Cove and are described below. (See figure 10.)

Masonville - This Habitat Protection Area (HPA) has been identified as a colonial water bird staging and concentration area. The area includes all waters to the mean high water line which lie within the cove formed by the irregular shoreline of 3100 Childs Street (Block #7043, Lot #1) and all lands within 100 feet of the mean high water line. In addition, the area includes a 100-foot buffer on both sides of the tributary stream which empties into this cove at the south end of the property. This 100-foot buffer shall extend from the north side of Frankfurst Avenue and continue northeast to the point where the stream intersects the Critical Area Buffer.

Stonehouse Cove - This HPA has been identified as a colonial water bird roosting and concentration area as well as a waterfowl staging and concentration area. The cove contains vegetated tidal wetlands bordering on upland forested areas. The upper reach of the cove contains an intermittently tidal stream which is heavily vegetated along both banks. The area includes all the waters of the cove extending out into Curtis Creek to a point located approximately 1,750 feet when measured perpendicularly from East Patapsco Avenue. The area also includes all lands within 100 feet of the tidal waters described above and all lands within 50 feet of the intermittently tidal stream extending from the southeast side of the East Patapsco Avenue bridge and continuing upstream to the limits of the Critical Area. In addition to the above, this habitat protection area includes the forested areas along the western side of the cove extending from East Patapsco Avenue and

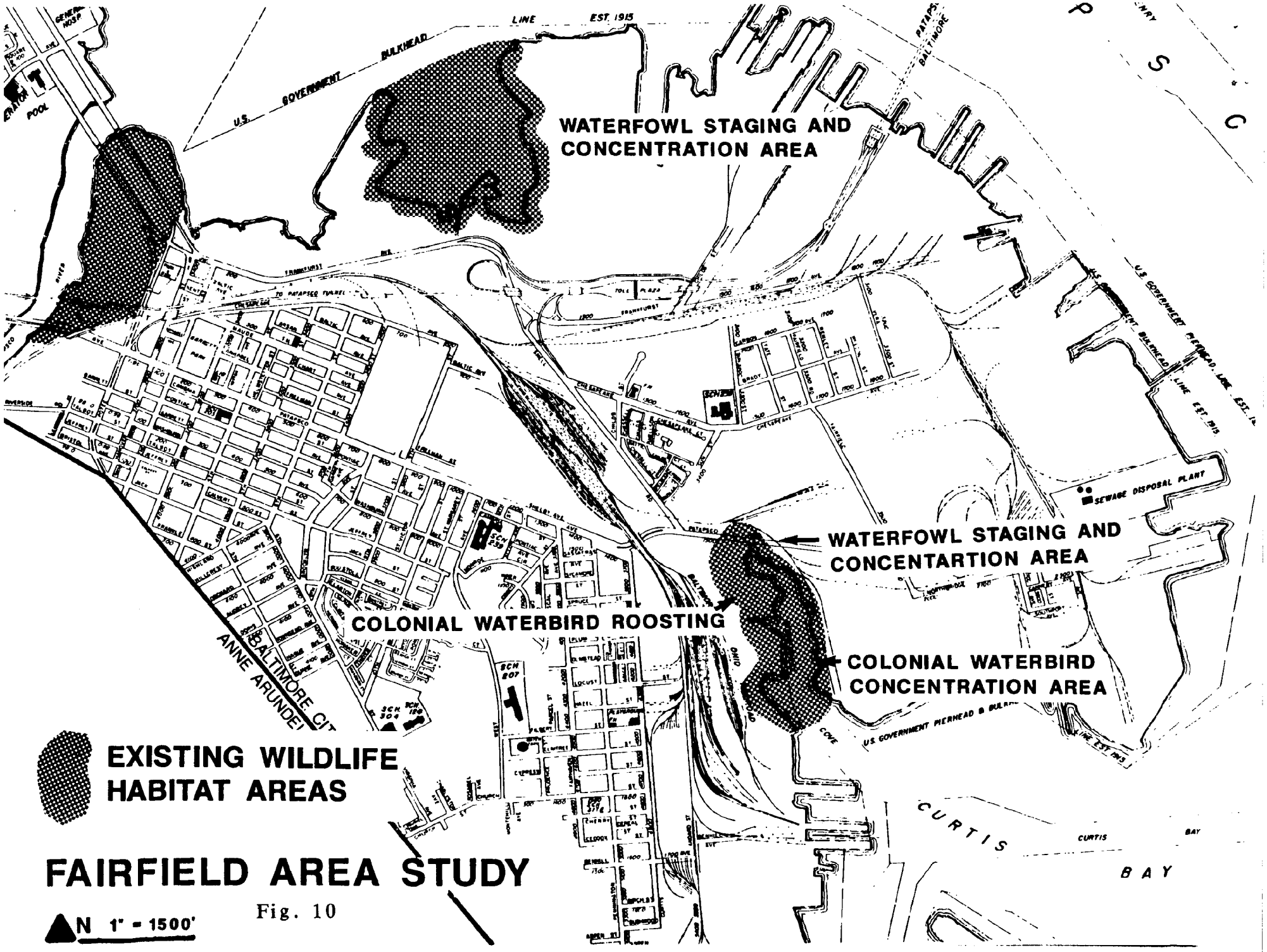
bounded on the west by the access road to the B&O Railroad coal terminal, further extending southward along the access road to a point located approximately 1,000 feet from the intersection of the access road with East Patapsco Avenue and extending diagonally southeast from this point to where it intersects with the 100-foot buffer and then extending to a point along the shoreline situated approximately 1,700 feet from East Patapsco Avenue when measured perpendicularly.

Provisions for obtaining variances from the mandatory set-back requirements can be found in the Habitat Protection Plan which may be obtained from the Baltimore City Department of Planning.



FAIRFIELD AREA STUDY

Fig. 9


WATERFOWL STAGING AND CONCENTRATION AREA
WATERFOWL STAGING AND CONCENTARTION AREA
COLONIAL WATERBIRD ROOSTING
COLONIAL WATERBIRD CONCENTRATION AREA
EXISTING WILDLIFE HABITAT AREAS
FAIRFIELD AREA STUDY
Fig. 10
N 1" = 1500'
U.S. GOVERNMENT BULKHEAD LINE EST. 1915
SEWAGE DISPOSAL PLANT
BALTIMORE
ANNE ARUNDEL
CURTIS BAY
PATAPSCO

IV. Conclusions and Assessment

A. Environmental Goals and Objectives

1. Improve Shoreline - In its present condition, the shoreline around the Fairfield peninsula can use improvement for both commerce and habitat uses. Many of the bulkheaded areas are dilapidated, and many pier structures and dilapidated barges exist along the shoreline, especially in Curtis Creek. Areas that are not bulkheaded can be improved through vegetative plantings and removal of derelict structures. Existing bulkheads can be rehabilitated as properties turn over and are redeveloped. This will reduce navigational hazards and erosion problems.

2. Protect Habitat - Despite the heavy industrial nature of the Fairfield area, some areas of high habitat value exist. It is the goal of this plan to preserve and enhance these areas where feasible.

3. Encourage buffers/wildlife corridors - Existing wildlife habitat can be greatly served by creation of a corridor/buffer system throughout the peninsula. This type of system is not difficult to implement if guidelines are built into existing development restrictions. Such corridors and buffers can serve the dual use of increasing habitat values while also improving water quality and drainage.

4. Improve quality of storm water run off - The historical industrial uses on the Fairfield peninsula have created a situation where soil compaction and contamination cause pollution problems in stormwater runoff. Through the use of a buffer and naturalized drainage system, as well as the EPA stormwater regulations, it is hoped that stormwater quality can be improved.

5. Remove discharges except Patapsco's WWTP - As part of the effort to improve water quality around the Fairfield peninsula, all existing NPDES discharges should be tied into the City's Pretreatment program, where feasible.

6. Improve Patapsco's discharge - The current discharge from the Patapsco WWTP occasionally violates NPDES permit requirements because of excess chlorine, or high Coliform counts during storm flows. Planned expansion of capacity, improved treatment operations and construction of a dechlorination plant will all help to improve effluent discharge.

7. Use Offset funds to improve specific areas - Offset funds are available to complete specific projects for wetlands creation and habitat improvements, which will be discussed in more detail in the following section.

B. Findings - Potential Measures for Environmental Improvement

1. Changes to Zoning

Although land use controls via zoning are a viable means of protecting the environment, it can also unduly limit the potential growth of existing businesses. This section of the report examines alternative land use controls for Fairfield by first describing the existing zoning and then describing the existing land use pattern. Finally, four alternatives for industrial land use control are explored. All of the industrial land in Fairfield is zoned M-3 for heavy industry which is the most permissive type of industrial development. (See figure 11.) Land use in Fairfield can be described in terms of three subareas. The southern part of Fairfield is the most heavily developed and has mostly M-3 uses. In this area, east of Shell Road and south of Chesapeake Avenue, almost all the land is used for manufacturing chemicals, distributing petroleum, or producing asphalt.

The northern part of Fairfield, north of Frankfurst Avenue, has large non-M-3 uses such as an automobile import/export marine terminal and large outdoor storage lots for automobiles and lumber (M-2 and M-1 uses). This part of Fairfield also contains the Buffalo Tank manufacturing plant and Port Liberty, a multi-tenant industrial redevelopment project.

The west-centrol part of Fairfield, between Frankfurst Avenue and Chesapeake Avenue, has a mixture of small M-3 and M-2 uses and the Old Fairfield residential community. In the western most part of this subarea, west of Sun Street, is a number of medium sized vacant parcels among a group of M-2 businesses. The City owns two

vacant sites here, the former Victory Elementary School (4.25 acres) and the former Fairfield Homes public housing project (20 acres). The general character of this part of Fairfield as currently developed is less intense than a typical M-3 area.

The general purpose of zoning is to assure land use compatibility within a zone and between adjacent zones. However, to respect the rights of existing land uses and to meet public economic growth objectives, zoning cannot ignore the long established pattern of land use. There are several alternatives within the zoning code which could be used to address problems resulting from industrial development:

(1) changing to a less intensive industrial zoning category; for example, from M-3 to M-2;

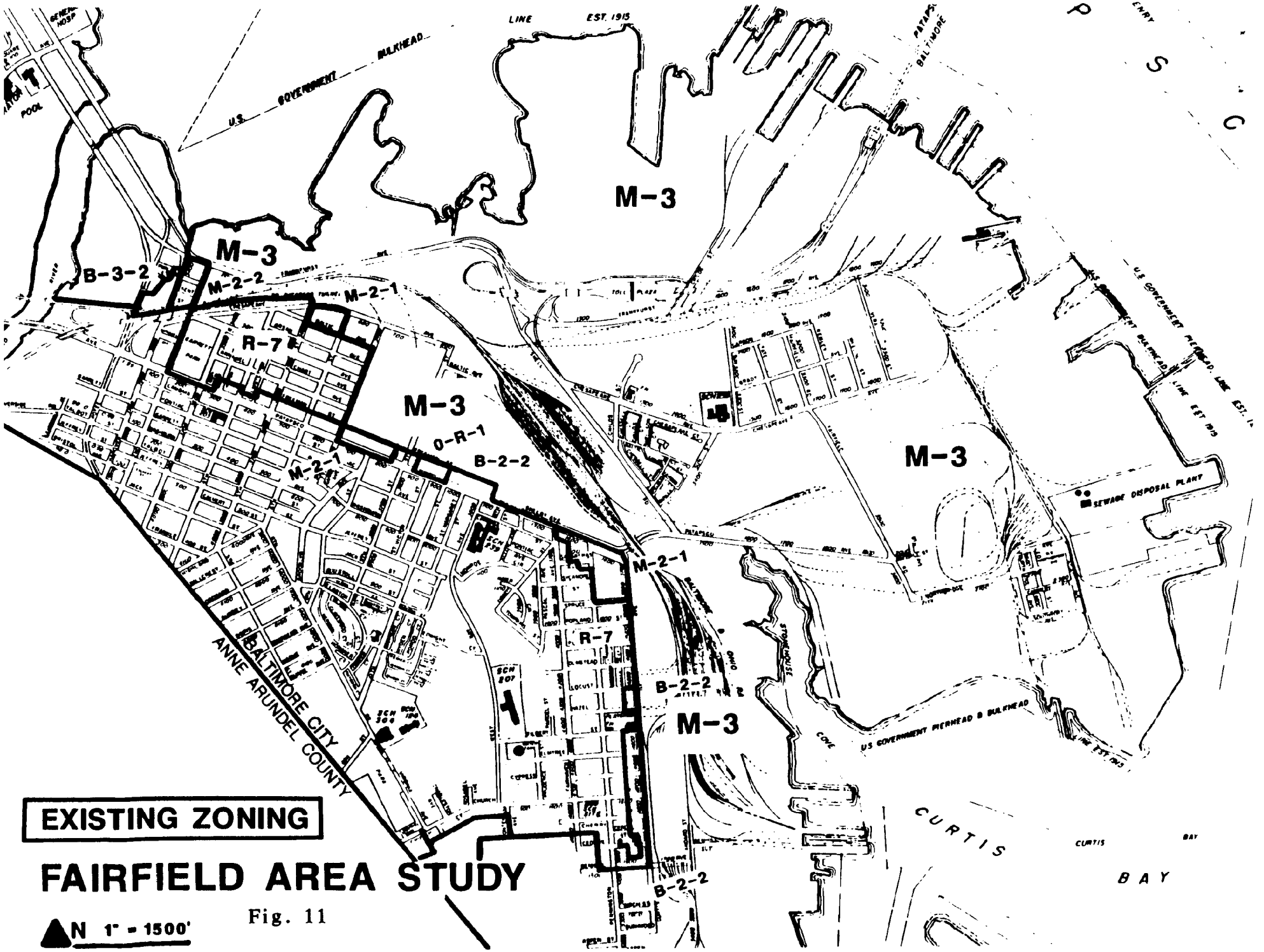
(2) changing the definition of permitted uses within the existing category; for example, eliminating some uses in M-3 or M-2 (this alternative may involve the formation of a new zoning category);

(3) changing which uses are conditional in existing zoning categories;

(4) creating performance standards for certain uses. Land use control changes such as these are now being explored by a task force representing area community, industry, city, and State officials.

2. Suggested Places to Use Offset Funds

The Fairfield Peninsula contains two significant waterfowl staging and concentration areas - Masonville and Stonehouse Cove.



EXISTING ZONING

FAIRFIELD AREA STUDY

N 1" = 1500'

Fig. 11

The Masonville Cove has significant habitat for wintering waterfowl. The upland portion of the site has habitat attractive to field species with significant potential for enhancement. The site was created with dredge spoil and so the soils are extremely acidic which would need to be addressed in any enhancement plan. A significant part of the 70 acre tidal marsh is vegetated with Phragmites which has limited habitat value.

The natural shoreline along parts of Curtis Creek are important habitat for wintering waterfowl, wading birds, gulls, migrant waterfowl, cormorants and grebes. In particular, Stonehouse Cove has attractive wetlands with shore-wide vegetation for roosting.

Due to the limited availability of funds, only one of these areas is likely to receive financial assistance to examine future enhancement potential and protection. Since the proposed development for Masonville has been postponed for the present time, it is suggested that efforts be directed to Stonehouse Cove and the intermittent stream which flows into it. As part of this overall assessment, it is recommended that the feasibility of establishing a greenway link with Masonville be evaluated.

Linkage is an important variable in habitat areas. Habitat areas which are either adjacent to each other or connected by a corridor will have greater value to wildlife than isolated patches. Streams are a strong determinant in the linkage of habitat areas. The

intermittent stream may serve as a convenient means to establish a greenway corridor in the Fairfield peninsula.

In addition to the on-site mitigation expected to be driven by new development and redevelopment, the City will be working with property owners who wish to use portions of their shore line for enhanced vegetation as a means of achieving overall water quality and wildlife improvements. The City is committed to using offset funds derived from elsewhere or development projects to match the efforts of private property owners to improve shoreline conditions. The City is also prepared to negotiate conservation easements with cooperating property owners to provide property tax relief and to insure that revegetated portions of the City's shoreline remain forever green.

3. Use of Critical Area regulations and Habitat Protection Program to enforce/encourage needed changes

The Maryland State Critical Area Law has established criteria for the protection of eleven resource areas within the Critical Area. The State law defines each of these areas and establishes guidelines for protection. The Baltimore City Habitat Protection Program identifies and locates each of these habitat areas which exists in Baltimore City, establishing protection policies for each.

Virtually all of the natural habitat of Baltimore City's Critical Area has been disturbed within the past century. For the majority

of the land area, shoreline habitat (84%) has been completely removed and replaced with paved surfaces, bulkheading, filling, rip-rap, or concrete rubble. Relatively small pockets of vegetated open space comprised of various stages of secondary growth and wetlands still exist and serve to support wildlife species.

The Critical Area Commission favors and encourages non-structural shore-erosion control measures only be used in areas where wave conditions permit.

Shoreline conditions will be taken into consideration whenever a "significant" development project is subject to Critical Area findings. New development or redevelopment that is undertaken along the shoreline will be required to specify whether new or replacement shoreline protection is contemplated. Bulkheading will be allowed for water-dependent uses that expect to tie vessels up to the shoreline, or in the Waterfront Revitalization Area, where necessary for public safety or boat access. All other uses will be required to use stone revetment or vegetative stabilization, with a preference for the latter. The lower cost of vegetative stabilization and the presence of viable examples throughout the Chesapeake Bay area should assure that this method is used more often.

The open spaces within the Critical Area include approximately 70 acres of high and low marsh habitat in Masonville and a 5 acre undeveloped wooded lot adjacent to and east of Fairfield Homes.

Baltimore City has identified the presence of two general categories of habitats in Fairfield as established in COMAR 14.15.09 and they are the Critical Area 100-foot buffer and historic waterfowl staging and concentration areas. The City is proposing that these areas be designated as Habitat Protection Areas (HPA) and that the following protective measures be adopted to protect these areas from the adverse impact of development.

Proposed Protection Requirements for Designated HPA's

The following protection measures are proposed to protect these areas from the adverse impacts of development.

1. A 100 foot buffer along vegetated tidal wetlands (shoreline) and greenway corridors.
2. A 50 foot buffer along intermittently tidal tributaries and streams.
3. A 25 foot buffer along non-tidal wetlands and streams.
4. An expanded buffer area on selected parks and floodplain areas.
5. An expanded buffer to include adjacent wooded areas where woodlands are an integral part of the habitat of the buffer area.

Habitat Protection Areas having significant vegetation

In those designated habitat protection areas where the Director of Planning determines that significant vegetation already exists, there will be no disturbance of these areas.

In the event these restrictions would result in unwarranted hardship to a property owner owing to special features of the site or other circumstances, the property owner may file an appeal with the Board of Municipal and Zoning Appeals for the grant of a variance from the provisions set forth in the Critical Area Management Program. The grant of such a program variance will be subject to the conditions as established in Section 3C.2-2 of the Zoning Ordinance of Baltimore City. The grant of such a program variance is further conditioned upon certification by the Director of Planning for Baltimore City that the proposed development could not be located elsewhere on the property and that the development activity is limited to the absolute minimum required for the development.

Habitat Protection Area not having significant vegetation

In those portions of designated habitat protection areas where the Director of Planning determines that no significant vegetation exists, the developer may encroach upon the habitat protection area providing that all the conditions set forth below are met.

Any proposed encroachment upon a designated HPA not having significant vegetation will require that a zoning appeal be filed

with the Board of Municipal and Zoning Appeals for a conditional use. The grant of a conditional use will require the developer to demonstrate that the proposed development could not be located elsewhere on the property and that the development activity is limited to the absolute minimum required for the development as determined by the Director of Planning for Baltimore City.

In order for the Director of Planning to certify for the Board that the above conditions have been met and that the proposed development will not adversely affect the Habitat Protection Area, the developer must first prepare a habitat assessment and a mitigation plan for the development site as explained below.

Habitat Assessment

Where a proposed development project has requested a variance from the provisions set forth in the Critical Area Management Program, the developer will be required to perform a habitat assessment of the site to determine the impact of the proposed development on the protected habitat located on or adjacent to the development site. Any such assessment will be subject to field investigations and other verification methods as determined by the department of Planning.

The habitat assessment requirements and field survey form will be published as an appendix to the City's Critical Area Development Manual.

Mitigation

In addition, the grant of a program variance will require the developer to provide appropriate environmental mitigation on a 1:1 basis. Any such mitigation for developing in or near a designated habitat protection area is subject to the prior approval of the Department of Planning.

Tree Replacement Requirement

Within the Critical Area of Baltimore City, any tree of a 4" caliper or larger that is cut, removed or destroyed by a development activity must be replaced and maintained by the property owner. Replacement of all such trees shall be on a 1:1 basis where the combined total caliper of the replacement trees equals the combined total caliper of the trees displaced. Any trees cut, removed or destroyed without prior approval must be replaced and maintained on a 2:1 basis.

Any tree replacement plan or reforestation program undertaken for mitigation purposes must have the prior written approval of the Director of Planning for Baltimore City. No occupancy permit shall be issued until the tree replacement or reforestation program has been completed or until an escrow account or, non-revocable letter of credit has been established in the name of Major and City Council. This account has be for an amount equal to the total estimated costs of the tree replacement reforestation program plus

40% for contingencies and project management fees in the event the developer fails to implement the plan.

4. Stormwater Changes

Urban streets contain many toxic contaminants (non-point source pollution) which enter streams during a storm's peak, and this pollution poses a serious detriment to wildlife.

Motor vehicles are primarily responsible for depositing substantial quantitites of materials on roadways, including significant levels of toxic heavy metals, asbestos, and slowly biodegradable petroleum products and rubber. Runoff from urban roadways induces a shock effect upon the receiving waters and the biota of these waters as the accumulated nutrients and toxic and oxygen-demanding substances are introduced abruptly during a storm.

A few potential solutions for reducing these shock loads may include the following:

(a) select roadway sites so as to minimize the area draining directly into the receiving body of water;
(b) utilize low curbs when the road is adjacent to flat, unpaved areas or areas that slope gently away from the street surface. This will facilitate the deposition of the dust and dirt into grass and gravel areas and reduce the rate of deposition in runoff water;

(c) consider the use of porous pavement in areas where the soil type permits it;

(d) intensify and improve street-cleaning operations to reduce urban roadway runoff effects;

(e) design curbs and gutters to facilitate concentration and collection of particulate material;

(f) investigate various approaches to detention and storage of storm runoff and separation of solids from stormwater.

APPENDIX 1

1. The Clean Air Act

2. The Clean Water Act

3. The Permit Program and Enforcement

4. Resource Conservation and Recovery Act (RCRA)

5. Superfund Amendments Reauthorization Act (SARA, 1986)

1. The Clean Air Act

The major goals of the Clean Air Act are to identify air pollutants that could endanger public health and welfare, to describe the potential effects of these pollutants at varying levels, and to establish "control techniques" to achieve and maintain appropriate ambient air quality standards.

The Clean Air Act's complex processes are primarily focused upon the setting, attainment, and maintenance of National Ambient Air Quality Standards (NAAQS). "Ambient air" has been defined by EPA as "that portion of the atmosphere external to buildings, to which the general public has access."

According to the Act, EPA is responsible for

1. Identifying air pollutants which endanger public health or welfare,
2. Issuing scientific "air quality criteria" describing the effects expected on public health from the presence of such pollutants in the ambient air, and
3. Publishing "control techniques" for the pollutants.

EPA is required to promulgate primary and secondary NNAQS for these air pollutants.

The Clean Air Act requires states (through State Implementation Plans) to classify areas by pollutant into (1) those areas that fail to meet primary or secondary ambient air quality standards, (2) those that cannot be classified due to insufficient data or information, and (3) those that have ambient air quality levels better than any national primary or secondary ambient air quality standard.

SIPs must also include emission limits, schedules of compliance, preconstruction review of direct sources and the Prevention of Significant Deterioration (PSD).

Activities Requiring Permits: Major Stationary Sources and Major Modifications to existing sources are regulated under the permit requirements. The program requires that prior to the commencement of construction of any major stationary source or major modification of such a source, a permit must be obtained for the source or modification after undergoing preconstruction review, which involves impact and technology analyses and an opportunity for public hearing.

The PSD regulations generally define a "major stationary source" as (1) any one of 28 listed industrial sources that emit or have the "potential to emit" 100 tons per year or more of any pollutant regulated under the Act, and (2) any other stationary source that emits or has the potential to emit 250 tons a year or more of any pollutant regulated under the Act.

A "major modification" is defined as "any physical change in or change in the method of operation of a major stationary source that would result in a significant net emissions increase of any pollutant subject to regulation under the Act."

2. The Clean Water Act

Congress enacted the Water Quality Act of 1987 reauthorizing the Clean Water Act. The new act extends deadlines for industry compliance, amends the storm water permit program for industry plants, and establishes administrative penalties for noncompliance.

It also sets schedules for State compliance with the reduction of toxic discharge into streams and increases the penalties for civil and criminal violations of the Act.

The Safe Drinking Water Act of 1986 requires EPA to set standards for 83 chemicals within three years of enactment. The Act also provides for ground water protection around public wells.

Under the Clean Water Act, the EPA or approved state agencies regulate the out of pipe discharges of pollutants into U.S. waters. Every discharger must obtain a permit and comply with technology-based or water quality-based standards.

The primary federal law governing water pollution control is contained in the Clean Water Act, also known as the Federal Water Pollution Control Act (FWPCA). The Act authorizes federal and state control of pollutant discharges into waters of the United States (direct discharges) and of pollutants into sewer systems

(indirect discharges). These controls are established and enforced through permits and regulations.

There are two basic regulatory controls on discharges within the Clean Water Act: water quality-based requirements and technology-based requirements.

Technology based requirements are designed to reflect the levels of effluent quality achievable through the use of pollution control technology. All existing dischargers of toxic pollutants are generally required to meet limits based on the "best available control technology" (BAT). There are also technology-based standards for discharges to municipal sewer systems.

Water quality requirements consist of a set of rules designed to achieve a given level of quality for natural body of water. They are based on scientific information. Water quality standards are adopted by the states and submitted to EPA for approval. The water quality standards for different waters may vary depending on their uses and local conditions.

3. The Permit Program and Enforcement

A person responsible for a "discharge of pollutants" into any water of the United States from a point source is subject to various provisions of the Act. The key requirement is to obtain and comply with a permit under the national pollution discharge elimination system (NPDES) program pursuant to Section 402 of the Act. Permits must be obtained from the MDE Section. NPDES permits apply the technology and water quality-based requirements of the Act to a particular discharger. Permits also contain schedules of compliance, monitoring obligations, and reporting requirements. Permits may be issued for a term of up to five years.

Discharges without a permit and violations of permit conditions are subject to federal and state and civil and criminal penalties and citizen suits.

The state of Maryland assisted by EPA water quality criteria, has the primary role in establishing water quality standards to protect the uses of a particular body of water. NPDES permits are granted on the condition that state water quality standards will be met. When a discharge would interfere with state standard, water quality-based effluent limits on appropriate pollutants or toxicity-based effluent limits may be established.

The NPDES permit program is the backbone of the Clean Water Act. Every discharger must apply for and obtain a permit. The function of a permit is to define a discharger's obligations.

As part of its enforcement authority under the Act, EPA can require permittees to monitor and report their discharges and may enter the discharger's premises to inspect and confirm those reports.

Discharges may opt to enter into a pretreatment program rather than obtaining a NPDES permit. Rather than releasing effluent directly to the water body, dischargers ties into the STP system. If the firm is permitted to do this, they are required to 'Pre-Treat' the effluent to remove hazardous substances before releasing it to the STP. Both the Back River and Patapsco STP receive treated industrial wastes. The City of Baltimore operates a local pre-treatment program. The pretreatment program sets acceptable levels of pollutants for effluent, and establishes a series of fines which can be levied if violations occur.

4. Resource Conservation and Recovery Act (RCRA)

Through the Resource Conservation and Recovery Act EPA has established a comprehensive program for the management of hazardous waste. The original law, passed in 1976, established a comprehensive program for the cradle to grave management and tracking of hazardous wastes. Waste generators and haulers must complete a manifest which accompanies the waste to its final destination, and documents its disposal. Firms are permitted a grace period in which they can store hazardous waste without needing to receive a RCRA permit. The waste must be removed within the time limit of the grace period. Also, if firms store less than 100 kilograms of waste on their site they are not subject to RCRA regulations.

The Resource Conservation and Recovery Act, passed in 1984, provides for: a ban on land disposal of hazardous waste in sties where the substances will migrate, deadlines for Congressional mandated decisions regardless of EPA action, more stringent standards for handling and disposal of hazardous material, a deadline for EPA decisions on adding substances to the hazardous materials list, Criteria making it more difficult for EPA to remove chemicals from the list, and regulatory standards and controls for underground storage tanks.

Through the RCRA legislation the EPA was charged with establishing a definition of those items which constitute hazardous

waste, and procedural rules for the treatment, storage and disposal of the waste.

5. Superfund Amendments Reauthorization Act (SARA, 1986)

The Superfund Amendments and Reauthorization Act of 1986 established a 5-year $8.5 billion fund to pay for the continued cleanup of hazardous waste sites. The Act includes provisions for citizen litigation to compel compliance. It also extends the doctrine of strict, and joint and several liability to encompass all federal agencies.

The Superfund Amendments Reauthorization Act contains specific requirements in Title III, Section 312 which require that firms producing, using or storing hazardous materials notify State and local emergency management and health agencies. To gain an understanding of the types of hazardous waste stored in Fairfield, this data was compiled and placed in Table 4. Firms which store wastes on site include Delta Chemical, Mobil Oil, Essex Industrial Chemicals, Amoco, FMC Corporation, Vista Chemical, Air Products & Chemicals, and Alcolac. Some of the most common items stored included gasoline, Chlorine, Sulfuric Acid and Hydrochloric Acid.

APPENDIX II

Baltimore City Critical Area Management Program (CAMP)

Section III

Development Requirements

SECTION III

DEVELOPMENT REQUIREMENTS

The Chesapeake Bay Critical Area Law requires each local jurisdiction to include, as part of its local management program, provisions to guide and restrict new development and redevelopment ("development" hereinafter) in such a way as to minimize stormwater runoff pollution and to preserve and enhance natural habitat within the Critical Area. This Section summarizes the requirements that must be met by development projects. Details about these requirements and the review process can be found in the Critical Area Development Manual and the Stormwater Management Design Manual.

A. Public Actions That Trigger Critical Area Review

Development in the Critical Area will be subject to Critical Area review only when, and at each time that, the development activity requires one or more of the public actions listed below:

1. Subdivision
2. Rezoning
3. Zoning Variance
4. Conditional Use or Special Exception
5. Building Permit within the Buffer
6. Building Permit outside the Buffer which has not been granted an exemption from Stormwater Management requirements.

B. When Is A Development Project Subject To Critical Area Development Requirements?

Once the Critical Area review process has been triggered by one of the above public actions, the project will be evaluated by the Department of Planning to determine whether the proposed development is "significant development," so as to be subject to the provisions set forth herein.

Significant development is defined as development which would: 1) meet or exceed 50% of the assessed value of the property, or 2) result in a disturbance to land within the Buffer by 5,000 square feet, or 3) result in a disturbance to land within the Critical Area by 10,000 square feet.

Although development requirements for meeting the Critical Area provisions will vary from area to area, only significant development will be subject to the requirements outlined in Section III.C and III.D below.

C. General Requirements:

1. Baltimore City Code Requirements

All development located in the Critical Area shall comply with the applicable provisions of the City Code (1983 Replacement Volume, as amended) as follows:

(a) Article 26, Sections 117-139 - Stormwater Management (formerly Ordinance 1130 - see Appendix H-2).

(b) Article 30, Chapter 3C - Critical Area Overlay District - Ordinance (formerly Ordinance 1132 - see Appendix H-3).

(c) Article 32, Section 521.0 - Chesapeake Bay Critical Area Development - Building Code (formerly Ordinance 1131 - see Appendix H-4).

2. CAMP Requirements

All development located in the Critical Area shall reduce the post-development pollutant loading to 90% or less than the pre-development loading. Developers are encouraged to meet the 10% runoff pollution reduction requirement on-site whenever the City determines it is practical and feasible.

Developers are encouraged to avoid development within the Buiffer, particularly when such development would result in an increase in the amount of impervious surface within the Buffer. Throughout the City's Critical Area, developers will be required to replace existing vegetation disturbed by development and to correct any shore erosion problems. All development proposed for any portion of the Buffer must be granted a Buffer exemption as required by the Criticla Area REgulations (COMAR 14.15.09.01C(8)). Such exemptions may be granted by the City

providing that it can be sufficiently demonstrated the existing conditions preclude a naturally vegetated Buffer and provided that the developer agrees to an appropriate offset as described in Section IV, so that water quality and habitat objectives can be met elsewhere in the City's Critical Area.

These general requirements are in addition to the requirements listed below.

D. Requirements By Development Area

The Critical Area legislation requires the City to designate sub-areas within its Critical Area and to propose guidelines and restrictions to govern development within each. Accordingly, specific development requirements, according to the project's location within the City's Critical Area, are set forth as follows:

1. Waterfront Revitalization Area

(a) Requirements for Runoff Pollution Reduction: The developer is required to meet the 10% runoff pollution reduction requirement for stormwater. This reduction may be accomplished on-site either by installing an adequate stormwater management system or by restoring vegetation on a portion of the site as specified in ARticle 26 of the Baltimore City Code and the Stormwater Management Design Manual. These requirements shall be met on-site unless it

would be infeasible due to site conditions. The developer is required to offset for any remaining pollution reduction to meet the 10% standard.

(b) Requirements for Buffer Establishment: A developer who encroaches upon the Buffer is required to apply for a Buffer exemption (see the Critical Area Development Manual). The developer is encouraged to plant vegetation on as much of the Buffer (i.e., total land area within the site which lies 100 feet or less from mean high tide, exclusive of the promeade easement) as possible. Properly vegetated areas within the Buffer portion of the site may be counted against the developer's Buffer establishment requirement (see Appendix A). In addition, porperly vegeted areas outside the Buffer may be credited toward the Buffer requirement provided they are contiguous to vegetated areas within the Buffer and are no less than 25 feet in width.

The developer is required to contribute to the Buffer Offset Fund or otherwise offset for any portion of the Buffer which is not vegetated in an approved manner. All privately owned lands within the Buffer for which the developer agrees to grant a public access easement are excluded from this requirement. Thus, the portion of any site which has been dedicated for the public promenade or access to the promenade will be excluded when calculating the net Buffer land areas for a given development site (i.e., 100 feet back from the

water's edge, minus the promenade easement, as shown in Figure 8)

2. Waterfront Industrial Area

(a) Requirements for Runoff Pollution Reduction: The developer is required to meet the 10% runoff pollution reduction requirement for stormwater. The reduction may be accomplished on-site either by installing an adequate stormwater management system or by restoring vegetation on a portion of the site as specified in Article 26 of the Baltimore City Code and the Stormwater Management Design Manual. The requirements shall be met on-site unless it would be infeasible due to site conditions. The developer is required to offset for any remaining pollution reduction required to meet the 10% standard.

(b) Requirements for Buffer Establishment: Critical Area requirements for significant development which has been granted a Buffer exemption vary depending on whether the development activity is proposed for a water-dependent or a non-water-dependent use.

(i) Development Within the Buffer for a Water-Dependent Use

Development within the Buffer of the designated Waterfront Industrial Area for a water-dependent use requires that the developer offset only for the land

area within the Buffer which has been disturbed for new construction or paving associated with the water-dependent use. The developer is required to compensate (either on-site or through the offset program) for any existing vegetation disturbed by the development and to correct any shore erosion problems.

As an alternative offset for disturbance to land in the Buffer, the developer may elect to increase the runoff pollution reduction requirement to 20% or more for the entire Buffer on the site. The 10% reduction requirement will be applied to the remainder of the site.

(ii) Development Within the Buffer for a Non-Water-Dependent Use

Development within the Buffer of the designated Waterfront Industrial Area for a non-water-dependent use is limited to 50% of the total Buffer area. Whenever a developer uses any portion of the Buffer as part of a significant development, the developer has the option of: 1) vegetating on-site so that 50% of the total Buffer area is established in vegetation in an approved manner, or 2) contributing to the Buffer Offset Fund an amount equal to the total Buffer area of the site which is not vegetated. In addition, the developer is required to further compensate (either on-site or through the

offset program) for any vegetation disturbed by development and to correct any shore erosion problems.

Significant development outside the Buffer is required to meet runoff pollution reduction requirements but not Buffer requirements, unless the proposed development disturbs existing vegetation and/or the site has shore erosion problems (see Sections III.A and III.C).

In hardship cases, where the Buffer comprises 15% or more of the entire development site, the developer is allowed to develop within the Buffer providing that he or she offsets for the portion of the Buffer disturbed by such development.

(c) Additional Provision:

Within the Waterfront Industrial Area, total liability for Buffer offsets shall not exceed 2% of the cost of the proposed development.

3. Resource Conservation Areas

(a) Requirements for Development Outside the Buffer: Any significant development outside the Buffer shall be limited to open space and public recreational, cultural and educational facilities. Any significant development outside the Buffer which results in a vegetated area having habitat value being disturbed by an impervious surface requires an offset for the

total vegetated area displaced by such development. In addition, the developer is required to meet the 10% runoff pollution reduction requirement for stormwater. In no case may the overall acreage of forest or woodland within these areas be decreased by such development.

(b) Requirements for Development Within the Buffer: Development within the Buffer of the Resource Conservation Areas which has been granted a Buffer exemption is limited to water-dependent facilities for public use. The developer is required to offset for twice the total Buffer area disturbed by development in addition to meeting the 10% runoff pollution reduction requirement for stormwater.

E. Buffer Establishment Credit for Vegetation Planted Outside The Buffer

New vegetation planted outside the Buffer may be credited toward development requirements for vegetation within the Buffer provided that: 1) vegetation planted outside the Buffer is at least 25 feet in width and, 2) it is contiguous to existing or planned vegetation within the Buffer, and 3) existing or planned vegetation within the Buffer includes at least 50 linear feet along the shoreline for the entire depth of the Buffer, and 4) the planting plan receives prior City approval.

F. Future Development

Any subsequent redevelopment of a site already assessed an offset fee for either the 10% runoff pollution reduction requirement or the Buffer establishment requirement will require additional Critical Area review if the further redevelopment is determined to be significant development. Such additional redevelopment may require further offsets if the redevelopment increases impervious surfaces or displaces vegetation originally approved as part of a Critical Area determination.

G. Grandfathering

All existing structures and operations, including bulkheads and piers, located within the Critical Area may be maintained for existing uses without having to comply with Critical Area requirements, provided that these land uses are lawful under current zoning regulations and do not constitute significant development.

All building permit applications submitted in acceptable form before January 4, 1988, the effective date of the Ordinances implementing this CAMP, are excluded from meeting the requirements of this CAMP. Those projects receiving subdivision, rezoning, zoning variance, special exception or conditional use approval prior to the effective date of this CAMP are bound only by those requirements in place at the time of application for building permits.

H. Offsets for Certain Public Uses

Baltimore City plans a number of parks, educational and cultural facilities within the Critical Area and some, especially the promenade, will need exemption from the Buffer requirements of the Criteria under Section 14.15.09.C(8). These areas are highly urbanized and are served by storm drains. The establishment of a naturally vegetated Buffer would not fulfill the functions of the Buffer as stated in the Criteria.

Baltimore City maintains a policy of requiring waterfront developers to provide a pedestrian easement located from the harbor water's edge, typically 20 feet landward in the Waterfront Revitalization Area. This easement generally consists of twelve feet of pavement at the water's edge and an eight foot planting bed. Cultural and educational facilities will also need paved plaza areas to accommodate pedestrian traffic, and due to the size of configuration of the site, reduced areas maybe available for planting. In conformance with the spirit of the Critical Area Management Program, developers and the City will be required to mitigate for the water quality impacts of impervious surfaces and provide habitat to the extent appropriate in these areas. The requirements detailed in Appendix G will serve as the offset for the exemption requested for constructing the promenade, parks, and other educational and cultural facilities in the Buffer. In addition, these facilities will provide educational and public awareness programming which fulfills other Critical Area objectives as stated in the Regulations.

APPENDIX III

Summary of the Clean Air Act Amendments of 1990

In general, the bill incorporates the provisions of the House version of Title I, with two exceptions that concern NOx Controls and Fees from Federal Facilities. The bill includes the House provisions for controlling nitrogen oxides from new and existing facilities which subject such sources to the same requirements as major stationary sources of volatile organic compounds but adds a provision allowing states to opt out of or opt down from the requirement if excess emissions will result. With respect to the fee provisions, the bill treats federal sources the same as other sources. In addition, some technical adjustments were made to certain provisions of the House proposal.

Ozone nonattainment areas are classified into one of five categories; marginal, moderate, serious, severe and extreme. These classifications are based on the degree to which they exceed the ozone standard. Deadlines are extended providing from three to twenty years to reach attainment (one two-year deadline extension may be granted). States may voluntarily reclassify areas into higher categories.

All but moderate nonattainment areas are required to reduce volatile organic compounds by 15 percent within six years. No credit is given for reductions resulting from exhaust/evaporative emission regulations promulgated prior to January 1, 1990, gasoline volatility programs, measures taken to correct a SIP or implementation of a previously required I/M program. After the initial six years, serious, severe and extreme nonattainment areas are required to achieve a 3-percent annual reduction in volatile organic compounds or oxides of nitrogen; a waiver or

modification of this requirement may be allowed if a 3-percent reduction is technologically infeasible.

A Northeast Transport Region has been established to include Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, the District of Columbia and northern Virginia (the DC metropolitan area). All areas included in a region (including those in attainment) are required, at a minimum, to meet the requirements for moderate ozone nonattainment areas, regulate sources emitting 50 tons per year or more, adopt an enhance I/M program (in specified areas), implement all Control Technique Guidelines (new and existing) and adopt measures that will achieve reductions comparable to those achieved as a result of implementation of Stage II Vapor Recovery. A transport commission is also established.

EPA is provided with authority to establish requirements to control air pollution from Outer Continental Shelf sources along the Pacific, Arctic and Atlantic coasts and along the eastern Gulf coast of Florida. Sources located within 25 miles of state waters are to be subject to the same regulations as sources located onshore. For areas not covered by these regulations - Texas, Mississippi, Louisiana and Alabama, the Secretary of the Interior must consult with the EPA Administrator to ensure coordination of air pollution control regulations. In addition, a study is called for to examine the effects of toxic air pollutants on coastal waters; if necessary, control requirements must be promulgated to protect these waters.

Air Toxics

The bill lists 189 chemicals to be regulated, which include the substances in the Administration's proposal, with the exception of ammonia and hydrogen sulfide. EPA may add and delete chemicals from the list; the public may petition EPA to amend the list. In making additions, EPA must consider the threat of adverse human health effects or "adverse environmental effects," defined as "any threat of significant adverse effects...to wildlife, aquatic life or other natural resources, including disruption of local ecosystems, impacts on populations of endangered or threatened species, significant degradation of environmental quality over broad areas, or other comparable effects."

Within one year of enactment, EPA must establish a list of major source categories and subcategories to be regulated. A major source generally is defined as stationary source that emits 10 or more tons per year, in the aggregate, of any hazardous air pollutant.

MACT Standards

For each source category, EPA must promulgate emission standards for new and existing sources calling for the installation of Maximum Achievable Control Technology (MACT). For new sources, MACT must be at least as stringent as the controls achieved in practice by the best controlled source in the same category,and may be more stringent when feasible.

For existing sources, MACT may be less stringent than the standards for new sources in the same category, but may not be less stringent than that achieved by the best performing 12 percent of existing units.

Determinations of the lowest Achievable Emission Rate made in the eighteen months prior to the proposal of the standard or 30 months prior to promulgation of the standard (whichever is shorter) are excluded from calculations made to determine the top existing sources. The standards must take into account the impacts on the environment, in addition to effects on human health.

EPA may identify area sources of listed pollutants, along with major sources, that are required to install MACT. EPA must list sufficient area source categories to encompass 90 percent of emissions of the 30 most serious area source pollutants. Sources that present a substantial risk to health, but for which the required control technology is too expensive, may meet alternative controls. EPA must list area source categories within five years of enactment, with regulations to take effect within 10 years.

EPA must conduct a study on toxic pollution of the Great Lakes, Lake Champlain, the Chesapeake Bay and coastal waters from atmospheric deposition. Based upon the study, within three years EPA must take action to address this problem, including the effects due to bioaccumulation and indirect exposure pathways.

Acid Rain

The bill seeks to reduce emissions of sulfur dioxide in the 48 contiguous states by 10 million tons from 1980 emission levels by the year 2000 and, beginning in 1994, emissions of oxides of nitrogen by two million tons from 1980 levels.

The two phased emission reduction program for sulfur dioxide is based upon a system of allowances. Each utility will receive marketable allowances for the amount of pollution it is allowed to emit; utilities may sell these allowances to one another. The bill limits the number of allowances to be issued nationally to 8.9 million tons and requires EPA to reduce annual allowances to individual plants on a pro rate basis, if necessary to comply with the national cap.

Permits

The permit program makes it unlawful to operate an affected source (i.e., acid rain), a major source (10-100tpy), sources subject to sections 111 and 112, or sources required to obtain a permit under Parts C or D without a permit. The Administrator may exempt certain source categories from these requirements if compliance is considered "impracticable, infeasible or unnecessarily burdensome..." However, the Administrator may not exempt any major source.

While both the House and Senate bills originally called for a special permit program for small businesses, the final bill is limited to requiring that technical and environmental compliance assistance be provided to these businesses. EPA is required, within nine months of enactment, to establish a small business stationary source technical and environmental compliance assistance program to assist states in developing their programs, issue guidance for use by the states and provide for implementation of a program in any state that fails to submit a program to EPA.

Sources eligible for inclusion in the small business technical and environmental compliance assistance program include those: (1) owned or operated by a person employing fewer than 100 employees; (2) defined as a small business by the Small Business Act; (3) not considered a major stationary source; (4) emitting less than 50 tons per year of any regulated pollutant; and (5) emitting less than 75 tons per year (total) of all regulated pollutants. In addition, a state may petition to include in its program sources emitting up to 100 tons (total) of all regulated pollutants. Further, both EPA and states, in consultation with one another and the Administrator of the Small Business Administration, may exclude from eligibility sources determined to have sufficient technical and financial capabilities to comply with requirements of the Act without special assistance.

Stratospheric Ozone Depletion

Within sixty days of enactment, EPA must publish initial lists of Class I and Class II materials. Class I includes all fully halogenated chlorofluorocarbons (CFCs), halons, carbon tetrachloride, and methyl chloroform. Class II includes HCFCs (i.e. "transitional substances"). Production of Class I substances must be terminated by January 1, 2000 (January 1, 2002 for methyl chloroform, except for certain exceptions, which must be capped at 10 percent). Exemptions are allowed for medical devices, aviation safety, export to developing countries, national security, fire suppression and explosion prevention. Production of Class II substances must be frozen in 2015 and banned in 2030. Use will be restricted in 2015 (except for refrigerants, which will be restricted by

2020). Exceptions are allowed for medical devices and for developing countries. The schedule for freezes and bans may be accelerated if scientific information warrants it, the availability of substitutes make it feasible or the Montreal Protocol is amended.

APPENDIX IV

Baltimore Integrated Environmental Management Project

Phase II Report

Baltimore Harbor Data Analysis

Baltimore Integrated Environmental Management Project

Phase II Report

Baltimore Harbor

Regulatory Integration Division
Office of Policy Analysis
Office of Policy, Planning, and Evaluation
U.S. Environmental Protection Agency

1987

C. Definition of Uses and Parameters

The harbor information matrix is composed of (1) the definition of harbor uses, (2) the definition of water quality and use-related parameters that affect those uses, and (3) the relationships between the uses and the parameters.

We considered six uses:

- Fish Quality: the health of fish living in the harbor and the fitness of those fish for human consumption, defined as the presence or absence of contaminants, such as heavy metals and organic toxicants, or lesions in their flesh.

- Floating Debris: debris can be both a safety and an aesthetic problem.

- Sediment Quality: this is a broad parameter used to define the presence of organic and inorganic pollutants in sediments and their potential impact on biota. Highly polluted sediments can contaminate biota, especially bottom organisms.

- Shore Type: the quality of the shoreline affects both recreational access and natural systems. Natural shoreline contributes to high habitat levels, while the presence of boat ramps and piers will enhance recreational boating, crabbing, and fishing.

- Substrate Type: this is critical to development of biota, but it may also influence recreation, especially swimming.

- Turbidity: this has an influence on both recreation and biota. High turbidity levels will adversely affect aesthetics and biota.

- Vegetative Habitat: the presence of submerged and emergent aquatic vegetation (SAV) influences biological systems as well as recreation. High levels will enhance habitat, fish diversity and crabbing, but may be less desirable for recreational boating and swimming.

- Water Column Metals: metals in the water column may be bioaccumulated in fish and may therefore affect human health; high levels may also adversely affect development of ecological systems, thus lowering habitat levels.

Some harbor conditions may lend themselves to being considered as either a use or a parameter. For instance, we consider boat traffic, measured by the presence of shipping channels and marinas, to be a parameter and we also consider recreational boating as a use that is influenced by boat traffic and nine other parameters. The perspective of consideration (and the definition) of the use is clearly different from the parameter. Similarly, vegetative habitat is a parameter that influences habitat as a use. The habitat use is affected not only by the vegetative habitat parameter, but by every other parameter as well.

Because of problems of measurement, data availability, and uncertainty about their potential effects, we made no attempt to include consideration of trace organic toxicants, such as pesticides, in the water column. In addition, the separate nutrient effects of nitrogen and phosphorus have been combined into a single "enrichment" parameter.

Table 3
Minimum Parameter Levels Required To Attain Each Use Level

Key parameters indicated with an asterisk (*)

Fish Quality

Parameters

Use Levels	Bacteria Status	Boat Traffic	Dissolved Oxygen	Dredging Frequency	Enrichment Level	Floating Debris	Sediment Pollution	Shore Type	Substrate Type	Turbidity	Vegetative Habitat	Wat Col. Metals
1	* 1	1	* 1	1	* 1	* 1	* 1	1	* 1	* 1	1	* 2
Contaminated (exceeds FDA Action Level) and sickly (lesions)	Consistently >200 coliform/100 ml (i.e., by a factor of 2).	Heavy major shipping and/or large marinas present.	Occasionally reaches 0 mg/l during part of the year.	Yearly	Total nitrogen 100-320 mg/l or total phosphorus 13-44 mg/l.	Heavy industrial debris present and/or oil sheen.	Highly organic muck, high levels of toxic organics. Contamination Index (CI)>14 predominant in	Almost completely developed industrially, with bulkheads and piers.	Unstable substrate in most of subarea. Very soft, almost fluid, mud or silt.	>100 mg/l	No SAV or emergent shoreline vegetation in area	Level of any heavy metal occasionally at or exceeding EPA's acute criteria.
2	* 2	1	* 3	1	* 2	* 1	* 1	1	* 2	* 2	1	* 3
Slight contamination, occasional lesions	Consistently >200 coliform /100 ml; however, exceedances are no greater than 250	Heavy major shipping and/or large marinas present.	2 - 4 mg/l	Yearly	Total nitrogen 10-99 mg/l or total phosphorus 0.4-12 mg/l.	Heavy industrial debris present and/or oil sheen.	Highly organic muck, high levels of toxic organics. Contamination Index (CI)>14 predominant in	Almost completely developed industrially, with bulkheads and piers.	Somewhat compacted mud or silt, but readily resuspended by vessel traffic	60-100 mg/l	No SAV or emergent shoreline vegetation in area.	Frequently at EPA's chronic criteria.
3	* 3	1	* 4	1	* 3	* 2	* 3	1	* 3	* 3	1	* 4
Slight contamination (exceeds FDA Advisory) no lesions	Frequently >200 coliform/100 ml so as to require closing of area for swimming	Heavy major shipping and/or large marinas present.	4 - 5 mg/l	Yearly	Total nitrogen 1-9 mg/l or total phosphorus 0.14-.99 mg/l.	Moderate debris present and/or oil sheen.	Some highly organic muck, moderate levels of toxic organics. CI 4-14.	Almost completely developed industrially, with bulkheads and piers.	Relatively stable substrate throughout subarea, but most of substrate of one type (silt,	40-60 mg/l	No SAV or emergent shoreline vegetation in area.	Measurable levels of metals close to, but never equal to, EPA's chronic criteria.
4	* 3	1	* 5	1	* 4	* 2	* 3	1	* 3	* 3	1	* 4
Slight tainting (flavor impairment but no measurable contaminants)	Frequently >200 coliform/100 ml so as to require closing of area for swimming	Heavy major shipping and/or large marinas present.	Above 5 mg/l	Yearly	Total nitrogen 0.1-0.99 mg/l or total phosphorus 0.014-0.13 mg/l.	Moderate debris present and/or oil sheen.	Some highly organic muck, moderate levels of toxic organics. CI 4-14.	Almost completely developed industrially, with bulkheads and piers.	Relatively stable substrate throughout subarea, but most of substrate of one type (silt,	40-60 mg/l	No SAV or emergent shoreline vegetation in area.	Measurable levels of metals close to, but never equal to, EPA's chronic criteria.
5	* 4	1	* 5	1	* 4	* 3	* 4	1	* 3	* 4	1	* 5
Healthy and clean	Occasionally >200 coliform/100 ml	Heavy major shipping and/or large marinas present	Above 5 mg/l	Yearly	Total nitrogen 0.1-0.99 mg/l or total phosphorus 0.014-0.13 mg/l.	Some natural debris present (wood, etc.) and/or sometimes slight oil sheen.	No evidence of organic contamination (natural or toxic) CI 4-14	Almost completely developed industrially, with bulkheads and piers	Relatively stable substrate throughout subarea, but most of substrate of one type (silt,	20 - 40 mg/l	No SAV or emergent shoreline vegetation in area.	No metal exceeding background concentrations for known healthy environment

Table 3
Minimum Parameter Levels Required To Attain Each Use Level

Key parameters indicated with an asterisk (*)

Habitat

Parameters

Use Levels	Bacteria Status	Boat Traffic	Dissolved Oxygen	Dredging Frequency	Enrichment Level	Floating Debris	Sediment Pollution	Shore Type	Substrate Type	Turbidity	Vegetative Habitat	Wat Col. Metals
1	* 1	* 1	* 1	* 1	* 1	* 1	* 1	* 1	* 1	* 1	* 1	* 1
Water column and sediments contaminated, no shellfish	Consistently >2400 coliform/100 ml (i.e., by a factor of 2).	Heavy major shipping and/or large marinas present.	Consistently reaches 0 mg/l during part of the year.	Yearly	Total nitrogen 100-320 mg/l or total phosphorus 13-44 mg/l.	Heavy industrial debris present and/or oil sheen.	Highly organic muck, high levels of toxic organics. Contamination Index (CI)>14 predominant in	Almost completely developed industrially, with bulkheads and piers.	Unstable substrate in most of subarea. Very soft, almost fluid, mud or silt.	>100 mg/l	No SAV or emergent shoreline vegetation in area.	Level of any heavy metal occasionally at or exceeding known LC50 level.
2	* 2	* 2	* 1	* 2	* 2	* 2	* 1	* 1	* 2	* 1	* 2	* 4
Water column acceptable but sediments contaminated and no shellfish	Consistently >2400 coliform /100 ml; however, exceedances are no greater than 2400	Minor shipping channels and/or numerous small or large marinas.	Occasionally reaches 0 mg/l during part of the year.	Every other year.	Total nitrogen 10-50 mg/l or total phosphorus 0.4-12 mg/l.	Moderate debris present and/or oil sheen.	Highly organic muck, high levels of toxic organics. Contamination Index (CI)>14 predominant in	Almost completely developed industrially, with bulkheads and piers.	Somewhat compacted mud or silt, but readily recompended by vessel traffic	>100 mg/l	Occasional patches of SAV or emergent vegetation or historic occurrence of SAV.	Measurable levels of metals close to, but never equal to, EPA's chronic criteria.
3	* 2	* 3	* 4	* 3	* 2	* 3	* 4	* 2	* 3	* 2	* 3	* 4
Water column and sediments of acceptable quality but no shellfish	Consistently >2400 coliform /100 ml; however, exceedances are no greater than 2400	No more than 1 large marina and no more than 2 small marinas and/or no shipping.	4 - 5 mg/l	Regular dredging, but 3-5 years between incidents.	Total nitrogen 10-50 mg/l or total phosphorus 0.4-12 mg/l.	Some natural debris present (wood, etc.) and/or sometimes slight oil sheen.	No evidence of organic contamination (natural or toxic). CI 4-14.	Fairly heavily developed with bulkheads.	Relatively stable substrate throughout subarea, but most of substrate of one type (silt,	50-100 mg/l	Occasional patches of SAV and moderate emergent vegetation.	Measurable levels of metals close to, but never equal to, EPA's chronic criteria.
4	* 2	* 4	* 4	* 3	* 4	* 4	* 4	* 4	* 4	* 4	* 4	* 4
Water column and sediments of acceptable quality but limited shellfish	Consistently >2400 coliform /100 ml; however, exceedances are no greater than 2400	No more than one small marina and/or no shipping.	4 - 5 mg/l	Regular dredging, but 3-5 years between incidents.	Total nitrogen 0.1-0.69 mg/l or total phosphorus 0.014-0.13 mg/l.	Occasional wood or other natural debris; no oil sheen.	No evidence of organic contamination (natural or toxic). CI 4-14.	31 - 50% natural, with some sand, some fringe marsh, moderately developed.	One substrate type (mud, silt, shell, sand) dominant in subarea, but small patches of other types	20 - 49 mg/l	Moderate patches of SAV and emergent vegetation.	Measurable levels of metals close to, but never equal to, EPA's chronic criteria.
5	* 3	* 5	* 5	* 5	* 5	* 4	* 4	* 5	* 5	* 5	* 5	* 4
Water quality and sediments acceptable and adequate shellfish	Frequently >2400 coliform/100 ml so as to require closing of area for swimming	One small marina or no marinas present and/or no shipping channels.	Above 5 mg/l	Never dredged.	Total nitrogen 0.000-0.09 mg/l or total phosphorus 0.0004-0.0009 mg/l.	Occasional wood or other natural debris; no oil sheen.	No evidence of organic contamination (natural or toxic) CI 4-14.	>50% natural with large stretches of sand and marshes; only slightly developed	Variety of substrate types adjacent to one another, resulting in diversity	<20 mg/l	Abundant SAV and emergent vegetation in area	Measurable levels of metals close to, but never equal to, EPA's chronic criteria.

Table 5
Summary of Analytical Results For Baltimore Harbor

OK = Parameter level acceptable
+1 = Parameter level needs minor upgrade (1 level)
+2, +3, +4 = Parameter needs major upgrade
R = No data available—primary research priority

Use	Key Parameter	1 Upper Middle Branch	2 Lower Middle Branch	3 North-west Branch	4 Middle Harbor	5 Curtis Bay and Creek	6 Marley Furnace Creek	7 Lower Bear Creek	8 Upper Bear Creek	9 Outer Harbor	10 Stoney Creek	11 Rock Creek	12 Old Road Bay	13 Cox Creek	Summary of Status Of All Harbor Subareas: Number of Areas "OK"	Number Needing Minor Upgrade	Number Needing Major Upgrade	Number Needing Research Effort
Recreational Boating	Bacteriological Status	OK	OK	OK	OK	OK	+2	OK	OK	OK	OK	OK	OK	R	11	0	1	1
	Boat Traffic	OK	OK	+2	OK	OK	OK	+1	OK	+1	OK	OK	OK	OK	10	2	1	0
	Dissolved Oxygen	OK	OK	+1	OK	OK	OK	OK	OK	OK	OK	R	OK	R	10	1	0	2
	Enrichment Level	R	OK	+2	OK	OK	OK	OK	OK	OK	R	R	OK	R	8	0	1	4
	Floating Debris	+2	OK	+1	+1	+1	R	OK	OK	OK	OK	OK	OK	OK	8	3	1	1
	Sediment Pollution	OK	OK	OK	OK	OK	R	OK	OK	OK	R	R	OK	R	9	0	0	4
	Shore Type	+1	OK	+1	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	11	2	0	0
	Substrate Type	R	OK	+2	+1	R	OK	+1	+1	OK	OK	OK	OK	OK	7	3	1	2
	Turbidity	OK	OK	OK	OK	OK	OK	OK	OK	OK	R	R	OK	R	10	0	0	3
	Water Column Metals	R	R	R	R	R	R	R	R	R	R	R	R	R	0	0	0	13
Recreational Crabbing	Boat Traffic	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	13	0	0	0
	Dissolved Oxygen	OK	OK	+2	OK	OK	+2	OK	OK	OK	+1	R	OK	R	8	1	2	2
	Dredging Frequency	OK	OK	+2	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	12	0	1	0
	Enrichment Level	R	OK	+2	OK	OK	OK	OK	OK	+1	R	R	+2	R	6	1	2	4
	Floating Debris	+1	OK	OK	OK	OK	R	OK	OK	OK	OK	OK	OK	OK	11	1	0	1
	Sediment Pollution	OK	+1	+1	+1	OK	R	+1	+1	OK	R	R	+1	R	3	6	0	4
	Shore Type	+2	OK	+1	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	11	1	1	0
	Substrate Type	R	+1	+2	OK	R	OK	OK	OK	OK	OK	OK	+1	OK	8	2	1	2
	Turbidity	+2	OK	+2	OK	OK	OK	OK	OK	OK	R	R	OK	R	8	0	2	3
	Vegetative Habitat	OK	OK	OK	OK	OK	+1	OK	OK	+1	+1	OK	OK	OK	10	3	0	0
	Water Column Metals	R	R	R	R	R	R	R	R	R	R	R	R	R	0	0	0	13
Swimming	Bacteriological Status	+1	+1	OK	OK	OK	+2	+3	OK	OK	+2	+2	OK	R	6	2	4	1
	Boat Traffic	OK	OK	OK	OK	OK	OK	+1	OK	+1	OK	OK	OK	OK	11	2	0	0
	Dissolved Oxygen	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	R	OK	R	11	0	0	2
	Enrichment Level	R	OK	OK	OK	OK	OK	OK	OK	OK	R	R	+1	R	8	1	0	4
	Floating Debris	+2	+1	OK	OK	+1	R	+2	OK	+2	OK	OK	+1	OK	6	3	3	1
	Sediment Pollution	+1	+3	OK	OK	+1	R	+3	+3	OK	R	R	+3	R	3	2	4	4
	Shore Type	+1	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	12	1	0	0
	Substrate Type	R	OK	OK	OK	R	OK	+2	OK	+1	OK	OK	+1	OK	8	2	1	2
	Turbidity	+1	OK	OK	OK	OK	OK	OK	OK	OK	R	R	OK	R	9	1	0	3
	Water Column Metals	R	R	R	R	R	R	R	R	R	R	R	R	R	0	0	0	13

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