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Shoreline Situation Report City of Suffolk, Virginia

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Shoreline Situation Report CITY OF SUFFOLK, VIRGINIA



Supported by the National Science Foundation, Research Applied to National Needs Program
NSF Grant Nos. GI 34869 and GI 38973 to the Wetlands/Edges Program, Chesapeake Research Consortium, Inc.
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Special Report In Applied Marine Science and Oceanic Engineering Number 116 of the

VIRGINIA INSTITUTE OF MARINE SCIENCE
Gloucester Point, Virginia 23062

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Shoreline Situation Report CITY OF SUFFOLK, VIRGINIA

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CHAPTER 1

INTRODUCTION

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INTRODUCTION

1.1 PURPOSES AND GOALS

It is the objective of this report to supply an assessment, and at least a partial integration, of those important shoreland parameters and characteristics which will aid the planners and the managers of the shorelands in making the best decisions for the utilization of this limited and very valuable resource. The report gives particular attention to the problem of shore erosion and to recommendations concerning the alleviation of the impact of this problem. In addition, we have tried to include in our assessment a discussion of those factors which might significantly limit development of the shoreline and, in some instances, a discussion of some of the potential or alternate uses of the shoreline, particularly with respect to recreational use, since such information could aid potential users in the perception of a segment of the shoreline.

The basic advocacy of the authors in the preparation of the report is that the use of shorelands should be planned rather than haphazardly developed in response to the short term pressures and interests. Careful planning could reduce the conflicts which may be expected to arise between competing interests. Shoreland utilization in many areas of the country, and indeed in some places in Virginia, has proceeded in a manner such that the very elements which attracted people to the shore have been destroyed by the lack of planning and forethought.

The major man-induced uses of the shorelands are:

- Residential, commercial, or industrial development
- Recreation
- Transportation
- Waste disposal
- Extraction of living and non-living resources

Aside from the above uses, the shorelands serve various ecological functions.

The role of planners and managers is to optimize the utilization of the shorelands and to minimize the conflicts arising from competing demands. Furthermore, once a particular use has been decided upon for a given segment of shoreland, both the planners and the users want that selected use to operate in the most effective manner. A park planner, for example, wants the allotted space to fulfill the design most efficiently. We hope that the results of our work are useful to the planner in designing the beach by pointing out the technical feasibility of altering or enhancing the present configuration of the shore zone. Alternately, if the use were a residential development, we would hope our work would be useful in specifying the shore erosion problem and by indicating defenses likely to succeed in containing the erosion. In summary our objective is to provide a useful tool for enlightened utilization of a limited resource, the shorelands of the Commonwealth.

Shorelands planning occurs, either formally or informally, at all levels from the private owner of shoreland property to county governments, to planning districts and to the state and federal agency level. We feel our results will be useful at all these levels. Since the most basic level of comprehensive planning and zoning is at the county

or city level, we have executed our report on that level although we realize some of the information may be most useful at a higher governmental level. The Commonwealth of Virginia has traditionally chosen to place as much as possible, the regulatory decision processes at the county level. The Virginia Wetlands Act of 1972 (Chapter 2.1, Title 62.1, Code of Virginia), for example provides for the establishment of County Boards to act on applications for alterations of wetlands. Thus, our focus at the county level is intended to interface with and to support the existing or pending county regulatory mechanisms concerning activities in the shorelands zone.

1.2 ACKNOWLEDGEMENTS

This report was prepared and published with funds provided to the Commonwealth of Virginia through provisions of the Coastal Zone Management Act (CZM - NOAA Grant No. 04-6-158-44037). The methodology and procedures used in data acquisition and interpretation were developed on similar projects funded by the Research Applied to National Needs (RANN) program of the National Science Foundation (NSF Grant Nos. GI 34869 and GI 38973) through the Chesapeake Research Consortium, Inc. (CRC). Beth Marshall typed the manuscript. Bill Jenkins and Ken Thornberry prepared the photographs. We would like to thank the numerous other persons in Virginia and Maryland that have assisted our work with their suggestions and criticisms of our ideas and methods.

CHAPTER 2

APPROACH USED AND ELEMENTS CONSIDERED

CHAPTER 2

APPROACH USED AND ELEMENTS CONSIDERED

2.1 APPROACH TO THE PROBLEM

In the preparation of this report the authors utilized existing information wherever possible. For example, for such elements as water quality characteristics, zoning regulations, or flood hazard, we reviewed relevant reports by local, state, or federal agencies. Much of the desired information, particularly with respect to erosional characteristics, shoreland types, and use was not available, so we performed the field work and developed classification schemes. In order to analyze successfully the shoreline behavior we placed heavy reliance on low altitude, oblique, color, 35 mm photography. We photographed the entire shoreline of each county and cataloged the slides for easy access at VIMS, where they remain available for use. We then analyzed these photographic materials, along with existing conventional aerial photography and topographic and hydrographic maps, for the desired elements. We conducted field inspection over much of the shoreline, particularly at those locations where office analysis left questions unanswered. In some cases we took additional photographs along with the field visits to document the effectiveness of shoreline defenses.

The basic shoreline unit considered is called a subsegment, which may range from a few hundred feet to several thousand feet in length. The end points of the subsegments were generally chosen on physiographic consideration such as changes in the character of erosion or deposition. In those cases where a radical change in land use occurred, the point of change was taken as a boundary point of

the subsegment. Segments are groups of subsegments. The boundaries for segments also were selected on physiographic units such as necks or peninsulas between major tidal creeks. Finally, the county itself is considered as a sum of shoreline segments.

The format of presentation in the report follows a sequence from general summary statements for the county (Chapter 3) to tabular segment summaries and finally detailed descriptions and maps for each subsegment (Chapter 4). The purpose in choosing this format was to allow selective use of the report since some users' needs will adequately be met with the summary overview of the county while others will require the detailed discussion of particular subsegments.

2.2 CHARACTERISTICS OF THE SHORELANDS INCLUDED IN THE STUDY

The characteristics which are included in this report are listed below followed by a discussion of our treatment of each.

- a) Shorelands physiographic classification
- b) Shorelands use classification
- c) Shorelands ownership classification
- d) Zoning
- e) Water quality
- f) Shore erosion and shoreline defenses
- g) Limitations to shore use and potential or alternate shore uses
- h) Distribution of marshes
- i) Flood hazard levels
- j) Shellfish leases and public shellfish grounds
- k) Beach quality

a) Shorelands Physiographic Classification

The shorelands of the Chesapeake Bay System may be considered as being composed of three interacting physiographic elements: the fastlands, the shore and the nearshore. A graphic classification based on these three elements has been devised so that the types for each of the three elements portrayed side by side on a map may provide the opportunity to examine joint relationships among the elements. As an example, the application of the system permits the user to determine miles of high bluff shoreland interfacing with marsh in the shore zone.

For each subsegment there are two length measurements, the shore-nearshore interface or shoreline, and the fastland-shore interface. The two interface lengths differ most when the shore zone is embayed or extensive marsh. On the subsegment maps, a dotted line represents the fastland-shore interface when it differs from the shoreline. The fastland-shore interface length is the base for the fastland statistics.

Definitions:

Shore Zone

This is the zone of beaches and marshes. It is a buffer zone between the water body and the fastland. The seaward limit of the shore zone is the break in slope between the relatively steeper shoreface and the less steep nearshore zone. The approximate landward limit is a contour line representing one and a half times the mean tide range above mean low water (refer to Figure 1). In operation with topographic maps the inner fringe of the marsh symbols is taken as the landward limit.

The physiographic character of the marshes has also been separated into three types (see Figure 2).

Fringe marsh is that which is less than 400 feet in width and which runs in a band parallel to the shore. Extensive marsh is that which has extensive acreage projecting into an estuary or river. An embayed marsh is a marsh which occupies a reentrant or drowned creek valley. The purpose in delineating these marsh types is that the effectiveness of the various functions of the marsh will, in part, be determined by type of exposure to the estuarine system. A fringe marsh may, for example, have maximum value as a buffer to wave erosion of the fastland. An extensive marsh, on the other hand, is likely a more efficient transporter of detritus and other food chain materials due to its greater drainage density than an embayed marsh. The central point is that planners, in the light of ongoing and future research, will desire to weight various functions of marshes and the physiographic delineation aids their decision making by denoting where the various types exist.

The classification used is:

Beach

Marsh

Fringe marsh, <400 ft. (122 m) in width
along shores

Extensive marsh

Embayed marsh, occupying a drowned valley
or reentrant

Artificially stabilized

Fastland Zone

The zone extending from the landward limit of the shore zone is termed the fastland. The fastland is relatively stable and is the site of most material development or construction. The physiographic classification of the fastland is based upon the average slope of the land within 400 feet

(122 m) of the fastland - shore boundary. The general classification is:

Low shore, 20 ft. (6 m) or less of relief; with or without cliff

Moderately low shore, 20-40 ft. (6-12 m) of relief; with or without cliff

Moderately high shore, 40-60 ft. (12-18 m) of relief; with or without cliff

High shore, 60 ft. (18 m) or more of relief; with or without cliff.

Two specially classified exceptions are sand dunes and areas of artificial fill.

Nearshore Zone

The nearshore zone extends from the shore zone to the 12-foot (MLW datum) contour. In the smaller tidal rivers the 6-foot depth is taken as the reference depth. The 12-foot depth is probably the maximum depth of significant sand transport by waves in the Chesapeake Bay area. Also, the distinct drop-off into the river channels begins roughly at the 12-foot depth. The nearshore zone includes any tidal flats.

The class limits for the nearshore zone classifications were chosen following a simple statistical study. The distance to the 12-foot underwater contour (isobath) was measured on the appropriate charts at one-mile intervals along the shorelines of Chesapeake Bay and the James, York, Rappahannock, and Potomac Rivers. Means and standard deviations for each of the separate regions and for the entire combined system were calculated and compared. Although the distributions were non-normal, they were generally comparable, allowing the data for the entire combined system to determine the class limits.

The calculated mean was 919 yards with a standard deviation of 1,003 yards. As our aim was to

determine general, serviceable class limits, these calculated numbers were rounded to 900 and 1,000 yards respectively. The class limits were set at half the standard deviation (500 yards) each side of the mean. Using this procedure a narrow nearshore zone is one 0-400 yards in width, intermediate 400-1,400, and wide greater than 1,400.

The following definitions have no legal significance and were constructed for our classification purposes:

Narrow, 12-ft. (3.7 m) isobath located <400 yards from shore

Intermediate, 12-ft. (3.7 m) isobath 400-1,400 yards from shore

Wide, 12-ft. (3.7 m) isobath <1,400 yards

Subclasses: with or without bars
with or without tidal flats
with or without submerged vegetation

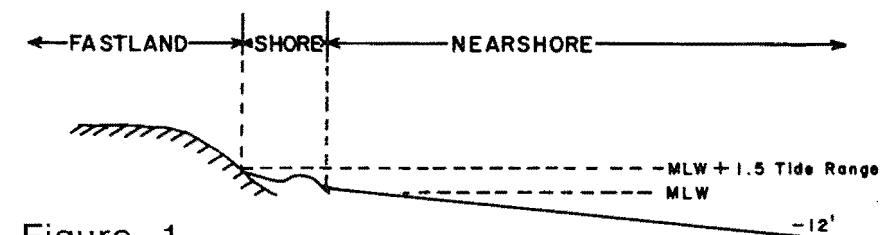


Figure 1

A profile of the three shorelands components.

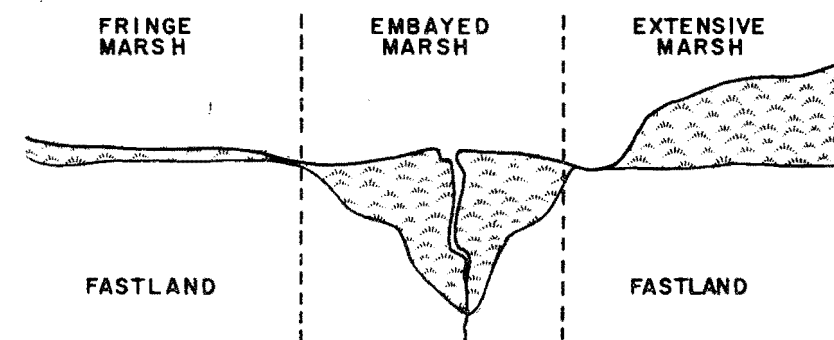


Figure 2

A plan view of the three marsh types.

b) Shorelands Use Classification

Fastland Zone

Residential

Includes all forms of residential use with the exception of farms and other isolated dwellings. In general, a residential area consists of four or more residential buildings adjacent to one another. Schools, churches, and isolated businesses may be included in a residential area.

Commercial

Includes buildings, parking areas, and other land directly related to retail and wholesale trade and business. This category includes small industry and other anomalous areas within the general commercial context. Marinas are considered commercial shore use.

Industrial

Includes all industrial and associated areas. Examples: warehouses, refineries, shipyards, power plants, railyards.

Government

Includes lands whose usage is specifically controlled, restricted, or regulated by governmental organizations: e.g., Camp Peary, Fort Story. Where applicable, the Government use category is modified to indicate the specific character of the use, e.g., residential, direct military, and so forth.

Recreation and Other Public Open Spaces

Includes designated outdoor recreation lands and miscellaneous open spaces. Examples: golf courses, tennis clubs, amusement parks, public

beaches, race tracks, cemeteries, parks.

Preserved

Includes lands preserved or regulated for environmental reasons, such as wildlife or wildfowl sanctuaries, fish and shellfish conservation grounds, or other uses that would preclude development.

Agricultural

Includes fields, pastures, croplands, and other agricultural areas.

Unmanaged

Includes all open or wooded lands not included in other classifications:

- a) Open: brush land, dune areas, wastelands; less than 40% tree cover.
- b) Wooded: more than 40% tree cover.

The shoreland use classification applies to the general usage of the fastland area to an arbitrary distance of half mile from the shore or beach zone or to some less distant, logical barrier. In multi-usage areas one must make a subjective selection as to the primary or controlling type of usage. For simplicity and convenience, managed woodlands are classified as "unmanaged, wooded" areas.

Shore Zone

Bathing
Boat launching
Bird watching
Waterfowl hunting

Nearshore Zone

Pound net fishing
Shellfishing
Sport fishing
Extraction of non-living resources
Boating
Water sports

c) Shorelands Ownership Classification

The shorelands ownership classification used has two main subdivisions, private and governmental, with the governmental further divided into federal, state, county, and town or city. Application of the classification is restricted to fastlands alone since the Virginia fastlands ownership extends to mean low water. All bottoms below mean low water are in State ownership.

d) Water Quality

The water quality sections of this report are based upon data abstracted from Virginia State Water Control Board's publication Water Quality Standards (November, 1974) and Water Quality Inventory (305 (b) Report) (April, 1976).

Additionally, where applicable, Virginia Bureau of Shellfish Sanitation data is used to assign ratings of satisfactory, intermediate, or unsatisfactory. These ratings are defined primarily in regard to number of coliform bacteria. For a rating of satisfactory the maximum limit is an MPN (Most Probable Number) of 70 per 100 ml. The upper limit for fecal coliforms is an MPN of 23. Usually any count above these limits results in an unsatisfactory rating, and, from the Bureau's standpoint, results in restricting the waters from the taking of shellfish for direct

sale to the consumer.

There are instances however, when the total coliform MPN may exceed 70, although the fecal MPN does not exceed 23, and other conditions are acceptable. In these cases an intermediate rating may be assigned temporarily, and the area will be permitted to remain open pending an improvement in conditions.

Although the shellfish standards are somewhat more stringent than most of the other water quality standards, they are included because of the economic and ecological impacts of shellfish ground closures. Special care should be taken not to endanger the water quality in existing "satisfactory" areas.

e) Zoning

In cases where zoning regulations have been established the existing information pertaining to the shorelands has been included in the report.

f) Shore Erosion and Shoreline Defenses

The following ratings are used for shore erosion:

slight or none - less than 1 foot per year

moderate - - - - 1 to 3 feet per year

severe - - - - - greater than 3 feet per year

The locations with moderate and severe ratings are further specified as being critical or non-critical. The erosion is considered critical if buildings, roads, or other such structures are endangered.

The degree of erosion was determined by several means. In most locations the long term trend was determined using map comparisons of shoreline positions between the 1850's and the 1940's. In

addition, aerial photographs of the late 1930's and recent years were utilized for an assessment of more recent conditions. Finally, in those areas experiencing severe erosion field inspections and interviews were held with local inhabitants.

The existing shoreline defenses were evaluated as to their effectiveness. In some cases repetitive visits were made to monitor the effectiveness of recent installations. In instances where existing structures are inadequate, we have given recommendations for alternate approaches. Furthermore, recommendations are given for defenses in those areas where none currently exist. The primary emphasis is placed on expected effectiveness with secondary consideration to cost.

g) Limitations to Shore Use and Potential or Alternate Shore Uses

In this section we point out specific factors which may impose significant limits on the type or extent of shoreline development. This may result in a restatement of other factors from elsewhere in the report, e.g., flood hazard or erosion, or this may be a discussion of some other factor pertaining to the particular area.

Also we have placed particular attention on the recreational potential of the shore zone. The possible development of artificial beach, erosion protection, etc., influence the evaluation of an area's potential. Similarly, potential alternate shore uses are occasionally noted.

h) Distribution of Marshes

The acreage and physiographic type of the marshes in each subsegment is listed. These

estimates of acreages were obtained from topographic maps and should be considered only as approximations. Detailed county inventories of the wetlands are being conducted by the Virginia Institute of Marine Science under the authorization of the Virginia Wetlands Act of 1972 (Code of Virginia 62.1-13.4). These surveys include detailed acreages of the grass species composition within individual marsh systems. In Shoreline Situation Reports of counties that have had marsh inventories, the marsh number is indicated, thus allowing the user of the Shoreline Situation Report to key back to the formal marsh inventory for additional data. The independent material in this report is provided to indicate the physiographic type of marsh land and to serve as a rough guide to marsh distribution, pending a formal inventory. Additional information on wetlands characteristics may be found in Coastal Wetlands of Virginia: Interim Report No. 3, by G.M. Silberhorn, G.M. Dawes, and T.A. Barnard, Jr., SRAMSOE No. 46, 1974, and in other VIMS publications.

i) Flood Hazard Levels

The assessment of tidal flooding hazard for the whole of the Virginia tidal shoreland is still incomplete. However, the United States Army Corps of Engineers has prepared reports for a number of localities which were used in this report. Two tidal flood levels are customarily used to portray the hazard. The Intermediate Regional Flood is that flood with an average recurrence time of about 100 years. An analysis of past tidal floods indicates it to have an elevation of approximately 8 feet above mean water level in the Chesapeake Bay area. The Standard Project Flood level is

established for land planning purposes which is placed at the highest probable flood level.

j) Shellfish Leases and Public Grounds

The data in this report show the leased and public shellfish grounds as portrayed in the Virginia State Water Control Board publication "Shellfish growing areas in the Commonwealth of Virginia: Public, leased and condemned," November 1971, and as periodically updated in other similar reports. Since the condemnation areas change with time they are not to be taken as definitive. However, some insight to the conditions at the date of the report are available by a comparison between the shellfish grounds maps and the water quality maps for which water quality standards for shellfish were used.

k) Beach Quality

Beach quality is a subjective judgment based upon considerations such as the nature of the beach material, the length and width of the beach area, and the general aesthetic appeal of the beach setting.

CHAPTER 3

PRESENT SHORELINE SITUATION

CHAPTER 3
PRESENT SHORELINE SITUATION
OF THE CITY OF SUFFOLK

3.1 THE SHORELANDS OF SUFFOLK

In 1974, the cities of Nansemond and Suffolk combined to form the City of Suffolk. The major water body in the county is the Nansemond River, which empties into the mouth of the James River. Large portions of the shoreline are found on Chuckatuck and Bennett Creeks and on Western Branch.

Suffolk has 113.1 miles of shoreline and 166.1 miles of fastland. Almost all of the shorelands have elevations of less than forty feet (see Table 1). However, flooding is not considered a critical problem in most areas of Suffolk, since the Nansemond River is a relatively low energy water body. High water levels accompanying storms can cause isolated flooding. These storm surges can be two or more feet above normal high tide levels. Usually, only marsh areas are inundated.

Seventy percent of the shoreline is either embayed or extensive marsh; twenty-five percent is fringe marsh (a tidal marsh inventory for the City of Suffolk is forthcoming). These tidal marshes should be preserved due to their flood and erosion protection qualities and their ecological assets. Marshes, especially extensive and embayed marshes, are important habitats and food producers for various aquatic life. Alteration of wetlands is restricted by the Virginia Wetlands Act of 1972.

The remaining five percent of the shoreline is divided between beaches (3%) and artificially stabilized (2%). The beaches in Suffolk are usually rather thin and often have vegetation such as

saltbush. Most instances of artificial stabilization in Suffolk are for cosmetic or commercial purposes. Only along the James River (Subsegments 2A and 6D) are the structures for erosion control.

The areas near the James River on both sides of the Nansemond River are zoned for residential use, with the Pig Point area being zoned industrial. The City of Suffolk is zoned for residential and commercial use. Most of the Nansemond River shoreline is zoned for agriculture. Though the zoning does not necessarily reflect existing use, it does show proposed changes in the shorelands use for the future. Sixty percent of the shorelands in Suffolk are presently used for agriculture. Residential and unmanaged, wooded lands comprise approximately one-third of the shorelands. Other uses include commercial, governmental, industrial, and recreational areas. There are two parks along the shorelands of Suffolk; Sleepy Hole Park, owned by the City of Portsmouth (Subsegment 5A), and Bennett Creek Park, owned by Suffolk (Subsegment 6B). Many agricultural areas have been zoned for residential use, showing a planned urban buildup for some sections, especially those close to Portsmouth. A combined sewage treatment plant at Pig Point is scheduled for late 1977.

According to the Virginia State Water Control Board's Water Quality Inventory (305 (B) Report) of April, 1976, the entire Nansemond River is currently contaminated. The river has high fecal coliform counts and low dissolved oxygen concentrations due to numerous domestic and industrial discharges. According to the Bureau of Shellfish Sanitation, the entire river is closed to the taking of shellfish (see Map 10).

3.2 SHORE EROSION SITUATION

Shoreline erosion is generally not a significant problem in Suffolk. Most erosion is confined to the environs of the relatively high energy James River. Even here, however, shoreline retreat is moderate with long term rates under three feet per year. No buildings are endangered. Elsewhere in the city, the shoreline is virtually stable.

The bluffs at Eclipse on the peninsula between Chuckatuck Creek and the Nansemond River are continually being eroded (Figures 3, 4, and 5). This area has an erosion rate of 2.3 feet per year, the highest in the city. The bluffs are affected by storm generated high waters and by downhill rain runoff or weathering. Existing bulkheading has been flanked in numerous places and is mostly separated from the fastland. A properly designed and constructed protective structure making use of the existing marsh fronting the area should control the erosion. For proper protection, an area-wide plan for erosion control would meet with more success than any individual actions. This would hold true for any location where shore protection is needed.

Though the shoreline of the Nansemond River is virtually stable, some areas have slight erosion caused by boat wakes and upland rain runoff. Shoreline stabilization is not urgent in these areas, as erosion is not significant. Storm generated high waters can also attack the fastland, but only infrequently. The Nansemond River and the various creeks in Suffolk are generally quite pacific. Although certain sections have substantial lengths of bulkhead, they serve more for commercial or convenience purposes rather than for shore protection.

The limited erosion in these sheltered areas can often be controlled with natural means such as vegetation. Well developed marsh vegetation has proved to be an excellent energy buffer along the shore. Similarly, upland vegetation with a dense root system is an excellent buffer to rain runoff erosion.

In summary, erosion in Suffolk is not severe and can usually be controlled with ordinary, well conceived methods of protection. Where stabilization seems necessary, an area wide program of protection is most suitable and least costly. Well designed and implemented structures with professional advice and guidance is a most important step in ensuring good protection with a long life.

3.3 SHORE USE LIMITATIONS

The City of Suffolk is in a transitional stage of development. The city currently has many rural and some urban areas. Basically, the lands at the mouth and head of the Nansemond River are urban and the sections between are rural. The current zoning for Suffolk allows for continued development near the mouth and at the head of the river.

Many areas along the shoreline in Suffolk are embayed or extensive marshes. These marshes comprise seventy percent of the shoreline and should be preserved. The Virginia Wetlands Act of 1972 restricts development in marshes and strictly regulates any proposed alteration of them. Development behind marsh areas would have limited and difficult access to the water.

Subsegments 1A, 1B, 3B thru 4B, and 4D are all zoned and used as agricultural areas. These lands will probably remain rural in nature. Subsegments 1C thru 2B are zoned for residential use. Several developments are located here, and more intensive

use is projected. Suffolk City, Subsegment 4C, is zoned and used for residential and commercial use. Future development here will probably be centered along the waters just downstream from the city. Marshes here prevent extensive shoreline development.

The shorelands from the Kings Highway Bridge to Knotts Creek (Subsegments 5A-6B) are zoned for residential usage. The area from Knotts Creek to Streeter Creek (Subsegments 6C and 6D) is zoned for industrial development. These sections of the city are close to the City of Portsmouth, which provides jobs for many residents of Suffolk. Several residential developments are already located along the shoreline, with more developments planned.

Suffolk currently has several sewage treatment plants, with a major plant planned for the Pig Point area in the near future. Existing treatment plants are not capable of handling the amounts and types of sewage now needing treatment. As a result, many contaminants are discharged into the river. Care should be taken to ensure against allowing pollutants to further contaminate the Nansemond River. New developments should have adequate treatment facilities.

In summary, the City of Suffolk is in a transitional phase of development. Being one of the newest and largest cities in the Commonwealth, its lands show a diversity of use. Any planned industrial or residential development should be carefully studied to ensure that it not only causes no adverse environmental effects to the area but that it also be harmonious to the long range development plans of the city. Shorelands are a valuable and limited resource. Their many beneficial functions and their natural beauty should be conserved

and preserved where possible.

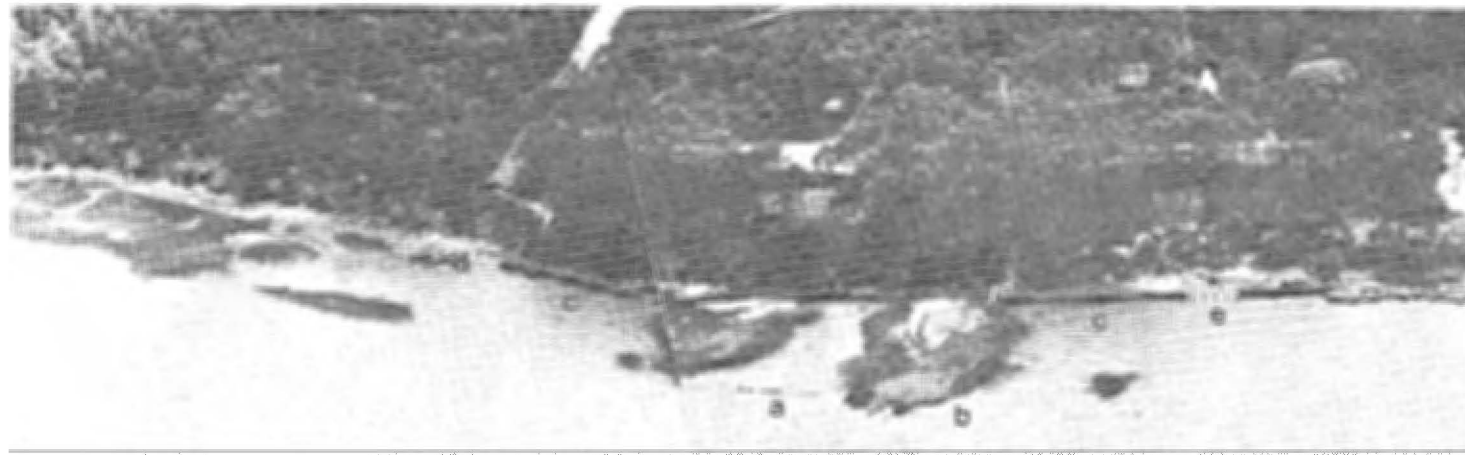


Figure 3



Figure 4



Figure 5



Figure 6

FIGURE 3: Aerial mosaic of shoreline near Eclipse. Lettered areas show: (a) ruins of old bulkhead, (b) marsh areas fronting the shoreline, (c) failing bulkhead, (d) eroding cliff at the end of road, and (e) scouring behind collapsed sections of bulkhead.

FIGURE 4: View from cliff at Eclipse showing bulkhead ruins in water (Area a, Figure 3), marsh areas (Area b), and existing bulkhead (Area c).

FIGURE 5: Cliff erosion and debris on beach at Eclipse (Area d, Figure 3).

FIGURE 6: Marina on Chuckatuck Creek near Crittenden Bridge.

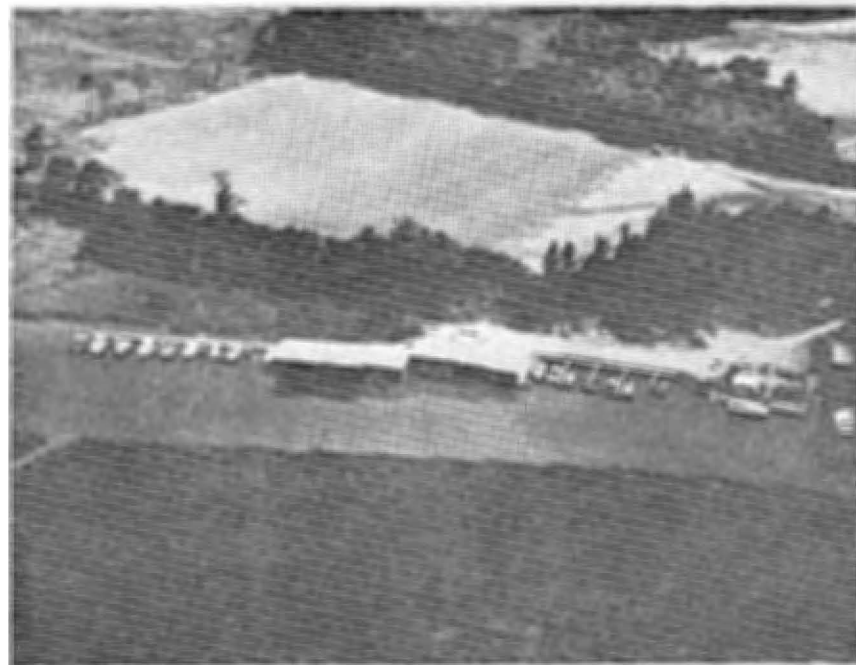


Figure 7



Figure 8

FIGURE 7: Marina on Western Branch.

FIGURE 8: Aerial view of shorelands near Suffolk. Housing developments such as these will probably continue to be built behind marsh areas.

FIGURE 9: Bulkhead next to the Planters Club, Nansemond River. This structure, retaining fill, would probably be illegal now, as the natural fringe barrier has been destroyed (The Virginia Wetlands Acts of 1972).

FIGURE 10: Aerial view of Pig Point area, showing part of Tidewater Community College. The shoreline has been protected with rubble riprap.

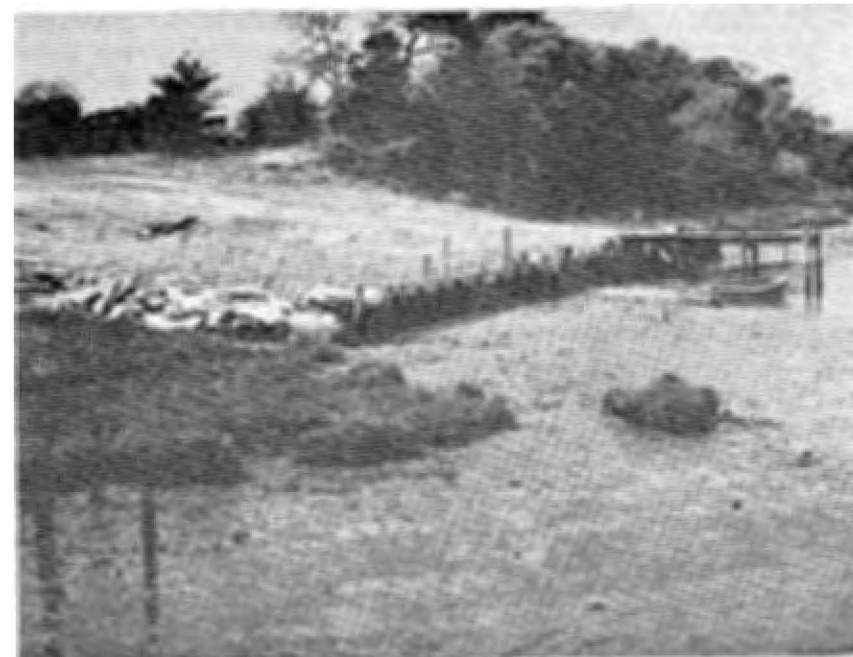


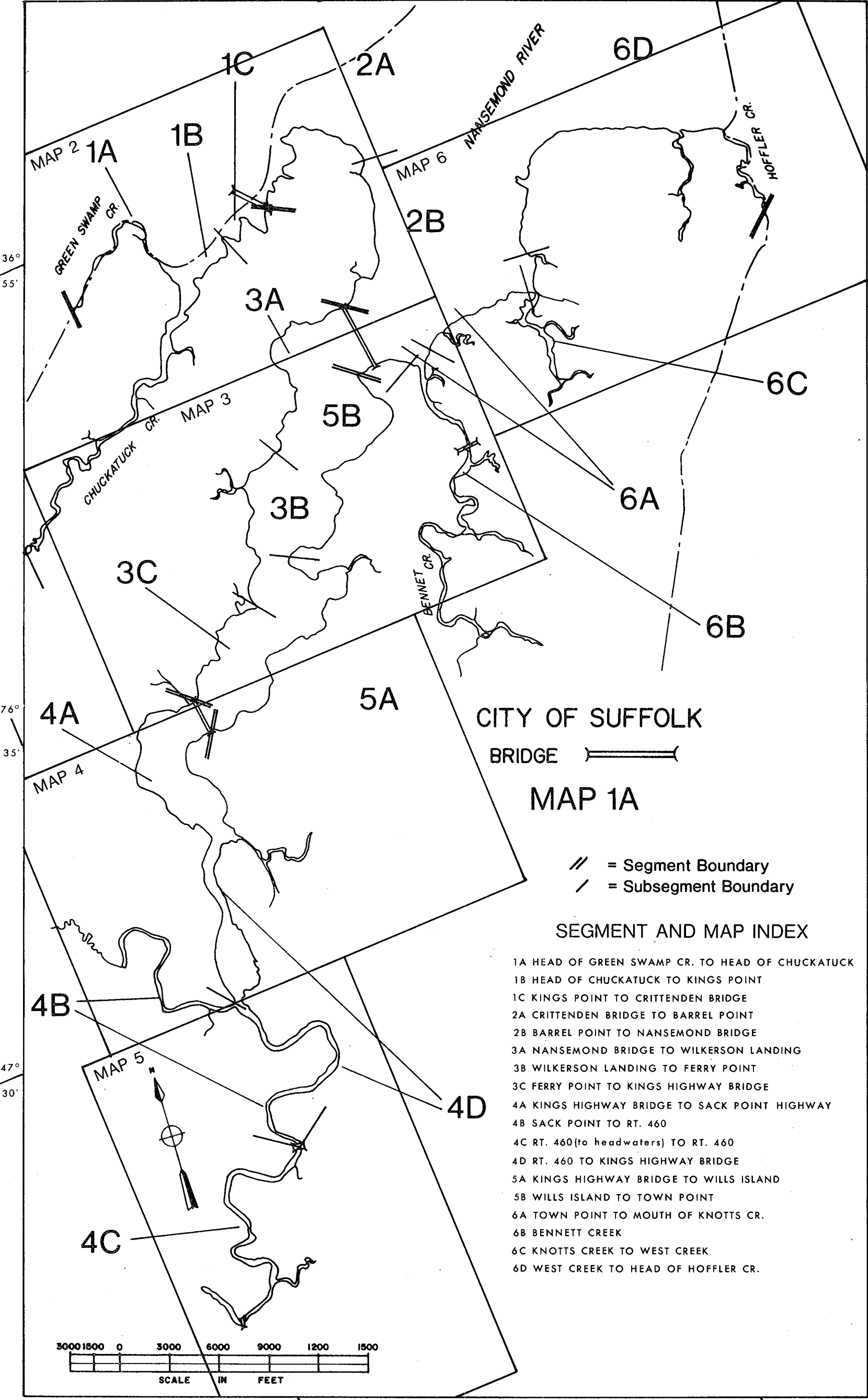
Figure 9



Figure 10

76° 30'

36° 55'



36° 55'

76° 35'

47° 30'

15

CITY OF SUFFOLK

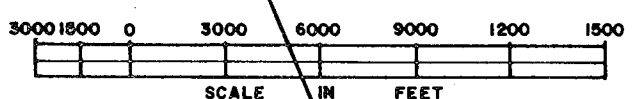
BRIDGE

MAP 1A

= Segment Boundary
 = Subsegment Boundary

SEGMENT AND MAP INDEX

- 1A HEAD OF GREEN SWAMP CR. TO HEAD OF CHUCKATUCK
- 1B HEAD OF CHUCKATUCK TO KINGS POINT
- 1C KINGS POINT TO CRITTENDEN BRIDGE
- 2A CRITTENDEN BRIDGE TO BARREL POINT
- 2B BARREL POINT TO NANSEMOND BRIDGE
- 3A NANSEMOND BRIDGE TO WILKERSON LANDING
- 3B WILKERSON LANDING TO FERRY POINT
- 3C FERRY POINT TO KINGS HIGHWAY BRIDGE
- 4A KINGS HIGHWAY BRIDGE TO SACK POINT HIGHWAY
- 4B SACK POINT TO RT. 460
- 4C RT. 460 (to headwaters) TO RT. 460
- 4D RT. 460 TO KINGS HIGHWAY BRIDGE
- 5A KINGS HIGHWAY BRIDGE TO WILLS ISLAND
- 5B WILLS ISLAND TO TOWN POINT
- 6A TOWN POINT TO MOUTH OF KNOTTS CR.
- 6B BENNETT CREEK
- 6C KNOTTS CREEK TO WEST CREEK
- 6D WEST CREEK TO HEAD OF HOFFLER CR.

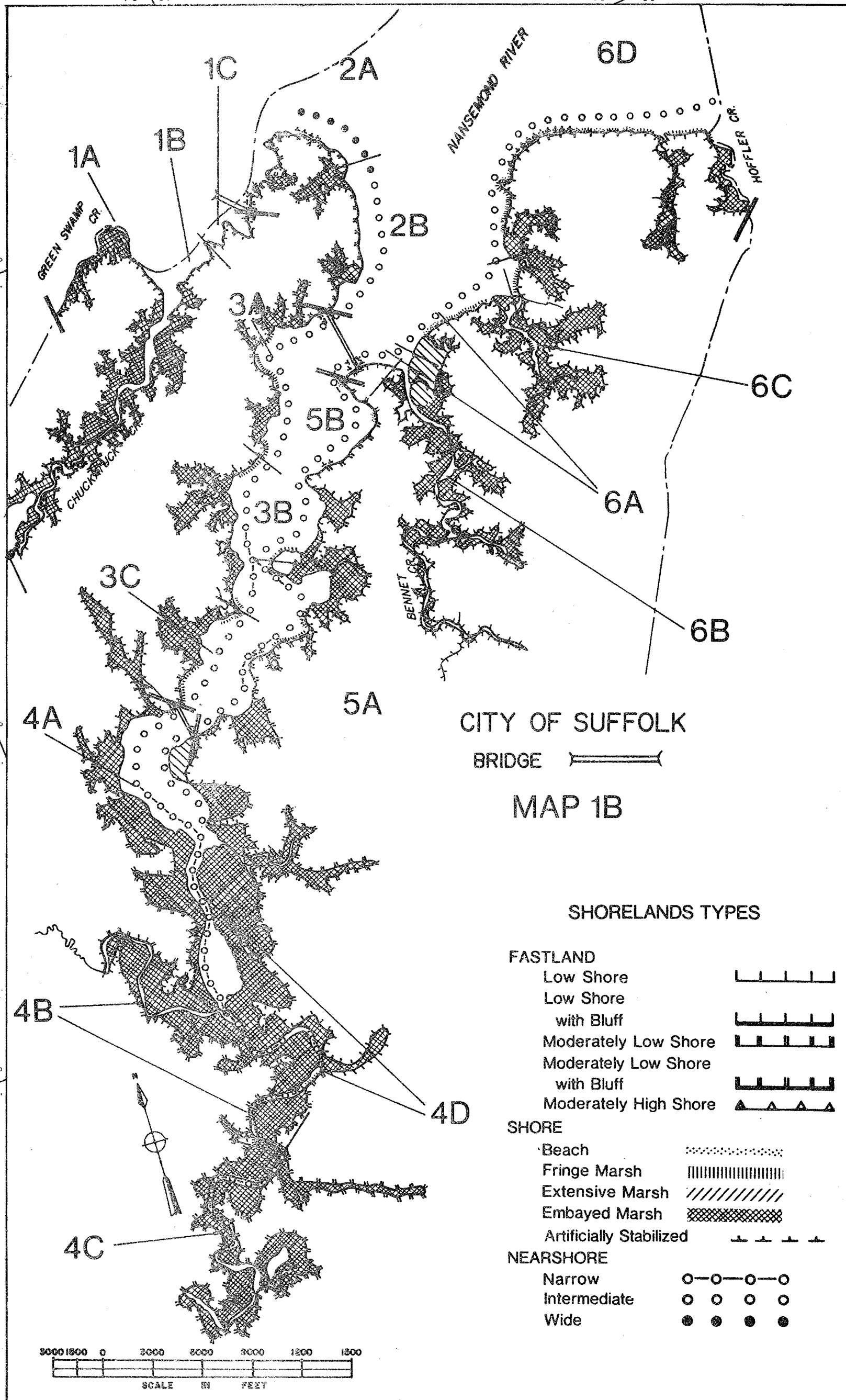


76° 35'

76° 30'

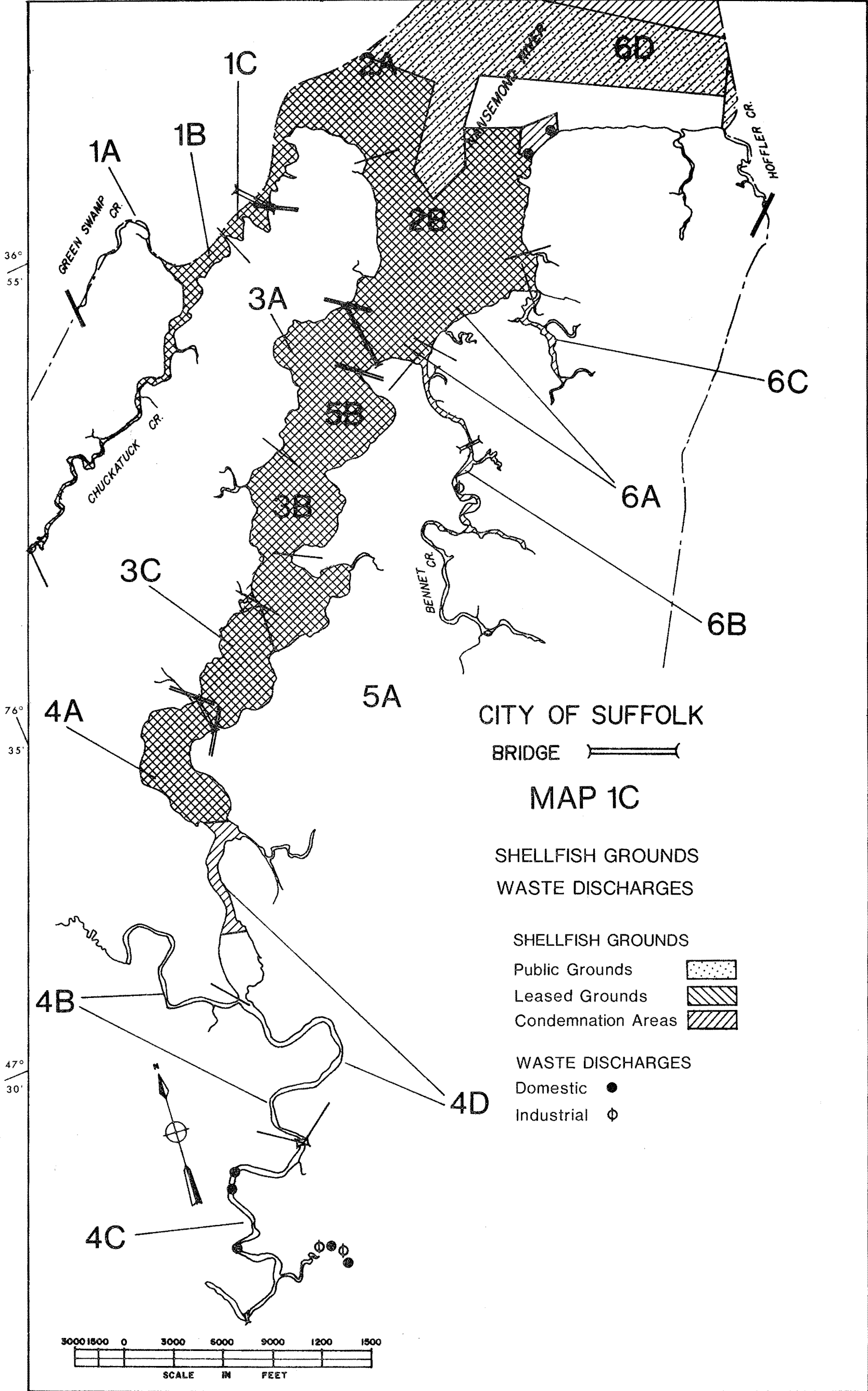
76° 30'

36° 55'

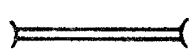


76° 30'

36° 55'




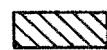
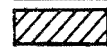
CITY OF SUFFOLK

BRIDGE 

MAP 1C

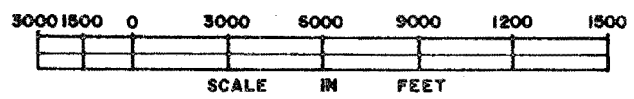
SHELLFISH GROUNDS
WASTE DISCHARGES

SHELLFISH GROUNDS

- Public Grounds 
- Leased Grounds 
- Condemnation Areas 

WASTE DISCHARGES

- Domestic ●
- Industrial ◊



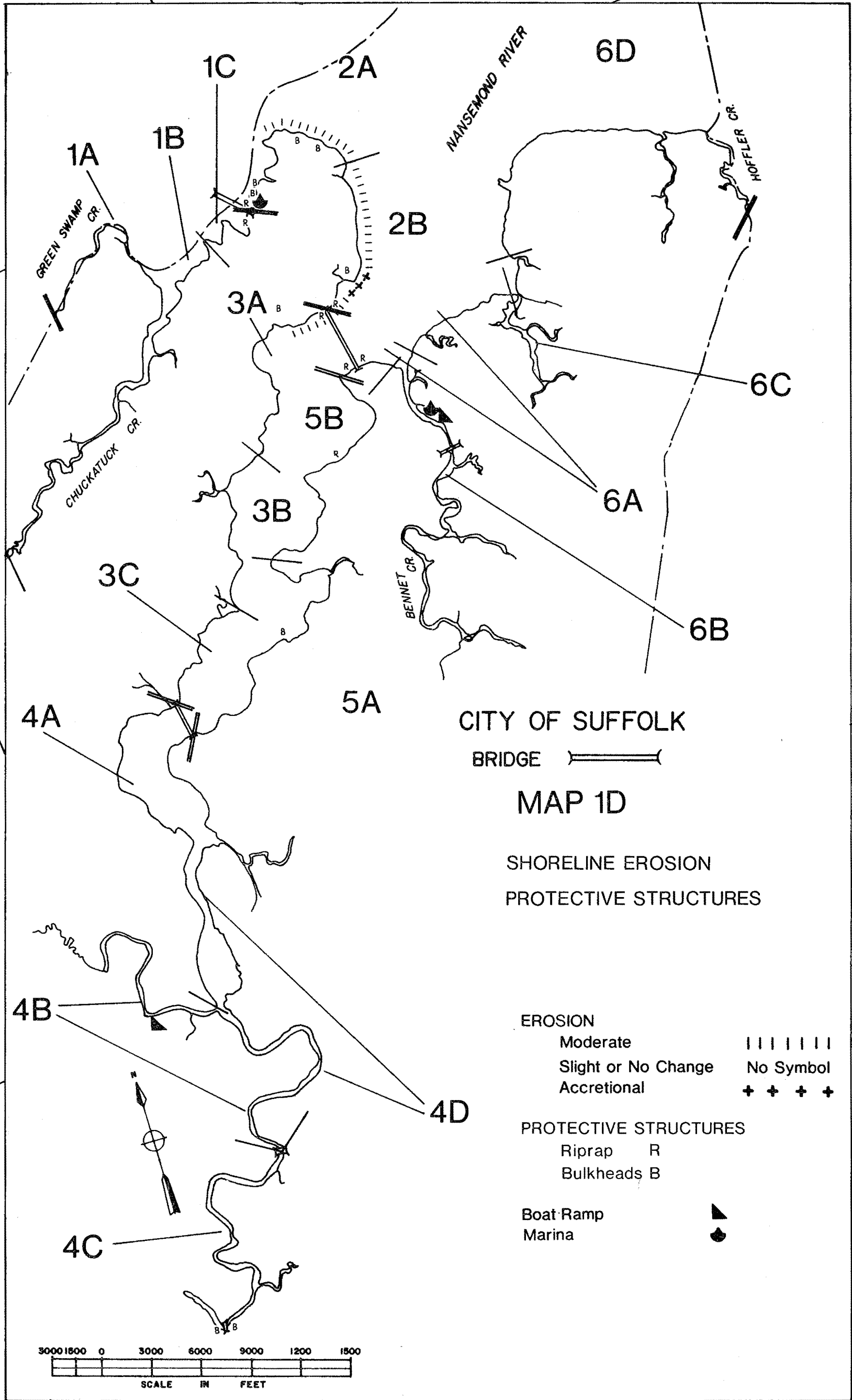
SCALE IN FEET

76° 35'

47° 30'

76° 30'

36° 55'



36° 55'


76° 35'

47° 30'

47° 30'

18

CITY OF SUFFOLK

BRIDGE 

MAP 1D

SHORELINE EROSION
PROTECTIVE STRUCTURES

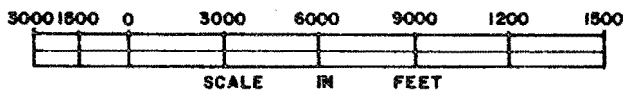
EROSION

Moderate	
Slight or No Change	No Symbol
Accretional	

PROTECTIVE STRUCTURES

Riprap	R
Bulkheads	B

Boat Ramp	
Marina	

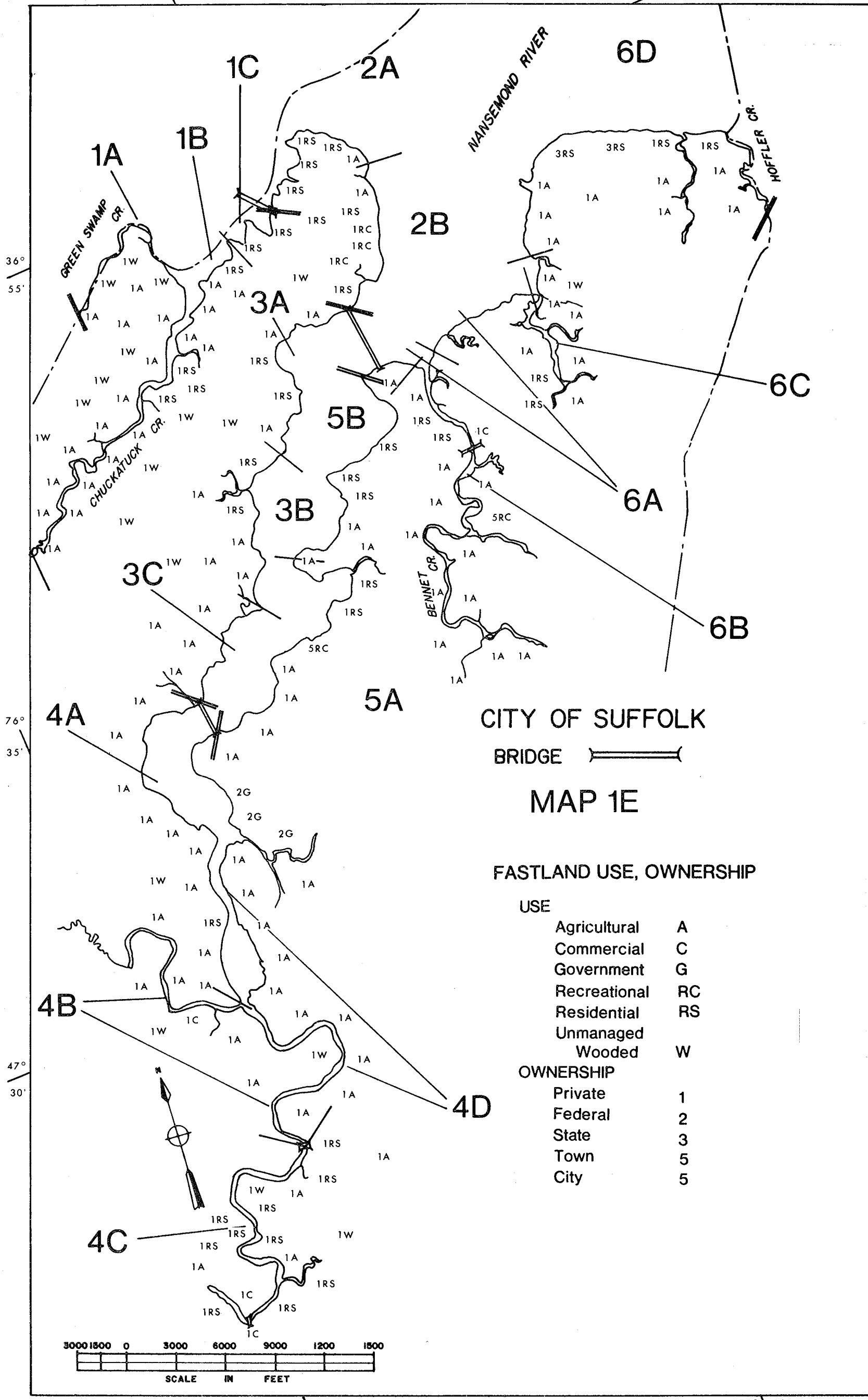


76° 35'

76° 30'

76° 30'

36° 55'



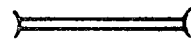
36° 55'

76° 35'

47° 30'

19

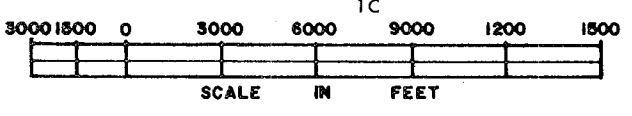
CITY OF SUFFOLK

BRIDGE 

MAP 1E

FASTLAND USE, OWNERSHIP

USE	
Agricultural	A
Commercial	C
Government	G
Recreational	RC
Residential	RS
Unmanaged	
Wooded	W
OWNERSHIP	
Private	1
Federal	2
State	3
Town	5
City	5



76° 35'

76° 30'

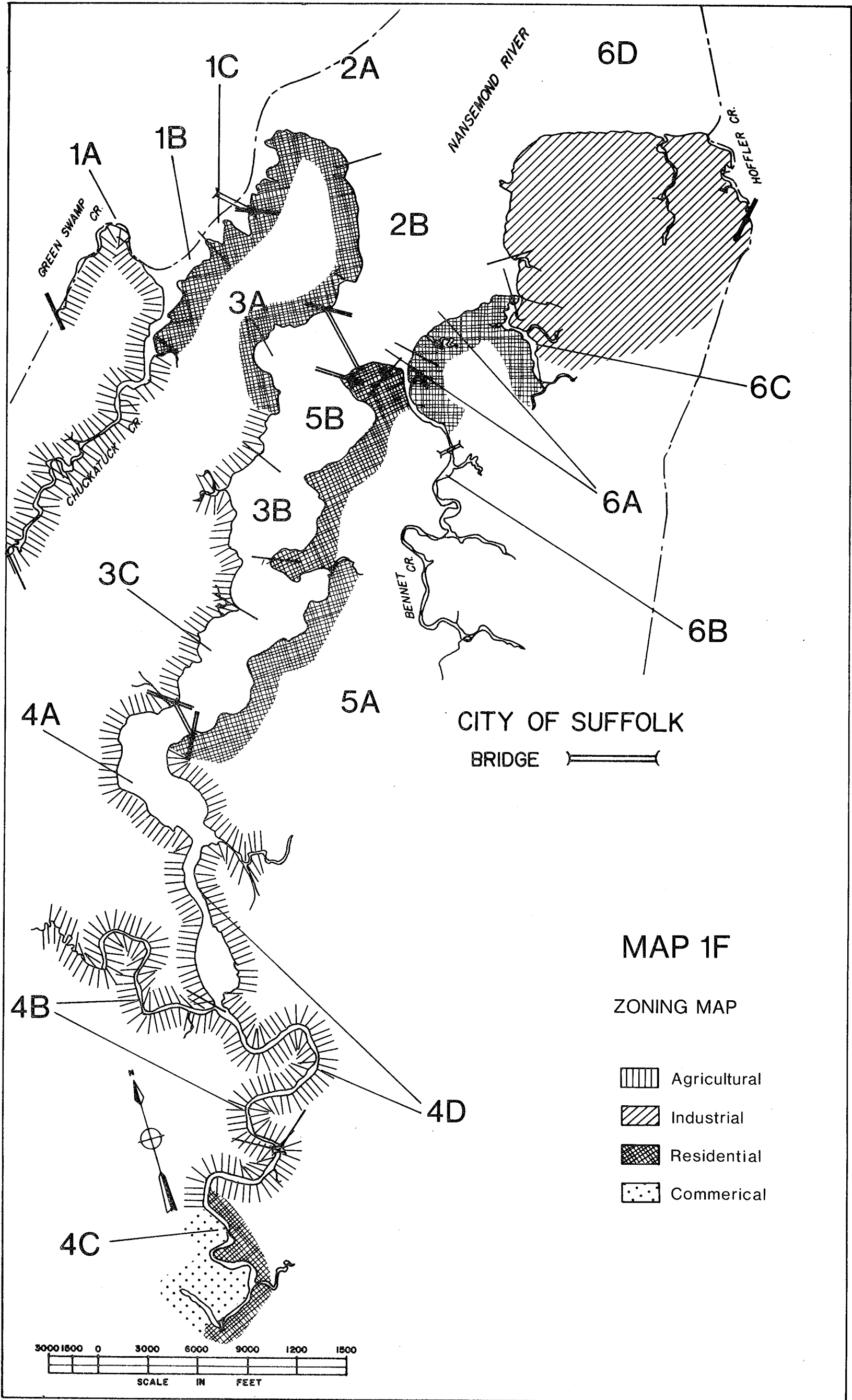


TABLE 1. SUMMARY OF CITY OF SUFFOLK SHORELANDS PHYSIOGRAPHY, FASTLAND USE AND OWNERSHIP (STATUTE MILES)

Ownership, use and physio- graphic classifi- cation	SHORELANDS PHYSIOGRAPHY											FASTLANDS USE							OWNERSHIP				TOTAL MILES							
	FASTLANDS					SHORE					NEARSHORE																			
	LOW SHORE	LOW SHORE WITH BLUFF	MODERATELY LOW SHORE	MODERATELY LOW SHORE WITH BLUFF	MODERATELY HIGH SHORE	ARTIFICIALLY STABILIZED	BEACH	FRINGE MARSH	EMBAYED MARSH	EXTENSIVE MARSH	NARROW	INTERMEDIATE	WIDE	AGRICULTURAL	COMMERCIAL	GOVERNMENTAL	INDUSTRIAL	RECREATIONAL	RESIDENTIAL	UNMANAGED, WOODDED	PRIVATE	FEDERAL	STATE	CITY	SHORE	FASTLAND				
1A	8.2		5.3				1.0	6.1		CREEK			6.4					0.3	6.8	13.5					7.1	13.5				
1B	4.1		5.5				2.4	3.2		CREEK			6.9					1.6	1.1	9.6					5.7	9.6				
1C	1.4		0.3			0.1	1.6			CREEK								1.7		1.7					1.7	1.7				
2A	0.2		2.3	0.8		0.4	0.9	0.9	0.6			0.8	0.3	0.3				2.4	0.3	3.3					2.8	3.3				
2B	1.8		3.7	0.3		0.1	0.2	0.9	2.0		0.9	1.0	2.1				1.7	1.7	0.3	5.8					3.1	5.8				
3A	3.3		2.3			0.1		1.4	1.4				2.2					1.0	2.4	5.6					2.8	5.6				
3B	2.1		4.3					1.1	1.9	0.5	1.4		3.8					0.7	1.9	6.4					3.0	6.4				
3C	0.7		2.2				0.1	0.7	1.4	0.2	1.4		2.3						0.6	2.9					2.1	2.9				
4A	7.8		6.3			0.2		2.1	7.8	2.9	1.5		12.0					0.4	1.7	14.1					10.1	14.1				
4B	6.7		4.6		0.2	0.1		1.8	5.7	3.1			8.1	0.2		0.2		0.5	2.7	11.5					7.6	11.6				
4C	3.6		12.3	0.6	0.2	0.8		1.4	8.2	8.3			9.2	1.2				5.5	0.8	16.7					10.5	16.7				
4D	8.5		9.4			0.1		0.7	8.8	5.0	1.8		11.7		4.3			0.5	1.4	13.6	4.3				10.3	17.9				
5A	4.1		4.4			0.1		2.8	2.9	0.9	2.8		5.8				1.8	0.9		6.7			1.8		5.8	8.5				
5B	2.3		1.1	0.2		0.1	0.1	2.2	0.8	0.7	2.5		2.0					1.5		3.6					3.2	3.6				
6A	1.8	0.1						1.7	0.4		2.0		1.9							1.9					2.7	1.7				
6B	19.6	0.3	2.6			0.2		2.5	10.4			CREEK	12.5	0.2			0.8	4.3	4.8	21.7			0.8		15.9	22.5				
6C	10.3		0.9	0.2				1.5	9.4				7.3					1.7	2.3	11.4					10.9	11.4				
6D	9.2		0.1			1.0	1.4	2.2	3.2			1.4	2.0					3.7	0.8	7.3		2.0			7.8	9.3				
TOTAL	95.6	0.4	67.6	2.1	0.4	3.3	2.6	28.9	74.2	4.3			21.6	19.1	3.8			99.3	2.3	4.3	0.2	4.3	28.0	27.9	157.1	4.3	2.0	2.6	113.1	166.1
% of FASTLAND	58%	0	41%	1%	0								60%	1%	3%	0	2%	17%	17%	95%	3%	1%	1%			100%				
% of SHORELINE						2%	3%	25%	66%	4%	16%	17%	3%													100%				

CHAPTER 4

4.1 TABLE OF SUBSEGMENT SUMMARIES

4.2 SEGMENT AND SUBSEGMENT DESCRIPTIONS

4.3 SEGMENT AND SUBSEGMENT MAPS

TABLE 2. SHORELINE SITUATION REPORT SUBSEGMENT SUMMARY FOR CITY OF SUFFOLK, VIRGINIA

SUBSEGMENT	SHORELANDS TYPE	SHORELANDS USE	OWNERSHIP	ZONING	FLOOD HAZARD	BEACH QUALITY	SHORE EROSION SITUATION	ALTERNATE SHORE USE
1A CHUCKATUCK CREEK 7.1 miles (13.5 miles of fastland)	FASTLAND: Low shore 51% and moderately low shore 39%. SHORE: Fringe marsh 14% and embayed marsh 86%. CREEK: Very narrow and shallow.	FASTLAND: Agricultural 47%, residential 3%, and unmanaged, wooded 50%. SHORE: Sport fishing and waterfowl hunting in the marshes. CREEK: Sport fishing.	Private.	Agricultural.	Low. This area is not subject to large waves or other direct storm effects.	There are no beaches in this subsegment.	The area appears stable. There are no endangered or protective structures.	Low density residential-agricultural use is possible, however the marshes prohibit development along the majority of the shoreline.
1B CHUCKATUCK CREEK 7.1 miles (9.6 miles of fastland)	FASTLAND: Low shore 43% and moderately low shore 57%. SHORE: Artificially stabilized less than 1%, fringe marsh 42%, and embayed marsh 57%. CREEK: Narrow and shallow. Depths near Kings Point average 6 feet.	FASTLAND: Agricultural 71%, residential 17%, and unmanaged, wooded 12%. SHORE: Sport fishing and waterfowl hunting. CREEK: Sport boating and fishing.	Private.	Agricultural and residential.	Low. This area is not subject to large waves or other direct storm effects.	There are no beaches in this subsegment.	The area appears stable. There is approximately 200 feet of bulkhead retaining fill in a marsh area near Hobson.	Low density residential development is possible along the shoreline, however the marsh areas should be preserved.
1C CRITTENDEN 1.7 miles (1.7 miles of fastland)	FASTLAND: Low shore 82% and moderately low shore 18%. SHORE: Artificially stabilized 5% and fringe marsh 95%. CREEK: The channel has depths of 7 to 11 feet.	FASTLAND: Residential. SHORE: Sun bathing and walking along the shore. CREEK: Sport boating and other water related activities.	Private.	Residential.	Low. This area is not subject to large waves or other direct storm effects.	There are no beaches in this subsegment.	The area appears stable. There is approximately 400 feet of bulkhead at Moores Point.	Low. The area is already developed. Further construction is possible only to a limited degree.
2A CRITTENDEN BRIDGE TO BARRELL POINT 2.8 miles (3.3 miles of fastland)	FASTLAND: Low shore 5%, moderately low shore 72%, and moderately low shore with bluff 23%. SHORE: Artificially stabilized 13%, beach 31%, fringe marsh 35%, and embayed marsh 21%. NEARSHORE: Wide 28%. The remainder of the subsegment is located along Chuckatuck Creek.	FASTLAND: Agricultural 6%, commercial 9%, residential 74%, and unmanaged, wooded 8%. SHORE: Bathing, private and commercial use (marinas). NEARSHORE: Sport boating and fishing.	Private.	Residential.	Low. The majority of the area has elevations of 15 to 20 feet and is not subject to flooding.	Poor. The narrow, strip beaches are often vegetated.	Slight or no change to moderate, noncritical. The area of most change is from the mouth of Chuckatuck Creek to Barrell Point, where the historical erosion rate is 2 to 3 feet per year. There is approximately 2,000 feet of artificial stabilization in this subsegment.	Low. Only isolated new development is possible in this subsegment. Small neighborhood parks or open spaces would be ideal for several sections of the shoreline.
2B BARRELL POINT TO THE NANSEMOND BRIDGE 3.1 miles (5.8 miles of fastland)	FASTLAND: Low shore 32%, moderately low shore 64%, and moderately low shore with bluff 4%. SHORE: Artificially stabilized 2%, beach 6%, fringe marsh 29%, and embayed marsh 63%. NEARSHORE: Intermediate 28% and wide 34%. The remainder of the shoreline is located along several creeks in the subsegment.	FASTLAND: Agricultural 36%, recreational 30%, residential 30%, and unmanaged, wooded 4%. SHORE: Some fishing and waterfowl hunting in the marshes. NEARSHORE: Sport boating, fishing, and other water related activities.	Private.	Residential.	Low. The majority of the area has elevations of 20 feet and is not subject to flooding. The marsh areas may flood during northeast storm conditions.	Poor. The subsegment has narrow, strip beaches often fronted by marsh.	Moderate, noncritical. The area from Bleakhorn Creek to Cedar Point has an historical erosion rate of 1.2 feet per year. Cedar Point is accreting at 2.9 feet per year. There is approximately 200 feet of bulkhead retaining fill along Bleakhorn Creek.	Low. The current residential development taking place in this area precludes alternate shore use.
3A NIX COVE 2.8 miles (5.6 miles of fastland)	FASTLAND: Low shore 59% and moderately low shore 41%. SHORE: Artificially stabilized 4%, fringe marsh 48%, and embayed marsh 48%. NEARSHORE: Intermediate.	FASTLAND: Agricultural 40%, residential 18%, and unmanaged, wooded 42%. SHORE: Some fishing and waterfowl hunting in the marshes. NEARSHORE: Commercial shipping and sport boating.	Private.	Residential.	This subsegment is partially exposed to wind and wave actions. Although with elevations of 20 feet, flooding is not likely to occur.	There are no beaches in this subsegment.	The area appears stable. There is approximately 600 feet of effective bulkheading in this subsegment.	Low. The land in Nix Cove is currently being developed for residential use, although low intensity recreational uses such as hiking, camping, and picnicking are possible for some areas.
3B WILKERSON LANDING TO FERRY POINT 3.0 miles (6.4 miles of fastland)	FASTLAND: Low shore 32% and moderately low shore 68%. SHORE: Fringe marsh 40% and embayed marsh 60%. NEARSHORE: Narrow 17% and intermediate 49%. The remainder of the subsegment is located along Campbell Creek.	FASTLAND: Agricultural 59%, residential 12%, and unmanaged, wooded 29%. SHORE: Some fishing and waterfowl hunting in the marshes. NEARSHORE: Sport fishing, boating, and commercial shipping to Suffolk.	Private.	Agricultural.	Low. The majority of the subsegment has elevations of 10 feet. It is not subject to large waves or other direct storm effects.	There are no beaches in this subsegment.	The area appears stable. There are no endangered or shore protective structures.	Low. The present agricultural use and the lack of access to the shore would hinder shore development.

TABLE 2 (cont'd.)

SUBSEGMENT	SHORELANDS TYPE	SHORELANDS USE	OWNERSHIP	ZONING	FLOOD HAZARD	BEACH QUALITY	SHORE EROSION SITUATION	ALTERNATE SHORE USE
3C FERRY POINT TO KINGS HIGHWAY BRIDGE 2.1 miles (2.9 miles of fastland)	FASTLAND: Low shore 23% and moderately low shore 77%. SHORE: Beach 2%, fringe marsh 33%, and embayed marsh 65%. NEARSHORE: Narrow 1% and intermediate 65%. The remainder of the shoreline is located along the marsh creek.	FASTLAND: Agricultural 80% and unmanaged, wooded 20%. SHORE: Fishing and waterfowl hunting in the marshes. NEARSHORE: Sport fishing, boating, and commercial shipping to Suffolk.	Private.	Agricultural.	Low. The area is not subject to large waves or other direct storm effects.	Poor. There is approximately 150 feet of narrow, strip beach fronting a private residence at Ferry Point.	The area appears stable. There are no endangered or shore protective structures.	Low. The limited lands directly bordering the river are already used for agriculture.
4A KINGS HIGHWAY BRIDGE TO SACK POINT 10.1 miles (14.1 miles of fastland)	FASTLAND: Low shore 55% and moderately low shore 45%. SHORE: Artificially stabilized 1%, fringe marsh 21%, and embayed marsh 77%. NEARSHORE: Narrow 29% and intermediate 15%. The remainder of the shoreline is located along Cedar Creek and an unnamed marsh creek.	FASTLAND: Agricultural 85%, residential 3%, and unmanaged, wooded 12%. SHORE: Some fishing and waterfowl hunting in the marshes. NEARSHORE: Sport fishing, boating, and commercial shipping to Suffolk.	Private.	Agricultural.	Low. This area is not subject to large waves or other direct storm effects.	There are no beaches in this subsegment.	The area appears stable. There is approximately 1,000 feet of bulkheading near Cedar Creek.	Low. Some new development is possible, though most areas will probably continue to be cultivated.
4B WESTERN BRANCH TO ROUTE 460 7.6 miles (11.6 miles of fastland)	FASTLAND: Low shore 58%, moderately low shore 40%, and moderately high shore 2%. SHORE: Artificially stabilized 1%, fringe marsh 24%, and embayed marsh 75%. NEARSHORE: Narrow 41%. The remainder of the shoreline is located along Western Branch.	FASTLAND: Agricultural 70%, commercial 1%, industrial 1%, residential 5%, and unmanaged, wooded 23%. SHORE: Some waterfowl hunting in the marsh areas, commercial use (marina) and industrial use (pumping station). NEARSHORE: Western Branch is used for fishing and sport boating. The dredged channel in the Nansemond is mainly used by commercial shipping to Suffolk.	Private.	Agricultural.	Low. The area is not subject to large waves or other direct storm effects.	There are no beaches in this subsegment.	The area appears stable. There is approximately 600 feet of bulkheading at the marina along Western Branch.	Low. The majority of the subsegment is embayed marsh, which should be preserved.
4C HEAD WATERS OF THE NANSEMOND RIVER 10.5 miles (16.7 miles of fastland)	FASTLAND: Low shore 21%, moderately low shore 74%, moderately low shore with bluff 4%, and moderately high shore 1%. SHORE: Artificially stabilized 8%, fringe marsh 13%, and embayed marsh 79%. NEARSHORE: Narrow 79%. The remainder of the shoreline is located along Shingle Creek and Burnetts Mill Creek.	FASTLAND: Agricultural 55%, commercial 7%, residential 33%, and unmanaged, wooded 5%. SHORE: Some waterfowl hunting in the marshes, commercial use (marinas) and private use. NEARSHORE: Sport boating and commercial shipping.	Private.	Mostly commercial and residential with a small portion of agricultural.	Low. The area is not subject to large waves or other direct storm effects.	There are no beaches in this subsegment.	The area appears stable. There is approximately 4,400 feet of bulkhead in this subsegment, the majority of which is located in the commercial district of Suffolk.	Residential development will probably continue along the fastland. Low intensity recreational parks for camping, hiking, and picnicking are much needed near the residential areas.
4D ROUTE 460 BRIDGE TO KINGS HIGHWAY BRIDGE 10.3 miles (17.9 miles of fastland)	FASTLAND: Low shore 48% and moderately low shore 52%. SHORE: Artificially stabilized 1%, fringe marsh 7%, embayed marsh 85%, and extensive marsh 7%. NEARSHORE: Narrow 49% and intermediate 18%. The remainder of the subsegment is located along several creeks.	FASTLAND: Agricultural 66%, governmental 24%, residential 3%, and unmanaged, wooded 8%. SHORE: Some fishing and waterfowl hunting in the marshes. NEARSHORE: Commercial shipping, private boating and other water related activities.	Private 76% and Federal 24%.	Agricultural.	Low. This area is not subject to large waves or other direct storm effects.	There are no beaches in this subsegment.	The area appears stable. There is approximately 400 feet of effective bulkhead at Trotman Wharf.	Low. It is expected that some development will continue along the shoreline, however the majority of the shoreline will probably remain as agricultural lands.
5A KINGS HIGHWAY BRIDGE TO WILLS ISLAND 5.8 miles (8.5 miles of fastland)	FASTLAND: Artificial fill 1%, low shore 48%, and moderately low shore 51%. SHORE: Artificially stabilized 1%, fringe marsh 48%, and embayed marsh 51%. NEARSHORE: Narrow 16% and intermediate 48%. The rest of the shoreline is located along the dredged creeks at Bennett Harbor.	FASTLAND: Agricultural 68%, recreational 21%, and residential 10%. SHORE: Waterfowl hunting in the marshes. Nature walks are located in the marsh at Sleepy Hole Park. NEARSHORE: Sport fishing and boating, commercial shipping to Suffolk.	Private 79% and city 21%.	Residential.	Low. This area is not subject to large waves or other direct storm effects.	There are no beaches in this subsegment.	The area appears stable. There is approximately 400 feet of effective, wooden bulkhead retaining fill adjacent to the Planters Club.	Low. Sleepy Hole Park is already a low intensity recreation area and other recreational development is not necessary at this time. Most residential and commercial activity will probably center around the major access roads further inland.
5B NANSEMOND SHORES 3.2 miles (3.6 miles of fastland)	FASTLAND: Low shore 64%, moderately low shore 32%, and moderately low shore with bluff 4%. SHORE: Artificially stabilized 2%, beach 2%, fringe marsh 69%, and embayed marsh 26%. NEARSHORE: Narrow 21% and intermediate 79%.	FASTLAND: Agricultural 57% and residential 43%. SHORE: Waterfowl hunting in the marshes. NEARSHORE: Sport fishing and boating, commercial shipping to Suffolk.	Private.	Residential.	Low. This area is not subject to large waves or other direct storm effects.	Poor. There are only narrow, strip beaches fronted by marsh in this subsegment.	The area appears stable. There is approximately 200 feet of rubble riprap in the Nansemond Shores development.	Low. Almost all the shoreline in this subsegment is developed. Nature walks are possible on Wills Island.

TABLE 2 (cont'd.)

SUBSEGMENT	SHORELANDS TYPE	SHORELANDS USE	OWNERSHIP	ZONING	FLOOD HAZARD	BEACH QUALITY	SHORE EROSION SITUATION	ALTERNATE SHORE USE
6A TOWN POINT TO MOUTH OF KNOTS CREEK 2.5 miles (1.9 miles of fastland)	FASTLAND: Low shore 94% and low shore with bluff 6%. SHORE: Fringe marsh 62%, embayed marsh 14%, and extensive marsh 24%. NEARSHORE: Intermediate 74%. The remainder of the shoreline is located along a marsh creek.	FASTLAND: Entirely agricultural. SHORE: Some fishing and waterfowl hunting in the marshes. NEARSHORE: Commercial shipping to Suffolk, sport boating, fishing, and other water related activities.	Private.	Residential.	This subsegment is exposed to wind and wave actions, although with elevations of 15 to 20 feet, flooding is not likely to occur.	There are no beaches in this subsegment.	The area appears stable. There are no endangered or shore protective structures.	This area has been proposed for urban residential development. Any development should include open spaces for public recreation.
6B BENNETT CREEK 16.0 miles (22.5 miles of fastland)	FASTLAND: Low shore 87%, low shore with bluff 2%, and moderately low shore 11%. SHORE: Artificially stabilized 1%, fringe marsh 15%, embayed marsh 65%, and extensive marsh 19%. CREEK: The depth at the creek mouth is approximately 1 foot at low tide. Interior depths are generally greater.	FASTLAND: Agricultural 55%, commercial 1%, recreational 4%, residential 19%, and unmanaged, wooded 21%. SHORE: Waterfowl hunting in the marshes. CREEK: Sport boating, fishing, and other water related activities.	Private 96% and City 4%.	Residential and industrial.	Low. This subsegment is not subject to large waves or other direct storm effects.	There are no beaches in this subsegment.	The area appears stable. There is approximately 1,000 feet of bulkhead at a marina and several residences near the Route 17 bridge.	Moderate. This section has been zoned for residential and industrial use. The probable continued development along the creek should be carefully planned to insure against destroying the area's natural beauty.
6C MOUTH OF KNOTS CREEK TO WEST CREEK 10.9 miles (11.4 miles of fastland)	FASTLAND: Low shore 91%, moderately low shore 8%, and moderately low shore with bluff 1%. SHORE: Fringe marsh 14% and embayed marsh 86%. NEARSHORE: Intermediate 6%. The remainder of the shoreline is located along the creeks.	FASTLAND: Agricultural 65%, residential 15%, and unmanaged, wooded 20%. SHORE: Fishing and waterfowl hunting in the marshes. NEARSHORE: Commercial shipping to Suffolk, sport boating and fishing in the creeks.	Private.	Industrial and residential.	Low. The majority of this subsegment is located along creeks, which are protected from large waves or other direct storm effects. The area fronting the river has elevations of 15 to 20 feet and is not susceptible to flooding.	There are no beaches in this subsegment.	The area appears stable. There are no endangered or shore protective structures.	This area has been proposed for residential and industrial development. Any development should include open spaces for public recreation.
6D MOUTH OF WEST CREEK TO HEAD OF HOFFLER CREEK 7.8 miles (9.3 miles of fastland)	FASTLAND: Low shore 99% and moderately low shore 1%. SHORE: Artificially stabilized 13%, beach 18%, fringe marsh 28%, and embayed marsh 41%. NEARSHORE: Intermediate 18% and wide 25%. The rest of the subsegment is located along Streeter and Hoffler Creeks.	FASTLAND: Agricultural 51%, residential 40%, and unmanaged, wooded 9%. SHORE: Some waterfowl hunting in the marshes; strolling and sun bathing on the beaches. NEARSHORE: Commercial shipping to Suffolk, sport fishing and boating in the creeks.	Private 78% and state 22%.	Industrial and some residential.	Low. This area is subject to storm effects, though most sections have elevations of 10 feet so flooding is not likely to occur.	This subsegment has narrow, strip beaches often fronted by vegetation.	No historical data. Recent evidence indicates this area has a moderate erosion rate of about 2.0 feet per year. The Tidewater Community College has approximately 5,000 feet of rubble riprap which appears to be effective.	This area is zoned for high intensity industrial use, characterized as a major production area with open storage, noise, and odor. Little other development would be compatible with this usage.

SUBSEGMENT 1A
CHUCKATUCK CREEK
(Maps 2 and 3)

EXTENT: 37,400 feet (7.1 mi.) of shoreline from Brewers Creek to the head of Chuckatuck Creek. The subsegment also includes 71,400 feet (13.5 mi.) of fastland.

SHORELANDS TYPE

FASTLAND: Low shore 61% (8.2 mi.) and moderately low shore 39% (5.3 mi.).
SHORE: Fringe marsh 14% (1.0 mi.) and embayed marsh 86% (6.1 mi.).
CREEK: Chuckatuck Creek is very narrow and shallow in this subsegment.

SHORELANDS USE

FASTLAND: Agricultural 47% (6.4 mi.), residential 3% (0.3 mi.), and unmanaged, wooded 50% (6.8 mi.).
SHORE: Some waterfowl hunting in the marshes and fishing.
CREEK: Sport fishing.

SHORELINE TREND: The shoreline trend is basically NW - SE then NE - SW.

OWNERSHIP: Private.

ZONING: Agricultural.

FLOOD HAZARD: Low. The area is not subject to large waves or other direct storm effects.

BEACH QUALITY: There are no beaches in this subsegment.

SHORE EROSION SITUATION

EROSION RATE: The area appears stable.
ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: None.

OTHER SHORE STRUCTURES: There are several piers in this subsegment.

SHORE USE LIMITATIONS: Eighty-six percent of the shoreline along the western bank of Chuckatuck Creek is embayed marsh. These marshes should be left in their natural state. Since the majority of the creek is too shallow for most

boats to use, this area loses much of its water related residential value. Access is difficult to most of the shoreline.

ALTERNATE SHORE USE: The area is best suited for low density residential - agricultural use. Other residences are possible in some areas, though the marshes prohibit development along most of the shoreline.

MAPS: USGS, 7.5 Min.Ser. (Topo.), BENNS CHURCH, Va. Quadr., 1965; pr. 1972.
C&GS, #11248 (formerly 529), 1:40,000 scale, JAMES RIVER, Newport News to Jamestown Island, 21st ed., 1975.

PHOTOS: Aerial-VIMS 5May76 SF-1A/229-240.

SUBSEGMENT 1B
CHUCKATUCK CREEK
(Maps 2 and 3)

EXTENT: 30,000 feet (5.7 mi.) of shoreline from the head of Chuckatuck Creek to Kings Point. The subsegment also includes 50,600 feet (9.6 mi.) of fastland.

SHORELANDS TYPE

FASTLAND: Low shore 43% (4.1 mi.) and moderately low shore 57% (5.5 mi.).
SHORE: Artificially stabilized, less than 1%, fringe marsh 42% (2.4 mi.), and embayed marsh 57% (3.2 mi.).
CREEK: Most of the creek is very narrow and shallow. Depths near Kings Point average 6 feet.

SHORELANDS USE

FASTLAND: Agricultural 71% (6.9 mi.), residential 17% (1.6 mi.), and unmanaged, wooded 12% (1.1 mi.).
SHORE: Some fishing and waterfowl hunting in the marshes.
CREEK: Sport fishing and some sport boating.

SHORELINE TREND: The shoreline trend is basically SW - NE in this subsegment.

OWNERSHIP: Private.

ZONING: Agricultural and residential.

FLOOD HAZARD: Low. This area is not subject to large waves or other direct storm effects.

BEACH QUALITY: There are no beaches in this subsegment.

SHORE EROSION SITUATION

EROSION RATE: The area appears stable.
ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: There is approximately 200 feet of bulkhead retaining fill in an area of marsh near Hobson.

OTHER SHORE STRUCTURES: There are several piers and a boat ramp in this subsegment.

SHORE USE LIMITATIONS: Embayed marshes, which

comprise fifty-seven percent of the shoreline, should not be altered to support development. Access to the shoreline is also somewhat limited.

ALTERNATE SHORE USE: Some development is possible along the shoreline. However, Chuckatuck Creek does not meet the State water quality standards, so any development would have to ensure against adding pollutants to the creek.

MAPS: USGS, 7.5 Min.Ser. (Topo.), BENNS CHURCH, Va. Quadr., 1965; pr. 1972.
C&GS, #11248 (formerly 529), 1:40,000 scale, JAMES RIVER, Newport News to James-town Island, 21st ed., 1975.

PHOTOS: Aerial-VIMS 5May76 SF-1B/207-228.

SUBSEGMENT 1C

CRITTENDEN

(Map 2)

EXTENT: 8,800 feet (1.7 mi.) of shoreline from Kings Point to the Crittenden Bridge. The subsegment also includes 8,800 feet (1.7 mi.) of fastland.

SHORELANDS TYPE

FASTLAND: Low shore 82% (1.4 mi.) and moderately low shore 18% (0.3 mi.).

SHORE: Artificially stabilized 5% (0.1 mi.) and fringe marsh 95% (1.6 mi.).

CREEK: The channel here has depths of from 7 to 11 feet.

SHORELANDS USE

FASTLAND: Entirely residential.

SHORE: Fishing and bathing.

CREEK: Sport boating and fishing and other water related activities.

SHORELINE TREND: The shoreline trends basically SW - NE in this subsegment.

OWNERSHIP: Private.

ZONING: Residential.

FLOOD HAZARD: Low. This subsegment is not subject to large waves or other direct storm effects.

BEACH QUALITY: There are no beaches in this subsegment.

SHORE EROSION SITUATION

EROSION RATE: No data. The area appears stable.

ENDANGERED STRUCTURES: None.

SHORE PROTECTIVE STRUCTURES: There is about 400 feet of effective bulkhead at Moores Point.

OTHER SHORE STRUCTURES: There are several piers, a boat ramp and a boat house along the shore of this subsegment.

SHORE USE LIMITATIONS: Higher intensity development of this area would further degradate the

water quality of the creek. Much of the land near the shore is too low for development.

ALTERNATE SHORE USE: Low. This area is already developed for residential use. Some further development is possible, though care should be taken to ensure against further pollution of the creek. Also, no structures should be built on lands which are susceptible to flooding.

MAPS: USGS, 7.5 Min.Ser. (Topo.), BENNS CHURCH, Va. Quadr., 1965; pr. 1972.
C&GS, #11248 (formerly 529), 1:40,000 scale, JAMES RIVER, Newport News to James-town Island, 21st ed., 1975.

PHOTOS: Aerial-VIMS 5May76 SF-1C/204-206.

SUBSEGMENT 2A
CRITTENDEN BRIDGE TO BARREL POINT
(Map 2)

EXTENT: 15,000 feet (2.8 mi.) of shoreline from the Crittenden Bridge to Barrel Point. The subsegment also includes 17,200 feet (3.3 mi.) of fastland.

SHORELANDS TYPE

FASTLAND: Low shore 5% (0.2 mi.), moderately low shore 72% (2.3 mi.), and moderately low shore with bluff 23% (0.8 mi.).
SHORE: Artificially stabilized 13% (0.4 mi.), beach 31% (0.9 mi.), fringe marsh 35% (0.9 mi.), and embayed marsh 21% (0.6 mi.).
NEARSHORE: Wide 28% (0.8 mi.). The remainder of the subsegment is located along Chuckatuck Creek, which is too narrow and shallow for classification.

SHORELANDS USE

FASTLAND: Agricultural 8% (0.3 mi.), commercial 9% (0.3 mi.), residential 74% (2.4 mi.), and unmanaged, wooded 8% (0.3 mi.).
SHORE: Bathing, private use, and commercial use (marinas).
NEARSHORE: Sport fishing, boating and other water related activities.

SHORELINE TREND: The shoreline trend is basically SW - NE, then NW - SE. The fetch at Eclipse is NE - 4 nautical miles.

OWNERSHIP: Private.

ZONING: Residential.

FLOOD HAZARD: Low. Most of the area has elevations of 15 to 20 feet and is not subject to flooding.

BEACH QUALITY: Poor. The subsegment has narrow, strip beaches which are often vegetated. Marshes sometimes front the beach areas.

SHORE EROSION SITUATION

EROSION RATE: Slight or no change to moderate, noncritical. The area of most change is from the mouth of Chuckatuck Creek to Barrel Point, where the historical erosion rate is 2.3 feet

per year.

ENDANGERED STRUCTURES: None.

SHORE PROTECTIVE STRUCTURES: There is approximately 2,000 feet of bulkhead and rubble riprap in this subsegment. The Pike Point area has had several attempts at stopping erosion. In the nearshore zone, vertical pilings and leaders give evidence of a bulkhead long since deteriorated. Marsh areas now exist between these ruins and the fastland. On the fastland-shore interface is a more recent attempt at controlling the problem. Sections of this bulkhead have deteriorated, making gaps in the structure and allowing scouring behind. The bulkhead, no longer attached to most of the fastland, is acting like a breakwater. Though somewhat effective at lessening storm wave effects, the gaps and flanked ends of the structure are continuing to allow erosion of the fastland. Rubble riprap adjoining the bulkhead appears to be effective.

Elsewhere in the subsegment, a disused oyster shucking plant on Chuckatuck Creek has some wooden bulkheading retaining fill, though most of the structure is in a dilapidated condition. A marina nearby also has a partially effective bulkhead retaining fill.

OTHER SHORE STRUCTURES: There are several piers, a marine railway, boat ramp, and several boat sheds in this subsegment.

SHORE USE LIMITATIONS: Twenty-one percent of the shoreline is embayed marsh which should be left in its natural state. The fastland, twenty-three percent of which is bluff, ranges in elevation from 20 to 25 feet. The bluffs to the northwest of Eclipse are experiencing moderate erosion due to rain runoff and to undercutting of the cliff base in places by waves. No structures should be built near the unstable cliff areas. The Crittenden area of the subsegment already has been developed for residential use.

ALTERNATE SHORE USE: Low. Only isolated new development is possible in the subsegment. There is not enough unused land for a park or other large scale recreational area. Small neighborhood parks or open areas would be ideal for several sections of the shorelands.

MAPS: USGS, 7.5 Min.Ser. (Topo.), BENNS CHURCH,

Va. Quadr., 1965; pr. 1972;
USGS, 7.5 Min.Ser. (Topo.), NEWPORT NEWS SOUTH, Va. Quadr., 1964; pr. 1968 and 1973.
C&GS, #11248 (formerly 529), 1:40,000 scale, JAMES RIVER, Newport News to Jamestown Island, 21st ed., 1975.

PHOTOS: Aerial-VIMS 5May76 SF-2A/189-203.

Ground-VIMS 16Apr76 SF-2A/01-11 and 41-60.

SUBSEGMENT 2B

BARREL POINT TO THE NANSEMOND BRIDGE

(Map 2)

EXTENT: 16,600 feet (3.1 mi.) of shoreline from Barrel Point to the Nansemond Bridge including Bleakhorn Creek. The subsegment also includes 30,800 feet (5.8 mi.) of fastland.

SHORELANDS TYPE

FASTLAND: Low shore 32% (1.8 mi.), moderately low shore 64% (3.7 mi.), and moderately low shore with bluff 4% (0.3 mi.).

SHORE: Artificially stabilized 2% (0.1 mi.), beach 6% (0.2 mi.), fringe marsh 29% (0.9 mi.), and embayed marsh 63% (2.0 mi.).

NEARSHORE: Intermediate 28% (0.9 mi.) and wide 34% (1.0 mi.). The rest of the shoreline is found along several creeks in the subsegment.

SHORELANDS USE

FASTLAND: Agricultural 36% (2.1 mi.), recreational 30% (1.7 mi.), residential 30% (1.7 mi.), and unmanaged, wooded 4% (0.3 mi.).

SHORE: Some waterfowl hunting in the marshes.

NEARSHORE: Sport fishing, boating and other water related activities.

SHORELINE TREND: The shoreline trend is basically N - S in this subsegment. The fetch at Cedar Point is NE - 5 nautical miles.

OWNERSHIP: Private.

ZONING: Residential.

FLOOD HAZARD: Low. Most of the subsegment has elevations of 20 feet and is not subject to flooding. The marsh areas may flood during northeast storm conditions.

BEACH QUALITY: Poor. The subsegment has narrow, strip beaches, often fronted by marsh areas.

SHORE EROSION SITUATION

EROSION RATE: Moderate, noncritical. The area from Bleakhorn Creek to Cedar Point has an historical erosion rate of 1.2 feet per year.

Cedar Point is accreting at 2.9 feet per year.

ENDANGERED STRUCTURES: None.

SHORE PROTECTIVE STRUCTURES: An abandoned

oyster shucking plant on Bleakhorn Creek has approximately 200 feet of effective bulkhead retaining fill.

OTHER SHORE STRUCTURES: There is one pier in the subsegment.

SHORE USE LIMITATIONS: The embayed marshes at Bleakhorn Creek and Cedar Point comprise sixty-three percent of the shoreline. These areas should be preserved in their natural state. Most of the area from Bleakhorn Creek to Cedar Point is already developed as a golf course, which would preclude other development. Except for Cedar Point, the entire subsegment is experiencing moderate, noncritical erosion.

ALTERNATE SHORE USE: Low. The current residential development taking place in this subsegment precludes other alternate shore uses. A new development is located behind the marsh at Cedar Point. Also, more houses are being built along the shoreline in front of the golf course. These developments should ensure against adding any pollutants to the already contaminated Nansemond River. The rural nature of this section of Suffolk makes it an attractive residential area. However, over development of the area will destroy the natural beauty which first induced development.

MAPS: USGS, 7.5 Min.Ser. (Topo.), NEWPORT NEWS SOUTH, Va. Quadr., 1964; pr. 1968 and 1973. C&GS, #11248 (formerly 529), 1:40,000 scale, JAMES RIVER, Newport News to Jamestown Island, 21st ed., 1975.

PHOTOS: Aerial-VIMS 5May76 SF-2B/176-188.

Ground-VIMS 16Apr76 SF-2B/12.

SUBSEGMENT 3A

NIX COVE

(Maps 2 and 3)

EXTENT: 15,000 feet (2.8 mi.) of shoreline from the Nansemond Bridge to Wilkerson Landing. The subsegment also contains 29,400 feet (5.6 mi.) of fastland.

SHORELANDS TYPE

FASTLAND: Low shore 59% (3.3 mi.) and moderately low shore 41% (2.3 mi.).
SHORE: Artificially stabilized 4% (0.1 mi.), fringe marsh 48% (1.4 mi.), and embayed marsh 48% (1.4 mi.).
NEARSHORE: Intermediate.

SHORELANDS USE

FASTLAND: Agricultural 40% (2.2 mi.), residential 18% (1.0 mi.), and unmanaged, wooded 42% (2.4 mi.).
SHORE: Waterfowl hunting in the marshes.
NEARSHORE: Sport fishing and other water related activities. Commercial shipping to Suffolk.

SHORELINE TREND: The shoreline trends basically NE - SW in this subsegment.

OWNERSHIP: Private.

ZONING: Residential.

FLOOD HAZARD: This subsegment is partially exposed to wind and wave actions although with average elevations of 20 feet, flooding is not likely to occur.

BEACH QUALITY: There are no beaches in this subsegment.

SHORE EROSION SITUATION

EROSION RATE: No data. The area appears stable.

ENDANGERED STRUCTURES: None.

SHORE PROTECTIVE STRUCTURES: There is approximately 600 feet of effective bulkheading in this subsegment. Rubble riprap is protecting the shore at the Nansemond Bridge.

OTHER SHORE STRUCTURES: There are several piers

located in this subsegment.

SHORE USE LIMITATIONS: Forty-eight percent of the shoreline is comprised of embayed marshes. These marsh areas should be preserved in their natural state. This subsegment is mainly rural in nature, being divided between agricultural and unmanaged, wooded areas. Eighteen percent is currently used for residential purposes. The agricultural lands should not be sacrificed for residential build up.

ALTERNATE SHORE USE: Low. The land in Nix Cove is currently being developed for residential use. Elsewhere in the subsegment, the land is either used for agriculture or is wooded. The wooded lands backing the embayed marsh south of Nix Cove could be used for low intensity recreation, such as hiking, camping, and picnicking.

MAPS: USGS, 7.5 Min.Ser. (Topo.), NEWPORT NEWS SOUTH, Va. Quadr., 1964; pr. 1968 and 1973; USGS, 7.5 Min.Ser. (Topo.), BENNS CHURCH, Va. Quadr., 1965; pr. 1972; USGS, 7.5 Min.Ser. (Topo.), CHUCKATUCK, Va. Quadr., 1965; pr. 1972. C&GS, #11248 (formerly 529), 1:40,000 scale, JAMES RIVER, Newport News to Jamestown Island, 21st ed., 1975.

PHOTOS: Aerial-VIMS 15Oct75 SF-3A/162-175.

SUBSEGMENT 3B

WILKERSON LANDING TO FERRY POINT

(Map 3)

EXTENT: 15,600 feet (3.0 mi.) of shoreline from Wilkerson Landing to Ferry Point, including Campbell Creek. The subsegment also includes 34,000 feet (6.4 mi.) of fastland.

SHORELANDS TYPE

FASTLAND: Low shore 32% (2.1 mi.) and moderately low shore 68% (4.3 mi.).
SHORE: Fringe marsh 40% (1.1 mi.) and embayed marsh 60% (1.9 mi.).
NEARSHORE: Narrow 17% (0.5 mi.) and intermediate 49% (1.4 mi.). The rest of the shoreline is located along Campbell Creek.

SHORELANDS USE

FASTLAND: Agricultural 59% (3.8 mi.), residential 12% (0.7 mi.), and unmanaged, wooded 29% (1.9 mi.).
SHORE: Some fishing and waterfowl hunting in the marshes.
NEARSHORE: Sport fishing, boating and commercial shipping to Suffolk.

SHORELINE TREND: The shoreline trend is basically NE - SW in this subsegment.

OWNERSHIP: Private.

ZONING: Agricultural.

FLOOD HAZARD: Low. Most of the area has elevations of at least 10 feet. It is not subject to large waves or other direct storm effects.

BEACH QUALITY: There are no beaches in this subsegment.

SHORE EROSION SITUATION

EROSION RATE: No data. The area appears stable.

ENDANGERED STRUCTURES: None.

SHORE PROTECTIVE STRUCTURES: None.

OTHER SHORE STRUCTURES: There are several piers in this subsegment.

SHORE USE LIMITATIONS: Sixty percent of the

shoreline in this subsegment is embayed marsh, which should remain unspoiled. Most of these areas are located along Campbell Creek. The majority of the fastland is actively used for agriculture. Major access to this area is via Route 628, which is located more than a mile into the fastland. Any development along the shoreline would depend upon the building of a good access road, which would be costly.

ALTERNATE SHORE USE: Low. Any major build up along the shoreline would have to buy agricultural lands and also build an access road. The subsegment is best left as a rural agricultural area.

MAPS: USGS, 7.5 Min.Ser. (Topo.), CHUCKATUCK, Va. Quadr., 1965; pr. 1972.
C&GS, #11248 (formerly 529), 1:40,000 scale, JAMES RIVER, Newport News to Jamestown Island, 21st ed., 1975.

PHOTOS: Aerial-VIMS 15Oct75 SF-3B/147-161.

SUBSEGMENT 3C
FERRY POINT TO KINGS HIGHWAY BRIDGE
(Map 3)

EXTENT: 11,000 feet (2.1 mi.) of shoreline from Ferry Point to Kings Highway Bridge. The subsegment also includes 15,400 feet (2.9 mi.) of fastland.

SHORELANDS TYPE

FASTLAND: Low shore 23% (0.7 mi.) and moderately low shore 77% (2.2 mi.).

SHORE: Beach 2% (0.1 mi.), fringe marsh 33% (0.7 mi.), and embayed marsh 65% (1.4 mi.).

NEARSHORE: Narrow 1% (0.2 mi.) and intermediate 65% (1.4 mi.). The rest of the shoreline is located in the marsh creek.

SHORELANDS USE

FASTLAND: Agricultural 80% (2.3 mi.) and unmanaged, wooded 20% (0.6 mi.).

SHORE: Fishing and waterfowl hunting in the marshes.

NEARSHORE: Sport fishing, boating and commercial shipping to Suffolk.

SHORELINE TREND: The shoreline trend is basically NE - SW in this subsegment.

OWNERSHIP: Private.

ZONING: Agricultural.

FLOOD HAZARD: Low. This area is not subject to large waves or other direct storm effects.

BEACH QUALITY: Poor. There is approximately 150 feet of very thin beach fronting a private residence at Ferry Point.

SHORE EROSION SITUATION

EROSION RATE: No data. The area appears stable.

ENDANGERED STRUCTURES: None.

SHORE PROTECTIVE STRUCTURES: None.

OTHER SHORE STRUCTURES: None.

SHORE USE LIMITATIONS: Sixty-five percent of the shoreline is embayed marsh. Only three areas of fastland directly border the water. Farm

buildings are located on two of these, and the third, Hollidays Point, is too close to the Kings Highway Bridge to be developed. Development behind the marshes would be at the sacrifice of the farm lands located there.

ALTERNATE SHORE USE: Low. The present agricultural use seems best suited for the area.

MAPS: USGS, 7.5 Min.Ser. (Topo.), CHUCKATUCK, Va. Quadr., 1965; pr. 1972.
C&GS, #11248 (formerly 529), 1:40,000 scale, JAMES RIVER, Newport News to Jamestown Island, 21st ed., 1975.

PHOTOS: Aerial-VIMS 5May76 SF-3C/132-146.

SUBSEGMENT 4A
KINGS HIGHWAY BRIDGE TO SACK POINT
(Maps 3 and 4)

EXTENT: 53,200 feet (10.1 mi.) of shoreline along the west bank of the Nansemond River, including Cedar Creek. The subsegment also includes 74,400 feet (14.1 mi.) of fastland.

SHORELANDS TYPE

FASTLAND: Low shore 55% (7.8 mi.) and moderately low shore 45% (6.3 mi.).

SHORE: Artificially stabilized 1% (0.2 mi.), fringe marsh 21% (2.1 mi.), and embayed marsh 77% (7.8 mi.).

NEARSHORE: Narrow 29% (2.9 mi.) and intermediate 15% (1.5 mi.). The rest of the shoreline is found along Cedar Creek and an unnamed marsh creek.

SHORELANDS USE

FASTLAND: Agricultural 85% (12.0 mi.), residential 3% (0.4 mi.), and unmanaged, wooded 12% (1.7 mi.).

SHORE: Some fishing and waterfowl hunting in the marshes.

NEARSHORE: Boating and other water related sports. Commercial shipping in the channel.

SHORELINE TREND: The shoreline trends basically N - S in this subsegment.

OWNERSHIP: Private.

ZONING: Agricultural.

FLOOD HAZARD: Low. This area is not subject to large waves or other direct storm effects.

BEACH QUALITY: There are no beaches in this subsegment.

SHORE EROSION SITUATION

EROSION RATE: No data. The area appears stable.

ENDANGERED STRUCTURES: None.

SHORE PROTECTIVE STRUCTURES: There is approximately 1,000 feet of bulkheading near Cedar Creek. The structure appears to have been a cargo dock connected with the sand and clay pits further inland. It is now disused and

most of the bulkhead has deteriorated. A vegetated spit has formed in front of the jetty.

OTHER SHORE STRUCTURES: There is a pipeline crossing and several piers in the subsegment.

SHORE USE LIMITATIONS: Seventy-seven percent of the shoreline is embayed marsh, which sometimes extends into the fastland for 3,000 feet. These areas should remain in their natural state. Marsh areas greatly reduce the water related value of the fastland behind due to the lack of access to the water. Of the 14.1 miles of fastland in the subsegment, only 0.4 miles are used for residential purposes. The rest of the lands are used for agriculture or are wooded. The only major road in most of this subsegment is Route 10/32, which is usually greater than one mile into the fastland. The exception is near Cedar Creek, where the Kings Highway Bridge is located and where Route 603 nears the shore. These areas, like most of the subsegment, are used for agriculture.

ALTERNATE SHORE USE: Low. Eighty-five percent of the shorelands are actively cultivated. Any development would be at the sacrifice of the agriculture. Some new housing is possible in areas, though most development is located on or near Route 10. Low intensity recreational development, though possible, seems unlikely.

MAPS: USGS, 7.5 Min.Ser. (Topo.), CHUCKATUCK, Va. Quadr., 1965; pr. 1972.
C&GS, #11248 (formerly 529), 1:40,000 scale, JAMES RIVER, Newport News to Jamestown Island, 21st ed., 1975.

PHOTOS: Aerial-VIMS 15Oct75 SF-4A/ 99-101,
103-106,
111-117,
119-120,
122-131;
5May76 SF-4A/ 102, 107,
110, 118,
121.

Ground-VIMS 22Apr76 SF-4A/ 61-63.

SUBSEGMENT 4B
WESTERN BRANCH TO ROUTE 460
(Maps 4 and 5)

EXTENT: 40,200 feet (7.6 mi.) of shoreline along Western Branch and the west bank of the Nansemond River. The subsegment also includes 61,000 feet (11.6 mi.) of fastland.

SHORELANDS TYPE

FASTLAND: Low shore 58% (6.7 mi.), moderately low shore 40% (4.6 mi.), and moderately high shore 2% (0.2 mi.).

SHORE: Artificially stabilized 1% (0.1 mi.), fringe marsh 24% (1.8 mi.), and embayed marsh 75% (5.7 mi.).

NEARSHORE: Narrow 41% (3.1 mi.). The rest of the shoreline is located along Western Branch.

SHORELANDS USE

FASTLAND: Agricultural 70% (8.1 mi.), commercial 1% (0.2 mi.), industrial 1% (0.2 mi.), residential 5% (0.5 mi.), and unmanaged, wooded 23% (2.7 mi.).

SHORE: Some waterfowl hunting in the marshes, commercial use (marina) and industrial use (pumping station).

NEARSHORE: Western Branch is used for fishing and sport boating. The dredged channel in the Nansemond is mainly used by commercial and industrial shipping to Suffolk.

SHORELINE TREND: Western Branch trends basically NW - SE. The Nansemond River trends basically N - S through a series of broad meanders.

OWNERSHIP: Private.

ZONING: Agricultural.

FLOOD HAZARD: Low. This area is not subject to large waves or other direct storm effects.

BEACH QUALITY: There are no beaches in this subsegment.

SHORE EROSION SITUATION

EROSION RATE: No data. The area appears to be stable.

ENDANGERED STRUCTURES: None.

SHORE PROTECTIVE STRUCTURES: There is

approximately 600 feet of effective bulkhead retaining fill at the marina on Western Branch.

OTHER SHORE STRUCTURES: There are several piers, boat houses and a boat ramp at the marina on Western Branch. Several additional piers are located in the subsegment.

SHORE USE LIMITATIONS: Like most of the other shoreline on the Nansemond River, this area is predominantly embayed marsh (75%). These areas should be preserved in their natural state. Access is limited to the shore. Roads are on the area perimeter and one bisects the subsegment. Other areas have no access.

This section is rural in character; seventy percent of the fastland is used for agriculture. Development is localized to three points. Five houses are located around Thompson Landing, a marina and sandpits are on Western Branch, and several structures are at the pumping station at the dam on Western Branch. The rest of the subsegment is virtually unpopulated. The shorelands are not well suited for residential development, since access to the water is difficult from most areas.

ALTERNATE SHORE USE: Low. Development, though possible, seems unlikely for most parts of the shoreline. There are two lakes in the interior of the subsegment, parts of which could be developed for recreational purposes. Low intensity usage, such as camping, hiking, and nature trails might easily be established here.

MAPS: USGS, 7.5 Min.Ser. (Topo.), CHUCKATUCK, Va. Quadr., 1965; pr. 1972.
C&GS, #11248 (formerly 529), 1:40,000 scale, JAMES RIVER, Newport News to Jamestown Island, 21st ed., 1975.

PHOTOS: Aerial-VIMS 15Oct75 SF-4B/86, 88-95, 97, 98;
5May76 SF-4B/77-85, 87, 96.

SUBSEGMENT 4C

HEAD WATERS OF THE NANSEMOND RIVER

(Map 5)

EXTENT: There are 55,200 feet (10.5 mi.) of shoreline from the Route 460 bridge to the headwaters at Lake Meade and back to the bridge. The subsegment also includes 88,400 feet (16.7 mi.) of fastland.

SHORELANDS TYPE

FASTLAND: Low shore 21% (3.6 mi.), moderately low shore 74% (12.3 mi.), moderately low shore with bluff 4% (0.6 mi.), and moderately high shore 1% (0.2 mi.).

SHORE: Artificially stabilized 8% (0.8 mi.), fringe marsh 13% (1.4 mi.), and embayed marsh 79% (8.2 mi.).

NEARSHORE: Narrow 79% (8.3 mi.). The rest of the shoreline is located on Shingle Creek and Burnetts Mill Creek.

SHORELANDS USE

FASTLAND: Agricultural 55% (9.2 mi.), commercial 7% (1.2 mi.), residential 33% (5.5 mi.), and unmanaged, wooded 5% (0.8 mi.).

SHORE: Some waterfowl hunting in the marshes, commercial use (marinas) and private use.

NEARSHORE: Private boating and commercial shipping.

SHORELINE TREND: The shoreline trend is basically NE - SW through a series of meanders in this subsegment.

OWNERSHIP: Private.

ZONING: Mostly commercial and residential, with a small portion of agricultural.

FLOOD HAZARD: Low. This area is not subject to large waves or other direct storm effects.

BEACH QUALITY: There are no beaches in this subsegment.

SHORE EROSION SITUATION

EROSION RATE: No data. The area appears stable.

ENDANGERED STRUCTURES: None.

SHORE PROTECTIVE STRUCTURES: There is

approximately 4,400 feet of bulkhead in this subsegment, the majority of which is in the commercial district of Suffolk. All areas of bulkhead appear to be effective.

SHORE USE LIMITATIONS: This subsegment includes the commercial, industrial, and residential sections of the City of Suffolk. Forty percent of the total fastland is already developed for such purposes (eighty-one percent of the river fronting fastland). Most of the other lands in this subsegment are used for agriculture. Very little other development is feasible along the river in Suffolk, especially near the dam.

Embayed marshes comprise seventy-nine percent of the shoreline. These areas should be preserved. Special care should be taken where embayed marshes directly front residential developments, as excessive traffic and pollutants can jeopardize marsh areas.

ALTERNATE SHORE USE: Moderate. Residential development will probably continue along the fastland, especially in the area of Willowbrook. The only area which could be developed for recreational purposes would be along Burnetts Mill Creek, where the fastland is alternately agricultural and wooded. This section is close enough to the residential portions of the city for easy access by residents. Low intensity recreational parks for hiking, camping, and picnicking are much needed near residential areas.

MAPS: USGS, 7.5 Min.Ser. (Topo.), CHUCKATUCK, Va. Quadr., 1965; pr. 1972;
USGS, 7.5 Min.Ser. (Topo.), SUFFOLK, Va. Quadr., 1954; pr. 1968.
C&GS, #11248 (formerly 529), 1:40,000 scale, JAMES RIVER, Newport News to Jamestown Island, 21st ed., 1975.

PHOTOS: Aerial-VIMS 5May76 SF-4C/53-76.

Ground-VIMS 22Apr76 SF-4C/64-69.

SUBSEGMENT 4D

ROUTE 460 BRIDGE TO THE KINGS HIGHWAY BRIDGE

(Maps 4 and 5)

EXTENT: 54,200 feet (10.3 mi.) of shoreline from the Route 460 Bridge to the Kings Highway bridge. The subsegment also includes 94,400 feet (17.9 mi.) of fastland.

SHORELANDS TYPE

FASTLAND: Low shore 48% (8.5 mi.) and moderately low shore 52% (9.4 mi.).
SHORE: Artificially stabilized 1% (0.1 mi.), fringe marsh 7% (0.7 mi.), embayed marsh 85% (8.8 mi.), and extensive marsh 7% (0.8 mi.).
NEARSHORE: Narrow 49% (5.0 mi.) and intermediate 18% (1.8 mi.). The rest of the subsegment is found along creeks.

SHORELANDS USE

FASTLAND: Agricultural 66% (11.7 mi.), governmental 24% (4.3 mi.), residential 3% (0.5 mi.), and unmanaged, wooded 8% (1.4 mi.).
SHORE: Some fishing and waterfowl hunting in the marshes.
NEARSHORE: Commercial shipping, private boating, and other water related activities.

SHORELINE TREND: The shoreline trend is basically S - N, through a series of large meanders.

OWNERSHIP: Private 76% and federal 24%.

ZONING: Agricultural.

FLOOD HAZARD: Low. This area is not subject to large waves or other direct storm effects.

BEACH QUALITY: There are no beaches in this subsegment.

SHORE EROSION SITUATION

EROSION RATE: No data. The area appears stable.

ENDANGERED STRUCTURES: None.

SHORE PROTECTIVE STRUCTURES: There is approximately 400 feet of effective bulkhead at Trotman Wharf.

OTHER SHORE STRUCTURES: There are several piers in the subsegment.

SHORE USE LIMITATIONS: Ninety-two percent of the shoreline is either embayed or extensive marsh, which should be preserved. These areas are valuable flood and erosion control agents and are habitats for numerous aquatic life. Due to the lack of water access, such marshes lessen the residential related value of the fastland.

Twenty-four percent of the shoreline is the federally owned Navy Transmitter Station located at Trotman Wharf. Any development is prohibited in this area. The majority of the subsegment is actively cultivated, though some residential use is found near the Route 460 bridge. These agricultural areas will probably not be developed to any great extent.

ALTERNATE SHORE USE: Low. It is expected that some residential construction will continue along Route 642 near the Route 460 bridge. However, other areas in the subsegment are actively used for agriculture. There are no major forest holdings along the shoreline which would prove suitable for recreational development.

MAPS: USGS, 7.5 Min.Ser. (Topo.), CHUCKATUCK, Va. Quadr., 1965; pr. 1972.
C&GS, #11248 (formerly 529), 1:40,000 scale, JAMES RIVER, Newport News to Jamestown Island, 21st ed., 1975.

PHOTOS: Aerial-VIMS 5May76 SF-4D/29-40, 45-52;

15Oct75 SF-4D/41-44.

SUBSEGMENT 5A
KINGS HIGHWAY BRIDGE TO WILLS ISLAND
(Maps 3 and 4)

EXTENT: 30,600 feet (5.8 mi.) of shoreline from Kings Highway bridge to Wills Island. The subsegment also includes 44,800 feet (8.5 mi.) of fastland.

SHORELANDS TYPE

FASTLAND: Low shore 49% (4.1 mi.) and moderately low shore 51% (4.4 mi.).
SHORE: Artificially stabilized 1% (0.1 mi.), fringe marsh 48% (2.8 mi.), and embayed marsh 51% (2.9 mi.).
NEARSHORE: Narrow 16% (0.9 mi.) and intermediate 48% (2.8 mi.).

SHORELANDS USE

FASTLAND: Agricultural 68% (5.8 mi.), recreational 21% (1.8 mi.), and residential 10% (0.9 mi.).
SHORE: Waterfowl hunting in the marshes. Nature walks are located in the marsh at Sleepy Hole Park.
NEARSHORE: Sport fishing and boating.

SHORELINE TREND: The shoreline trend is basically SW - NE.

OWNERSHIP: Private 79% and city 21%.

ZONING: Residential.

FLOOD HAZARD: Low. This area is not subject to large waves or other direct storm effects.

BEACH QUALITY: There are no beaches in this subsegment.

SHORE EROSION SITUATION

EROSION RATE: No data. The area appears stable.
ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: There is approximately 400 feet of wooden bulkhead retaining fill adjacent to the Planters Club. This structure appears to be effective.

OTHER SHORE STRUCTURES: There are several piers located along the shoreline in this subsegment.

SHORE USE LIMITATIONS: Fifty-one percent of the shoreline is embayed marsh which should remain in its natural state. Sleepy Hole Park, owned by the City of Portsmouth, controls twenty-one percent of the shoreline, restricting development there. Adjacent to Sleepy Hole Park is the privately owned Planters Club. Sixty-eight percent of the fastland is actively cultivated. Development would be at the sacrifice of the agriculture.

ALTERNATE SHORE USE: Low. Sleepy Hole Park is already a low intensity recreational area, providing nature walks, picnic grounds, paddle boating, and other activities. Other recreational development, though possible, is not necessary at this time. Most residential and commercial activity will probably continue to center around the major access roads further into the fastland.

MAPS: USGS, 7.5 Min.Ser. (Topo.), CHUCKATUCK, Va. Quadr., 1965; pr. 1972.
C&GS, #11248 (formerly 529), 1:40,000 scale, JAMES RIVER, Newport News to Jamestown Island, 21st ed., 1975.

PHOTOS: Aerial-VIMS 15Oct75 SF-5A/23-28.
Ground-VIMS 22Apr76 SF-5A/20-40.

SUBSEGMENT 5B
NANSEMOND SHORES
(Map 3)

EXTENT: 17,000 feet (3.2 mi.) of shoreline from Wills Island to Town Point. The subsegment also includes 18,800 feet (3.6 mi.) of fastland.

SHORELANDS TYPE

FASTLAND: Low shore 64% (2.3 mi.), moderately low shore 32% (1.1 mi.), and moderately low shore with bluff 4% (0.2 mi.).
SHORE: Artificially stabilized 2% (0.1 mi.), beach 2% (0.1 mi.), fringe marsh 69% (2.2 mi.), and embayed marsh 26% (0.8 mi.).
NEARSHORE: Narrow 21% (0.7 mi.) and intermediate 79% (2.5 mi.).

SHORELANDS USE

FASTLAND: Agricultural 57% (2.0 mi.) and residential 43% (1.5 mi.).
SHORE: Some waterfowl hunting in the marsh areas.
NEARSHORE: Sport fishing and boating.

SHORELINE TREND: The shoreline trend is basically SW - NE.

OWNERSHIP: Private.

ZONING: Residential.

FLOOD HAZARD: Low. This area is not subject to large waves or other direct storm effects.

BEACH QUALITY: Poor. There are only narrow, strip beaches in this subsegment.

SHORE EROSION SITUATION

EROSION RATE: No data. The area appears stable.
ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: There is approximately 200 feet of rubble riprap in the Nansemond Shores development.

OTHER SHORE STRUCTURES: There are numerous piers in the subsegment.

SHORE USE LIMITATIONS: Approximately one third

of the subsegment, located around Wills Island, has elevations of five feet or less. These areas would not be suitable for most residential purposes, since flooding would pose a threat to structures. The Nansemond Shores and Holliday Point Estates residential developments comprise forty-three percent of the shorelands. Most of the shoreline here is already actively used. The fastland zone from Holliday Point Estates to Town Point is very narrow due to the location of Route 17 near to the shoreline. Also, there are rather steep slopes to the twenty-foot contour inland close to the road in some sections. These areas have virtually no usable lands. Town Point is used for agriculture.

ALTERNATE SHORE USE: Low. Almost all the lands in this subsegment which are suitable for development have been developed. There are no lands suitable for recreational development, though nature walks are possible for Wills Island.

MAPS: USGS, 7.5 Min.Ser. (Topo.), CHUCKATUCK, Va. Quadr., 1965; pr. 1972;
USGS, 7.5 Min.Ser. (Topo.), BOWERS HILL, Va. Quadr., 1965; pr. 1970;
USGS, 7.5 Min.Ser. (Topo.), NEWPORT NEWS SOUTH, Va. Quadr., 1965; pr. 1968 and 1973.
C&GS, #11248 (formerly 529), 1:40,000 scale, JAMES RIVER, Newport News to James-town Island, 21st ed., 1975.

PHOTOS: Aerial-VIMS 15Oct75 SF-5B/17-22.

Ground-VIMS 16Apr76 SF-5B/13-19.

SUBSEGMENT 6A

TOWN POINT TO MOUTH OF KNOTTS CREEK

(Maps 3 and 6)

EXTENT: 13,400 feet (2.5 mi.) of shoreline from Town Point to the mouth of Knotts Creek. The subsegment also includes 10,000 feet (1.9 mi.) of fastland.

SHORELANDS TYPE

FASTLAND: Low shore 94% (1.8 mi.) and low shore with bluff 6% (0.1 mi.).

SHORE: Fringe marsh 62% (1.7 mi.), embayed marsh 14% (0.4 mi.), and extensive marsh 24% (0.6 mi.).

NEARSHORE: Intermediate 74% (2.0 mi.). The remainder of the shoreline is located along the marsh creek on Knotts Neck.

SHORELANDS USE

FASTLAND: Entirely agricultural.

SHORE: Some fishing and waterfowl hunting in the marshes.

NEARSHORE: Sport fishing, boating and other water related activities. Commercial shipping to Suffolk.

SHORELINE TREND: The shoreline trend is basically E - W in this subsegment. The fetch at Town Point is NNE - 6 nautical miles.

OWNERSHIP: Private.

ZONING: Residential.

FLOOD HAZARD: This subsegment is exposed to wind and wave actions, but with average elevations of 15 to 20 feet, flooding is not likely to occur. The marsh areas along the shoreline are subject to flooding.

BEACH QUALITY: There are no beaches in this subsegment.

SHORE EROSION SITUATION

EROSION RATE: No data. The area appears to be stable.

ENDANGERED STRUCTURES: None.

SHORE PROTECTIVE STRUCTURES: None.

OTHER SHORE STRUCTURES: The Nansemond Bridge is

located in this subsegment.

SHORE USE LIMITATIONS: The extensive marsh on Knotts Creek comprises twenty-four percent of the shoreline. Marshes, especially extensive and embayed marshes, are valuable natural resources and should be preserved. This entire subsegment is proposed as an urban area by the Suffolk Planning Commission. Any development along the shoreline should ensure against pollutants or artificial nutrients entering the already contaminated Nansemond River. Also, the marsh areas can be easily endangered by man's activities along the shore.

ALTERNATE SHORE USE: As already stated, this area is proposed for urban development. Any concentration of urban residences should include areas for public recreation, such as parks for picnicking and possibly a community center with a swimming pool, bath houses, and other sports facilities.

MAPS: USGS, 7.5 Min.Ser. (Topo.), NEWPORT NEWS SOUTH, Va. Quadr., 1964; pr. 1968 and 1973. C&GS, #11248 (formerly 529), 1:40,000 scale, JAMES RIVER, Newport News to Jamestown Island, 21st ed., 1975.

PHOTOS: Aerial-VIMS SF-6A/16.

SUBSEGMENT 6B

BENNETT CREEK

(Map 3)

EXTENT: 84,000 feet (16.0 mi.) of shoreline in Bennett Creek. The subsegment also includes 119,000 feet (22.5 mi.) of fastland.

SHORELANDS TYPE

FASTLAND: Low shore 87% (19.6 mi.), low shore with bluff 2% (0.3 mi.), and moderately low shore 11% (2.6 mi.).

SHORE: Artificially stabilized 1% (0.2 mi.), fringe marsh 15% (2.5 mi.), embayed marsh 65% (10.4 mi.), and extensive marsh 19% (2.9 mi.).

CREEK: A channel to the mouth of Bennett Creek was dredged to a depth of 5 feet in 1959. Controlling depths at the mouth are now near 1 foot at low tide. Interior waters are generally deeper.

SHORELANDS USE

FASTLAND: Agricultural 55% (12.5 mi.), commercial 1% (0.2 mi.), recreational 4% (0.8 mi.), residential 19% (4.3 mi.), and unmanaged, wooded 21% (4.8 mi.).

SHORE: Waterfowl hunting in the marsh areas. A marina is located at the bridge.

CREEK: Sport boating, fishing and other water related activities.

SHORELINE TREND: The shoreline trend is basically N - S in this subsegment.

OWNERSHIP: Private 96% and city 4%.

ZONING: Residential and industrial.

FLOOD HAZARD: Low. This area is not subject to large waves or other direct storm effects. Extensive marshes at the creek mouth absorb much water during high water levels, lessening the possibility of flooding.

BEACH QUALITY: There are no beaches in this subsegment.

SHORE EROSION SITUATION

EROSION RATE: No data. The area appears stable.

ENDANGERED STRUCTURES: None.

SHORE PROTECTIVE STRUCTURES: There is approximately 1,000 feet of effective bulkhead at a marina and several residences near the Route 17 bridge.

OTHER SHORE STRUCTURES: There are several piers and boat sheds in this subsegment. The marina and the city park have boat ramps.

SHORE USE LIMITATIONS: Eighty-four percent of the shore is either embayed or extensive marsh. These areas should be preserved. Most parts of the shoreline have very limited access, especially on the east side of the creek. These areas would be difficult to develop.

ALTERNATE SHORE USE: Moderate. This section has been zoned for residential and industrial use. There are currently several developments along the creek, the largest being Bennett Harbor. Residences and some industry are interspersed along the shoreline. Care should be taken to ensure against any pollutants being added to the creek as the result of future development.

The city owned Suffolk Park, located in this subsegment, has several boat ramps and picnic facilities. Other recreational areas for camping, picnicking, and water sports are possible for several sites along the shoreline.

This subsegment will probably have continued development along or near to the shoreline. Care should be taken not to destroy the natural beauty of the area in the process of this development.

MAPS: USGS, 7.5 Min.Ser. (Topo.), NEWPORT NEWS SOUTH, Va. Quadr., 1964; pr. 1968 and 1973; USGS, 7.5 Min.Ser. (Topo.), BOWERS HILL, Va. Quadr., 1965; pr. 1975. C&GS, #11248 (formerly 529), 1:40,000 scale, JAMES RIVER, Newport News to Jamestown Island, 21st ed., 1975.

PHOTOS: Aerial-VIMS 16Apr76 SF-6B/13-15.

Ground-VIMS 15Jun76 SF-6B/70-76.

SUBSEGMENT 6C
MOUTH OF KNOTTS CREEK TO WEST CREEK

(Map 6)

EXTENT: 57,800 feet (10.9 mi.) of shoreline from the mouth of Knotts Creek to north of the mouth of West Creek. This subsegment also includes 60,000 feet (11.4 mi.) of fastland.

SHORELANDS TYPE

PASTLAND: Low shore 91% (10.3 mi.), moderately low shore 8% (0.9 mi.), and moderately low shore with bluff 1% (0.2 mi.).

SHORE: Fringe marsh 14% (1.5 mi.) and embayed marsh 86% (9.4 mi.).

NEARSHORE: Intermediate 6% (0.6 mi.). The remainder of the shoreline is located along the creeks.

SHORELANDS USE

PASTLAND: Agricultural 65% (7.3 mi.), residential 15% (1.7 mi.), and unmanaged, wooded 20% (2.3 mi.).

SHORE: Fishing and waterfowl hunting in the marshes.

NEARSHORE: Sport fishing, boating, and other water related activities. Commercial shipping on the river.

SHORELINE TREND: The shoreline trend is basically N - S in this subsegment.

OWNERSHIP: Private.

ZONING: Industrial and residential.

FLOOD HAZARD: Low. The majority of the subsegment is found along the creeks, which are protected from large waves or other direct storm effects. The area fronting the river has elevations of 15 to 20 feet and is not susceptible to flooding.

BEACH QUALITY: There are no beaches in this subsegment.

SHORE EROSION SITUATION

EROSION RATE: No data. The area appears stable.

ENDANGERED STRUCTURES: None.

SHORE PROTECTIVE STRUCTURES: None.

OTHER SHORE STRUCTURES: There are several piers in this subsegment.

SHORE USE LIMITATIONS: The area including the west side of Knotts Creek, its head waters, and along the east side to the first tributary is proposed as an urban area by the Suffolk Planning Commission. The rest of the subsegment is zoned for industrial use. Eighty-six percent of the shoreline in this subsegment is embayed marsh. Any development along the shorelands, whether residential or industrial, should ensure against sewage or industrial wastes being added into the environment. Pollutants should not be allowed to further degrade the already contaminated Nansemond River. Also, the marsh areas should be preserved. Man's activities along the shoreline should not disturb the natural resources located there.

ALTERNATE SHORE USE: As already stated, this area has been proposed for residential and industrial development. A recreational facility is possible near the head of Knotts Creek.

MAPS: USGS, 7.5 Min.Ser. (Topo.), NEWPORT NEWS SOUTH, Va. Quadr., 1964; pr. 1968 and 1973; USGS, 7.5 Min.Ser. (Topo.), BOWERS HILL, Va. Quadr., 1965; pr. 1970. C&GS, #11248 (formerly 529), 1:40,000 scale, JAMES RIVER, Newport News to Jamestown Island, 21st ed., 1975.

PHOTOS: Aerial-VIMS 15Oct75 SF-6C/10-12.

SUBSEGMENT 6D

MOUTH OF WEST CREEK TO HEAD WATERS OF HOFFLER CREEK

(Map 6)

EXTENT: 41,200 feet (7.8 mi.) of shoreline from just north of West Creek to the head waters of Hoffler Creek. The subsegment also includes 49,000 feet (9.3 mi.) of fastland.

SHORELANDS TYPE

FASTLAND: Low shore 99% (9.2 mi.) and moderately low shore 1% (0.1 mi.).

SHORE: Artificially stabilized 13% (1.0 mi.), beach 18% (1.4 mi.), fringe marsh 28% (2.2 mi.), and embayed marsh 41% (3.2 mi.).

NEARSHORE: Intermediate 18% (1.4 mi.) and wide 25% (2.0 mi.). The remainder of the subsegment is found along Streeter and Hoffler Creeks.

SHORELANDS USE

FASTLAND: Agricultural 51% (4.8 mi.), residential 40% (3.7 mi.), and unmanaged, wooded 9% (0.8 mi.). The Tidewater Community College comprises 18% (2.0 mi.) of the residential usage.

SHORE: Some waterfowl hunting in the marshes. Strolling and sun bathing on the beaches.

NEARSHORE: Sport fishing, boating and other water related activities. Commercial shipping to Suffolk.

SHORELINE TREND: The shoreline trend is basically SW - NE, then W - E. The fetch at Pig Point is 8 nautical miles.

OWNERSHIP: Private 78% and state 22%.

ZONING: Industrial and some residential.

FLOOD HAZARD: Low. Though this area is subject to direct storm effects, most sections have elevations greater than 10 feet. Flooding would be limited to the marshes and the narrow shore zone.

BEACH QUALITY: This subsegment has narrow, strip beaches, often fronted by vegetation.

SHORE EROSION SITUATION

EROSION RATE: No historical data. Recent evidence indicates this area has moderate erosion

of approximately 2.0 feet per year.

ENDANGERED STRUCTURES: None.

SHORE PROTECTIVE STRUCTURES: There is approximately 5,000 feet of effective rubble riprap located at the Tidewater Community College, Frederick Campus. Fringe marsh and some beaches have formed in front of parts of the stabilized area.

OTHER SHORE STRUCTURES: There are several piers in this subsegment.

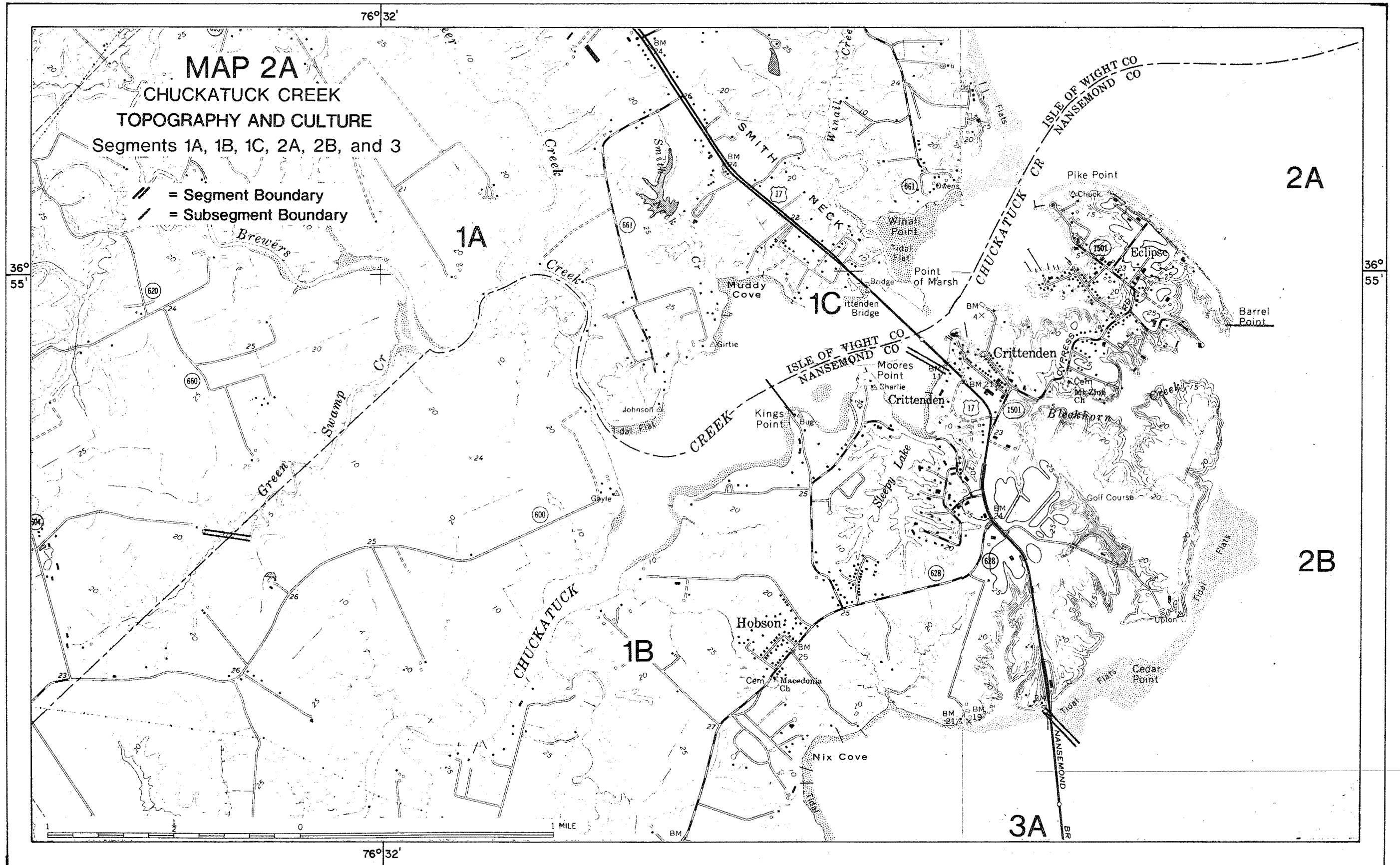
SHORE USE LIMITATIONS: The entire subsegment is zoned for industrial use except for Holly Acres, a residential development located on the shoreline between Streeter and Hoffler Creeks. In this industrial zone is the Frederick Campus of Tidewater Community College, located at Pig Point.

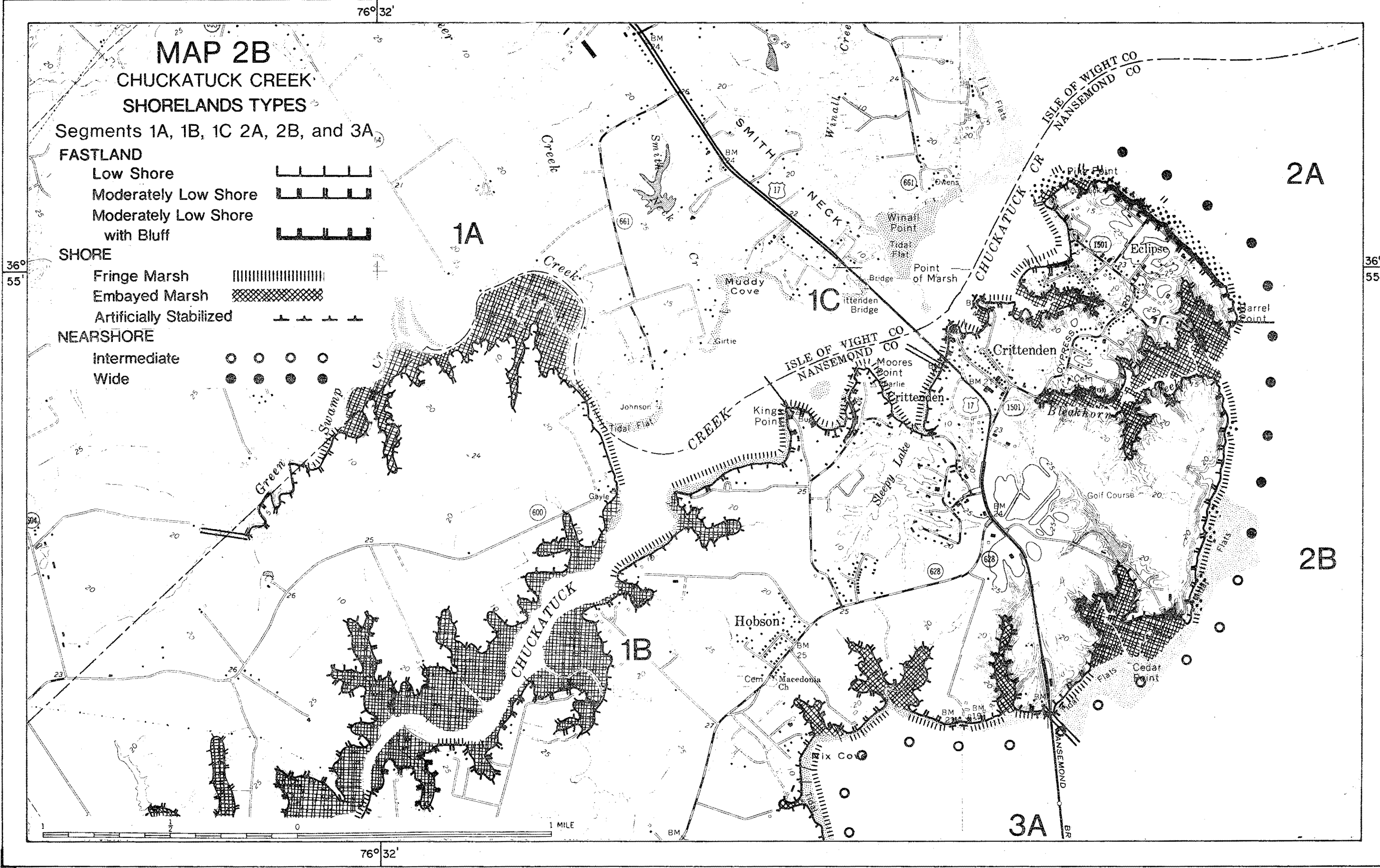
Forty-one percent of the shoreline is embayed marsh located along Streeter and Hoffler Creeks. These marshes should be preserved in their natural state, as they are valuable both as erosion and flood protection agents and as habitats for numerous types of aquatic life.

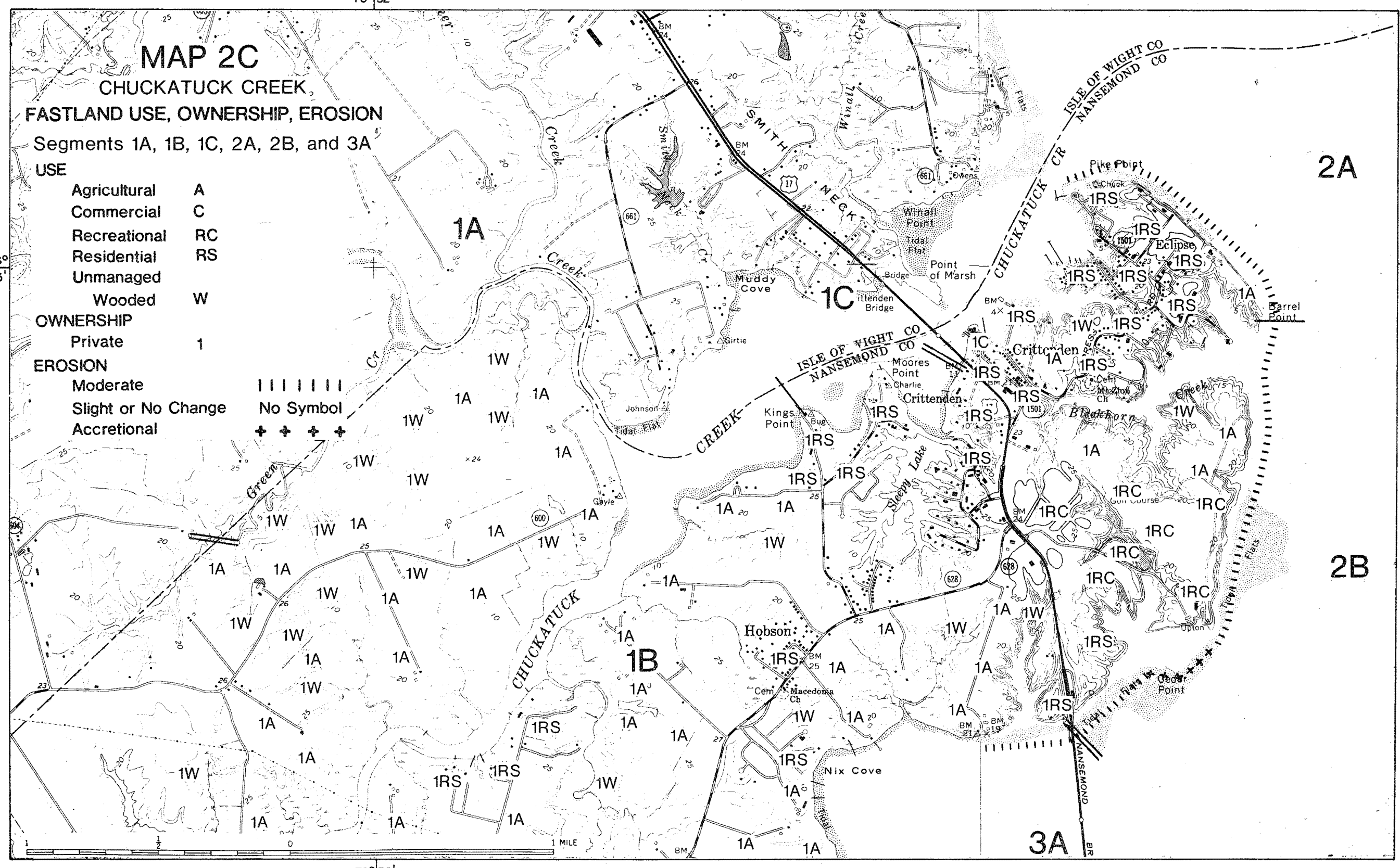
ALTERNATE SHORE USE: As already stated, most of the subsegment has been zoned for high intensity industrial use. This potential use is characterized as a major production area with open storage, noise and odor. A combined Suffolk Sewage Treatment Plant at Pig Point is tentatively scheduled for completion in 1978, and will eventually handle most of Suffolk's waste treatment. The potential heavy industrial usage of this area would probably not be compatible with most recreational uses, especially water related ones. Swimming, fishing, and other water sports would be restricted in areas where industrial plants are located.

MAPS: USGS, 7.5 Min.Ser. (Topo.), NEWPORT NEWS SOUTH, Va. Quadr., 1964; pr. 1968 and 1973. C&GS, #11248 (formerly 529), 1:40,000 scale, JAMES RIVER, Newport News to Jamestown Island, 21st ed., 1975.

PHOTOS: Aerial-VIMS 15Oct75 SF-6D/01-10.







MAP 2C

CHUCKATUCK CREEK

FASTLAND USE, OWNERSHIP, EROSION

Segments 1A, 1B, 1C, 2A, 2B, and 3A

USE

- Agricultural A
- Commercial C
- Recreational RC
- Residential RS
- Unmanaged
- Wooded W

OWNERSHIP

- Private 1

EROSION

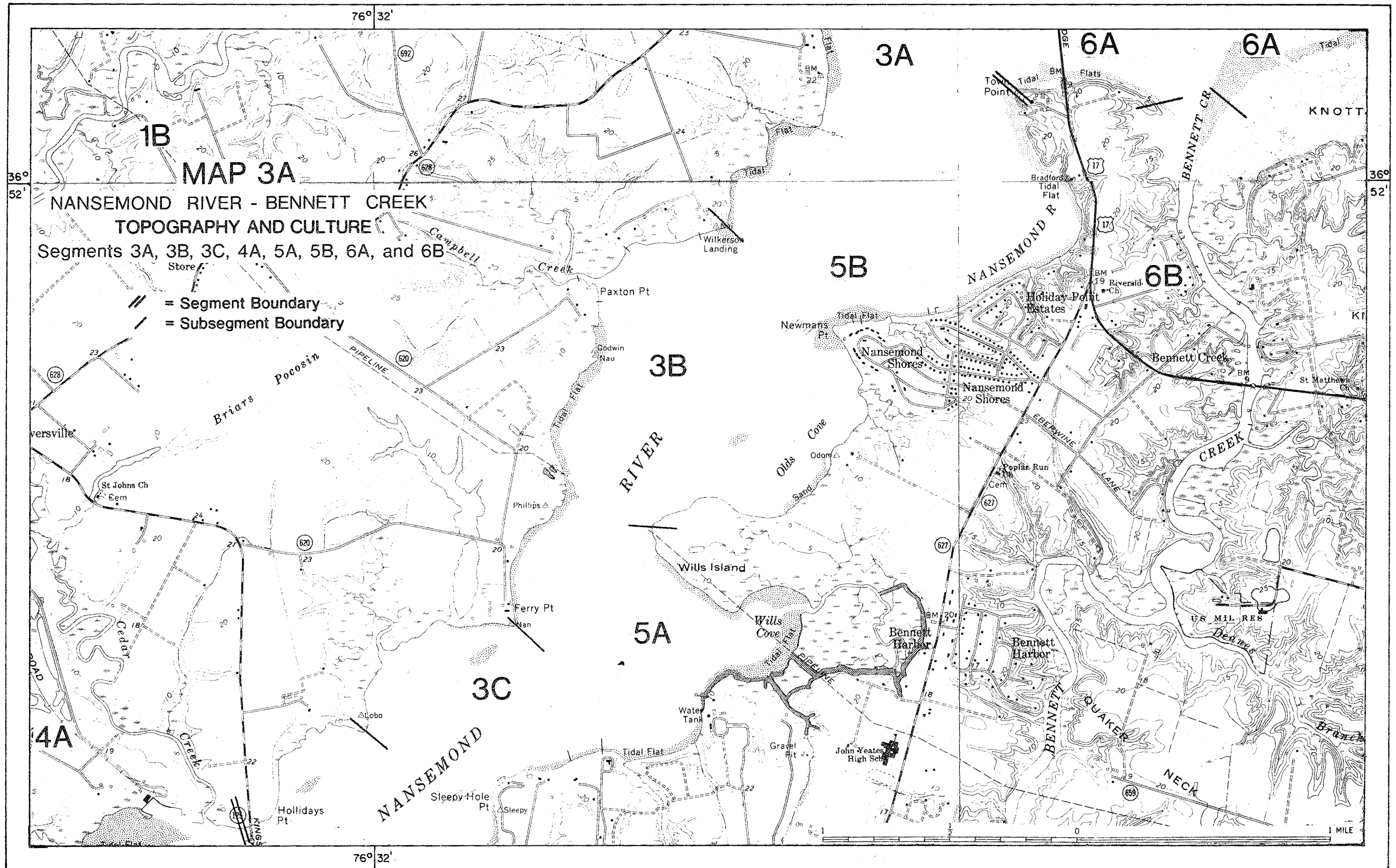
- Moderate ||| ||| |||
- Slight or No Change No Symbol
- Accretional + + + +

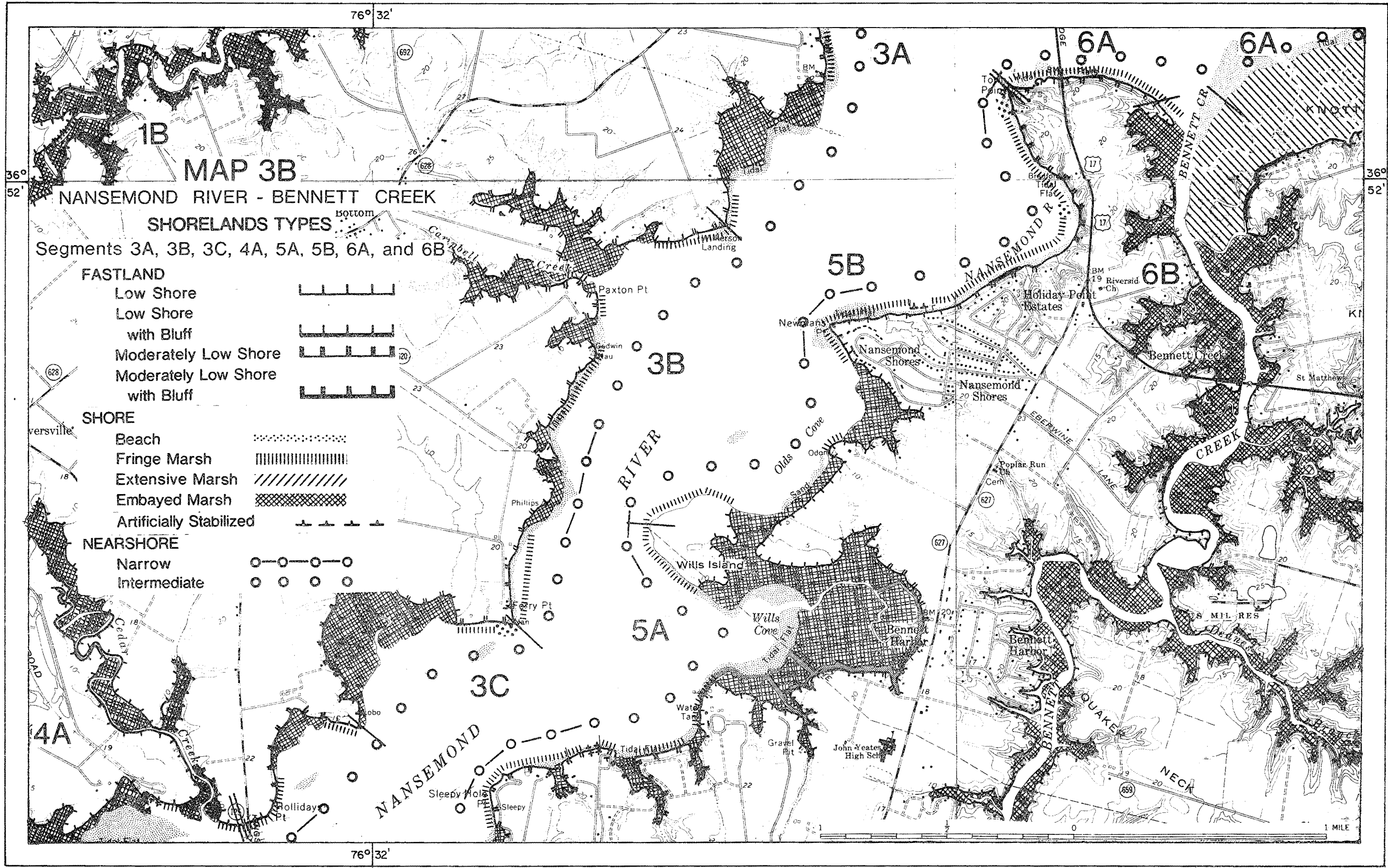
36° 55'

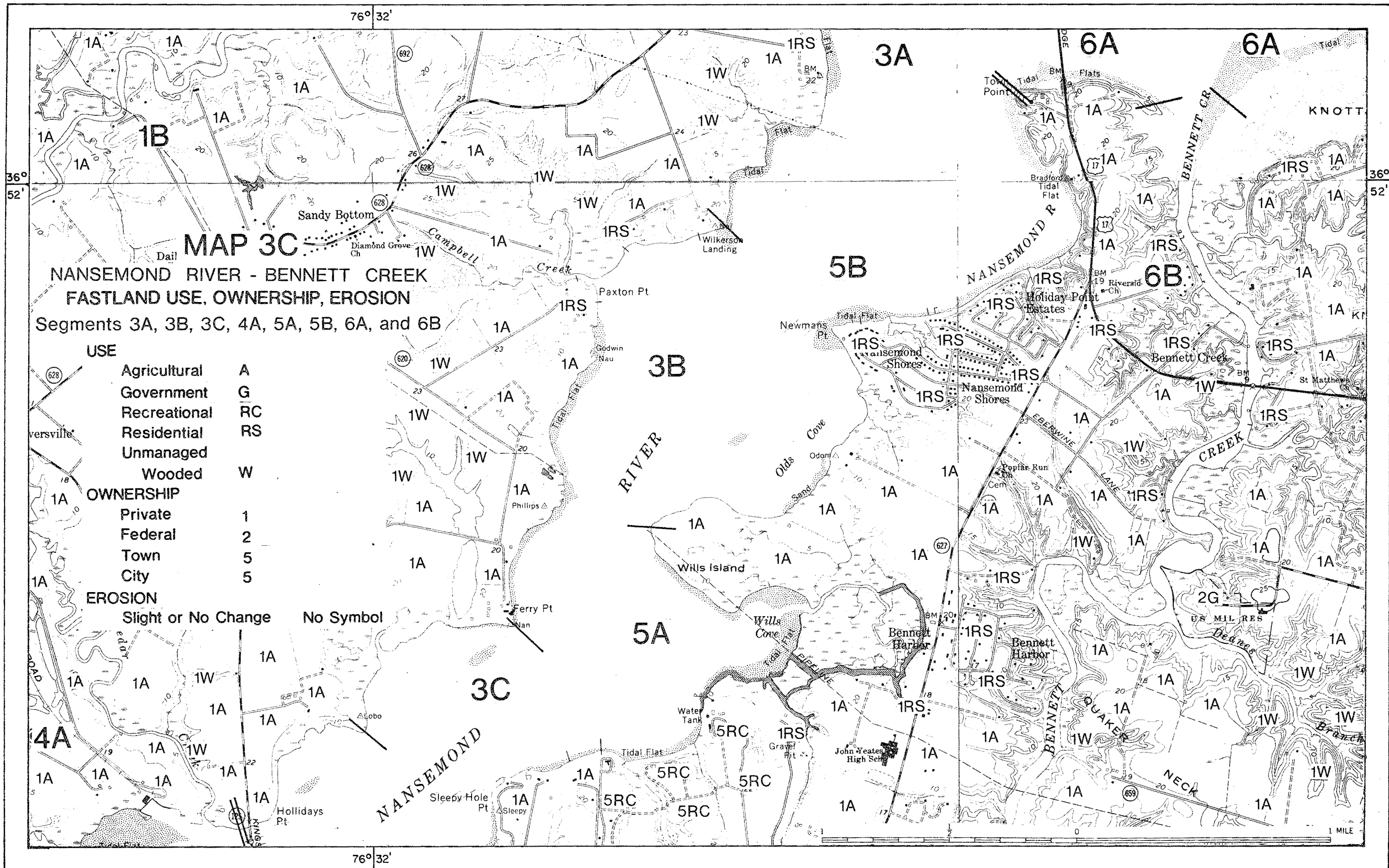
36° 55'

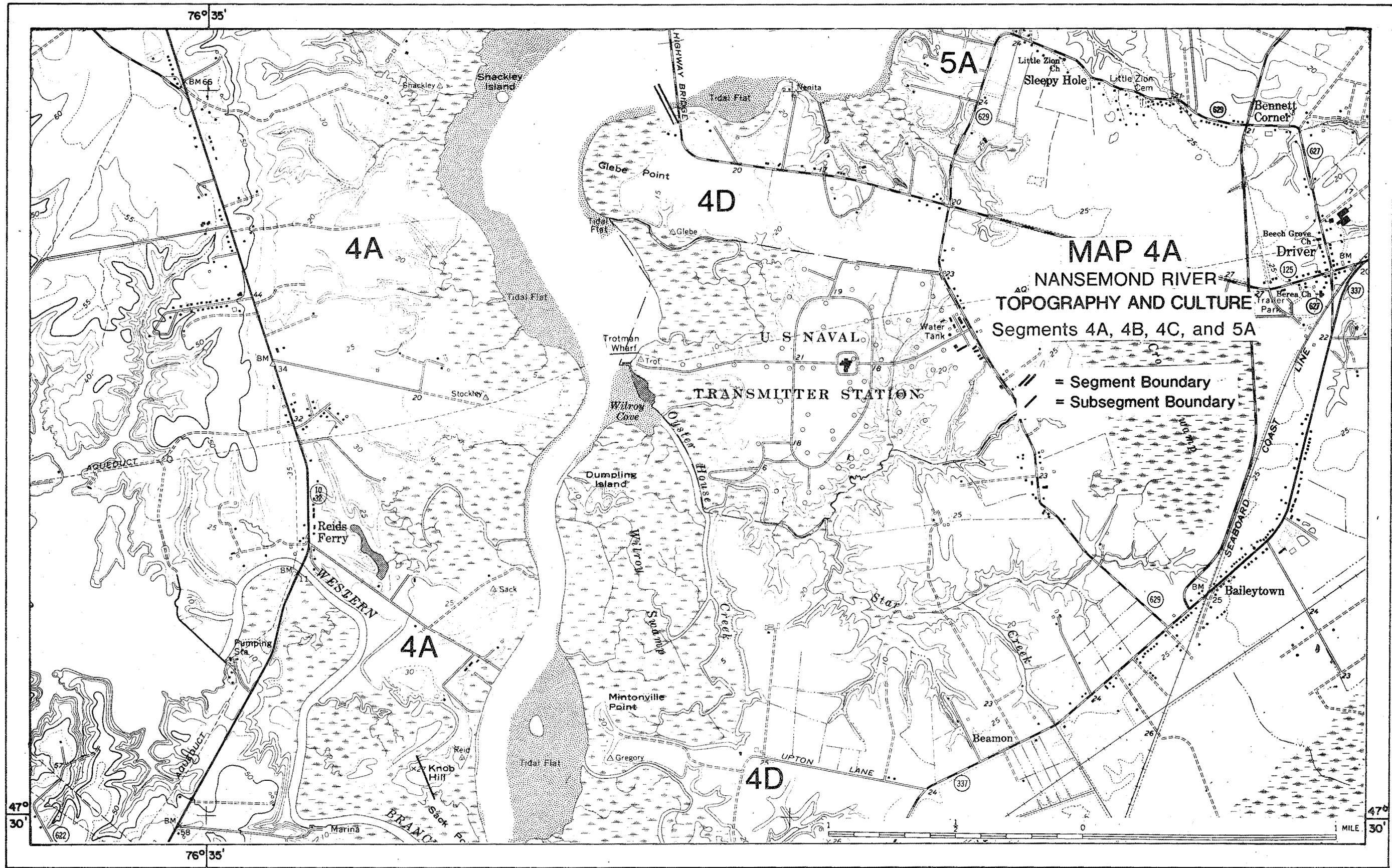
76° 32'

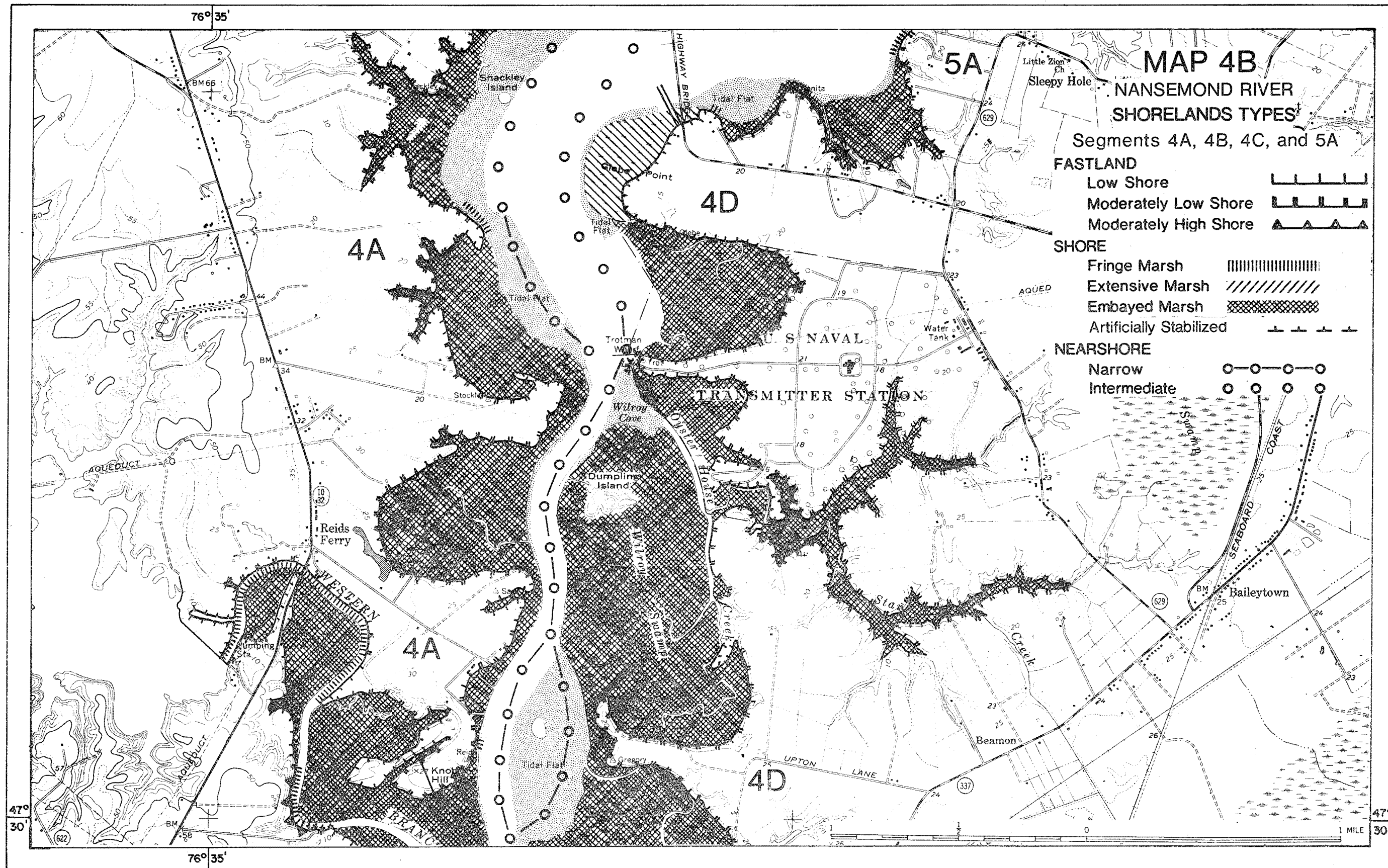
76° 32'

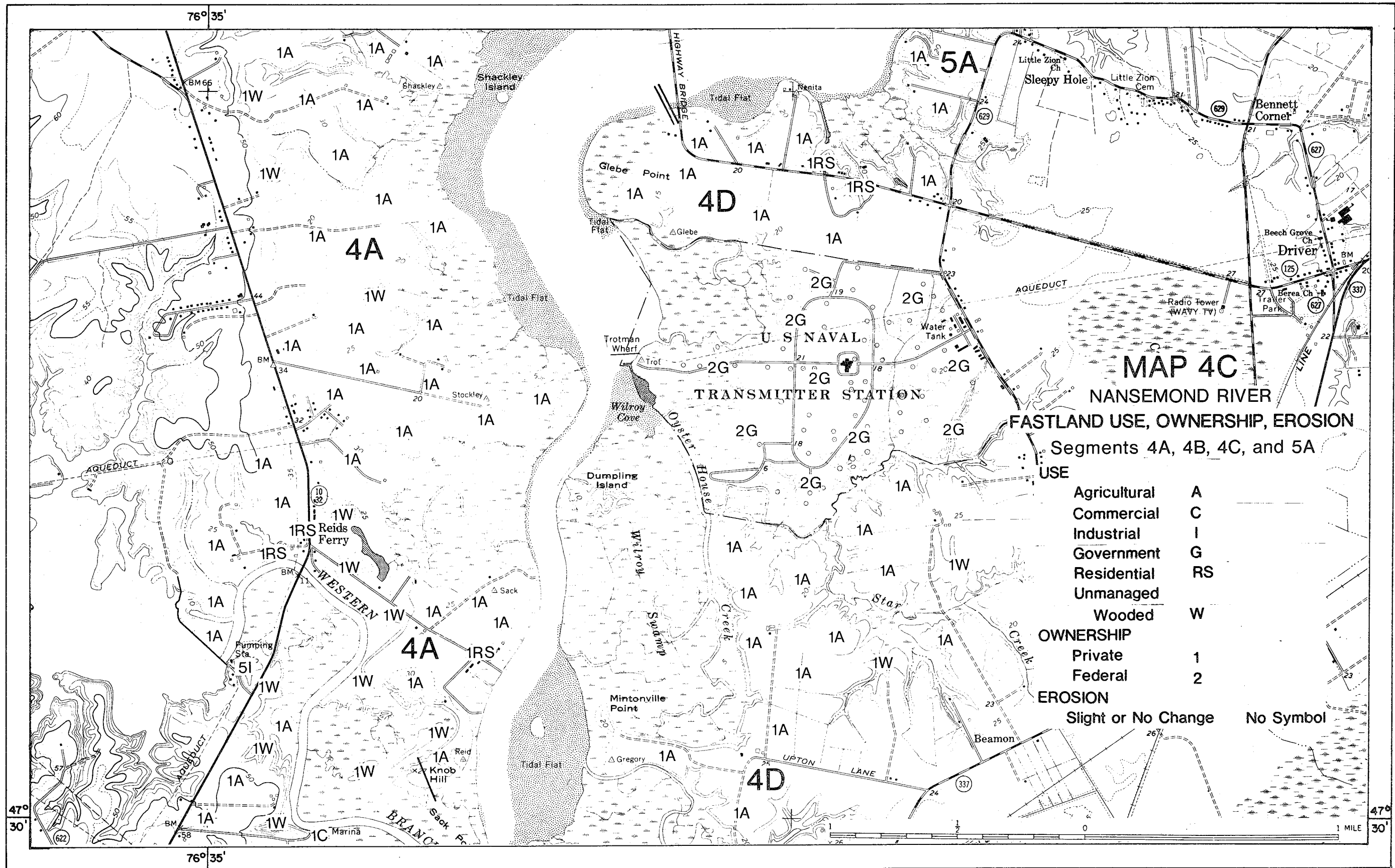




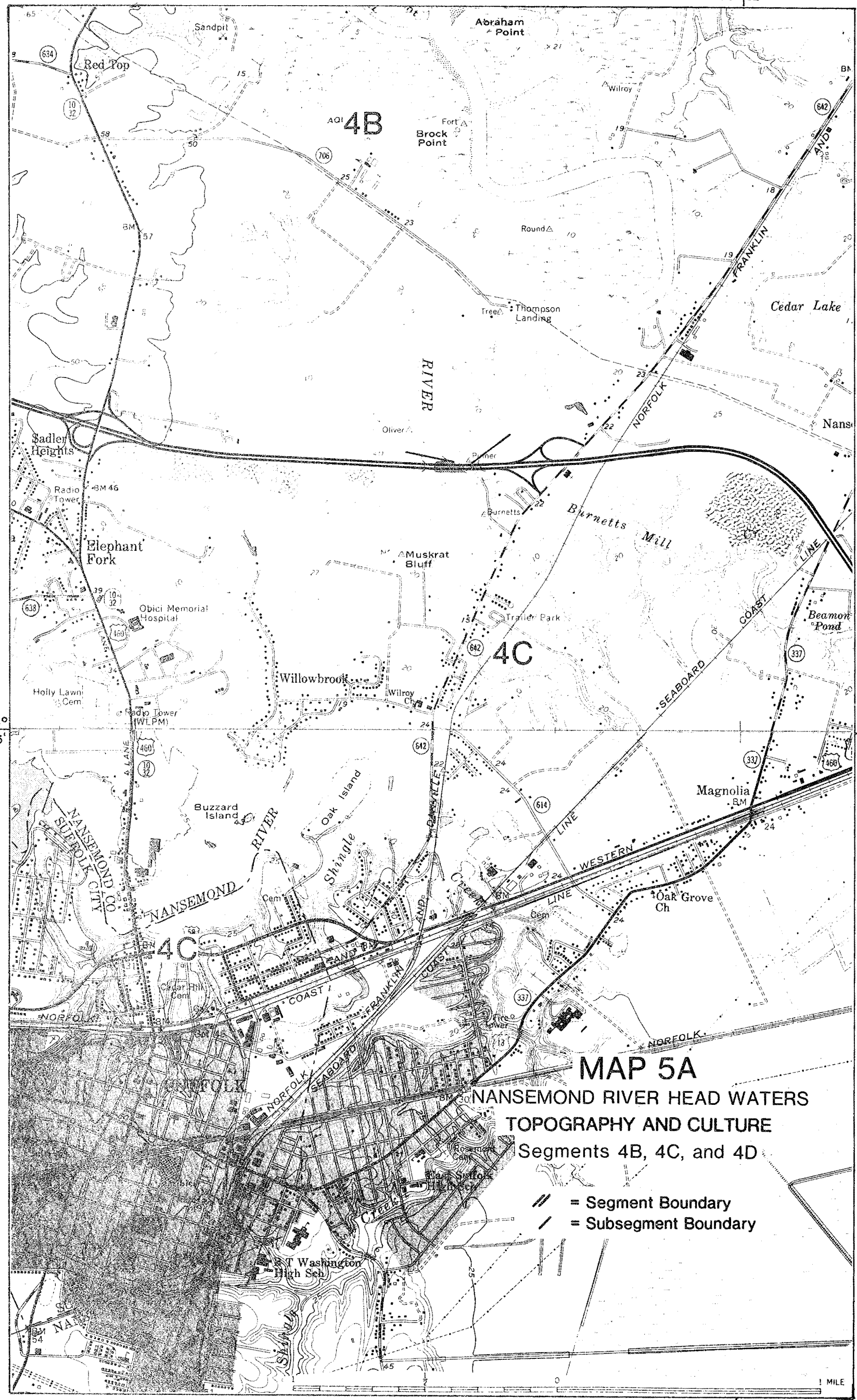








76° 32'





50

36° 45'

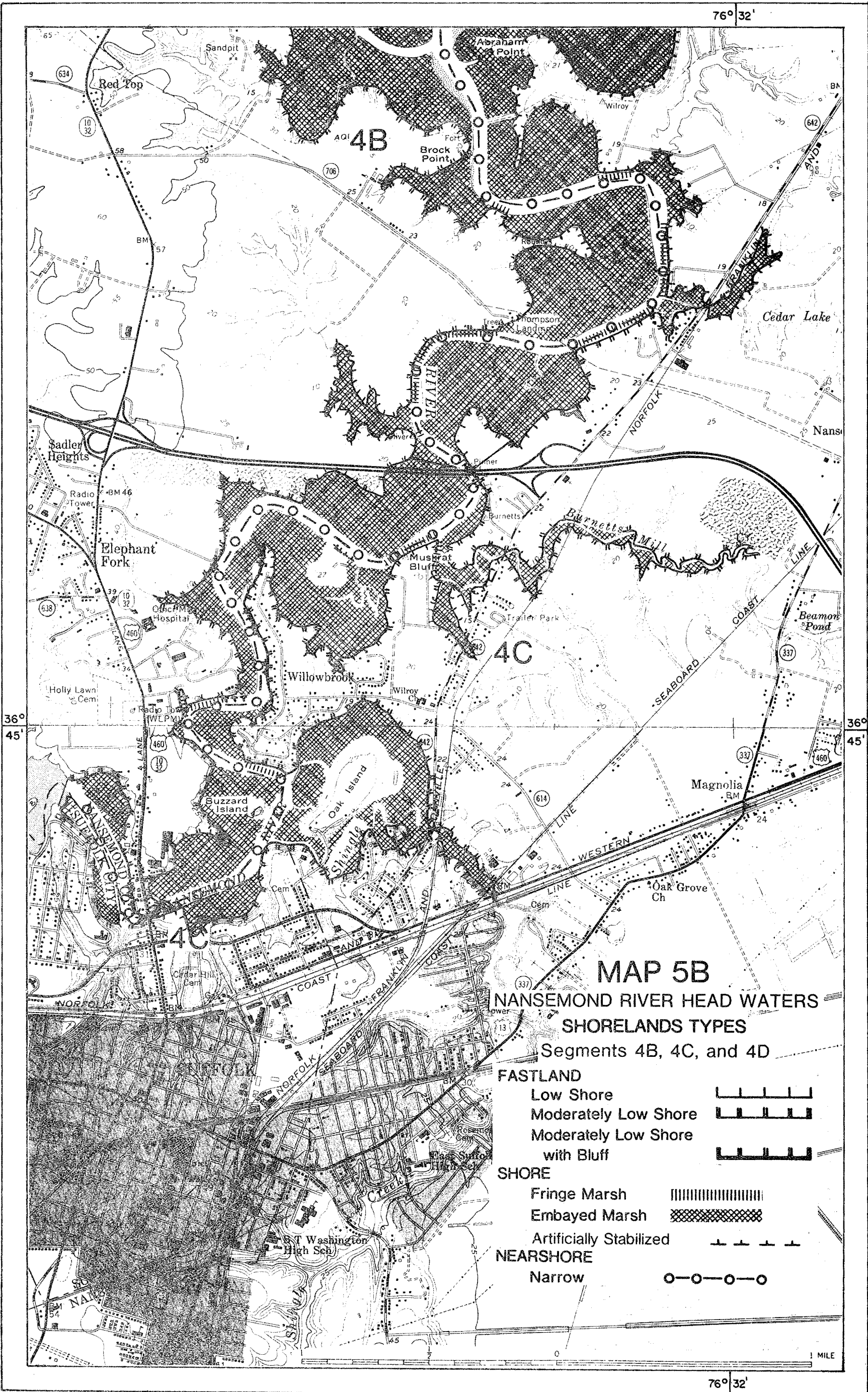
36° 45'

MAP 5A
NANSEMOND RIVER HEAD WATERS
TOPOGRAPHY AND CULTURE
 Segments 4B, 4C, and 4D

-  = Segment Boundary
-  = Subsegment Boundary

1 MILE

76° 32'



MAP 5B

NANSEMOND RIVER HEAD WATERS SHORELANDS TYPES

Segments 4B, 4C, and 4D

FASTLAND

- Low Shore
- Moderately Low Shore
- Moderately Low Shore with Bluff

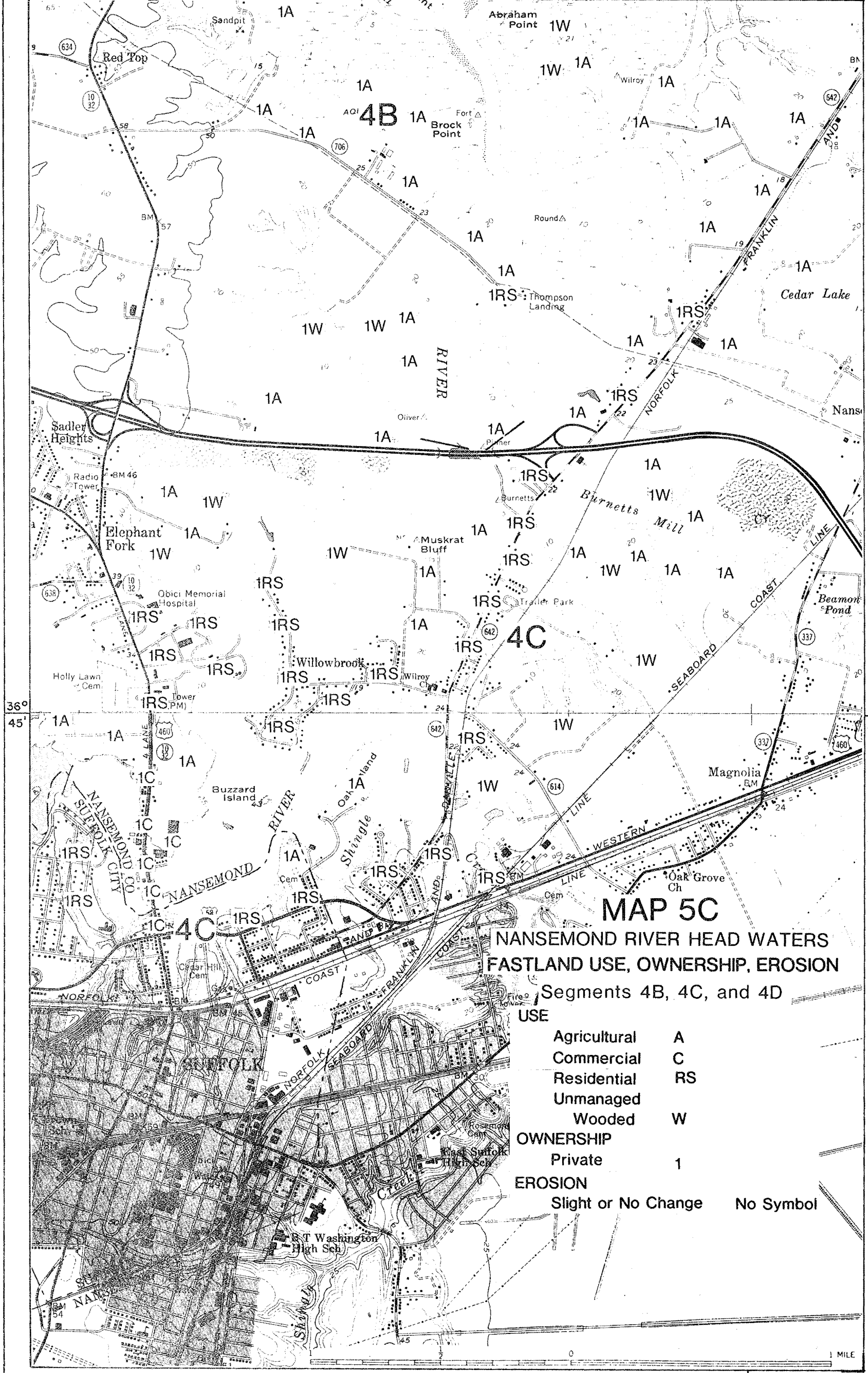
SHORE

- Fringe Marsh
- Embayed Marsh
- Artificially Stabilized

NEARSHORE

- Narrow

1 MILE

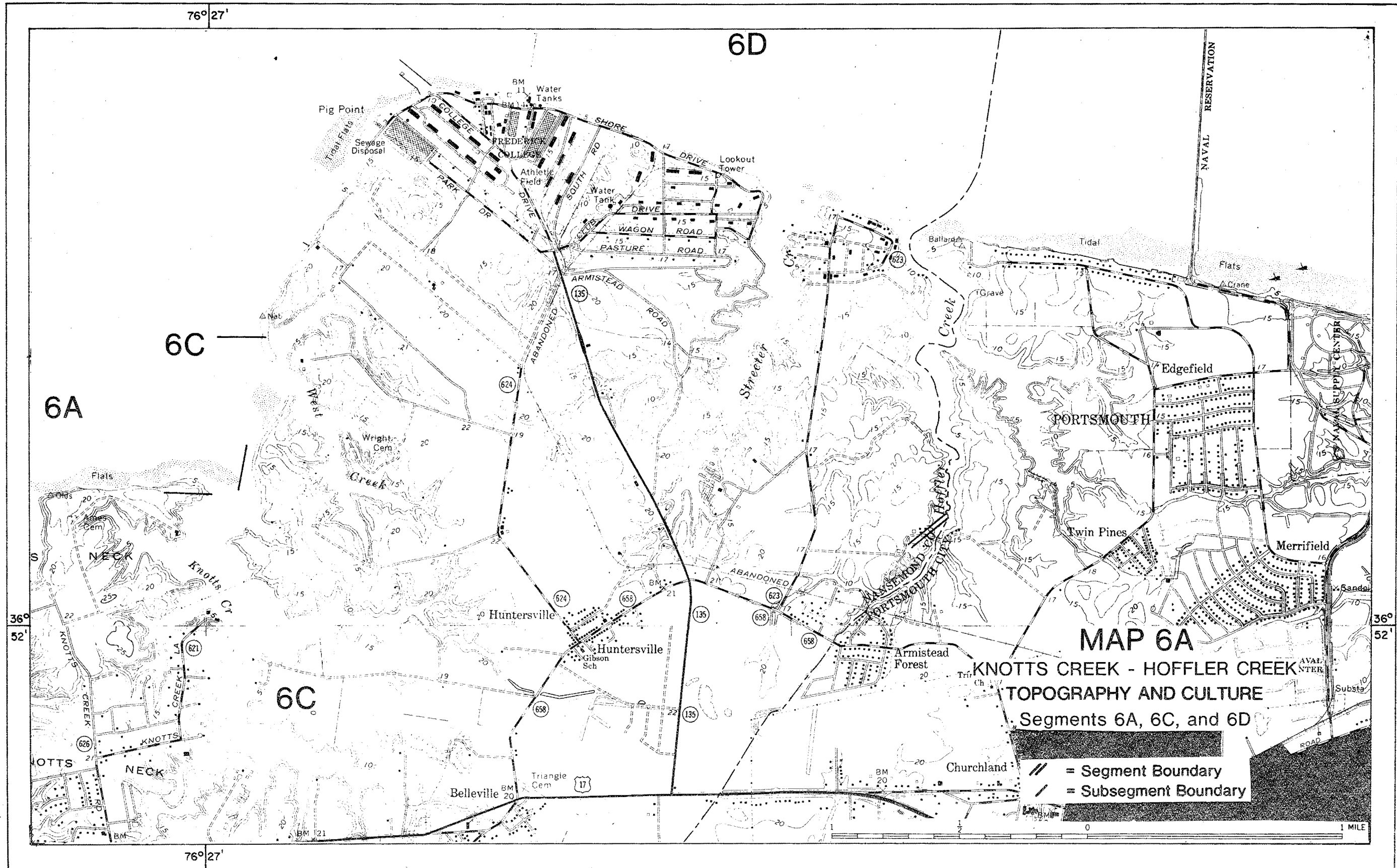


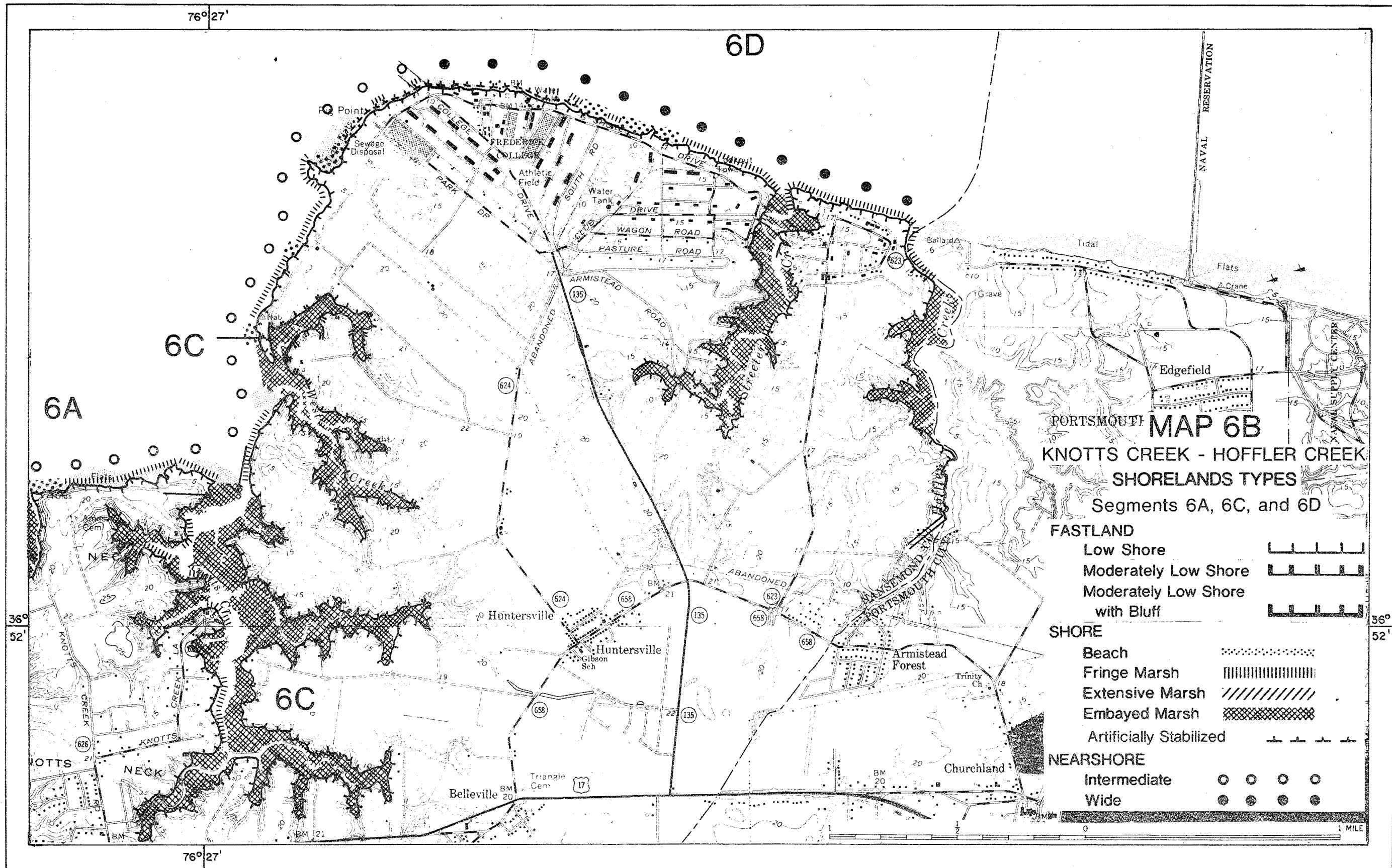
MAP 5C
NANSEMOND RIVER HEAD WATERS
FASTLAND USE, OWNERSHIP, EROSION

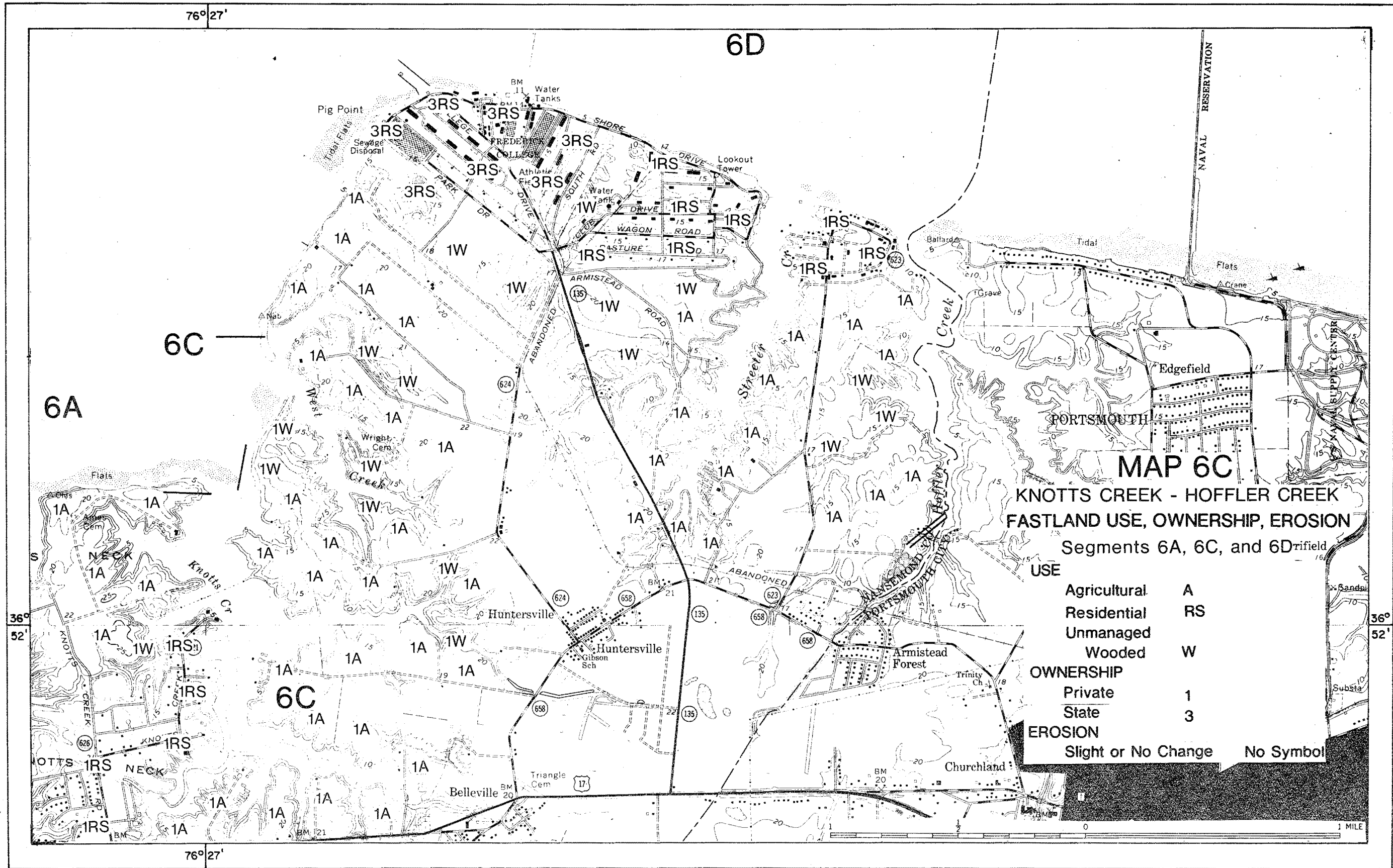
Segments 4B, 4C, and 4D

USE	
Agricultural	A
Commercial	C
Residential	RS
Unmanaged	
Wooded	W
OWNERSHIP	
Private	1
EROSION	
Slight or No Change	No Symbol

1 MILE







76° 27'

6D

6C

6A

MAP 6C

**KNOTTS CREEK - HOFFLER CREEK
FASTLAND USE, OWNERSHIP, EROSION**

Segments 6A, 6C, and 6D

USE	
Agricultural	A
Residential	RS
Unmanaged	
Wooded	W
OWNERSHIP	
Private	1
State	3
EROSION	
Slight or No Change	No Symbol

36° 52'

36° 52'

76° 27'

