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Shoreline Situation Report Stafford County, Virginia

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Shoreline Situation Report STAFFORD COUNTY, VIRGINIA

Special Report In Applied Marine Science and Ocean Engineering Number 79
Chesapeake Research Consortium Report Number 13



Supported by the National Science Foundation, Research Applied to National Needs Program
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VIRGINIA INSTITUTE OF MARINE SCIENCE
Gloucester Point, Virginia 23062

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CHAPTER 1
Introduction

CHAPTER 1
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 some of the potential uses of the shoreline, particularly with respect to recreational use, since such information could be of considerable value in the way a particular segment of coast is perceived by potential users.

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 ACKNOWLEDGMENTS

This report was prepared with funds provided by the Research Applied to National Needs Program (RANN) of the National Science Foundation administered through the Chesapeake Research Consortium (CRC), Inc. Publication funds were provided through the Coastal Zone Management Act, P.L. 92-583, as administered in the Commonwealth of Virginia, Grant Number O4-5-158-50001. George Dawes, Ken Moore, and Gene Silberhorn of the VIMS Wetlands Research Section contributed to the data collection. Gaynor Williams, Martha Patton, and Mike Carron assisted with the data reduction and editing. Beth Marshall typed the manuscript. Russell Bradley, Joe Gilley, Mike Carron, Ken Thornberry, and Bill Jenkins prepared the graphics. We also thank the numerous other persons who have assisted us with criticism, comments, ideas, and information.

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 unresolved. 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 a grouping 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) Potential 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.

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 slope of the land near the water as follows:

Low shore, 20-ft. (6 m) contour > 400 ft.

(122 m) from fastland-shore boundary

Moderately low shore, 20-ft. (6 m) contour

< 400 ft. (122 m); with or without cliff

Moderately high shore, 40-ft. (12 m) contour

< 400 ft. (122 m); with or without cliff

High shore, 60-ft. (18 m) contour < 400 ft.

(122 m); with or without cliff

Dune

Artificial fill, urban and otherwise

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 shoreline 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

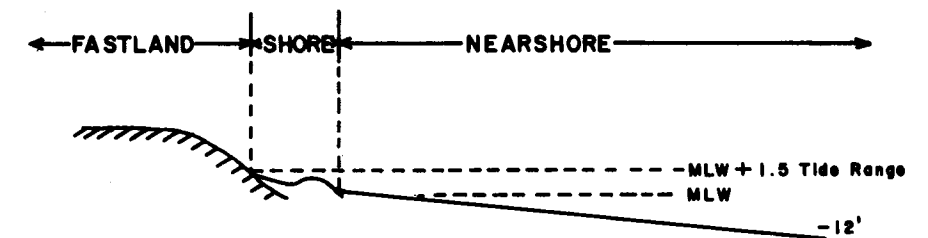


Figure 1

An illustration of the definitions of the three components of the shorelands.

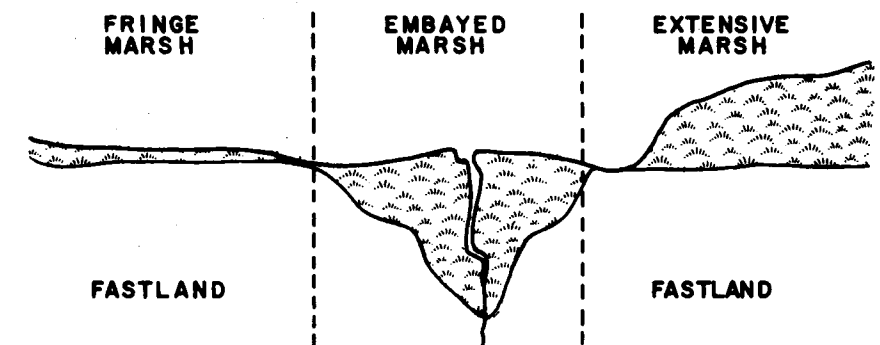


Figure 2

A generalized illustration of the three different 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.

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.

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 ratings of satisfactory, intermediate or unsatisfactory assigned to the various subsegments are taken from a listing at the Virginia Bureau of Shellfish Sanitation, based on information from water samples collected in the various tidewater shellfishing areas. The Bureau attempts to visit each area at least once a month.

The 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 these limits are somewhat more stringent than those used in rating recreational waters

(see Virginia State Water Control Board, Water Quality Standards 1946, amended 1970), they are used here because the Bureau of Shellfish Sanitation provides the best areawide coverage available at this time. In general, any waters fitting the satisfactory or intermediate categories would be acceptable for water recreation.

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 noncritical. 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) Potential Shore Uses:

We placed particular attention in our study on evaluating the recreational potential of the shore zone. We included this factor in the consideration of shoreline defenses for areas of high recreational potential. Furthermore, we gave consideration to the development of artificial beaches if this method were technically feasible at a particular site.

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. The material in this report is provided to indicate the physiographic types of marshes and to serve as a rough guide on acreages until detailed surveys are completed. Additional information of the wetlands characteristics may be found in Coastal Wetlands of Virginia: Interim Report by Marvin L. Wass and Thomas D. Wright, SRAMSOE Report No. 10, Virginia Institute

of Marine Science, 1969, 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 judgement based on such considerations 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 Shorelands Situation

CHAPTER 3

PRESENT SHORELANDS SITUATION

3.1 THE SHORELANDS OF STAFFORD COUNTY

This Shoreline Situation Report is concerned with a study of the shorelands of Stafford County, Virginia, along the Potomac River, its larger tributary creeks, and along the Rappahannock River below the fall line at Fredericksburg. The seventy-one and a half miles of shoreline are quite variable, reflecting the geologic history of the area and the geology of both the coastal plain and piedmont provinces.

The fastlands vary from low shore, along the lower portions of the tributary creeks, to very high shore, with bluff, along the Rappahannock. The tributary creeks grade upstream to high shore as they penetrate the fastland. The Potomac River fastland is moderately low or low.

Forty-five percent (31.8 miles) of shore is beach or open bank. Thirty-one percent (22.4 miles) is fringe marsh, most of which is along the Rappahannock and the large creeks. The remainder of the shorelands are fairly equally divided amongst embayed and extensive marsh and artificially stabilized lands.

Although we have classified the 11.8 miles of the Rappahannock River's shore zone as either fringe marsh, 10.5 miles, or embayed marsh, 1.3 miles, it is not true marsh. Preliminary work on the Tidal Marsh Inventory for Stafford County by the V.I.M.S. Wetlands Research Section indicates that the segment's wetlands are woody swamps and are primarily composed of nonmarine species. The inventory lists 1,360 acres of marsh land, most of which are Potomac side creek systems.

The creeks are shallow, generally less than ten feet in depth, and are not counted in the nearshore width classifications. Along the Potomac there are 4.4 miles of intermediate width and 7.5 miles of wide nearshore zone. The nearshore zone of the Rappahannock River segment is narrow.

Except for the U.S. Marine Corps Base at Quantico, which occupies five miles of shoreline on Chompawansic Creek and the Potomac River, a small park area on the Rappahannock River, and Youbedamm Landing, altogether totalling eight percent of the county's shoreline, the shorelands are privately owned. The greatest single usage is unmanaged wooded, 44%, being double the residential usage of 22%. With the inclusion of the unmanaged, unwooded, 17%, over 60% of the county's shorelands are unused. Most of the residential areas are along the bluffs above the Potomac and the upper portions of the tributary creeks. Of the remaining shorelands, two percent of the usage was adjudged commercial, seven percent agricultural, and, as previously noted, eight percent governmental.

Table 1, "Stafford County Shorelands Physiography, Fastland Use, and Ownership," and Table 2, the "Segment Summaries", are summaries and condensations of the various shorelands parameters.

3.2 EROSION

The distribution of erosion in Stafford County generally correlates with the nature of the river fronting the shorelands. Although long term historical data is lacking, erosion appears to be greatest along the powerful Potomac. In areas of great erosion, such as near Marlboro Point, twenty-foot high bluffs are rapidly retreating, undermining at least one house and endangering other structures. Youbedamm Landing, which is on the Potomac at the mouth of Aquia Creek, is eroding at an apparent rate of ten feet per year. Although no structures are endangered, Youbedamm Landing, as discussed in a later section, is the one public area on the river in Stafford County and should be protected.

The cause for such great erosion along the Potomac is the relatively large reaches of open water up, down, and across the river. Direct fetches from the northnortheast through southeast vary from three to eight miles; however, the county's general location on the outside of a large bend in the river allows waves originating from further away to approach Stafford's shores. Because of the highly erodible nature of the shorelands, shore protection probably would be a costly proposition. As there is a good sediment source in the bluffs, groins, if sufficiently high and long and properly spaced would, after they fill, partially protect the bluff. A massive seawall, bulkhead, or riprap would protect the bluff from direct attack by the river's waters, but, unless it were built very high, would offer little protection from erosion caused by upland runoff and slumping. Indeed, complete shore protection along the threatened portions of Stafford County's

Potomac River shores would be a difficult and expensive proposition.

In the large creeks, Potomac, Accokeek, and Aquia Creek, erosion is not a significant problem, except near the creek mouths. There the mighty Potomac is the driving force and relatively major actions, seawalls, groins, and/or nourishment would be necessary to combat erosion. Upstream, erosion is slight and probably is caused as much by downslope wasting of bluff material and upland runoff as it is by waves or currents in the creeks. Gabions, low bulkheads, or relatively small riprap would reduce or eliminate the erosive influence of the creeks and boatwakes; and vegetation, retaining walls, and terracing or slope modification would lessen the slope retreat in areas where action was deemed necessary.

Erosion on the Rappahannock side of Stafford County, below Fredericksburg, is neither especially significant or critical. At present there is no need for extensive shore protection. As with the tributary creeks along the Potomac, runoff over the river banks and boat wakes probably rate along with natural riparian processes in causing erosion.

3.3 POTENTIAL USE ENHANCEMENT

The potential use enhancement of Stafford County's shorelands is controlled by both physical geography and man. Man's control is philosophical in that human decisions concerning shoreline uses and alterations often are subjective or evolve from actions first affecting other areas. Whether an area is committed to conservation, agriculture, residential development, or industry has a great impact on the adjacent shorelands and the philosophy of their use and development. Similarly the physical geography, the processes and rates of erosion, the frequency of storm or tidal flooding, the topography, and the proximity to marshes contribute to the desirability of various land uses.

As discussed in the previous sections, there are three major land groups in Stafford County. The lands with the greatest potential for enhanced usages are those along Aquia, Potomac, and Accokeek Creeks. The reasons for this are the generally undeveloped character of the area, the good access to quiet water, the general stability of the shoreline, and the great scenic beauty of the land. Indeed there have been at least two proposals for major "planned residential communities" with populations of many thousands along Aquia and Potomac Creeks. Provided substantial safeguards were taken to protect the very valuable wetlands and the concomitant wildlife, these shore areas would be nearly ideal for parklands or relatively low density housing and associated small dock areas or marinas.

The significant erosion rates and difficulty of access over the bluff lower the potential of the Potomac's riverfront lands. Because of the proximity of the R.F.&P. railroad tracks, the few

low lying areas lose some of their attractiveness for recreational or residential use. Any construction on the highlands should be many yards set back from the top of the bluff, or erosion might claim the building. The pressures from increasing populations may well force residential development of the area, but prospective residents had best sacrifice part of their beautiful view of the river in favor of a more secure building site somewhat removed from the bluff. Also, some areas might make good parks or campgrounds developed on the scenic qualities of the river rather than on water related activities.

The Rappahannock River shorelands of Stafford County away from Fredericksburg probably will feel pressure for residential development later than other portions of the county. At present, because of limited access to the water, most of the area is not particularly suited for development. Continued use along present patterns, with perhaps expanded recreational aspects appears to be a suitable future for the area.

One area in the county worthy of special consideration is Youbedamm Landing, the county's only public lands along the Potomac River. The remainder of this section is taken from a report on Youbedamm Landing prepared in late spring of 1974. The area has a very high potential for public use, but definite steps need to be taken to control the significant erosion problem.

Youbedamm Landing is located on a marshy peninsula at the mouth of Aquia Creek. We are told the access road (Route 608) follows the bed of an old spur of the Richmond, Fredericksburg and Potomac Railroad to the site of a Civil War warehouse. The remains of the warehouse piles are now

some tens of yards offshore from the public park at the point.

The nonmarsh portions of the peninsula are a low plain at approximately five feet above mean sea level. A small scarp, approximately three feet high, separates the low plain from the shore. The beach material is fine to medium sand that is derived from the eroding scarp. Along the north face of the peninsula are a concrete boat launching ramp and three plank groins. The shoreward ends of the groins are approximately fifty feet from the beach. A handsome, old tree is falling over the scarp at the north point and there are approximately half a dozen plank groins along the east face of the peninsula. The northernmost of the groins are full with sand eroded from the north face of the peninsula. The southern groins have not as yet trapped sand. The nearshore and lower beach areas are littered with rocks, bricks and trash. Mean tide range is just over one foot.

According to local sources, the three groins along the north face were butted into the shore three years ago. This indicates a local shoreline erosion rate on the order of fifteen feet per year. Before facing the problem of stabilizing the shoreline, it is necessary to understand the causes of erosion.

The primary problem at Youbedamn Landing is its exceptionally exposed position. Table 1 indicates measured fetches across open water. Youbedamn Landing's location on the outside of a bend in the river, however, allows the wind to work over distances longer than those measured. Waves generated by north winds blowing downriver are refracted into the mouth of Aquia Creek. Similarly waves moving upriver may be refracted around the

bend and toward the point.

The task at this site is twofold, first to stabilize the shoreline then, water quality aside, to enhance the quality of the area as a bathing beach. It should be noted that no shore defense structures or methods are permanent. Some are effective for only a few months or years, while others may work for decades, but none work forever.

The four general methods of shore protection are (1) artificial nourishment, (2) groins, (3) riprap or bulkhead, and (4) combinations of the first three methods. The lack of effectiveness of groins alone along the north face of the point is obvious. The three year old groins are now totally useless. Artificial nourishment, that is trucking or barging suitable beach sand to Youbedamn Landing from elsewhere, creating a pleasant artificial beach over the present shore, probably would be only a temporary solution. As soon as it were emplaced the sand would begin moving away under the forces of erosion. Eventually all the sand would be removed and today's situation would reappear. Continual maintenance, however, might not be very expensive and might provide a tolerable solution. A compound structure of two or three feet long, high groins substantially filled with trucked in sand probably would work reasonably well and would not require as frequent replenishment as the nourished, ungroined beach. In either case of nourishment, if the area were filled level and three feet deep for ten yards, then sloped one on twenty, approximately twenty cubic yards of sand would be required for each yard of beach protected. Twenty thousand cubic yards of fill would be required to protect one hundred yards of beach. This nourishment would serve both to (temporarily)

stabilize the shoreline and enhance the beach.

A more sure method of stabilizing the shoreline would be to riprap or bulkhead the full length of the endangered area. If riprapped, a proper large stone or crushed stone on filter cloth system should be used. Construction rubble, brick, and concrete block type riprap does not have sufficient mass to significantly deter erosion at Youbedamn Landing. An extensive bulkhead with weep holes, a crushed stone back fill and filter cloth probably would work comparably. Waves refracted from the face of the bulkhead might tend to scour the beach area. While either structure will satisfactorily control erosion of the scarp, neither does anything to improve the beach.

In summary, the alternatives open to the county with respect to Youbedamn Landing in increasing effectiveness and cost are...

- (1) Do nothing or continue to grade the scarp which only apparently retards erosion.
- (2) Nourish (fill) the beach area, significantly enhancing the beach quality and retarding erosion of the scarp only for so long as it takes erosion to remove the fill material.
- (3) Nourish and groin the beach area, the groins serving to slow the removal of the sand.
- (4) Riprap or bulkhead the scarp area, effectively stabilizing the shoreline but doing nothing to the beach quality. Scour from waves reflected from a bulkhead might tend to lower the beach quality.
- (5) Riprap, groin, and nourish the area. This would be the most complete, successful, and expensive alternative. It would stabilize the shoreline, probably for decades, and it would, for a shorter time, enhance the beach.

If alternatives 3 or 5 are used, care on specific design criteria should be exercised. The groins should be somewhat higher at their shoreward ends than might normally be constructed so as to prohibit any overwash by other than extreme storm waters. In both of these alternatives part of the purpose of the fill material is to protect the groin ends and prevent flanking of the groins. The groins should be buttressed into the riprap or fastland.

If alternatives 4 or 5 are used strict criteria such as might be found in the U.S. Army Corps of Engineers, Coastal Engineering Research Center's Shore Protection Manual or its earlier Technical Report No. 4, Shore Protection, Planning and Design should be used.

Percentage Frequency of Surface Wind Direction and Speed,
from Hourly Observations for all Months from 1957 to 1970
at Fort Belvoir/Davison A.A.F. Virginia

Knots	1-3	4-6	7-10	11-16	17-21	22-27	%	Mean Wind Speed	Fetch Miles
<u>Dir.</u>									
N	1.0	2.1	1.5	.5			5.2	6.3	*
NNE	.5	.8	.4	.1			1.8	5.2	5
NE	.5	.9	.5				2.0	5.2	4
ENE	.4	.6	.3				1.3	4.9	3
E	.9	1.2	.5	.1			2.6	4.9	3
ESE	.7	.8	.3				1.7	4.4	8
SE	.9	1.4	.7	.1			3.0	5.1	5
SSE	1.0	1.5	.7	.1			3.3	4.9	
S	1.8	3.1	1.7	.2			6.8	5.4	
SSW	.7	1.5	.9	.1			3.2	5.6	
SW	.6	1.1	.6	.1			2.4	5.5	
WSW	.4	.5	.3				1.2	5.1	
W	1.1	1.4	1.0	.4	.1		4.0	6.3	
WNW	1.7	1.4	1.4	1.1	.3	.1	6.0	7.5	4
NW	1.7	2.4	3.1	2.1	.4		9.8	8.3	
NNW	.9	1.7	1.8	.9	.1		5.1	7.5	
VARBL									
CALM							40.1	3.8	
	14.8	22.5	15.5	5.8	1.0	.3	100.0		

121, 761 observations

Wind data from National Weather Service, Asheville, North Carolina

* Youbedamm Landing's location on the outside of a bend in the Potomac River allows the wind to work across fetches much larger than measured.

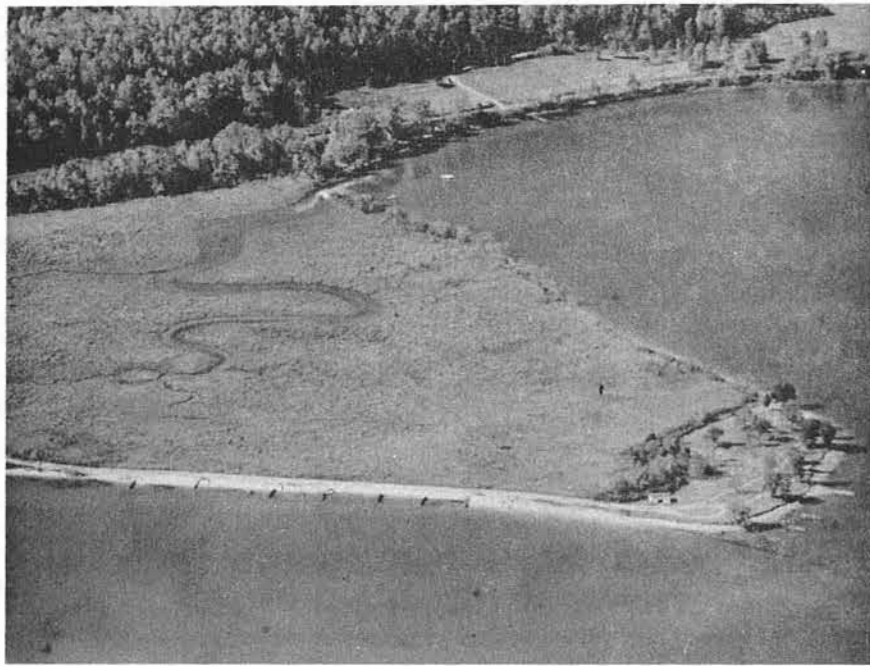


Figure 3

3. Aerial view of Youbedamm Landing at the mouth of Aquia Creek on the Potomac River. The blunt end of the peninsula is experiencing severe erosion, as evidenced by the separation of the groins from the mainland. The large, partially filled groinfield on the Potomac River is trapping some of the eroded material.
4. A ground view at Youbedamm Landing looking out toward the Potomac River. The structure in the foreground is the remains of a groin. In less than ten years the bank has retreated, leaving the groin stranded and useless as a shore defense structure. The large tree in the background has, since the date of this picture, surrendered its hold on the shore and fallen into the river.



Figure 4

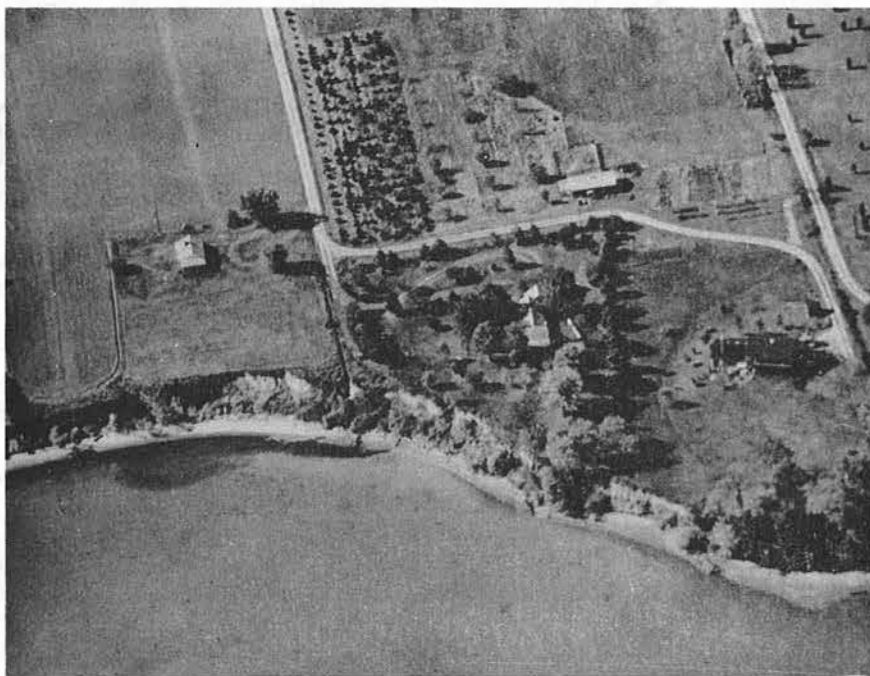


Figure 5

5. An area of very severe erosion just north of Marlboro Point on the Potomac River. The high bluff consists of unconsolidated sediments that are easily eroded by waves. Most attempts at shore protection have met with little or no success as they have not been of sufficient scope to stem the problem.
6. A ground view near Marlboro Point, south of the area shown in the preceding photograph. The great erosion has removed much of the bank, significantly undercutting the house.

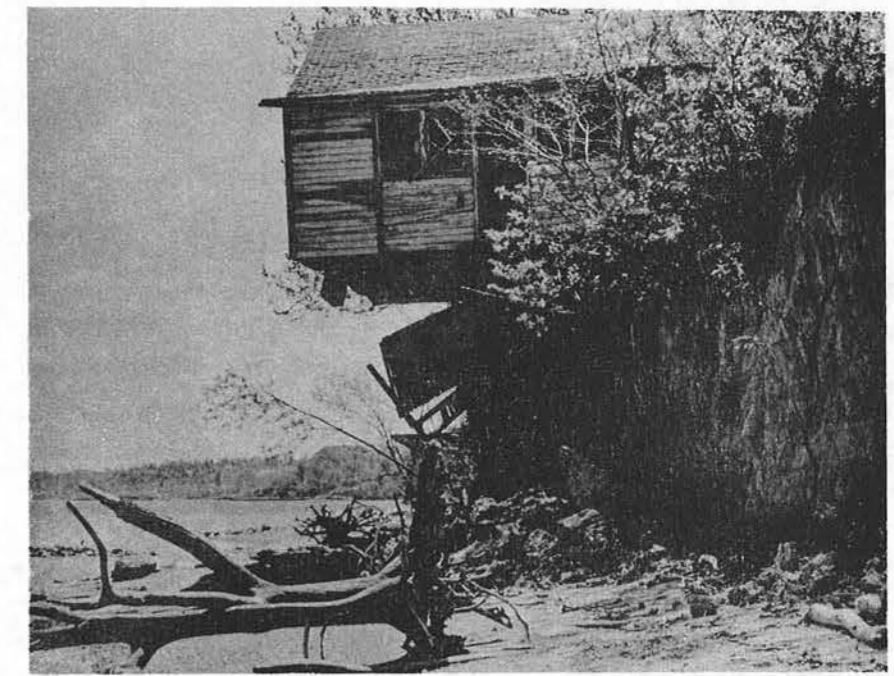


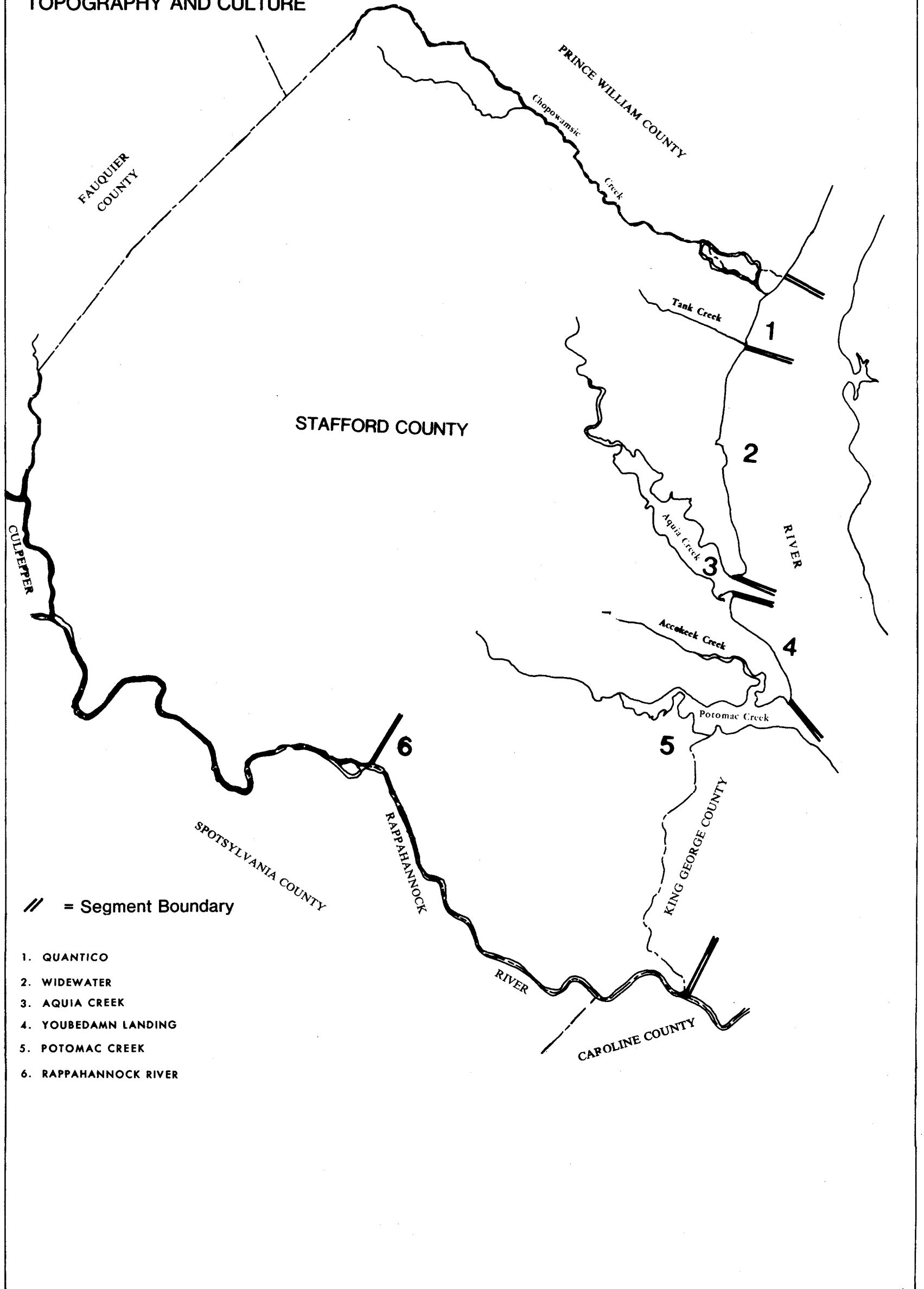
Figure 6

TABLE 1. STAFFORD COUNTY SHORELANDS PHYSIOGRAPHY, FASTLAND USE, OWNERSHIP (STATUTE MILES)

Physiographic, ownership, and use classifi- cation	SHORELANDS PHYSIOGRAPHY												FASTLANDS USE						OWNERSHIP			TOTAL MILES				
	FASTLAND								SHORE				NEARSHORE													
	LOW SHORE	MODERATELY LOW SHORE	MODERATELY LOW SHORE WITH BLUFF	MODERATELY HIGH SHORE	MODERATELY HIGH SHORE WITH BLUFF	HIGH SHORE	HIGH SHORE WITH BLUFF		BEACH	ARTIFICIALLY STABILIZED	FRINGE MARSH	EMBAYED MARSH	EXTENSIVE MARSH	NARROW	INTERMEDIATE	WIDE	AGRICULTURAL	COMMERCIAL	GOVERNMENTAL	RESIDENTIAL	UNMANAGED, UNWOODED		UNMANAGED, WOODED	PRIVATE	COUNTY	FEDERAL
1		1.7	2.6			0.7		3.8		1.2				2.0				5.0						5.0		5.0
2	1.4	5.1						4.7		0.8		1.0		2.4	4.1				0.3	1.6	4.6	6.5				6.5
3	14.7	8.0		0.9		4.4		20.1	3.8	1.9		2.2							11.2	8.4	8.4	28.0				28.0
4		2.0				1.4		2.4				1.0			3.4				1.4	0.3	1.7	3.2	0.2			3.4
5	1.7	9.3		0.8		5.0		0.8	0.8	8.0	5.3	1.9					0.3		2.2	0.9	13.4	16.8				16.8
6		0.5		5.2	0.6	2.1	3.4			10.5	1.3		11.8			4.8	1.1	0.6	0.9	1.3	3.1	11.2		0.6		11.8
SUBTOTAL	17.8	26.6	2.6	6.9	0.6	13.6	3.4	31.8	4.6	22.4	6.6	6.1	11.8	4.4	7.5	4.8	1.4	5.6	16.0	12.5	31.2	65.7	0.2	5.6		71.5
% of TOTAL	25%	37%	4%	9%	1%	19%	5%	45%	7%	31%	9%	8%	17%	6%	10%	7%	2%	8%	22%	17%	44%	92%	0%	8%		100%

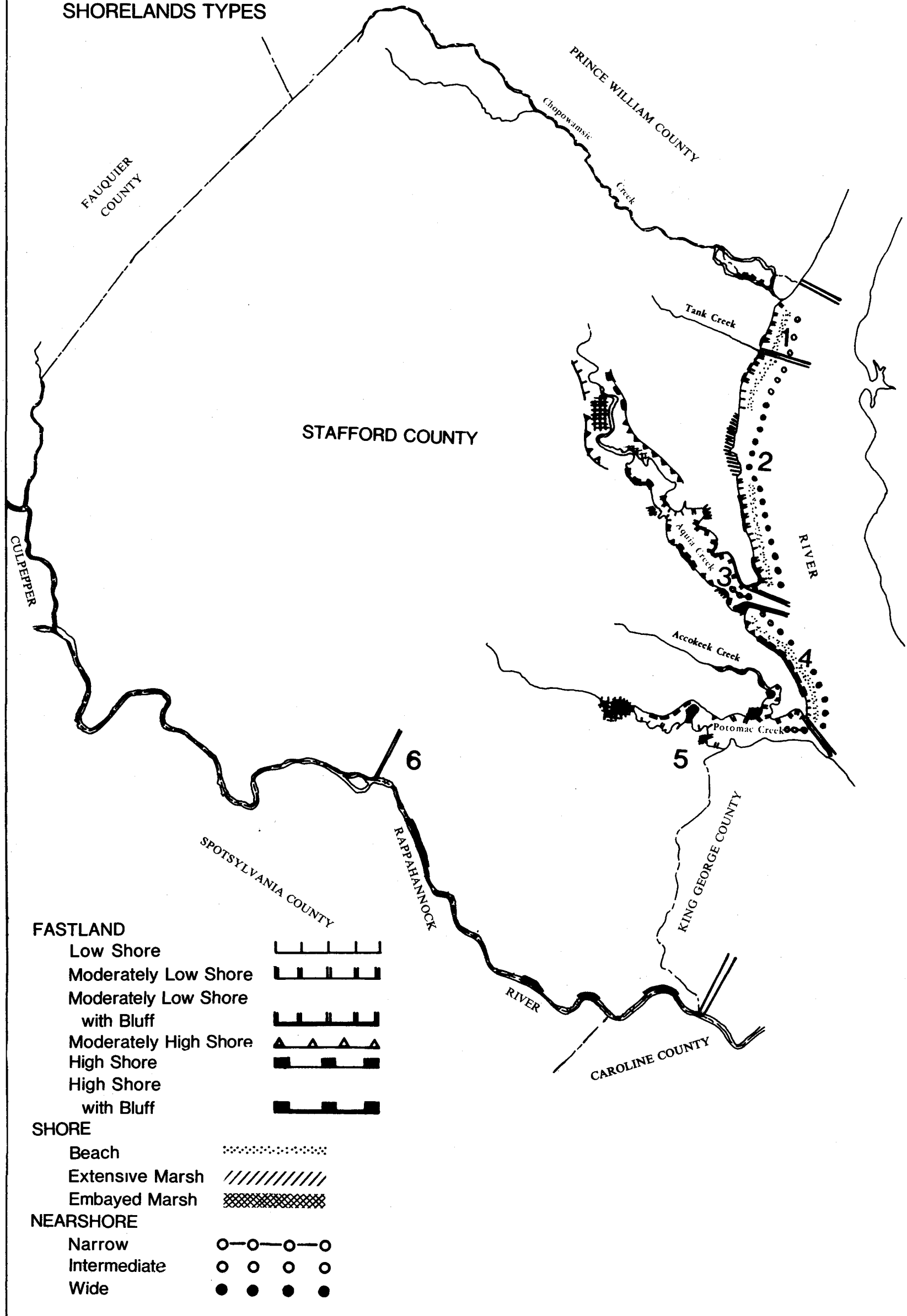
MAP 1A

STAFFORD COUNTY TOPOGRAPHY AND CULTURE



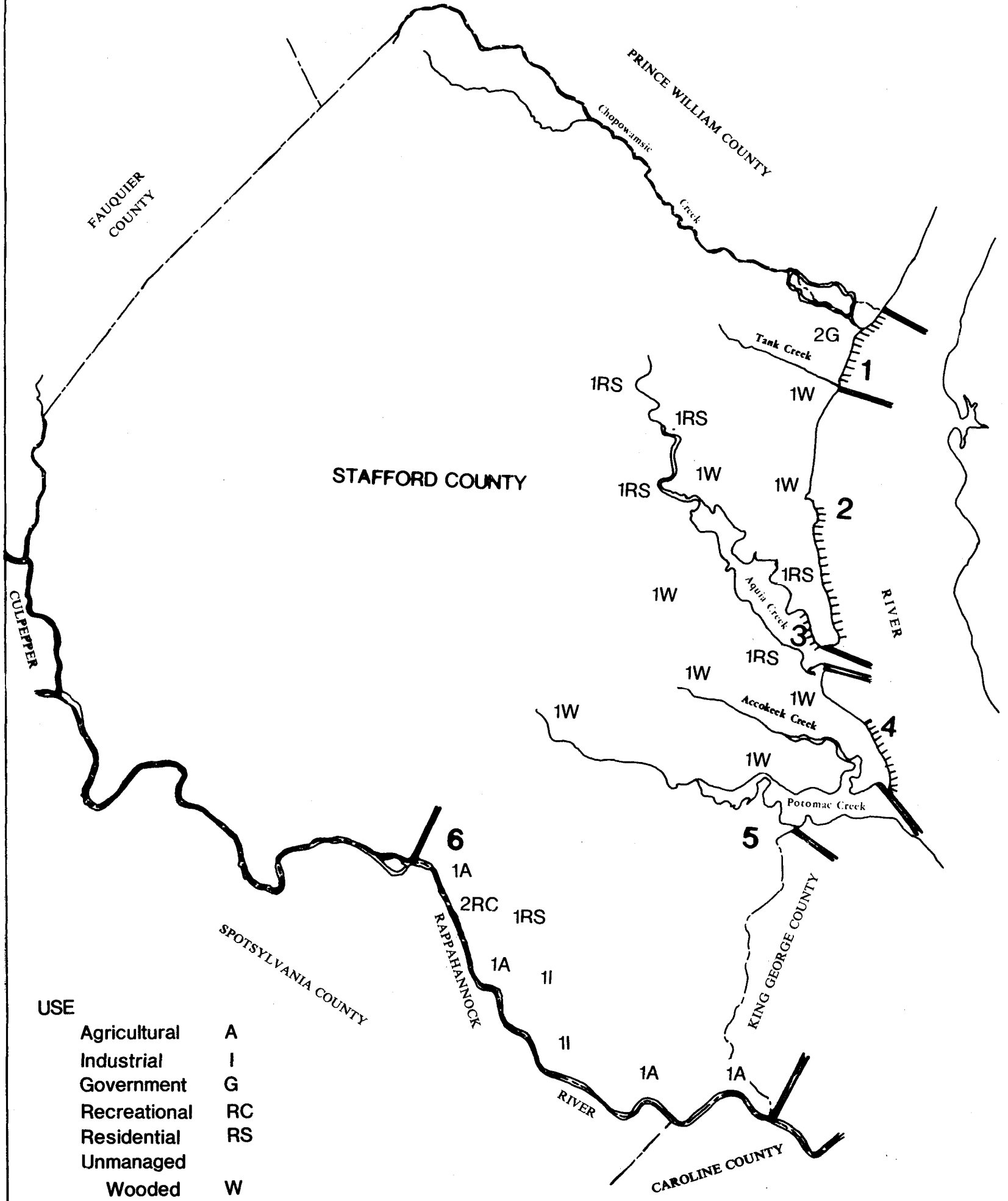
MAP 1B

STAFFORD COUNTY
SHORELANDS TYPES



MAP 1C

STAFFORD COUNTY
FASTLAND USE, OWNERSHIP, EROSION



USE

- Agricultural A
- Industrial I
- Government G
- Recreational RC
- Residential RS
- Unmanaged
- Wooded W

OWNERSHIP

- Private 1
- Federal 2

EROSION

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

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 SEGMENT SUMMARIES, STAFFORD COUNTY

SEGMENT	SHORELANDS TYPE	SHORELANDS USE	OWNERSHIP	BEACH QUALITY	FLOOD HAZARD	SHORE EROSION SITUATION	POTENTIAL USE ENHANCEMENT
1 QUANTICO 26,400 feet (5 mi.)	FASTLAND: Moderately low shore with bluff 53%, moderately low shore 33%, high shore 14%. SHORE: Beach 75%, fringe marsh 25%. NEARSHORE: Along the Potomac, intermediate.	FASTLAND: Government, Quantico U.S.M.C. Base. SHORE: Governmental and recreational. NEARSHORE: Water sports.	Federal.	Poor.	Low.	Moderate, noncritical. There is one marginally effective groin field. No action is necessary.	Low. The present federal use severely limits open public use.
2 BRENT MARSH 34,600 feet (6.5 mi.)	FASTLAND: Moderately low shore 79%, low shore 21%. SHORE: Beach 73%, extensive marsh 15%, fringe marsh 12%. NEARSHORE: Wide 63%, intermediate 37%.	FASTLAND: Unmanaged, wooded 70%, unmanaged, open 25%, residential 5%. SHORE: Unused and recreational. NEARSHORE: Water sports.	Private.	Fair to poor.	Low.	Moderate to severe, critical and noncritical. There is a satisfactory groin field at the south end of the segment and a bulkhead groin complex south of Brent Marsh. Maintenance and extension of already existing structures is recommended.	Low. The high erosion rate, with a limited chance of establishing artificial beaches, greatly reduces the potential for this area.
3 AQUILA CREEK 148,000 feet (28.0 mi.)	FASTLAND: Low shore 53%, moderately low shore 28%, moderately high shore 3%, high shore 16%. SHORE: Beach 72%, artificially stabilized 13%, extensive marsh 8%, fringe marsh 7%. CREEK: Water depth is usually less than 12 feet.	FASTLAND: Residential 40%, unmanaged, wooded 30%, unmanaged, open 30%. SHORE: Mostly unused, some recreation. NEARSHORE: Water sports.	Private.	Fair to poor.	Low, noncritical for most of the segment. Moderate to high, critical, to some houses.	Slight to none, noncritical for most of the segment. Moderate to high, noncritical, erosion is found between Simms and Shackley Points. Bulkheading is found at most residential areas. At Youbedamm Landing groins have successfully built up a beach on the Potomac side.	Low. The poor beaches and water quality greatly limits the potential use of this segment.
4 YOUNBEDAMN LANDING 18,000 feet (3.4 mi.)	FASTLAND: Moderately low shore 60%, high shore 40%. SHORE: Narrow beach 72%, extensive marsh 28%. NEARSHORE: Wide.	FASTLAND: Unmanaged, wooded 50%, residential 40%, unmanaged, open 10%. SHORE: Swimming. NEARSHORE: Boating, fishing.	Private, except Youbedamm Landing which is municipally owned.	Fair to poor.	Low.	Moderate to severe, critical to homes at and around Marlboro Point. There are three areas where groin fields have been constructed. The only one that has been effective is on the Potomac side of Youbedamm Landing. No action is recommended at present.	Low.
5 POTOMAC CREEK 88,800 feet (16.8 mi.)	FASTLAND: Low shore 10%, moderately low shore 55%, moderately high shore 5%, high shore 30%. SHORE: Fringe marsh 47%, embayed marsh 32%, extensive marsh 12%, beach 5%, artificially stabilized 4%. CREEK: Narrow.	FASTLAND: Unmanaged, wooded 80%, residential 13%, unmanaged, open 5%, recreation/commercial 2%. SHORE: Mostly unused, some recreation. NEARSHORE: Boating, fishing.	Private.	Poor.	Low, noncritical for most areas. High, noncritical in low areas on the south side of the creek and in marsh areas.	Slight to none, noncritical. There are two effective groin fields and one area of bulkheading that is only of minimal effectiveness. There is no suggested action at present.	Moderate until significant increases in population pressures force expansion of boating facilities. Great potential for low density residential development on the higher fastland.
6 RAPPAHANNOCK RIVER 62,800 feet (11.8 mi.)	FASTLAND: Moderately high shore 44%, high shore with bluff 29%, high shore 18%, moderately high shore with bluff 5%, moderately low shore 4%. SHORE: Mostly fringe marsh 89%, some embayed marsh 11%. NEARSHORE: Narrow.	FASTLAND: Agricultural 41%, unmanaged, wooded 26%, unmanaged, open 11%, commercial 9%, residential 8%, governmental 5%. SHORE: Mostly unused. NEARSHORE: Boating, fishing.	Private, except Federally owned Military Park.	Poor.	Low, noncritical for most. Moderate to high, noncritical in low shore areas in the meanders.	Slight to none, noncritical. There are no endangered structures or shore protective structures.	Low.

QUANTICO, STAFFORD COUNTY, VIRGINIA

SEGMENT 1 (Map 2)

EXTENT: 26,400 feet (5 mi.) from the Stafford - Prince William County line to Tank Creek, including the southern shore of Chopawamsic Creek.

SHORELANDS TYPE

FASTLAND: Moderately low shore with a 10 to 20-foot bluff 53% (14,000 ft.) along the Potomac River; moderately low shore 33% (8,600 ft.) and high shore 14% (3,800 ft.), both along Chopawamsic Creek.

SHORE: Beach 75% (20,000 ft.) and fringe marsh 25% (6,400 ft.).

NEARSHORE: Intermediate width along the Potomac River. Chopawamsic Creek is less than 12 feet deep.

SHORELANDS USE

FASTLAND: Entirely governmental, Quantico U.S. Marine Corps Training School.

SHORE: Mostly governmental, some recreational.

NEARSHORE: Boating and water sports.

OFFSHORE: The Potomac River is used for boating and shipping.

WIND AND SEA EXPOSURE: The shoreline trend is N - S.

Fetches are:

NE 2.7 nm
E 2 nm
SE 2.3 nm.

OWNERSHIP: Federal government.

FLOOD HAZARD: Low, noncritical.

BEACH QUALITY: Poor. All beaches are quite narrow.

WATER QUALITY: No data.

SHORE EROSION SITUATION

EROSION RATE: The VIMS Historical Survey does not have any information on this area. The erosion rate seems to be moderate, noncritical.

ENDANGERED STRUCTURES: None.

SHORE PROTECTIVE STRUCTURES: There is one

small groinfield of marginal effectiveness.

Suggested Action: None.

OTHER SHORE STRUCTURES: One pier.

POTENTIAL USE ENHANCEMENT: Low. The future use of this segment is controlled by the U.S. Marine Corps.

MAPS: USGS, 7.5 Min.Ser. (Topo.), QUANTICO, Va. - Md. Quadr., 1966, photorevised 1971.
USGS, 7.5 Min.Ser. (Topo.), WIDEWATER, Va. - Md. Quadr., 1966.
C&GS, #559, 1:40,000 scale, POTOMAC RIVER, Lower Cedar Point to Mattawoman Creek, 1971.
C&GS, #101SC, 1:40,000 scale, POTOMAC RIVER, 1973.

PHOTOS: Aerial-VIMS 2Nov73 ST-1/1-25.

WIDEWATER, STAFFORD COUNTY, VIRGINIA

SEGMENT 2 (Maps 2, 3, and 4)

EXTENT: 34,600 feet (6.5 mi.) along the Potomac River from Tank Creek to Simms Point at the mouth of Aquia Creek.

SHORELANDS TYPE

FASTLAND: Moderately low shore 79% (27,300 ft.) and low shore 21% (7,300 ft.). Most of the low shore is in the area south of Brent Marsh.

SHORE: Beach 73% (25,000 ft.), extensive marsh 15% (5,300 ft.), and fringe marsh 12% (4,300 ft.). All the marsh is in the Brent Marsh area.

NEARSHORE: Wide 63% (22,000 ft.) and intermediate width 37% (12,600 ft.).

SHORELANDS USE

FASTLAND: Unmanaged, wooded 70% (24,288 ft.), unmanaged, unwooded 25% (8,448 ft.), residential 5% (1,584 ft.).

SHORE: Mostly unused, some recreation at the residential areas.

NEARSHORE: Boating and fishing.

OFFSHORE: The Potomac River is used for shipping and boating.

WIND AND SEA EXPOSURE: The shoreline trend is N - S.

Fetches are:

NE 3.3 nm
E 2.8 nm
SE 4.1 nm.

OWNERSHIP: Private.

FLOOD HAZARD: Low, noncritical.

WATER QUALITY: No data.

BEACH QUALITY: Fair to poor. The beaches are generally narrow and have very little sand.

SHORE EROSION SITUATION

EROSION RATE: There is no data in the VIMS Historical Erosion Survey on this area. Erosion is moderate to severe, both critical and noncritical. The area south of Brent Marsh has been subjected to heavy erosion.

ENDANGERED STRUCTURES: Most of the potentially endangered structures are protected by a bulkhead and groin system.

SHORE PROTECTIVE STRUCTURES: There is a large bulkheading and groin system south of Brent Marsh which appears quite effective. However, the area adjacent to the bulkheading is experiencing very severe erosion. There is an effective groin system on the beach between Brent and Simms Points.

Suggested Action: Maintenance and extension of the bulkheads as necessary for continuation and expansion of protection. Gabions or large stone riprap should be equally as acceptable as a bulkhead.

OTHER SHORE STRUCTURES: None.

POTENTIAL USE ENHANCEMENT: Low. The poor access and high erosion rates limits development of recreational areas and artificial beaches.

MAPS: USGS, 7.5 Min.Ser. (Topo.), WIDEWATER, Md. - Va., Quadr., 1966.
C&GS, #559, 1:40,000 scale, POTOMAC RIVER, Lower Cedar Point to Mattawoman Creek, 1971.
C&GS, #101SC, 1:40,000 scale, POTOMAC RIVER, 1973.

PHOTOS: Aerial-VIMS 2Nov73 ST-2/26-62.

AQUIA CREEK, STAFFORD COUNTY, VIRGINIA

SEGMENT 3 (Maps 3, 4, and 5)

EXTENT: 148,000 feet (28.0 mi.), Aquia Creek east of Interstate 95. From Simms Point to Youbedamm Landing.

SHORELANDS TYPE

FASTLAND: Low shore 53% (77,000 ft.), moderately low shore 28% (42,200 ft.), moderately high shore 3% (4,700 ft.), and high shore 16% (23,400 ft.). From Simms Point to 5,000 feet above the railroad crossing (25,000 ft.) the shoreline is moderately low shore. From this point to the beginning of the meander pattern (4,000 ft.), the fastland is high shore with elevations of over 150 feet within 400 feet of the shoreline. The channel meanders for approximately 32,000 feet (64,000 ft. of shoreline), with a moderately low to low shore with occasional areas of high and moderately high shore. From the base of the meander pattern, downstream to Youbedamm Landing (40,500 ft.), the fastland ranges from moderately high to high shore with extensive lowlands in the predominately marsh areas.

SHORE: Beach 72% (106,000 ft.), artificially stabilized 13% (20,000 ft.), extensive marsh 8% (12,000 ft.), and fringe marsh 7% (10,000 ft.). Between Simms Point and Shackley Point there is a very narrow beach with extensive erosion landward. From Bennetts Point to Boars Creek 50% is fringe marsh and 50% is very narrow beach with minor erosion. From the railroad bridge to the Narrows is extensive marsh. From the Narrows to Interstate 95 the creek has 64,000 feet of natural shoreline and 20,000 feet of manmade shoreline. Of this, 30% runs through an extensive marsh and the remaining 70% has narrow beach. The 20,000 feet of manmade shoreline is a canal system constructed in the Aquia Creek development area west of Aquia Creek and midway between the Narrows and Interstate 95. From the Narrows to Seegars Point 50% is extensive marsh and 50% is narrow beach. From Seegars Point to the marina about 60% is marsh and 40% narrow beach. Between the marina and Thorney Point the majority of the shore zone is narrow beach. From this point to Youbedamm Landing 20% is very narrow beach and 80% is extensive marsh. Along the edge of much of the marsh is

a narrow sand beach which widens at a groin-field on Youbedamm Landing.

CREEK: Water depth of Aquia Creek is usually less than 12 feet and for the most part, less than 6 feet.

SHORELANDS USE

FASTLAND: Residential 40% (59,136 ft.), unmanaged, wooded 30% (44,352 ft.), and unmanaged, open 30% (44,352 ft.). The residential areas are found at Widewater Beach and the marina area on the northern shore at Thorney Point on the southern shore.

SHORE: Unused, recreation, and access to the creek.

NEARSHORE: Boating and fishing.

WIND AND SEA EXPOSURE: The mouth of Aquia Creek is exposed to waves from the east with a fetch of 3.4 to 4.0 miles.

OWNERSHIP: Private.

FLOOD HAZARD: Moderate to high, critical to some of the houses around the marina area and Thorney Point. Low, noncritical elsewhere in the segment.

WATER QUALITY: No data.

BEACH QUALITY: Fair to poor. Most of the beach in this area is too narrow and thin to support any recreational use. On the Potomac side of Youbedamm Landing, groins have built up a fair beach.

SHORE EROSION SITUATION

EROSION RATE: The VIMS Historical Survey has no information on this area. However, erosion, in general, is only minor along most of the creek meanders. The only area of more extensive erosion is between Simms Point and Shackley Point but there are no structures endangered. As for the manmade areas it is impossible to say what the erosion situation will be.

ENDANGERED STRUCTURES: None.

SHORE PROTECTIVE STRUCTURES: In general, wherever residential areas are found, there is bulkheading. Two areas of shore protection are Widewater Beach where most of the beach zone is bulkheaded and Youbedamm Landing where groins have successfully built up a beach on the

Potomac side but have been unsuccessful at the mouth of Aquia Creek.

Suggested Action: Riprap and nourishment at Youbedamn Landing.

OTHER SHORE STRUCTURES: There are many piers and one railroad bridge along the shore of this segment.

POTENTIAL USE ENHANCEMENT: Minimal. The poor beach quality and probable water quality of Aquia Creek limit the potential for recreational use along the creek. There is potential for boat ramps and marinas.

MAPS: USGS, 7.5 Min.Ser. (Topo.), STAFFORD, Va. Quadr., 1966, photorevised 1972.
USGS, 7.5 Min.Ser. (Topo.), WIDEWATER, Md. - Va., Quadr., 1966.
C&GS, #559, 1:40,000 scale, POTOMAC RIVER, Lower Cedar Point to Mattawoman Creek, 1971.
C&GS, #101SC, 1:40,000 scale, POTOMAC RIVER, 1973.

PHOTOS: Aerial-VIMS 2Nov73 ST-3/63-69, 99-194.

YOUBEDAMN LANDING, STAFFORD COUNTY, VIRGINIA

SEGMENT 4 (Maps 4 and 6)

EXTENT: 18,000 feet (3.4 mi.) from Youbedamn Landing to Marlboro Point.

SHORELANDS TYPE

FASTLAND: Moderately low shore 60% (10,800 ft.) and high shore 40% (7,200 ft.).

SHORE: The shore zone between Youbedamn Landing and Marlboro Point consists of extensive marsh 28% (5,000 ft.) and narrow beach 72% (13,000 ft.).

NEARSHORE: Wide. The 12-foot isobath averages 1,500 yards offshore.

SHORELANDS USE

FASTLAND: Unmanaged, wooded 50%, residential 40%, and unmanaged, open 10%.

SHORE: Swimming.

NEARSHORE: Boating and fishing.

WIND AND SEA EXPOSURE: The shoreline trend is NW - SE with a fetch of 3 miles.

OWNERSHIP: Private except for Youbedamn Landing which is municipally owned.

FLOOD HAZARD: Low, noncritical.

WATER QUALITY: No data.

BEACH QUALITY: Poor to fair. As with Segment 3, most of the beach is too narrow and thin to support recreational use. The only area that may have some potential is the beach on the Potomac River side of Youbedamn Landing. It is a medium size beach that has been built up by the use of groins.

SHORE EROSION SITUATION

EROSION RATE: The VIMS Historical Survey offers no information of this area. However, moderate to severe erosion is estimated due to the number of trees that have fallen into the river and the major slumping of the cliffs along the river. This could be critical to many homes, especially those at and around Marlboro Point.

ENDANGERED STRUCTURES: Several houses around Marlboro Point are endangered.

SHORE PROTECTIVE STRUCTURES: There is a small groinfield on the Aquia Creek side of Youbedamn Landing which is totally ineffective. Groins on the Potomac River side have been effective in building up a fair beach. Near Marlboro Point, in the residential area, groinfields have been constructed but have not prevented the massive erosion along the Potomac River.

Suggested Action: None. Extensive, major structures would be necessary to deter the erosion. Such action may not be economically justifiable.

POTENTIAL USE ENHANCEMENT: Low. The extensive erosion and lack of boating facilities is detrimental to the potential.

MAPS: USGS, 7.5 Min.Ser. (Topo.), PASSAPATANZY, Va. - Md. Quadr., 1966.
USGS, 7.5 Min.Ser. (Topo.), WIDEWATER, Va. - Md. Quadr., 1966.
C&GS, #559, 1:40,000 scale, POTOMAC RIVER, Lower Cedar Point to Mattawoman Creek, 1971.
C&GS, #101SC, 1:40,000 scale, POTOMAC RIVER, 1973.

PHOTOS: Aerial-VIMS 2Nov73 ST-4/69-86.

POTOMAC CREEK, STAFFORD COUNTY, VIRGINIA

SEGMENT 5 (Map 6)

EXTENT: 88,800 feet (16.8 mi.) of shoreline from Marlboro Point to the Stafford - King George County line, including Accokeek Creek.

SHORELANDS TYPE

FASTLAND: Low shore 10% (8,800 ft.), moderately low shore 55% (55,600 ft.), moderately high shore 5% (5,000 ft.), and high shore 30% (27,600 ft.). From Marlboro Point to Indian Point the shore is moderately low. Accokeek Creek runs through an embayed marsh system. The fastland to the north and south of this marsh system varies from moderately low to high shore. From Crows Nest Point to Boykins Island the fastland is moderately low. The fastland is generally high from Boykins Island to the throat of the Potomac Creek. From this point to Black Swamp the fastland is nearly all moderately low shore with the exception of a few scattered spots of low shore.

SHORE: Fringe marsh 47% (42,000 ft.), embayed marsh 32% (28,400 ft.), extensive marsh 12% (10,200 ft.), beach 5% (4,200 ft.), and artificially stabilized 4% (4,000 ft.). Almost the entire length of shoreline is fringing marsh. Embayed marsh is found along almost all of Accokeek Creek and at the head of the Potomac Creek. One area of extensive marsh, Big Marsh, exists between Spillmans Landing and Old Landing Point. The beach and artificially stabilized areas are found between Marlboro and Indian Point at the mouth of the Potomac Creek. CREEK: Narrow. Water depth in both the Potomac Creek and Accokeek Creek is usually less than 12 feet.

SHORELANDS USE

FASTLAND: Unmanaged, wooded 80% (74,400 ft.), residential 13% (12,200 ft.), unmanaged, open 5% (4,600 ft.), and recreation/commercial 2% (1,800 ft.). From Marlboro Point to 2,600 feet to the north of Indian Point is residential. Accokeek Creek is marshland backed by unmanaged, wooded land. There are two small areas of residential use on the north shore of Accokeek. Crows Nest Point at the throat of the Potomac is primarily unmanaged, wooded. From the throat to Black Swamp the fastland varies between

unmanaged, wooded and open. There is one yacht club and marina at Old Landing Point.

SHORE: Mostly unused, some recreation.

CREEK: Boating and fishing.

WIND AND SEA EXPOSURE: The mouth of the Potomac Creek lies in a N - S direction. The fetch from the east is 4.5 miles.

OWNERSHIP: Private.

FLOOD HAZARD: Low, noncritical for most areas. High, noncritical in the low areas on the south side of the creek and in marsh areas.

WATER QUALITY: No data.

BEACH QUALITY: Poor. There is very little beach in this segment. The only beaches that do exist are found in several spots along Accokeek Creek and between Marlboro Point and Indian Point. These beaches are narrow and thin.

SHORE EROSION SITUATION

EROSION RATE: Slight to none, noncritical. Most of the erosion seems to be confined to the area around the mouth of the Potomac Creek. ENDANGERED STRUCTURES: None. SHORE PROTECTIVE STRUCTURES: On the Potomac Creek side of Marlboro Point a groinfield has successfully established a narrow beach. Toward Indian Point another groinfield has also established a narrow beach. Bulkheading is used near the mouth of Accokeek Creek but that appears to be of only marginal effectiveness.

Suggested Action: None.

OTHER SHORE STRUCTURES: There are some piers along the creek and a yacht club with a boat ramp at Old Landing Point.

POTENTIAL USE ENHANCEMENT: Moderate until significant increases in population force the expansion of existing pleasure boat facilities. The rolling, higher fastland of this segment has great potential for a low density residential development and plans have been cast to that end.

MAPS: USGS, 7.5 Min.Ser. (Topo.), PASSAPATANZY, Va. - Md. Quadr., 1966

USGS, 7.5 Min.Ser. (Topo.), FREDERICKSBURG, Va. Quadr., 1966.
C&GS, #559, 1:40,000 scale, POTOMAC RIVER, Lower Cedar Point to Mattawoman Creek, 1971.
C&GS, #101SC, 1:40,000 scale, POTOMAC RIVER, 1973.

PHOTOS: Aerial-VIMS 2Nov73 ST-5/195-247.

RAPPAHANNOCK RIVER, STAFFORD COUNTY, VIRGINIA
SEGMENT 6 (Maps 7 and 8)

EXTENT: 62,800 feet (11.8 mi.) of the northeast bank of the Rappahannock River, below the fall line.

SHORELANDS TYPE

FASTLAND: Moderately high shore 44% (27,600 ft.), high shore with bluff 29% (18,200 ft.), high shore 18% (11,000 ft.), moderately high shore with bluff 5% (3,200 ft.), and moderately low shore 4% (2,800 ft.).

SHORE: Almost the entire length of the segment is bordered by fringe marsh with occasional areas of embayed marsh.

RIVER: Narrow.

SHORELANDS USE

FASTLAND: Agricultural 41% (26,000 ft.), unmanaged, wooded 26% (16,400 ft.), unmanaged, open 11% (7,000 ft.), commercial 9% (5,400 ft.), residential 8% (5,200 ft.), and governmental 5% (2,800 ft.). Most of the shoreline varies from agricultural to unmanaged, wooded and open. The residential areas are Tylerton and Chatham Heights. A military park is found fronting a portion of Chatham Heights. The commercial areas are the gravel pits found just south of Tylerton.

SHORE: Mostly unused.

RIVER: Some boating and fishing.

OWNERSHIP: Private.

FLOOD HAZARD: Low, noncritical for most areas. Moderate to high, noncritical in the low shore areas in the meanders.

WATER QUALITY: Intermediate.

BEACH QUALITY: Poor.

SHORE EROSION SITUATION

EROSION RATE: Slight to none, noncritical.

ENDANGERED STRUCTURES: None.

SHORE PROTECTIVE STRUCTURES: None.

Suggested Action: None.

POTENTIAL USE ENHANCEMENT: Low. Most shoreline pressure in Stafford County probably will be directed at the Potomac River areas with its greater number of creeks and broader river.

MAPS: USGS, 7.5 Min.Ser. (Topo.), FREDERICKSBURG, Va. Quadr., 1966, photorevised 1971.
USGS, 7.5 Min.Ser. (Topo.), GUINEA, Va. Quadr., 1966, photorevised 1972.
USGS, 7.5 Min.Ser. (Topo.), RAPPAHANNOCK ACADEMY Quadr., 1969.
C&GS, #559, 1:40,000 scale, POTOMAC RIVER, Lower Cedar Point to Mattawoman Creek, 1971.
C&GS, #101SC, 1:40,000 scale, POTOMAC RIVER, 1973.

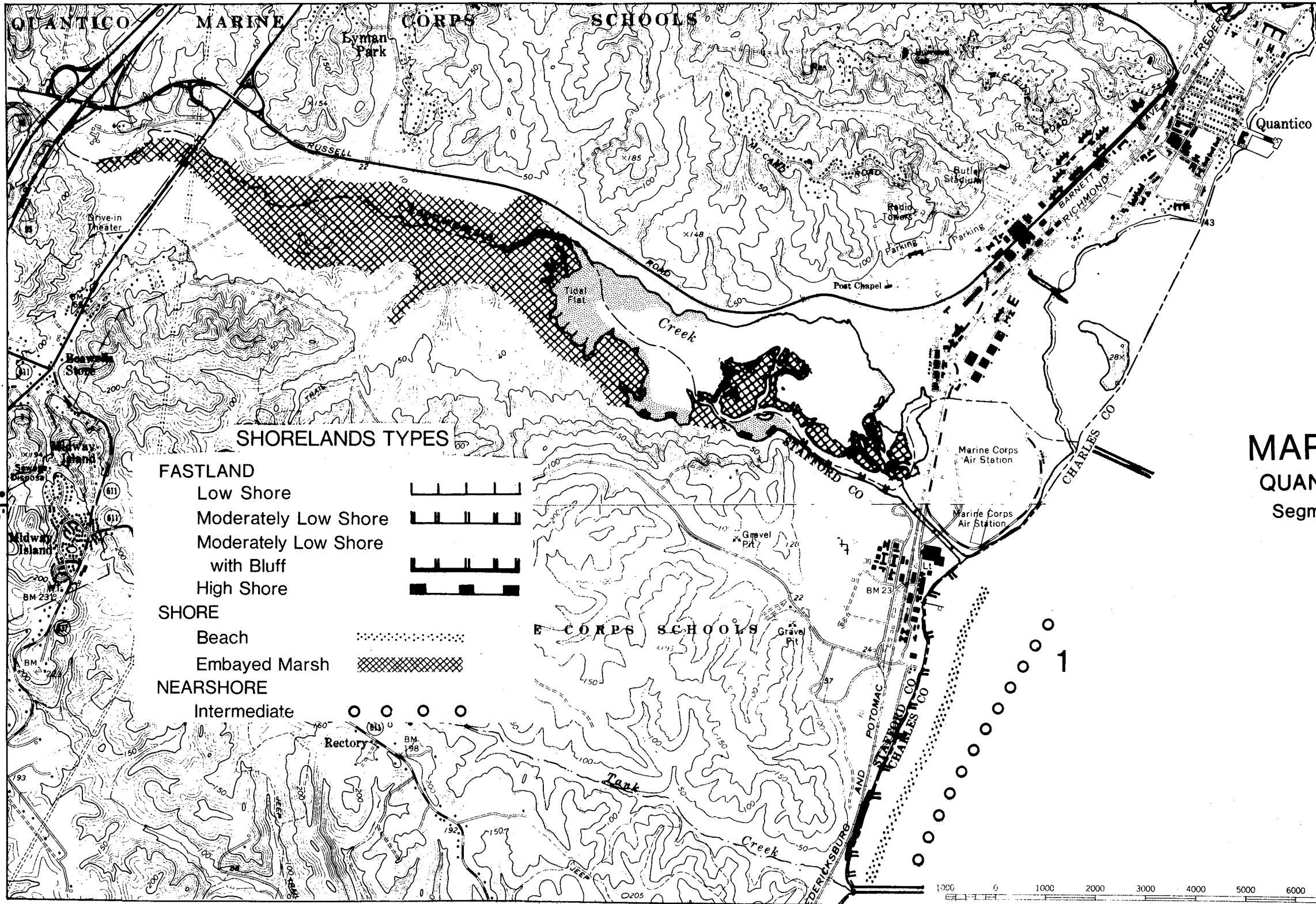
Segment and Subsegment Maps

77° 17' 30"


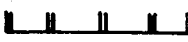


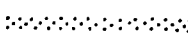


36° 30'

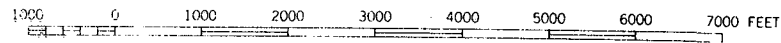
MAP 2B QUANTICO Segment 1

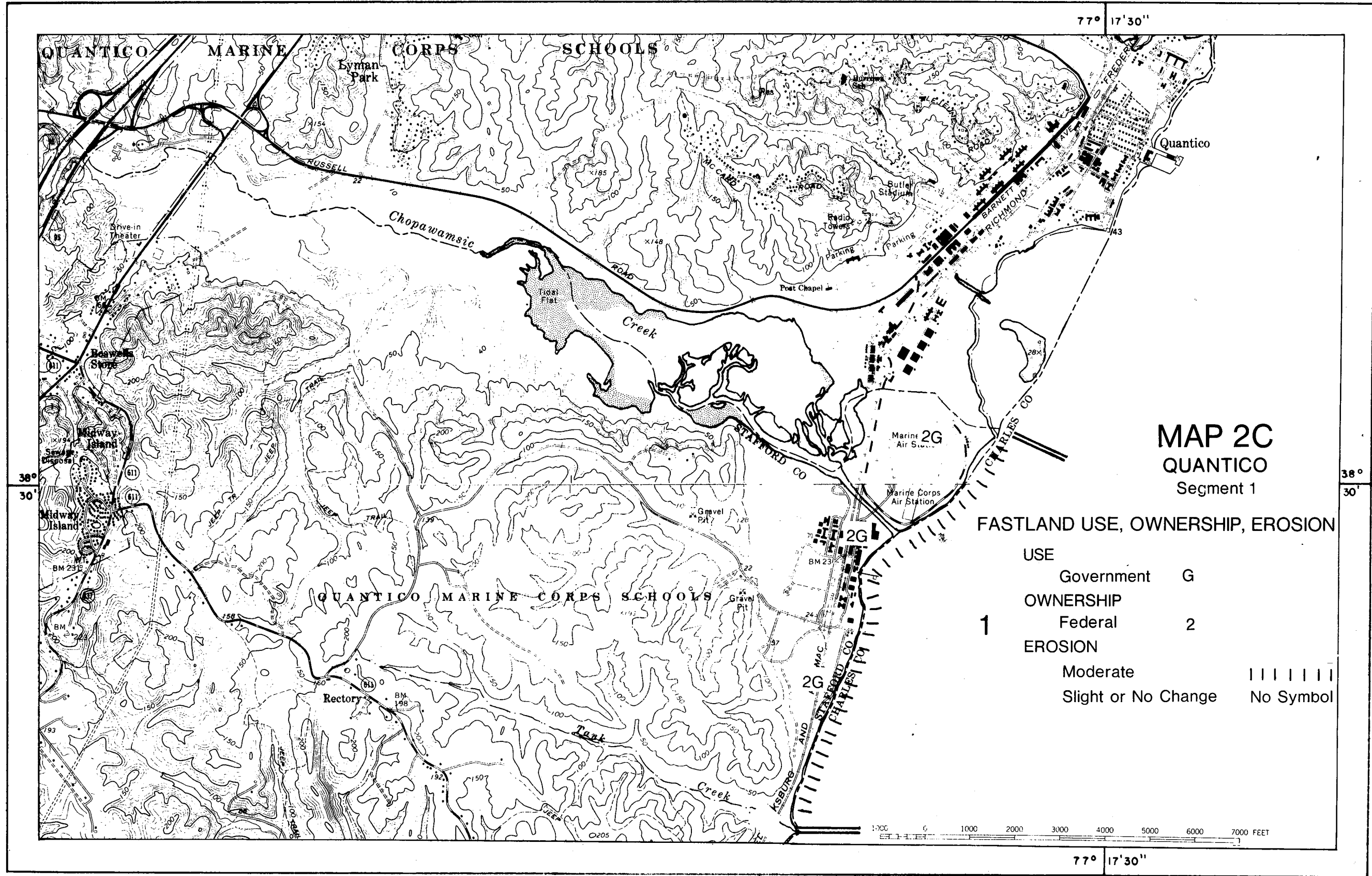
77° 17' 30"



SHORELANDS TYPES

- FASTLAND**
- Low Shore 
- Moderately Low Shore 
- Moderately Low Shore with Bluff 
- High Shore 
- SHORE**
- Beach 
- Embayed Marsh 
- NEARSHORE**
- Intermediate 

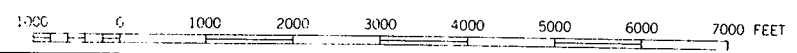




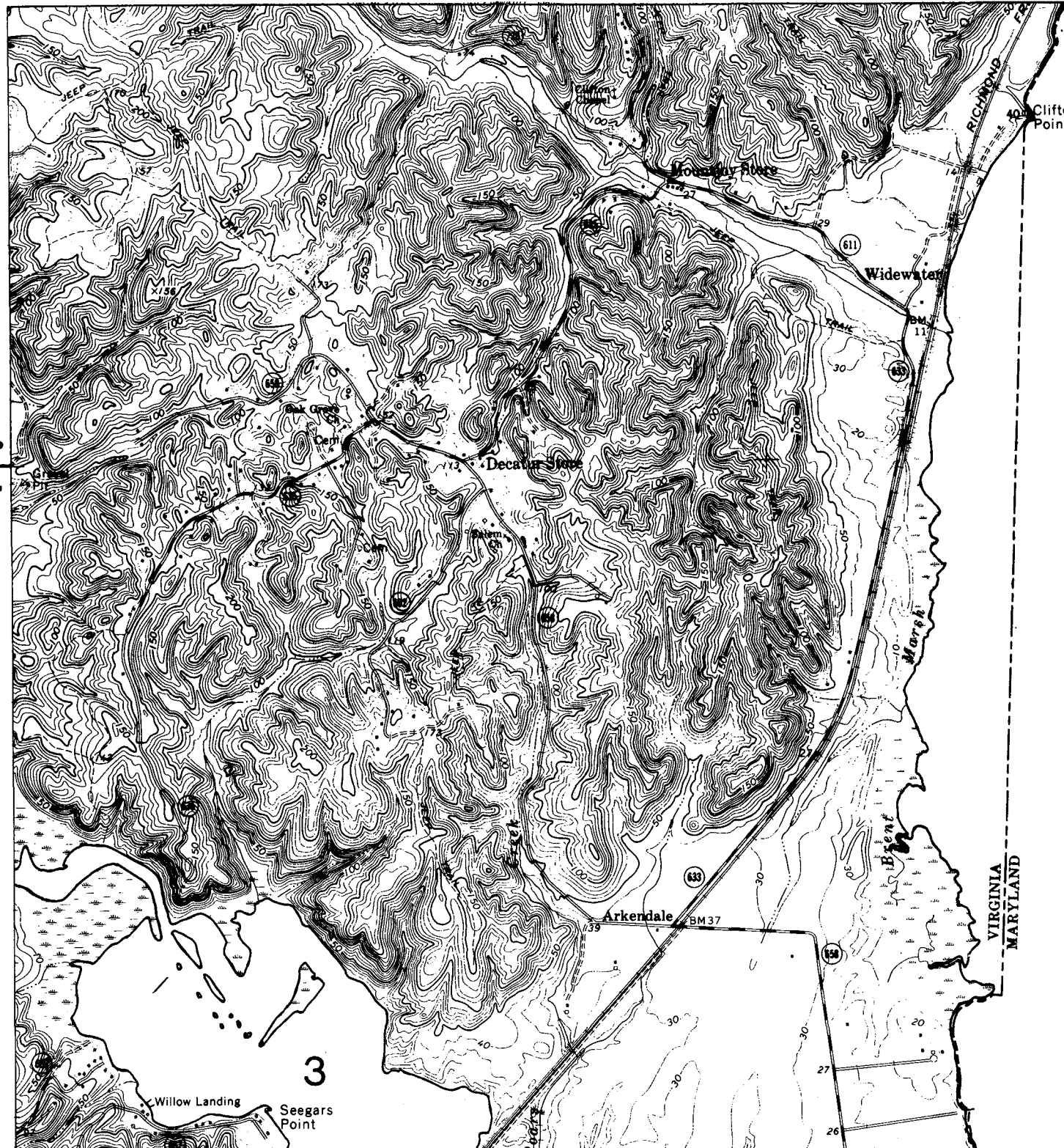
MAP 2C
QUANTICO
 Segment 1

FASTLAND USE, OWNERSHIP, EROSION

USE		
Government	G	
OWNERSHIP		
Federal	2	
EROSION		
Moderate		
Slight or No Change	No Symbol	



77° 17' 30"

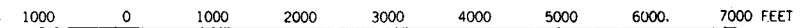


MAP 3A
BRENT MARSH-
MIDDLE AQUIA CREEK
 Segments 2, 3 (partial)
TOPOGRAPHY AND CULTURE
 // = Segment Boundary

38°
27'
30"

38°
27'
30"









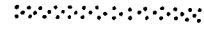





2



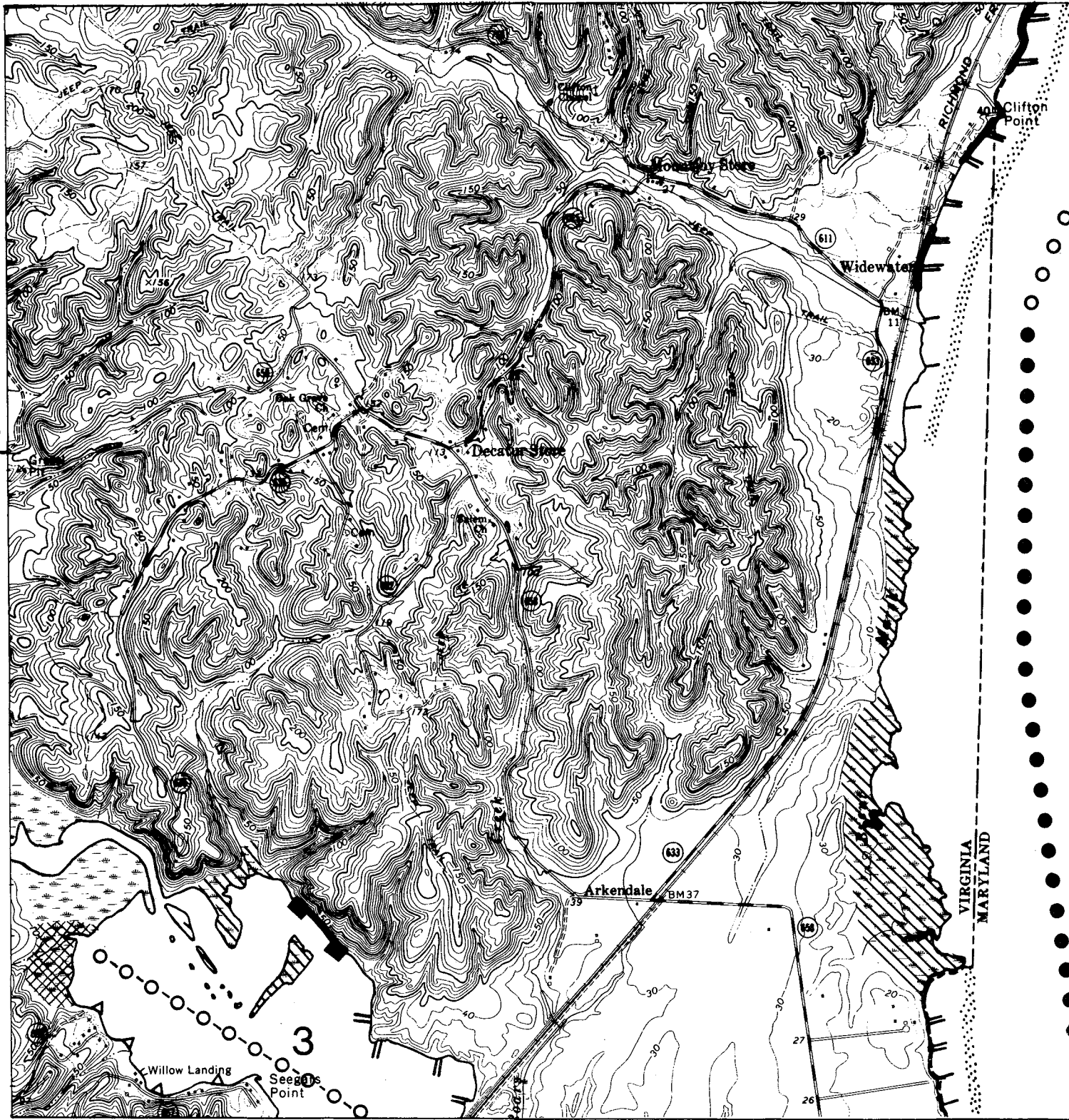
77° 17' 30"

77° 17' 30"

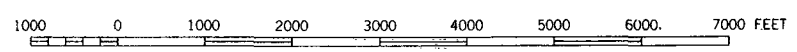
MAP 3B
BRENT MARSH-
MIDDLE AQUIA CREEK
 Segments 2, 3 (partial)
SHORELANDS TYPES

- FASTLAND**
- Low Shore 
 - Low Shore with Bluff 
 - Moderately Low Shore 
 - Moderately Low Shore with Bluff 
 - Moderately High Shore 
 - Moderately High Shore with Bluff 
 - High Shore 
 - High Shore with Bluff 
- SHORE**
- Beach 
 - Extensive Marsh 
 - Embayed Marsh 
- NEARSHORE**
- Intermediate 
 - Wide 
 - Narrow 

30°
27'
30"



30°
27'
30"



77° 17' 30"

77° 17' 30"

MAP 3C

BRENT MARSH- MIDDLE AQUIA CREEK

Segments 2, 3 (partial)

FASTLAND USE, OWNERSHIP, EROSION

USE

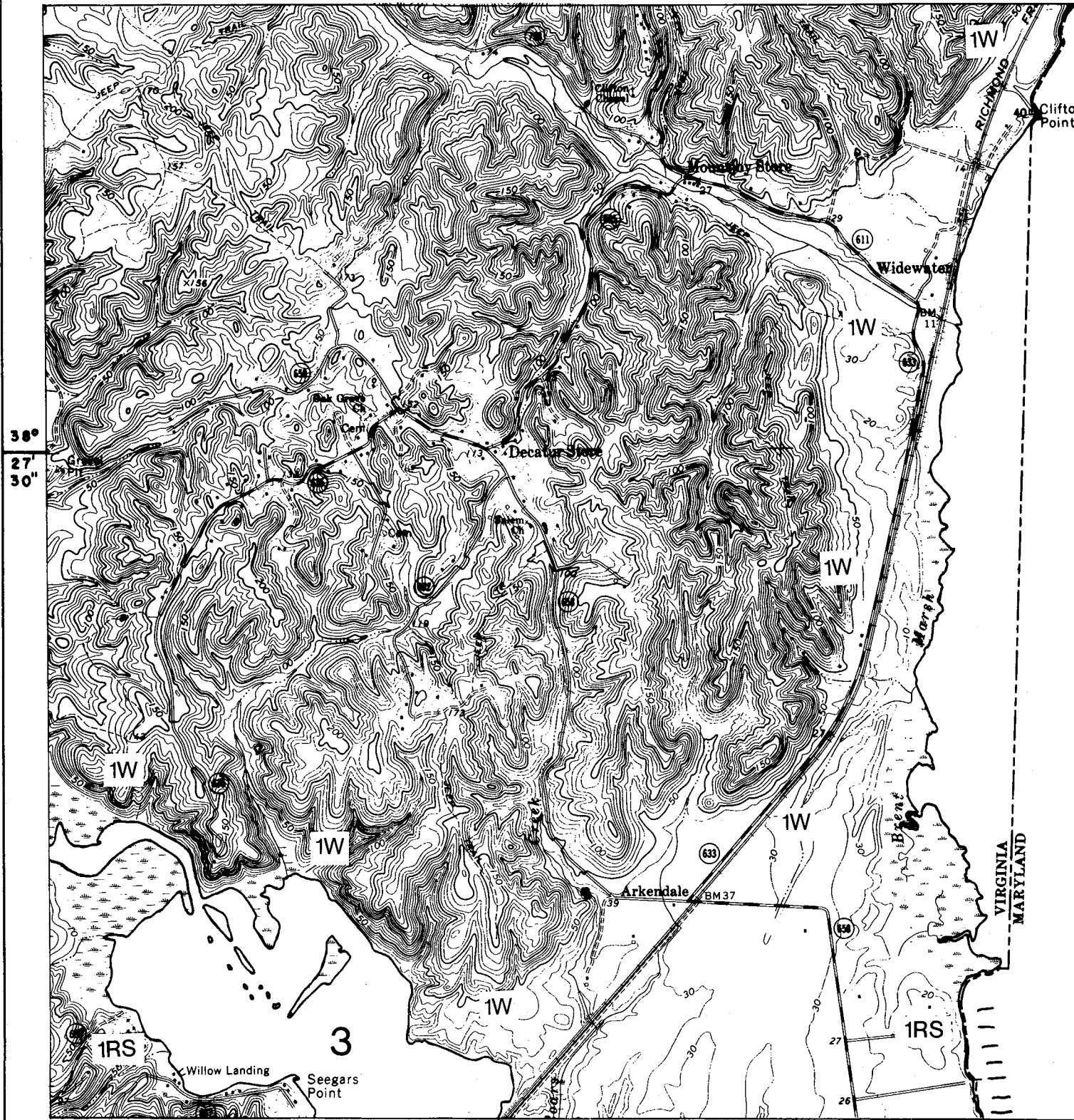
- Residential RS
- Unmanaged Unwooded U
- Wooded W

OWNERSHIP

- Private 1

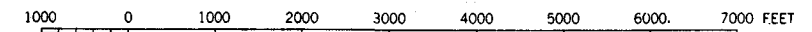
EROSION

- Moderate ||| ||| |||
- Slight or No Change. No Symbol



38°
27'
30"

38°
27'
30"



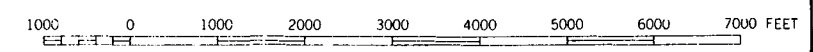
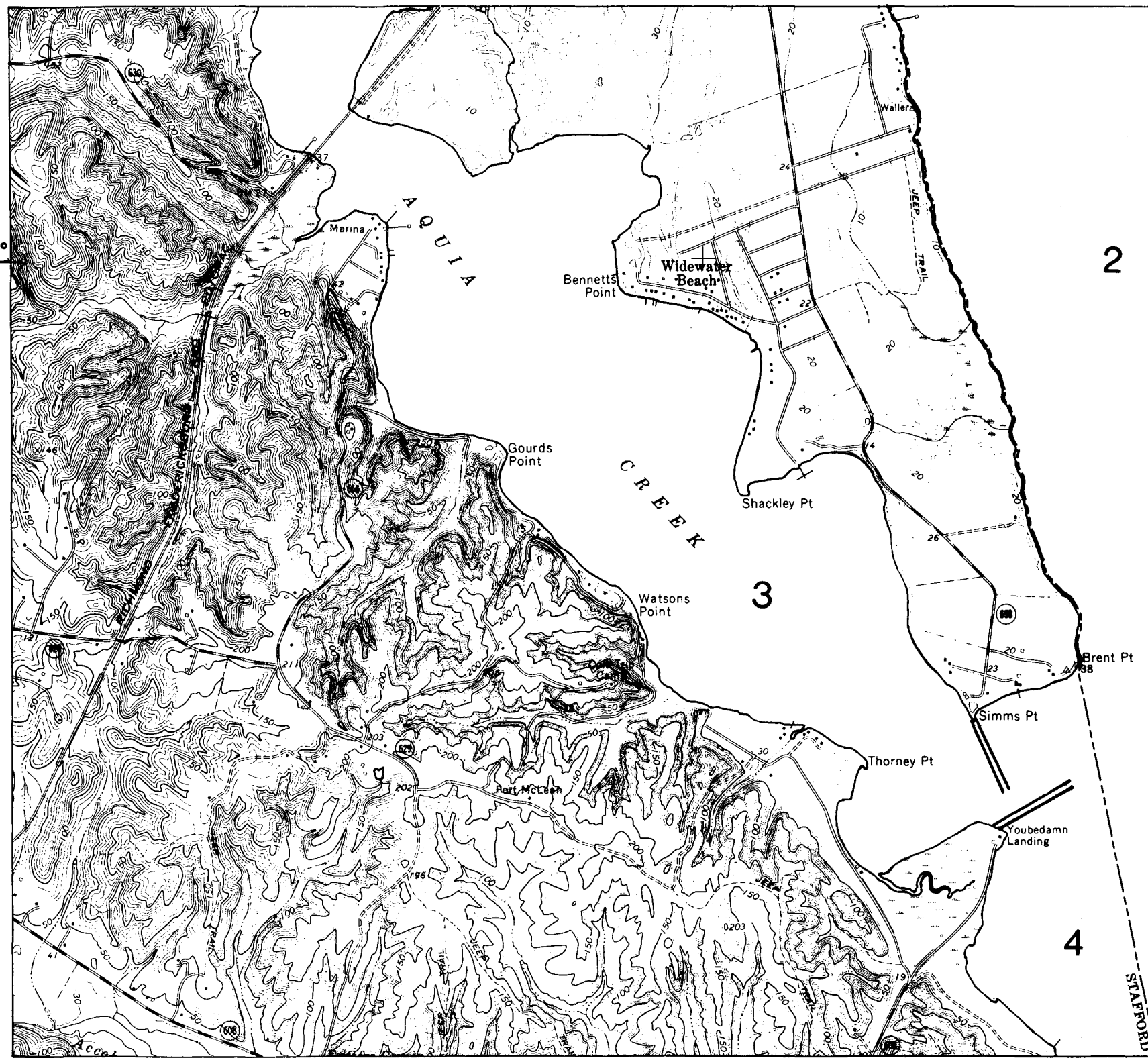
77° 17' 30"

77° 17' 30"

38° 25'

38° 25'

MAP 4A
BRENT POINT-
LOWER AQUIA CREEK
 Segments 2, 3 (partial)
TOPOGRAPHY AND CULTURE
 // = Segment Boundary



77° 17' 30"















77° 17' 30"

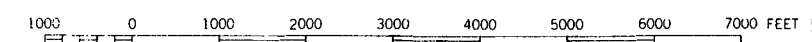
MAP 4B

BRENT POINT- LOWER AQUIA CREEK

Segments 2, 3 (partial)

SHORELANDS TYPES

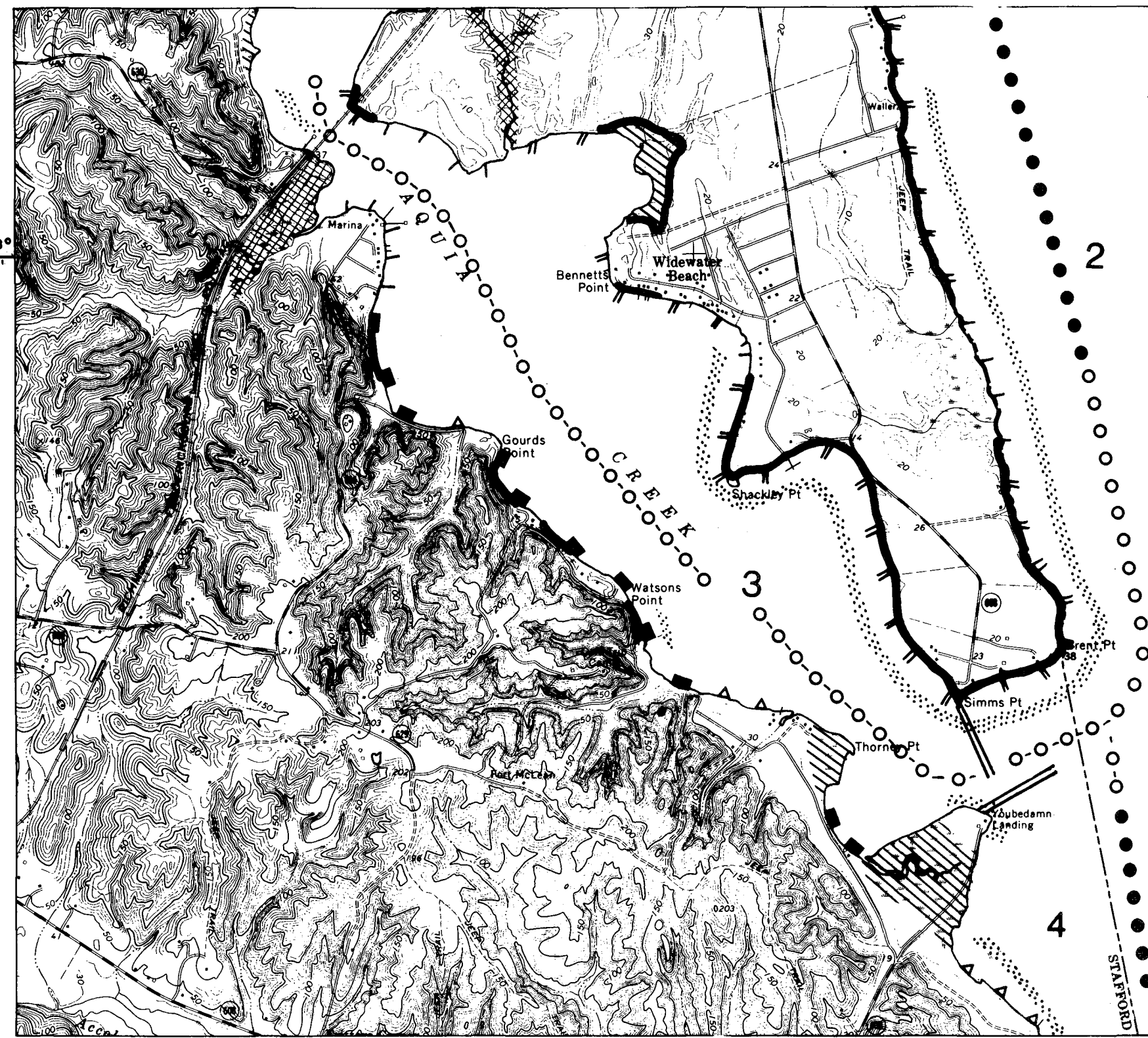
- FASTLAND**
- Low Shore 
 - Low Shore with Bluff 
 - Moderately Low Shore 
 - Moderately Low Shore with Bluff 
 - Moderately High Shore 
 - High Shore 
 - High Shore with Bluff 
- SHORE**
- Beach 
 - Fringe Marsh 
 - Extensive Marsh 
 - Embayed Marsh 
- NEARSHORE**
- Narrow 
 - Intermediate 
 - Wide 



77° 17' 30"

38° 25'

38° 25'



77° 17' 30"

38° 25'

38° 25'

MAP 4C

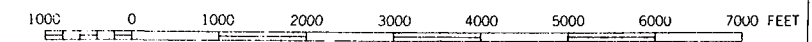
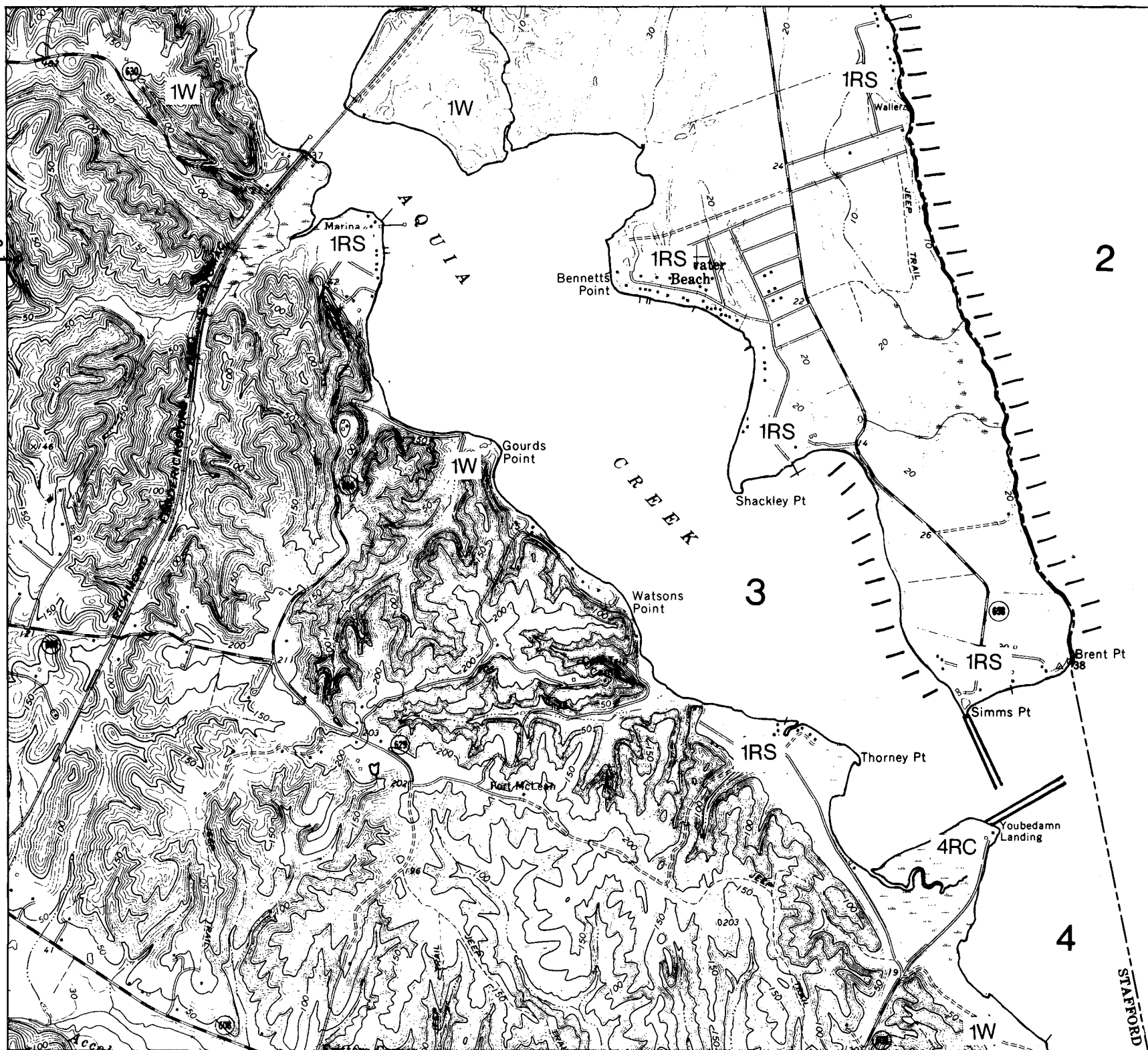
BRENT POINT- LOWER AQUIA CREEK Segments 2, 3 (partial)

FASTLAND USE, OWNERSHIP, EROSION

USE	
Recreational	RC
Residential	RS
Unmanaged	
Unwooded	U
Wooded	W

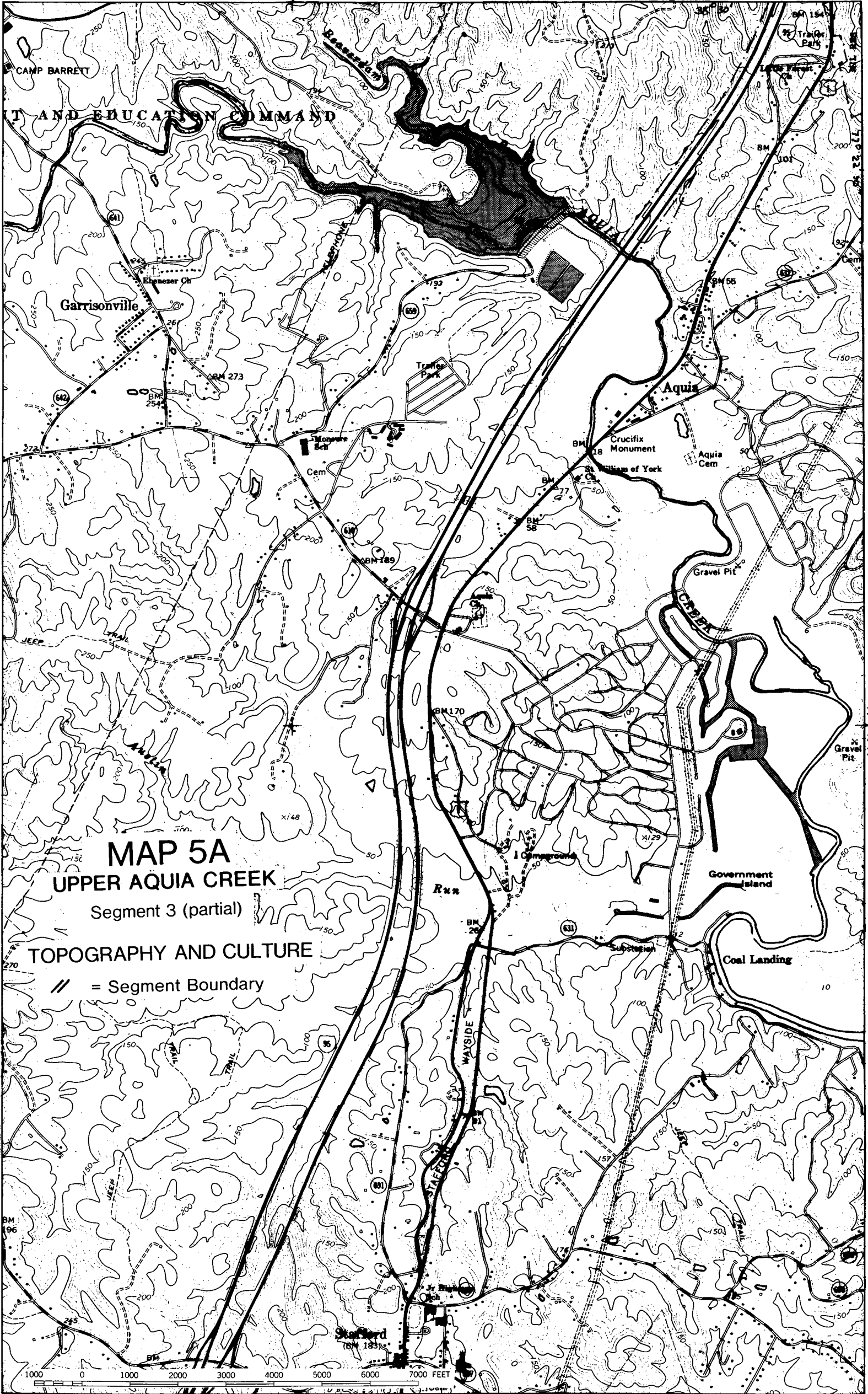
OWNERSHIP	
Private	1
County	4

EROSION	
Moderate	
Slight or No Change	No Symbol



77° 17' 30"

77° 25'



T AND EDUCATION COMMAND

Garrisonville

Aquia

MAP 5A
UPPER AQUIA CREEK

Segment 3 (partial)

TOPOGRAPHY AND CULTURE

// = Segment Boundary

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

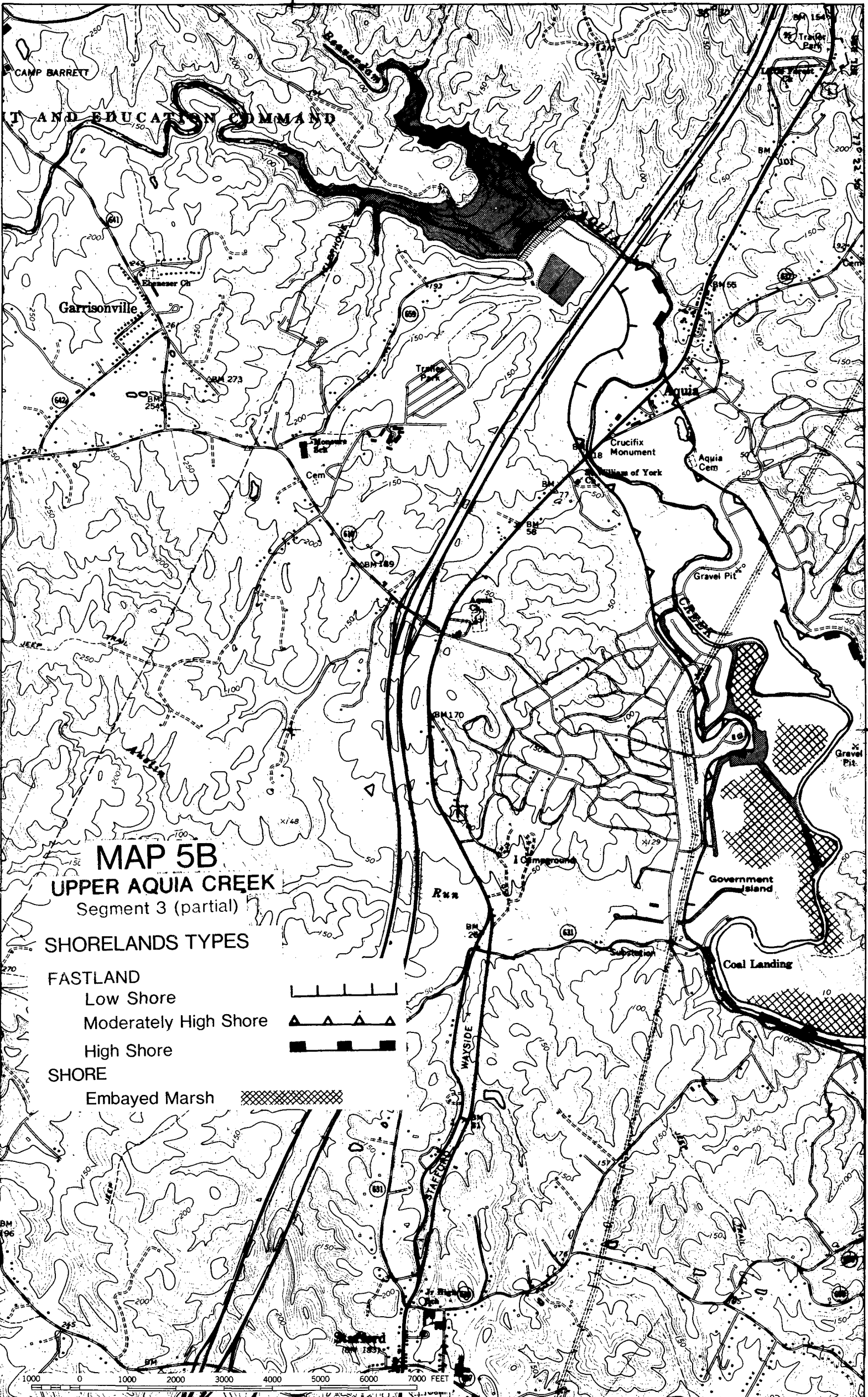
77° 25'

41

38°
27'
30"

38°
27'
30"

77° 25'



CAMP BARRETT
T AND EDUCATION COMMAND

Garrisonville

Aquia

Crucifix Monument

William of York

Aquia Cem

Gravel Pit

Government Island

Coal Landing

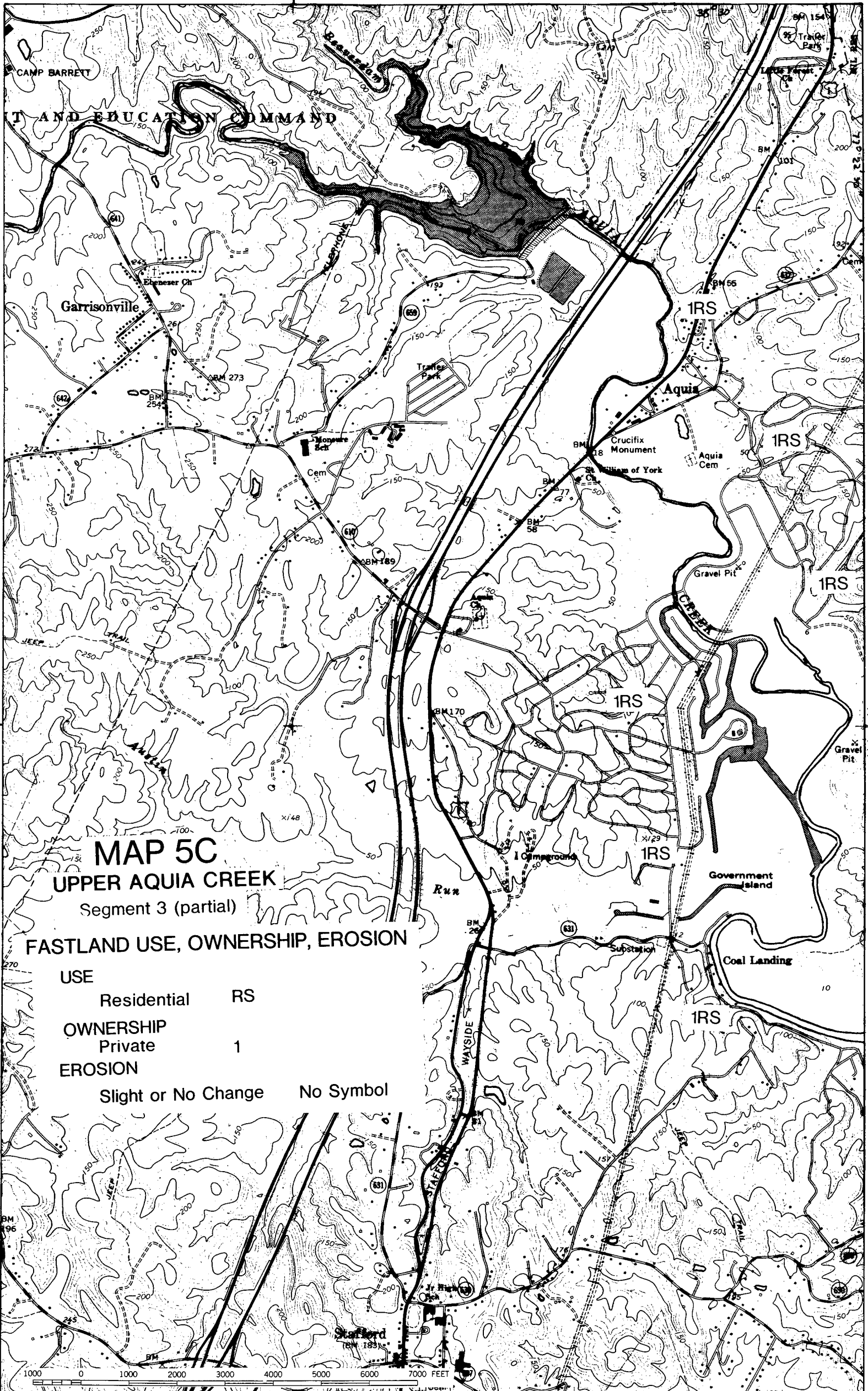
Stafford

38°
27'
30"

38°
27'
30"

77° 25'

77° 25'



CAMP BARRETT
T AND EDUCATION COMMAND

Garrisonville

IRS

Aquia

IRS

IRS

IRS

IRS

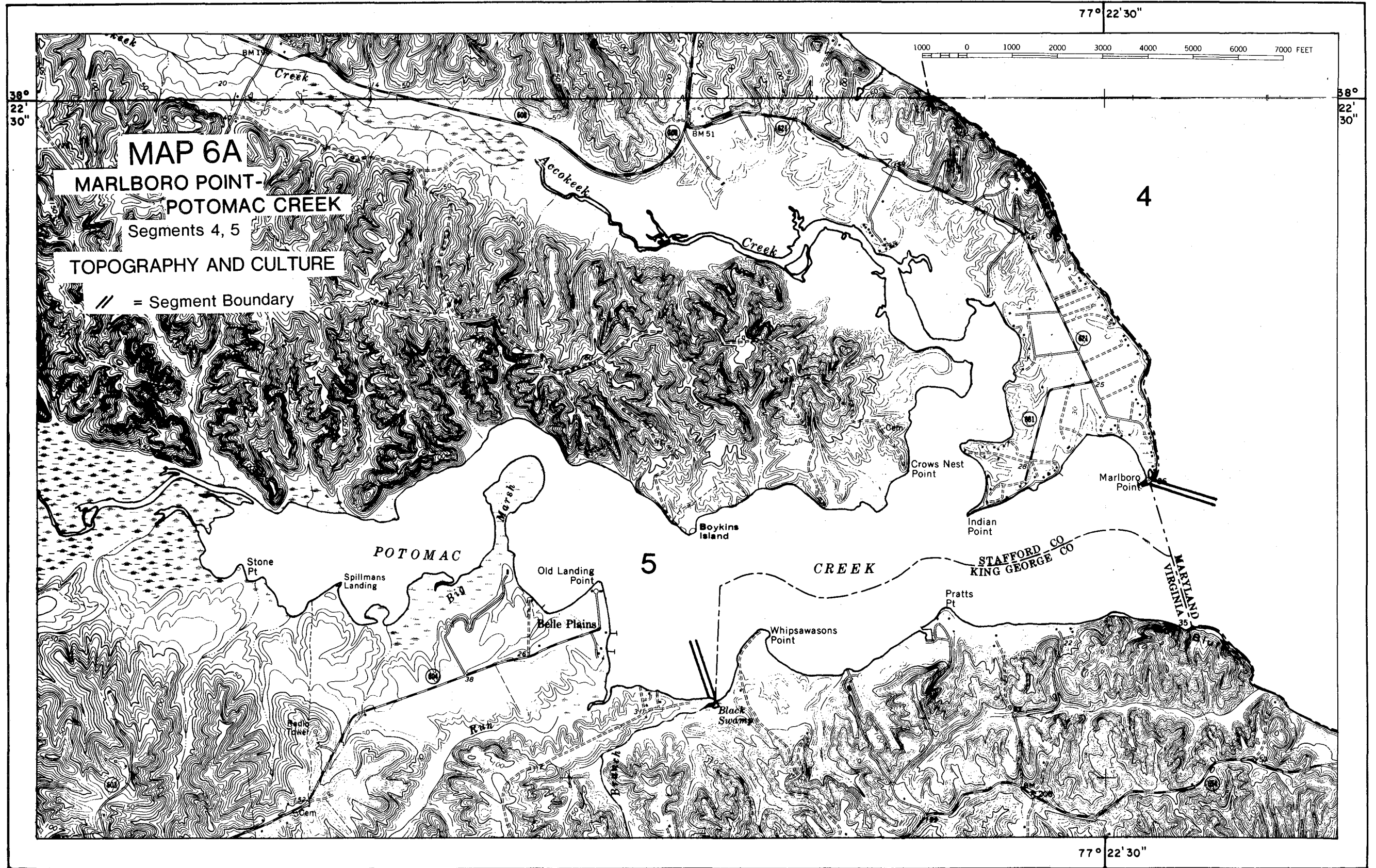
IRS

38°
27'
30"

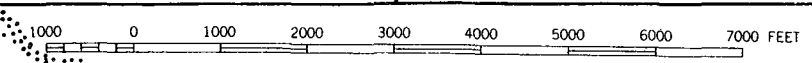
38°
27'
30"

43

77° 25'



77° 22' 30"



38° 22' 30"

38° 22' 30"

MAP 6B MARLBORO POINT- POTOMAC CREEK

Segments 4, 5

SHORELANDS TYPES

FASTLAND

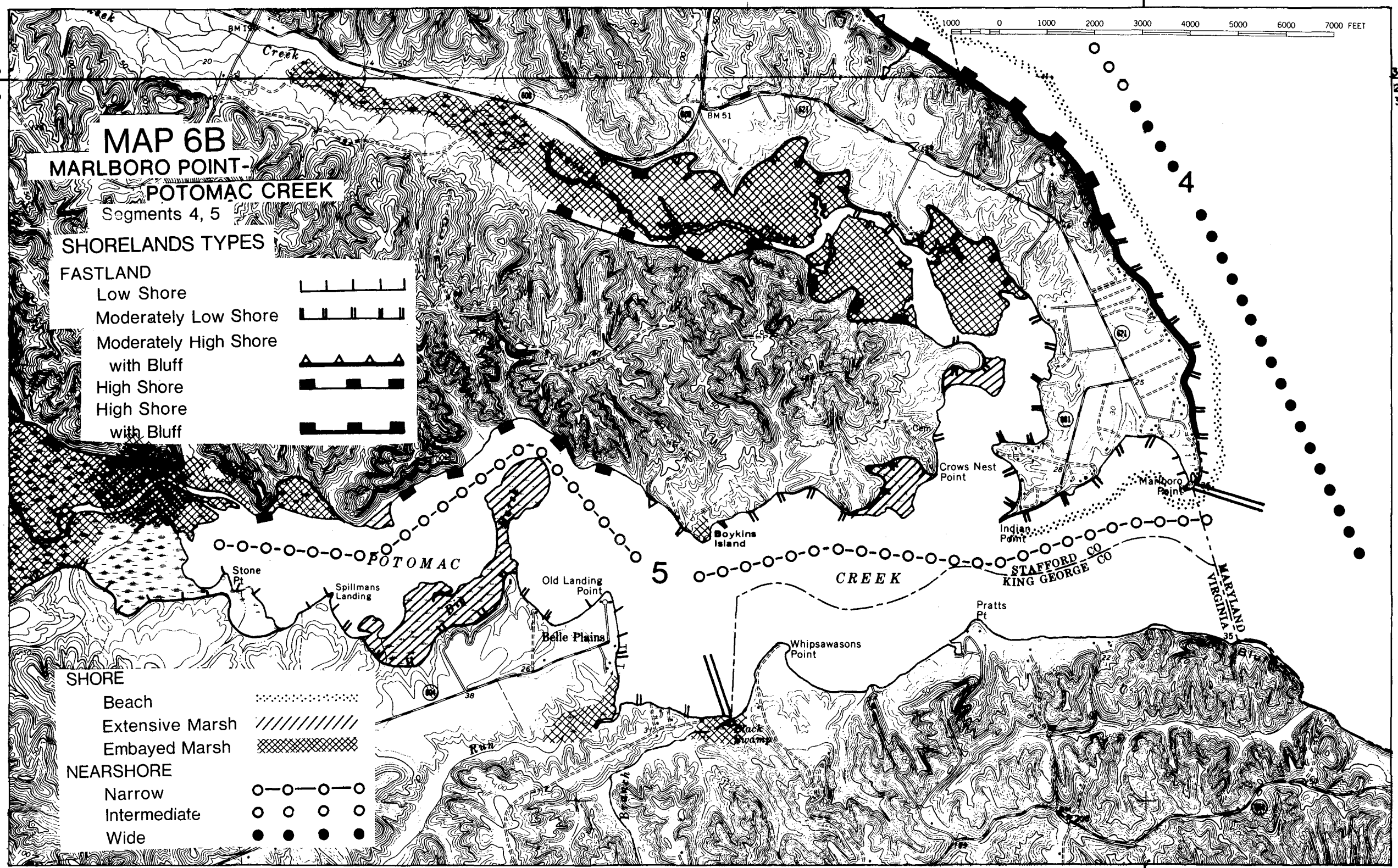
- Low Shore
- Moderately Low Shore
- Moderately High Shore with Bluff
- High Shore
- High Shore with Bluff

SHORE

- Beach
- Extensive Marsh
- Embayed Marsh

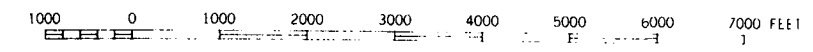
NEARSHORE

- Narrow
- Intermediate
- Wide



77° 22' 30"

77° 22' 30"



38° 22' 30"

38° 22' 30"

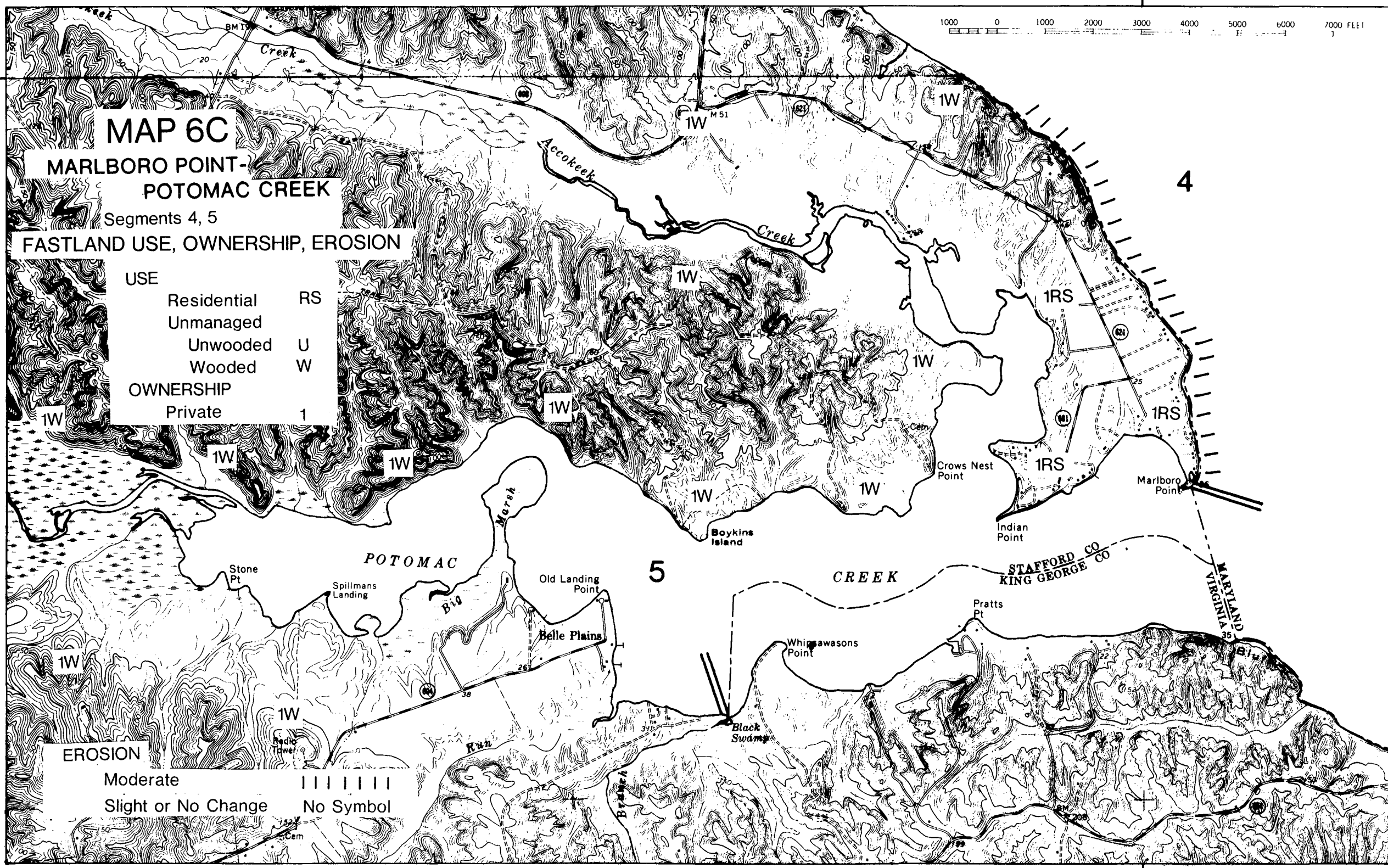
MAP 6C

MARLBORO POINT - POTOMAC CREEK

Segments 4, 5

FASTLAND USE, OWNERSHIP, EROSION

USE	
Residential Unmanaged	RS
Unwooded	U
Wooded	W
OWNERSHIP	
Private	1



EROSION

Moderate	
Slight or No Change	No Symbol

77° 22' 30"

77° 22' 30"

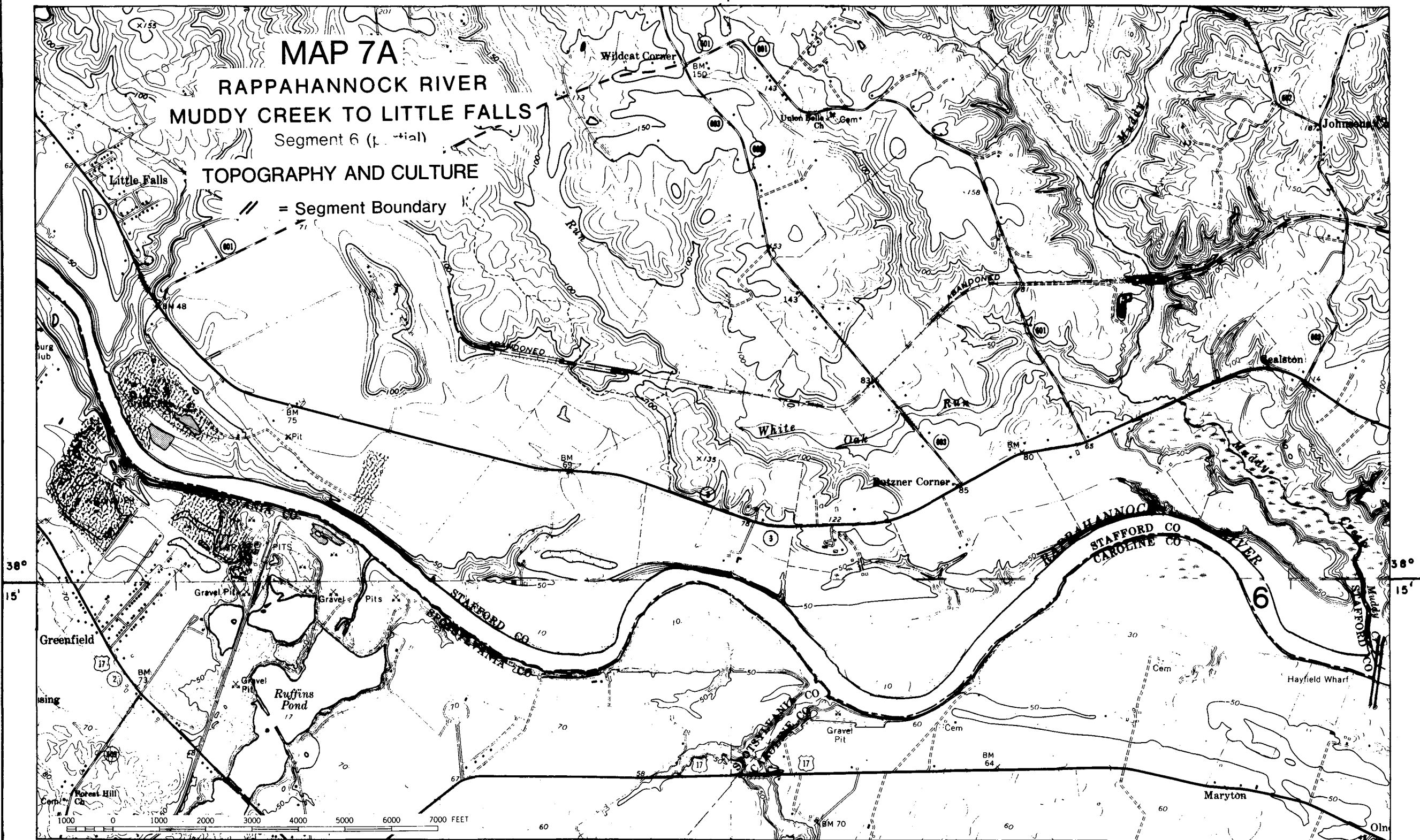
MAP 7A

RAPPAHANNOCK RIVER MUDDY CREEK TO LITTLE FALLS

Segment 6 (partial)

TOPOGRAPHY AND CULTURE

// = Segment Boundary



38°

15'

38°

15'

77° 22' 30"

77° 22' 30"

MAP 7B

RAPPAHANNOCK RIVER

MUDDY CREEK TO LITTLE FALLS

Segment 6 (partial)

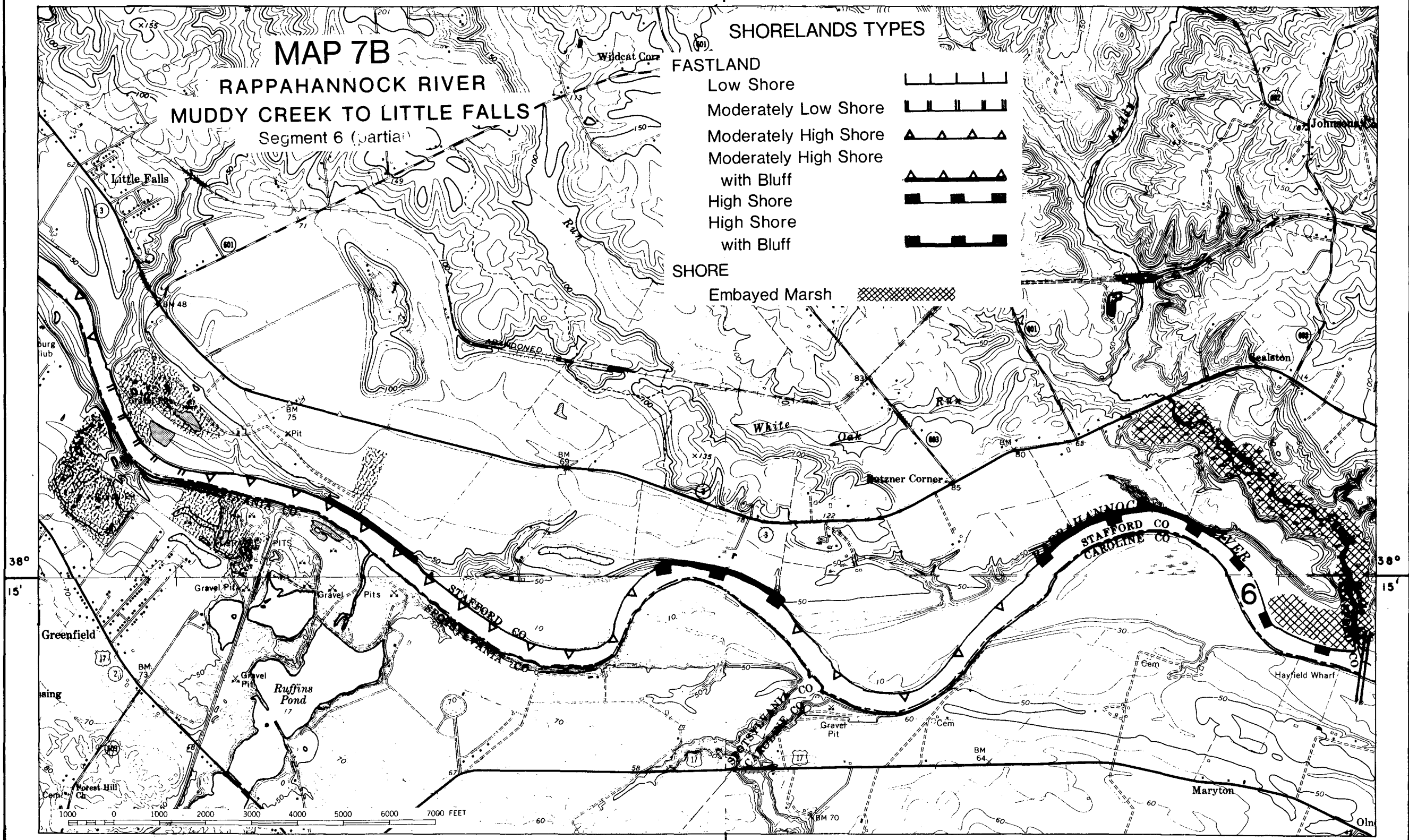
SHORELANDS TYPES

FASTLAND

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

SHORE

- Embayed Marsh



77° 22' 30"

77° 22' 30"

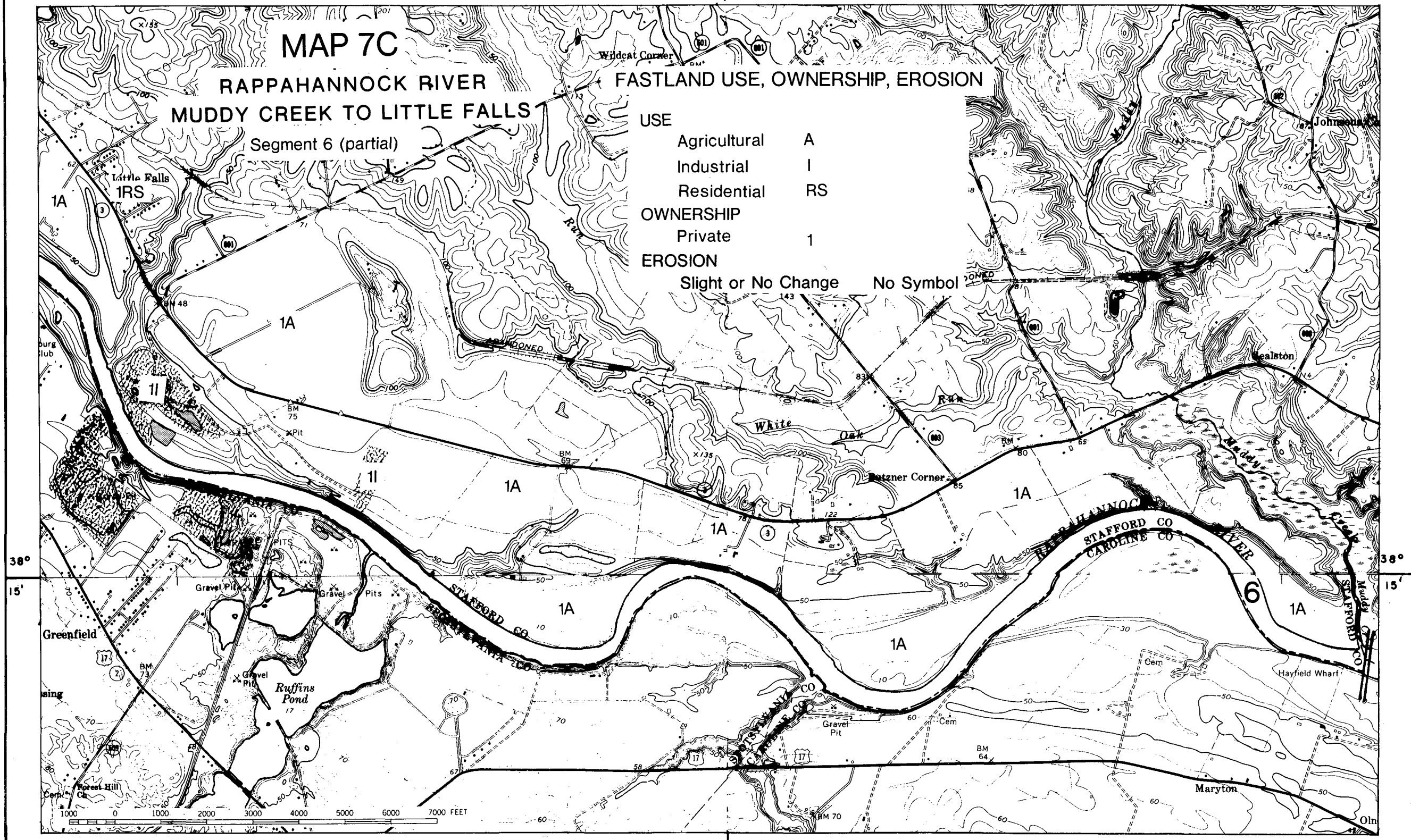
MAP 7C

RAPPAHANNOCK RIVER MUDDY CREEK TO LITTLE FALLS

FASTLAND USE, OWNERSHIP, EROSION

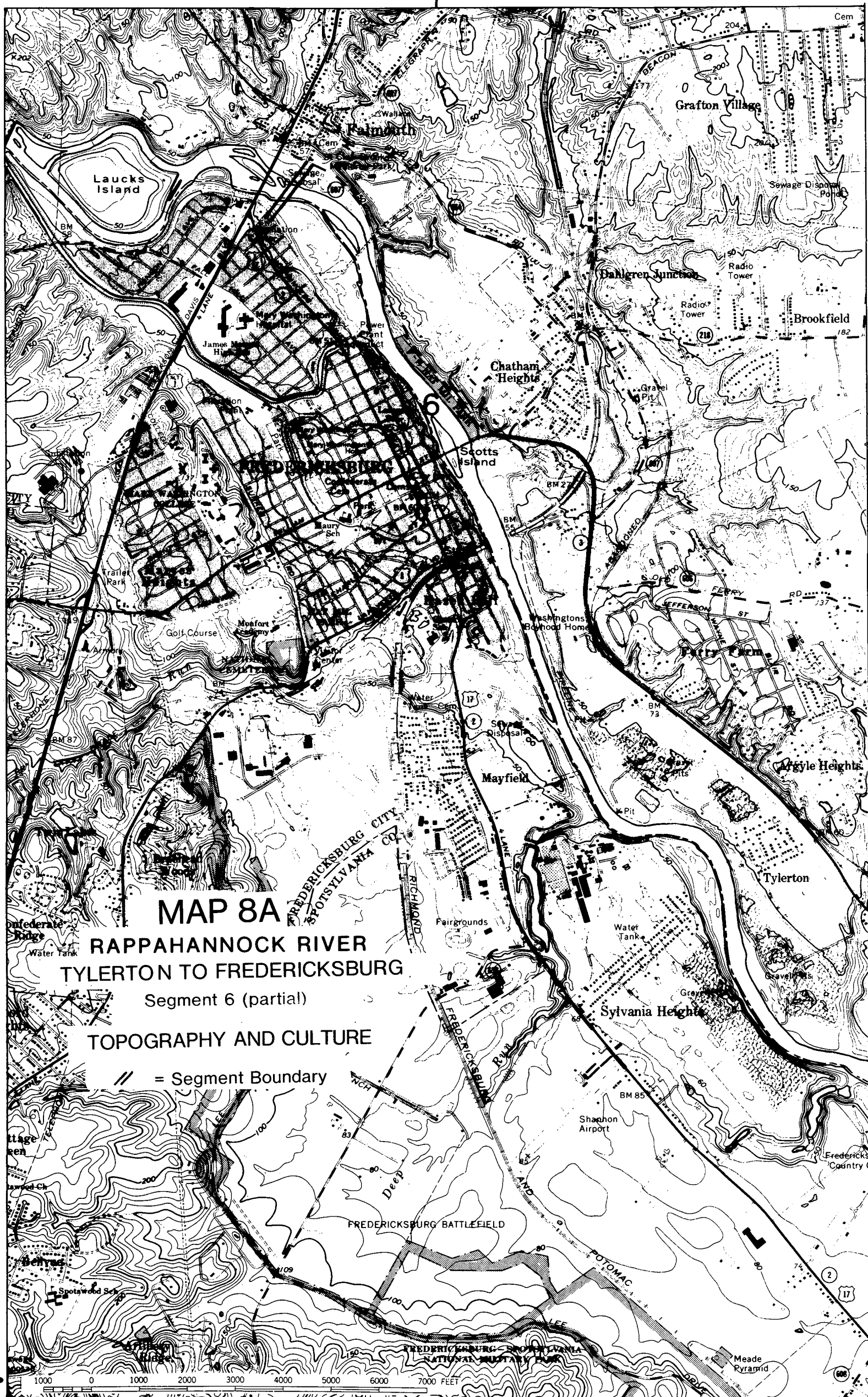
Segment 6 (partial)

- USE
- Agricultural A
 - Industrial I
 - Residential RS
- OWNERSHIP
- Private 1
- EROSION
- Slight or No Change
 - No Symbol



77° 22' 30"

77° 27' 30"



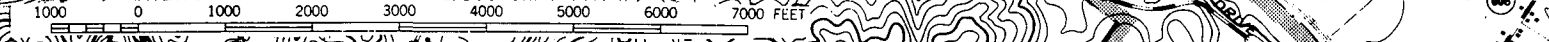
MAP 8A

RAPPAHANNOCK RIVER TYLERTON TO FREDERICKSBURG

Segment 6 (partial)

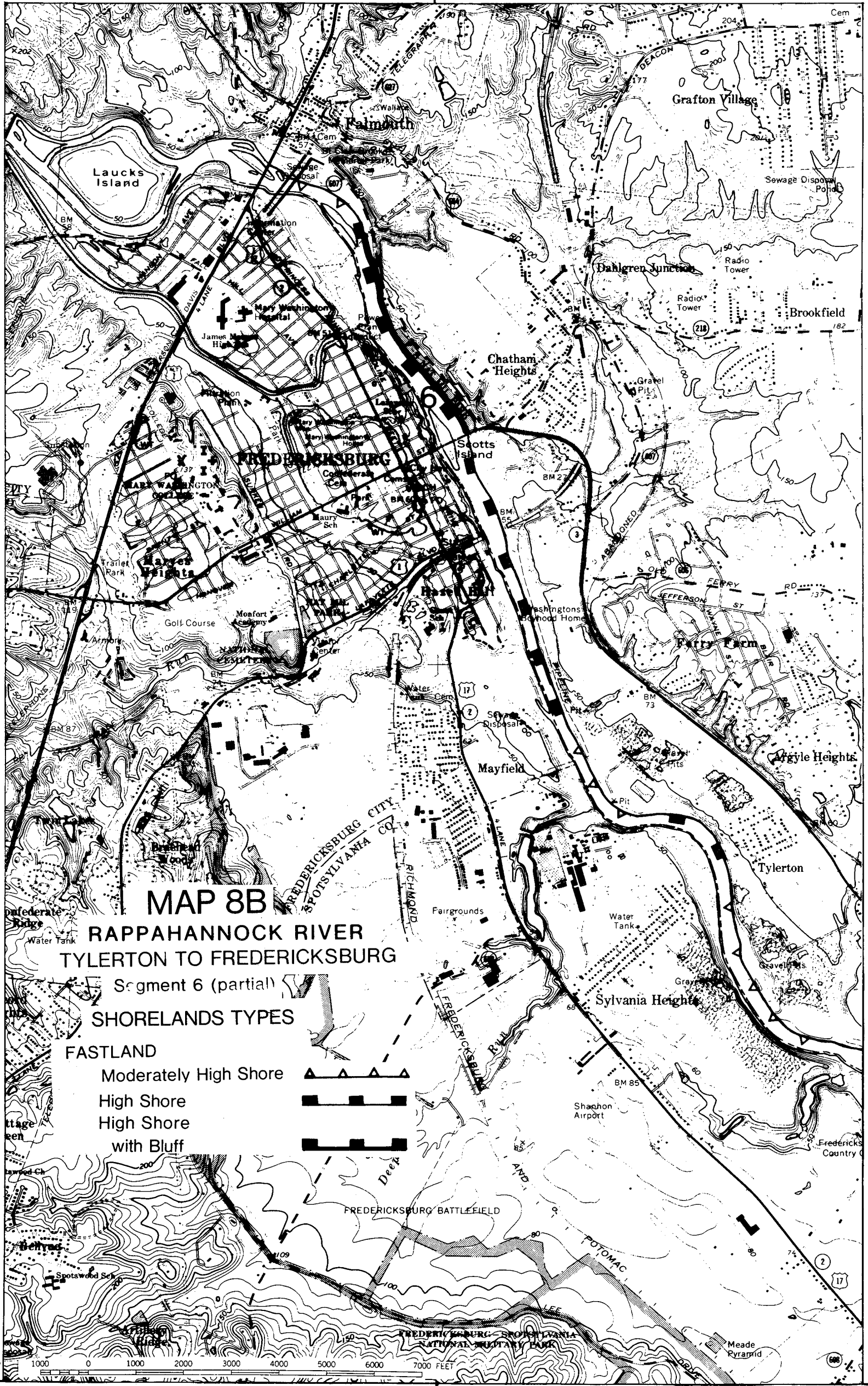
TOPOGRAPHY AND CULTURE

// = Segment Boundary



77° 27' 30"

77° 27' 30"



MAP 8B

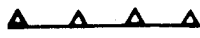
RAPPAHANNOCK RIVER TYLERTON TO FREDERICKSBURG

Segment 6 (partial)

SHORELANDS TYPES

FASTLAND

Moderately High Shore



High Shore



High Shore
with Bluff



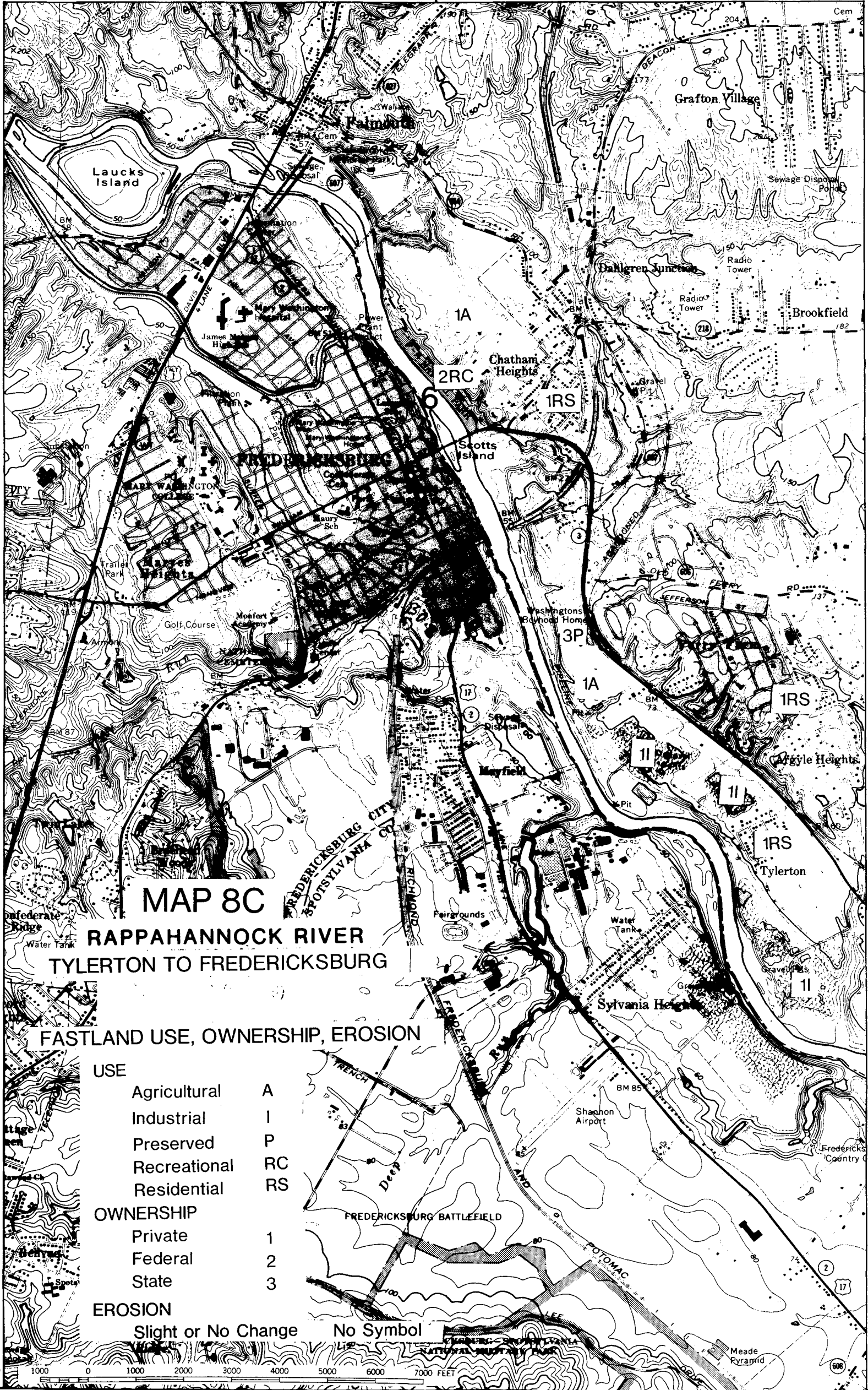
FREDERICKSBURG BATTLEFIELD

FREDERICKSBURG - SPOTSYLVANIA
NATIONAL MILITARY PARK

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

77° 27' 30"

77° 27' 30"



MAP 8C

RAPPAHANNOCK RIVER TYLERTON TO FREDERICKSBURG

FASTLAND USE, OWNERSHIP, EROSION

USE

- Agricultural A
- Industrial I
- Preserved P
- Recreational RC
- Residential RS

OWNERSHIP

- Private 1
- Federal 2
- State 3

EROSION

- Slight or No Change
- No Symbol

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

77° 27' 30"