COMPREHENSIVE WATER AND SEWER FACILITIES PLAN. 1989 UPDATE

MD WP

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CHAPTER ONE
GOALS AND ORGANIZATION

A. Goals

1. To protect the health, safety and welfare of the people of Talbot County and their neighbors by improving and/or maintaining sanitary conditions.

2. To encourage and direct growth of the County in concentrated centers around existing centers of population which presently have adequate or potentially adequate water and sewerage services. Conversely, it is the intent to discourage strip and scattered development.

4. To protect the waterfront and simultaneously develop portions of these areas for recreational purposes.

5. To promote self supporting industrial development of the County in conformity with both the Talbot County Comprehensive Land Use Plan and Sewerage and Water Plan as amended from time to time.

6. To prepare and adopt such ordinances, rules and regulations as may be necessary to implement the Comprehensive Water and Sewerage Plan.

6a. To assist the County Office of Environmental Health in approving all subdivision plats and building permits. Article 43, Section 387C requires that the County Office of Environmental Health's approval of plats and permits be in accordance with the Master Plan.

7. To provide for updating and amending the Talbot County Comprehensive Water and Sewerage Plan as dictated by changes in needs.

8. To continue to provide qualified management of water resources, on a county basis, in order to contend with water pollution and to conserve and maintain the necessary quality standard of streams, estuaries and ground waters, for residential purposes, industrial, commercial and recreational use.

9. To identify and categorize sources of pollution from urban areas, agricultural areas, industrial wastes and soil erosion.

10. To map portions of the County to assist in continued planning efforts.

11. To administer all matters pertaining to water resources, waste disposal and sediment control.

12. To prepare a Policy Manual for water and sewerage facilities for new developments and existing development.

13. To prepare Feasibility studies as needed for those water and sewerage projects planned by the County.

14. To adopt an ordinance regulating discharge of industrial wastes into County waters or into community systems.

15. To study the waste disposal problems at marinas.

16. To determine the status of Facilities Plans and identify changes needed.

17. To provide a Ground Water Protection Plan for regulation of new on-site sewerage disposal systems.

18. To identify available funding services for sewer & water projects.

19. To provide Financial Management Plans for each publicly - owned community sewerage systems.

20. To develop a sludge management policy for disposal of wastewater generated solids.

21. To encourage water conservation.

22. To develop a plan for future extensive of Region II and Region V Sanitary Districts.

23. To develop a plan for future water supply to Claiborne and Tilghman Village.

24. To comply with the Talbot County Critical Area Land Management Policies.

25. To provide a policy for Shared Facilities.

26. To provide sewer use regulations consistent throughout the County.

B. Organization

The County Council of Talbot County is the controlling authority responsible for all aspects of all water and sewerage facilities owned and/or operated by the County. The Talbot County Department of Public Works is responsible to the County Council for the planning, design, construction, operation, maintenance and Financial Management of County owned or operated facilities. These include the Region II and Region V wastewater collection and treatment systems, Claiborne Water System (proposed), and Unionville area central sewage system (prototype).

All incorporation municipalities have their own governing bodies which are directly responsible for the management of their water and sewerage system except St. Michaels whose sewerage system is managed by the County (Region II Sanitary District).

Martingham is a privately owned public utility regulated by the Maryland Public Service Commission. Claiborne currently is not incorporated but has two separate water companies supplying the public. Jensen's Hyde Park is a privately owned park providing there own water and sewer.

C. - Definitions

The following technical words and phrases have been defined for this report.

A. "APPROVING AUTHORITY" means one or more officials, agents, or agencies of local government designated by the local governing body or specified by other provisions of Article 43 Paragraph 387C of the Annotated Code of Maryland to take certain actions as a part of implementing this section.

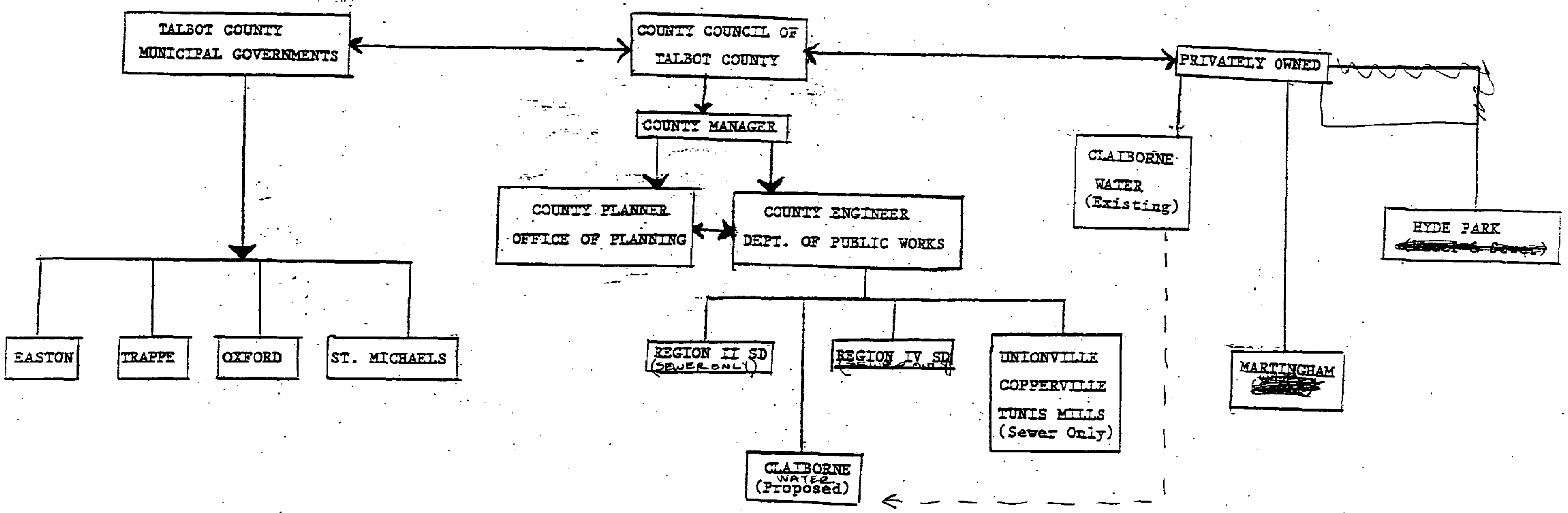
B. "COMMUNITY SEWERAGE SYSTEM" means any system whether publicly or privately owned, serving two or more individual lots for the collection and disposal of sewage or industrial wastes of a liquid nature including various devices for the treatment of such sewage and industrial wastes.

C. "COMMUNITY WATER SUPPLY SYSTEM" means a source of water and a distribution system, including treatment and storage facilities whether publicly or privately owned, serving two or more individual lots.

D. "COUNTY WATER AND SEWER PLAN" means a

COUNTY ORGANIZATION FOR MANAGEMENT OF WATER AND SEWERAGE FACILITIES

TALBOT COUNTY, MARYLAND



comprehensive plan and all amendments and revisions of it for the provision of adequate water supply systems, on-site sewerage and solid waste acceptance facilities, throughout the county, whether publicly or privately owned, to include all towns, municipal corporations, and sanitary districts in the county.

E. "DEPARTMENT" means the Maryland Department of the Environment.

F. "EXISTING SERVICE AREA" means that area which is currently served.

G. "FINAL PLANNING STAGES" means a work or works of community & multi-use water supply and sewerage for which contract plans and specifications have been completed, or where sewer or water construction permits have been issued or public works agreements executed.

H. "IMMEDIATE PRIORITY" means a work or works of community & multi-use water supply and sewerage system for which the beginning of construction is scheduled to start within 2 years following the date of adoption of the plan its amendment and revision thereof.

I. "INDIVIDUAL SEWERAGE SYSTEMS" means a single system of sewers and piping treatment tanks or other facilities serving only a single lot and disposing of sewerage or individual wastes of a liquid nature, in whole or in part, on or in the soil of the property, into any waters of this State, or by other methods.

J. "INDIVIDUAL WATER SUPPLY SYSTEM" means a single system of piping, pumps, tanks, or other facilities utilizing a source of ground or surface water to supply only a single lot.

K. "MARINA" means a dock, wharf, or basin providing mooring for boats which contain on-board toilet facilities, operated under public or private ownership either free or on a fee basis for the convenience of the public or club membership.

L. "MULTI-USE SEWERAGE SYSTEMS" means a single system serving a single lot whether owned or operated by an individual or group of individuals under private or collective ownership and serving a group of individuals for the collection and disposal of sewage or industrial wastes of a liquid nature, including various devices for the treatment of such sewage and industrial wastes having a treatment capacity in excess of 5,000 GPD.

M. "MULTI-USE WATER SUPPLY SYSTEM" means a single system of piping, pumps, tanks, or other facilities utilizing a source of ground or surface water to supply a group of individuals on a single lot and having a capacity in excess of 5,000 GPD.

N. "NON-POINT SOURCE" means pollution originating from land run-off where no specific outfall can be identified.

O. "SEWER SERVICE AREA" is that area served by, or potentially served by, a single collection system under the control of a single utility or, in a very large system, sub-area as delineated by the County.

P. "SHARED FACILITIES" Any new, privately owned sanitary system for potable water supply and distribution and/or wastewater collection and disposal or treatment, serving two (2) or more detached single family dwelling units, on separately recorded land lots or parcels in Talbot County, Maryland.

Q. "SIX TO TEN YEAR PERIOD" means that period 6 to 10 years following the date of adoption of the plan its amendment or revision by the County.

R. "THREE TO FIVE YEAR PERIOD" means that period 3 to 5 years following the date of adoption of the plan its amendment or revision by the County.

S. "UNDER CONSTRUCTION" means a work or works of community & multi-use water supply and sewerage systems where actual work is progressing or where a notice to proceed with a contract for such work has been let as of the adoption date of this plan its amendment or revision.

T. "WATER SERVICE AREA" means that area served by or potentially served by, a single distribution system under control of a single utility, or, in very large system, sub-areas as delineated by the County.

U. "W-1" "S-1" means areas to be served by community and multi-use water and sewerage systems which are either existing under construction, in the final planning stages, or have immediate priority status to be served by extension of existing community and multi-use water supply and sewerage systems or by newly constructed community and multi-use water supply and sewerage systems. W-1 shall be referred to for water system and S-1 for sewerage systems.

V. "W-2" "S-2" means areas where improvements to existing community and multi-use water and sewerage systems or construction of new community and multi-use water supply and sewerage systems will be programmed for 3 to 5 year period. W-2 shall be referred to for water systems and S-2 for sewerage systems.

W. "W-3" "S-3" means areas where improvements to existing community and multi-use water and sewerage systems are programmed for inclusion within the 6 through 10 year period. W-3 shall be referred to for water systems and S-3 for sewerage systems.

X. "W-4" "S-4" means areas where improvements to existing community and multi-use water and sewerage systems or construction of new community and multi-use water supply and sewerage systems are not currently planned. W-4 shall be referred to for water systems and S-4 for sewerage systems.

D. - Policies - Requirements

D.1. Individual Water Supply and Sewerage System Installation Requirements

The installation of individual water supply or individual sewerage systems shall be subject to the following requirements.

A. An individual water supply or individual sewerage system may not be permitted to be installed where an adequate community water or sewerage facility is available. If an existing community water or sewerage facility is inadequate or is not available, an interim individual water and sewerage system may be used as set forth in B (1), B (2) and B (3) below:

B. Interim individual water supply and sewerage systems may be permitted to be installed in any portion of the county, except where otherwise prohibited, where community systems will be programmed for construction within the S-1 or 2 and W-1 or 2 service categories provided that:

(1) Such interim systems are adjudge by the local health department to be adequate, safe, and in compliance with pertinent State and local regulations, including Regulation 10.17.02 and the Talbot County Ground Water Protection Plan.

(2) Permits for such interim systems shall bear a notice regarding the interim nature of the permit and stating that connection to a future community system shall be made within 1 year or less after such system becomes available;

(3) If interim systems are used, provisions shall be made, whenever possible, to locate such systems so as to permit connection to the public facilities in a most economical and convenient manner.

D.2. Capped Water and Sewer Policy

In order to prevent street and other damage encountered in providing public sewer service to developed areas, and to provide for efficient and effective connection to public sewer service, the following policy is presented for sewer and water line installation in areas where public sewerage and water service is not available at the time of street and residential construction but will be made available at some future time:

(1) Requests for such installation will only be accepted where interim systems are permitted by the Water and Sewerage Plan (S-1, S-2, W-1, W-2).

(2) Each application for a sewer or water service construction permit must be accompanied by a letter from the County Health Officer requesting that such installation be permitted.

(3) Building permits, subdivision plats, and septic tank approvals shall include a provision requiring the connection of the premises to community sewerage and water within twelve (12) months of announced availability.

(4) Water and Sewer lines shall be designed and installed in accordance with applicable

municipal or County specifications and in compliance with the State of Maryland Plumbing Regulations.

(5) The connection of a "dry" system shall be plugged with a visible and readily inspectable plug at the connection to the existing system.

D.3. <u>Requirements for Proposed Privately-Owned Community Water and Sewerage Systems</u>

The following current policies are in effect in Talbot County.

1. There is a current temporary moratorium on "shared facilities" in Talbot County due to inadequate controls to properly regulate construction and operation. The County intends to legislate a specific shared sanitary facility regulation and the moratorium will be removed upon enactment of such legislation.

   A shared sanitary facility is any new, privately owned sanitary system for potable water supply & distribution EN. Sec. 9-501(c) and/or wastewater collection and disposal or treatment EN. Sec. 9-501 (b), serving two (2) or more detached single family dwelling units, on separately recorded land lots or parcels, in Talbot County, Maryland.

2. For privately owned water systems other than "shared facilities" the State Department of the Environment utilizes the following policy for review and approval of proposed facilities. Under current Talbot County Zoning Regulations, this would include only mobile home planned developments under one ownership providing community water.

D.3.1 <u>MDE Requirements for Privately Owned Community Water Systems</u>

These requirements have recently been developed by MDE as a result of our observation that, for privately-owned water systems, plant operation and maintenance problems increase over time, problems which can be mitigated if these requirements are met. These requirements have been established to assure that, through proper operation and maintenance of the systems, consumers have safe and adequate supply of drinking water, now and in the future.

For those water systems which the County intends to purchase and/or operate, please send a copy of the appropriate public works agreement to Mr. William Parrish, Chief, Division of Water Supply. 201 West Preston Street, Baltimore, Maryland 21201. For publicly-owned systems, some of the financial requirements may be omitted from the public works agreement if the County believes that its existing financial plan accommodates new systems and if sufficient funds will be available throughout the life of the systems to assure a safe and adequate supply of drinking water for all consumers.

(1) The project must be described and shown in the County Ten-Year Water and Sewerage Plan in the correct service area category designated.

(2) A water appropriation permit must be obtained from the Maryland Water Resource Administration (DNR), with a copy of same submitted to the Division of Water Supply.

(3) A well construction permit must be obtained from the Maryland Department of the Environment.

(4) A financial management plan must be submitted to this agency, Division of Water Supply, for review and approval. This plan should detail estimated operating costs and the revenues required to support these costs.

(5) An agreement must be developed and executed between the Water Management Administration and the owner of the proposed water system which provides for deposit into an escrow account of funds sufficient to cover repair or replacement of the highest-cost water treatment plant unit. In addition, a separate account must be included which provides sufficient funds for the initial operation and maintenance of the system. This requirement would remain in effect until operating costs were fully supported by income. Finally, the agreement must provide for establishing a fund sufficient for replacement of the system 20 years after initial construction. This financial assurance requirement is a condition of COMAR 10.17.03 and may include such guarantees of equal protection as may be requested by the applicant.

(6) An operation and maintenance plan must be prepared and submitted to the Division of Design Review for review and approval.

(7) A State water construction permit must be obtained for the installation of the system from the Department of Health and Mental Hygiene.

After the State construction permit has been issued, there are additional requirements which must be met prior to actual operation of the new system:

(1) A water treatment plant superintendent and operator, if required, certified in the appropriate classification by the Board of Waterworks and Waste System Operators, must be employed prior to start-up to attend the plant on a daily basis.

Delete → (2) Plans must be made for compliance with the monitoring and reporting requirements of COMAR 10.17.07 in advance of start-up.

D.5. Financial Requirements for Privately Owned Sewerage Systems

New or proposed privately owned community or multi-use sewerage systems or extensions are required to provide Financial Management Plans as indicated in the following excerpt from COMAR 10.17.05.02J.2:

Before the State Department of the Environment may issue a permit for the construction of an extension to an existing or planned, self-contained, privately-owned community or multi-use sewerage system:

(A) The project must be described in the county plan in the correct service area category designation and designated by the appropriate map symbol.

(B) A Schedule FS must be submitted to the Department for review and approval.

(C) An agreement must be developed and executed between the State Department of the Environment and the owner of the proposed sewerage system which provides that the owner deposit into an escrow account funds to cover the repair or replacement of the highest cost treatment plant unit. (The Department may accept a binding financial arrangement, such as a letter of credit or other type of legal document in lieu of said escrow account.) In addition, the agreement may require that a separate account be established which provides sufficient for replacement of the system twenty years after initial construction. The Department shall provide an informational copy of the executed agreement to the local (county or town) government.

Since new sewerage systems have no historical financial data, Schedule FS should contain anticipated revenues and expenses for the first two years of operation. See Appendix F for Schedule FS form and instructions for completing.

D.6 GROUND WATER PROTECTION PLAN

MANAGEMENT SUMMARY
TALBOT COUNTY
GROUNDWATER PROTECTION REPORT

Background

On November 18, 1985, the State of Maryland adopted new regulations governing the installation of private sewage disposal systems (COMAR 10.17.02). These regulations have incorporated the concept of maintaining a minimum four-foot unsaturated zone below the bottom of on-site sewage disposal systems for treatment of effluent. Available data and research indicate that a two-to four-foot depth of suitable, unsaturated soil material will provide a high degree of treatment of septic-tank effluent. The depth of unsaturated soil material needed below the bottom of on-site systems for adequate treatment is primarily dependent on the soil properties. Generally, more permeable soils may require greater unsaturated depths than less permeable soils having higher clay content.

Many areas within the Maryland Coastal Plain Province, especially on the Lower Eastern Shore, have seasonally high water table at depths that cannot provide the four-foot treatment zone. Previous regulations have allowed Talbot, Dorchester, Wicomico, Somerset and Worcester Counties to discharge septic-tank effluent directly into shallow aquifers under the following conditions:

1. Areas of utilization should be confined to those portions of each county where surface soil formations consist of a thick layer of impermeable clay underlain with extensive deposits of water-bearing sand.

2. A minimum separation distance of 150 feet should be maintained between any individual water supply and sewage disposal facilities.

3. Maximum density of housing in these areas should not exceed 160 residences per square mile.

4. Systems are to be empirically sized based on county experience.

5. Wells for potable water supply utilizing shallow aquifers may not be permitted if on-site systems discharge directly to groundwater.

This practice has been referred to as groundwater penetration and is used routinely in these counties on necks, peninsulas and islands.

Other coastal plain counties, while prohibited by regulation from using groundwater penetration, have utilized treatment zones that vary from less than one to greater than four feet. Several of these counties have been granted variances to allow groundwater penetration. In addition, many counties have had to resort to groundwater penetration occasionally to remodel failing on-site systems when no other conventional alternative was available.

Local county health departments that routinely use groundwater penetration have not associated any major public health problems with these systems. Extensive monitoring and well-documented studies of the impacts of these systems on groundwater or surface waters however, have not been conducted.

Data Used in Preparing Summary

This document is based on two reports: Groundwater Protection Report, Area B (Appendix A), prepared by Gary I. Rinehart, R.S. and Groundwater Protection Report, Area A (Appendix B), prepared by Redman, Johnston & Associates, Ltd., along with published groundwater reports and maps by Maryland Geological Survey, U. S. Geological Survey, Soil Conservation Service and selected consultant's hydrogeologic and soil evaluation reports. Records of hundreds of water wells were available from files of well permits and completion reports; these records were carefully reviewed and selected records were used. Some of these data are provided or referenced in the attached reports.

Rationale for Selecting Management Areas

The management areas outlined in this report represent an attempt to generalize those areas: 1) with little or no shallow confining material which therefore require maximum protection of on-site water-supply sands (Area A); and 2) those areas where more than 5 feet of shallow confining material (Area B) separates shallow permeable layers used for disposal of sewage effluent from deeper water-bearing sands.

These areas are outlined on the attached Figure 1 and on the Geologic Map of Talbot County (Appendix G) prepared by James P. Owens and Charles S. Denny, USGS, 1986. It should be stressed that areas outlined on these maps are generalized and based on limited data in some places. Within each management area, there may be localized areas which require reclassification when

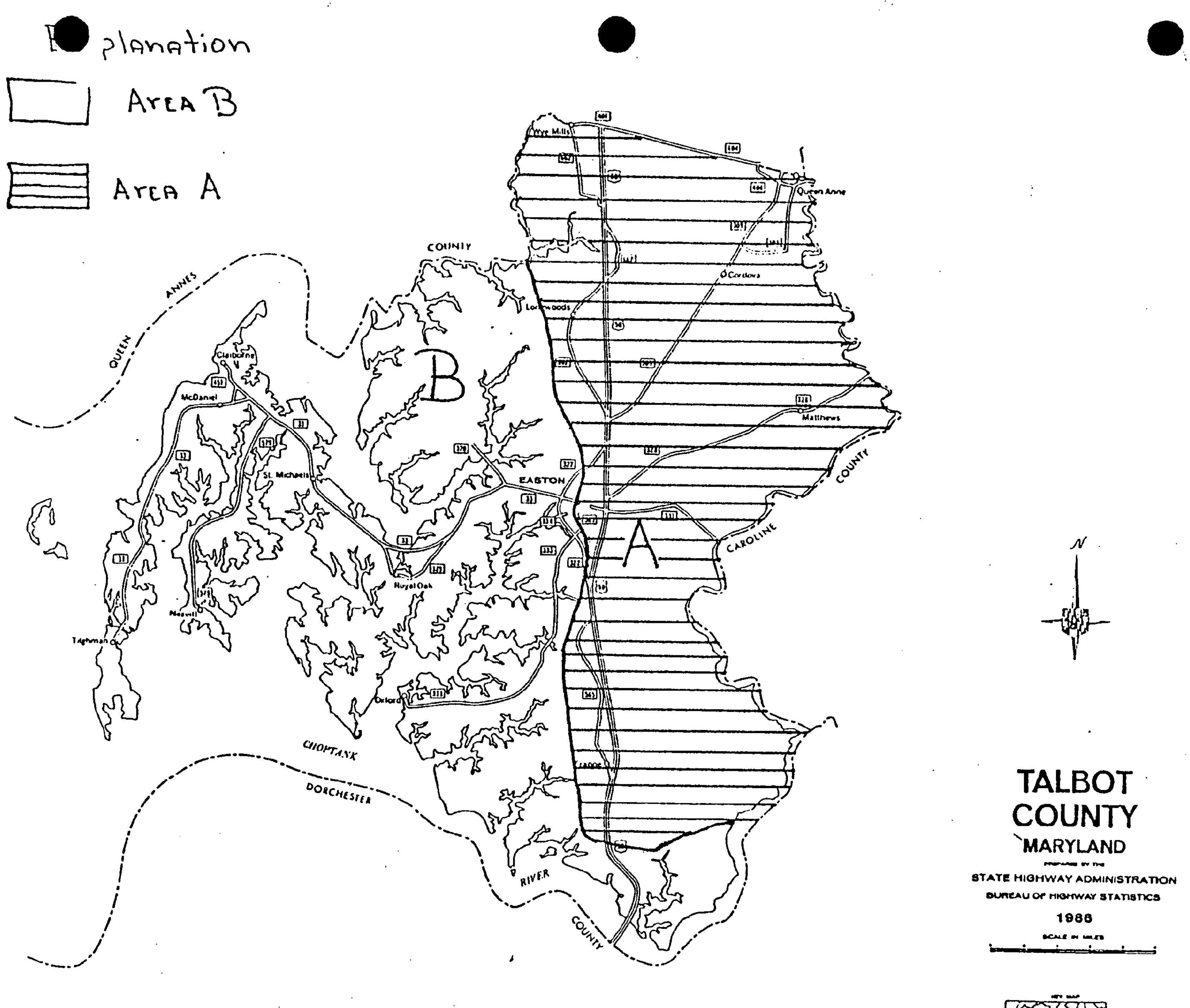


Figure 1. Map Showing Management Areas

additional data become available.

Management Area "A"

Management Area "A" is outlined on figure 1 and the Geologic Map of Talbot County in the pocket. It comprises the majority of eastern Talbot County, with the exception of the southern tip and is bounded on the west by a line roughly paralleling U. S. Route 50. This line represents the boundary between the Beaverdam Sand and Pensauken Formations of the eastern portion of the county and the geologically younger and finer-grained sediments of the Kent Island Formation to the west.

The Pliocene and Miocene age sediments of the Beaverdam Sand and the Pensauken Formations are thick, permeable sands and gravels which are currently being used for water supplies and have the potential to provide future water supplies. The number of water supplies being derived from these sediments is not known as many may be driven wells which did not require permits prior to 1977.

To protect the existing and potential water supplies available from shallow aquifers in Area "A", sewage disposal practices which maximize effluent treatment should be employed. Table 1 presents on-site sewage disposal and water supply options which are appropriate to provide the required protection. The most applicable technology must be determined through on-site evaluation of each site (including soil, topography, and drainage characteristics). A reduction of the minimum four-foot soil treatment zone can be allowed where finer soil textures or fill materials along with in-situ soils can provide adequate sewage effluent renovation for most wastewater constituents of concern (e.g., microorganisms, organic matter, solids, and phosphorus). Protection of valuable surficial aquifers from nitrogen pollution is provided by controlling on-site system density with minimum lot sizes. Minimum lot sizes of ~~one~~ two acres provide~~s~~ a mechanism for nitrogen dilution which should ensure groundwater levels of NO_3-N will remain at or below 10 mg/l where this level is not already exceeded (see Appendices C & D for nitrogen dilution calculations).

Sewage disposal trenches should always be installed to maximize the soil treatment zone (i.e., as shallow as possible) utilizing above grade fill, if necessary. The thicker the treatment zone utilized, the better the sewage effluent renovation derived.

A minimum well depth of <u>40</u> feet is recommended to provide good protection against nitrate pollution from surface sources. Additional protection should be afforded to wells in AREA "A" by requiring well construction in the unconfined Pliocene and Miocene aquifers to include grouting to the top of the screen.

In areas such as Area "A" in which there are valuable surficial groundwater supplies, care should be taken to eliminate introduction of household chemicals (e.g., solvents, degreasers, pesticides, etc.) into the ground through septic systems. Homeowners should be informed of the risks to sewage disposal systems and to water supplies, in particular their own, from such activities and appropriate alternative disposal options.

Management Area "B"

Management Area "B" is outlined on figure 1 and the Geologic Map of Talbot County in the pocket. It comprises all of the ~~eastern~~ portion of the County in addition to the southern tip. This area is underlain by the interstratified silts, sands, and clays of the Kent Island Formation.

The near-surface aquifers of Area "B" have a limited potential to provide year-round, adequate water supplies. They are thin, shallow, and experience seasonally fluctuating water tables. Further, they are separated from deeper water supplies derived from confined aquifers, such as the Piney Point and the Aquia, by thick confining layers. Of the 123 well records reviewed in Groundwater Protection Report, Area B, 98 (80%) had at least a five-foot thick confining layer within 25 feet of ground surface, with a mean (average) confining layer thickness of 96 feet. State well construction regulations (COMAR 10.17.13) would preclude the construction of a drilled well into such shallow aquifers.

Table 2 outlines on-site sewage disposal system and water supply options which are appropriate for the hydrogeologic conditions prevalent in Area "B". These options allow for direct penetration of shallow groundwater which, given proper well construction requirements, should protect existing and potential water supply resources available in the underlying confined aquifers. Large areas of poorly drained and slowly permeable soils, such as the Othello series, predominate in Area "B" and indicate the most likely option to be employed, as it has in the

TABLE 1

On-Site Sewage Disposal and Water Supply Alternatives: Management Area "A"

Unsaturated Natural Soil Thickness Beneath Bottom of Sewage Disposal Trenches	Soil Texture	Minimum Lot Size	Sewage Disposal Options & Requirements		Water Supply Requirements			
			Conventional	Alternative	Aquifer Type	Minimum Separation Distance: Wells & SDS/SRA	Minimum Depth	Minimum Grouting Depth
1. ≥ 4'	All	based on zoning & COMAR 10.17.02 & 10.17.03 reqts.	gravity trench	shallow pressure dosing trench	unconfined confined	100' 50'	40 N/A	top of screen COMAR 10.17.13 reqts.
2. 2' - 4'	All	based on zoning & COMAR 10.17.02 & 10.17.03 reqts.		sand mound	unconfined confined	100' 50'	40 N/A	top of screen COMAR 10.17.13 reqts.
3. 2' - 4'	sandy loam or finer	2 acres	gravity trench	shallow pressure dosing trench	unconfined confined	100' 50'	40 N/A	top of screen COMAR 10.17.13 reqts.
4. 2' - 4'	sand or finer	4 acres	gravity trench	shallow pressure dosing trench	unconfined confined	100' 50'	40' N/A	top of screen COMAR 10.17.13 reqts.

On-Site Sewage Disposal and Water Supply Alternatives: Management Area "B"

TABLE II

Unsaturated Natural Soil Thickness Beneath Bottom of Sewage Disposal Trenches	Soil Texture	Minimum Lot Size	Sewage Disposal Options & Requirements		Water Supply Requirements			
			Conventional	Alternative	Aquifer Type	Minimum Separation Distance: Wells & SDA	Minimum Depth	Minimum Grouting Depth
1. ≥ 4'	All	based on zoning & COMAR 10.17.02 & 10.17.03 reqts.	gravity trench	shallow pressure dosing trench	confined	100'	N/A	Through disposal stratum and 5' into lower confining layer
2. 2' - 4'	All	based on zoning & COMAR 10.17.02 & 10.17.03 reqts.		sand mound	confined	100'	N/A	Through disposal stratum and 5' into lower confing layer
3. 1' - <4'	All	2 acres	gravity trench	shallow pressure dosing trench	confined	100'	N/A	Through disposal stratum and 5' into lower confining layer
4. 0'	All	2 acres		sand lined trench	confined	150'	N/A	Through disposal stratum and 5' into lower confining layer
5. 0'	All	4 acres		bermed infil-tration ponds	confined	150'	N/A	Through disposal stratum and 5' into lower confining layer

past, will be direct groundwater penetration. However, where surface soils are better drained and more permeable, sewage disposal systems employing an unsaturated soil treatment zone should be utilized as the favored alternative given reasonable indication of satisfactory hydraulic performance. Minimum lot sizes are required to provide contamination dilution and filtration to minimize degradation of ground and surface water resources (see Appendices C and D for nitrogen dilution calculations).

Well construction practices shall preclude the use of unconfined aquifers and require wells to be grouted through the disposal stratum a minimum of 5 feet into the underlying confining bed. Well drillers shall inform the Talbot County Health Department prior to grouting and the County shall inspect a minimum of 10% of all wells constructed in Area "B", retaining a record of inspection for their files.

A minimum separation distance of 100' will be required between water supply wells and sewage disposal systems and reserve areas employing an unsaturated soil treatment zone. A minimum separation distance of 150' will be required between water supply wells and sewage disposal systems and reserve areas utilizing direct groundwater penetration.

<u>Innovative & Experimental On-Site Sewage Disposal Systems</u>

The State Department of the Environment has an effective program to develop innovative/alternative on-site sewage disposal systems. Although the experimental systems are not listed in Tables 1 and 2, their use where site conditions warrant and

County personnel are available for site evaluation and monitoring is encouraged. Systems which are considered experimental will change with time as the successful systems become conventional and the unsuccessful systems are no longer used. This is one reason they are not listed or described in the main text or tables of this report. Appendix E, Status Report to the Governor and General Assembly on the State of Maryland Innovative and Alternative On-Site Sewage Disposal Program dated February 1987 will provide an overview of the State's program and descriptions of the innovative and alternative systems with which the State is working. This should prove useful in describing the alternative systems listed in Tables 1 and 2 as well as providing an understanding of the experimental systems being developed.

Variances

One goal of adopting a countywide groundwater protection strategy is to employ a comprehensive rather than a piecemeal approach to groundwater resource management. Therefore, it is prudent to minimize small scale variance to the broad management areas mapped. However, as previously noted, management area boundaries are necessarily imprecise and should be subject to revision as additional data warrant. Decisions on management area placement for properties located along area boundaries will be made at the discretion of the Talbot County Health Department and supported by site-specific field data. Applicants who disagree with this determination in management fringe areas have the opportunity to provide site-specific hydrogeologic information to support a more appropriate determination.

Inclusions of one management area within the confines of another will be restricted to areas in which the total groundwater flow pattern can be adequately characterized and supports the altered area designation. Appendix F provides guidance for conducting hydrogeologic evaluations to support management area determinations and subdivision requests requiring detailed hydrogeologic information.

Recommendations

The most pressing needs at present, in order to provide good operation and maintenance of existing and future wastewater disposal systems, is to locate safe and adequate disposal sites for septage haulers and to develop institutional mechanisms to handle shared (community) on-site wastewater disposal facilities. As the pressures of land development continue to grow in Talbot County, more shared facilities will be proposed and it will become increasingly difficult for wastewater haulers to find adequate land disposal sites. Surrounding counties have found it necessary to allow septage haulers to use sewage treatment plants to dispose of their product and to adopt local shared facilities ordinances. Alternative approaches to adequately address both issues should be examined and adopted in the near future.

E. AMENDMENT PROCEDURE

The Maryland Department of the Environment will issue water/sewer construction permits only for properties designated as W-1, S-1 or property owners wishing to change the priority status of their land for either water and sewer service, may request an amendment to the Comprehensive water and Sewerage Plan. For more information contact the Talbot County Department of Public Works, County Engineer, Talbot County Courthouse, Easton, Maryland, 21601, 1-301-822-5873.

F. FINANCIAL ASSISTANCE FOR WATER AND SEWER PROJECTS

Financial assistance for sewer and water construction projects are available form several State and Federal sources. Assistance may be in the form of a loan, a bond pool, a grant or a combination of these. The Water Quality Act of 1987 initiated a change in the EPA monies to support construction of wastewater treatment facilities will be in the form of a State revolving loan program instead of a grant program. Active EPA projects within Talbot County include upgrade of the Easton Wastewater Treatment Facility and Step One Facilities Planning for Royal Oak - Newcomb. The Town of Trappe is active in the State's Chlorine Removal Grant Program. Appendix E provides a list of funding sources for water and sewer projects.

In 1988 Governor Schaefer created an interagency coordination program called Small Urban Waterfront Development Program which is designed to (1) promote Bay related activities and, (2) help waterfront Towns and Counties obtain grants and loans from the various state funding programs listed in Appendix E. (Contact David Schultz, Department of Housing and Community Development at 974-2129).

G. WATER CONSERVATION

1. General

The Maryland Water Conservation Plumbing Fixtures Act (MWCPFA) (originally Article 43, Section 325D) was enacted in 1978 and amended in 1979 for the purpose of requiring the installation of water-conserving water closets, urinals, sinks and showerheads in building constructed or remodeled after February 15, 1980. The Act also prohibits the sale of non-water-conserving fixtures in the State of Maryland. Enforcement of the Act in vested with the local plumbing inspectors.

None of the jurisdictions within Talbot County are actively implementing the MWCPFA or promoting water conservation. On the other hand, approved fixtures are increasingly produced and sold at retail outlets to meet the water conserving standards of the State Plumbing Code. Licensed plumbers are likely to comply with provisions of the code.

The majority of rural counties, Talbot included, are less likely to actively implement conservation measures since water supplies are more than adequate. Conservation measures are only used in the case of a special problem or emergency.

2. Benefits

There are several benefits of water conservation that could be realized now among the jurisdictions. Benefits occur on two levels - to the community as a whole and to the individual consumer.

Benefits to the community include:

(1) The elimination or postponement of new capital expenditures related to storage tank construction or well development;

(2) A reduction in hydraulic loadings to centralized waste treatment facilities and hence more reserve capacity.

(3) A reduction in hydraulic loading to septic tank systems and hence fewer failing septic tanks.

(4) A lessening of the need for expansion of energy generating capacity; and

(5) A reduction in water supply and sewerage facility operating costs.

Community water conservation benefits are often significant but will vary from locality to locality. However, the direct benefits of in-home conservation to individual consumers are readily apparent. By installing water conservation plumbing fixtures (low-flow shower heads, faucet aerators, flow restrictors, etc.) average homeowners in the Washington/Baltimore area can, at little expense, reduce their home water use by nearly 50,000 gallons per year without altering their life styles. The total savings (in 1980 dollars) on water/sewer bills in one year could amount to $94,00. Hot water saved in one year could amount to approximately 23,000 gallons, resulting in an annual savings of $285 for those with electric water heaters.

3. Water Conservation Policy

A. Each county water and sewer plan shall contain documentation that compliance with Maryland Water Conservation Plumbing Fixtures Act (MWCPFA) as codified in Article 56 and 445, Annotated code of Maryland, is being achieved.

B. The documentation shall include:

(1) Designation of the county agency responsible for the enforcement of MWCPFA;

(2) A summary of county programs to assure implementation of and compliance with MWCPFA, including a description of:

(a) A procedure which assures compliance with MWCPFA before the issuance of a certificate of occupancy.

(b) Local actions taken to assure compliance with the prohibition of the sale of non-water conserving plumbing fixtures.

(c) The local procedures used to ensure that agreements between a developer and a builder to assure compliance with MWCPFA are made a part of the record plat process or a part of a county building, plumbing, or occupancy permit, or bill of sale.

C. If the county is not currently complying with the MWCPFA, then the county water and sewerage plan shall include a description of proposed changes to the local program which the county intends to implement to achieve compliance with MWCPFA.

CURRENT SITUATION

None of the municipalities within Talbot County have implemented the MWCPFA or are actively promoting water conservation. The policy of the county is to encourage water conservation to realize the benefits previously discussed.

1989 UPDATE
COMPREHENSIVE
WATER AND SEWER

TABLE OF CONTENTS

CHAPTER TWO

CHAPTER TWO
GENERAL BACKGROUND INFORMATION

Section I - Physical Features

A. Location (See Figure No. 1)

Talbot County lies in the heart of Maryland's Eastern Shore. The County is on the west-central edge of the Delmarva Peninsula that extends between the Atlantic Ocean and the Chesapeake Bay. It is located between the parallels of 38 34' and 38 57' north latitude. It has an area of 462.51 square miles - 271.82 of land and 190.69 of water. The County is bounded on the north by Queen Anne's County, on the east and south by Tuckahoe Creek and the Choptank River, and on the west by the Chesapeake Bay.

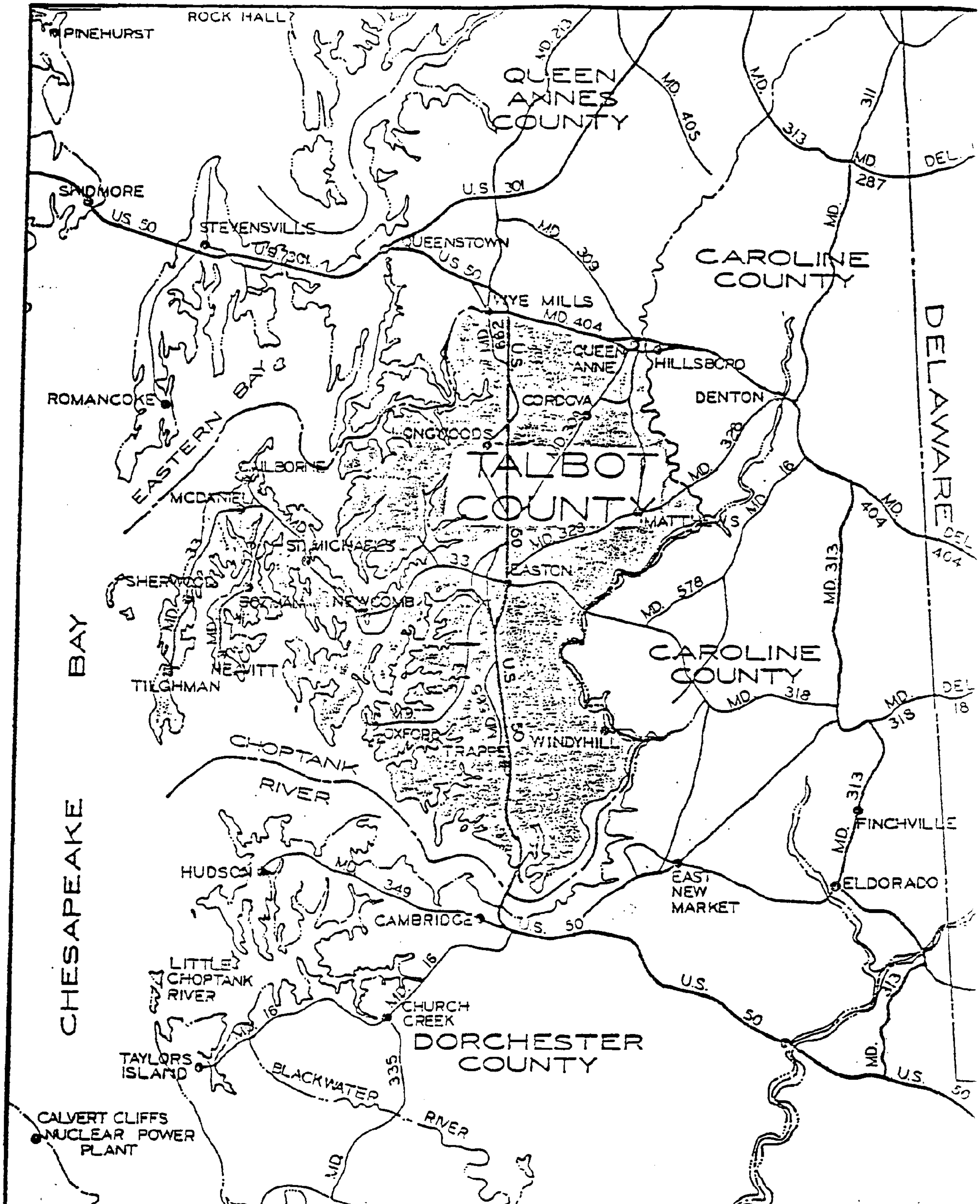
B. Topography (See Figure No 2)

The County's land mass is a low lying, gently rolling, terraced plain which ranges from sea level to 78 feet at the highest point near Easton. The western valleys where the land is 20 feet or less above sea level. The eastern half is a plain which ranges, in general, from 40 to 70 feet above sea level. A prominent break in the slope of the land occurs in the range from 25 to 40 feet above sea level at a point where the former water levels used to stand. This break extends from south to north along the centerline of Talbot County, passing through Easton. West of this break is the low land neck area below 25 feet in elevation, and east is the rolling, many-basined plain. This same break faces the Choptank River in eastern Talbot County but is much closer to the water at this point.

Talbot County has three distinct topographic features. These features are tidal marshes, the Talbot Plain, and the Wicomico Plain.

Tidal marsh consists of land that is covered with brackish or salt water on each flood tide. It has a silt or very fine sand surface layer containing much partly decomposed organic matter. Below this an organic silt layer that has a few lenses of sand extends to a depth of more than 32 feet in some marshy areas bordering the Choptank River in the eastern part of the county. In other places Tidal marsh generally contains organic silt to a depth of 3 to 8 feet. This material normally does not exceed 35 percent. In some areas, particularly along the Choptank River, this marsh gives off a strong odor of hydrogen sulfide when it is disturbed. Generally marsh that has this odor is only slightly acid until it dries. After it dries, it is extremely acid.

Tidal marsh generally occurs along the shoreline in Talbot County in areas of 1 to 10 acres, but these areas contain a hundred acres or more along the Choptank River in the eastern part of the county. This land does not support grazing animals and is suitable only for wetland wildlife and for a few kinds of recreation.



TALBOT COUNTY · COMPREHENSIVE
WATER AND SEWERAGE PLAN

LOCATION MAP

ANNAPOLIS

McCRONE

EASTON

FIGURE NO.

geologically than are the tidal marshes. The Wicomico Plain lies at a higher elevation than the Talbot Plain and is made up of older marine sediments. The escarpment between these two formations is easily recognized through much of the county. It runs roughly north and south. (See Figure No. 3). In many areas on this boundary, what are believed to be buried soil horizons have been seen. These horizons are at varying depths beneath the sediments of the Talbot formation. The most prominent buried horizon is normally black, high in organic-matter content, and about 10 inches thick. Below this black layer, horizons are lacking and barely discernible. In some places, pieces of rotted wood are in the black horizon.

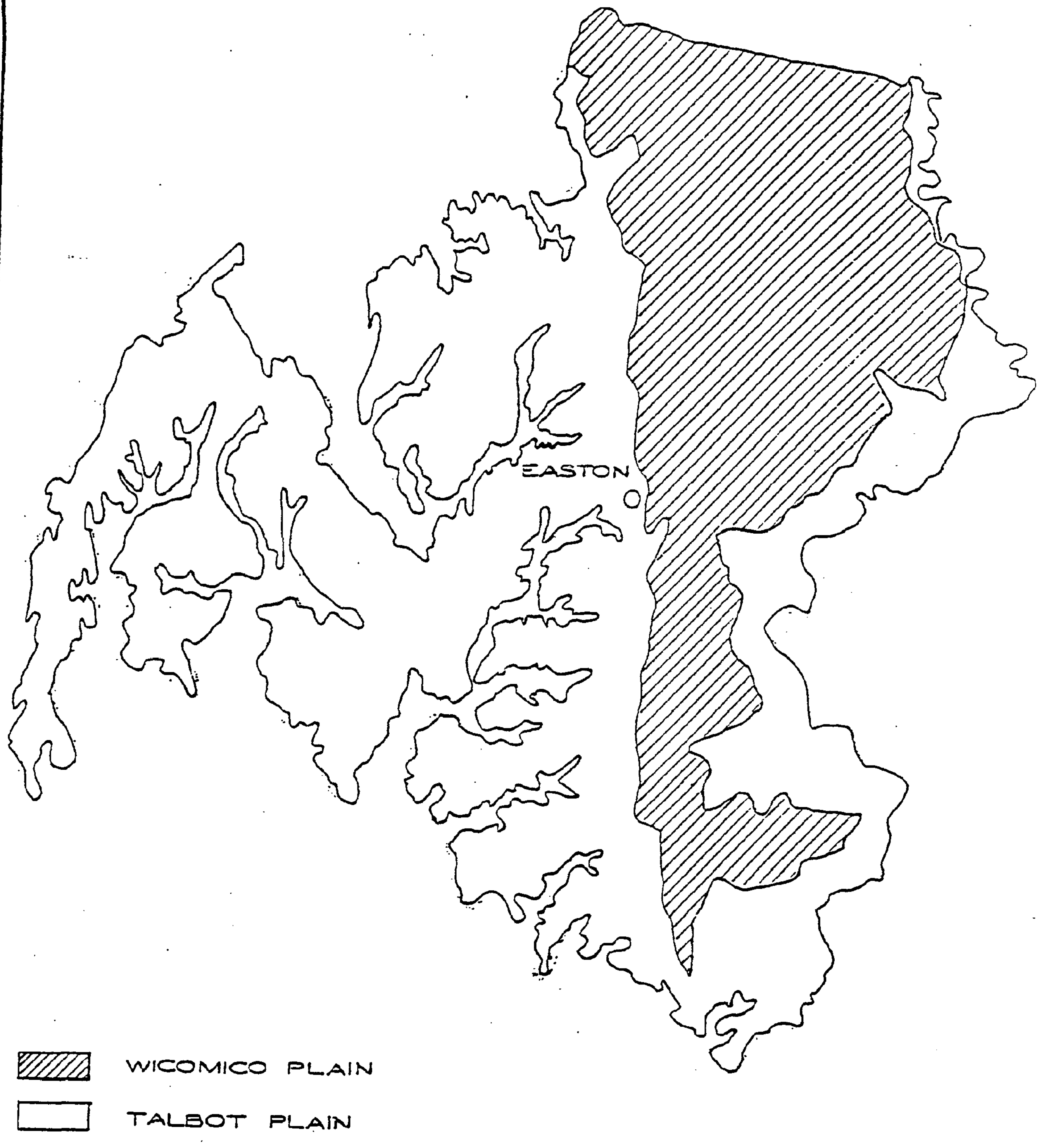
Both the Wicomico and Talbot formations were developed during interglacial periods from sediments carried by streams that are now the Delaware, Susquehanna and Potomac Rivers. Some uplifting and subsidence of the land has taken place at various intervals and has caused some stream cutting and filling. Material from the Wicomico formation was deposited before the material from the Talbot. Consequently, soils, such as Sassafras, on the Wicomico Plain are better developed than those on the Talbot Plain. Soils on the younger Talbot Plain show only slight horizon formation.

Several kinds of soils, especially the Keyport soils on the Talbot Plain, reveal large blocks where the soils are cut horizontally. The blocks generally are very dense and brittle and tend to hold together well. The material between the blocks is usually gray and silty. Because this material is friable, tree roots grow in it rather than in the dense blocks.

C. Geology

Talbot County is part of the Atlantic Coastal Plain, a wedge-shaped mass of unconsolidated sedimentary deposits which overlie older hard crystalline rocks. The crystalline rocks, sometimes referred to as the "basement", are igneous and metamorphic rocks of Precambrian or early Paleozic age. The unconsolidated deposits consist of nearly flat-lying layers of sand, gravel strata comprise the only important water-bearing sediments.

The crystalline rocks crop out to the northwest of the Fall Line, a line through the major eastern cities of Philadelphia, Wilmington, Baltimore and Washington. The surface of the crystalline rock basement slopes below the Coastal Plain sediments from the Fall Line to the southeast at the rate of about 60 to 110 feet per mile (Figure No. 3). At Annapolis, the basement rocks are probably about 1,500 feet below sea level, at Easton they are about 2,700 feet below sea level, and at Cambridge about 3,300 feet. Because adequate supplies of fresh water have been obtained at depths less than 1,000 feet and because the crystalline rocks lie at great depth, crystalline rocks have not been penetrated by drilling in the County.



TALBOT COUNTY COMPREHENSIVE
WATER AND SEWERAGE PLAN

WICOMICO AND TALBOT TERRACES

ANNAPOLIS

McCRONE

EASTON

FIGURE NO.

The unconsolidated deposits are usually easy to drill and, where exposed, are generally soft enough to be worked with a shovel. The deposits are thinnest in northwestern Talbot County (2,200 feet) and thickest in the southwestern part of Dorchester County (4,200) feet). Most of the layers of clay, silt, sand, and gravel of these deposits crop out in a more or less regular banded sequence trending northeast to southwest. The age of the deposits range from Cretaceous, just above the crystalline basement, to Pleistocene or Holocene at land surface. The cretaceous units make up more than half the section of Coastal Plain sediments underlying the County area.

A generalized geologic section southwestward across the Coastal Plain from the Fall Line to Cambridge is shown in Figure No. 3. The section shows that: (1) the depth to crystalline rock increases progressively toward the southeast; (2) the Coastal Plain sediments lie upon one another in "layer cake fashion," with the youngest formation cropping out progressively to the southeast; and (3) the formations generally thicken to the southeast. Table A summarizes the ages, thickness, lithologic character, and water-bearing properties of geologic units in the Talbot and Dorchester counties.

D. Drainage

The drainage of Talbot County is comparatively simple, owing to the simple structure of the formations and the locations of the region adjacent to Chesapeake Bay. The County generally has good surface drainage. Enough streams dissect the uplands to provide suitable drainage outlets for most all areas of poorly and very poorly drained soils. In the more nearly level areas, surface waster runs off where ditches are provided, but runoff normally is very slow. The major drainage systems of the county are divided tow ways. To the east water drains from the soils into the Tuckahoe Creek and Choptank River, and to the west it drains into the Wye, Miles and Tred Avon Rivers. All surface drainage is within the Chesapeake Bay watershed. Figure No. 4 shows drainage basins in the County.

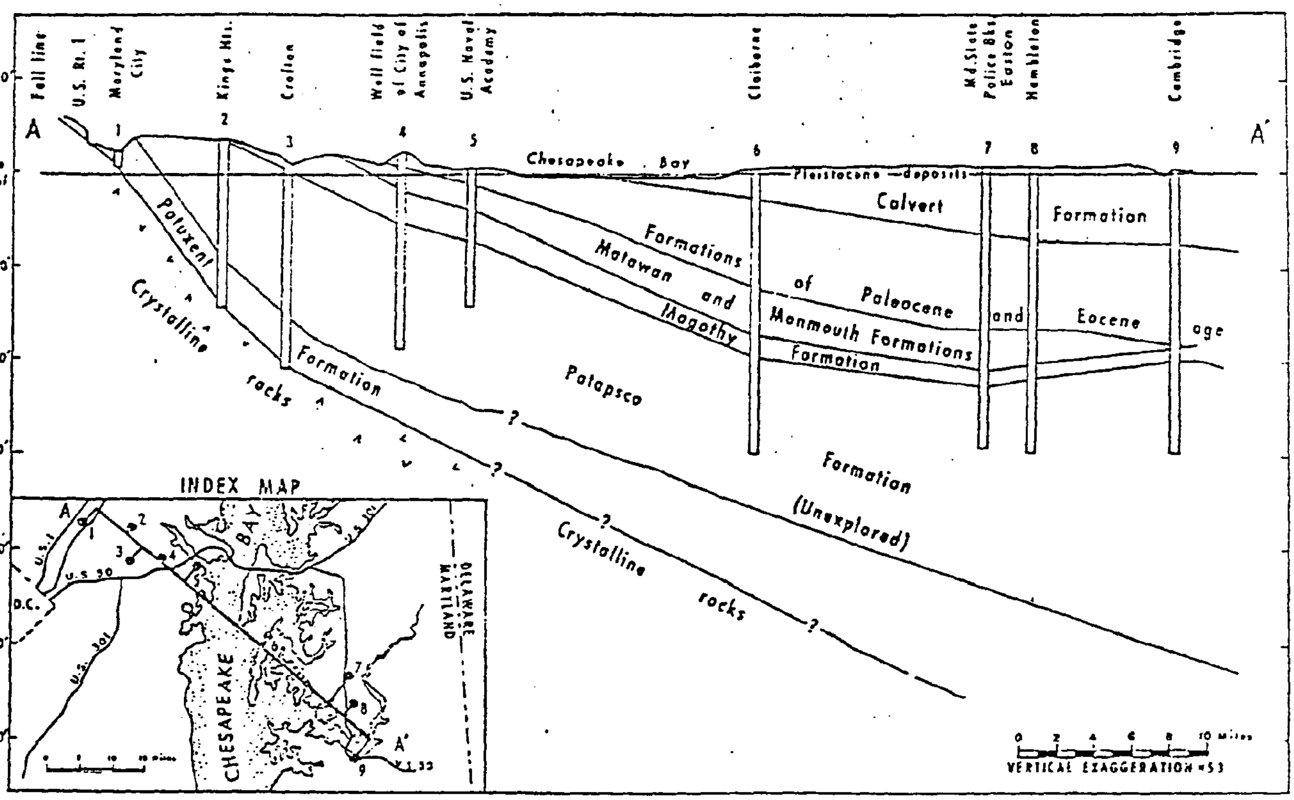
E. Soil Characteristics

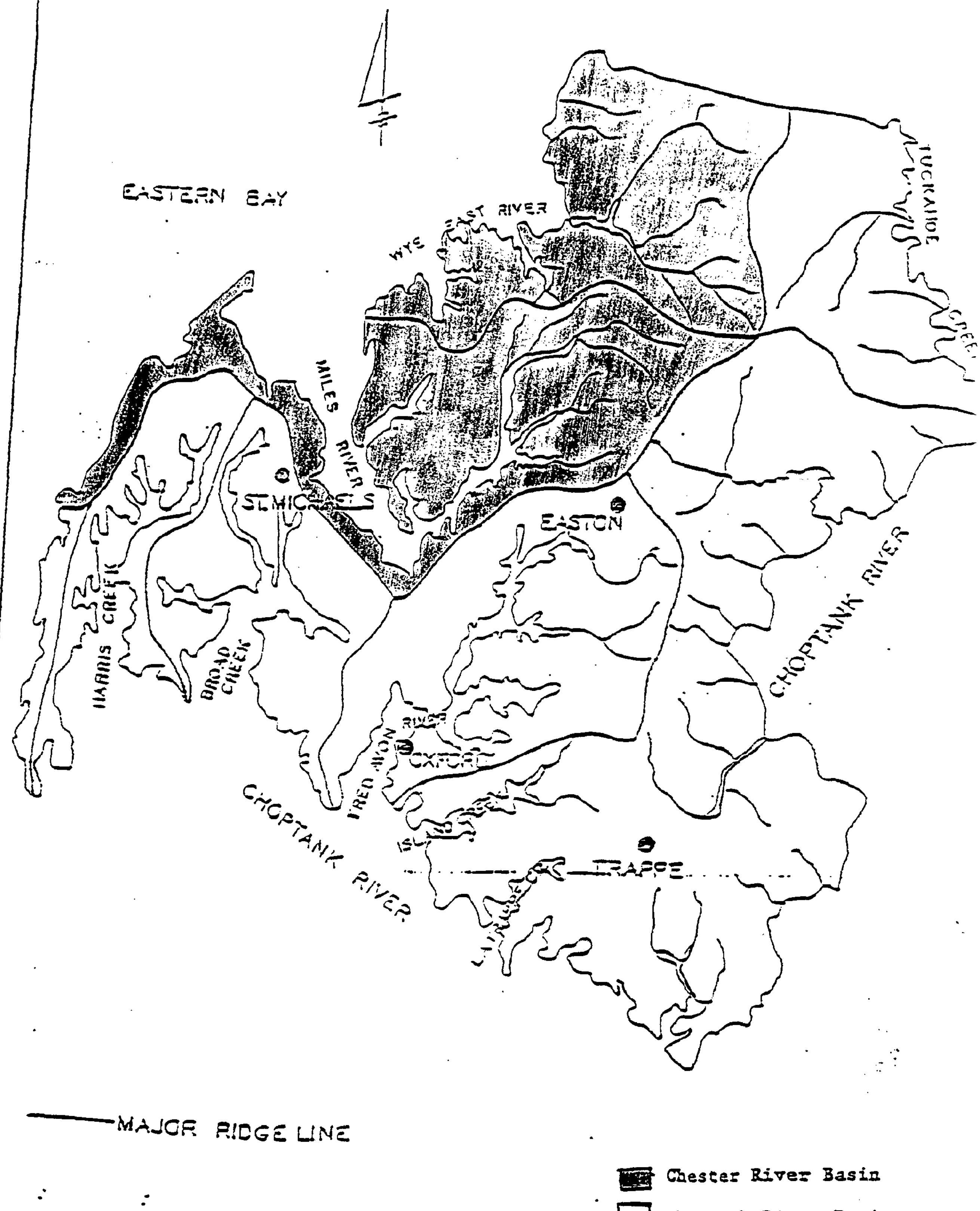
Soils of Talbot County were surveyed in 1969 (See Reference 3). Soil profiles are classified for all areas of the county to a depth of four to five feet below the surface. The six major soil associations, classified by the Soil Conservation Service, are described as follows: (See Figure No. 5).

1. Sassafras - Woodstown Association

Level to strongly sloping, well drained and moderately well drained soils that have subsoil of sandy loam or sandy clay loam.

FIGURE NO. 4 - GENERALIZED GEOLOGIC SECTION*





TALBOT COUNTY COMPREHENSIVE
WATER AND SEWERAGE PLAN

DRAINAGE BASINS

ANNAPOLIS

MCRONE

EASTON

FIGURE NO.

This association occurs mostly in large tracts along U.S. Highway 50 and eastward to the Choptank River. Most of the association is open farmland consisting of level nor moderately sloping soils. The association occupies 28 percent of the county.

The Sassafras soils make up about 70 percent of the association; the Woodstown soils, about 20 percent; and minor soils, the rest. Among the minor soils are the poorly drained Fallsington and Elkton soils.

The Sassafras and Woodstown soils are deep and have a sandy loam to sandy clay loam subsoil. They formed in marine deposits of sand, silt and clay.

The Sassafras soils are well drained. Ground water may be below a depth of 5 feet. The Woodstown soils are moderately well drained. They have a fluctuating high water table during February and March. Sassafras soils are seriously eroded along strongly sloping narrow strips bordering intermittent streams.

The major soils in this association are well suited to farming. A small acreage is wooded.

The soils of this association generally are suitable for community development including waste disposal, although a seasonal high water table, where present, restricts the use of Woodstown soils for such uses as septic tanks,and land application of wastewater and sludges. Most of the fill used for road subgrade in the county is from soils in this association. The major soils are suitable as foundations for buildings.

2. Mattapex-Matapeake Association

Level to strongly sloping, moderately well drained and well drained soils that have a subsoil of loam to silty clay loam.

This association occurs throughout the county. The largest areas are in the central part, bordering the tidal streams of Miles River Neck, Island Neck and Oxford Neck. Most of the acreage is farmland consisting of level to gently sloping soils. This association occupied about 23 percent of the county.

The Mattapex soils make up about 53 percent of the associations; the Matapeake soils, about 40 percent; and minor soils the rest. Among the minor soils are the somewhat poorly drained Barclay soils and the well-drained Sassafras soils.

The Mattapex and Matapeake soils are deep. They developed into silty marine sediments underlain by sands containing a large amount of silt. The Mattapex soils are moderately well drained. Their subsoil is compact and tends

Matapeake soils are well drained. They become compact when they are plowed or grazed when wet.

The major soils in this association are well suited to grain. These soils respond well to large additions of fertilizer. They retain moisture well and keep it readily available for plants. In most places the soils are level to gently sloping, occur in large areas, and are suitable for the use of large farm equipment. A small acreage is wooded.

The soils of this association generally are suitable for community uses such as homesites, golf courses and parks. Well drained soils of this association may be suitable for septic tanks, and land applications of wastewater and sludges.

3. Keyport-Mattapex Association

Level to gently sloping, moderately well drained soils that have a subsoil of silty clay loam or silt loam.

This soil association occurs mainly in narrow areas that border tidal streams in the western part of Talbot County near St. Michaels, Bozman, Neavitt and Royal Oak. The landscape is mostly level, except where it slopes to tidewater. This association makes up about 11 percent of the county.

The Keyport soils make up about 75 percent of this association, and the Mattapex soils, most of the rest, though there is a small acreage of minor soils.

The Keyport and Mattapex soils are deep and formed from silt and silty clay marine deposits. The Keyport soils have a silty clay loam subsoil, and the Mattapex soils have a silt loam subsoil. Both of these subsoils restrict the movement of air and water, and especially in winter, water collects on the surface of the soils where they are nearly level.

The subsoil of both kinds of soils is so hard and compact that it restricts the growth of roots during the dry summer months.

Grain, hay, and pasture crops grow well on the soils in this association where surface water is removed. Corn and soybeans are the main crops. Only a small part of this association is wooded.

Although the soils in this association have limitations if used for septic tank filter fields or for the foundations of buildings, many homes have been built on the soils. The surface water and the compact subsoil cause severe limitations for building foundations. The Keyport soils shrink and swell on alternate drying and wetting. Foundations of homes must be designed to take this into account.

4. Elkton-Othello-Barclay Associations

Level and nearly level, poorly drained and somewhat poorly drained soils that have a subsoil of silty clay to silt loam.

This soil association is in large areas in the western half of Talbot County, but smaller areas are scattered throughout. The soils occupy parts of or all of peninsulas, necks, and a few small islands throughout the tidewater area. The landscape is flat and is broken only by drainage ditches. Much of the acreage is wooded. This association occupies about 30 percent of the county.

The Elkton soils make up about 45 percent of this association; the Othello soils, about 40 percent; and the Barclay soils, about 15 percent.

The Elkton and Othello soils are deep and poorly drained. They formed in marine sediments of silt and silty clay texture. The Elkton soils are gray, and the Othello soils are grayish and brownish. The Barclay soils are deep and somewhat poorly drained. They are not as gray as the Elkton or Othello soils.

All the soils in this association have a fluctuating high water table during winter and spring. For much of these seasons the water table is at the surface, and in some places the water is ponded.

Artificial drainage is needed before the soils of this association can be farmed successfully. In most places the fields are large, level, and suitable for the use of large farm equipment.

Much of this soil association has mixed cover of loblolly pine and oak. Loblolly pine grows well on these soils, but in winter and spring logging is difficult because of wetness.

Seasonal wetness also severely limits the use of these soils for community development and wastewater disposal. Roads are difficult to build and are expensive to maintain because of high water tables and susceptibility to frost heave.

5. Fallsington-Pocomoke Association

Level to depressional, poorly drained and very poorly drained soils that have a subsoil of sandy loam or sandy clay loam.

in the southern part of Talbot County and near Cordova in the northern part. The soils occupy depressions or low areas that generally are surrounded by the higher lying soils of the Sassafras-Woodstown association. The Fallsington-Pocomoke association occupies about 5 percent of the county.

The Fallsington soils make up about 80 percent of this association, and the Pocomoke and minor soils make up the rest.

The Fallsington and Pocomoke soils are deep and dark colored. They formed in deposits of sand, silt, and clay. The Fallsington soils are gray and poorly drained. The Pocomoke soils are black and very poorly drained.

The soils of this association have a fluctuating high water table throughout much of the year. Several inches of ponded water generally cover the Pocomoke soils about 6 months each year.

Artificial drainage is needed to make soils of this association suitable for farming. These soils are used for may kinds of general farm crops.

The soils of this association have severe or very severe limitations for community development and wastewater disposal. Because the water table is high throughout much of the year, limitations are severe for most engineering uses.

6. Tidal Marsh Association

Low-lying level areas that are subject to flooding by salt water.

This soil association occupies large areas along the Choptank River and Tuckahoe Creek and smaller areas along most of the other tidal creeks in the county. These smaller areas generally are so small that they cannot be shown on the soil association map. In most places the landscape of this association is low-lying and flat, but in some places it is broken by hummocks, or by other slightly higher ground. The soils are not used for farming. This association occupies about 3 percent of the county.

Tidal marsh makes up about 95 percent of this association. The remaining 5 percent consists of small areas of Coastal beaches, of the low Othello soils, and of the Plummer and Pocomoke soils.

This association is subject to flooding by salt water. Nearly all of the acreage is affected to some degree by tides, but some areas are shown on the general soil map as Tidal marsh are much like fresh water swamp.

Except for some of the small areas of minor soils, the association is not used for woodland. The trees on the minor soils are water-tolerant hardwoods and loblolly pine, but generally these trees are not large enough to be sold.

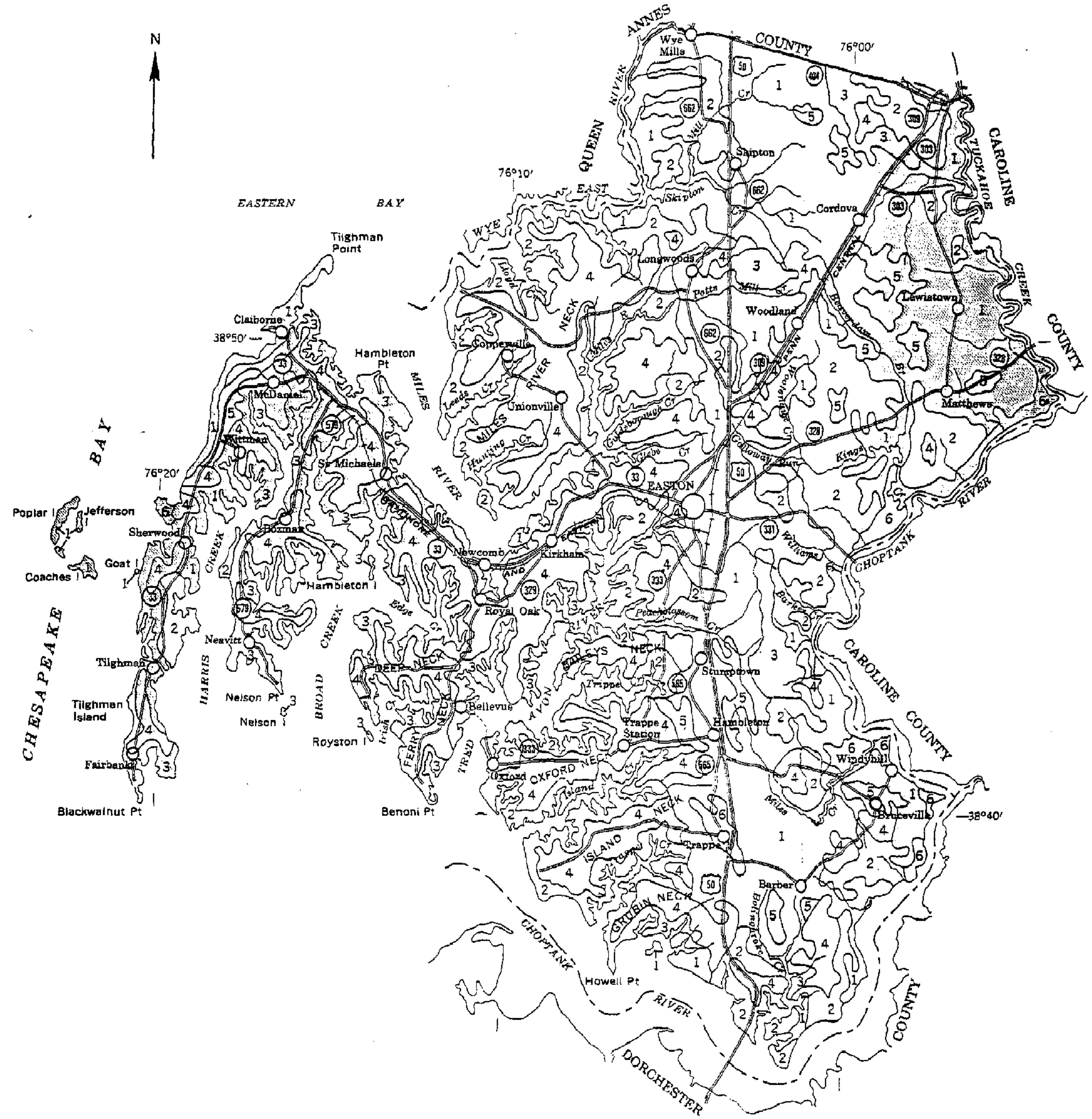
Most of this association is used for a variety of wildlife purposes. This association is not suitable for community or commercial development.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
MARYLAND AGRICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP

TALBOT COUNTY, MARYLAND

SCALE IN MILES
1 0 1 2 3 4



SOIL ASSOCIATIONS

1 — Sassafras-Woodstown association: Level to strongly sloping, well drained and moderately well drained soils that have a subsoil of sandy loam or sandy clay loam

2 — Mattapex-Matapeake association: Level to strongly sloping, moderately well drained and well drained soils that have a subsoil of loam to silty clay loam

3 — Keyport-Mattapex association: Level to gently sloping, moderately well drained soils that have a subsoil of silty clay loam or silt loam

4 — Elkton-Othello-Barclay association: Level and nearly level, poorly drained and somewhat poorly drained soils that have a subsoil of silty clay to silt loam

5 — Fallsington-Pocomoke association: Level to depressional, poorly drained and very poorly drained soils that have a subsoil of sandy loam or sandy clay loam

6 — Tidal marsh association: Low-lying level areas that are subject to flooding by salt water

April 1969

SECTION II

Population

A. General

Population change is governed principally by three variables; birth, death and net migration, all of which are influenced by a number of factors. In Talbot County population trends are affected by trends in household size, retired and semiretired people attracted to the area, employment, interest rates (and the economy in general), and zoning.

Population forecasting requires an intensive study of past and present trends and assumptions as to how trends will continue. The primary sources of these data are the U.S. Bureau of Census reports and the vital statistics published by the Maryland State Health and Planning Departments. Other sources of data include building permits, school enrollment records, electric and water meter installation records and land zoning regulations.

The latest census was taken in 1980. New census data will not be taken until 1990. The 1980 data is presented here along with any updated estimates available.

The population of Talbot County, according to the 1980 census was 25,604 persons.

TABLE B

1980 POPULATION BY ELECTION DISTRICT

DISTRICT NO.	ELECTION DISTRICT	POPULATION	GROWTH SINCE 1970
1	Easton	12,166	8.9%
2	St. Michaels	4,654	5.5%
3	Trappe	3,510	4.3%
4	Chapel	3,347	2.2%
5	Bay Hundred	1,927	-20.0%
TOTAL		25,604	

Source: U.S. Census (1980)

Table C shows the population of the municipality of Easton and other incorporated municipalities of Talbot County as provided by the 1980 Census, and as updated by 1986 census estimates.

TABLE C

POPULATION OF INCORPORATION MUNICIPALITIES

MUNICIPALITY	1980 CENSUS	1986 CENSUS ESTIMATE	CHANGE NO.	CHANGE %
Easton	7,536	8,480	944	125
St. Michaels	1,301	1,360	59	4.5
Oxford	754	790	36	4.8
Trappe	739	860	121	16.4
Queen Anne	128	100	-28	-21.9
Total for Towns	10,458	11,590		
Total for County	25,604	27,200		

Source: U.S. Census (1980)

It should be pointed out that the figure for the town of Queen Anne represents only that portion of the town which is actually in Talbot County, with the remainder of the town being in Queen Anne's County. From the tables it can be seen that almost one-half of the County population lives in the Easton Election District, and that almost one of every three County residents lives in the Town of Easton. When the populations for all five are combined, it can be seen that about 41 % of the population resided in these towns in 1980.

B. Population Density

As basically a rural area, the Eastern Shore is much less dense than the state average for either Maryland (396.6 persons per square mile) or Delaware (276.5 persons per square mile). Talbot County with its 98 persons per square mile, has a density which is notably higher than that of the other rural counties of the Shore.

Density distribution within the County serves as a reliable guideline for the planning of sewer and water service areas. For ease in planning these municipal systems, the densities were analyzed by election districts. Areas of dense development having small lots (generally less than one acre) should, if feasible have a public sewer and water system. These lots are usually too small to contain both septic systems and well. Dense developments also reduce the costs of public systems since the cost per user diminishes as more dwelling units are connected to the system . On the other hand, areas of sparse development with large lots, if not located on poor soils, present less chance of contamination to the neighbor's water supply and do not necessarily require public systems. Table D shows the density of the County by election districts.

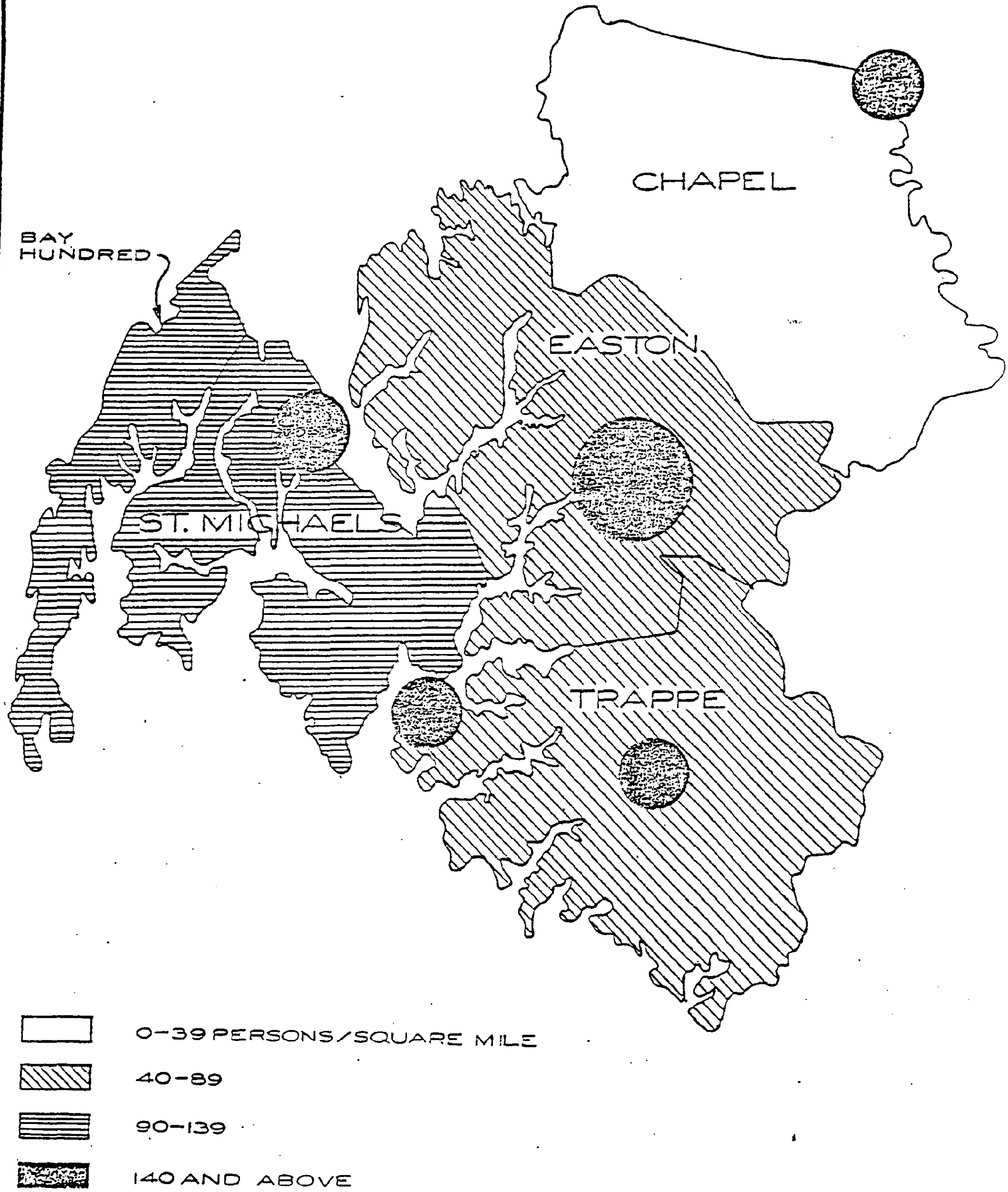
TABLE D

POPULATION DENSITY BY ELECTION DISTRICT: 1940-1980

	Density (Persons Per Square Mile)				
DISTRICT	1940	1950	1960	1970	1980
EASTON	101	113	132	153.4	167
ST. MICHAELS	102	98	117	149.1	157
TRAPPE	45	42	43	55.1	57
CHAPEL	32	31	34	34.1	41
BAY HUNDRED	95	103	91	119.7	117
TOTAL	67	70	77	90.7	98

Source: Maryland State Planning Department

Figure No. 6 shows the density within the County. The number for the various election districts are calculated for the areas and populations outside of the incorporated towns. In general, it can be said that the densest parts of the County (outside of towns) are in the western half in the waterfront areas. Thus both Bay Hundred (117 persons per square mile) and St. Michaels (157 person per square mile) election districts show higher densities; and Chapel District, which is the most inland of the five, shows the lowest density of all at 41 persons per square



TALBOT COUNTY COMPREHENSIVE
WATER AND SEWERAGE PLAN

POPULATION DENSITY BY ELECTION DISTRICT

ANNAPOLIS McCRONE EASTON

ENGINEERS · PLANNERS · SURVEYORS

FIGURE NO.

mile. Although the map does not reflect diffences which occur within a particular election district, the actual density varies within the district. In reality the waterfront areas of both Easton and Trappe election districts are more dense than the inland ares east of U.S. Route 50

These more dense waterfront areas are those which tend to have soils with poorer drainage qualities. Thus the areas of the County which can handle increased population with greatest difficulty have become the most densely populated, and areas with the best soils for development have remained basically undeveloped, consistent with County Agricultural Land Preservation objectives.

C. Population Growth

1. Past Growth Trends

The purpose of this section is to examine the County's past growth trends and identify those factors that appear to have influenced the present population of Talbot County.

In Talbot County the growth curve is relatively flat until the 1940's when the rate increased slightly. From 1950 to 1980 the County's growth rate stabilized at a moderate rate of about 10% increase per decade. Talbot County's growth during the decade of 1970-1980 was 81%. The 8.1 % increase in Talbot County represented an actual numerical increase of 1,922 persons during the decade 1970-1980.

Every election district except Bay Hundred showed population growth during this decade. The population of Bay Hundred has remained near 2,000 for the past 70 years. By far the area of greatest numerical growth within the County was the Easton Election District. Its 8.9% growth represented a substantial numerical growth of 999 persons, most of which occurred within the Town of Easton. The St. Michaels Election District showed a growth rate of 5.5% from 1970 to 1980 .The Town of Easton experienced a 10.7 % growth rate with 727 new residents from 1970 to 1980. During the 1970's Trappe District showed a moderate rate of 4.37% growth. Bay Hundred District experienced a decrease in population of 481 persons during the 1970's. The Chapel District however, showed a 2.21% population increase through the 1970's.

The Town of Easton experienced a 10.7% growth rate with 727 new residents from (1970 to 1980). The population for the Town of St. Michaels decreased however by 155 people from 1970 to 1980 indicating that growth in this Election District occurred in the areas outside of town during the '70's. This represented in many cases the presence of new residents who have purchased or built retirement homes in the waterfront areas of the Election District.

From 1970 to 1980 Talbot County experienced a net immigration of 803 persons. This accounts for just about half of the County's growth during this period, the other half being "home grown" (births 2783 deaths 3,9020). This is rather exceptional for a rural area. Nationally and in the state of Maryland there has been a strong demographic trend for movement out of the rural areas and into urban ones. The Eastern Shore as a whole, being basically a rural area, experienced a net out-migration also, while Montgomery and Prince George's Counties (part of the Washington D.C. SMSA) together showed an immigration of almost a third of a million persons. Thus it can be seen that Talbot County has been atypical and that it has assets which are attractive enough to reverse the usual out-migration trend.

2. Current Population

While census data is only available every 10 years, interim estimates are provided by the Census Bureau & the Maryland Department of State Planning. Based on these 1986 estimates, the Town of Easton's growth rate has accelerated from about 1% per year in the 1970's to about 2% per year from 1980 to 1986. The other Town's in the County are also growing rapidly with the exception of Queen Anne. Actual 1980 decade growth rates will be confirmed in the forthcoming 1990 Census.

TABLE
MARYLAND DEPARTMENT OF STATE PLANNING AND
U.S. CENSUS BUREAU

JULY 1, 1986 POPULATION ESTIMATE

Municipalities	Population	% Change From 1980 to 1986
Easton	8,480	12.5
St. Michaels	1,360	4.5
Trappe	860	16.4
Oxford	790	4.8
Queen Anne	100	-21.9
Talbot County	27,200	6.2

D. Population Characteristics

As the following table from the 1980 Census indicates, the older age groups make up a larger percentage of the County population than they do in either the State or nation as a whole. Compared to both Maryland and the Nation, Talbot County is under-represented in all groups below age 45.

TABLE
TALBOT COUNTY POPULATION BY AE GROUP

Age Group	1980	
	No.	%
Under 5	1360	5
5 - 14	3279	13
15 - 24	4047	16
25 - 34	3629	14
35 - 44	2772	11
45 - 54	2726	11
55 - 64	3322	13
65 & over	4469	17

Source: U. S. Census (1980)

Table E shows the breakdown of age groups for the Talbot County Election Districts. In general, the waterfront areas tend to be older. Chapel district, which is the "inland" one, shows a much "younger median age than the rest of the County and a median age which is very close to the figure for the State. This is due to the presence of many active farms, and the lack of waterfront to attract older persons. The St. Michaels Election District is by far the area with the oldest population in the County and has been impacted by the arrival of older persons settling on its highly valued waterfront real estate. Easton, Trappe, and Bay Hundred districts remain fairly close to the County average.

TABLE E
AGE DISTRIBUTION BY ELECTION DISTRICT

Election District	Under 18	18-64	65 and Over
Easton	21%	60%	19%
St. Michaels	20%	58%	22%
Trappe	23%	59%	18%
Chapel	33%	58%	9%
Bay Hundred	24%	59%	17%
Talbot County	23.1%	59.4%	17.5%
State of Maryland	35.2%	57.2%	7.6%

Source: U.S. Census (1980)

E. Population Projection

There are a number of factors which will affect the population growth patterns of the Eastern Shore during the next several decades. National events and trends such as wars, economic cycles, and urbanization have influenced growth in the past. While these continue to be important factors, they are difficult to predict. National decreases in household size will also affect the Eastern Shore as well as the attractiveness of water front properties to retired and semi retired persons. Recent critical area regulations will also affect population by limiting certain types of land use.

A factor which is having a significant impact upon the population of Talbot County and the Eastern Shore is the completion of the second span of the Chesapeake Bay Bridge, which opened in 1974. This project plus the incremental upgrading of the Route 50 will further increase the accessibility of the ocean beach areas of the Lower Shore to the urban populations of Washington, D.C. and Baltimore. At this same time it will make it easier to get to places like Talbot County. There will certainly continue to be an increase in the quantity of weekend traffic on Route 50, and this should affect the development of commercial facilities along this route.

There have been three recent attempts to forecast future population for Talbot County with different results. The outcomes of these forecasts depend upon the population indicators used in each study and the assumptions made about future trends. Studies included here are the Maryland Department of State Planning,Hammer, Siler, George Associates (as consultants to the County Council) and the Talbot County Planning Department.

Table No. 1 compares the results of these forecasts along with Figure No. 1.

TABLE NO.1
POPULATION FORECASTS
TALBOT COUNTY, MARYLAND

Year	Hammer Siler, George Assoc.	MD. Dept. of State Plan.	Talbot County
1985	27,656	26,950	27,013
1990	30,340	28,800	28,798
1995	33,469	29,700	30,854
2000	34,497	30,300	32,983
2005	36,427	30,700	34,044
2010	38,423	31,100	37,042

TABLE
COMPARISON OF AVERAGE ANNUAL GROWTH RATE
IN POPULATION FORECASTS FOR
TALBOT COUNTY 1970-2010

	1980-1990		1990-2000		2000-2010	
	No.	%	No.	%	No.	%
Hammer, Siler, George & Assoc.	474	1.85	416	1.37	430	1.56
MD Department of State Planning	320	1.25	150	0.51	166	0.62
Talbot County Planning Dept.	319	1.25	419	1.45	401	1.49

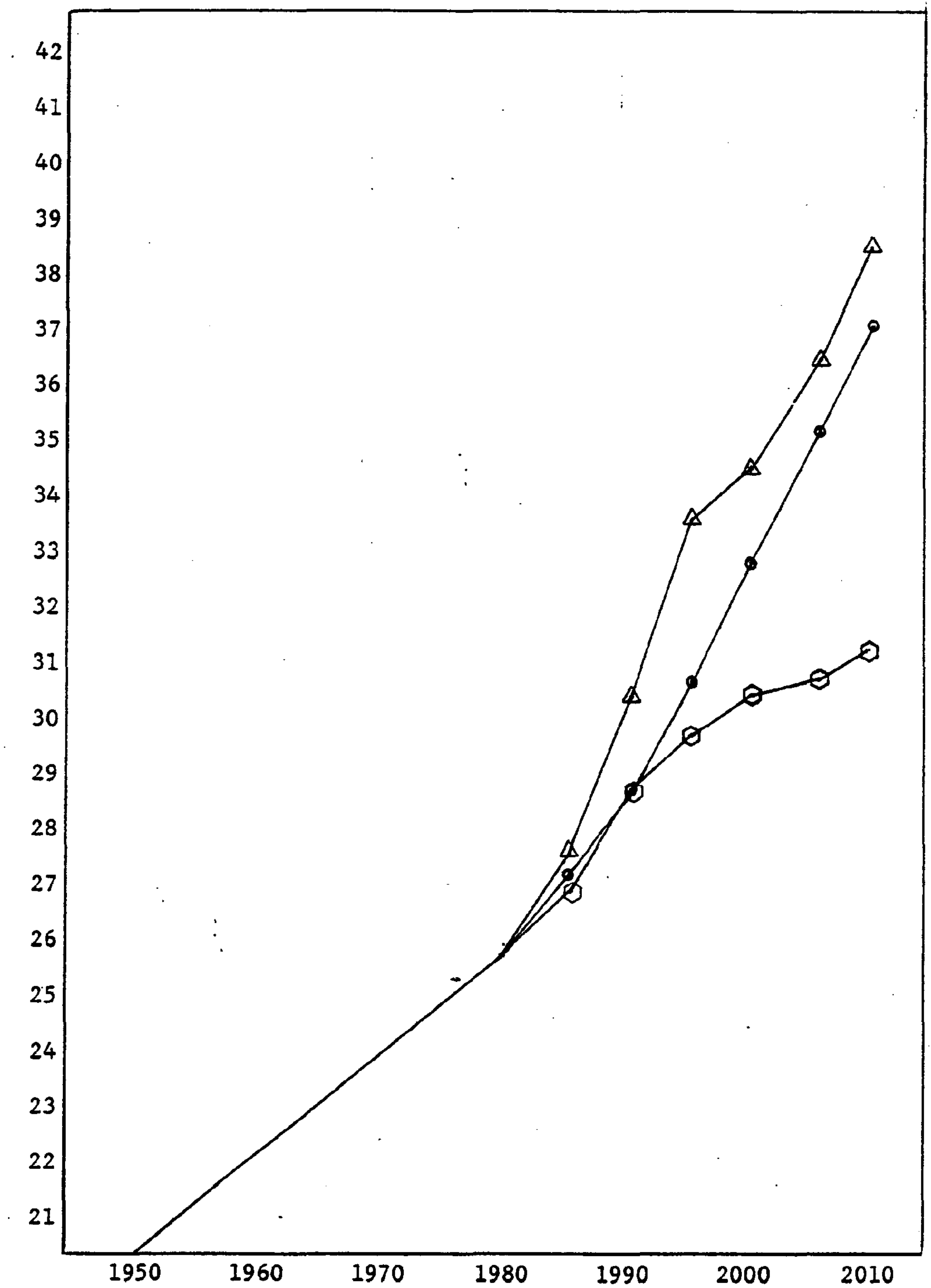
The forecasts by Hammer, Siler, George Associates and the Talbot County Planning Department predict higher rates of growth county wide than the Maryland Department of State Planning (Figure No.). The difference is due to the indicators used. The State's methodogy depends heavily on birth, death and U.S. Census trend data. It does not include as many housing units authorized by building permits as the County planning staff has documented and assumes slightly fewer of them will become housing units than believed to be the case. Information used by the Hammer, Siler, George projection included residential building permits, proposed residential projects, allocation of electricity and water permits, amount of vacant land zoned for residential uses, and employment participation rate trends.

Based upon the results of Hammer, Siler, George Associates and Talbot County Planning Department, it is projected that the County's population will grow at a rate of 13.7 to 14.5% during the forthcoming decade. This will yield a County population from 30,854 to 33,469 persons in 1995 and 32,983 to 34,497 the year 2000. The general trend toward an older County population should continue. This will be brought about because of several factors: (1) a general national decline in the number of babies being born; (2) a state and national demographic trend for people in their post-adolescent years to migrate from the rural areas to urban areas; (3) a continued in-migration of older adults, attracted to Talbot County as a retirement location, and (4) medical advances which tend to help everyone live longer.

<u>Weekend and Seasonal Visitors</u>

In addition to the resident population, it is important to consider the demand that visitors place on water & sewerage facilities. With Talbot County's high influx of tourists this demand may be significant in some areas. In St. Michaels, between the years of 1982 and 1986, for example, water demands increased 50% from winter to summer. On a gallons-pre-resident basis where total gallons used are divided by the number of residents the seasonal change is from 90 gpcd during winter to 215 gpcd in summer. Engineers and planners should be aware of these impacts when planning system capacities.

POPULATION PROJECTIONS
TALBOT COUNTY
MARYLAND



△ Hammer, Siler, George Associates (1988)

o Talbot County Planning Department

⬡ Maryland Department of State Planning

FIGURE NO.

TALBOT COUNTY OFFICE
OF
PLANNING AND ZONING
COURT HOUSE
EASTON, MARYLAND 21601
PHONE 301-822-2030

DANIEL R. COWEE
Planning Officer

June 13, 1989

Mike Thomas
Coastal Resources Division
Department of Natural Resources
Tawes State Office Building
Annapolis Maryland 21401

Dear Mike:

Throughout the process of updating the Talbot County Comprehensive Sewer and Water Facilities Plan, a number of workshop meetings were held to discuss Critical Areas and how sewer, water and shared facilities fit into the overall land use plan.

Initial mapping for Critical Areas took into account current and proposed sewer service districts and sewer service areas. This information coupled with the ground water study, which is a section of the updated Comprehensive Sewer and Water Facilities Plan, were used extensively in making the land use and zoning decisions in critical areas. In addition to this information the different committees used land use and transportation information to determine future growth patterns both within and outside of critical areas. The final critical areas product consists of a plan and implementation ordinance (zoning ordinance). Growth occurring in critical areas in and around the towns of Easton, St. Michaels and Oxford is controlled by growth allocation under critical areas, and sewer allocation is controlled by the Comprehensive Water and Sewer Facilities Plan.

The overall Comprehensive Plan for Talbot County is expected to be finished by September of 1990. Critical Areas and decisions on growth control and sewer allocations have essentially been completed. The workshops took place from June of 1987 to present and have involved numerous local commissions and committees and many personnel from town and county governments.

In summary, the Comprehensive Sewer and Water Facilities Plan becomes a part of the overall County Comprehensive Plan and vice versa.

I hope this discussion clears up any concerns you may have had concerning the process, procedure and coordination that has taken place during the Critical Area Program development.

If I can be of further assistance feel free to contact me at the Talbot County Planning Office, telephone 822-2030.

Sincerely,

TALBOT COUNTY OFFICE OF PLANNING AND ZONING

Daniel R. Cowee
Planning Officer

DRC/jc

P.S. I have enclosed a rough draft of the Land Use section of our draft Comprehensive Plan to be included in the Comprehensive Sewer and Water Facilities Plan.

DRAFT Summary of Land Use Section of Comprehensive Plan
for Inclusion in Talbot County Sewer Plan (3 March 1989)

SECTION III - Land Use

EXISTING LAND USE PATTERN

The existing land use pattern for Talbot County is shown in Figure No._____. From the map, it can be seen that most of the County's land is used for agricultural purposes. As of October 1987, 73% of the total County land, or 126,850 of its 172,704 acres, is farmland. An additional 11% is forested, leaving 16% of built up land area. Residential development accounts for 14% of total land acreage. In 1985, 8% of the jobs in Talbot County or 1,400 people employed were involved in farming, agricultural services, forestry or fisheries activities.

The largest single area of development has occurred in and around the Town of Easton. In addition, residential development has also concentrated in the western portion of the County along the waterfront. Development of all types in the waterfront area of the County is now regulated by the State of Maryland Critical Area Law that is designed to protect the Chesapeake Bay environment. The provisions of this State law are being implemented through the County zoning code and land use regulations.

Commercial and industrial land uses in the County have located in close proximity to the incorporated towns. Some scattered industrial uses exist in the villages, including seafood processing operations along the waterfront. These uses are also regulated by the Critical Area legislation. In most instances, strip commercial development has been limited to certain areas along Route 50.

FACTORS INFLUENCING GROWTH AND DEVELOPMENT

1. Population Growth

As Table 1 indicates, the population of Talbot County is projected to increase moderately over the next twenty years. While this rate of growth may not seem noteworthy as compared to the dramatic rate of growth experienced on the western shore of Maryland, this projected population growth rate is significant within the context of Talbot County. The population increase will result from an in migration rather than a natural increase in population birthrate. In addition, the composition of the population will change in future years as an increasingly large percentage of the population in Talbot County will be over 64 years of age. As much as 17.5% of the population was over 64 years in 1980, with that proportion expected to increase to 22.3% by 2010.

Table 1
POPULATION FORECASTS TALBOT COUNTY 1970-2010

	1970	1980	1985	1990	1995	2000	2005	2010
Total	23,682	25,604	27,013	28,798	30,854	32,983	35,044	37,042

Average Annual Growth Rate	1970-1980	1980-1990	1990-2000	2000-2010
	0.81%	1.25%	1.45%	1.23%

Source: Talbot County and Maryland Department of State Planning

As a gauge of development activity, average annual building permit statistics for 1980-1988 indicate that 59% of all residential permits in the County were issued outside of the incorporated towns. The Town of Easton accounted for 32% of the average annual permits issued during this period with the remaining 9% issued in the other incorporated towns. The number of permits issued in St. Michaels has dropped significantly in recent years, most probably as a result of the Critical Area legislation.

The goal of land use regulation in Talbot County is to service the needs of its expanding population while preserving and protecting its natural and environmental resources from over development.

2. Preservation of Natural Resources

Waterfront

Talbot County's 600 miles of tidal shoreline and extensive rural landscape are unique assets that enhance the quality of life of county citizens. In the past, the demand for waterfront property in Talbot County has raised land values for properties in this location and increased pressure for waterfront development. The poorly drained soils and high water table limited the availability of sewage disposal through septic tanks in the waterfront areas. The environmental quality of the waterfront is a significant component of not only real estate values, but of the fishing and tourist economics as well.

In recognition of the ecological significance of the Chesapeake Bay and tributary waters, the State of Maryland enacted legislation to protect water quality and preserve natural habitats within a specified Critical Area. The Talbot County Critical Area Plan was drafted in accordance with the Maryland State Chesapeake Bay Critical Area Law and sets forth the goals to be addressed in order to satisfy the State Law criteria. The Talbot County Development Ordinance implements the Critical Area Plan by incorporating regulations pertaining to the limitation and control of all development in the Critical Area so that the adverse impacts of growth along shoreline and tributary areas are minimized.

Rural Character

The high proportion of agricultural land in Talbot County contributes to the County's economy, employment, and quality of life. The upland agricultural areas in the eastern portions of the County often contain the soils with the best drainage potential, and therefore the most suitable for on site sewage disposal. These areas are located inland where the land prices are lower, and more suitable for less expensive development. In seasons with normal rainfall patterns, farmers and developers may compete for the same well drained areas. The unique rural and water oriented character of Talbot County attracts the development of second or retirement homes in the County. Yet this population influx creates development pressure that threatens the open space that is so attractive. In order to prevent a further loss of rural character in the County, an agricultural lands preservation program is recommended in the Comprehensive Plan and implemented through the County Development Ordinance.

COUNTY COMPREHENSIVE PLAN

The paramount goal of the Comprehensive Plan is to preserve and provide a high quality of life for all County residents. In order to achieve this goal, the County shall endeavor to maintain a pace of growth and development that is controlled and moderate in order to preserve the natural attributes that contribute to the county's rural character. The purpose of land use regulations shall be to channel development into the most appropriate areas while helping to preserve the open and rural areas.

Land Use

The County future land use plan is shown on Figure No._____ and highlights seven general areas:

1. Incorporated Towns
2. Critical Area
   - a. resource conservation areas (low density)
   - b. limited development areas (medium density)
   - c. intensely developed areas (highest intensity)
3. Agriculture/Open Space (low density)
4. Village/Residential (medium density)
5. Commercial (highest intensity)

The future land use plan designations are general categories for various portions of the County designed to depict an overview of future development patterns.

1. <u>Incorporated Towns</u>

The five existing incorporated towns should remain the principal centers of population, employment, and services for the County. High density residential uses are best located in the towns where public transit, retail, and employment opportunities are convenient. Regional office, commercial, service, and industrial activity should be located in the towns. Easton shall remain the center of County-wide services, governmental functions and other institutional uses serving the County-wide population.

2. <u>Critical Area</u>

The Maryland Chesapeake Bay Critical Area Law defines the Critical Area lands within each jurisdiction as "... all waters of and lands under the Chesapeake Bay and its tributaries ... [and] ... all land and water areas within 1000 feet beyond the ... wetlands and the heads of tide ..." The Talbot County Critical Area Plan maps all County lands within the Critical Area. The Critical Area boundary is reflected in Map_____. The Critical Area Plan policies guide and limit development within the Critical Area according to State Law. The land uses permitted in the Critical Area have been placed in three categories:

a. Resource Conservation Areas - Characterized by low density activities consisting of agriculture, forestry, fisheries, other resource utilization and/or the protection of natural habitats.

b. Limited Development Areas - Characterized by limited, medium density development subject to strict regulation to prevent adverse impacts of natural habitats and water quality.

c. Intensely Developed Areas - Characterized by the highest density permitted in the Critical Area. Development is subject to limitations designed to prevent adverse impacts on habitats and water quality.

3. Agriculture/Open Space

The goal of preserving the rural character of Talbot County can only be achieved by conserving existing agricultural and open areas. To that end, the County should undertake a series of measures as part of a comprehensive and coordinated program. First, the County should restrict development of its agricultural and open space areas, including farmlands, open fields, woodlands, stream valleys and marshes; residential development should be permitted only at very low densities. Second, development allowed in agricultural and rural areas should be clustered to minimize its visual and environmental impact and preserve the maximum amount of open areas. Third, additional development density should be provided for properties in agricultural and rural areas which may be transferred to Village/Residential areas in order to meet the need for housing in a concentrated manner. Finally, the establishment of a Land Trust for the County should be encouraged to acquire properties and/or their development rights for preservation of open areas.

4. Village/Residential

The Village/Residential areas include village centers, suburban residential areas adjacent to incorporated towns, and rural residential areas.

The role of the village center is to accommodate the needs of population centers outside of the incorporated towns. There are twenty village areas in Talbot County that provide a limited source of employment and services for residents within a local radius. The purpose of the villages is to provide an opportunity for necessary land uses that are not appropriate in the surrounding rural/agricultural areas. Medium density residential uses and local office & commercial activities should be accommodated within the existing boundaries of the villages.

Such activities should be developed in accord with village design guidelines that preserve the rural and intimate local atmosphere of the villages. By providing an opportunity for residential development on relatively small parcels, the villages provide an outlet for development pressure and protect the rural character of the surrounding countryside.

The villages could, in time, be provided with central water and/or sewer services and to that end, an average of at least one dwelling unit per acre would be required to provide economic central sewer service.

Town residential areas provide an opportunity for small lot residential development adjacent to incorporated towns. These areas also provide an opportunity to focus residential development to protect the County's rural character. As the incorporated towns annex these adjoining properties, sewer and water service would be provided by the towns.

Finally, the scattered areas of low density rural residential development should not be expanded. Abundant development of this type would not be consistent with the preservation of the agricultural/rural character of the County and would result in low density sprawl.

5. Commercial

The role of commercial uses in the County is to provide a source of local services and employment for County citizens. While major regional retail, office, and commercial activity is centered in Easton and the other incorporated towns, the outlying commercial areas in the County serve an important function on the local level. The majority of commercial activity is to be centered in the villages, where the residential densities are sufficient to support a small retail and office market.

Major Roadways

The presence of U.S. Route 50 has drawn a substantial amount of commercial activity along the roadway, particularly near the Town of Easton. Route 50 is heavily traveled, particularly during the summer months when the tourist beach traffic is greatest. In order to discourage unsightly strip commercial uses from clustering along Route 50, design guidelines shall be enforced to preserve the scenic quality of the roadways and to prevent further traffic congestion.

Two major state highway improvements should improve traffic circulation in Talbot County. The St. Michaels by-pass will enhance the local character of St. Michaels by diverting through traffic around the town. The dualization and improvement of Route 404 with a grade separated intersection at Route 50, will also aid traffic flow by diverting tourist beach traffic from Route 50.

EXISTING LAND USE CONTROLS

Talbot County regulates the use of land located outside the areas of the incorporated towns. All of the five incorporated towns located within the County (Easton, St. Michaels, Oxford, Trappe, and Queen Anne), have adopted Comprehensive Plans and implementing ordinances or regulations, applicable within the corporate limits of each town.

The Talbot County Development Ordinance contains the zoning and subdivision regulations administered by the County Planning Officer with advice from the five member Planning and Zoning Commission. Special exceptions and appeals are addressed by the County's Board of Appeals. A full time staff with three professional and two clerical positions administers the daily affairs of the Planning and Zoning Department.

The Development Code contains provisions for the following districts, generally described below.

1. RC Rural Conservation District

This district is characterized by natural environments (wetlands, forests, or abandoned fields) and resource development activities (agriculture, forestry, fisheries, or aquaculture). The purpose of this district is to conserve the irreplaceable agricultural, forested, and natural environmental character of the County. To achieve this goal, the residential development density for on site development is one dwelling unit per 20 acres.

Such development activities are intended to be in the form of clustered lots. In the Critical Area, these lots are clustered, primarily, to minimize impacts on plant and wildlife habitats. Outside the Critical Area, these lots are clustered, primarily, to preserve agricultural fields and to be buffered by forested areas. The residual of these development activities are large parcels protected from future development. The developed lots do not have public water or sewer service.

In addition, intrafamily transfers may be permitted on site at a density of one dwelling unit per 2 acres outside the Critical Area with more specific requirements for parcels within the Critical Area. An intrafamily transfer allows a property owner to transfer a portion of his/her property to a member of his/her immediate family for the purpose of establishing a residence for that family member.

As an additional option, development density may be transferred off a site at a ratio of one dwelling unit per 5 acres. This is done through a joint subdivision that also involves land in a Village Center or Town Residential District. Through the joint subdivision development density in the Rural Conservation District, known as the sending area, may be transferred to the Village Center or Town Residential District, known as the receiving area. A property in the Rural Conservation District that is part of a joint subdivision may still be subdivided at the 1 unit per 20 acre density. Conversely, any parcels that are larger than 5 acres, including those that were part of subdivisions developed at the 1 unit per 20 acre density, may be involved in a joint subdivision which transfers density. A joint subdivision is processed as any other subdivision.

2. <u>RR Rural Residential District</u>

This district is characterized by low intensity residential uses. The purpose of this district is to protect the environment and preserve the valuable natural resources found in the rural areas of the County while providing for a limited degree of residential development in the form of clustered lots. In the Critical Area, these lots are clustered, primarily, to minimize impacts plant and wildlife habitats. Outside the Critical Area, these lots are clustered to preserve agricultural fields and to be buffered by forested areas. The residual of these development activities are parcels protected from future development. These lots do not have public water or sewer service. The residential development density is one dwelling unit per 5 acres.

3. <u>TR Town Residential District</u>

This district is characterized by moderate intensity residential uses. The purpose of this district is to provide an opportunity for suburban residential development adjacent to existing incorporated towns. In the Critical Area, any existing natural habitat should be preserved wherever possible. Public water and sewer service should be provided. Residential development density is one dwelling unit per one acre without sewer service (with approval from the Health Department).

The residential density limits on a parcel in the Town Residential District may be increased to 4 units per acre through a joint subdivision, subject to Public Works Department approval of a sewage disposal system. As described in the Rural Conservation District section above, the number of permitted units in the sending area portion of the subdivision (1 unit per 2 acres of property in the Rural Conservation District) may be transferred to the receiving area portion of the subdivision (parcels in the Town Residential District) through a joint subdivision.

4. VC Village Center District

This district is characterized by low or moderate intensity residential and commercial uses. The purpose of this district is to provide an opportunity for a mixture of residential, commercial, and maritime/agricultural service uses at existing centers of development in rural areas of the County. Development is directed toward this district, so that the environment and valuable natural resources in the rural areas of the County are protected and preserved. These uses may have public water and/or sewer service. The residential development density is one dwelling unit per one acre without sewer service (subject to Health Department approval) and 4 dwelling units per one acre with sewer service (subject to Public Works Department approval).

The residential density limits on a parcel in the Village Center District may be increased to 6 units per acre (for parcels of 2 acres or larger) through a joint subdivision, subject to Public Works Department approval of a sewage disposal system. As described in the Rural Conservation District section above, the number of permitted units in the sending area portion of the subdivision (1 unit per 5 acres of property in the Rural Conservation District) may be transferred to the receiving area portion of the subdivision (parcels in the Village Center District) through a joint subdivision.

5. LC Limited Commercial District

This district is characterized by low intensity commercial uses. The purpose of this district is to provide an opportunity for commercial and office development serving County residents.

6. GC General Commercial District

This district is characterized by moderate intensity commercial uses. The purpose of this district is to provide an opportunity for a broad range of commercial activities including retail, wholesale, storage and contracting activities serving the County residents and visitors.

7. LI Limited Industrial District

This district shall be characterized by low intensity manufacturing uses. The purpose of this district is to provide an opportunity for light industrial/office research uses that would provide employment and services to County residents.

TABLE F
ENROLLMENT IN THE PUBLIC SCHOOLS
TALBOT COUNTY, MARYLAND

SCHOOL	SE	KG	1	2	3	4	5	6	7	8	9	10	11	12
Glenwood Elem.	6	0	0	153	145	140								
Mt. Pleasant Elem.	5	183	218	0										
Easton Middle							145	148						
St. Michaels El.-Mid. School	8	59	48	51	51	75	55	59						
White Marsh Elem.		44	47	35	43	42	29	14						
Cordova/Upper County School		30	58	33	28	36	31	27						
Tilghman Elem. School		24	23	15	22	17	9							
ELEM. TOTALS	19	340	394	287	289	310	269	248						
Easton Middle School										213	209			
St. Michaels Ele.-Mid. School										53	74			
MIDDLE TOTALS										266	283			
Easton High School												224	217	188
St. Michaels High School												68	50	60
HIGH TOTALS												292	267	248

GRAND TOTAL FOR COUNTY . . . 3,795

1989 UPDATE
COMPREHENSIVE
WATER AND SEWER

TABLE OF CONTENTS

CHAPTER THREE

CHAPTER THREE - WATER SYSTEMS

SECTION I

Water Supply Sources

A. Ground Water*

1. General

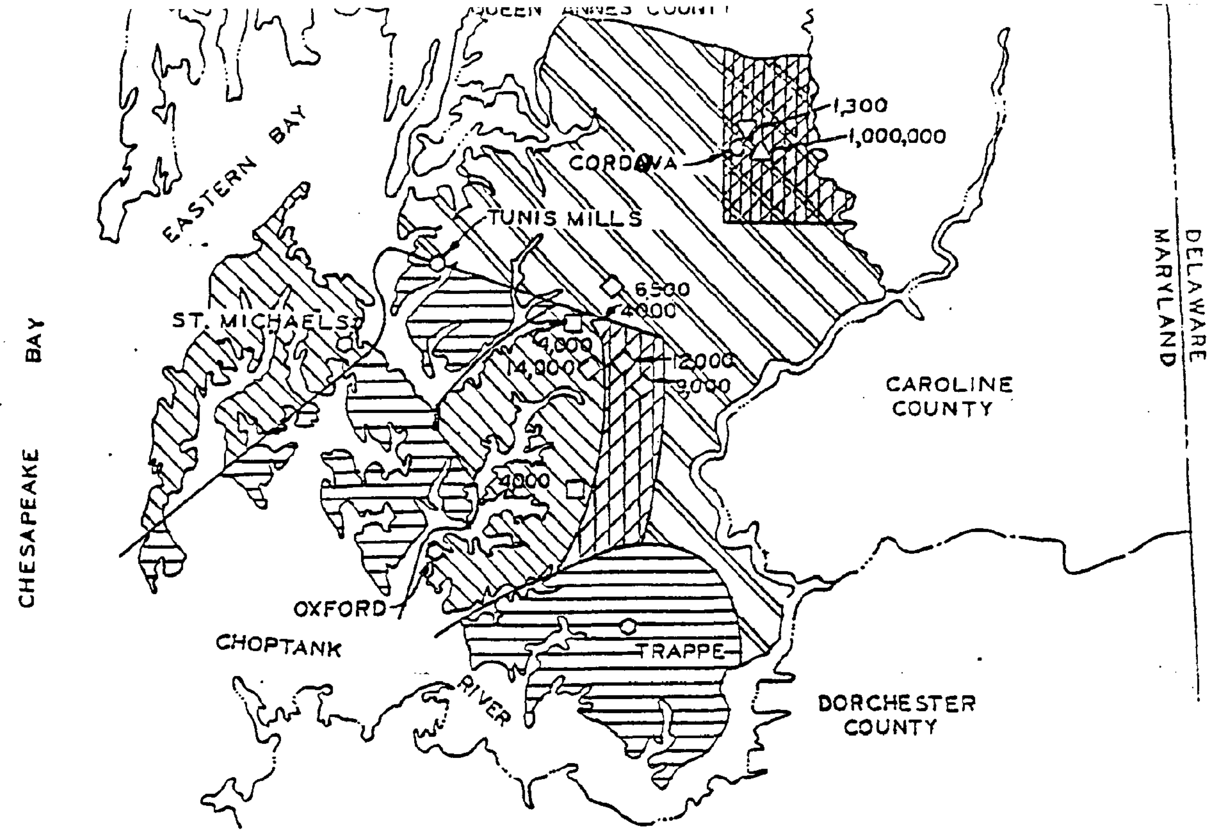
Ground-water supplies nearly all of the water presently used in the area, and is expected to continue to do so. This section discusses the availability of ground water from the various geologic units with emphasis on a determination of the quantity of water than can be obtained on a long-term basis. After a review of public literature, it can be postulated that available ground water supply is well in excess of projected County needs for the next 25 years. The present and future anticipated water needs are greatest in and around the city of Easton. A section is included that evaluates the ground-water potentials of the city.

2. Availability From Geologic Units

The major aquifers in Talbot County are sands in the Patapsco, Raritan, Magothy, Matawan, Aquia, Piney Point, and Calvert Formations and in the deposits of Pleistocene age. Some of the water-bearing sands pinch out locally, whereas others are widely distributed and their occurrence is generally predictable. Although each of the major aquifers has its own distinctive water-bearing characteristics, the sands themselves often vary considerably from one place to another in thickness, grain size, mineral content, and permeability.

In some places, the aquifers are separated by impermeable confining beds (or aquicludes). In other places, the sands are separated by leaky confining beds (aquitards) and are, therefore, hydraulically connected to some degree. When differences in hydrostatic pressures exist between aquifers, water will leak from one aquifer to another through a leaky confining bed. Thus, the geology of the county is such that some aquifers function as separate, distinct hydrologic systems, where others are interconnected and form more complex systems.

Figure No. 12 is a hydrogeologic map of Talbot County. It shows the principal aquifer being pumped in each area in 1966. In general, the aquifer used is the shallowest water-bearing formation producing sufficient water of usable quality. However, in some areas more than one aquifer is used. For example, at Easton, the city wells pump water from the Aquia Formation, the Magothy Formation and a new well is under construction in the Patapsco Formation. Figure No. 12 also provides a brief description of the water-bearing properties of each aquifer, listing such data as transmissibility and yields of wells. The



△ Pleistocene deposits: aquifer consists of blanket of shallow sands and gravel from 40 to 100 feet thick. Transmissibility ranges from 95,000 to 175,000 gpd per foot when tested.

▽ Calvert Formation: aquifer consists of lenses and thin (15 to 20 feet) sheets of gray medium sand containing shell beds within thick beds of silt and clay. Yields up to 200 gpm in one well in Easton. Transmissibility is 4000 gpd per foot at Easton.

○ Piney Point Formation: aquifer consists of up to 150 feet of medium to course olivde-green to black, glauconitic sand.

□ Aquia Formation: aquifer consists of layers 5 to 20 feet thick of glauconitic green sand with shell fragments. Transmissibility is from 2000 to 5000 gpd per foot at sites tested. Yields 250 gpm to wells.

◇ Magothy and Matawan Formations: aquifer consists of light gray, fine to course sand, 30 to 40 feet thick, at depths of 950 to 1100 feet. Transmissibility ranges from 6500 to 15,000 gpd per foot. Yields of wells range up to 440 gpm.

TALBOT COUNTY COMPREHENSIVE
WATER AND SEWERAGE PLAN

HYDROGEOLOGIC MAP

ANNAPOLIS

McCRONE
ENGINEERS · PLANNERS · SURVEYORS

EASTON

FIGURE NO.

map maybe used as a general guide to the availability of ground water, considering that some of the deeper aquifers have not been explored or tested to date.

2.1 Patapsco and Raritan Formation: The Patapsco and Raritan Formations are not widely used as sources of water because they occur at depths of 1,000 to 1,500 feet, and adequate supplies have been developed from shallower formations. However, elsewhere in the Maryland Coastal Plain, as at Annapolis and Glen Burnie, the two formations are excellent aquifers.

The Patapsco and Raritan Formations were penetrated by three test holes (Tal-De 16, Tal-De 18, and Tal-Cb 89). The logs of these holes disclose the presence of many sands worthy of testing to determine the quantity and quality of water available from them. The individual sands, though relatively limited in extent, may be sufficiently interconnected to form aquifers of local importance. Some individual sands cannot be correlated from one deep test hole to another because the spacing between holes is several miles. The clays in the Patapsco and Raritan are generally red or variegated in color and very tough.

At Easton, test hole Tal-De 18 penetrated three sands that may be aquifers in the previously unexplored interval from 1,100 to 1,500 feet. The thickest sand occurred at a depth of 1,420 to 1,464 feet below land surface, and thinner sands were found at depths of 1,352 to 1,368 feet and 1,210 to 1,219 feet. Geophysical logging indicated that the two thickest sands are probably good aquifers.

On the western shore characteristics of the aquifer are well known. Transmissivity ranges from 160 to 6700 square feet per day. Storage coefficients range from 0.00005 to 0.005. Specific capacities range from 1 to 13 gpd per foot. Easton recently completed Well No. 11 in this formation.

2.2 Magothy Formation: For the purpose of this report, the Magothy Formation is grouped with the overlying Matawan and Monmouth Formation, as it is difficult to differentiate the three formations in most drill holes, especially in the northern part of the area.

The Magothy occurs throughout an extensive area, but its sands differ greatly in permeability. In most drill holes, the sands are medium-to-course-grained and occur in beds from 20 to 50 feet thick. The top of the formation is found about 1,000 feet below sea level at Easton. A contour map showing the approximate depth to the top of the uppermost water-bearing sand in the Magothy Formation is presented in reference 13.

The Magothy was the deepest formation used in Talbot County until Easton recently tapped the Patapsco. Sands of the Magothy Formation constitute one of the most productive aquifers in

Maryland, especially in the Annapolis area. The water-bearing properties of the formation may be summarized as follows:

(1) The Magothy yields water from permeable water-bearing sands that are lenticular and that may be either isolated or interconnected.

(2) Transmissivity ranges from 500 to 12,000 square feet per day. Specific capacities range from 1 to 7 gpm per foot.

(3) Wells completed in the Magothy generally have a large available draw down because of the relatively shallow static water levels and great depth to the top of the formation (900 to 1,150 feet).

Thus, large additional quantities of water are available from the Magothy Formation by lowering water levels. The limit of this development will probably be at the top of the formation, since lowering water levels below this level will decrease the yield. Pumping water from depths of 800 to 1,000 feet will demand more power, longer pump columns, and will result in greater cost per gallon than the present pumping from shallow levels.

A well, Tal-Bf 66, drilled from Esskay Poultry Plant at Cordova in 1947, yielded 210 gpm from the Magothy Formation for 24 hours with 185 feet of drawdown during its acceptance test. Evidence that the sands in the Magothy are interconnected lies in the fact that water levels in these wells, where measured, are at similar depths below sea level. However, some sands may be lens-shaped, small in areal extend, and enclosed by clay beds. Such beds would receive little or no recharge and, during long periods of heavy pumping, might be pumped to the limit of recovery. Well Tal-Ce 5 at Easton taps a sand that is probably an isolated lens. It has been reported that water levels in this well declined more rapidly and recovered more slowly than would be expected if the sand were hydraulically connected to other sands.

2.3 <u>Aquia Formation:</u> The Aquia Formation is a green, glauconitic quartz sand. It also contains a few clay layers, shell fragments, Foraminifera, and hard crusty (cemented) beds. Fossils in the formation attest to its marine origin. The water-bearing sands are about 40 to 175 feet thick.

Within our area, the Aquia is an aquifer only in western Talbot County. Because an impermeable boundary passes northeastward through Trappe the Aquia contains no water-bearing sands at Cambridge. Most of the recharge to the Aquia occurs in the outcrop area on the western shore of Chesapeake Bay along a narrow band, which strikes northeastward through Annapolis, about 27 miles from Easton.

The Aquia Formation is the primary source of water in: (1) an area southwest of Easton (including the Bailey's Neck and

Oxford Neck areas), and (2) parts of the St. Michaels-Tilghman Neck area (Figure No. 12). The Aquia Formation is used more as a source of water in the area southwest of Easton because the Piney Point Formation is not as productive in that the area as is the Aquia.

Water pumped from the Aquia Formation is used mainly for domestic purposes, much of it being pumped from small-capacity wells at rural homes.

Aquifer characteristics of the Aquia Formation were determined by pumping tests at two locations. The transmissivity is from 100 to 5,500 square feet per day with highest vales located in the northern Talbot County. The storage coefficient usually ranges from 0.0001 to 0.0004. Specific capacity ranges from 1 to 20 gpm per foot.

At Easton the Aquia lies 550 to 620 feet below sea level. The original static water level was at least a few feet above sea level and thus about 550 feet of drawdown was available to the first well completed in the formation. The potentiometric surface on the Eastern Shore has generally become lower in recent years. The cone of depression around Easton has become larger and deeper. The Aquia is capable of supplying moderately large quantities of water in the Easton area in spite of its low transmissibility.

2.4 Piney Point Formation: The Piney Point Formation, the most important artesian aquifer in the area, provides much of the water used in Talbot County. The formation was deposited in a marine environment similar to that in which the Aquia Formation was deposited. The two formations are similar and are distinguished from one another in the field more by position in the geologic column than by lithologic characteristics. The Piney Point is generally an olive-green to black slightly glauconitic quartz sand and is predominantly medium-to-coarse-grained. It contains some lenses of fine sand, silt, and clay, and Foraminifera. Earlier studies indicate that the Piney Point Formation pinches out toward the northwest before reaching the land surface. Because the Piney Point does not crop out, it cannot be recharged directly by precipitation, and all fresh water in the must be derived from leakage through adjacent beds. The source of water in the Piney Point is not definitely know but is probably derived from both lateral and vertical leakage. In its updip direction, the Piney Point becomes hydrologically connected with the underlying Nanjemoy Formation, which is an aquifer on the western shore of Chesapeake Bay. Thus, some water may move laterally into the Piney Point from the Nanjemoy. On the Eastern Shore, the principal source of recharge is leakage from the Cheswold Aquifer. The thickness of water-bearing sands in the Piney Point is variable, ranging from a few feet in western Talbot County to 150 feet in eastern Talbot County

The transmissivity ranges from 1,200 to 6,000 sq. ft. per day. The low values for coefficient of storage, 0.00009 to 0.0004 indicates artesian conditions. Specific capacities range from 1 to 88 gpm per foot.

Sands in the Piney Point at a depth of 320 to 375 feet below sea level produce much of the water used for domestic and agricultural purposes in rural areas surrounding Easton. These sands appear to be correlative with sands identified as the Piney Point Formation in southern Talbot County.

Currently, no wells at Easton are producing water from the Piney Point because of the desire of the city to leave the aquifer available for users in the surrounding area, and because the formation appears to be incapable of furnishing large supplies of water. Drillers log show that in the Easton area, and as far south as Oxford Neck, the formation contains mostly silt and clay and few permeable water-bearing sands. The Town of Trappe utilizes this formation for their public supply.

2.5 Calvert Formation: The Calvert Formation (which includes the Federalsburg and Cheswold Aquifers) consists of gray diatomaceous silts and clays with interspersed thin lenticular sands. The sands are fine-to-medium-grained, silty, and commonly contain associated shell fragments. The formation crops out in Calvert County on the western side of Chesapeake Bay and dips southeastward beneath the Bay. At Easton the top of the Calvert is 50 feet below sea level. The average thickness of the formation beneath Talbot County is about 200 feet.

In general the Calvert may be considered as a confining bed, but locally the sands are aquifers. Much of the water pumped from wells in eastern Talbot County is from these sands. The yields of wells are moderate and their depths are shallow (less than 200 feet deep). The transmissivity ranges from 200 to 4000 sq. ft. per day. The storage coefficient, ranging from a 0.0001 to 0.006, is typical of an artesian aquifer. The combination of moderately low transmissivity and small available drawdown limits the water-yielding capacity of the Calvert.

At Easton, the earliest ground-water supplies were developed from shallow (100-foot) wells tapping sands in the Calvert Formation. Six public-supply wells yielded 75 gpm in 1896, according to Darton (1896, P. 133). In 1966 one city well, Tal-Ce 2 was being pumped at an average of 82,000 gpd. However, some of the water pumped from well Tal-Ce 2 may be coming from sands of Cretaceous age . Two other wells in the Calvert, Tal-Ce 9 and -Ce 10, at the Tidewater Inn, pump water for air-conditioning. At the time of their completion in 1946, each of these wells was tested individually at 200 gpm for 6.5 hours, with a drawdown of 48 feet.

It is likely that much of the water pumped from the Calvert Formation in the Easton areas is derived by downward leakage through the overlying Choptank Formation. The formation may outcrop along ravines and streams. There is an area of potential saline intrusion in western Talbot County where lowering the potentiometric surface near outcrops or subcrops below the Chesapeake Bay could draw in saline water.

2.6 Deposits of Pleistocene Age: Large areas in Talbot County are underlain by substantial thicknesses of very permeable sands and gravels of probable Pleistocene age, capable of yielding large quantities of water to wells. The deposits consist of two lithologic types: (1) slightly cemented red, orange, and brown gravelly sands and (2) uncemented, stratified, lenticular buff-colored sands and silts with minor amounts of gravel and clay. The reddish-brown gravelly sands were tentatively designated as being in Pliocene age by Rasmussen and Slaughter (1957, p. 78-80). However, more recent work by Hansen (1966, p. 8-16) suggests that the two lithologic types are closely related in age, and Hansen Classifies both and groups the two lithologic types under the general heading of deposits of Pleistocene age.

The thickness of the Pleistocene ranges from a few feet to more than 150 feet.

Aquifer tests indicate that deposits of Pleistocene age were characterised by high transmissivity. Transmissivity commonly ranges from 100 to 50,000 sq. ft. per day and storage coefficients range from 0.0001 to 0.17. Specific capacities range from 1 to 50 gpm per foot. Both artesian and water-table conditions occur in these deposits. The deposits of Pleistocene age are not good aquifers in all the area. In some paces they are too thin, and in other places, where they are thicker, they are capable of yielding little water to wells because they are too well drained and the water table is too deep. However, moderately thick sections of saturated sands form the most productive aquifer there. These coarse-grained sands fill a rather deep trough in older fine-grained sediments, their base being about 80 feet below sea level. Because the water table is generally about 30 feet above sea level, drawdown available to some wells completed in these deposits is as much as 110 feet.

Water-level fluctuations have been observed for several years in two wells tapping these aquifers in northern Talbot County. Water levels in these wells fluctuate less than 5 feet in any year and change little from year to year. Water levels in the deposits of Pleistocene age are not affected by pumping from nearby wells in the deeper Calvert Formation. For example, the water level in well Tal-Bf 73 (in the Calvert about 13 feet away) fluctuated from 35 feet above sea level to 5 feet below.

3.0 Availability from Easton Area

Future demands for water are expected to be greatest in and around the city of Easton. Thus, special efforts have been made to evaluate the potential for developing groundwater supplies in and near the city.

The city of Easton had a population of 8480 in 1986. It is centrally located in the County and is on U.S. Route 50 at the junction of Maryland Route 33 leading to the Tilghman Island - St. Michaels area. The Easton area, as discussed here, is arbitrarily considered to include about 6 square miles in a rectangular shape about 4 miles long in a north-south direction and 1 1/2 miles wide in an east-west direction. It is centered near the Pennsylvania Railroad Crossing with Maryland Route 331. Tidal parts of the Tred Avon River, a tributary of Chesapeake Bay, reach to within 2 miles of the city. A reach of the Choptank River is lees than 4 miles east of Easton.

3.1 Current Use of Ground Water and Estimated Future Requirements: The City of Easton depends on ground water for its municipal supplies as do several small industries in the area. No fresh-water streams in the area flow sufficiently for reservoirs.

The depth, screened interval, water levels, aquifer, yield, and pumping test data for several high-capacity wells in Talbot County are given in Table G. The locations of important wells in the Easton area are shown in Figure No. 13.

The sands of Cretaceous age are the principal source of Easton's water, supplying 75 percent of the ground water pumped. The Aquia supplies the rest. After Well No. 11 is constructed, much of the Town's water will come from the Patapsco Formation.

3.2 Quantitative Appraisal of Aquifers: The Coastal Plain sediments are estimated to be 2,700 feet thick at Easton, although only the upper 1,500 feet of strata have been explored. Figure No. 14 is a geologic section of the upper 1,500 feet of Coastal Plain sediments showing the position of the various water-bearing sands, the chemical quality of ground water, and the hydraulic characteristics, and estimated long-term yield of the principal aquifers underlying Easton.

The long-term yields of the Calvert, Aquia, and Magothy Formation have been calculated from the estimates of available drawdown and the coefficients of transmissibility and storage shown on Figure No. 14. The calculations were made by the use of the Theis nonequilibrium method. The long-term yields presented here are only approximately, intended as guidelines for future planning.

3.2.1 Long-term Yield of the Sands of the Cretaceous System

Although the sands of Late Cretaceous (Magothy Formation) are the primary source of ground water for Easton, these aquifers seem capable of substantially greater development. Additional wells capable of yielding 400 gpm with drawdowns of 180 to 200 feet can probably be developed.

Coefficients of transmissibility, 8,000 gpd per foot, and of storage, 0.0001, have been used to calculate the theoretical drawdown at various distances from a pumping well in the Magothy Formation after 27 years. The available drawdown in the aquifer is about 950 feet, based on a 1965 static water level. Because the hydraulic coefficients and the amount of available drawdown are about the same for the Magothy Formation at Cambridge, analysis would show that 3 mgd could be obtained from Cretaceous sands in the Easton area.

3.2.2 Long-term Yield of the Aquia Formation

Sands of the Aquia Formation are presently tapped by only one well in the city of Easton. Using the same method as described for the sands of Cretaceous age and based on hydraulic coefficients determined for the Aquia Formation, the hydraulic interference in the aquifer caused by a line of 5 wells spaced 1 mile apart with each well pumping 300 gpm for 10,000 days (27 years) may be computed. The theoretical drawdown at each well, caused by its own pumping, would be about 186 feet. The computations show that the line of 5 wells pumping at 300 gpm will yield 2.1 mgd. The available drawdown is about 560 feet below sea level. The total predicted drawdown in the middle well of the 5-well field is 450 feet. An additional 45 feet of drawdown was added to the theoretical drawdown to allow for estimated well losses.

Prior to the drilling of any wells to the aquifer in the area, the hydraulic head was about 5 feet above sea level. Therefore, based on the initial head, a total drawdown of 565 feet is theoretically available. The 450 foot predicted drawdown includes a safety factor of 110 feet (25 percent) to allow for possible localized decreases in aquifer transmissibility, lower-than-anticipated well efficiencies, and general regional decline in the artesian head in the aquifer caused by withdrawals from it at other localities.

3.2.3 Long-term Yield of the Calvert Formation

Sands in the Calvert Formation are capable of yielding only small quantities of water because they have a low coefficient of transmissibility and are so thin that little drawdown is available. One well in the Calvert Formation, Tal-Ce 2,in 1966 was pumped at about 250 gpm for relatively short periods. However, some of the water from this well probably reaches the

TABLE G*

HIGH CAPACITY WELLS DATA

TALBOT COUNTY, MARYLAND

Well number U.S.G.S. Tal-	Well number Permit	Owner's name and designation	Date drilled	Altitude of land surface (feet)	Depth of well (feet)	Altitude of screen (feet)	Test data: Altitude of water level Static (feet)	Test data: Altitude of water level Pumping (feet)	Test data: Yield (gpm)	Test data: Date	Test data: Length of test (hours)	Specific capacity (gpm/ft) (drawdown)	Operating data: Altitude of water level Static (feet)	Operating data: Altitude of water level Pumping (feet)	Operating data: Yield (gpm)	Operating data: Date	Aquifer: Name	Aquifer: Transmissibility (gpd/ft)	Remarks
Af 10	41413	Fox Canning Co.	1961	10	845	-600 to -635 -760 to -830	4	-197	325	7/12/61	24	1.6	-	-	-	-	Aquia Matawan	-	
Bf 72	16235	Schluderberg-Kurdle Co.	1954	42	52	11 to -10	31	17	175	9/22/54	4	12	-	-	-	-	Pleistocene	100,000 5/	
Cc 32	T65450	Commissioners of St. Michaels	1965	15	458	-393 to -443	0 6/	-37	265	2/15/65	10	7	-	-	-	-	Aquia	-	
Cc 1	-	Easton Utilities Commission No. 1	1901	15	1,015	-85 to -95	15	-10	60	1901	-	-	-	-	-	-		-	
						-767 to -773 -985 to -1,000		-	-		-	2.4	-31 6/ -58 6/	- -	280 1/	10/7/48 6/11/64	Calvert and Cretaceous	-	Used as an observation well in 1966. Affected by pumping of Cc
Cc 2	-	do. No. 2	1910	20	110	- to -90	-13	-	193	1/16/56	19	-	-25 6/	-	200	8/27/64	Calvert	3,500	
Cc 3	-	do. No. 3	1929	15	1,025	-625 to -980 to -1,010	- 7 6/	-80 6/	616	8/19/50	24	8	-53 6/	1/	-	8/27/64	Aquia Matawan	20,000 2/	
Cc 5	2261	do. West St.	1947	30	1,148	-1,096 to -1,117	22 6/	-37 6/	415	1/18/49	2	7	15 6/	1/	-	8/22/64	Magothy	12,000 4/	
Cc 7	-	do. Well G	-	13	104	-82 to -89	-	-	-	-	-	-	-30 6/ -42 6/	1/ 1/	- -	10/7/48 4/9/66	Calvert	-	Used as an observation well in 19 Affected by pumping of Cc 2.
Cc 50	8836	do. No. 1B	1952	20	623	-550 to -603	- 9	-176	362	1/24/52	24	2	-21 6/	-	200	9/21/65	Aquia	4,000	
Cc 60	37628	do. No. 6	1960	21	1,045	-989 to -1,024	-22	-104	463	4/22/60	24	5.6	-79 6/	3/	555	9/28/65	Matawan	15,000	
Cc 61	46762	do. No. 7 Clifton	1962	35.5	1,057	-883 to -892 -1,006 to -1,022	-59	-217	494	7/10/62	24	3	-94 6/	-238 6/	600	9/22/65	Matawan	10,000	
Cc 67	T66W12	do. No. 8 Airport	1965	56	1,092	-794 to -821 -1,004 to -1,036	-23	-215	500	9/10/65	48	2.4	-51 6/	-215 6/ -	610 -	8/22/66 3/29/66	Cretaceous	6,500	
Dd 53	53609	Talbot Country Club, Inc.	1963	10	640	-580 to -630	-22	-173	200	9/20/63	8	1.3	-15 6/	-147 6/	180	12/13/66	Aquia	4,000	
Ee 8	895	Trappe Frozen Food Corp.	1946	55	940	-352 to -372 -858 to -870	-13	-191	240	6/12/46	1½	1.9	-	-	-	-	Piney Point and Cretaceous	-	

1/ Well out of service.

2/ Value for Cretaceous and Aquia aquifers combined (see Rasmussen and Slaughter, 1957, p. 53).

3/ Water level cannot be measured.

4/ Period of recovery to static level was exceptionally long, suggesting that aquifer is of limited lateral extent.

5/ Value obtained during pumping test of March 24, 1956 (see Rasmussen and Slaughter, 1957, p. 102).

6/ Measured.

Locations of Important Wells in the Easton Area

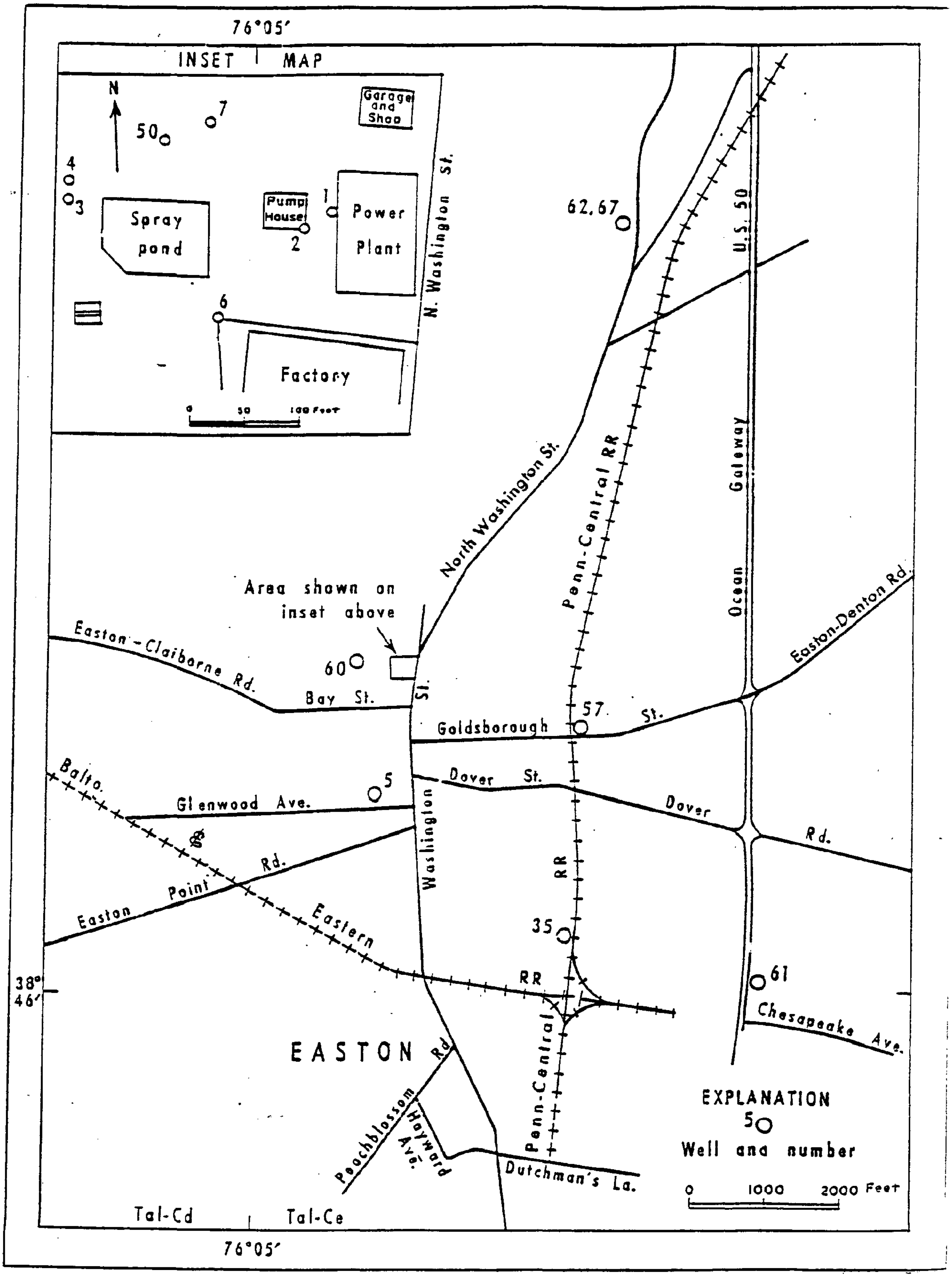
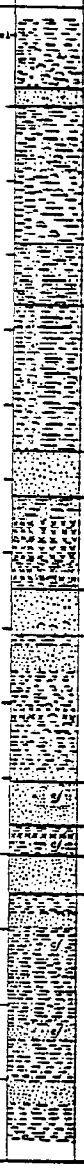


Figure No. 13

GEOLOGIC SECTION OF UPPER 1,500 FEET OF SEDIMENTS

OF EASTON*



HYDROGEOLOGY

System	Geologic unit	Position relative to sea level (feet)	Aquifer or aquiclude
Tertiary System	Calvert Formation	Sea level, 100, 200	Aquiclude (sea level to ~80); Aquifer (~80–100); Aquiclude (100–290)
Tertiary System	Piney Point Formation	300	Aquifer
Tertiary System	Nanjemoy Formation	400, 500	Aquiclude
Tertiary System	Aquia Formation	600, 700	Aquifer; Aquiclude
Cretaceous System	Monmouth Formation	800, 900	Aquifer; Aquiclude
Cretaceous System	Matawan Formation	1000	Aquiclude; Aquifer
Cretaceous System	Magothy Formation	1100	Aquifer
Cretaceous System	Raritan and Patapsco Formations	1200, 1300, 1400	Aquiclude

Composite geologic section a/

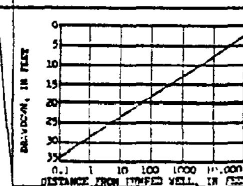
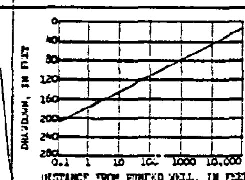
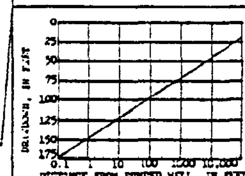
CHEMICAL CHARACTER OF GROUND WATER

Concentration of chemical constituents and properties of water (in mg/l except for pH and temperature)

Geologic unit (aquifer)	Constituent or property	Average	Maximum	Minimum	Number of samples
Calvert Formation	Iron (Fe)	0.12	0.32	0.03	4
	Chloride (Cl)	4.2	9.5	2.0	
	Dissolved solids	246	262	217	
	Hardness	166	196	146	
	Silica	50	57	30	
	Temperature (°F)	60	61	59	
	(°C)	16	16	15	
	pH	-	8.5	7.5	
Piney Point Formation	Iron (Fe)	0.72	1.5	0.11	3
	Chloride (Cl)	7.6	15	.8	
	Dissolved solids	277	339	216	
	Hardness	124	192	32	
	Silica	38	52	16	
	Temperature (°F)	60	63	58	
	(°C)	16	17	14	
	pH	7.9	8.0	7.8	
Aquia Formation	Iron (Fe)	0.05	0.1	0.00	3
	Chloride (Cl)	2.4	5.6	1.6	
	Dissolved solids	588	649	529	
	Hardness	16	20	14	
	Silica	12	14	9.2	
	Temperature (°F)	69	69	69	
	(°C)	21	21	21	
	pH	8.2	8.4	8.0	
Monmouth–Matawan Formations	Iron (Fe)	0.20	0.25	0.14	2
	Chloride (Cl)	1.6	1.6	1.6	
	Dissolved solids	246	249	243	
	Hardness	20	20	20	
	Silica	12	12	12	
	pH	7.6	7.6	7.5	
Magothy Formation	Iron (Fe)	0.6	0.8	0.4	2
	Chloride (Cl)	7.4	7.7	7.1	
	Dissolved solids	121	136	106	
	Hardness	18	29	12	
	Silica	18	27	9.5	
	Temperature (°F)	78	-	-	
	(°C)	26	-	-	
	pH	7.4	7.7	7.1	

LONG-TERM YIELD OF AQUIFER

Data used in estimations

Geologic unit (aquifer)	Transmissibility (gpd/ft)	Storage coefficient	Available drawdown (feet)	Number of wells	Spacing between wells (feet)	Pumping rate per well (gpm)	Distance-drawdown graph for 1,000 days of pumping	Estimated long-term yield (mgd)
Calvert Formation	4000	0.0001	85	5	5280	40		0.3
Piney Point Formation								b/
Aquia Formation	5000	0.0001	560	5	5280	300		2
Monmouth–Matawan Formations	8000	0.0001	950	9	2640	400		5
Magothy Formation	-	-	-	-	-	-		b/

a/ Upper 1100 feet of section is composite of logs from several wells of City of Easton. Remainder of section based on test hole drilled at barracks of Maryland State Police, Tal-De 18.

b/ Information available indicates these sands may not be capable of supplying quantities worthy of development by the City of Easton.

c/ Lignite

Figure No. 14

Calvert Formation from deeper sands of Cretaceous age by movement through well Tal-Ce 1, which is 25 feet away and taps both aquifers.

The coefficients of transmissibility (4,000 gpd per foot) and storage (0.0001) of the Calvert Formation have been used to calculate the theoretical drawdown at various distances from a pumping well. Based on drawdown calculations using these coefficients, the hydraulic interference was determined among five 12-inch diameter wells spaced 1 mile apart and pumping 40 gpm each for 27 years. The wide spacing of the wells, assumed to pump at moderate rates, is necessary to take full advantage of the small available drawdown. The total available drawdown is only about 85 feet, based on an initial static water level of 5 feet above sea level. The drawdown at each well in the five-well array caused by its own pumping would be about 31 feet. The total drawdown in the middle well would be about 82 feet (including an additional 15 feet to allow for well losses). The five-well array allows very little margin to provide for lower-than-average well efficiencies or local decreases in transmissibility. However, the shallow depth of the Calvert and probable recharge to the aquifer. The effect of the recharge would, of course, be to decrease the drawdown

The long-term yield of the Calvert Formation, with five wells pumping at 40 gpm, as described above, would be 200 gpm or slightly less than 0.3 mgd.

3.2.4 Summary

In summary, the estimated long-term yields of the three principal aquifers in the Easton area are as follows:

Aquifer	Estimated long-term yield (mgd)
Calvert Formation	0.3
Aquia Formation	2.0
Upper Cretaceous sands, chiefly the Magothy Formation	3.0
Total	5.3

The 1986 pumpage of 1.6 mgd was about 30 percent of the estimated 5.3 mgd available on a long-term basis. The long-term yields are conservative estimates subject to the assumptions discussed previously and allow a considerable margin of safety for adjustment data are acquired. Also, to be included in estimates of long term yield, is the Patapsco Formation, recently tapped and tested by Easton.

4. <u>Interformational Movement of Ground Water:</u> The static water level is different in the various aquifers underlying Easton and thus a potential exists for water movement between the aquifers. Normally, such movement is very slow because of intervening clay beds. However, when there is a direct hydraulic connection, such as an unused well screened or otherwise open to two or more aquifers, water movement is appreciable and may be measured.

A survey to detect vertical movement of water between two aquifers was made in well Tal-Ce 3 (in the Easton well field) by E. G. Otton and T. H. Slaughter in 1958. The survey was made under nonpumping conditions using a current meter and whitney (thermistor-type) thermometer. The results of the survey are shown in Figure no. 15.

Part A shows construction features of the well, Part B shows current-meter measurements (large dots indicate the location of individual measurements made at 4-foot intervals), and Part D shows the authors' interpretation of water movement. The current meter survey (Part B) indicated movement from a depth of 820 feet to 474 feet and no movement about 47 feet. The graph is only a relative indication of upward velocity because the current meter was not calibrated for conversation from revolutions per minute to gallons per minute. The decrease in apparent upward velocity was in part caused by the increase in the casing diameter - from 6 to 8 to 10 inches. The temperature survey showed a constant temperature from a depth of 500 feet to about 475 feet and a gradual temperature from a depth of 500 feet to about 475 feet and a gradual decrease from 475 to 104 feet. No measurements were made below 500 feet because the depth limitation of the thermometer. However, because the velocity of the water moving from the bottom of the well up to 500 feet was relatively high, it is probable that the temperature of water in the zone was representative of temperatures at the bottom of the hole - ranging between 76 and 77 F.

The best interpretation of the flowmeter and temperature data is that warm water moves through the screen into the well from the sands of the Cretaceous system at the bottom, upward through the casing to a depth of 474 feet, and then out into the Aquia Formation at the overlap between the 10- and 12-inch casings. Such upward movement explains the constant temperature of water, 76.4 F between the depths of 476 and 500 feet. Above 476 feet, where there is little water movement, the temperature decreases gradually to that of the shallow ground water. Some of the water probably left the casing and entered the Aquia Formation at the 640 foot level, where the 8-inch pipe is overlapped by the 10-inch pipe. This is suggested because the sudden drop in velocity at 640 feet cannot be completely explained by the increase in casing diameter.

INTERFORMATION MOVEMENT OF WATER IN

AN UNPUMPED WELL, TAL-CE 3

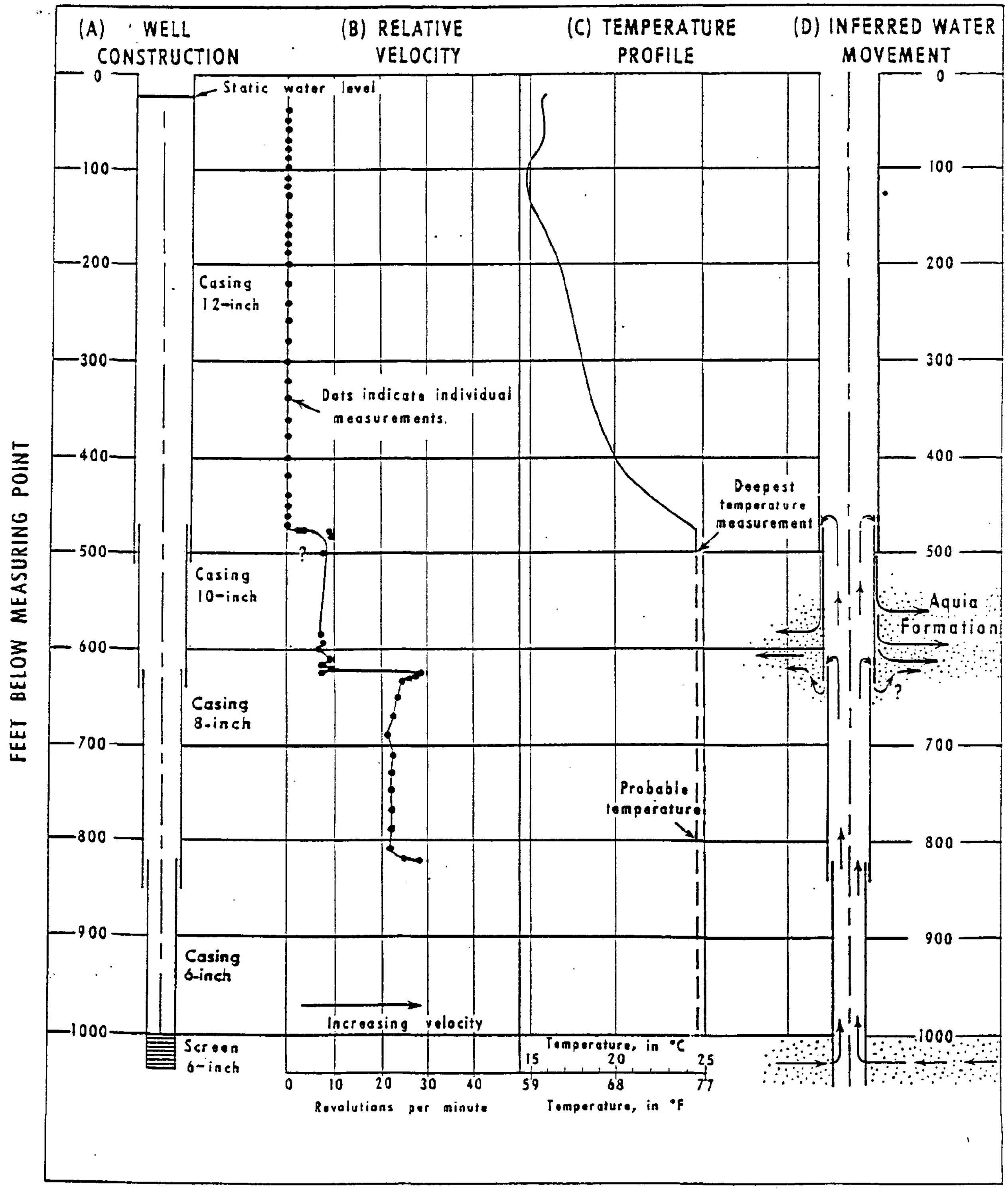


Figure No. 15

In summary, Figure No. 15 shows that water moves between the two aquifers in this well. The direction of movement depends on the relative hydrostatic heads in the aquifers. At the time the temperature and flow data were obtained, the hydrostatic head in the Aquia Formation was lower than that in the sand of the Cretaceous System because of pumping from well Tal-Ce 50 (in the Aquia Formation) about 100 feet east of Tal-Ce 3. At other times, when water is being pumped from the sands of Cretaceous age and well Tal-Ce 50 is idle, it is quite probable that the direction of flow in Tal-Ce 3 is reversed. Under these conditions, the water from the Aquia Formation would move down the well into the deeper sand. In 1966 water levels were much lower in the 1,000-foot sand than they were in 1958, and it is likely that flow is downward most of the time.

5. Ground Water Quality

The quality of the ground water in Talbot County is generally good, and the water can be used for most purposes without treatment. However, there are a few areas where the water would be satisfactory for domestic use only after extensive treatment. The chemical quality has been discussed in some detail by Rasmussen and other (1957, p. 105). For a discussion of water-quality standards the reader is referred to that report or a report of the U.S. Public Health Service (1962).

Chemical analyses of water from 45 wells in the county area are listed in Table H. The chemical character of the water in each of the principal aquifers is summarized in Table I.

6. Chemical Quality of Water by Formation

The chemical analyses in Tables H and I show that the water in the various aquifers differ somewhat in chemical characters. Study of the analyses show that, although individual samples from the same formation have certain characteristics in common, there is generally a predictable area variation in the character of the water within individual aquifers.

The U.S. Public Health Service recommends that drinking water contain no more than 0.3 mg/l iron (1962, p.7). Although water containing larger concentrations of iron has no toxic effect, concentrations above 0.3 mg/l are likely to be visible and to cause straining of laundry and plumbing fixtures.

High iron concentrations are one of the chief problems relating to the quality of ground water. Studies of iron in ground water are complicated because the plumbing and well casing may be sources of iron. Therefore, some of the iron concentrations reported in the analyses may not accurately

TABLE H*

CHEMICAL ANALYSES DATA

(in mg/l except as indicated)

Well number	Water-bearing formation	Altitude of screen or well opening (feet)	Date of collection	Temperature (°F)	Temperature (°C)	Silica (SiO_2)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphate (PO_4)	Dissolved solids (residue on evaporation at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Non-carbonate	Specific conductance (micromhos at 25°C)	pH	Color
Tal-Ad 5	do.	-375 to -390	9/22/65	63	17	11	.10	.00	13	3.8	56	9.8	213	0	2.5	1.1	1.9	.1	-	212	48	0	332	7.7	-
Tal-Af 5	Miocene	-	12/21/54	53	12	51	.17	.00	22	11	30	9.8	207	0	2.0	2.1	.4	1.0	.0	256	100	0	363	8.1	5
Tal-Bb 4	Aquia	-297 to -351	9/24/65	60	16	19	.42	.00	41	17	48	13	264	0	3.8	53	.2	.0	-	317	172	0	559	7.8	-
Tal-Bc 4	do.	-410 to -418	2/4/55	60	16	15	.26	.01	10	6.8	115	16	351	0	4.5	22	.5	1.4	.1	355	51	0	595	8.1	2
Tal-Bd 21	Piney Point	-178 to -193	2/4/55	57	14	48	.65	.02	26	12	67	10	325	0	6.2	3.2	.6	.6	.1	327	116	0	494	8.0	10
Tal-Be 3	Pleistocene	-	1/14/55	56	13	25	4.1	.02	.9	.8	6.0	1.0	0	0	11	9.1	.7	.2	.0	61	7	7	90	4.1	6
Tal-Be 6	Aquia	-445 to -455	2/4/55	62	17	16	.45	.01	12	5.8	134	16	406	13	4.9	6.0	1.4	2.1	.0	411	54	0	657	8.5	10
Tal-Be 79	Piney Point	-239 to -250	9/17/65	63	17	53	.15	.00	19	16	32	9.2	232	0	4.3	2.2	.3	.4	-	258	115	0	353	7.8	-
Tal-Bf 14	Pleistocene	-	2/4/55	53	12	18	.12	.03	3.0	2.2	6.4	.5	8	0	.4	7.6	.2	16	.0	63	17	10	80	5.6	5
Tal-Bf 38	Miocene	- 60 to - 92	2/26/54	53	12	-	2.4	-	-	-		7.6	208	0	1.6	3.0	-	.2	-	-	160	0	325	8.1	-
Tal-Bf 78	Pleistocene	+ 15 to + 10	9/16/65	56	14	22	.05	.00	14	2.4	3.8	1.9	29	0	2.5	6.4	.2	25	-	107	45	21	126	6.5	-
Tal-Cb 89	Cretaceous	-930 to -960	8/3/53	69	21	7.7	7.7	.15	15	5.8	3.4	4.2	56	0	26	2.0	.2	.2	.0	94	61	15	145	6.7	5
Tal-Cb 89	do.	-1340 to - 1380	8/3/53	69	21	8.2	10	.28	15	8.0	4.5	5.1	36	0	57	2.0	.1	.2	.0	124	70	41	177	6.3	5
Tal-Cb 92	Piney Point	-155 to -160	10/26/65	58	14	29	2.1	.00	32	33	7.2	22	306	0	.0	3.6	.3	.0	-	269	216	0	464	8.0	-
Tal-Cc 29	Aquia	-370 to -394	2/10/54	63	17	12	.15	.00	13	6.7	86	14	224	4	9.6	54	.3	.8	.2	338	60	0	536	8.4	6
Tal-Cc 33	do.	-497 to -507	10/26/65	64	18	14	.01	.00	5.7	3.9	126	11	308	0	11	32	.7	.3	-	347	30	0	569	8.0	-
Tal-Cd 2	Piney Point	-	10/14/65	58	14	46	.56	.02	40	11	6.5	3.4	171	0	15	6.9	.3	.0	-	216	147	7	310	7.9	-
Tal-Cd 48	Aquia	-446 to -466	10/28/65	61	16	13	.05	.00	7.7	7.1	151	12	378	7	12	35	1.4	.0	-	429	48	0	702	8.4	-

TABLE H (CON'T)

Well number	Water-bearing formation	Altitude of screen or well opening (feet)	Date of collection	Temperature (°F)	Temperature (°C)	Silica (SiO_2)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_4)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphate (PO_4)	Dissolved solids (residue on evaporation at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Non-carbonate	Specific conductance (micromhos at 25°C)	pH	Ccl
Tal-Cd 52	Piney Point	-243 to -336	11/22/65	60	16	16	0.11	0.00	5.8	4.1	114	11	334	0	1.6	15	0.9	1.3	-	339	32	0	540	8.0	1
Tal-Ce 2	Miocene	-	10/7/48	59	15	56	.03	-	36	15	27	5.9	242	0	6.9	2.8	.5	.3	-	260	152	0	394	7.5	2
Tal-Ce 3	Cretaceous	-980 to -1010 open at -625	3/18/49	74	24	14	.06	-	4.8	1.2	81	1.8	210	0	15	2.5	.9	1.8	-	241	17	0	377	8.2	5
Tal-Ce 3	do.	-980 to -1010 open at -625	10/6/48	76	24	13	.13	-	4.1	2.2	72	6.9	211	0	12	2.2	.6	.9	-	221	19	0	362	7.8	1
Tal-Ce 5	do.	-1096 to -1117	3/11/49	78	26	9.5	.38	-	2.4	2.0	30	2.2	80	0	15	2.5	.2	1.6	-	111	14	0	168	7.5	1
Tal-Ce 50	Aquia	-550 to -603	4/1/65	69	21	14	.00	.01	4.0	2.4	196	8.6	550	0	12	2.1	3.7	.0	-	529	20	0	838	8.1	-
Tal-Ce 60	Cretaceous	-990 to -1025	4/1/65	75	24	12	.14	.01	6.0	1.2	81	9.4	234	0	12	1.6	.8	.0	-	243	20	0	379	7.6	-
Tal-Ce 64	Miocene	+ 19 to - 13	9/17/65	59	15	30	.32	.04	72	4.0	4.5	1.1	225	0	8.5	9.5	.2	.0	-	245	196	12	373	7.9	-
Tal-Ce 66	do.	- 82 to - 92	9/14/65	61	16	55	.10	.01	56	7.2	11	6.3	202	11	9.7	2.0	.3	.1	-	262	169	4	347	8.5	-
Tal-Ce 67	Cretaceous	-794 to -821 -1004 to -1036	9/16/65	76	24	12	.25	.01	4.0	2.4	81	7.0	232	0	13	1.6	.2	.0	-	245	20	0	363	7.5	-
Tal-Da 36	Piney Point	- 95 to -200	2/10/54	57	14	-	.82	-	-	-	-	-	260	12	.4	2.0	-	3.0	-	-	106	0	430	8.4	-
Tal-Db 38	Aquia	-407 to -437	4/9/65	62	17	14	.13	.00	24	12	10	14	176	0	3.5	1.5	.2	.2	-	175	111	0	281	7.8	-
Tal-Db 61	do.	-	10/26/65	62	17	12	.16	.00	22	10	16	14	171	0	7.4	1.7	.3	.7	-	165	98	0	281	7.7	-
Tal-Dc 2	do.	-533 to -553	3/3/65	68	20	14	.00	.00	6.6	.9	136	8.4	368	0	12	13	1.6	.0	-	386	20	0	607	8.0	-
Tal-Dc 2	do.	-533 to -553	2/5/54	68	20	-	.17	-	-	-	147		322	22	8.6	6.0	-	.8	-	-	8	0	589	8.5	-
Tal-Dc 52	do.	-477 to -489	10/26/65	61	16	13	.03	.00	10	5.6	70	12	181	0	9.8	36	.4	.0	-	241	48	0	406	7.6	-
Tal-Dc 53	Piney Point	-295 to -305	10/26/65	61	16	15	.40	.01	12	7.8	99	15	311	0	3.4	21	1.0	.3	-	333	62	0	533	7.9	-
Tal-Dd 53	Aquia	-580 to -630	9/24/65	69	21	14	.04	.00	3.2	1.5	245	9.2	572	27	11	1.6	4.2	.3	-	645	14	0	915	8.4	-
Tal-De 12	Piney Point	-336 to -354	9/15/65	65	18	60	.52	.01	45	7.7	3.7	2.8	171	0	8.5	2.6	.2	.1	-	225	144	4	277	7.8	-
Tal-De 13	do.	-325 to -330 -348 to -363	9/17/65	63	17	52	1.5	.00	45	19	9.2	8.6	265	0	5.4	.8	.3	.0	-	277	192	0	395	7.8	-

TABLE H (CON'T)

Well number	Water-bearing formation	Altitude of screen or well opening (feet)	Date of collection	Temperature (°F)	Temperature (°C)	Silica (SiO_2)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphate (PO_4)	Dissolved solids (residue on evaporation at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Non-carbonate	Specific conductance (micromhos at 25°C)	pH	Color
Tal-De 15	Miocene	- 94 to -106	9/17/65	61	16	57	0.05	0.00	32	16	3.6	2.8	180	0	5.0	2.5	0.2	0.0	-	217	146	0	281	7.5	-
Tal-De 17	Piney Point	-316 to -331	9/17/65	64	18	53	.05	.00	20	9.7	25	8.9	182	0	8.1	.7	.4	.0	-	219	90	0	286	7.9	-
Tal-Df 4	Miocene	-150 to -165	9/23/65	62	17	61	.04	.00	21	10	64	5.7	278	0	6.2	2.1	.7	.1	-	307	94	0	418	7.9	-
Tal-Ee 1	Piney Point	-	2/9/54	65	18	-	.48	-	-	-	58		204	6	12	.2	-	1.2	-	-	64	0	354	8.4	-
Tal-Ee 30	do.	-333 to -363	9/22/65	64	18	40	.13	.00	16	1.0	75	8.2	246	0	12	1.1	.7	.1	-	281	48	0	392	7.8	-
Tal-Ee 31	do.	-359 to -379	9/23/65	64	18	28	.09	.00	7.3	4.4	174	9.2	473	4	7.2	4.6	1.1	.2	-	467	36	0	717	8.3	-
Tal-Ee 34	Miocene	-	9/23/65	61	16	63	.01	.01	33	17	74	12	370	0	4.2	9.1	.2	.5	-	385	152	0	571	8.0	-

TABLE I - SUMMARY OF IMPORTANT CHEMICAL AND PHYSICAL CHARACTERISTICS OF GROUND WATER FROM THE PRINCIPAL AQUIFERS OF TALBOT COUNTY*

Aquifer	Hardness as $CaCO_3$			Iron (Fe)			Chloride (Cl)			Fluoride (F)			Dissolved solids (Residue at 180° C)			Bicarbonate (HCO_3)			pH			Temperature					
																						Min		Avg		Max	
	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	°F	°C	°F	°C	°F	°C
Deposits of Pleistocene age	4	31	77	0.00	0.06[2]	21	2.0	10	22	0.0	0.1	0.7	54	103	257	0.0	6[1]	75	4.1	5.8	6.9	50	10	55	13	59	15
Calvert Formation	48	112	196	.01	.32	9.0	1.9	2.7[2]	170	.2	.4	1.0	217	261[1]	1270	180	325	804	7.5	8.0	8.5	53	12	60	16	63	17
Piney Point Formation	24	75	216	.00	.36	2.1	1	5.0[2]	195	.2	.9	2.3	216	411	886	171	356	720	7.8	8.1	8.6	53	12	62	17	65	18
Aquia Formation	6	59	172	.00	.14	.57	1.1	14	54	.2	1.2	4.2	136	317	645	124	297	572	7.5	8.0	8.5	56	13	63	17	69	21
Magothy Formation	4	21	61	.02	.3[2]	7.7	1.5	2.8	6.8	.2	.6	1.1	89	211	385	56	190	358	6.7	7.7	8.5	69	21	74	23	78	26
Raritan Formation[1]	—	70	—	—	10	—	—	2	—	—	.1	—	—	124	—	—	36	—	—	6.3	—	—	—	69	21	—	—
Desirable concentration for domestic use (in mg/l)		60			<0.3			<250			0.6 to 1.7			<500			—			—		—	—	—	—	—	—

[1] One well only.
[2] Median value

represent the concentration of iron in the water in the formation. Despite the inaccuracies that may exist the available data suggest that some water in the following aquifers in the areas indicated contains excessive iron:

Deposits of Pleistocene age	- West and South of U.S. 50.
Calvert Formation	- North of Easton in Talbot County
Piney Point Formation	- North of Trappe
Aquia Formation	- Northeast of St. Michaels
Sands of Cretaceous age	- West of Oxford

Pleistacene deposits have higher nitrate levels than other formations, primarily in agricultural areas. Water containing move than 10 mg/l nitrate - N (or 45 mg/l NO_3) is believed to cause methemoglobinemia in infants. Shallow wells, predominantly in eastern Talbot County should be tested regularly for nitrate.

B. <u>Surface Water</u>

1. <u>General</u>

Drainage of the County area is controlled by two large tidal rivers - the Choptank and the Wye East - and by many small rivers and creeks directly tributary to the Chesapeake Bay. Along the bay side of the County, the Wye, Miles and Tred Avon Rivers are tidal estuaries.

A physical feature which influences the topography in many ways is the great number of broad, poorly drained basins. These are oval shaped and commonly 10 to 15 feet deep. The long diameters of the basins range from a few hundred feet to several miles in length. The basins retard runoff, and frequently the water table is only a few inches from the land surface in the central area. Swampy conditions persist in many basins, although some have been drained by natural outlets and others with ditches and canals. The basins contribute to the hydrology of the region by providing optimum length of time for infiltration of the entrapped rainfall.

2. <u>Quantity</u>

The surface-water resources of Talbot County are capable of only limited development or water supplies because: (1) the low relief is usually considered a deterrent to economic surface storage; (2) the high salinity of water in the major tidal streams decreases the utility of water for most purposes; and (3) the drainage basins of the small fresh-water streams are not large enough to provide adequate stream-flow for most purposes. Consumptive use of water is restricted to a small amount of pumpage for irrigation during dry periods.

3. Quality

In accordance with COMAR 10.50.01 all Maryland Waters are protected by one or another of the various Water quality standards established by the State. The waters of Talbot County are described as protected for Class I and II use. These classification are described in 10.50.01 as follows:

Class I: Water Contact Recreation. Aquatic Life and Water Supply. This classification includes waters which are suitable for:

(i) Water contact sports;
(ii) Play and leisure time activities where individuals may come in direct contact with the surface water;

(iii) The growth and propagation of fish (other than trout), other aquatic life, and wildlife;

(iv) Public water supply;
(V) Agricultural water and supply; and
(vi) Industrial water supply.

Class II: Shellfish Harvesting Waters. This classification includes waters where:

(i) Shellfish are propagated, stored, or gathered for marketing purposes; and

(ii) Actual or potential areas for the harvesting of oysters, softshell clams, hardshell clams, and brackish water clams.

A continuing quality control program for the State Waters is carried out at various stream surveillance stations. Water samples for examination are periodically taken to ensure that the designated water quality standards for that area are being maintained. Samples are analyzed for total coliform, fecal coliform, dissolved oxygen, temperature and PH. Waters closed to Shellfish harvesting as of (date) are shown on Figure 16a through 16f.

Water quality data maybe obtained form the "Maryland Water Quality Inventory - Section 305 (b) Report" by contacting J. Shermer Garrison, 305 (b) coordinator, Watershed Nonpoint Source Division, Maryland Department of the Environment, 201 W. Preston Street, Baltimore, Maryland, 21201.

SECTION II

Existing and Proposed Water Facilities

A. General

As of May 23, 1988 there were 237 active Ground Water Appropriation Permits issued by the Maryland Department of Natural Resources to ground water users in Talbot County. Ground Water Appropriation Permits (GWAP) are issued to all well water users except for farms and single family dwellings with individual wells. Appropriation permits for the county total 3.6 million gallons per day (MGD) yearly average daily flow, and 6.2 MGD average daily use in the highest usage month.

Table No. 3 shows the population projections and the projected water supply demands and planned capacity through the year 2000.

B. Inventories

Table No. 4 shows an inventory of Community system wells.

Table No. 5 would show an inventory of impounded supplies but is not included in this report because no existing impounded supply has been documented.

Table No. 6 shows an inventory of existing treatment facilities.

Table No. 7 shows an inventory of water problem areas.

Table K shows the summary of ground water appropriation permits in the County.

Following the above tables is a tabulation of Detailed Information on Existing Water Systems.

TABLE NO. 3
PROJECTED WATER DEMANDS AND PLANNED CAPACITY
TALBOT COUNTY, MARYLAND

WATER SERVICE AREA	1988 (PRESENT) POPULATION TOTAL	1988 POPULATION SERV	1988 UNSERV	1988 GPCD	1988 CAPACITY DEMAND (MGD)	1988 CAPACITY PLAN (MGD)	1990 POPULATION TOTAL	1990 POPULATION SERV	1990 UNSERV	1990 GPCD	1990 CAPACITY DEMAND (MGD)	1990 CAPACITY PLAN (MGD)	1995 POPULATION TOTAL	1995 POPULATION SERV	1995 UNSERV	1995 GPCD	1995 CAPACITY DEMAND (MGD)	1995 CAPACITY PLAN (MGD)	2000 POPULATION TOTAL	2000 POPULATION SERV	2000 UNSERV	2000 GPCD	2000 CAPACITY DEMAND (MGD)	2000 CAPACITY PLAN (MGD)
Easton Residential	8000	8000	0	86	0.70		8600	8600	0	86	0.74		9600	9600	0	86	0.83		10500	10500	0	86	0.90	
Commerical Industrial & Institutional					0.90						0.97						1.08						1.18	
TOTAL					1.60	2.3					1.71	2.3					1.91	2.3				200	208	2.3
Oxford	850	850	0	143	0.12	0.24	950	950	0	143	0.14	0.24	n/a				0.24	n/a						0.24
St. Michaels	1360	2500	1	103	0.26	0.66		2595	0	103	0.27	0.66		2721	0	103	0.28	0.66		2861	0	103	0.29	0.66
Trappe	860	943	0	117	0.11	0.17	945	945	0	117	0.11	0.17	1010	1010	0	117	0.12	0.17	1075	1075	0	117	0.13	0.17
Bayview Water Co., Inc.	66	44	12	0.004	0.018																			
Clairborne Water Co. Inc.	198	69	29	95	0.007	0.0036																		
Hyde Park	195	195	0	77	0.015	0.080	265	265	0	77	0.020	0.080	435	435	0	76	0.033	0.080	545	545	0	76	0.042	0.080
Martingham	393	393	0	76	0.030	0.075	500	500	0	95	0.048	0.075	610	610	0	111	0.068	0.075	610	610	0	111	0.068	0.075
Community System Total																								
Calhoon MEBA	100	100	0	50	0.005	0.096	100	100	0	50	0.005	0.096	100	100	0	50	0.005	0.096	100	100	0	50	0.005	0.096
Institutional Totla																								
Community & Instituional Total																								
Private Water Use																								

TABLE NO. 3 CONTINUED
PROJECTED WATER DEMANDS AND PLANNED CAPACITY
TALBOT COUTNY, MARYALND

Public Water Supplies:

"Planned Capacities" for water system as follows:

(Total gpm all wells - gpm largest well) x 16 hr/day x 60 min/hr = gpd

This does not take into account storage capacity see section 3-II for further information

TABLE NO. 4
INVENTORY OF EXISTING COMMUNITY WELLS
TALBOT COUNTY, MARYLAND

OWNER	WELL NAME OR NUMBER	AQUIFER	COORDINATE LOCATION	DEPTH (FEET)	DIAMETER (INCHES)	MAX. SAFE YIELD	PUMPING CAPACITY
Easton	No. 6	Magothy	1,062,590 345,650	1045	12		550 gpm
	No. 7	Magothy	1,068,240 341,100	1057	16		450 gpm
	No. 8	Magothy	1,066,025 351,370	1092	16		600 gpm
	No. 9	Aquia	1,059,330 343,050	665	N/A		600 gpm
	No.10	Magothy	1,059,330 343,230	1000	6		150 gpm
	No.11	Patapsco (Nonmarine-Cretaceous)	1,061,000 350,000	1225	10	Under Construc-tion	1400 gpm
Oxford	No. 1	Aquia	1,036,000 312,000	675	8	0.15 MGD	250 gpm
	No. 2	Aquia	1,036,000 345,000	404	8	N/A	350 gpm
St. Michaels	No. 1	Aquia	1,022,000 345,000	458	10	243 gpm	200 gpm
	No. 2	Aquia	1,022,000 345,000	458	10	480 gpm	480 gpm
	No. 3	Aquia	1,022,000 345,000	450	16	500 gpm	500 gpm

TABLE NO. 4
INVENTORY OF EXISTING COMMUNITY WELLS
TALBOT COUNTY, MARYLAND

OWNER	WELL NAME OR NUMBER	AQUIFER	COORDINATE LOCATION	DEPTH (FEET)	DIAMETER (INCHES)	MAX. SAFE YIELD	PUMPING CAPACITY
Trappe	No. 4	Piney Point	1,068,000 302,000	410	6	N/A	180 gpm
	No. 5	Piney Point	1,068,000 302,000	421	8	N/A	180 gpm
Calhoon MEBA Engr. School	No. 1	N/A	1,042,000 345,000	198	4	N/A	50 gpm
	NO. 2	N/A	1,042,000 345,000	190	4	N/A	50 gpm
	No. 3	Aquia	1,042,000 345,000	570	6	N/A	150 gpm
Bayview Water Co., Inc. Claiborne	No. 1	Aquia	1,006,000 367,000	364	4	N/A	25 gpm
Claiborne Water Co., Inc. Claiborne	No. 1	Aquia	1,006,000 367,000	350	4	N/A	50 gpm

QJ

TABLE NO. 4
INVENTORY OF EXISTING COMMUNITY WELLS
TALBOT COUNTY, MARYLAND

OWNER	WELL NAME OR NUMBER	AQUIFER	COORDINATE LOCATION	DEPTH (FEET)	DIAMETER (INCHES)	MAX. SAFE YIELD	PUMPING CAPACITY
Jensen's Hyde Park	No. 1	Federalsburg	1,070,000 360,000	140	6	35,000 gpd	50 gpm
	No. 2	N/A	1,070,000 360,000	666	6	45,000 gpd	65 gpm
Martingham Est.	No. 1	Aquia	1,019,000 357,000	406	6	N/A	330 gpm
	No. 2	Aquia	1,019,000 357,000	395	6	N/A	330 gpm
Tilghman School	No. 1	N/A	988,000 320,000	382	4	N/A	20 gpm

Updated January 1983

QJ

TABLE NO. 6
INVENTORY OF EXISTING WATER TREATMENT FACILITIES
TALBOT COUNTY, MARYLAND

Owner	Water Source	Type Treatment	Plant Coordinate Location	Rated Plant Capacity (MGD)	Average Production (MGD)	Max. Peak Flow (MGD)	Storage Capacity (MGD)	Planned Expansion MGD/Dates	Method of Sludge Disposal	Operatin Agency
Easton	Wells 6,7,8,9 10	Chlorination	N/A	3.4	1.2	1.8	1.325	1989	N/A	Town
Easton	Well #11	Iron Rem. & Chlorination	1,061,000 350,000	2.0	Under Construc-tion				Sanitary Sewer	Town
Oxford	Wells	Chlorination	1,036,000	0.574	0.120	.2360.	020	None	N/A	Town
Saint Michaels	Wells	Chlorination	1,022,000 345,000	1.7	0.26	0.518	0.3	None	N/A	Town
Trappes	Wells	Chlorination	1,068,000 320,000	0.518 0.288	0.11	0.316	0.70	None	N/A	Town
Calhoon Meba School	Wells	Chlorination at Well No. 3	1,038,000 337,000	0.216	0.005	0.006	0.010 Hydronuematic	None	N/A	Town
Bay View Water Co. Inc. Claiborne	Well	Chlorination	1,066,000 367,000	0.036	0.004	N/A	500 gal Hydronuematic	1991	N/A	Private
Claiborne Water Co. Inc.	Well	Chlorination	1,066,000 367,000	0.072	0.0001	N/A	0 1 0 0 0 galHydronuematic	1991	N/A	Private
Hyde Park	Well	Chlorination	1,070,000 360,000	0.080 0.018	0.015	N/A	0.005	None	N/A	Private
Martingham	Wells	Chlorination	1,019,000 357,000	0.907	0.030	N/A	0.075	None	N/A	Private

* Pump gpm x 24/hr. x 60 min./hr. = hydraulic capacity of plant

TABLE NO. 7
INVENTORY OF WATER PROBLEM AREAS
TALBOT COUNTY, MARYLAND

SERVICE AREA	LOCATION	POPULATION	ACRES	NATURE OF PROBLEM	PLANNED CORRECTION DATE (IF KNOWN)
Claiborne	N.W. of Martingham				
Claiborne 1) Bayview 2)		50 homes 22 homes		Old system needs repairs Constructed of Transite-asbetos/cement pipe	Grant application in process
Cordova/ Queen Anne	N.E. of Easton			High Nitrates in shallow wells	Currently recommending deep wells be drilled
St. Michaels Tilghman	West of Easton			Static water level dropping	Replace wells being drilled with 4" casing
Oxford Neck	West of Easton			High sodium/flouride levels	N/A
Trappe	S.W. of Easton			High nitrates in shallow wells	Currently recommending deep wells be drilled in areas with problems

DETAILED INFORMATION ON EXISTING WATER SYSTEMS

A. Easton

Source - Wells - Aquia, Magothy, and Patapso

Well No. 6

a. 1045' deep - 550 gpm electric deep well submersible pump.

b. Treatment - Chlorination

Well No. 7

a. 1057' deep - 450 gmp submersible pump

b. Treatment - Chlorination

Well No. 8

a. 1092' deep - 600 gpm submersible pump

b. Treatment - Chlorination

Well No. 9

a. 665' deep - 600 gpm submersible pump

b. Treatment - Chlorination

Well No. 10

a. 1000' deep - 150 gpm

b. Treatment - Chlorination

Well No. 11

a. 1225' deep - 1400 gpm

b. Treatment - Iron removal and Chlorination

Storage - 1 - 86,000 gals. standpipe (built 1900)

1 - 250,000 gals. elevated tank (built 1955)

1 - 1 MG elevated tank (built 1983)

Treatment Plant Hydraulic Capacities - 3.4 MGD for wells 6,7,8,9,10 which use Chlorination only, and 2.0 MGD for well No. 11.

Distribution - pipelines sizes 4" through 12"

Service Area - the service area is basically the town corporate limits. Present population served is approximately 8000 persons.

B. <u>Oxford</u>

Source - Wells - Aquia Formation

Well No. 11

a. 675' - 8" diameter casing - 250 gpm electric deep well

b. Treatment - Chlorination

Well No. 12 (drilled in 1984)

a. 650' - 8" diameter casing - 350 gpm electric deep well

b. Treatment - Chlorination

Storage - 1 - 100,000 gallon elevated storage tank (built 1927)

1- 100,000 gallon elevated storage tank (built 1988)

Capacity - 574,000 gallons per day

Distribution - distribuiton lines vary from 2" - 8" in diameter

Service Area - The Corporation limits of the town and adjacent areas soon to be annexed serving approximately 850 persons

C. <u>St. Michaels</u>

Source - Wells - Aquia Formation

Well No. 1

a. 404' - 8" diameter casing - 243 gpm electric turbine pump

b. Treatment - Chlorination

Well No. 2

a. 458' - 10" diameter casing - 480 gpm electric

b. Treatment - Chlorination

Well No. 3

a. 450' -16" diameter - 500 gpm

b. Treatment Chlorination

Storage 1 - 100,000 gallon elevated storage tank

1 - 200,00 gallon elevated storage tank

Distribution - The distribution system consists of 4" to 10" diameter lines

Service Area - About one half of the service area is inside Towm limits and about one half is outside including the Rio Vista, Bentley Hay Area.

D. <u>Trappe</u>

Source - Wells - Piney Point formation

Well No. 4

a. 410' deep - 6" diameter - 180 gpm

b. Treatment - Chlorination

Well No. 5

a. 421' deep - 8" diameter - 180

b. Treatment - Chlorination

Storage - Storage provided by 1-70,000 gallon elevated (100' high) storage tank

Service Area - the service area is the corporate limits of the town plus about 31 out of town accounts.

Present Population Served - 860 person

E. Bay View Company, Inc. (Claiborne)

Source - Well

Well No. 1

a. 364' deep - 4" diameter casingwith 25 gpm submersible (new pump in 1987)

b. Treatment - Disinfection with Sodium hypochlorite

Storage - 1 - 350 gallon pressure tank (1966)

Distribution - 4" diameter asbestos cement pipes installed in 1966.

Service Area - 18 hours

F. Claiborne Water Company, Inc.

Source - Well

Well No. 1 (drilled 1983 with old well kept as a backup)

a. 350' deep well - 4" diameter casing and 50 gpm submersible pump (1983).

b. Treatment - Disinfectionwith sodium hypochlorite

Storage - 1000 gallon pressure with 250 gallons liquid capacity

Distribution - Small diameter (3/4" and 1") galvanized steel pipes (possibly built in 1940's)

G. Martingham

Source - Well

Well No. 1

a. 406' deep - 6" diameter casing - 300 to 330 gpm (new pump in 1984)

b. Treatment - Chlorination

Well No. 2

a. 395' deep - 6" diameter casing - 300 - 330 gpm

b. Treatment - Chlorination

Storage - 1- 75,000 gallon tank at ground level with booster pump

Service Area - The Martingham area

H. Hyde Park

Source - Well

Well No. 1

a. 140' deep - 6" casing - 50 gpm

b. Treatment - Chlorination

Well No. 2

a. 666' deep - 6" casing - 65 gpm

b. Treatment - Chlorination

Storage - 5000 gallon storage tank

Distribution - The distribution system consists of 4" and 2" diameter lines

Service Area - Jensen Hyde Park Mobile Home Park

C. EXISTING CONDITIONS AND PROPOSED FACILITIES

The following are brief descriptions of existing conditions and proposed facilities for various water system in Talbot County. Reference may be made to Figure 27, Comprehensive Water System Plan.

More detailed information concerning these systems may be found in the above section entitled "Detailed Information on Existing Water System".

EASTON - HYDE PARK AREA - Refer to Figure No. 17, Easton-Hyde Park Water System Plan. The Town of Easton presently draws water from the Aquia Greensand Aquiter (Well No. 9) the Magothy Aquifer (Wells 6,7,8,9,10) and the Patapsco Aquifer (Well No. 11). These wells provide 1,600,000 gallons per day to an estimated population of 8000 and many industrial, commercial and institutional establishments. Elevated Storage Capacity is 1.33 million gallons.

There is a need to increase the storage capacity to meet average demands and preliminary plans have begun for providing a new 1 million gallon tank. Service area expansions to surrounding areas is expected to continue to keep pace with the demands of development. A new water treatment plant will be completed in 1989 for iron removal at the new Well # 11. It is expected to produce about 700 lbs per day of sludge (@10% solids) which will be discharged to the sanitary sewer.

Hyde Park currently serves 107 mobile home lots with another 61 lots under construction. Average daily demand is 15,000 gallons to serve 195 people.

<u>CALHOON M.E.B.A. ENGINEER SCHOOL</u> draws water through three wells. Well No. 3 services the school and living quarters only and is chlorinated. A 10,000 gallon storage tank is provided. The other two wells service the manor house and adjcent structures only at an average demand of less than 1000 gallons per day. These wells are not chlorinated and based on the present demand is not necessary. The school can potentially serve 350 - 400 people but due to currently low industry demands for marine personnel the service population about 100 people maxinum.

<u>OXFORD AREA</u>- Refer to Figure 18, Oxford Area Water System Plan. Oxford currently utilizes three (2) wells each approximately 650 feet deep to draw water from the Aquia Greensand Aquifer. The wells presently supply 121,500 gallons per day to approximately 8509 persons. Individual water meters were installed for all residential and commercial customers in 1983. Oxford currently serves water customers both inside and outside of Towm limits, however, one objective of the 1985 Comprehensive Plan is to provide public services only within existing and future corporate limits. Currently about 100 persons outside Town limits are served.

<u>ST. MICHAELS - CLAIBORNE - MARTINGHAM AREA</u> - Refer to Figure No. 19, St. Michaels, Claiborne, Martingham Water System Plan. St. Michaels draws water from the Aquia Greensand Aquifer through two (3) wells each approximately 450 feet deep. These wells provide 260,000 gallons per day to an estimated population of 2500 person within the corporate limits and outside to Bentley Hay-Rio Vista. Total storage capacity is 300,000 gallons per day. A new well (1988) will augment the supply and eventually replace the oldest well (60 years old). Storage is not adequate to meet water and fire needs during the tourist season.

Claiborne is served by two private water systems, one serving fifteen (18) homes and the other serving twenty (28) homes. The system are adjacent and each has a well penetrating the Aquia Greensand Aquifer providing 13,000 gallons per day. The Bayview Water Company well and pump has limited capacity for expanded service. The Claiborne Water Company's main distribution lines are too small and frequently leak. 130th systems have a very limited amount of storage. To provide a reliable system which will supply the basic potable water needs of Claiborne, it is recommended that the two systems be unified and storage increased. The County is currently investigating grant funding from the State fro the project.

Martingham Estates draws water from two wells, each approximately 400 feet deep. These wells provide 30,000 gallons per day with a large capacity to a population of 393 persons. A 75,000 gallon storage facility is available and will be adequate beyond 2000.

TRAPPE AREA - Refer to Figure No. 20, Trappe Area Water System Plan. Trappe draws water from the Piney Point Aquifer through two wells, each approximately 400 feet deep. The system supplies an average of 110,000 gallons per day 860 persons. Storage is provided by one-79,000 gallon elevated storage tank. The existing water main to White Marsh School needs replaced or looped to improve flows. A new Chlorinator building is proposed at well No. 4.

Lesser Developed Areas

For the small unincorporated areas of Cooperville, Tunis Mills, Unionville, Royal Oak, Newcomb Bellevue, Bozman, Wittman, Neavitt, Tilghman, Avalon, Fairbank, Matthews, Bruceville and Cordova it is concluded that, due to sparse population density these areas do not warrant consideration of community water system unless they experience future nitrate problems and unless federal and/or state funds become available for water development.

SECTION III

COMPREHENSIVE WATER PLAN

Preface

This section defines water projects accepted within this plan.

Cost Index

The estimated cost for the proposed work in the various municipalities are generally furnished by the various towns themselves or consultants employed by such.

Schedule

The construction time frames represent the best judgement of the county as to when the scheduled facilities may realistically be built. The actual construction time on many of these projects is subject to availability of local, state and federal funds, health needs and the wishes of the participating community governments.

Expansion of privately owned facilities is to be financed by private capital and no local, state or federal government funds are anticipated. Therefore, costs are generally not included except in cases where estimates are provided by the developer.

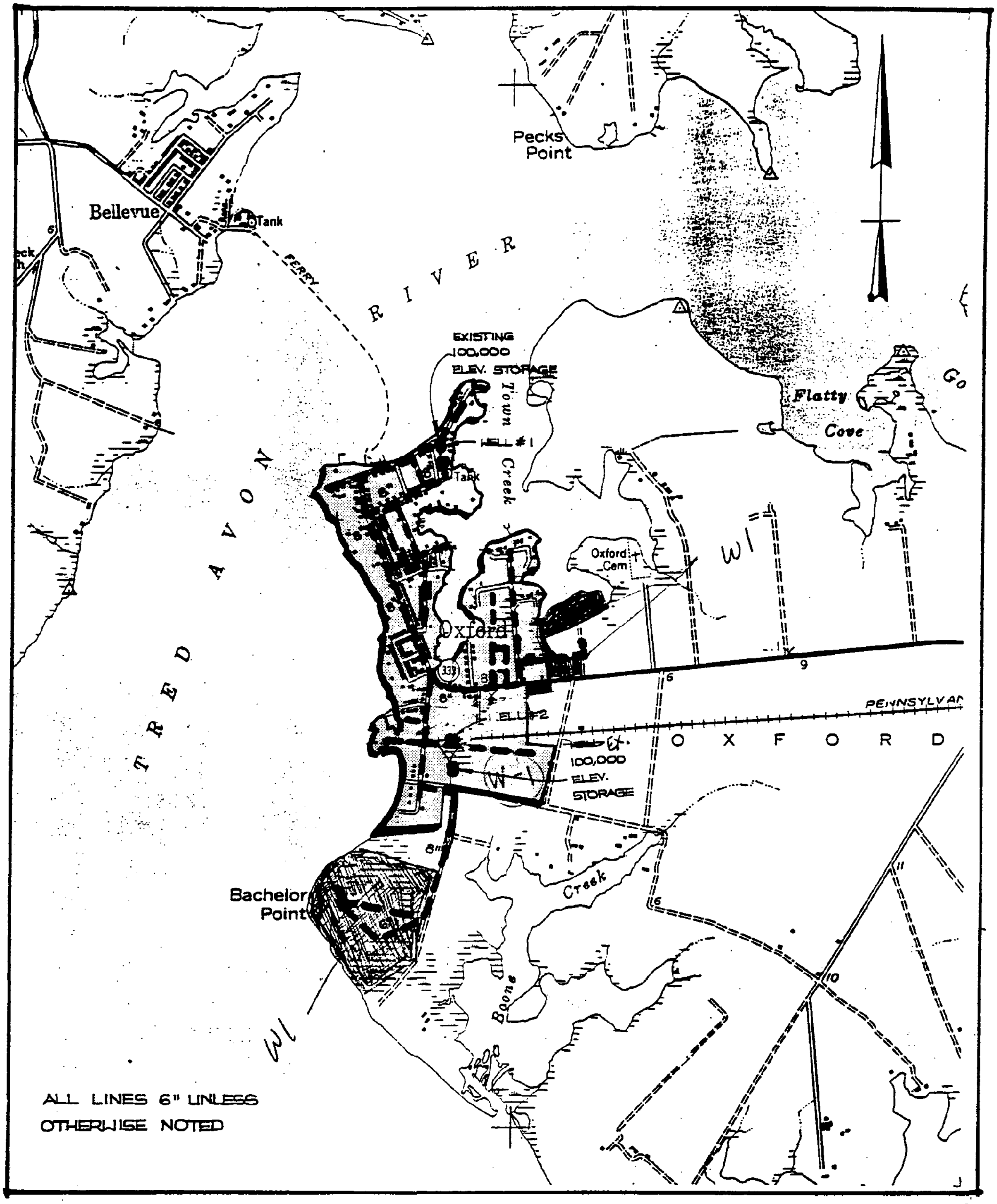
WATER SYSTEM LEGEND

EXISTING AND PLANNED SERVICE AREAS

W-1	EXISTING & IMMEDIATE PRIORITY
W-2	3 TO 5 YEARS
W-3	5 TO 10 YEARS
W-4	NO SERVICE PLANNED

MAP SYMBOLS

EXISTING		PLANNED
▲	WATER TREATMENT PLANT	△
■	WATER PUMPING STATION	□
⬢	WATER STORAGE	⬡
⯐	WELLS	⌖



OXFORD AREA

WATER SYSTEM PLAN

MCRONE

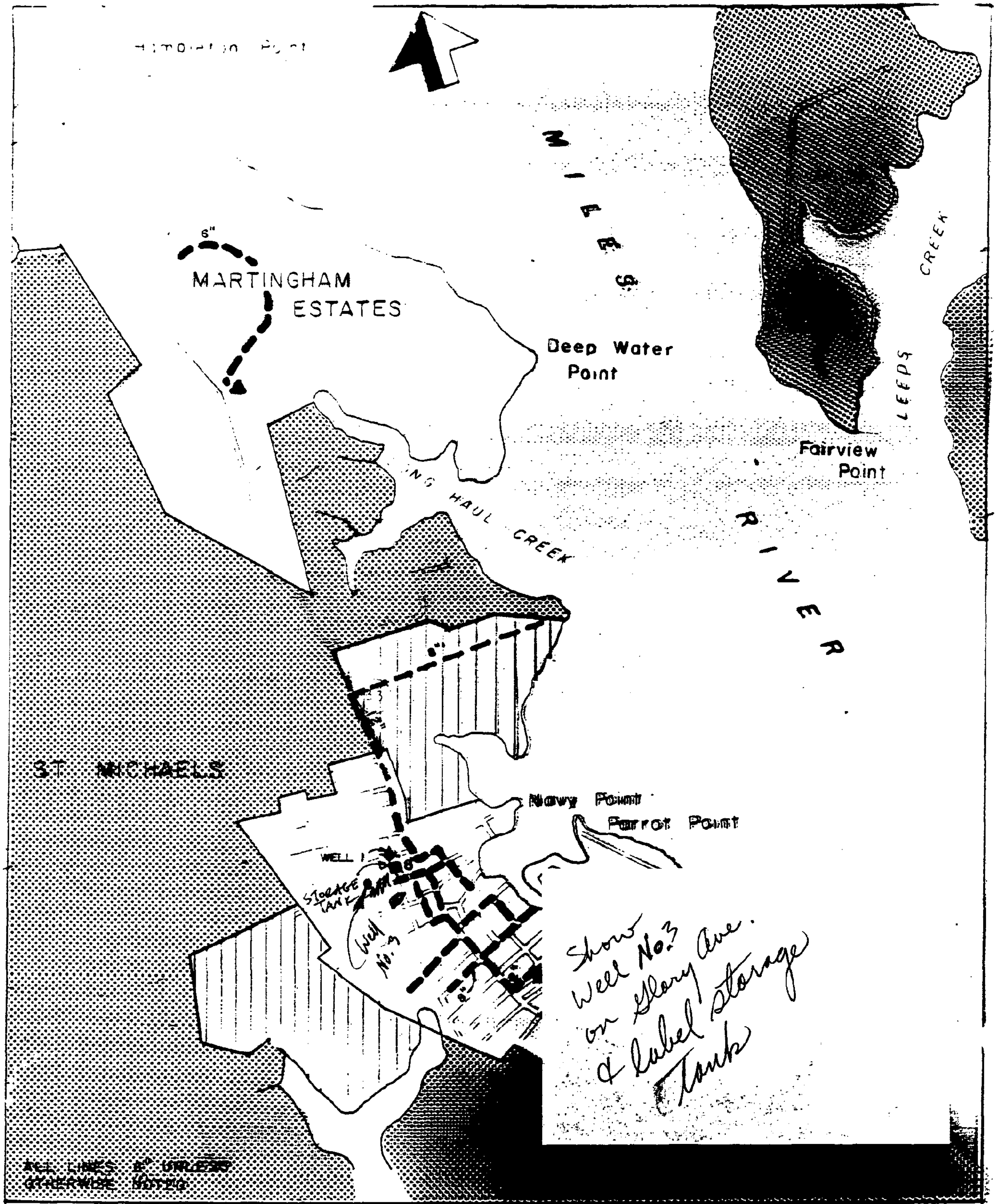
ENGINEERS · PLANNERS · SURVEYORS

ANNAPOLIS

EASTON

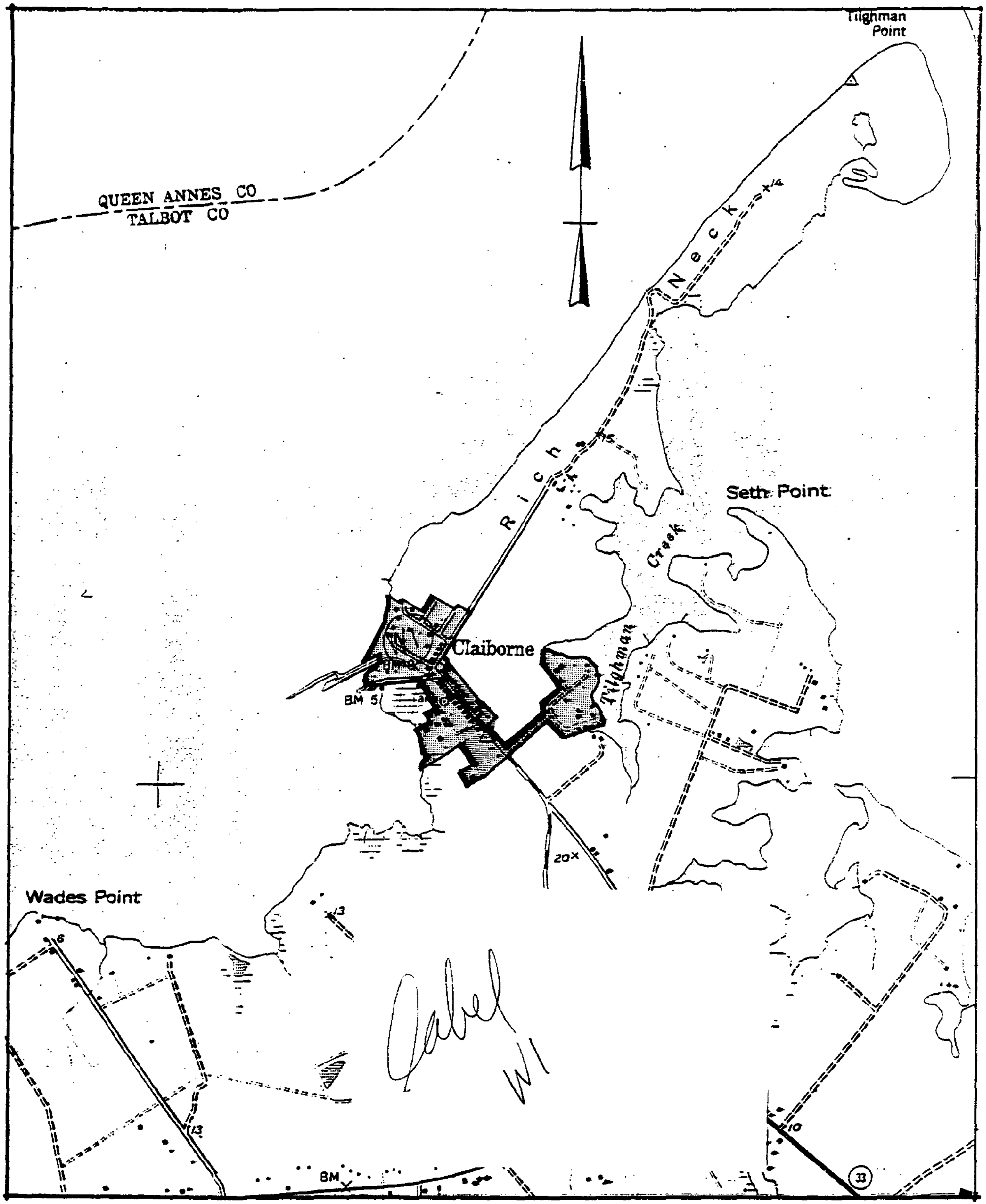
SCALE: 1" = 2000'

FIGURE NO.



ST. MICHAELS - MARTINGHAM AREA
WATER SYSTEM PLAN

SCALE : 1"= 2,000'   REVISED JAN. 1981   FIGURE NO. 19-A



CLAIBORNE AREA

WATER SYSTEM PLAN

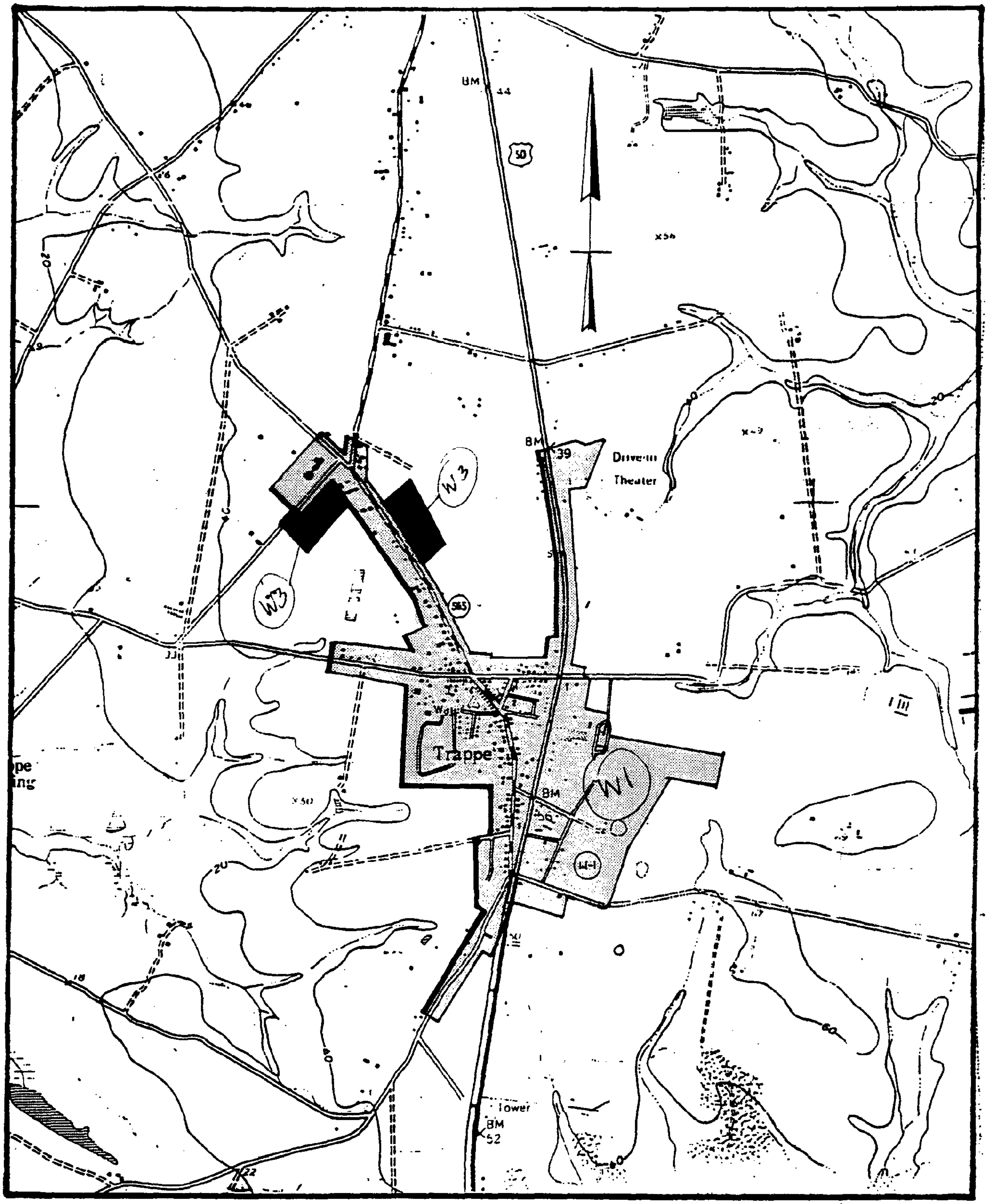
ANNAPOLIS

MCRONE

EASTON

SCALE: 1" = 2000'

FIGURE NO.



TRAPPE AREA

WATER SYSTEM PLAN

MCRONE

ENGINEERS · PLANNERS · SURVEYORS

ANNAPOLIS

EASTON

SCALE: 1" = 2000

FIGURE NO.

1989 UPDATE
COMPREHENSIVE
WATER AND SEWER

TABLE OF CONTENTS

CHAPTER FOUR

CHAPTER FOUR
SEWERAGE SYSTEM

Section I - Existing And Proposed Sewerage Facilities

A. General

Wastewater systems in Talbot County are quite varied, ranging from individual systems and sub-surface disposal to municipal systems utilizing mechanical equipment. Except for one Talbot County regional system, three (3) municipal systems, two private systems and several schools, the rest of the County utilizes sub-surface disposal. To properly accommodate a system using sub-surface disposal, appropriate soil groupings must be available. The sands, sandy loams and silt loams located generally east of U.S. 50 are in general very good for sub-surface discharge. Unfortunately, this is not the area of development. The silty and clayey soils, located generally west of U.S. 50, are not reliable for sub-surface discharge. However, this area also contains the greatest population concentration outside the municipalities. The unsuitability of the silty and clayey soils, coupled with a high water table and low elevations render the western portion of the County susceptible to system failures.

Some industries in the County treat and discharge wastewater generally as spray irrigation onto the surface of the ground. This prevents concentration in a body of water and allows recharge of the sub-surface aquifers.

Other means of disposal include discharge to receiving streams or infiltration ponds.

B. Inventories

Table No. 10 shows an inventory of existing sewage treatment plants.

Table No. 11 shows an inventory of existing problem areas including inadequate portions of community systems and areas where individual systems are experiencing difficulty.

Table No. 12 identifies water quality problems due to storm drain outfall and to non-point sources.

Following the above tables is a tabulation of Detailed Information on Existing Sewerage Systems.

Table L and Figure No. 26 show the location and detailed information of all the marinas in Talbot County.

DETAILED INFORMATION ON EXISTING SEWERAGE SYSTEMS

A. Easton

Point of discharge - Councell Creek, then into the Choptank River.

Pumping Stations

No. 1 - North Pump Station - with a comminutor; two pumps - 1500 and 2000 gpm; one - hand cleaned bypass bar screen.

No. 2 - South Pump Station - a comminutor with bypass bar screen; two pumps - 1,000 and 1,000 gpm; - 2,10" force mains.

No. 3 - Windmill Pump Station - a comminutor with bypass bar screen; two pumps - 400 and 1000 gpm; 10" force main.

No. 4 - Clifton Pump Station - a comminutor with bypass bar screen; three pumps 3500, 3500 and 5000 gpm; 20" diameter force main.

No. 5 - Calvert Pump Station - a comminutor with bypass bar screen; two pumps - 1500 and 1500 gpm; 16" force main.

There are no emergency on-site generators available since the entire Easton Utilities Commission power system is backed up by Delmarva Power.

Treatment Plant

Design capacity - 2.0 mgd

Two stabilization lagoons - one 50 ac. primary lagoon and one 13 ac secondary; operated in series.

Tertiary Treatment - overland flow on 80 acres.

Disinfection - gas chlorination.

Dechlorination - gaseous sulfur dioxide.

Post Aeration - three submersible 15 hp aerator

B. Oxford

Point of Discharge - Town Creek, a tributary of the Tred Avon River Pumping Stations.

No. 1 - Bank Streets P.S. - two pumps 175 and 175 gpm; 4" diameter force main and generator backup.

No. 2 - Bonfield P.S. - two pumps 105 and 105 gpm; 4" diameter force main - generator backup.

No. 3 - Main P.S. with a comminutor and manually cleaned bar screen bypass; two pumps 350 and 350 gpm; 6" diameter force main and generator backup.

Treatment Plant

2 - stabilization lagoons - one, three acre primary lagoon with a baffle and one three acre secondary lagoon.

Chlorine Contract Tank - 30 minutes detention.

Design Capacity 208,000 gallons per day.

Disinfection - Chlorination

Dechlorination - Sulfur Dioxide

Post Aeration - Diffused air.

C. Talbot County Region II (St. Michaels)

Point of Discharge - Miles River.

Collection System - 8" - 12" diameter. (clay and PVC)

Pumping Stations:

No. 1 (Green Street) - one 1/4" slot comminutor - 1- bypass bar screen manually cleaned - two 500 gpm Sewage Pumps 6" diameter discharge. Emergency power. Centrifugal.

No. 2 (Mill Street) - two 280 gpm - centrifugal sewage pumps, 4" diameter discharge. Station has comminutor and bar screen. Emergency Power.

No. 3 (Grace Street) - two 125 gpm centrifugal sewage pumps, 4" discharge. Station has bar screen.

No. 5 (Madison Avenue) - two 100 gpm self priming pumps, 4" discharge. Station has bar screen.

Perry Cabin - nine duplex 15 gpm Environment One Grinder Pump Stations. Force main size from 1 1/4" to 3".

Treatment Plant:

Bar screen and comminutor, influent pump station (1050 gpm), 2-30' diameter primary clarifiers, three rotating biological contactors, 2-30' diameter final clarifiers, automatic backwash filter (with limiting capacity of 0.450 gpd), chlorination, dechlorination, and post aeration. There are four sludge drying beds 25 feet x 95 feet each, and a lagoon for temporary storage of waste water during maintenance of a unit process (capacity equals 1.35 MG or 3 days of normal flow).

D. Trappe

Point of discharge - a tributary of the LaTrappe Creek.

Pumping Stations.

Lakeview - two pumps each 1.5 hp and a 3" force main.

Main - two pumps 335 and 335 gpm and a 6" force main (has emergency generator).

Route 50 - two pumps each 3 hp and a 4" force main.

Rumsey Drive - two pumps, one 1 hp and one 3/4 hp with a 1 1/2" force main.

White Marsh School - two pumps, each 2 hp and a 4" force main.

Treatment Plant

Three stage stabilization lagoon with half of secondary pond aerated.

Disinfection - Chlorination - Dechlorination

E. Calhoon MEBA Engineer School

Disposal - Spray Irrigation.

Treatment Plant

Three (3) call stabilization lagoons with Rock Filter and Chlorination emptying into holding pond for spray irrigation.

Disinfection - effluent is chlorinated.

F. Martingham Estates

Lagoons for treatment and holding during inclement weather and spray irrigation on Golf Course.

Two - 0.9 acre stabilization lagoon - water depth varies from 3' to 5'

Disinfection - effluent is chlorinated prior to entering holding pond and lagoon prior to spraying.

Design Capacity - Treatment capacity = 75,000 gpd but spray disposal areas = 42,800 gpd.

TABLE NO. 9
PROJECTED SEWER DEMANDS AND PLANNED CAPACITY
TALBOT COUNTY, MARYLAND

WATER SERVICE AREA	1988 (PRESENT) POPULATION TOTAL	SERV	UNSERV	GPCD	CAPACITY DEMAND (MGD)	PLAN (MGD)	1990 POPULATION TOTAL	SERV	UNSERV	GPCD	CAPACITY DEMAND (MGD)	PLAN (MGD)	1995 POPULATION TOTAL	SERV	UNSERV	GPCD	CAPACITY DEMAND (MGD)	PLAN (MGD)	2000 POPULATION TOTAL	SERV	UNSERV	GPCD	CAPACITY DEMAND (MGD)	PLAN (MGD)
Easton Residential	8000	8000	0	98	0.78	2.0	8600	8600	0	92	0.79	2.0	9600	9600	0	92	0.88	2.57	10500	10500	0	92	0.97	3.0
Commerical Industrial & Institutional					0.90						0.86						0.96						1.05	
TOTAL					1.70	2.0					1.66	2.0					1.84	3.0					202	3.0
Oxford	800	800	0	99	0.08	0.200	950	950	0	0.09	0.09	0.208	n/a			91		0.206	n/a			99	2.02	3.0
Region S.D.																								
Unionville, Tunis Mills, Cooperville																								
Hyde Park	195	195	0	77	0.015		265	265	0	77	0.02		435	435	0	77	0.033		545	545	0	77	0.042	
Martingham	393	393	0	48	0.049	0.043	500	500	0	60	0.030	0.043	610	610	0	10	0.043	0.043	610	610	0	70	0.043	0.043
Community System Total																								
Calhoon MEBA	100	100	0	63	0.006	0.015	100	100	0	63	0.005	0.015	100	100	0	03	0.005	0.015	100	100	0	63	0.005	0.015
Institutional Toda																								
Community & Instituional Total																								
Private Water Use																								

TABLE NO. 10
INVENTORY OF EXISTING SEWAGE TREATMENT PLANTS
TALBOT COUNTY, MARYLAND

OWNER	TYPE TREATMENT	PLANT COORD. LOCATION	OCCUPIED AREA	VACANT AREAS	POINT OF DISCHARGE	MAX. SITE CAPACITY (MGD) SECONDARY	MAX. SITE CAPACITY (MGD) ADVANCED	EXISTING (MGD) CAPACITY	FLOWS (MGD) AVERAGE PEAK	PLANNED OR EXPECTED ABANDON. DATE IF INTERIM	OPER AGEN CY
Easton	Lagoons & Overland Flow	1,080,000 334,000	150	100	Council Creek	7.8	7.8	2.0	1.7/ 2.7	Permanent	Town
Oxford	Lagoons	1,037,000 309,000	7.5	11	Head of Town Creek	0.4	0.4	0.208	0.08/ 0.14	Permanent	Town
Talbot County Region II	Rotating Biological Contactors & Filters	1,020,000 340,000	7.8	22	Miles River	1.0	1.0	0.450	0.325 0.812	Permanent	T.C. P.W.
Trappe	Lagoons (Partially Aerated)	1,067,000 303,000	8	0	La Trappe Creek	0.20	0	0.114	0.64 0.108	Permanent	Town
Calhoon MEBA Eng. Sch.	Lagoons & Spray Irrigation	1,042,000 346,000	7	600	Land App-lication	n/a	n/a	0.015	0.005 0.208	Permanent	Priv -ate
Hyde Park	Lagoons	1,068,000 359,000	2.1	0	Rapid In-filtratio n Pond - 1.0 acre	0.058	0	0.058	0.015	Permanent	Priv ate

TABLE NO. 10
INVENTORY OF EXISTING SEWAGE TREATMENT PLANTS
TALBOT COUNTY, MARYLAND

OWNER	TYPE TREATMENT	PLANT COORD. LOCATION	OCCUPIED AREA	VACANT AREAS	POINT OF DISCHARGE	MAX. SITE CAPACITY (MGD) SECONDARY	MAX. SITE CAPACITY (MGD) ADVANCED	EXISTING (MGD) CAPACITY	FLOWS (MGD) AVERAGE PEAK	PLANNED OR EXPECTED ABANDON. DATE IF INTERIM	OPER AGEN CY
Marting ham	Lagoons & Spray Irrigation	1,020,000 355,000	3	2	Land App-lication	0.075	0.043	0.043	0.019 n/a	Permanent	Priv ate
Talbot County Region V	Lagoon (Aerated)	988,000 322,500	10	0	Chesapeak e Bay	0.15	0	0.15	0.067	Permanent	T.C. P.W.

TABLE NO. 11
PROBLEM AREAS - INDIVIDUAL AND COMMUNITY
TALBOT COUNTY, MARYLAND

Priorty	Service Area	Problem Description	Location	Population*	Approx. Acres	Treat-ment Capacity
1.	Royal Oak/ Newcomb	Failing Septic System High Ground Water Table Small Lots Poorly Drained Soils	1,034,000 322,000			
2.	Unionville/ Tunis Mills/ Cooperville	"	1,045,000 358,000			
3.	Wittman	"	1,001,000 350,000			
4.	Black Dog Alley/ North Easton/ Cordova Road/ Clearview	"	1,060,000 340,000			
5.	Neavitt	"	1,033,000 326,000			
6.	Fairbanks	"	987,500 311,500			
7.	Bellevue	Small Lots	1,033,000 318,000			

TABLE NO. 11 (CONT.)
PROBLEM AREAS - INDIVIDUAL AND COMMUNITY
TALBOT COUNTY, MARYLAND

Priorty	Service Area	Problem Description	Location	Population*	Approx. Acres	Treat-ment Capacity
8.	Queen Anne/ Hillsboro	"	1,098,000 397,000			
9.	Claiborne	"	1,007,000 366,000			

TABLE 11-A
MARINA SANITARY SURVEY
TALBOT COUNTY, MARYLAND

PART 1 - COMMERCIAL MARINAS

Marina Location	No. of Slips	Disposal System: Type	Disposal System: Condition	Disposal System: Location	Water System: Type	Water System: Condition	Water System: Location
1. Bates Marine Basin Oxford, Maryland	51	PS		on shore	PW		on shore on pier
2. Crockett Brothers Boatyard, Oxford, MD	73	PS		on shore	PW		on shore
3. Easton Point Marina Easton, Maryland	23	S&DW		on shore	DR		on shore
4. Knapps Narrows Marina, Inc. Tilghman, MD	23	None		on shore	None		on shore
5. St. Michaels Town Dock, St. Michaels, Maryland	22	PS		on shore	PW		on shore
6. Pier Street Marina Oxford, Maryland	65 pub. 12 priv.	PS		on shore	PW		on shore on pier

Line Location

TABLE 11-A
MARINA SANITARY SURVEY
TALBOT COUNTY, MARYLAND

PART 1 - COMMERCIAL MARINAS

Marina Location	No. of Slips	DISPOSAL SYSTEM Type	DISPOSAL SYSTEM Condition	DISPOSAL SYSTEM Location	WATER SYSTEM Type	WATER SYSTEM Condition	WATER SYSTEM Location
7. St. Michaels Marina St. Michaels, MD (see no. 22)	60	PS		on shore	PW		on shore on pier
8. Oxford Yacht Haven Oxford, Maryland	5 pub. 12 priv.	PS		on shore	PW		on shore
9. Oxford Boat Yard Oxford, Maryland	140	PS		on shore	PW		on shore on pier
10. Severn Marine Tilghman, Maryland	48	S&DW		on shore	PW		on shore on pier
11. Cutts & Case Oxford, Maryland	140 ?	PS		on shore	PW		on shore on pier
12. Town Creek Rest. & Marina Ft. of Tilghman St. Oxford	25	PS		on shore	PW		on shore
13. Todd's Boat Works John K. Todd, Jr. Oxford, Maryland	84	PS		on shore	PW		on shore

Marina Location

TABLE 11-A
MARINA SANITARY SURVEY
TALBOT COUNTY, MARYLAND

PART 1 - COMMERCIAL MARINAS

Marina Location	No. of Slips	Disposal System: Type	Disposal System: Condition	Disposal System: Location	Water System: Type	Water System: Condition	Water System: Location
14. Higgins Marine Service, St. Michaels, MD	23 (or more?)	PS		on shore	PW		on shore
15. Reeser's Boatyard Tilghman, MD	45	Chem.		on shore	Deep Well		on shore
16. Snow's Landing Black Walnut, Tilghman, MD	13	S&DW		on shore	DR		on shore
17. Dickerson Boat Builders, Inc. Trappe, MD	50	S&DW		on shore	DR		on shore
18. Gateway Marina & Ship Store Rt. 50, Trappe, Maryland	108	S&DW		on shore	DR		on shore
19. Tilghman Inn & Lodging, Tilghman, Maryland	21	PS		on shore	DR		on shore
20. Mears Yacht Haven Oxford, Maryland	96	PS		on shore	PW		on shore

Marine Location

TABLE 11-A
MARINA SANITARY SURVEY
TALBOT COUNTY, MARYLAND

PART 1 - COMMERCIAL MARINAS

Marina Location	No. of Slips	DISPOSAL SYSTEM Type	Condition	Location	WATER SYSTEM Type	Condition	Location
21. Bay Hundred Rest. & Marine, Tilghman, MD	~~10~~ 14/30	PS		on shore	PW		on shore
22. St. Michaels Harbour & Marine St. Michaels, MD	60	PS		on shore	PW		on shore

TABI NO. 12

WATER QUALITY PROBLEMS DUE TO STORM DRAINAGE OUTFALLS AND TO NON-POINT SOURCES
TALBOT COUNTY, MARYLAND

Service Area	Problem Description	Location	Reach Affec
Broad Creek	Harvesting restriction after one inch of rain due to stormwater run-off	Upper parts of Broad Creek, Edge Creek & San Domingo	
Choptank River	Cambridge Wastewater Treatment Plant, Harvesting restrictions after one inch of rain due to stormwater run-off	Area near Cambridge Island Creek, Upper parts of Choptank, Bolingbroke Creek & LaTrappe Creek	
Tred Avon	Harvesting restrictions after one inch of rain due to stormwater run-off	Upper parts of Tred Avon, Plaindealing Creek, Goldsborough Creek, Tar Creek & Town Creek	
Miles River	Closed for High Fecal Coliform	Parts of Leeds Creek, Upper Miles, Hunting Creek, Oak, Creek & St. Michaels Harbor	
	Restricted because of Talbot County Region 2 Wastewater Treatment Plant.	Parts of Miles River	
Tilghman Island	High Fecal Coliform	Black Walnut Cove, Knapps Narrows	
	Restricted because of County Regional 5 Wastewater Treatment Plant	Part of Eastern Bay	
Harris Creek	High Fecal Coliform	Cummings Creek	
	Harvesting restrictions after one inch of rain due to stormwater run-off	Dunn Cove, Upper Parts of Harris Creek	

TABLE NO. 13
IMMEDIATE 5 AND 10 YEAR PRIORITYS FOR SEWERAGE DEVELOPMENT
TALBOT COUNTY, MARYLAND

FISCAL YEAR AND PROJECT NO.	DESCRIPTION	TOTAL	FEDERAL	AND/OR STATE	LOCAL	PRE. PLANS	FINAL PLANS	START CONS.	COMP. CONS.
EASTON									
1994	Additional & Modification to Wasterwater Treatment Plant	N/A			75,000	1987	1987	1994	1995
1987	Charles Town Subdivision	90,000	0	0	90,000	1988	1989	1990	1990
	Londonderry	150,000	0	0	150,00 0	1989	1989	1991	1991
	Calvert Terrance Area	75,000	0	0	75,000	1989	1989	1991	1991
	Chapel Farm Phase III	200,000	0	0	200,000	1988	1989	1989	1991
	Chapel Farm Phase IV	150,000	0	0	150,000	1988	1989	1989	1991
	North of Chapel Road Area, West of Route 50	150,000	0	0	150,000	1991	1991	1992	1992
	George Schnaeder Subdivision	25,000	0	0	25,000	1989	1989	1990	1990
	Airport Industrial Park Phase II	300,000	0	200,000	100,000	1988	1988	1989	1990
	Glebe Road Business Center	80,000	0	0	80,000	1988	1988	1988	1991
	Easton Point	300,000	0	0	300,000	1993	1993	1994	1995

TABLE NO. 13
IMMEDIATE 5 AND 10 YEAR PRIORITYS FOR SEWERAGE DEVELOPMENT
TALBOT COUNTY, MARYLAND

FISCAL YEAR AND PROJECT NO.	DESCRIPTION	TOTAL	FEDERAL	AND/OR STATE	LOCAL	PRE. PLANS	FINAL PLANS	START CONS.	COMP. CONS.
	Hampton Forest I	600,000	0	0	600,00	1987	1988	1989	1995
	Hampton Forest II	300,000	0	0	300,000	1988	1990	1992	1993
	Hampton Forest III	300,000	0	0	300,000	1994	1994	1995	1996
	Woodland Farms	300,000	0	0	300,000	1989	1989	1991	1993
	Clifton Industrial Park	275,000	0	0	275,000	1991	1991	1992	1992
	Beechwood (Failing Septic Tank Area)	500,000	250,000	125,000	125,000	1997	1998	1999	1999
	Stoney Ridge (James Street Area)	300,000	150,000	75,000	75,000	1994	1995	1996	1996
	North Easton (inside town)	200,000	0	0	200,000	1988	1989	1990	1990
	North Easton (currently outside of Town)	800,000	400,000	200,000	200,000	1990	1990	1991	1991
	"Reward Farm"	750,000	0	0	750,000	1993	1993	1994	1995
	"Golton"	750,000	0	0	750,000	1991	1991	1992	1992

TABLE NO. 13
IMMEDIATE 5 AND 10 YEAR PRIORITYS FOR SEWERAGE DEVELOPMENT
TALBOT COUNTY, MARYLAND

FISCAL YEAR AND PROJECT NO.	DESCRIPTION	TOTAL	FEDERAL	AND/OR STATE	LOCAL	PRE. PLANS	FINAL PLANS	START CONS.	COMP. CONS.
	Mistletoe Hall/Airport	600,000	0	0	600,00 0	1993	1993	1994	1995
	Mulberry Muse (Plansoen Estate East of U.S. Route 50)	2,000,000	0	0	2,000,000	1988	1989	1989	1989
	Maryland Route 33 Industrial	500,000	0	0	500,000	1991	1991	1992	1992
	Dutchman's Lane East of Stoney Ridge	n/a	n/a	n/a	n/a	1993	1993	1994	1995
Talbot County									
1990	Region II Treatment Plant Upgrade Sand Filters	0.1	0	0	0.1	1989	1989	1989	1990
1992	Region II -Royal Oak/Newcomb	5.8	5.6	0	0.2	1990	1990	1991	1992
1993	Region III-Treament Plant Increase Capacity	4.0	0	0	4.0	1989	1990	1991	1993
Hyde Park									
1990	Sewer extension Kensington Drive, Victoria Court, St. James Court, Baker Street	0			0	1988	1989	1990	1995

TABLE NO. 13
IMMEDIATE 5 AND 10 YEAR PRIORITYS FOR SEWERAGE DEVELOPMENT
TALBOT COUNTY, MARYLAND

FISCAL YEAR AND PROJECT NO.	DESCRIPTION	TOTAL	FEDERAL	AND/OR STATE	LOCAL	PRE. PLANS	FINAL PLANS	START CONS.	COMP. CONS.
1995	Talbot Gardens East of existing park	0			0	1993	1994	1995	1995
	Unionville, Tunis Mills, Copperville								

G. Hyde Park

Point of Discharge - subsurface disposal and spray irrigation on Hog Neck Golf Course (planned for 1989).

Pumping Station - 250 gpm- Wet well type - 4" diameter force main

Treatment Plant:

One - 2.1 ac two stage stabilization lagoons, and one infiltration pond. Floating aerators to be added to lagoon in 1989.

Design Capacity - 58,00 gpd

Disinfection - Effluent is chlorinated before discharge

H. Region V - Sanitary District (Tilghman Village)

Point of Discharge - Chesapeake Bay

Collection System - 8" and 12" PVC

Pumping Stations:

East (Chicken Point Road) - two 34 gpm grinder pumps with 3" force main.

West (Coopertown Road Offset) - two 37 gpm grinder pumps with 3" force main and emergency power.

North (Summit Street) - two 50 gpm grinder pumps with 3" force main and emergency power.

Simplex Stations - there are four simplex grinder pump stations with 1 1/4" force main, each serving a single building. Two of these are located on Foster Avenue, one is located west of Route 33 and one is located north of Coopertown Road.

Treatment Plant:

Basket screen and comminutor; raw sewage pumps (two @ 400 gpm each); two-cell aerated lagoon; disinfection, dechlorination, post aeration.

C. Existing Conditions and Proposed Facilities

The following are brief descriptions of existing conditions and proposed facilities for various wastewater systems in Talbot County. Reference may be made to Figure No. 28, Talbot County Comprehensive Sewerage System Plan.

More detailed information concerning these systems may be found in the above section entitled "Detailed Information of Existing Sewerage Systems".

Easton-Hyde Park Area - Refer to Figure No. 21 - Easton-Hyde Park - North Easton Unincorporated Area Sewerage System Plan. The Town of Easton is presently served by a secondary and tertiary treatment facility which presently handles 1.7 mgd of which 0.54 mgd is estimated to be infiltration and inflow. The lagoons and overland flow provide a design capacity of 2.0 mgd which will be sufficient until about 1998. Preliminary plans are now being made to increase plant capacity within the next 5 to 10 years. Sewer extensions and expansion of service areas are scheduled through 1995. Top priority should be given to the North Easton area which is experiencing many failing septic systems.

North Easton Unincorporated is an area adjacent to the North limit of the Town of Easton. The current problems in this area include failing septic systems of the Clearview Subdivision and adjacent properties within the A-1 zoning. Corrections of these problems may ultimately be by connection of the area to the Town of Easton's sanitary facilities. This can only be done following annexation of the area. Although grant funds would possibly be available for the sanitary facilities, excessive costs would be associated with other facilities required by the town. A sewer study and preliminary design has been performed in this area to service the Talbot Trailer Park, Clearview Subdivision and Commercial properties along Kennedy Street. However due to the stringent effluent requirements for discharge by a treatment facility into Galloway run, a tributary of the Choptank River and the inacceptance of a bermed infiltration pond by the State Health Department has made this approach economically unfeasible. The Town of Easton has identified the area within their immediate 5 to 10 year planning area.

Hyde Park's system currently serves 107 mobile home lots. The two stage stabilization lagoon system with a design capacity of 58,000 gpd currently processes an average of 15,000 gpd. The treated effluent is disposed of in a 1.0 acre infiltration pond. Sewer extensions along Westminister Road were recently made. Future extensions are planned west of Park Lane by 1990. Also, east of Knightsbridge Road additional expansion is being contemplated.

In 1989 a new pump station and force main will be constructed at the infiltration pond to convey treated effluent to the Hog Neck Golf Course for disposal 9 months of the year via an existing spray irrigation system. Also, floating aerators will be installed on the lagoons to enhance treatment.

Calhoon MEBA Engineer School currently spray irrigates 5,000 gpd of lagoon treated wastewater. They are currently in the process of converting from a single spray gun to smaller, evenly spaced spray heads. If the marine industry should improve in the future, the student population could increase. There are no current indicators that this will happen.

Oxford Area - Refer to Figure No. 22, Oxford Area System Plan. Oxford is presently served by a secondary treatment system. This is a three stage waste stabilization lagoon system with diffused air which currently treats 80,000 gallons per day. This newly improved system has a design capacity of 208,000 gallons per day and will be sufficient for Oxford's future growth through 2000. Chlorine for disinfection and dechlorination by induction of Sulfur Dioxide are provided prior to discharge to Town Creek.

Sanitary District No. 2 - St. Michaels, - Refer to Figure No. 23, Talbot County Region II - Sewerage System Plan, for the limits of this Sanitary District.

The boundaries of Sanitary District No. 2 include the Town of St. Michaels, Rio Vista and Bentley Hay, and extends to and includes Newcomb, Cedar Grove, Royal Oak, and Royal Acres to the southeast.

The Wastewater Treatment Facility for Region II is owned by Talbot County. The plant is located on a 30 acre parcel of land. The treatment facility includes primary, secondary and tertiary treatment. Prior to discharge the effluent is chlorinated, dechlorinated (SO2) and post aerated. The sludge is aerobically digested and dried in four (4) 95'x25' drying beds and ultimatly disposed at the Easton Landfill. The design capacity of the plant is 500,000 gpd but the 1989 limited operating capacity is 450,000 gpd due to the limited capacity of the sand filters. The county plans to modify the plant in 1990 to allow operation at 500,000 gpd (see the Region II Allocation Policy in Appendix J). Inground facilities such as pump valves, pipes, etc. were provided to accommodate expansion of the plant up to 1.0 mgd. Current plans are to expand the capacity to 1.0 mgd by 1993.

The Royal Oak Newcomb Area An EPA Facility Plan is currently being developed for the Royal Oak - Newcomb area and is expected to be finalized in 1989. A draft version of the Plan recommends a small diameter gravity system for pretreating and conveying the waste to a pump station which will then convey the waste to the Region II Plant for treatment. Because of failing septic systems in this area, the Talbot County Health Department has imposed a septic system moratorium and has therefore halted new building

SECTION II

The Comprehensive Sewerage Plan

Preface

This section defines sewerage projects accepted within the plan.

Cost Index

The estimated costs for the proposed work in the various jurisdictions are generally furnished by the town's or county's department of public works or consulting engineers working on the projects.

Schedule

The times of construction represents the best judgment of the County as to when the scheduled facilities may realistically be financed. The actual construction time on many projects is subject to availability of state and federal grants, health needs and the wishes of participating communities.

Expansion of private utilities is to be financed by private capital and no federal or state funds are anticipated. Therefore, costs are generally not included except in a few cases where estimates were provided by the developer.

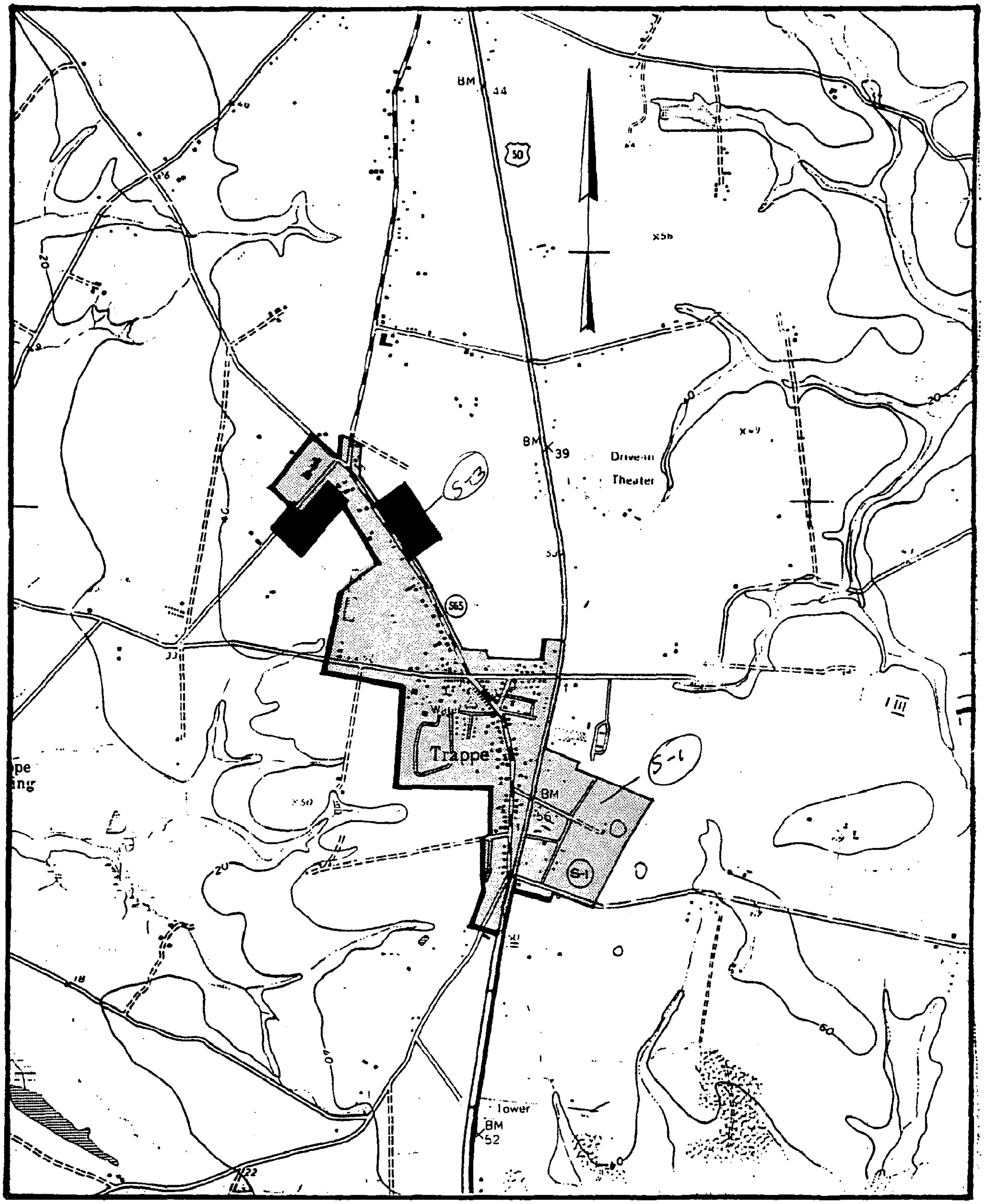
SEWER SYSTEM LEGEND

EXISTING AND PLANNED SERVICE AREAS

▒	S-1	EXISTING & IMMEDIATE PRIORITY
▓	S-2	3 TO 5 YEARS
█	S-3	5 TO 10 YEARS
□	S-4	NO SERVICE PLANNED

MAP SYMBOLS

EXISTING		PLANNED
▲	SEWER TREATMENT PLANT	△
■	SEWER PUMPING STATION	□



TRAPPE AREA

SEWER SYSTEM PLAN

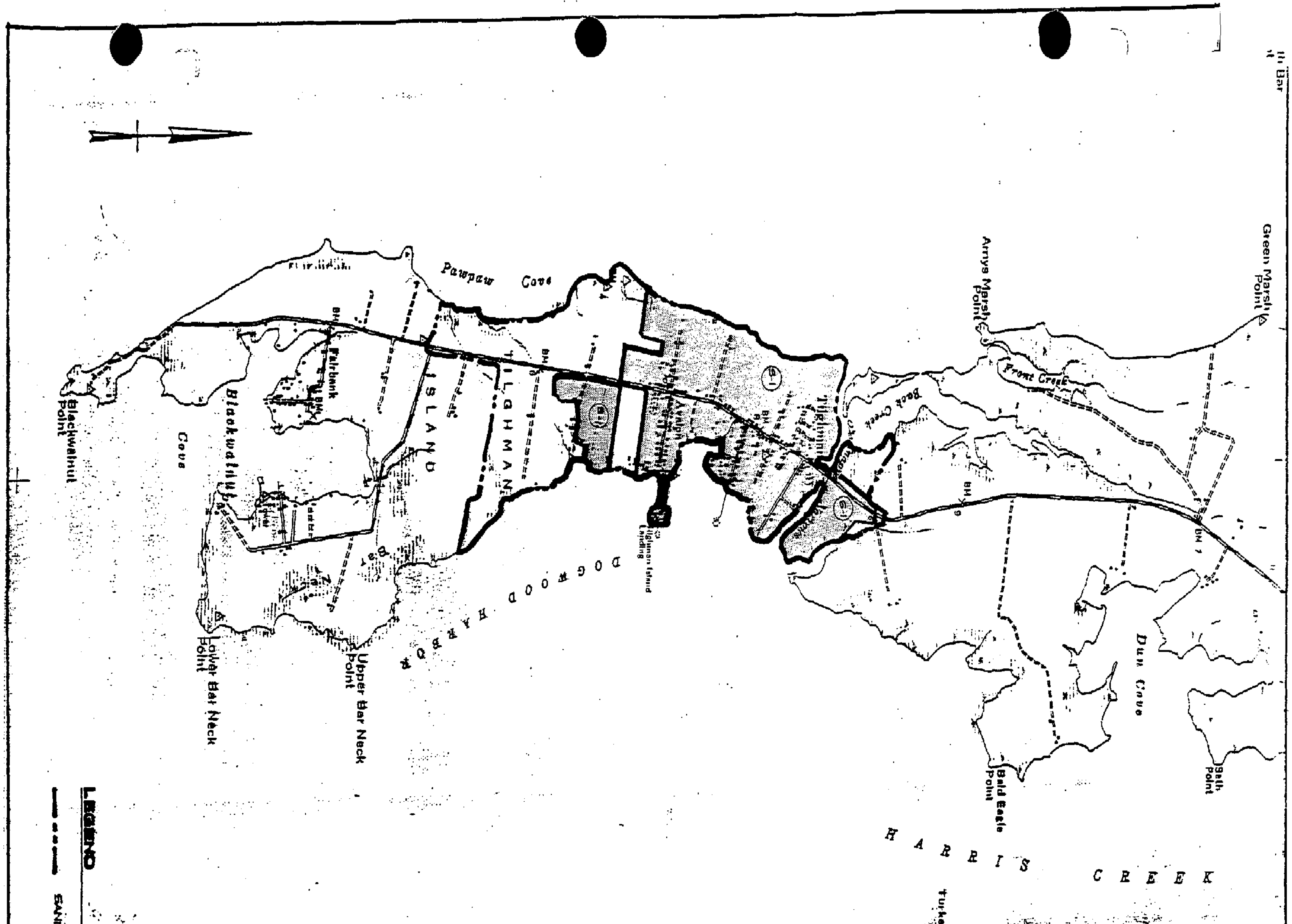
MCRONE

ENGINEERS · PLANNERS · SURVEYORS

ANNAPOLIS | EASTON

SCALE: 1" = 2000

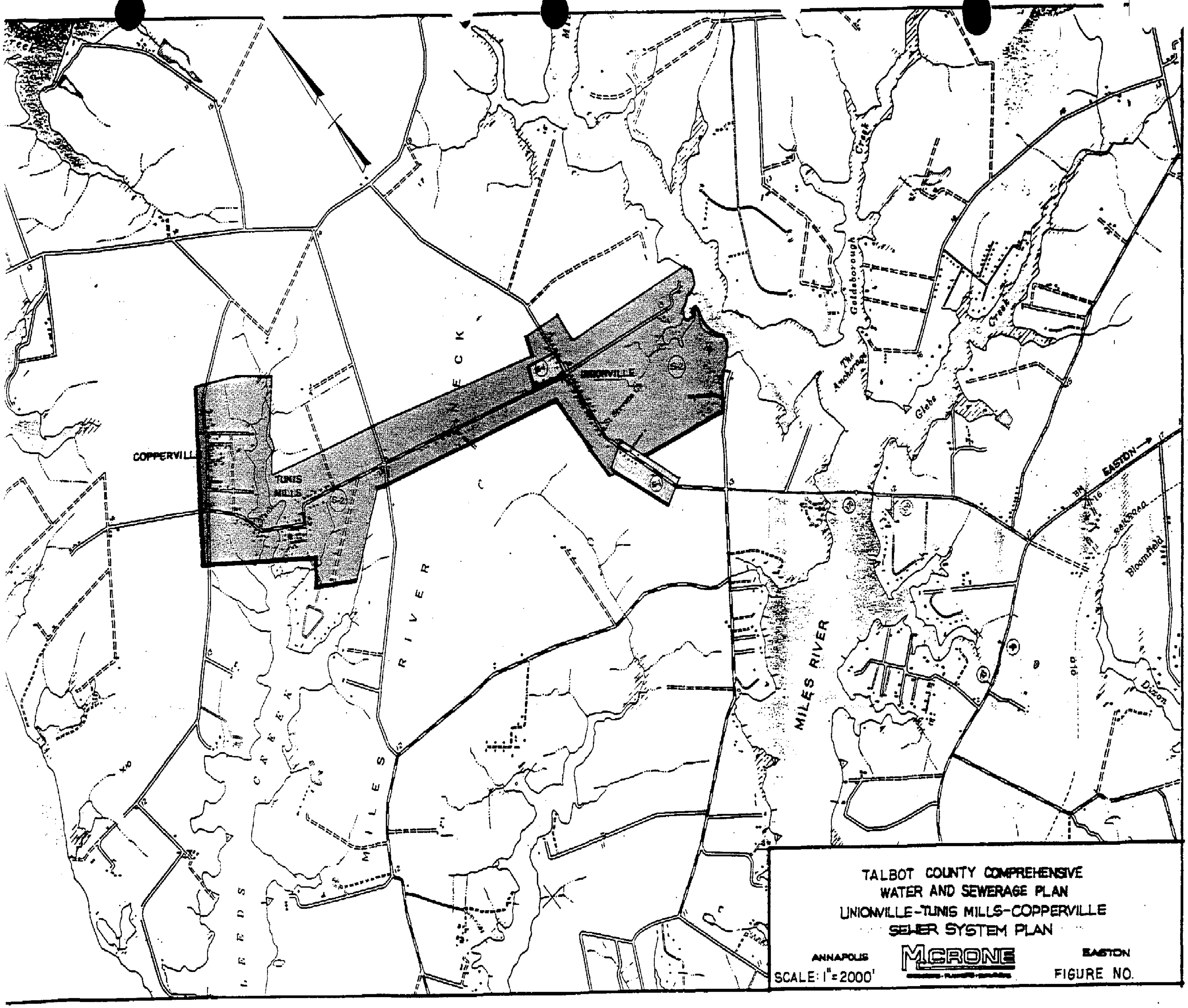
FIGURE NO.



TALBOT COUNTY COMPREHENSIVE
WATER AND SEWERAGE PLAN
TALBOT COUNTY REGION V - TILGHMAN
SEWER SYSTEM PLAN

ANNAPOLIS | McCRONE | EASTON

SCALE: 1" = 2000' | FIGURE NO.

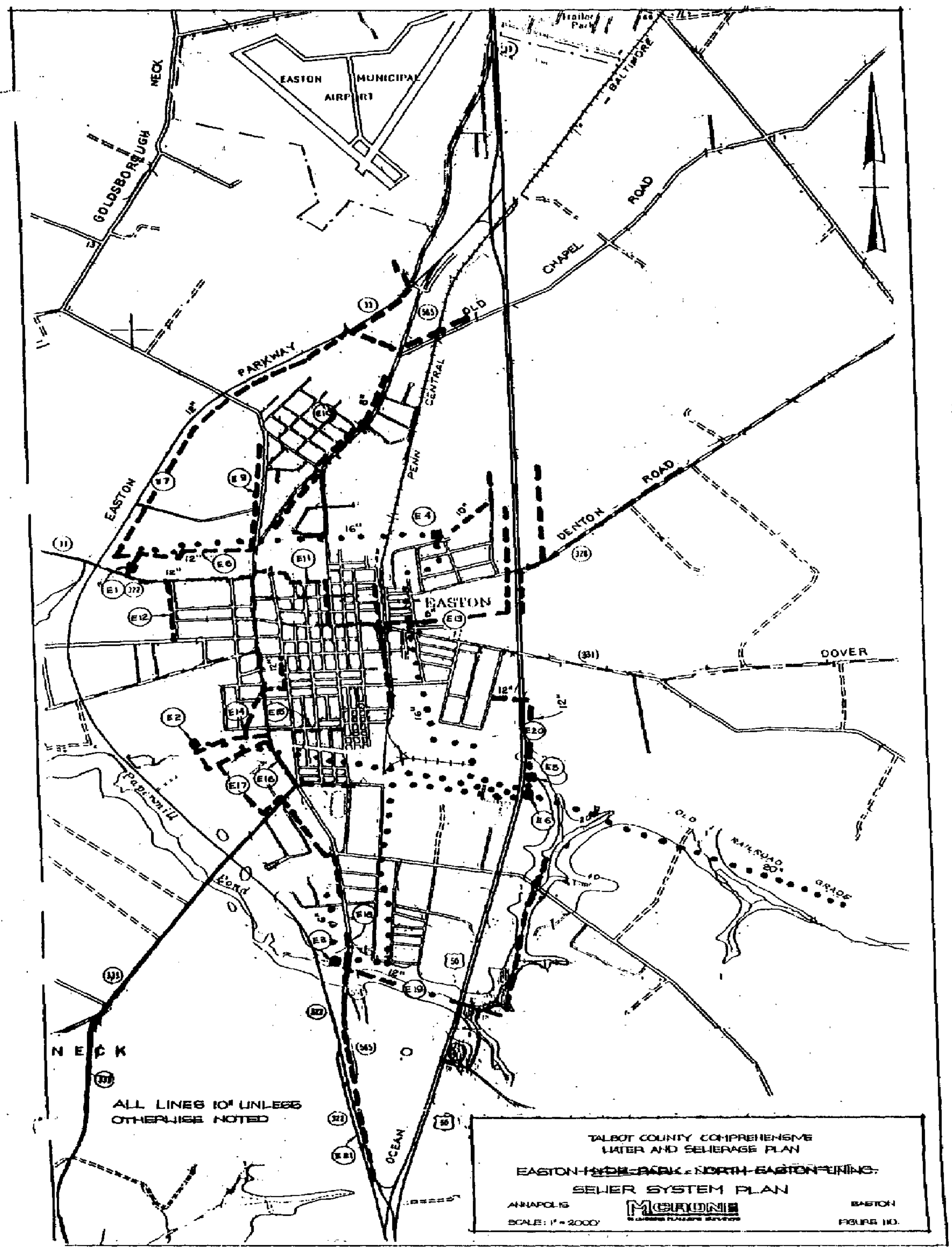


TALBOT COUNTY COMPREHENSIVE
WATER AND SEWERAGE PLAN
UNIONVILLE-TUNIS MILLS-COPPERVILLE
SEWER SYSTEM PLAN

ANNAPOLIS McCRONE EASTON

SCALE: 1" = 2000'

FIGURE NO.


TALBOT COUNTY COMPREHENSIVE
WATER AND SEWERAGE PLAN
EASTON-HYDE PARK - NORTH EASTON - UNING
SEWER SYSTEM PLAN
ANNAPOLIS
EASTON
SCALE: 1" = 2000'
MCCRONE
FIGURE NO.
ALL LINES 10" UNLESS
OTHERWISE NOTED
EASTON
MUNICIPAL
AIRPORT
GOLDSBOROUGH
NECK
BALTIMORE
CHAPEL
ROAD
OLD
PARKWAY
PENN
CENTRAL
EASTON
DENTON
ROAD
DOVER
OLD
RAILROAD
GRADE
OCEAN
N E C K
Trailer Park