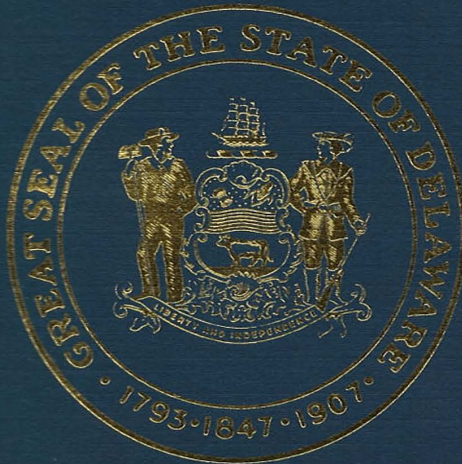


A VISION FOR THE RIVERS



THE GOVERNOR'S TASK FORCE
ON THE FUTURE OF THE
BRANDYWINE & CHRISTINA RIVERS

A VISION FOR THE RIVERS

**THE FINAL REPORT OF THE
GOVERNOR'S TASK FORCE
ON THE FUTURE OF THE BRANDYWINE
AND CHRISTINA RIVERS**

October 1992 - October 1994

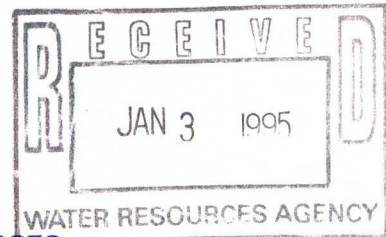
**Presented to
The Honorable Thomas R. Carper
Governor of the State of Delaware
October 11, 1994**

**Published by the
DEPARTMENT OF NATURAL RESOURCES
AND ENVIRONMENTAL CONTROL
Dover, Delaware 19901**



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December 28, 1994

Mr. Bernard L. Dworsky
NCC Water Resources Agency
2701 Capitol Trail
Newark, DE 19711

Dear Bernie:

I am pleased to forward your copy of "A Vision for the Rivers," the final report of the Governor's Task Force on the Future of the Brandywine and Christina Rivers.

On behalf of Russ Peterson and Art Trabant, I wish to thank you for your participation. The excitement that our "vision" is generating in Wilmington and throughout the State stands as the measure of a job well done by a group of dedicated and conscientious people. Without your thoughts and advice, our efforts would not have been as well received as they have been.

Best regards,


William J. Cohen

Delaware's good nature depends on you!



**GOVERNOR'S TASK FORCE
ON THE FUTURE OF THE
BRANDYWINE AND CHRISTINA RIVERS**

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The Honorable Thomas R. Carper
Governor of Delaware
Dover, Delaware 19901

October 11, 1994

Dear Governor Carper:

We hereby transmit to you the final report of the Governor's Task Force on the Future of the Brandywine and Christina Rivers.

These rivers constitute one of Delaware's most important assets. Over a two-year period the Task Force members have defined the means of improving water quality, protecting and enhancing stream banks, providing public access to the streams, dedicating greenways, acquiring critical land areas, cleaning up the watershed, establishing Delaware's first urban wildlife refuge and rejuvenating the Wilmington waterfront.

This last item is particularly exciting. A team of Delaware architects has produced a dramatic vision of what the waterfront could be like. It appears to us to be a practical way to make this area as exciting as San Antonio's River Walk and Baltimore's Inner Harbor and in the process create jobs and business opportunities, enhance the quality of life for Delawareans and provide an expanded tax base for Wilmington, New Castle County and the State of Delaware.

Hundreds of Delawareans have seen this "vision" of what Wilmington could be like and are ready to go to work to help bring it about. What is now required is your leadership in sparking a major sustained effort involving the city, county, state and federal governments and the private sector in implementing our recommendations.

On behalf of all of us who have participated in this important project, thank you for the opportunity.

Respectfully,

E. Arthur Trabant
Co-chairman

Russell W. Peterson
Co-chairman

Preface

This document, the final report of Governor Thomas R. Carper's Task Force on the Future of the Brandywine and Christina Rivers, provides recommendations that could save the rivers, protect extensive areas of prime wetland habitat and contribute to the economic prosperity of Wilmington and New Castle County. An interim report was submitted to the Governor in April 1992.

This final report is based on the work of the Task Force over a two-year period during which members and a wide range of technical advisers attempted to develop a course of action for the rivers that reconciles natural resource conservation with economic growth. It addresses many of the complex issues that must be resolved in order to protect and enhance the rivers: improving water quality; preserving the historic and cultural attributes of the river corridors; improving wildlife habitat; increasing recreational opportunities; and encouraging compatible economic uses.

The recommendations of the Task Force were developed by seven issue-based working committees whose principal areas of focus included stream bank quality and water supply; wetlands and wild lands enhancement; land acquisition for preservation, recreation and access; river cleanup; waterfront development and legislation, regulations and zoning.

It is in the next phase - implementation - that this major public/private venture will be tested. Already the political support at local, state and congressional levels is strong and community support is growing. The Task Force recognizes that success will hinge on river cleanup, regional planning and adequate funding, as well as balancing the goals and objectives of disparate groups of users.

The Task Force wishes to thank all contributors to this endeavor, as listed in the acknowledgments section.

Contents

Field Project Recommendations	26
A Vision for the Rivers:	
Implement an Interstate Mathematical Stream Model	27
5. River Cleanup	30
Ongoing Activity Recommendations	30
Priority Project Recommendations	31
A Vision for the Rivers:	
Restore the Environmental Quality of the Rivers	32
6. Land Acquisition for Reservation, Recreation and Access	33
Methodology	33
Achieving Greenway Objectives	34
Public Acquisition and Use	34
Brandywine Creek from the Pennsylvania	
Line to the City of Wilmington	34
Christina River from the City of Wilmington	
to Maryland State Line	35
A Vision for the Rivers:	
Provide for Public River Walks	38
Brandywine and Christina Rivers Task Force	39
Acknowledgments	44
Appendix A Senate Resolution No. 62	45
Appendix B Executive Order No. 109	47
Appendix C Executive Order No. 8	51
Appendix D Legislation, Regulations and Zoning	53
Appendix E Task Force Resolutions	61
Appendix F Combined Sewer Overflow Systems, with map	64
Appendix G Legal, Technical and Political Dynamics	
of Brandywine Creek	68
Bibliography	71

Tables, Renderings, Plans and Maps

Following Page

Tables

Examples of High Quality Wetlands 7
Wetlands in Need of Rehabilitation: Brandywine and Christina Rivers 8

Renderings

Wilmington Wildlife Refuge 11
Sports Entertainment Complex 17
A New Century Waterfront 18
South Market Canals 18

Plans

Existing 15
Master 16
Circulation 18

Maps 38

- 1. Overview
- 2. Upper Brandywine Creek
- 3. Mid Brandywine Creek
- 4. Urban Brandywine Creek
- 5. Lower Christina River / City of Wilmington
- 6. Newport / Richardson Park
- 7. Churchman's Marsh
- 8. Smalleys Pond / Lewden-Green Park
- 9. Salem Church Road Area
- 10. South Newark
- 11. North Newark
- 12. Upper Christina River

Introduction

On June 24, 1992 the Delaware Senate unanimously endorsed Senate Resolution No. 62 which called on the Governor “to appoint a blue ribbon task force to make recommendations concerning the future of the Brandywine and Christina rivers.” This action was prompted by a growing concern for Wilmington’s waterfront. On Oct. 20, 1992 Governor Michael N. Castle signed Executive Order 109, establishing a Task Force on the Future of the Brandywine and Christina Rivers and naming former Governor Russell W. Peterson and Dr. E. A. Trabant, president emeritus of the University of Delaware, as its co-chairmen.

The order designated an executive committee whose membership included Senator Robert I. Marshall, the resolution’s chief sponsor; Senator Andrew G. Knox; Edward W. Cooch, Jr., president of the Christina River Conservancy; James M. Baker, president of Wilmington City Council; Dennis E. Greenhouse, county executive of New Castle County; James H. Sills, Jr., mayor of the City of Wilmington; and Christophe A. G. Tulou, secretary of the Department of Natural Resources and Environmental Control. It also provided for additional members “as necessary to obtain a full representation of community organizations, environmental organizations, businesses and governments affected by and interested in the Brandywine and Christina rivers.” Forty-three were appointed. In addition, the Task Force created an advisory panel of former Wilmington mayors and an Architects Waterfront Design Team. Seven working technical committees, plus the design team, were organized to address specific issues. Assisting the Task Force were an executive director provided by DNREC and more than 30 technical advisors from state, county and municipal agencies.

The charge to the Task Force was to “develop recommendations regarding what actions, if any, the State, New Castle County, the City of Wilmington, and the other incorporated communities along the Brandywine and Christina rivers should take” in order to:

- ♦ improve water quality;
- ♦ preserve historical, cultural and community attributes of the river corridors;

Long-Range Objectives: 1-50+ Years

The purpose of establishing "visionary objectives" was to allow the Task Force to look boldly at what the future could realistically hold for these waterways.

1. Re-establish or restore natural areas and wetlands that have been damaged by uncontrolled or environmentally-insensitive uses.
2. Provide an open space network which incorporates state, county, city and private conservation areas, parks and greenways.
3. Create river buffer zones that will protect against negative impacts of development.
4. Provide areas and facilities for both active and passive recreational uses.
5. Preserve and protect historic sites that perpetuate the state's cultural and maritime heritage.
6. Improve Wilmington's working waterfront to ensure that it will continue to serve community, employment and economic needs, while making modifications that will be more responsive to aesthetic and environmental impacts on unique river locations.
7. Promote the design and construction of new urban waterfront facilities, including residential, commercial, institutional and recreational, that will be economically viable as well as compatible with the master plan for the future of the rivers.

Public Investment Objectives: 1-15+ Years

To supplement zoning or permit regulations, sufficient funds should be made available to acquire certain key areas to prevent environmental damage, to maintain the desired development pattern and to protect the options on future waterfront use. In light of very real budgetary constraints, the Task Force set public investment objectives that could be met through capital improvement programs or through federal grants or loans.

1. Add to the existing open space network.
2. Acquire sites or construct facilities for public recreation.
3. Budget state, county or municipal expenditures for infrastructure improvements necessary for new development or redevelopment.
4. Seek federal funding participation for special projects that will improve public access or upgrade the waterfront environment.

Environmental Improvement Objectives: 0-5+ Years

These objectives are geared to short-term implementation and in most instances extend on-going efforts, including governmental enforcement programs and community-sponsored projects.

1. Establish an ongoing river cleanup program.
 - ◆ Prioritize target projects.
 - ◆ Develop timetables, manpower requirements, financial needs.
 - ◆ Attain commitment for participation from community organizations, citizen groups and governmental jurisdictions.
2. Encourage state environmental improvement efforts and programs to reduce or eliminate nonpoint and point sources of pollution, rehabilitation of wetlands and overall visual blight.

Implementation Objectives: 0-3+ Years

Continued intergovernmental cooperation is the key to the success of these objectives. The Task Force looks to the state for strong leadership in assuring environmental integrity within the Christina and Brandywine river watersheds and to the city and county to employ existing land use protection measures to ensure beneficial development or redevelopment in these areas.

1. Determine what agency or agencies will have responsibility for implementing the recommendations of the Task Force.
2. Determine the role state, county and municipal agencies will play in the land use review and approval process.

Summary of Accomplishments

The following pages track accomplishments between October 1992, when the Task Force was established, through October 1994, when this report was presented to the Governor and the General Assembly, and beyond.

Project

Accomplishments

1. Create Wilmington Wildlife Refuge

1994
Nov. Dec. Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct.



2. Delaware Architects Waterfront Design Team



3. Christina Gateway Enhancement Project



4. Stream Bank Stabilization



Project

1. Create Wilmington Wildlife Refuge

- The Task Force, working with DNREC, has established owner contact and is in initial stages of agreement with Delmarva Power, Conrail and New Castle County to convert the 258 acres of Wilmington (Dravo) Marsh into an urban wildlife refuge - the first in Delaware.
- DNREC has committed \$60,000 to a Phase 1 feasibility study and has agreed to act as "facilitator" to make the Wilmington Wildlife Refuge a reality.

2. Delaware Architects Waterfront Design Team

- At the invitation of the Task Force co-chairmen, AIA Delaware created a waterfront design team of the principals of northern Delaware's most prestigious architectural firms. The architects are providing pro bono architectural services to the Task Force valued between \$275,000 - \$375,000.

3. Christina Gateway Enhancement Project

- Proposed by Delaware Theatre Company to enhance public access to cultural attractions, businesses and the Railroad Passenger Terminal. The Task Force is a sponsor of this project which will be funded through the Delaware Department of Transportation with funds from the Intermodal Surface Transportation Efficiency Act (ISTEA).

4. Stream Bank Stabilization

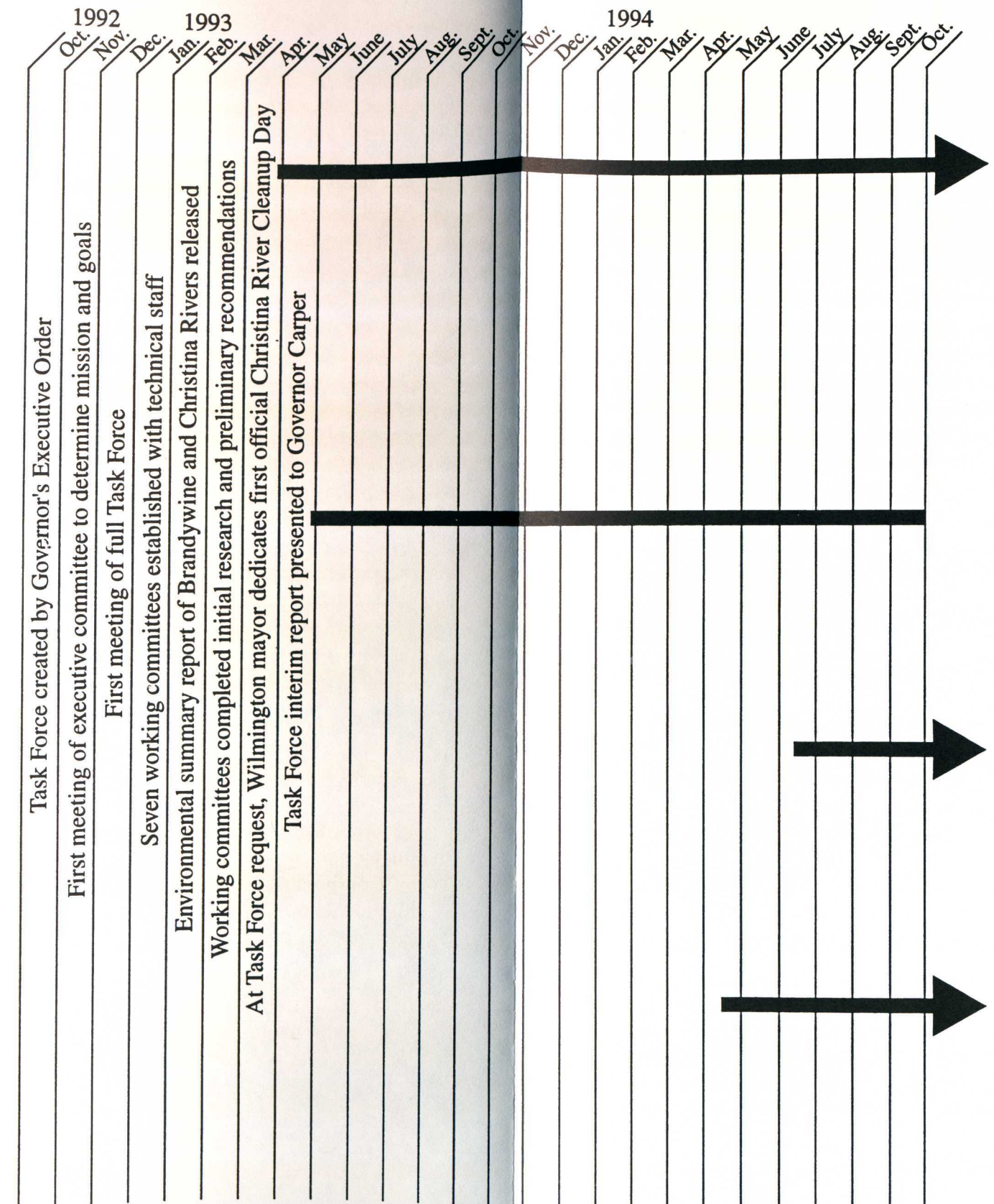
- The Task Force applied for and received an EPA grant totaling \$50,000 to undertake a demonstration project for streambank stabilization and water quality protection using state-of-the-art bio-engineering techniques.

Project

Track of

Accomplishments

1. **Create Wilmington Wildlife Refuge**
 - The Task Force, working with DNREC, has established owner contact and is in initial stages of agreement with Delmarva Power, Conrail and New Castle County to convert the 258 acres of Wilmington (Dravo) Marsh into an urban wildlife refuge - the first in Delaware.
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4. **Stream Bank Stabilization**
 - The Task Force applied for and received an EPA grant totaling \$50,000 to undertake a demonstration project for streambank stabilization and water quality protection using state-of-the-art bio-engineering techniques.



Project

5. River Cleanup

- Assisted in the removal of sunken tugboats at the confluence of Brandywine Creek and the Christina River.
- Task Force has been instrumental in expanding the Christina River Cleanup to include other streams and creeks in the watershed.

6. Land Acquisition

- Supported negotiations to acquire 33 acres along Brandywine Creek which will become the Brandywine-Alapocas-Rockford link in the Northern Delaware Greenway.

7. "A Vision for the Rivers" Video

- The Task Force received corporate support from Ciba Pigments, DuPont, Delmarva Power and Artesian Water Company as well as the New Castle County Chamber of Commerce to create a community information and education video. The video was produced by Arden Media Resources.

8. Brandywine and Christina Rivers Improvement Project

FY 1994

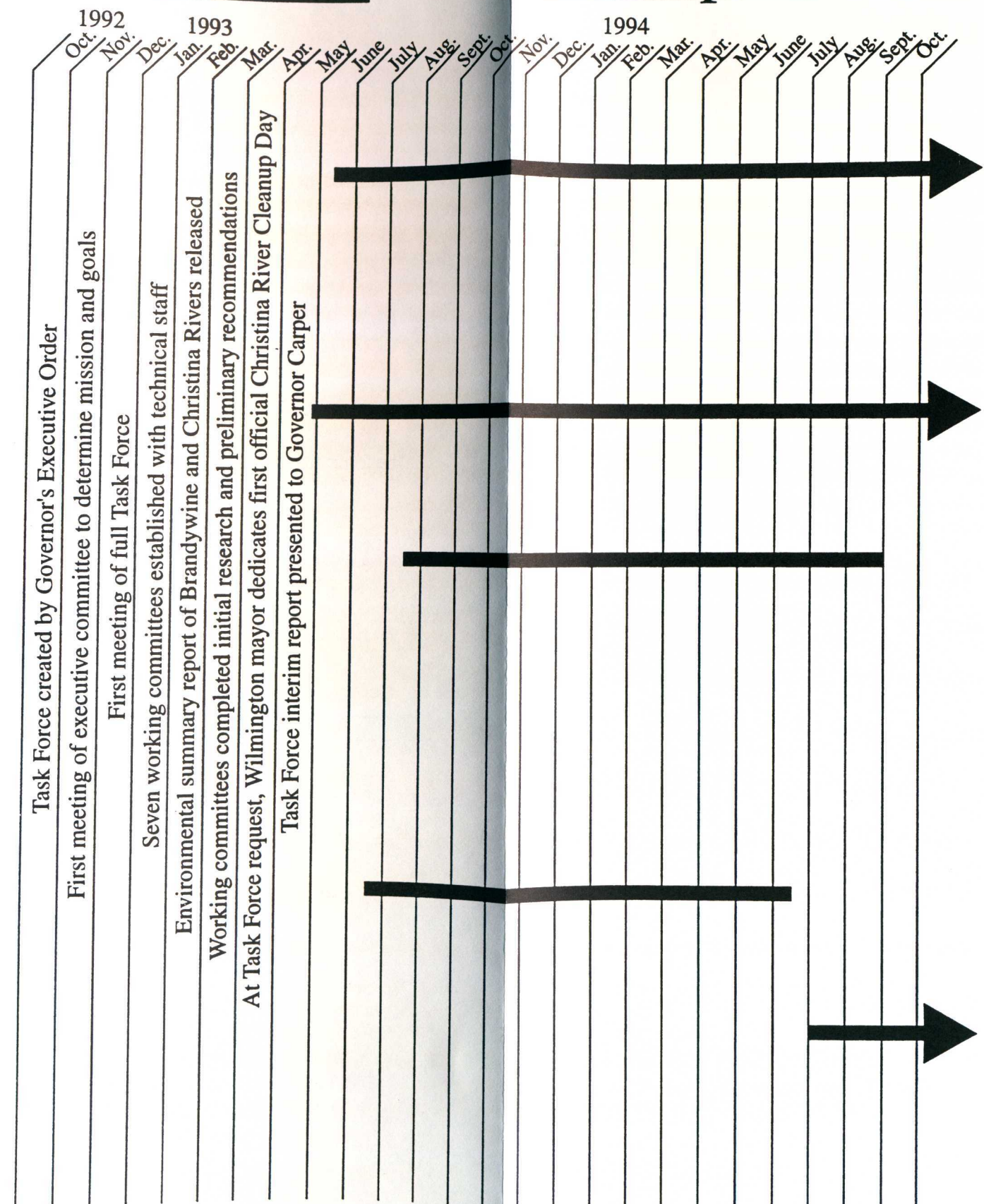
- \$50,000 for FY 1994 for:
- planning and design development
 - educational promotion
 - demonstration project

FY 1995

- \$50,000 for FY 1995 for:
- planning and implementation
 - site specific design and evaluation
 - educational promotion

Track of

Accomplishments

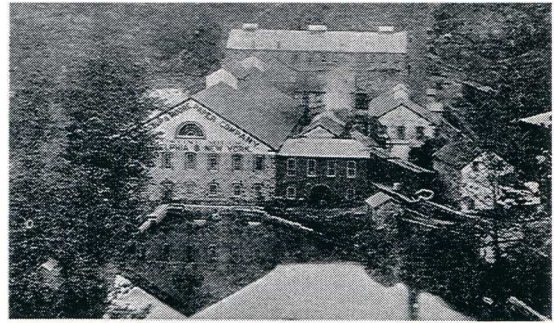


1. A Historic Perspective

The development of Wilmington and northern New Castle County is directly related to the location of Brandywine Creek and the Christina River. Each has witnessed contrasting forms of land use activity, due in large measure to their unique geographical characteristics. The history of these waterways has been extensively described over the years by writers, historians, artists and poets. For this report it seems appropriate to put into perspective the historic importance of these waterways.

THE BRANDYWINE: DELAWARE'S 'ROMANTIC RIVER'

Brandywine Creek meanders through southeastern Pennsylvania and enters Delaware near Smith Bridge Road north of the City of Wilmington. It makes its way toward Wilmington and its juncture with the Christina through some of the most picturesque land in the state. The Brandywine is to many people Delaware's romantic river. Even as the early mills located along its banks, a harmony with nature existed. The force and flow of the river became the sole reason the Gilpin family founded the state's first paper mill on the Brandywine in 1787 and that the Duponts emigrated from France to build their powder mills at Hagley in 1802.



Augustine Mills on the Brandywine, 1906.

Milling on the Brandywine flourished well into the twentieth century. In 1883 William P. Bancroft, a highly successful mill owner in Wilmington, developed a "vision" for the future. Bancroft, who had grown up along its banks, became concerned that the natural integrity of the Brandywine should be preserved. With the support of community business leaders, he offered the public a large tract of land along the creek on condition that the city purchase additional land downstream to serve as the focus of a system of public parks. The city's acceptance of the challenge saved the river from industrial development and insured the perpetuation of the treasured resource we now call Brandywine Park.

No longer are there operating mills on the Brandywine. Rather, we find north of the City an extensive open space network principally due to the preservation efforts by the Woodlawn Trustees, parkland acquisitions by the State of Delaware and the location of large, private estates. Suburban housing and commercial development have been reasonably buffered from the Brandywine, thus saving its natural beauty.

***THE CHRISTINA:
DELAWARE'S INDUSTRIAL RIVER***

Carved out of the rocky hills of the piedmont plateau, the Christina has its headwaters in Pennsylvania, flows into Cecil County, Maryland and enters Delaware just

north of Newark. Meandering south, east, then north through the relatively flat coastal plain, the Christina widens from a small creek to a navigable waterway. Along its course, which spans more than 30 miles, it meets the Brandywine before joining the Delaware River east of Wilmington.

Before the Europeans discovered the Delaware Valley, the Christina was the home to various tribes of Lenape and Minquas Indians. The first settlers were the Swedes, who landed in 1638 on the "Rocks" which formed part of a natural protective harbor on the river just west of its juncture with the Delaware River. It was here that a permanent settlement was made that would become the City of Wilmington.

At one time, the Christina was a major



Landing of the Swedes at the "Rocks" on the Christina in 1638 by artist Robert E. Goodier.

transportation route for explorers, trappers and traders. As the early settlement of Wilmington grew and prospered, river became an ideal location for industrial development. Around 1840 heavy industry began to locate on the north shore of the Christina in the City. The new economic giants included Harlan and Hollingsworth, builders of custom railroad cars, steam yachts and boilers. They were also the first American company to build a cast-iron ship. Other firms included the Lobdell Car Wheel Company, the largest manufacturer of iron railroad car wheels in the United States through most of the nineteenth century; and Pusey and Jones, manufacturers of river boats and calendar rolls for papermills.

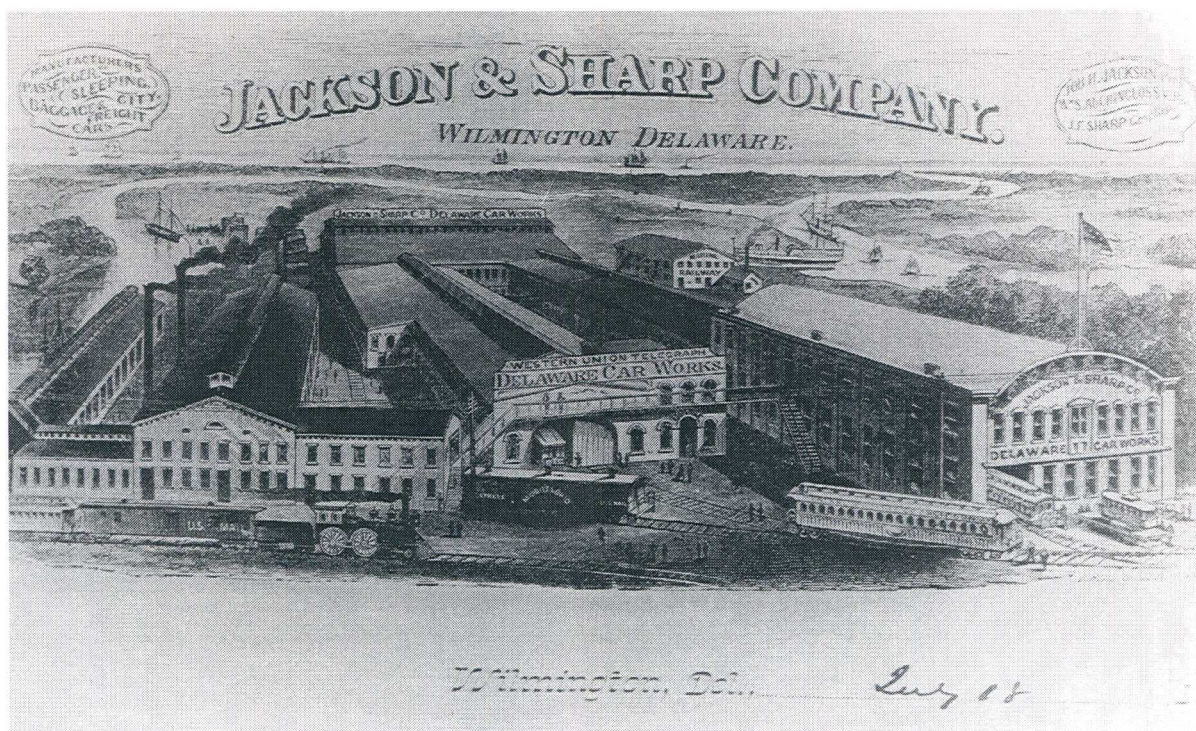
Most of the steamboats operating on the Delaware River were built on the Christina, along with other craft, including ferries and yachts, destined for service in this country and as far away as the Amazon in Brazil.

The building of railroad cars in

Wilmington was as well known as shipbuilding. The Jackson and Sharp Company led the industry in the United States during the 1870s, building cars for the nation's first transcontinental railroad. They also constructed trolley cars for both national and international markets.

By the middle of the twentieth century the Christina's importance to the shipbuilding industry took on national significance with the Dravo shipyards. Building landing craft and subchasers during the Second World War, the Dravo Company launched hundreds of vessels in the Christina. Today, near South Madison Street, there are several large cranes, the last remaining glimpses of the time Dravo was in full production.

During the last thirty years Wilmington has changed from a predominantly manufacturing town to more of a service center — a city of offices. During the same time, suburban New Castle County grew at a seemingly feverish pace. Once vacant, farm and



An 1876 view of manufacturing on the Christina looking toward East Seventh Street Peninsula.

agriculture land became consumed by new housing developments serving a demanding market between Newark and Wilmington.

THE CALL FOR A NEW VISION

The suburbanization of greater Wilmington has continued to impact the rivers, especially the Christina. In some cases a lack of accepting sound planning principles or misguided land use decisions have caused new problems for the rivers. New development has created more run-off carrying pollutants to the creeks and rivers. As development was allowed to violate the river's flood plain, downstream areas be-

came subject to extensive water damage. Once thriving wetlands began to show the damage generated by industrial waste over many years. In fact, the construction of I-95 completely reshaped Churchman's Marsh, at one time one of the most important wildlife habitats in northern Delaware.

In the early 1990s it was clear that a new vision for the future of the Brandywine and Christina Rivers needed to be fashioned. It was further recognized that this vision must carefully consider the consequences of land use actions today and how they may balance the preservation of nature with the needs of man, as we approach the next century.

2. Wetlands and Wildlands

This chapter provides a brief assessment of past and present conditions of the wetlands and wildlands that are an integral part of the Christina and Brandywine rivers. It outlines the goals and objectives developed by the Wetlands and Wildlands Committee to protect, preserve, manage and rehabilitate these natural resources. The chapter identifies specific wetland sites that will increase public awareness and support for the findings of the Task Force. The final section outlines actions that should be taken.

HISTORIC PERSPECTIVE

The Brandywine and Christina rivers flow through the most densely populated region of Delaware. In this region, wetlands and riparian habitats have been degraded by man's activities for many years. Along the tidal reaches of both rivers extensive tidal marsh drainage using dikes and sluices was first undertaken by the Swedes in the 1600s. Their vigorous approach to marsh management is still evident in the nearly continuous dikes and tidegates extending from the mouth of the Christina River to Churchman's Marsh and by the largest tidegate in the state at Shellpot Creek, which drains the last remnant tidemarch of the Brandywine River. The dikes and sluices have prevented several thousand acres of marsh

from having normal tidal interactions with the rivers and the Delaware Estuary for 300 hundred years. They have led to the degradation and destruction of thousands of acres of tidal wetlands, increased the flood staging levels of the rivers by reducing flood attenuation, and promoted the development of permanent structures in flood-prone areas.

The non-tidal riparian wetlands and habitat areas, located above the tidal headwaters of each river, have also suffered significant degradation. These riparian areas were settled early in the 1700s as the rivers were dammed to control flow and power mills and early industries. More recently, the upper watersheds have been extensively suburbanized, drastically increasing the upstream runoff during storms and the frequency of flooding along both rivers. In addition, continued development has contributed to the filling of riparian wetlands by sediment from overbank flow during storms.

ASSESSMENT

The wetlands and other riparian areas located within the watersheds of these two rivers were once among the state's most productive habitats. Semi-daily tides flowed and ebbed through diverse vegetative stands composed of wild rice, cattail, bur reed, sweetflag,

rushes, sedges, smartweeds and other important wildlife food plants. Prior to their degradation, the areas were extensively utilized by migratory waterfowl. Aerial censuses taken in 1950-1951 show that these areas contained 1,516 waterfowl per square mile as compared to the present statewide average of 155 waterfowl per square mile. On one day alone, 15,000 pintails were counted on the Newport marshes. Today we are lucky to find a flock of waterfowl larger than a few hundred birds using any of the Christina marshes. While much of this decline has been caused by other problems affecting waterfowl populations throughout their migratory flyways, some of the problem still stems from local habitat degradation. Plant diversity in most of the wetlands is limited to a few species such as phragmites, soft rush, smartweeds and purple loosestrife. Several areas, such as the tidal Christina Creek marshes, still contain a diverse plant community.

Large acreages of this aquatic system have survived the wave of development that has occurred in New Castle County since 1900. Most of them, however, have been left in a moderate to highly degraded condition. Only a small portion of the total acreage of riparian wetlands, largely those protected through private trust or public ownership, have escaped environmental degradation.

At present, the riparian habitat and wetlands along both rivers are experiencing heavy damage from inadequate stormwater control, nonpoint source pollution, bank erosion and ever-increasing development pressure. Additionally, as a result of past actions, many areas suffer from a lack of tidal flushing, excessive drainage, an invasion of phragmites or high contaminant levels in the sediments. The result is a deterioration in appearance and recreational potential, as well as a drastic decrease in fish and wildlife numbers and species.

Further assessment is needed to evaluate the long-term impacts of sea level rise on the

rivers. Significant wetland acreage may be lost in the future due to inundation. Watershed planning may require allowances for strategic retreat from the riparian area to permit inland migration of wetland systems. Sea level rise also is likely to impact the functioning of the dike and tidegate systems.



The proposed Wilmington Wildlife Refuge looking north toward the city skyline.

There exists a critical need for comprehensive protection, management and rehabilitation to ensure the long-term environmental health of this aquatic ecosystem. One important initiative already is being implemented - DNREC's Northern Delaware Wetlands Rehabilitation Program (NDWRP). This non-regulatory restoration program has targeted 31 New Castle County wetland sites totaling 10,000 acres, making it one of the largest and most beneficial aquatic system rehabilitation projects ever undertaken along the east coast of the United States. Work already is underway at a third of the sites. Through a cooperative effort of government, industry and private organizations, many of the existing environmental problems can be significantly reduced through NDWRP's activities.

RECOMMENDATIONS

Addressing the environmental and socioeconomic needs of wetlands and wildlands along the Brandywine and Christina rivers will be a considerable undertaking for the NDWRP. Issues of concern range from extensive habitat restoration, land acquisition and

recreational access to large-scale watershed planning, nonpoint source pollution control and remediation of toxic waste contamination throughout the aquatic system. The Task Force proposes its recommendations and priority geographic areas subject to review and approval of the Northern Delaware Wetlands Rehabilitation Program.

RECOMMENDATION

1. Identify and protect all existing high quality wetlands.

Achieving this goal is complicated by technical problems, by the fact that many of the areas are privately owned and by the cumulative and secondary impacts of upstream watershed development. Table 1 gives the acreage for high quality wetlands surrounding the Christina and Brandywine rivers. Table 2 provides a listing of all proposed rehabilitation sites.

Table 1
Examples of
High Quality Wetlands

Wetland Area	Approximate Acreage
Christina Creek	225
Bread & Cheese Island	348
Churchman's Marsh	250
Brandywine Creek Freshwater Marsh	18
Ramsey Run Floodplain Wetlands	6

Recommendation No. 1 is further defined by the following objectives:

- 1. Ensure that existing high quality wetland areas along the two rivers are protected from all future degradation.***
- 2. Identify existing wetland values on a regional scale that are most important to the river systems and deserve the highest priority.***
- 3. Use existing good quality wetlands as a benchmark for restoration of degraded wetland areas.***
- 4. Ensure the long-term protection of fish and wildlife.***
- 5. Set priorities for funding acquisition***



One of the few remaining cranes from the old Dravo Shipyard days on the Christina River.

TABLE 2
WETLANDS IN NEED OF REHABILITATION
BRANDYWINE AND CHRISTINA RIVERS

WETLAND AREA	APPROXIMATE ACREAGE	SUMMARY OF PRIMARY DEGRADATION PROBLEMS
Artesian Marsh *	136	1. Extensively filled with dredge spoil. 2. Monotypic stand of Phragmites.
Nonesuch Creek Basin *	588	1. Extensively drained via tidegate. 2. Phragmites invasion. 3. Large areas filled with dredge spoil. 4. Some buildings & roads in flood-prone areas.
NeCastro Marsh	29	1. High probability of contamination from Superfund site. 2. Extensively drained via tidegates. 3. Adjacent to automobile junk yard. 4. Phragmites invasion.
Koppers Marsh	90	1. High probability of contamination from Superfund sites(2).
Newport Marsh *	44	1. Extensively filled with dredge spoil. 2. Phragmites invasion. 3. Remote potential of toxins from past industrial discharges and from Superfund site. 4. Area drained by tidegate (currently flooded by beaver dam).
Banning Park Area Marshes	84	1. Phragmites invasion.
Dravo (old Wilmington) Marsh (includes adjacent areas)	258+	1. Extensive phragmites invasion. 2. Remote potential for contamination.
I-495/Route 13 Marsh	26	1. Extensive drainage by tidegates. 2. Phragmites invasion. 3. Adjacent roadway flooding.
Budd Metal Marsh System	70 - 120	1. Fragmented system located amongst commercial lands (eg. junk yards) 2. Poorly drained and high water prone areas. 3. High potential for contamination. 4. Most areas extensively drained via tidegates.
South Bridge Marsh	30	1. Adjacent area extensively filled with iron slag. 2. Area extensively drained via tidegate. 3. Extensive phragmites invasion. 4. Potential for contamination.
Shellpot Creek Marsh	150+	1. Extensively drained via tidegate. 2. Extensively invaded by phragmites. 3. Prone to upstream flooding. 4. High potential for contamination.
Brandywine River Mouth Marsh	40	1. Extensively invaded via tidegate. 2. Many areas have been filled. 3. Remote potential for contamination.
Halby Site Marsh	15	1. Superfund site.

* See The Northern Delaware Wetlands Rehabilitation Plan (February 1994)

RECOMMENDATION

2. Select and restore certain damaged and destroyed wetlands.

A wide range of wetland rehabilitation efforts will be necessary in order to achieve this recommendation. At a minimum, restoration efforts should include removing trash, halting recreational abuse, removing invasive exotic plants and revegetating wetland buffers. Conducting the full-scale restoration necessary to return highly degraded systems to a more natural condition will be a much larger and more costly task. These efforts might include removal of large volumes of fill material, removal of tidegates and dikes, and even a strategic retreat from flood-prone roads and structures to allow full tidal amplitude to return to extensively drained areas.

Achieving this goal will be complicated and somewhat limited by current scientific understanding of wetland restoration as well as by the high costs of full-scale rehabilitation projects. The existence of toxics, particularly sediment contaminants, will affect the ability to undertake restoration work. Wetlands should not be enhanced to attract fish and wildlife use if contaminants would cause significant adverse impacts to the animals that are attracted. We must keep in mind that there will be successes and failures, that any failures will teach us through experience, that long-term success may be quite different from short-term success, and that each wetland site is a small part of a much larger system. To ensure long-term maintenance of a restored system, we must attempt to move back toward the natural system.

Recommendation No. 2 is further defined by the following objectives:

1. Increase biodiversity throughout the riparian area of both rivers.

- 2. Improve fish and wildlife health for both consumptive and nonconsumptive uses.***
- 3. Improve the natural aesthetic quality of riparian areas along both rivers.***
- 4. Re-integrate fragmented components into a functional aquatic ecosystem.***

RECOMMENDATION

3. Ensure the long-term protection of all wetland habitats by improving watershed planning and hydrology management with an emphasis on reducing nonpoint source pollution.

Probably the most significant threat to wetlands along the Brandywine and Christina rivers is the cumulative and secondary impact of upstream development. Changes in the watershed landscape have had drastic effects on both the quantity and quality of runoff that must be assimilated by the wetlands and aquatic system. Although healthy wetlands can help improve surface water quality through natural processes such as filtration of excess sediments and nutrients and the uptake of contaminants, nearly all the wetlands along these two rivers appear to receive pollutant loadings from nonpoint sources that far exceed their carrying capacity. Addressing these threats, along with resolving the most important existing problems of limited-purpose water management, is key to successfully rehabilitating these wetlands.

Urban runoff is one of the primary sources of wetland degradation throughout the Christina and Brandywine rivers. Addressing this problem will require a long-term commitment. Since nonpoint source pollution originates from the activities of everyone living in or using the entire watershed drainage area, the problem is extremely difficult to address. Watershed plan-

ning measures must include adherence to regulations impacting on construction, erosion and sediment control, retrofitting existing stormwater conveyance systems, pollution prevention, changes in many of the operation and maintenance practices for highways and changes in some of the routine activities of watershed residents.

Without comprehensive watershed planning on both a regional and local scale to protect sensitive ecological areas, minimize land disturbances, retain natural drainage and vegetation, and retrofit existing systems to correct past problems, we will not maintain the current quality of our wetlands, let alone achieve any long-term improvements. The Department of Natural Resources and Environmental Control is developing a "whole basin management initiative" that will evaluate land use, water quality, wildlife resources and related matters from the basin or watershed perspective. In addition, the Division of Air and Waste Management and the Division of Water Resources have prepared a Christina River Basin Hazardous Waste Sites Restoration Project report that urges a basin-wide approach to the investigation and remediation of hazardous waste sites and emphasizes a voluntary compliance approach to addressing the remediation of hazardous wastes from areas impacted by historic industrial sites located along the river. Both of these efforts are fully supported and endorsed by the Task Force, which, through a resolution on June 7, 1993, urged a basin-wide approach to planning (see appendix E).

Recommendation No. 3 is further defined by the following objectives:

- 1. Reduce the degradation of wetlands by nonpoint source pollution and inadequate stormwater management.***
- 2. Promote the use of pretreatment techniques to control nonpoint source pollution before it is discharged into***

the aquatic system (e.g., sand filter systems, check dams, grass-lined waterways, retention basins, constructed wetlands.

- 3. Encourage proper disposal or recycling of hazardous chemicals used for residential, agricultural or commercial purposes that could cause nonpoint source pollution.***
- 4. Increase biodiversity through the reduction of environmental stresses caused by poor water quality.***
- 5. Provide additional flood water attenuation for flood-prone areas along each river.***

RECOMMENDATION

- 4. Provide opportunities for public access to wetland and wild land areas.***

Since protection, management and wise use of the wetlands and wildlands of the Christina and Brandywine rivers are for present and future generations of Delawareans, access for recreation, education, research or wildlife viewing must be provided. Activities could include greenways, trails, environmental education programs, fishing, hunting, trapping or boating. For each wetland site, consideration must be given to the anticipated level of public use and any impacts to the site's condition and sensitivity. The NDWRP final plan addresses the specifics of some of these actions at several locations. The level of access that will not endanger the resource should be determined in consultation with qualified resource managers and scientists.

Public access coupled with public education is one of the most important ways to stimulate support for the commitment that will be required to realize the full potential of the

wetlands and wildlands throughout the Christina and Brandywine river corridors. As people learn more about the values and functions of wetlands, their perceptions and behavior toward them will change.

Recommendation No. 4 is further defined by the following objectives:

- 1. Provide an opportunity for the public to enjoy the wetlands and wildlands along the two rivers.***
- 2. Increase public awareness and appreciation of wetlands.***
- 3. Provide opportunities for outdoor education, research and recreation.***

SPECIFIC AREAS FOR INITIAL FOCUS OF ACTION

After considering the enormous scope of work required to address the wetlands and wildlands needs throughout the Christina and Brandywine rivers area, the Wetlands and Wildlands Committee agreed that it would be best to concentrate initial efforts on a specific area of the system. It was determined that the best area in which to begin was the reach of the Christina River from just upstream of the Market Street Bridge in Wilmington to Route 141 in Newport. However, this is dependent upon analysis of existing or potential on-site contamination problems as well as approval of the NDWRP committee.

The selected area has several important attributes. It is located in a densely populated area with potential for easy public access. It requires only moderate wetland rehabilitation efforts, such as phragmites eradication and re-introduction of tidal flow. The cost should be moderate. There already is public and political support for the actions. Finally, considerable portions are already in public ownership.

Candidate sites include the Dravo (Old Wilmington) Marsh, Banning Park Marshes

and the Newport Marsh. Each site would be targeted for rehabilitation and improved public access. The adjacent watershed would be evaluated for potential nonpoint source pollution control measures.

A VISION FOR THE RIVERS: DELAWARE'S FIRST URBAN WILDLIFE REFUGE

The Task Force first announced its recommendation to support the establishment of Delaware's first urban wildlife refuge on June 17, 1993. Since that time considerable effort has been devoted to making that happen.

The principal area of focus is a 258-acre freshwater tidal marsh located northeast of I-95 and its intersection with the Christina River. The area has historically been referred to as the Old Wilmington Marsh or the Dravo Marsh. It is owned by New Castle County, Delmarva Power and Conrail.

The unique location of the Old Wilmington Marsh at the edge of the city underscores the educational and recreational values of this resource for northern Delaware residents. Indeed, there is a potential to create a symbiotic relationship between urban development along the waterfront and the natural environment by utilizing the marsh for the following purposes:

- ◆ improved wildlife habitat;
- ◆ environmental improvement;
- ◆ outdoor laboratory for students and general public;
- ◆ educational programs presented by organizations such as the Urban Environmental Center.

An architectural rendering of the proposed Wilmington Wildlife Refuge is on the following page.

3. Waterfront Development

Historically Wilmington's waterfront has been viewed primarily as a location for heavy industry and commerce. Today, as attitudes throughout the country have changed about how we should utilize our waterfronts, the concept of multiple use - a mix of nonpolluting, water-dependent industries, office complexes, condominiums, entertainment centers and outdoor recreation opportunities - is receiving broad support from government leaders and representatives of the business and commerce sector, as well as many citizen groups. From the beginning the Task Force was

dedicated to moving in that direction.

One of the first responsibilities of the Waterfront Development Committee was to evaluate current land and water uses along the two rivers. With that information they were able to make rational decisions on how best to balance the varied, and sometimes conflicting, needs of city government, landowners, business people, residents, potential developers, recreational users and conservationists.

Since the 1960s, the City of Wilmington has undertaken a number of studies that have addressed waterfront development. The



Wilmington's urban skyline as viewed from the Christina River.

committee's approach was to build on the concepts, plans and recommendations of those studies. It also benefited from access to an advisory panel of former Wilmington mayors, a group representing the leadership of the city from 1960 to 1992, the period during which previous waterfront development plans were formulated.

The committee endorsed several established waterfront development themes:

- ◆ developing greater public access;
- ◆ promoting public events such as festivals or concerts to attract people to the waterfront;
- ◆ upgrading the Wilmington working waterfront;
- ◆ formulating policies and regulations that will encourage mixed land uses.

RECOMMENDATIONS

1. *Concentrate a variety of facilities and activities that will attract people to the waterfront.*
2. *Encourage public events -- water festivals, rowing regattas, cleanups, food festivals, fireworks displays -- to create excitement, attract participants and generate a climate for economic development and investment.*
3. *Attract new entertainment facilities, such as theaters, restaurants and hotels.*
4. *Enhance the recreational aspects and amenities of the waterfront to appeal to individual, family and corporate needs.*
5. *Relocate existing heavy, non-water dependent industries from the waterfront.*
6. *Encourage use of rail rather than the river as an industrial transportation artery.*

7. *Upgrade the Wilmington working water front in order to increase employment opportunities as well as to maintain or strengthen the economic base.*
8. *Use regulatory mechanisms such as zoning to encourage multiple use development or redevelopment of the waterfront. Encourage cultural, recreational and historic land uses.*
9. *Develop an implementation strategy that can be agreed upon and actively supported by the governor, county executive, mayor and other elected officials.*
10. *Acquire land in areas likely to be the focal points of waterfront development.*
11. *Identify areas where infrastructure improvements, such as bulkheading, utility upgrades, transportation systems and facilities, are necessary to make sites attractive for development.*
12. *Investigate the feasibility of establishing a special tax incentive zone.*
13. *Investigate funding mechanisms to provide loans or grants for the remediation of contaminated sites.*
14. *Invite the participation of waterfront neighbors, civic organizations and interested citizens in plans, projects and programs involving the rivers. Understand and reflect the concerns of these groups in project development.*

Need for an Advocacy Organization for Waterfront Improvement

This report discusses the importance of the Brandywine and Christina rivers to Wilmington and New Castle County and actions that need to be taken to correct past abuses as well as to prevent further degradation. The primary focus, however, is on measures to promote beneficial uses through regional intergovernmental cooperation and

public/private partnerships. To ensure that the work of the Task Force and its committees moves forward, there is an immediate need for the creation of an advocacy mechanism to direct the planned growth of the waterfronts of the two rivers.

An advocacy organization should have the authority to establish and implement important development guidelines, review and advise on long-range objectives, evaluate current efforts, and offer guidance to private and public organizations on waterfront projects. While there are impediments (both real and imagined) to new development, not the least

of which are cost and site contamination, an advocacy organization could serve as a clearing house for information on governmental regulations, environmental permits and other requirements for major projects.

The Brandywine and Christina rivers are unique. They are naturally beautiful and serve as important assets to Wilmington, New Castle County and the State of Delaware. The Task Force believes they could become even more important if planned development along these waterfronts can be encouraged and aggressively marketed.



A 1989 view of the Christina River looking south toward I-495.

Creating the Design Team

When it became apparent that an essential component of any planning for waterfront development was an architectural design element, the Task Force enlisted volunteers from the Delaware chapter of the American Institute of Architects.

An Architects Waterfront Design Team was established to conceptualize a "vision for the rivers." In addition to their creative efforts, it was the goal of the design team to take a comprehensive approach to river planning and development. From the beginning, they pushed for community support to maintain momentum and an implementation strategy that identified funding sources.

The design team narrowed their focus to two areas: Brandywine Creek from the Market Street Bridge to the confluence with the Christina River and the Christina River from the Delaware River through the city to I-95. In addition, they identified five tasks that were considered pivotal to creating planning and design proposals:

- ◆ understanding current land use;
- ◆ establishing design principles;
- ◆ formulating concepts, plans and renderings;
- ◆ proposing development assumptions;
- ◆ estimating predevelopment access costs.

An Overview of Current Land Use

The first project of the design team was to determine current land use patterns. Out of this came an "existing plan" (see next page) which depicts the varied uses along the two rivers.

Along the Christina, the historic river-related industry is almost completely gone. Many of these sites are in disuse or have been replaced by junk yards, landfills and overgrowth. There are few areas for public access and no continuous pedestrian linkage. Except for a few remaining

large industrial structures most buildings are three stories or less. There are occasional pockets of renovation. Two hubs of activity can be found in the Christina Gateway area and at the former Dravo Shipyard site where Frawley-Johnson Stadium anchors a proposed sports/entertainment complex. There is minimum activity on the Seventh Street Peninsula due to restricted access.

Much of Brandywine Creek runs past public parklands (Brandywine Park, Josephine Gardens, Rockford Park and Brandywine Creek State Park), large estates, townhouses and office complexes. Some of the historic gristmills and gunpowder mills are preserved as cultural resources (Hagley Museum) or have been converted to contemporary uses. These help to preserve the area's ecological and historical value. One of the few developed stretches along the Brandywine is in the vicinity of the city's waterworks, where a mix of residential and commercial uses may be found.

Design Principles

The design team held a series of public contact sessions during which they exchanged ideas and concepts with various segments of the community. Many important ideas emerged from these meetings. This approach acknowledged both the strong interest the community has in the Brandywine and the Christina and the great potential for the future of these rivers. Out of the meetings, 11 principles evolved:

- ◆ Make the rivers a focus for the region.
- ◆ Create and expand recreational uses.
- ◆ Protect water quality.
- ◆ Enhance pedestrian opportunities.
- ◆ Provide security.
- ◆ Promote environmental conservation.
- ◆ Encourage new and varied employment opportunities.
- ◆ Open up new housing opportunities.
- ◆ Include an education element.
- ◆ Develop open space linkages.
- ◆ Plan for multi-modal transportation facilities, including motor vehicles and rail.

Design Methodology

The design team divided into four study groups, each assigned a specific stretch of the rivers. Extensive background information was collected on these "target areas" and detailed analyses were done of land use-to-design relationships.

At the completion of the work by the study groups, the design team as a whole met in a series of design sessions to determine the elements that would serve as the basic structure of the final architectural proposals. Out of these sessions came a comprehensive set of plans depicting the architects' vision for the future of the two rivers and their waterfronts.

A VISION FOR THE RIVERS: A "NEW CENTURY WATERFRONT"

Master Plan

The master plan includes a discussion of

near-term and long-range development assumptions and estimates for the construction of certain infrastructure improvements presented as predevelopment access costs. The Task Force commissioned a set of architectural renderings based on the master plan (see master plan on the following page).

First Target Area:

Brandywine Creek from Market Street Bridge to East Seventh Street Peninsula

Brandywine Park and Josephine Gardens, which are located west of the target area are areas of prime recreational and aesthetic importance to Wilmington. As populations increase so do demands for outdoor recreation opportunities, especially those near water sites. The design team envisions extending the park-like character into the area from Market Street south and east along both banks of the river.



East Seventh Street Peninsula is surrounded by the Brandywine on the right and its confluence with the Christina.

The design team recommends investigating the possibility of acquiring several sites which are currently being used as junk yards for either park land or housing.

Second Target Area: East Seventh Street Peninsula

Most of this urban peninsula was once a wetland but has been filled and developed over the last hundred years for industrial purposes. Today this area between the Brandywine and its confluence with the Christina is under-utilized, contains many abandoned junk yards and fill sites and is hampered by limited accessibility. Design team members felt high density uses would have a negative impact on the residential environment of Wilmington's east side and recommended focusing instead on meeting the rapidly increasing demand for outdoor recreation with marinas and other water-related activities.

Of special significance is the "Rocks" on the Christina River where the Swedes landed in 1638 to create the first permanent settlement by Europeans in the State of Delaware. The site is marked by a monument created by the famous Swedish sculptor, Carl Milles, and paid for by donations from Swedish school children. The State has established a small park at the site, which is listed in the National Register of Historic Places. Downstream is land owned by the City of Wilmington and leased to the Kalmar Nyckel Foundation which is well underway with a project to build and operate a replica of the tall ship, "Kalmar Nyckel" which brought the Swedes to Wilmington. By acquiring the narrow strip of land between the "Rocks" and the Kalmar Nyckel shipyard the State could provide sufficient area to build a major tourist attraction around this historic waterfront site.

Third Target Area: Lower part of the Christina

This area stretches west from the Christina's confluence with the Delaware River to the bend near Madison Street. Design team recommendations include enhancing the Port of Wilmington, whose docks, wharves, office buildings and warehouses occupy some 350 acres on the south bank of the Christina, and developing the capability for handling cruise ships. The need for additional docking facilities, improved public transit and beau-

tification of the area also were identified. The design team proposes developing additional facilities on either side of the Christina near the Marine Terminal to attract maritime uses that now occur upriver from the I-495 bridge. In addition, Cherry Island, which is more than 500 acres and has the advantage of excellent rail transportation and roadway access from I-495, could be transformed into an industrial park of statewide significance.

When design team members evaluated the antiquated industrial buildings on the north shore of the Christina, both to the east and west of Market Street, they concluded that the architectural interest, invaluable historic and cultural character and potential office/commercial space of these structures made them worth salvaging. It was their opinion that stabilizing the buildings and improving the infrastructure, including walkways, lighting, parking facilities and landscaping as well as subsurface utilities, would greatly enhance the desirability of the area. The design team emphasized that access to the water should be a key factor in any decisions regarding public improvements in this area.

While the waterfront design team acknowledged the valuable transportation resources of the Amtrak line, the historic railroad station and the bus center, it underscored the necessity for major interconnections, as well as the need to preserve and develop rights-of-way for future transit development, such as fixed-rail, dedicated busways or other means of intermodal transportation. Ideally this area should include a major civic plaza where public events showcasing the river could be held. A movie entertainment complex called Riverview Plaza has been proposed by the City for a site adjacent to the train station.

Fourth Target Area: Christina River from the bend at Madison Street to I-95 Bridge

In preparing a design plan for the north side of the Christina, an area historically used for industrial purposes, an important component was the incorporation and expansion of the waterfront activity created by the presence of Frawley-Johnson Stadium and the Big Kahuna nightclub. The design team recommends capitalizing on these successes, as depicted in the rendering "Sports Entertainment Complex" (see next page).

Just south of Wilmington near the stadium is Old Wilmington Marsh, a 258-acre tidal freshwater wetland that the Task Force proposes to convert into a Wilmington Wildlife Refuge. (See rendering in Wetlands and Wildlands chapter.) The Department of Natural Resources and Environmental Control is developing a public/private partnership to facilitate this process. One of the first requirements is an environmental assessment to determine if contaminants exist at the site and, if so, to evaluate any potential threat to the public.



Looking toward the proposed Wilmington Harbor from the intersection of M.L. King Boulevard and S. Market Street.

Across the river from the proposed wildlife refuge, north toward the city's urban core and west of the Southbridge neighborhood, lies an area that has the greatest potential for Wilmington's waterfront revitalization. This flat floodplain has seen a variety of industrial uses over the years, most of which have been abandoned. Junk yards, dumps and abandoned cars have all contributed to the pollution of a wetland area near the center of the area. The design team recommends creating a new Wilmington harbor by dredging this degraded wetland.

The rendering "A New Century Waterfront," (see next page) shows the proposed harbor and the multi-use development that it might attract: hotels, a retail/commercial center, residential areas, museums and an education campus. In addition, it depicts a fixed-seat civic area for sporting events and concerts adjacent to an already identified alternate site for the convention center.

The design team's conceptualization of an upscale residential complex, "South Market Canals" (following the "New Century Waterfront" rendering on the next page) which would be built on manmade canals near the proposed Wilmington Wildlife Refuge.

Circulation Plan

The revitalization of the waterfronts will magnify the need for convenient access to these areas. To address this issue, the design team created a circulation plan (following the Market Street Canal rendering) which outlines proposals for vehicular, multi-modal and pedestrian transportation.

1. Vehicular Patterns

A new alignment is proposed as a relief route to facilitate traffic flows from the stadium. This entails converting Madison Street to a two-lane "in" only road and creating a new two-lane "out" route connecting South West Street to Martin Luther King, Jr. Blvd. This will improve traffic movement without a negative impact on local neighborhoods.

The circulation plan envisions a new I-95 interchange connecting to realigned and improved South Market and South Walnut streets. This would provide direct access from I-95 to the proposed Wilmington harbor. An integral aspect would be to upgrade South Madison Street to ensure access to a sports/entertainment complex and the proposed wildlife refuge. This connector would require a new bridge across the Christina River.

In order to integrate regional or interstate traffic movements with local flows between I-95 on the west and I-495 on the east, it is suggested that Terminal Avenue, which extends from Christiana Avenue to New Castle Avenue, be extended from New Castle Avenue to Route 13.

In addition, the plan proposes upgrading the present alignment of A Street between



The Wilmington train station is the focal point of the future regional transportation system.

Christiana Avenue and South Market Street to include a lift bridge across the north inlet of the proposed harbor.

2. Multi-Modal Functions

The circulation plan encourages the use of existing rail lines for both regional and local rail service. As growth continues in suburban New Castle County, the Wilmington train station will take on added importance as a location for facilities to service rail and related mass transit needs.

The plan proposes that both regional and local bus service facilities be incorporated into site development plans for the waterfront. A suggested site for a future complex is near the train station. In addition, it is recommended that local routes for bus, trolley or other form of transit be established that would provide service to the waterfront as well as connect to the Market Street Mall and extend north to the Brandywine.

3. Pedestrian Access

A principal recommendation in the circulation plan is to maximize pedestrian access to the waterfront along both shores of the Brandywine and Christina rivers. Public access will be enhanced through the acquisition of open space as part of the Northern Delaware Greenway program and as a requirement of development projects.

Development Assumptions

The design team proposed development assumptions for near-term and long-term time frames. These assumptions evolved from the design sessions which produced the master plan and should be considered in conjunction with that plan.

Near-Term Assumptions

- ◆ Establish public access to the rivers.
- ◆ Identify and acquire important parcels of land for open space or outdoor recreation.
- ◆ Coordinate planning for vehicle, rail and water transportation.
- ◆ Begin acquiring land for the proposed I-95 interchange connector to South Market and South Walnut streets.
- ◆ Encourage development in target areas.
- ◆ Create a new Wilmington Harbor.
- ◆ Construct pedestrian and vehicular linkages between the waterfront and the Market Street business center.
- Reserve open space on the East Seventh Street Peninsula and establish marinas and other river-related uses in that area.

Long-Term Assumptions

- ◆ Continue residential development along both rivers.
- ◆ Complete an educational, museum and cultural complex.

Predevelopment Access Costs

In order to give a sense of the time and cost of implementing the waterfront master plan, the design team prepared the following estimates for design, permitting and construction. It should be

noted that these figures do not include the costs of sidewalks, landscaping and hardscaping which would typically be considered as part of the projects. Moreover, no costs were determined for new or replacement bulkheading along the two rivers.

East Seventh Street Marina

(1,200 linear feet bulkhead; dredging of 5 feet of silt; blasting of 1,000 cubic yards of rock)

Estimated cost	\$1.5 million
Design and permitting	3 years
Construction	1 year

New Interchange Connector to I-95

Estimated cost	\$30 million
Design and permitting	5 years
Construction	2 years

New South Madison Street

Interchange with I-95 Connector

Estimated cost	\$13.5 million
Design and permitting	4 years
Construction	2 years

New I-95 Connector

Bridge over Christina River

Estimated cost	\$5 million
Design and permitting	5 years
Construction	2 years

Improved access from Daniel S. Frawley

Stadium to Martin Luther King, Jr. Boulevard

Estimated cost	\$1.5 million
Design and permitting	1-2 years
Construction	1 year

Wilmington Harbor Area

(11,000 linear feet bulkhead; excavation and dredging of 15 feet of total depth from existing grade).

Estimated cost	\$30 million
Design and permitting	4 years
Construction	3 years

New A Street Bridge over

Wilmington Harbor Access Canal

Estimated cost	\$5 million
Design and permitting	5 years
Construction	3 years

Realignment of South Market Street

Estimated cost	\$9 million
Design and permitting	4 years
Construction	2 years

Terminal Avenue Extension

Estimated cost	\$9 million
Design and permitting	3 years
Construction	2 years

New B Street Pedestrian

Drawbridge over Christina River

Estimated cost	\$1.5 million
Design and Permitting	2 years
Construction	1 year

Establishing a Planning and Development Corporation to Implement Recommendations

In the spring of 1994, as much of the work of the Task Force was drawing to a close, discussions were held on the type of organizational structure needed to further the implementation of the recommendations that would be presented to the governor and the General Assembly. The consensus was that the best approach was an intergovernmental agency with the authority to coordinate the implementation as well as facilitate financing. To ensure interagency cooperation, it would be managed by a board appointed by the governor, the county executive and the mayor of Wilmington.

Recognizing the complex issues involved in merging the interests of the city, county and state with the interests of citizens' groups, industry and commerce, developers and conservationists, the Task Force recommends that a waterfront planning and development corporation be established that would be empowered to:

- ♦ establish a planning mechanism to include state, county and municipal participation in refining and implementing recommendations contained in "A Vision for the Rivers;"

- ◆ provide an integrated financial approach to developing the waterfront;
- ◆ exercise urban renewal authority to acquire property;
- ◆ issue public improvement and investment bonds to raise capital for development projects;
- ◆ seek funding for land acquisition.

Another task for the development corporation would be to create a grants program modelled after the Planning and Urban Development Action Grant (UDAG) program. This approach would allow the development corporation to receive federal, state and local funding, as well as foundation and private sector support, and leverage those monies as direct loans, interest rate buy downs or loan guarantees that would encourage private or public/private development partnerships.



An aerial view of Wilmington's waterfront and surrounding area (1989).

4. Water & Stream Bank Quality

The Christina River is the longest waterway in New Castle County. Its watershed encompasses Brandywine, Red Clay, White Clay, Mill and Pike creeks and drains almost all of New Castle County above the C&D Canal.

The Christina serves as a surface water source for private utility companies that distribute to consumers throughout the county. Its tributary, Brandywine Creek, in conjunction with the 2.3 billion gallon Hoopes Reservoir, serves as the primary domestic water supply source for the City of Wilmington.

Clearly these two waterways play a crucial role and must be protected. Over the years, however, development has had an impact and water quality has suffered. In order to address these growing concerns, the Water and Stream Bank Quality Committee focused its attention on public policy and field projects.

PUBLIC POLICY

RECOMMENDATION

1. Remediate hazardous waste sites

Priority must be given to implementing DNREC's Christina River Basin Hazardous Waste Sites Restoration Project Proposal to enable investigation of the more than 70 his-

toric sites (ie., industrial facilities in operation prior to 1940) along the lower portions of the Christina and Brandywine rivers. Remedial action should be taken as indicated so that the sites can be used without jeopardy to water quality.

Responsible parties

The Superfund Branch of the Department of Natural Resources and Environmental Control will have primary responsibility and will work with any party identified as responsible for site contamination, providing technical support and oversight under the Voluntary Cleanup Program whenever possible.

Suggested time frame

The program should begin as soon as funds are available or current staff can be reassigned; full cleanup will require several years, but the project should advance as rapidly as possible in concert with the five-year Christina Basin water quality study.

Cost

Estimates range from \$200,000 to \$500,000 a year depending on whether new staff is employed or existing staff members

are reassigned; the project should begin with federal seed monies of \$50,000. Future funding should be a combination of U. S. Environmental Protection Agency grants, General Assembly appropriations, and corporate and private contributions.

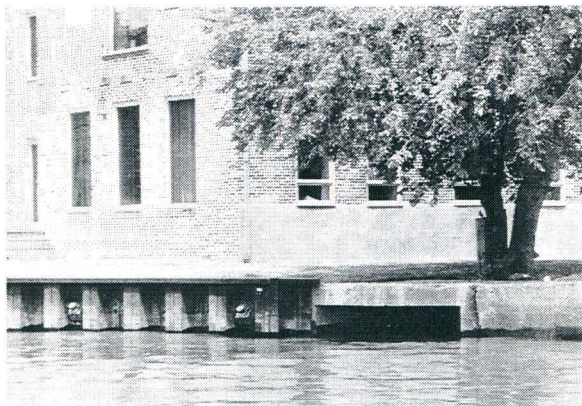
RECOMMENDATION

2. Support Wilmington's combined sewer overflow management program

Strong support should be given by EPA, the Delaware River and Bay Commission and DNREC to:

- ◆ the City of Wilmington's current water quality monitoring and modeling study aimed at defining the precise impacts of the combined sewer overflows (CSOs) to assist in determining feasible options for volume reduction and pollution removal;
- ◆ the solutions that evolve from the study. Separation of CSOs is financially unfeasible. Management by capturing, holding and bleeding out the overflows will mean an expensive, multi-year program. Preliminary estimates range from \$17 million to \$92 million for capital costs.

Appendix F is a report and map on combined sewer overflow systems that was prepared for the Task Force.



A combined sewer overflow on the Christina.

Water Quality Summary of the Christina River Basin within Delaware

The water quality of the Brandywine, Red Clay and White Clay creeks and Christina River was evaluated in DNREC's 1994 Watershed Assessment Report.

Brandywine Creek

Designated uses for this creek include:

- ◆ industrial water supply;
- ◆ primary contact recreation;
- ◆ secondary contact recreation;
- ◆ fish, aquatic life and wildlife;
- ◆ agricultural water supply.

All defined uses were supported except for primary contact recreation (swimming). This was not supported due to high levels of enterococcus bacteria throughout the system. In the upper portion of Brandywine Creek, additional uses include exceptional recreation and/or ecologically significant waters (ERES), public water supply, and cold water fisheries (put-and-take) in Beaver and Wilson Runs. The public water supply and cold water fishery uses are considered supported, but the ERES use is considered threatened due to increases in nitrate, nitrogen and phosphorus concentrations.

Possible origins of these problems include combined sewer overflows, urban runoff, industrial point sources, municipal point sources and agricultural nonpoint sources.

Christina River

Designated uses for this creek include:

- ◆ industrial water supply;
- ◆ primary contact recreation;
- ◆ secondary contact recreation;
- ◆ fish, aquatic life and wildlife.

Primary contact recreation (swimming) was not supported due to high levels of enterococcus bacteria throughout the system. Furthermore, the fish, aquatic life and wildlife use was not supported due to elevated levels of zinc attributable to downstream transport from Red Clay Creek and White Clay Creek. All other designated uses are considered supported. In the upper portion of Christina River an additional supported use is agricultural water supply. Possible origins of these problems include urban nonpoint sources, industrial point and nonpoint sources, combined sewer overflows, urban runoff and upstream sources.

Red Clay Creek

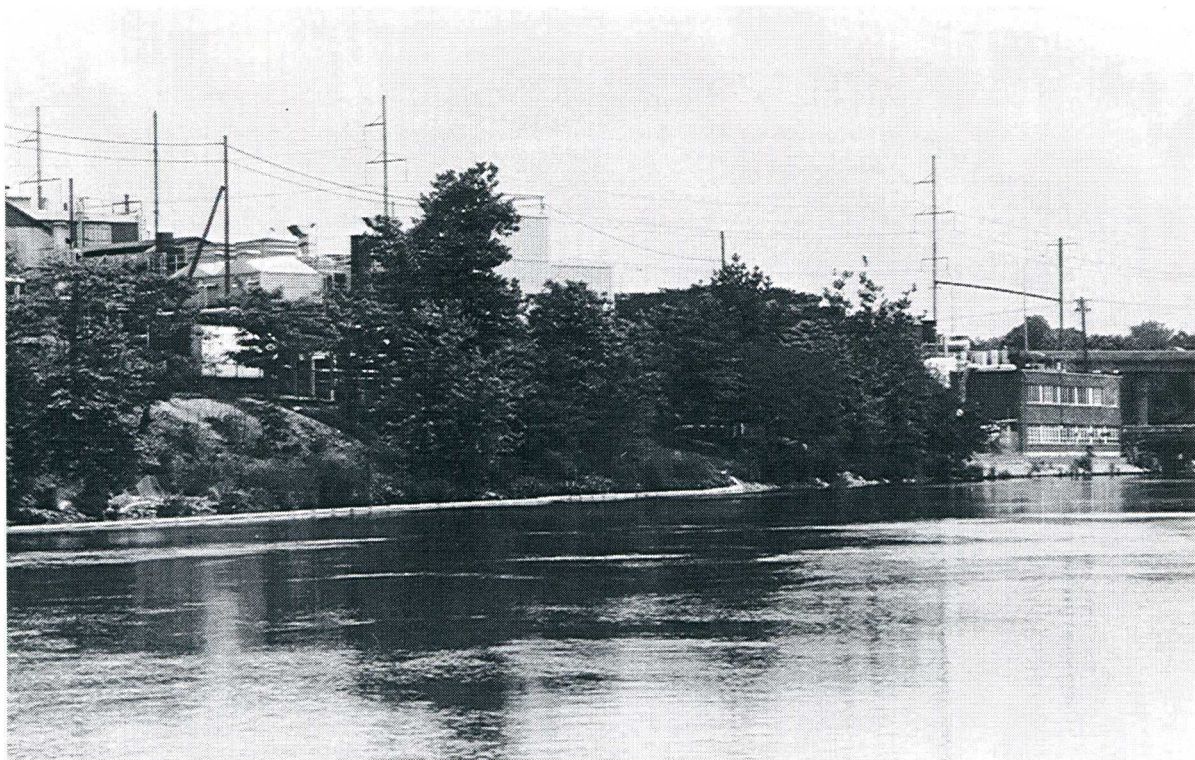
Designated uses for this creek include:

- ◆ industrial water supply;
- ◆ primary contact recreation;

- ◆ secondary contact recreation;
- ◆ fish, aquatic life and wildlife;
- ◆ agricultural water supply;
- ◆ public water supply;
- ◆ cold water fishery (put-and-take).

Primary contact recreation (swimming) was not supported due to high levels of enterococcus bacteria. Several intensive toxics surveys have revealed that zinc levels were above the acute water quality standards for aquatic life. Therefore, the fish, aquatic life and wildlife use is not supported. *The Synoptic Report on Toxic Substances Contamination of the Red Clay Creek*, commissioned by DNREC in 1987, reported that many of the other uses were threatened or not supported due to the presence of toxics, most notably PCBs, chlorinated pesticides and dioxins/furans.

Possible origins of these problems include urban runoff, sediment, agricultural nonpoint



Ciba Pigments in Newport has made environmental improvements that will protect the river.

sources, industrial point and nonpoint sources.

Additional sampling is recommended to fully assess the water quality. Delaware Stream Watch members have adopted this segment for collection of water quality data.

White Clay Creek

Designated uses for this creek include:

- ◆ industrial water supply;
- ◆ primary contact recreation;
- ◆ secondary contact recreation;
- ◆ fish, aquatic life and wildlife;
- ◆ agricultural water supply;
- ◆ public water supply;
- ◆ cold water fishery (put-and-take);
- ◆ exceptional recreation and/or ecologically significant water (ERES).

Primary contact recreation (swimming) was not supported due to high levels of enterococcus bacteria throughout the system. Furthermore, the fish, aquatic life and wildlife use was not supported below Route 72 due to elevated levels of zinc attributable to the NVF Company. All other designated uses were considered supported. However, the ERES use was considered threatened due to high nutrient levels.

A 1988 toxics survey indicated that whole body fish tissue samples contained detectable levels of PCBs and chlorinated pesticides at levels that may represent a threat to the fish and to recreational fishermen. Possible origins of these problems include urban runoff, agricultural nonpoint sources, industrial point and nonpoint sources.

Additional sampling is recommended to fully assess the water quality. Delaware Stream Watch members have adopted this segment for the collection for water quality data.

RECOMMENDATION

3. Protect aquifer recharge areas

Whenever land identified for public pur-

chase or acquisition contains a defined aquifer recharge area or any other water resource protection area, priority should be given to this land. Conversely, public building projects that increase impervious surface should avoid defined water resource protection areas on public lands.

Responsible parties

All public agencies that can acquire land or interests in land in New Castle County; private conservancies may assist.

Suggested time frame

Should become policy immediately.

Cost

The cost expenditures for this project are not available at this time.

RECOMMENDATION

4. New Castle County codes

Substitute No.3 to Ordinance No. 90-189 with Amendment No. 1 and Oral Amendment No. 1 to amend Chapter 23 of the New Castle County Code, establishing a water resource protection area overlay zone, should be strengthened by amending it as follows:

◆ Alter the language of Section 23-134 (c) to prohibit the installation of new underground petroleum storage tanks in aquifer recharge areas and over the Cockeysville Formation.

◆ Require the use of mixed media de-icers on roadways in aquifer recharge areas and over the Cockeysville Formation.

◆ Require the maintenance of existing vegetation to the greatest extent possible in all land disturbing activities to protect water quality in surface water supply streams.

The New Castle County Department of

Planning and the New Castle County Council would be the parties responsible for carrying out this recommendation; implementation could be virtually immediate, and there would be no direct costs.

FIELD PROJECTS

RECOMMENDATION

1. Increase citizen stream monitoring throughout the watersheds

Citizen monitoring throughout the watershed should be increased for its value in detecting potential sources of stream pollution and for its enormous public education effects. Stream habitat quality should be assessed by volunteers in the Delaware Stream Watch program, a DNREC/Delaware Nature Society partnership, in cooperation with the State Division of Water Resources.



Typical stream bank erosion on Brandywine Creek.

Responsible parties and suggested time frame

DNREC and the Delaware Nature Society should give priority to implementing this recommendation, which could be incorporated into the Delaware Stream Watch program with responsibility for its maintenance assumed by Stream Watch staff and volunteers at DNS.

Cost

\$20,000 for one part-time staff person, equipment, supplies, travel and other expenses for one year; the money could come from either public or private sources.

RECOMMENDATION

2. Stream bank stabilization projects

A demonstration project for stream bank stabilization and water quality protection using bio-engineering techniques should be established. Potential sites identified to date are:

Christina River

- ◆ Delmarva Power site on Route 72 south of Old Baltimore Pike.
- ◆ Vicinity of Falcon Steel Co.

Brandywine Creek

- ◆ Brandywine Park north of I-95 overpass on the east and west banks.
- ◆ Brandywine Park south of I-95 overpass on the east and west banks.

Responsible parties

- ◆ For the Brandywine Park sites, DNREC's Division of Soil and Water should take the lead with the City of Wilmington's Department of Parks and Recreation (Brandywine Park property owner), and receive monies

appropriated by the state's capital bond bill, federal nonpoint source program funds or another public sources. DNREC should supervise the project in cooperation with the Friends Society of Brandywine Park, the New Castle County Department of Parks and Recreation, the New Castle Conservation District and the Delaware Nature Society.

- ◆ For the Delmarva Power and vicinity of Falcon Steel sites, DNREC should work with landowners; it is anticipated that the projects on private property will be privately accomplished.

Suggested time frame

It is recommended that the projects begin as soon as funding is available, providing the season is appropriate for installation of the plant materials.

Cost

- ◆ For the Brandywine Park sites, \$50,000
- ◆ For the privately-owned sites the cost will vary according to the linear footage in the demonstration project; funding should be privately arranged.

Status

In early 1994 the Task Force received approval from EPA to conduct a shoreline restoration demonstration project for the Brandywine Creek. (See the Track of Accomplishments.) The \$50,000 project will stabilize a section or sections along the creek. The project began in March 1994 and will fully demonstrate the advantages of employing bio-engineering techniques to improve habitat and ecosystems. It will bring together private, public and non-profit sector technical resources.

Finally, an environmental educational program will be developed as a means to explain and demonstrate the value of bio-engineering techniques to achieve stream bank stabilization.

VISION FOR THE RIVERS: IMPLEMENT AN INTERSTATE MATHEMATICAL STREAM MODEL

The first tool needed to improve water quality and understand minimum acceptable flows is a mathematical model describing stream processes. The project must begin with communication at the highest levels of state government, the governors and their cabinet members. The stream use and land use interests and issues of all jurisdictions in the watersheds must be identified at the outset. Ultimately land uses will be determined by the ability of the streams to support them. The Task Force, upon recommendation of the Water and Stream Bank Quality Committee, passed two resolutions; one called for "support for interstate cooperation" as a necessary multi-agency approach to addressing water quality and supply issues. (See Appendix D).

The Task Force recommends that the respective governors direct DNREC, Pennsylvania Department of Environmental Resources (PaDER) and the Maryland Department of Natural Resources (DNR) to give budgetary priority to implementation of a mouth-to-headwaters model for both streams. In completing the mathematical modeling study the responsible parties will:

- ◆ conduct an intensive review of the National Pollutant Discharge Elimination System (NPDES) permits issued for Christina River and Brandywine Creek discharges;
- ◆ ensure that all sources of technical monitoring data share that data under some formal arrangement;
- ◆ quantify the minimum flow standards for

the Christina and Brandywine and make recommendations concerning their appropriateness and validity with relation to all designated stream uses;

- ◆ establish a technical basis for compatible interstate water quality standards and designated stream uses;
- ◆ acknowledge the significant contribution of the Red Clay and White Clay creeks to Christina River water quality;
- ◆ involve all political jurisdictions and water suppliers in the receiving watersheds.

Responsible Parties

- ◆ DNREC will have the primary responsibility and will establish a broad-based steering committee to give technical guidance to development of the model and assume a major share of the costs.
- ◆ The City of Wilmington and New Castle County through the Water Resources Agency, as the principal beneficiaries, will also have significant responsibility and share the costs.
- ◆ The study will involve water suppliers, both public and private - City of



The Brandywine, Wilmington's primary source of drinking water, flows under Market Street Bridge.

Newark, Artesian Water Company and Wilmington Suburban Water Company and other agencies, including DNREC, PaDER, Maryland DNR; the Delaware Geological Survey; Chester County Water Resources Authority and the U.S. Geological Survey, Malvern office; the planning agencies of New Castle, Chester and Cecil counties; municipalities and other local governments; and all other appropriate entities. The study will be conducted in cooperation with the Delaware River Basin Commission. *A Preliminary Study of the Brandywine Creek Sub-basin*, the final report by Science Applications International Corporation to the EPA, Region III, including recommendations for completing definition of the total maximum daily load (TMDL) advisable for the creek, should be incorporated into the model study. Appendix G presents an important historical perspective concerning issues of water use involving the Brandywine.

Suggested time frame

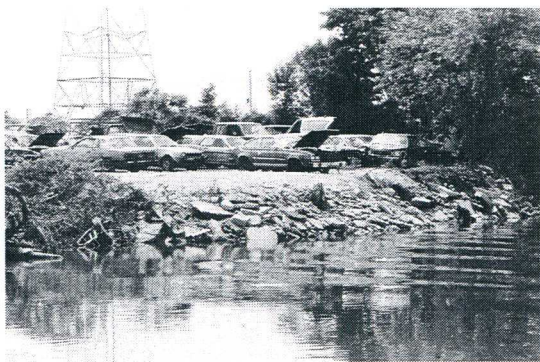
- ◆ DNREC should begin at once to establish the steering committee, develop the framework for the study and identify the sources of funding. The modeling effort can be incorporated into DNREC's five-year Christina Basin Water Quality Study.
- ◆ Once funded the project should be completed within 24-36 months.

Cost

- ◆ The project should begin with the seed monies of \$50,000 for the first year, with shared participation by the beneficiaries.
- ◆ Total cost will depend upon the scope of work.

5. River Cleanup

Trash in our rivers is unsightly and can have a major impact on tourism in waterfront communities. In addition, it can be deadly to fish and wildlife; thousands of aquatic animals die each year from becoming entangled in plastic debris or from ingesting plastic that they mistake for food. Illegally dumped 55-gallon drums can contain dangerous chemicals. Other harmful materials can come from items such as junked cars and refrigerators. Aquatic debris can also ensnare boat propellers or cause engine failures by clogging water intakes.



Junked vehicles, tires and other debris have a measurable impact on the Christina.

Laws have been enacted to restrict the dumping of garbage and wastewater from boats and to help control land-based sources of aquatic debris, such as stormwater systems

and combined sewer systems.

The River Cleanup Committee addressed these threats to the environment in general and the Christina watershed in particular.

ONGOING ACTIVITY RECOMMENDATIONS

1. The Department of Natural Resources and Environmental Control should continue the Christina River Cleanup as an annual event. (See Appendix E.)

The first cleanup of the Christina River was held on April 25, 1992 under the sponsorship of the Department of Natural Resources and Environmental Control and New Castle County. It clearly demonstrated the abuse and neglect the river has suffered over the years. In three years, volunteers have cleaned up more than 142 tons of trash, two automobiles and 5,300 tires. In 1994 the cleanup was expanded into a basinwide effort at the urging of the Task Force. It has become a popular annual event, with a long list of government, business and civic organizations as sponsors.

It should be noted that these cleanups -

one-day, voluntary events - cannot solve the problem of trash in the rivers. Their fundamental purpose is to raise public awareness about the state of our waterways and, hopefully, to change public behavior.

2. DNREC should encourage the formation of citizen groups (wherever necessary) to support the annual river cleanup. These organizations would focus their attentions on the tributaries of the Christina, similar to the activities of the Christina Conservancy and the Brandywine Conservancy.

3. The governor and/or the mayors of Wilmington, Newark and Newport should declare Christina Watershed Cleanup Day as a cleanup day for neighborhood streets and sidewalks as well.

PRIORITY PROJECT RECOMMENDATIONS

1. Remove decaying tugs and barges in the lower reaches of the Brandywine; examine for the presence of any toxic materials.

2. Develop legislation to phase out dumps on the banks of the Christina.

3. Ensure compliance with environmental laws regulating discharges of pollutants to the Brandywine and Christina.

4. Monitor the rivers to determine sources of bacterial contamination as a first step to their eventual elimination.



An abandoned truck mars the landscape and can cause environmental problems as well.



A beautiful and unspoiled section of the Branywine looking east toward I-95.

5. Remove decaying pilings and other hazards in the Christina.

6. Install fencing around the Cherry Island landfill to prevent trash from blowing into the Christina.

7. Encourage citizen groups to "adopt" segments of the river in the manner of the Adopt-a-Highway and Adopt-a-Wetland programs.

***A VISION FOR THE RIVERS:
RESTORE THE ENVIRONMENTAL
QUALITY OF THE RIVERS.***

Achieving the vision will take time and require a committed effort from governments at the state, county and local levels, nonprofit community organizations and the public.

6. Land Acquisition and Access

The Land Acquisition and Access Committee has identified potential acquisitions along the Christina and Brandywine rivers from the City of Wilmington to the boundaries of the adjoining states. This information for the entire length of both rivers appears on a series of maps at the end of this chapter. Map 1 serves as an overview to the series. Recommendations for acquisitions within the city were made by the Waterfront Development Committee and subsequently incorporated.

Long-term land protection along the Brandywine and Christina rivers will become a reality through public acquisition, private property easement or governmental regulation. Although this chapter identifies parcels for acquisition, it is important to acknowledge the diverse methods that are used to obtain protection.

The increased awareness and concern for the rivers generated by education, stewardship and cleanup programs have been vital precursors to achieving permanent protection status. Programs and policies for stewardship of the Red Clay and White Clay tributaries also are contributing to preservation of the Christina and Brandywine.

The recommendations that follow are the first step in formulating an acquisition policy for the two rivers and should lead to an imple-

mentation plan complete with priority rankings and targeted funding sources. Property identification and mapping has underscored the high degree of cooperation between public and private groups for the protection now in effect.

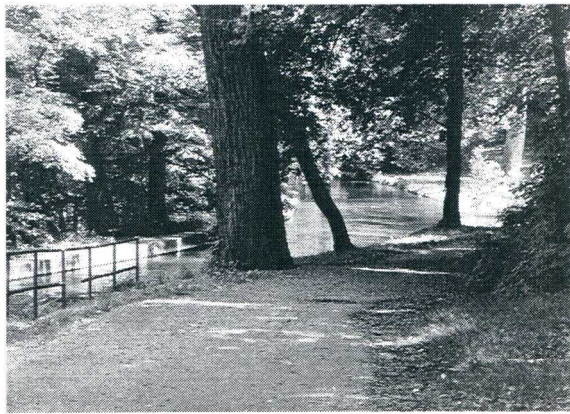
METHODOLOGY

The committee examined the status of all properties which border the Brandywine and Christina rivers from the point where they enter Delaware to their confluence at Wilmington.

In formulating its recommendations the committee sought to support the concept of greenways along the lengths of both rivers. However, the definition of greenway is open to much interpretation. The committee therefore identified three types of greenways, arranged in increasing levels of public use and environmental impact.

Level 1: Preservation Greenway

The major objective is to maintain the land in open space, to conserve plant and wildlife species and to eliminate sources of water pollution. Land may be in private or public hands.



A winding path along the race in Brandywine Park.

Level 2: Recreational Greenway

Limited public access is provided to selected waterfront sites such as parks, where roadside parking would be possible. Fishing, boat launching and picnicking would be typical public uses. There would be complete public access to the waterway itself. Public access points would require easements or public acquisition.

Level 3: Landpath Greenway

A continuous landpath along the river's entire length, which might involve crossing from one bank to the other, should be limited to foot or bicycles. Public acquisition or easements would be required. In selected cases, public access to this greenway would be limited.



Public access and greenway preservation along the Brandywine.

ACHIEVING GREENWAY OBJECTIVES

The Task Force's recommendations are based on achieving Level 1 along the lengths of both rivers and Level 2 with a reasonable density of access sites. Since Level 3 should be a long-term objective, the following recommendations are not based on this greenway type, which may require some degree of statutory protection such as has been done to protect steep slopes and the 100-year floodplain.

PUBLIC ACQUISITION AND USE

Much of the Brandywine and Christina shoreline and floodplain is already protected through public and private initiatives. The task of proposing sites for public acquisition, therefore, has been one of looking for critical missing links or special areas in a system of preservation that is well on its way to completion. Preservation efforts through easement further reduce the potential sites proposed for fee-simple acquisition. It is very encouraging that the number of these is a realistic and manageable goal. Where preservation has occurred, private or public recreation has sometimes also been made possible. Additional sites for river access have been identified.

BRANDYWINE CREEK FROM THE PENNSYLVANIA LINE TO THE CITY OF WILMINGTON

*Smiths Bridge to Brandywine Creek
State Park (Map 2)*

Private protection of this area is anticipated. The major landowner on the east bank has already dedicated a greenway for public use. Private conservation agencies have active landowner stewardship programs along this stretch of river.

*Brandywine Creek State Park
(Maps 2 and 3)*

Preservation, recreation and access are provided through public ownership.

*Brandywine Creek State Park to
Rockland/Adams Dam Road (Map 3)*

The last remaining private land holding on the east bank has been acquired through public acquisition. This area was annexed into the park on December 31, 1993 by Delaware's Open Space Council.

*Rockland Road to New Bridge Road
(Maps 3 and 4)*

Current and future river access is by fee or permission from the major institutional and private landowners. Land protection efforts are private.

New Bridge Road to I-95 (Map 4)

As the Brandywine approaches Wilmington, land ownership and uses become a patchwork. On the west bank the land is either already intensively developed (private condominiums, manufacturing and offices) or public (Rockford and South Rockford Park, linked by Kentmere Parkway).

RECOMMENDATION

1. On the east bank, acquire the 33-acre parcel bounded by Alapocas Woods Park, Brandywine Park and Brandywine Park condominiums.

The highest degree of preservation, recreation and river access would be obtained through public acquisition of the entire property. At the very least, access for canoe portage needs to be obtained by acquisition or

easement, and the railroad right-of-way through this property should be preserved as a greenway link between Alapocas Woods and North Brandywine Park. The City of Wilmington UDAG Corporation has claimed ownership of the railroad right-of-way from Alapocas Woods continuing through Brandywine Park condominiums to Brandywine Park.

***CHRISTINA RIVER FROM CITY OF
WILMINGTON TO MARYLAND STATE
LINE***

City of Wilmington (Map 5)

Recommendations for land preservation, recreation and access will be undertaken in conjunction with the Waterfront Development Committee. There are projects underway along the Christina in Wilmington, such



The setback of the new EDIS building on the Christina provides a corridor for public access.

as the Wilmington Walkways program, Urban Environmental Education Center, the Wilmington Rowing Club, Kalmar Nyckle, East Seventh Street Marina and other riverfront park projects, which the Task Force endorses.

RECOMMENDATION

2. River access and extension of the proposed "Christina River Walk" should be obtained by easement in conjunction with development.

*Dravo Shipyard Site --
Near Frawley Stadium (Map 5)*

The development of the Frawley-Johnson Stadium on a portion of this site will bring many people close to the Christina River at this point. This makes the land attractive for recreation and also for commercial development. The highest degree of protection, recreation and river access would be obtained through public acquisition of the entire property.

*Dravo Shipyard Site to
Churchman's Marsh (Maps 5, 6 and 7)*

This area is inaccessible due to industrial development, Conrail's active rail line and the tidal marsh. The Acquisition and Access Committee deferred to recommendations of the Wetlands and Wildlands Committee for any suggestions regarding appropriate or potential wetlands access.

*Churchman's Marsh to Route 7
(Maps 7 and 8)*

New Castle County is negotiating with a landowner to acquire property on the north side of the river at Christiana.

RECOMMENDATION

3. New Castle County should acquire floodplain and waterfront access at Artesian Water Company on Churchman's Road, either through easement or purchase.

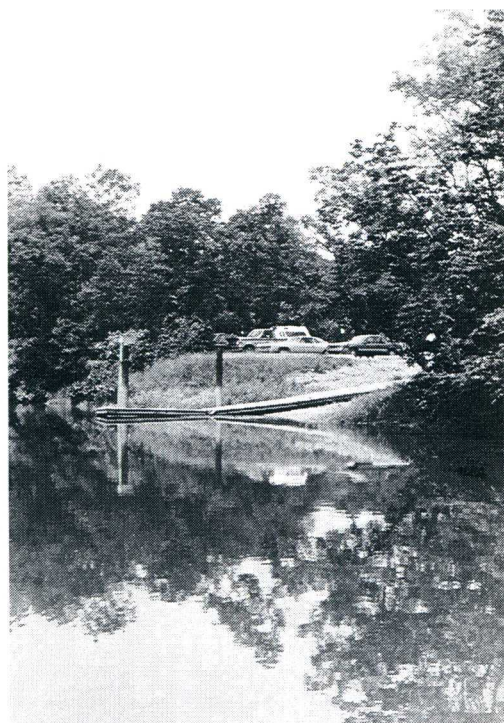
Other land holdings on the north bank include private open space (Cavalier Country Club), residential development with public open space, and DNREC's public boat launch site.

The south side is a patchwork of residential, industrial and marsh lands. New Castle County plans to create an access site at its Lewden Green Park.

Route 7 to Smalleys Dam Road (Map 8)

RECOMMENDATION

4. On the north side, one piece of undeveloped land remains which is recommended for acquisition.



The Division of Fish and Wildlife's Christina boat ramp on Churchman's Road.

Other portions of the north and south banks are private residential areas.

*Smalleys Dam Road to Walther Road
(Maps 8 and 9)*

RECOMMENDATION

***5. Acquire an access site at Walther Road,
on the north bank of the Christina.***

Extensive development and existing industry have generally shaped floodplain protection and public access along this portion of the river. Private protection is anticipated for major private land holdings. This area, too, could be the site of a future Route 301 connector.

Walther Road to Route 72 (Maps 9 and 10)

Preservation, recreation and access are being, or have been, obtained largely through New Castle County's floodplain and open space ordinances. Protection of major undeveloped holdings is anticipated through private conservation efforts. One of several possible corridors for Route 301 passes through this stretch near Piermont Woods. River access should be integrated into any transportation projects planned in this area. The Christina is canoeable from Route 72 to Churchman's Marsh.



This photo shows an ideal mix of roadway, open space, walkway and river.

Route 72 to I-95/Route 896 (Map 10)

Private protection of major landholdings is anticipated through private conservation stewardship programs.

RECOMMENDATION

6. Access easements should be acquired at the Delmarva Power and Dayett Mills properties near Old Baltimore Pike

*City of Newark
I-95/Route 896 to Nottingham Road*

Newark's floodplain ordinance has effectively preserved the Christina River from encroaching development. Access points for public recreation are in place at city parks, such as Rittenhouse Park.

RECOMMENDATION

7. Acquire an additional access site at Barksdale Road.

*City of Newark to the Maryland
State Line (Map 10, 11 and 12)*

Both banks are developed as private residential areas. River access is subject to homeowner permission.

**A VISION FOR THE RIVERS:
PROVIDE FOR PUBLIC RIVER WALKS**

An essential component in providing public enjoyment and use of the rivers is to provide access. An extension of the "Christina River Walk" can be accomplished by easements and river access points during the development of new waterfront projects. This vision is focused on the Christina, although as new development projects occur on the Brandywine public access should also become a reality.

Brandywine and Christina Rivers Task Force

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Architects Waterfront Design Team:	James R. Nelson, FAIA Joseph E. Carbonell, AIA
Water and Stream Bank Quality:	Lorraine M. Fleming William G. Turner, PE
River Cleanup:	Edward W. Cooch, Jr., Esq.
Land Acquisition and Access:	Lynn W. Williams
Funding:	E. A. Trabant
Legislation, Regulations & Zoning:	June D. MacArtor, Esq.

Acknowledgments

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♦ Eleanor "Georgi" Marquisee, Mark Marquisee and Matt Urban of Arden Resources Media, who captured the "Vision for the Rivers" on a video that has been, and will continue to be, an important means of generating support for the "New Century Waterfront."

♦ Madgdy S. Barsoum, Mid International Corp., Newtown Square, PA, who created the renderings that bring to life the architects' plans for the waterfront and illustrate the final report and executive summary.

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"Landing at the Rocks" printed courtesy of PNC Bank, Delaware

Historic views courtesy of Delaware State Archives

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Finally, the Task Force wishes to acknowledge the leadership of Edwin H. "Toby" Clark, who, while secretary of the Department of Natural Resources and Environmental Control, played an important role in establishing the Task Force and charting its course.

APPENDIX A



SPONSOR: Sen. Marshall

DELAWARE STATE SENATE

136TH GENERAL ASSEMBLY

62 JUN 25 1992

SENATE RESOLUTION NO. _____

URGING GOVERNOR MICHAEL N. CASTLE TO APPOINT A BLUE RIBBON TASK FORCE TO MAKE RECOMMENDATIONS CONCERNING THE FUTURE OF THE BRANDYWINE AND CHRISTINA RIVERS.

1 WHEREAS, twenty years ago, Delaware, under the bold leadership of Governor
2 Russell W. Peterson, had the foresight to take steps to protect the
3 environment and character of our coastal zone; and

4 WHEREAS, we now face a situation concerning the Christina and Brandywine
5 Rivers and decisions we make now will have a profound impact on these vital
6 waterways for generations to come; and

7 WHEREAS, plans to clean up the Christina and Brandywine Rivers to protect
8 adjacent wetlands could well make these waterways suitable for expanded
9 water-based recreation and compatible development of upscale shopping, eating
10 and entertainment facilities like the development that has transformed
11 Baltimore's Inner Harbor into one of the nation's leading tourist attractions;
12 and

13 WHEREAS, plans to preserve and develop the rivers in this manner would be
14 incompatible with proposals to locate certain industrial facilities on the
15 river that would necessitate the transporting of hazardous materials by ship
16 or barge; and

17 WHEREAS, on June 15, 1992, Senator Robert I. Marshall presented a letter to
18 the Office of the Governor urging the creation of a blue ribbon task force to
19 study the future of the affected waterways; and

20 WHEREAS, it is of utmost importance that a coordinated and comprehensive
21 approach be taken to address the future use of the river and, most especially,
22 to protect the marine life and the ecosystems that have been entrusted to us
23 to hand down as a legacy to future generations.

24 NOW THEREFORE:

25 BE IT RESOLVED by the State Senate of the 136th General Assembly of the
26 State of Delaware that we hereby urge Governor Michael N. Castle to appoint a

1 blue ribbon task force to make recommendations concerning the future of the
2 Brandywine and Christina Rivers.

3 BE IT FURTHER RESOLVED that we respectfully request that this task force be
4 appointed no later than July 31, 1992 and that said task force be charged with
5 the responsibility of reporting to the Governor's Office, the General
6 Assembly, the City of Wilmington and New Castle County by January 31, 1993.

7 BE IT FURTHER RESOLVED that said task force should comprise a cross-section
8 of community leaders, environmentalists, those who use the river for work or
9 recreation, the business community, elected officials and concerned citizens,
10 and that both the Mayor of Wilmington and the New Castle County Executive
11 should each appoint two members of said Task Force.

12 BE IT FURTHER RESOLVED that, upon passage, suitable copies of this
13 resolution be presented to Governor Michael N. Castle, Mayor Daniel S. Frawley
14 of the City of Wilmington, and New Castle County Executive Dennis Greenhouse.

APPENDIX B

STATE OF DELAWARE



EXECUTIVE DEPARTMENT DOVER

EXECUTIVE ORDER
NUMBER 109

TO: HEADS OF ALL STATE DEPARTMENTS AND AGENCIES
RE: BRANDYWINE AND CHRISTINA RIVERS

WHEREAS, the Brandywine and Christina Rivers are two of the natural resource treasures of the State of Delaware; and

WHEREAS, these waterways and their riparian lands provide major recreational, aesthetic, wildlife, and other environmental amenities for much of New Castle County and the rest of Delaware; and

WHEREAS, these waterways and their riparian lands, if properly managed, have the potential to make major contributions to economic development, community improvement, and the quality of life in New Castle County; and

WHEREAS, the Delaware State Senate unanimously endorsed Senate Resolution No. 62, which requests the Governor "to appoint a blue ribbon task force to make recommendations concerning the future of the Brandywine and Christina Rivers;

NOW, THEREFORE, I, MICHAEL N. CASTLE, by virtue of the authority vested in me as Governor of the State of Delaware do hereby declare an order as follows;

1. That there be established a "Task Force on the Future of the Brandywine and Christina Rivers."

2. The Task Force shall be composed of an Executive Committee with the following members:

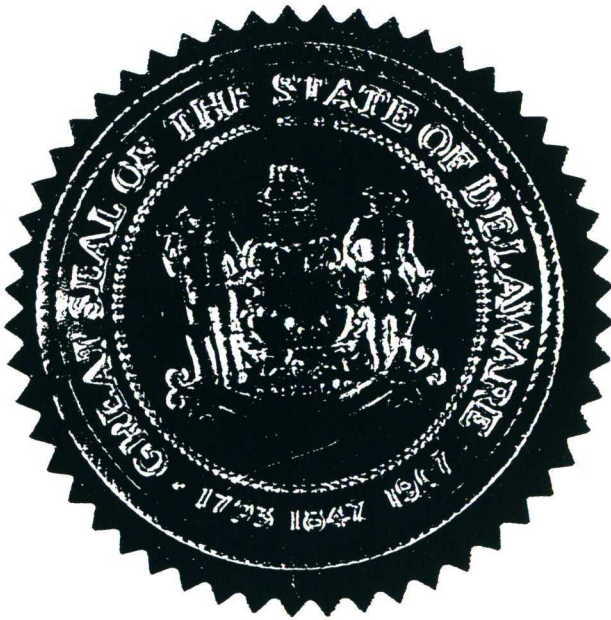
- a. Dr. E. A. Trabant, Chair
Governor Russell W. Peterson, Vice Chair
Senator Robert I. Marshall
Senator Andrew G. Knox
Edward Cooch, Jr., Esquire
The President of Wilmington City Council
The County Executive of New Castle County
The Mayor of the City of Wilmington
The Secretary of the Delaware Department of
Natural Resources and Environmental Control.
- b. The Chair and the Vice-Chair shall appoint, with the concurrence of the Executive Committee, such additional members as are necessary to obtain a full representation of community organizations, environmental organizations, businesses and governments affected by and interested in the Brandywine and Christina Rivers;

3. The Task Force shall develop recommendations regarding what actions, if any, the State, New Castle County, the City of Wilmington, and the other incorporated communities along the Brandywine and Christina Rivers should take in order to ensure that:

- a. The use and management of the riparian lands along these rivers is compatible with their use for recreational purposes, as community assets, and for the protection of fish and wildlife resources;
- b. The citizens of New Castle County are able to take full advantage of the riparian and water based recreational opportunities that these streams offer;
- c. The rich historical, cultural, and community attributes of the river corridors are properly protected and managed so as to preserve them for future generations;
- d. Current efforts to manage water quality, water use, and wildlife habitat in and along the rivers are consistent with the goals of protecting and enhancing the environmental integrity and public benefits of these streams; and

e. Compatible economic uses are encouraged which
enrich the future of the rivers.

4. The Task Force shall present its findings and
recommendations to the Governor and the General Assembly
by April 30, 1993.



APPROVED this 20th day of
October, 1992.

A handwritten signature in cursive script, reading "Michael N. Castle", written over a horizontal line.

Governor

ATTEST

A handwritten signature in cursive script, written over a horizontal line.

Secretary of State

APPENDIX C

STATE OF DELAWARE



EXECUTIVE DEPARTMENT
DOVER

EXECUTIVE ORDER
NUMBER 8

TO: HEADS OF ALL STATE DEPARTMENTS AND AGENCIES
RE: CONTINUATION OF THE TASK FORCE ON THE FUTURE
OF THE BRANDYWINE AND CHRISTINA RIVERS

WHEREAS, the Brandywine Creek and the Christina River are two of the natural resource treasures of the State of Delaware, and in recognition thereof the Delaware State Senate last year passed Senate Resolution Number 62 requesting the governor to create a task force that would undertake a coordinated and comprehensive analysis of the future of these two important waterways; and

WHEREAS, the "Task Force on the Future of the Brandywine and Christina Rivers" was established by Executive Order Number 109 of Governor Castle on October 20, 1992; and

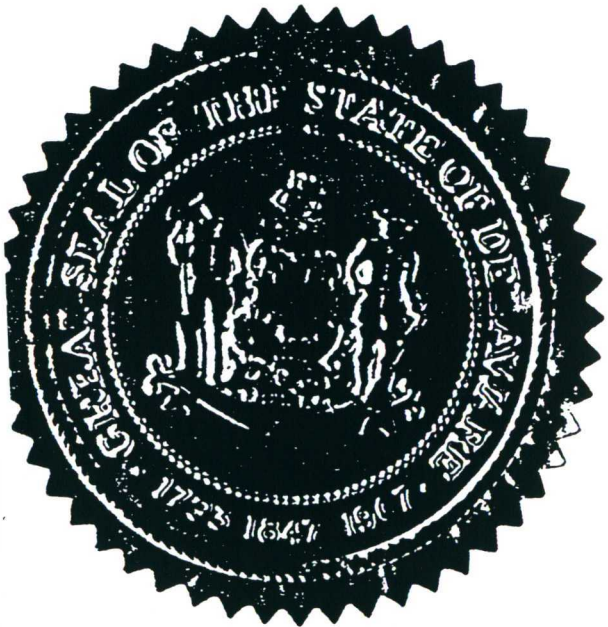
WHEREAS, the Task Force has issued an interim report and is proceeding to evaluate issues, develop recommendations and complete its mission.

NOW, THEREFORE, I, THOMAS R. CARPER, by virtue of the authority vested in me as Governor of the State of Delaware, do hereby declare and order that:

1. The Task Force on the Future of the Brandywine and Christina Rivers is hereby continued.

2. The Honorable Russell W. Peterson, former Governor of the State of Delaware, and E. A. Trabant, President Emeritus of the University of Delaware, shall continue as Co-Chairpersons of the Task Force.

3. The Task Force shall present its final findings and recommendations to the Governor and the General Assembly by September 1, 1993.



APPROVED this 14th day of June, 1993.

Thomas R. Carper
Governor

ATTEST:

William J. Zuckerman
Secretary of State

APPENDIX D

Legislation, Regulations and Zoning

The Legislation, Regulations and Zoning Committee compiled a reference list of local and state laws that relate to the Task Force work.

As a general guide, almost any activity in the purview of the two rivers is covered by at least one of the laws. In addition, there are protective statutes designed to prevent or remedy problems, such as the Sediment and Erosion Control standards, the various flood plain restrictions, steep slope building restrictions, the Surface Water Quality Standards as amended and the Limitation of Liability for Public Recreation on Private Lands law.

Rendition of many stream problems occurs under the auspices of the laws governing the Conservation Districts and the county and city public works departments, which have legal authority and expertise to plan and contract for prevention of erosion, floodwater and sediment damages and, in the case of the Conservation Districts, "protection and promotion of the health, safety and general welfare of the people."

PERTINENT ENVIRONMENTAL IMPACT CODES

ARCHEOLOGICAL SITES

7 Del. C. Chapter 53

Pertains to archaeological sites and activities which are administered by the governor and the Department of State.

BUILDING SETBACK LINES

Zoning, 23 Code of the County of New Castle, §§23-51 23-54.

Building setback lines: Deals with the distance buildings are to be set back from the street according to the district they are in.

COASTAL ZONE ACT

7 Del. C. Chapter 70

Coastal Zone Act: Prohibits new heavy industry use and regulates new manufacturing use in a strip along the Delaware coast and the Chesapeake and Delaware Canal roughly 2 miles wide, bounded by the Delaware eastern boundary and an inland highway network.

DELAWARE RIVER BASIN COMPACT

7 Del. C. Chapter 65

Delaware River Basin Compact: Delaware, New Jersey, New York, Pennsylvania and the United States form the Delaware River Basin Commission (DRBC), with overall jurisdiction to encourage interstate comity, planning, conservation, utilization, development, management and control of the water resources of the basin.

DRAINAGE

Subdivisions, 20 Code of the County of New Castle, §20-62.

Drainage Code: Requires compliance with Chapter 6, (which is currently under revision), and requires utilization of natural stormwater recharge points.

EROSION CONTROL

7 Del. C. Chapter 40

Erosion and sediment control: Storm water, erosion and sediment control activities administered by DNREC, Conservation Districts and local governments.

25 Pa. C. Chapter 102

Erosion control: Provides protection against secondary polluting effects should they become imminent.

FISHING

7 Del. C. Chapter 9

Pertains to regulations and penalties for catching and taking of fish in the Delaware River and Delaware Bay between the states of Delaware and New Jersey.

7 Del. C. Chapter 11

Pertains to regulations and penalties for catching and taking of fish in waters other than the Delaware River and Delaware Bay.

FLOOD PLAINS

Zoning, 23 Code of the County of New Castle, §§23-103 23-114

Flood plains: Creates a flood plain overlay zone consisting of the floodway, flood fringe and general flood plain areas as defined by named authorities and shown on a flood boundary, floodway map and flood insurance rate map.

Zoning, 32 Code of the City of Newark, DE., §§32-92 32-96.

Special provisions for floodplains and land adjoining floodplains: Regulates the use of flood hazard areas of the Christina River and the White Clay Creek, prohibiting above ground construction in flood plains; provides for increased flow of flood water, protects water quality and encourages natural recharging of ground water supplies.

Newport, DE, Zoning Ord. 407

Floodway/floodplain: Adopts FEMA standards. It regulates activities in areas subject to flooding. Board of Adjustment (mayor, town solicitor, one other resident) reviews activity; allows utilities and electrical; presumption can be overcome by elevation data.

Zoning, 48 Wilmington City Code, §§48-431 48-436.

Flood plain: Overlay district placing restrictions on activities subject to flooding.

GRASS CONTROL

7 Del. C. Chapter 38

Giant reed grass control: *Phragmites australis* declared to be a public and common nuisance. Agreements, work and money to eradicate same, may be available from DNREC budget permitting.

HAZARDOUS WASTE

7 Del. C. Chapter 63

Gives jurisdiction of hazardous waste to DNREC.

7 Del. C. Chapter 91

Hazardous substance cleanups, (also see 30 Del. C. §§2902 (c) (3) and 2905 (b) (1): State Superfund Act funded by 6% gross receipts determined under §§2902 and 2905 from the sale of petroleum products (except for crude oil sold prior to 4/1/93) and from funds collected from responsible parties administered by DNREC.

JUNK YARDS

Zoning, 48 Wilmington City Code, §48-333.

Junk yards: Provides for amortization of certain uses, such as junk yards, located in certain waterfronts districts.

OPEN SPACE

Subdivisions, 20 Code of the County of New Castle, §20-63

Open Space: Requires open space for outdoor recreation, play space, trails, residential attractiveness, scenic landscape and vista conservation, protection of natural and sensitive site features such as steep slopes, stream banks, wetlands, flood plains, rare species, and mature woodlands.

Subdivisions, 27 Code of the City of Newark, DE., App.6 to Ch.. 27

Parks, playgrounds, recreation area requirements: Requires a percentage of land be reserved for recreation or open space purposes in single-family residential subdivisions of more than ten units or multifamily single lot subdivisions.

PERMIT DENIALS

7 Del. C. Chapter 79

Environmental permit applicant background statement: Provides authority for DNREC to deny permits to applicants considered irresponsible.

PLANNED UNIT DEVELOPMENT

Zoning, 23 Code of the County of New Castle, §§23-80

Planned unit development: May contain residential, recreational or institutional uses.

PLUMBING

Newport, DE, Plumbing Ord. 430

Plumbing: Discharge of sanitary sewage into storm sewer prohibited.

PRIVATE LANDS

7 Del. C. Chapter 59

Encourages land owners to make lands and water areas available to the public for recreational purposes by limiting the land owners liability toward persons entering onto the private property.

PUBLIC LANDS

7 Del. C. Chapter 45

Gives jurisdiction over public lands of Delaware to DNREC.

PROPERTY ACQUISITION

7 Del. C. Chapter 95

Real property acquisition: Provides procedures and policies for compensation to owners of land acquired by state, interstate or local agencies.

29 Del. C. Chapter 93

When property is acquired by an agency, any person displaced is entitled to reimbursement of losses and expenses.

PROTECTION / PRESERVATION

7 Del. C. Chapter 2

Tax checkoff funding to protect the habitat and natural areas with rare species or unusual scientific significance or unusually important to survival of species in their natural environments.

7 Del. C. Chapter 73

Natural areas preservation: Areas of unusual natural significance are to be registered as natural areas and acquired when possible as nature preserves. There is no eminent domain power.

7 Del. C. Chapter 75

Land protection: (also see 30 Del. C. Ch. 54), Provides for the preservation of open space by the state and its political subdivisions through the acquisition of interests or rights in real property or through donation and allows public funds to be used. Creates the Delaware Open Space Council to advise on priorities by a fair non-political process. Associated with this is the provision of money from the transfer tax in 30 Del. C. Ch. 54 of the Delaware Code. This is administered by DNREC.

7 Del. C. Chapter 69

Conservation and preservation easements: Provides for acceptance, enforcement and conveyance of such easements by government agencies or charitable corporations or trusts.

Subdivisions, 20 Code of the County of New Castle, §20-14

Critical natural areas: Preserves selected critical natural site classes and coordinates with state natural areas.

POLLUTION

7 Del. C. Chapter 60

Controls air, water and solid waste pollution by setting requirements for permits, enforcement and administration by DNREC for these and other environmental subjects.

7 Del. C. Chapter 62

Prohibits and enforces oil pollution; jurisdiction is in DNREC.

7 Del. C. Chapter 78

Waste minimization/pollution prevention: Provides technical assistance to industries and locations; provides that waste should be, in order of priority, reduced at its source, recovered, reused, recycled, treated or disposed of safely. Has responsibilities for developing recycling programs (primary responsibility for recycling is with the Delaware Solid Waste Authority, 7 Del. C. §§6450-6460). Administered by DNREC.

RECYCLING

7 Del. C. Chapter 78

Waste minimization/pollution prevention: Provides technical assistance to industries and locations; provides that waste should be, in order of priority, reduced at its source, recovered, reused, recycled, treated or disposed of safely. Has responsibilities for developing recycling programs (primary responsibility for recycling is with the Delaware Solid Waste Authority, 7 Del. C. §§6450-6460). Administered by DNREC.

SEDIMENT CONTROL

7 Del. C. Chapter 40

Erosion and sediment control: Storm water, erosion and sediment control activities administered by DNREC, Conservation Districts and local governments.

STEEP SLOPES

Zoning, 23 Code of the County of New Castle, §§23-115 23-123

Steep slopes: An overlay district that prohibits building on slopes steeper than 25%; establishes areas of precautionary slope areas between 15-25%.

SUBAQUEOUS LANDS

7 Del. C. Chapter 72

Subaqueous lands: Provides for administering and leasing public subaqueous lands and regulating private subaqueous lands. All activity is regulated and enforced. Non-commercial projects administered by DNREC; commercial projects on state land administered by DNREC and the governor.

SUBDIVISION REGULATIONS

Subdivisions, 20 Code of the County of New Castle, §20-10.

Compliance with subdivision regulations required for recording deeds: Deals with constructing improvements, selling land, c. prior to approval.

TRANSPORTATION

Subdivisions, 20 Code of the County of New Castle, §§20-21 20-30.

Transportation analysis of major subdivision and major land development plans: Deals with exploratory sketches and reviews; preliminary traffic analysis, preliminary major plan submissions, reviews and final revisions.

UNDERGROUND STORAGE TANKS

7 Del. C. Chapter 74

Underground storage tanks: Pertains to protecting ground water from leaks by providing stringent controls for installing, operating and abandoning tanks.

WASTE DISPOSAL

Zoning, 23 Code of the County of New Castle, §23-11

Waste disposal facilities: Provisions concerning refuse dumps, clean fill, and dry waste areas.

WATER CONSERVATION DISTRICTS

7 Del. C. Chapter 39

Soil and water conservation districts: each county has an organization for furthering the conservation, protection, development and utilization of land and water resources. Includes impoundment, prevention of erosion, floodwater and sediment damages, providing recreation development, protection and promotion of the health, safety and general welfare of the people. They work with DNREC, Department of Agriculture and other groups.

WATER RESOURCES PROTECTION

Zoning, 32 Code of the City of Newark, DE., §§32-92 32-96.

Special provisions for floodplains and land adjoining floodplains: Regulates the use of flood hazard areas of the Christina River and the White Clay Creek, prohibiting above ground construction in flood plains; provides for increased flow of flood water, protects water quality and encourages natural recharging of ground water supplies.

Clean Streams = 35 Pa. State. Ann. § 691 et seq.

This law is enforced to preserve and improve the purity of the waters of the Commonwealth for the protection of people, animals, aquatic life, recreation and industrial consumption.

Storm = 32 Pa. Stat. Ann. , § 680.1 et seq.

(As Amended by Act 63). This Act is to encourage planning and management of storm water runoff in each watershed which is consistent with sound water and land use practices.

WETLANDS

7 Del. C. Chapter 66

Protects coastal wetlands from despoliation and destruction. These wetlands include land (below 2 feet, above local mean high water that will grow certain vegetation) that is subject to tidal action along the bays, Delaware River, coastal inland waterways or along an inlet, estuary or tributary waterway.

Subdivisions, 20 Code of the County of New Castle, §20-13

Wetlands: Adds delineation and protection of wetlands to review of subdivision and land development plans.

ZONING

Zoning, 23 Code of the County of New Castle, §§23-90

Historic review: Incorporates the Historic Review Board into the rezoning process.

Zoning, 48 Wilmington City Code, §48-40.1.

Waterfront district: Designates in-town waterfront zoning districts along the Christina River and Brandywine Creek and creates a process to review development proposals. Encourages appropriate development while creating standards for such development.

APPENDIX E

Task Force Resolutions

RESOLUTION

CHRISTINA RIVER CLEAN-UP DAY

RESOLVED, that the Task Force on the Future of the Brandywine and Christina Rivers requests that the Mayors of the City of Wilmington, City of Newark and Town of Newport proclaim April 24, 1993 as CHRISTINA RIVER CLEAN-UP DAY. Only by the cooperative effort of all jurisdictions, business and industry, as well as many citizen volunteers, will the water and scenic quality of the Christina be improved.

Approved by unanimous vote of the Executive Committee on March 29, 1993.

RESOLUTION

CHRISTINA RIVER LAND ACQUISITION

RESOLVED, that due to the limited availability of land that could be acquired for the provision of recreational and related uses along the Christina; and considering the public investment already made by the City of Wilmington and the State, especially along the East 7th Street peninsula, the Task Force on the Future of the Brandywine and Christina Rivers urges the State, County and City of Wilmington to work together to acquire new lands, whether vacant or built upon, and to establish as the highest priority the area of the East 7th Street peninsula extending to the Dravo shipyard site.

Approved by unanimous vote of the Executive Committee on March 29, 1993.

RESOLUTION

SUPPORT FOR INTER-STATE COOPERATION

WHEREAS, the Water and Stream Bank Quality and Water Supply Committee has submitted its "Interim Report of Activities" (April 4, 1993), which emphasizes the interstate nature of addressing issues involving water quality and water supply;

AND WHEREAS, it is recognized that a multi-agency approach to problem solving has already been established;

AND WHEREAS, the committee feels that its deliberations, as well as those of the Task Force, would be best served by endorsing the official involvement and participation of all relevant public agencies;

NOW THEREFORE BE IT RESOLVED, that the Task Force on the Future of the Brandywine and Christina Rivers requests the participation of representatives of all appropriate agencies in support of inter-agency technical meetings relative to the Brandywine Creek and the Christina River. Specifically, it is requested that the City of Wilmington and the Water Resources Agency of New Castle County be asked to begin immediately to participate in the technical committee guiding the preliminary study of the Brandywine Creek Sub-basin;

AND, BE IT FURTHER RESOLVED, that the Committee on Water and Stream Bank Quality and Water Supply include as technical advisors representatives from the following agencies:

- ◆ Delaware River Basin Commission (DRBC)
- ◆ Chester County Water Resources Authority
- ◆ Pennsylvania Department of Environmental Resources (PaDER)

Unanimously approved by the Task Force on April 12, 1993.

RESOLUTION

SUPPORT FOR BASIN-WIDE APPROACH TO PLANNING

WHEREAS, government's responsibility to protect the waterways in the State of Delaware will require an effort by many jurisdictions working together, including the Delaware Department of Natural Resources and Environmental Control, Pennsylvania and Maryland counterpart agencies and the U.S. Environmental Protection Agency;

AND WHEREAS, the Christina River watershed encompasses a land area in the states of Maryland, Pennsylvania and Delaware;

AND WHEREAS, the origination and identification of sources or points of pollution are manifest on a regional and basin-wide level, and have been identified to be of interest and concern to the Delaware River Basin Commission;

AND WHEREAS, the Brandywine Creek and the Christina River are two significant waterways in the State of Delaware that should be evaluated, monitored and improved on a regional basis if significant or measurable environmental improvement is to be achieved;

NOW THEREFORE, BE IT RESOLVED, that the Task Force on the Future of the Brandywine and Christina Rivers strongly endorses the basin-wide approach to environmental planning and specifically recommends that the Secretary of the Delaware Department of Natural Resources and Environmental Control promote the Christina River basin in its entirety for any future planning for environmental improvement.

Unanimously approved by the Task Force on June 7, 1993.

APPENDIX F

Combined Sewer Overflow Systems

Combined sewer overflows (CSOs) are discrete points within Wilmington's combined sewage pipe system that are specifically designed to allow storm water mixed with some sewage to be discharged directly into a nearby stream or river during rain storms when combined sewage flows exceed the hydraulic capacity of the sewer system.

Constructing CSOs to relieve over-burdened sewage facilities was an accepted practice in the 1940s when the city updated its sewage disposal system to address the growing need for public sewers and wastewater treatment facilities to service its increasing population. At that time, the city's sewers were a combined system designed to handle both storm runoff and sanitary sewage in one system of pipes. Rather than separating the storm water and sanitary systems, the treatment facilities were designed to accommodate three to five times the dry weather base flow. Any combined sewage flows exceeding that amount would be allowed to bypass the treatment works and be discharged directly to the receiving waters. Such overflows would be mostly storm water or very dilute sewage and be discharged to receiving waters swollen with additional storm runoff which would provide dilution.

Today the dry weather base sanitary flow averages 70-75 million gallons per day (MGD). The system as a unit overflows on the average 42 times out of 103 wet weather episodes a year. These episodes equate to about 710 million gallons (2180 acre feet) of overflow annually. The increased frequency of overflows is caused in part by a higher population density, more impervious surfaces, development and a sanitary system that is too small to accommodate these increases.

Two possible ways of totally eliminating CSOs are:

- ◆ to enlarge the existing system in order to treat the entire combined flow during all reasonable rain events, short of a hurricane and the hundred year flood; or
- ◆ to separate all stormwater and sewage into two systems.

Either of these options will cost the city \$200-400 million to accomplish.

The National Pollutant Discharge Elimination System (NPDES) is a permitting program administered by the Department of Natural Resources and Environmental Control (DNREC) and authorized by the federal Clean Water Act (CWA). Any point source discharge of a pollutant,

(e.g., industrial wastewater, effluent from a municipal sewage treatment works, contaminated stormwater) is required to be covered by an NPDES permit. In accordance with EPA's strategy for controlling CSOs, dischargers that have CSOs, including the City of Wilmington, must comply with a three-fold strategy:

1. Any point source discharge of a pollutant must be eliminated during all but wet weather episodes.
2. All wet weather CSO discharges must be brought into compliance with the technology-based requirements of the CWA.
3. Efforts must be made to minimize water quality, aquatic biota and human health impacts from overflows.

To do this permittees must accurately characterize their CSO discharges, demonstrate implementation of nine minimum controls and develop a long-term control plan. The programs should be reviewed and modified to be consistent with the environmental sensitivity of the area and financial capabilities of the permittee.

The nine controls are:

1. Proper operation and regular maintenance programs for the sewer system and the combined sewer overflow points.
2. Maximum use of the collection system for storage.
3. Review and modification of pretreatment programs to assure that CSO impacts are minimized.
4. Maximization of flow to the publicly-owned treatment works (POTW).
5. Prohibition of CSO discharges during dry weather.
6. Control of solid and floatable materials in CSO discharges.
7. Pollution prevention programs that focus on contaminant reduction activities.
8. Public notification to ensure that the public is informed of CSO occurrences and CSO impacts.
9. Monitoring to effectively characterize CSO impacts and efficiency of CSO controls.

During the past 15 years, the city has made an effort to minimize the frequency and impact of its CSOs. Significant resources have been invested to eliminate connectors between the city and county collection systems by pumping the county's wastewater directly to the treatment plant rather than going through the city's combined sewage system, thus decreasing the volume of flow in the city system and cutting down on the number of overflows.

As a condition of its NPDES permit, the City of Wilmington was required to develop a Combined Sewer Operating Plan (CSOP) by November 1993, (which it has), designed to identify, characterize and minimize the discharge of pollutants from overflow points. The operating plan includes an evaluation of the feasibility and cost of eliminating overflows.

In an effort to reduce the number of overflows, the City of Wilmington has begun a \$30 million construction project to expand its treatment facilities. These improvements will increase the existing primary waste treatment from 200 million gallons per day (MGD) to 350 MGD and increase secondary treatment from 125 MGD to 168 MGD. These improvements will decrease the occurrence of overflows, on average, by 56 percent city-wide.

At present there are a total of 40 CSO outlets in the Wilmington area; 21 are located on Brandywine Creek, 15 are on the Christina River and four others are on tributaries. The CSO location map is in Appendix F.

Although all CSOs must be addressed, numbers 27-29 and 30 are of primary concern to DNREC, because they are discharging into the upper reaches of small tributaries and have been the source of numerous complaints. CSOs 27, 28, and 29 are located on Silverbrook Run between Lancaster and Maryland Avenues; 30 is located on the Christina River at Beech Street. The Silverbrook, Clements and Shipley Run service areas, which contain 27-30, comprise 30 percent of the total combined sewer area in the city.

The Silverbrook Run interceptor cannot handle the combined sewer flows from the area, causing 27-29 to overflow often. Similarly, capacity in the interceptor downstream of CSO 30 is not large enough to contain the large volumes of combined sewage coming in from the Shipley and Clements Run interceptors. Therefore, each of these four locations will overflow 30 - 40 times a year depending on:

1. the amount of rain fall;
2. intensity of the storm;
3. time of day (whether there is a lot of sewage in the system at the time of the storm).

CSOs 27 and 28 empty into a Silverbrook Run next to Cathedral cemetery and CSO 29 empties into a tributary of Little Mill Creek in Canby Park, a county-owned facility, frequently causing odor and debris problems. CSO 30 is a pipe 20 feet wide by 8 feet tall. This is a major visual detraction to people using the river and causes hazardous conditions for the Wilmington Rowing Club.

The CSOP draft completed in November 1993 discussed options for ensuring primary treatment of CSO waters, including:

- ◆ a satellite treatment facility located in the area to provide the necessary processing;
- ◆ temporarily containing excess water until flow rates downstream and in the POTW can handle the extra combined sewage and stormwater.

In addition to primary treatment alternatives, preliminary treatment measures also were investigated.

FUTURE ACTION

Before deciding on any one plan, further sampling of discharge and receiving waters is recommended, as well as modeling of receiving waters.

(All data in this appendix was obtained from the "City of Wilmington Combined Sewer Operating Plan," November 6, 1993).

APPENDIX G

Legal, Technical and Political Dynamics of Brandywine Creek

Brandywine Creek is the sole source of water for the City of Wilmington. Its Watershed consists of 314 square miles which, through surface runoff and other natural processes, contribute an annual mean flow of about 260 million-gallons-per-day (MGD) to the lower reaches of the stream flow. The stream's principal tributaries, its east and west branches, join in the vicinity of Downingtown, PA.

Typically, daily stream flow will range between 450 MGD and 80 MGD. During 1992, the highest and lowest recorded flows were 2,240 MGD and 56 MGD, respectively. Record extremes are 18,700 MGD (1972) and 19 MGD (1948, due to ice effect).

The regional regulatory authority for the Brandywine is the Delaware River Basin Commission (DRBC), which works in conjunction with the U.S. Environmental Protection Agency, the Army Corps of Engineers and local regulatory agencies to control the use and quality of the stream's waters. The governors of New York, Pennsylvania, New Jersey and Delaware are represented on the commission, along with a federal government representative.

The DRBC was created more than 50 years ago by the U.S. Congress, with the support of forward-thinking leaders of the states involved. It is considered the final authority on Delaware River basin matters; as with most regulatory agencies, DRBC decisions can be challenged.

A major DRBC determination regarding the Brandywine, generally known as the "Marsh Creek Decision," was rendered in the early 1960s. This came about when the Chester County Water Authority proposed to build a dam on the Brandywine's east branch which would impound a 5.2 billion gallon reservoir. The reservoir was to be a multi-purpose water supply and flood control facility.

This proposal was vigorously opposed by Wilmington. It was considered a threat to the city's "historic rights" to the waters of the Brandywine. There followed long and, at times, contentious hearings before the DRBC. Ultimately, "historic rights" gave way to the principal of "equitable apportionment." Essentially, the DRBC decided that the Chester County Water Authority could build the Marsh Creek Dam with the proviso that when the Brandywine Creek flow measured at Chadds Ford fell to 90 MGD, the authority must stop impounding water and let the natural stream flow, however small, pass through the dam. The Chester County Water Authority is under no obligation to augment the stream flow from its reservoir. A new water supply/flood control dam is under construction on the west branch, its reservoir capacity is reportedly about 0.7 billion gallons.

During the 1970s, the DRBC took a step toward allocation of the basin's waters by issuing Certificates of Entitlement to water users. These were based on the capability to properly handle a volume of water with facilities that existed before a certain cut-off date. Use of more than the "entitlement" volume would result in a fee to DRBC. Similar fees are imposed for water transferred from one service area to another, as in the case of Wilmington's sale of water to Artesian and Wilmington Suburban water companies. Wilmington received a Certificate of Entitlement to withdraw up to 62 MGD from the Brandywine. This is based on the city's capability to handle that volume of water with facilities that existed before the cut-off date mentioned earlier. The city has additional capability.

Typically, Wilmington will produce about 30 MGD for its 32,000 accounts (2/3 city - 1/3 county). This rate may increase to 40 MGD during the summer. Through a series of system inter-connections with county suppliers, about 10 MGD of finished water can be transferred to the county. In addition, the city has the capability to release up to 10 MGD of raw water from Hoopes Reservoir to the Red Clay Creek for augmentation purposes during emergencies.

The value of the numerous inter-connections between water suppliers was demonstrated within the past few years when a supplier encountered difficult times. Other suppliers were able to assist in meeting basic demands. Thus, over the past 20 years, the hard-nose attitude of: "I've got mine, too bad for you," has been replaced with a more cooperative working relationship, not only in Delaware, but in Pennsylvania, where lines of communication have been opened.

Those well-versed in law suggest that the provisions of the Marsh Creek Decision and the Certificate of Entitlement are not cast in stone. They can be re-visited by the DRBC. But probably not without serious and vigorous litigation.

Our upstream neighbors are facing everincreasing demands for water and wastewater disposal means. Some question the 90 MGD "trigger" of the Marsh Creek Decision as well as the 62 MGD "entitlement" for Wilmington. They also point to what they perceive as unrestrained development in New Castle County. One could ask the same questions of them. Recent water conservation efforts, leak detection programs and denial of building permits until adequate infra-structure is available are proper responses to those concerns.

To date, the considerations about streamflows and water use of the Brandywine have been limited to quantities of water. Wastewater discharges have quality and quantity constraints. With increasingly more restrictive federal water quality regulations, total stream quality becomes a major issue.

There are, at last count, 23 sewage treatment plants with permits allowing 18 MGD treated wastewater to be discharged into the Brandywine or its tributaries in Pennsylvania. An additional 13 permits have been issued for six MGD cooling water discharge. Delaware has issued three

sewage treatment plant discharge permits for 0.029 MGD and two cooling water discharge permits for 0.1 MGD into the Brandywine. Stream quality is constantly monitored by regulatory agencies and Wilmington.

It should be noted that all streams have a natural tendency to recover from contaminant loadings, within limits, depending on a variety of hydraulic factors, water volume contaminant levels and time of flow, to name a few. Dispersion and re-oxygenation are factors in stream recovery.

Under current federal and state water quality regulations, chemical and biological loadings are manageable for Wilmington's water treatment system. However, total trihalomethane (THM) levels have been creeping upward toward the EPA threshold limit of 100 parts-per-billion, as measured at our state line. This threshold is due to be lowered by the EPA. THM results from chlorine contact with organic matter. Natural stream vegetation, run-off and wastewater treatment plant effluent are principal sources. Typically, efficient wastewater treatment plants remove about 95 percent of contaminants.

This is not to suggest that Pennsylvania wastewater treatment plants are not doing their job. All reports indicate that they are working effectively. Yet, there are increasing demands on the stream for consumption and treated wastewater discharge purposes. There is an obvious concern when stream flow is low and concentrations of impurities are greater. Short-term spills or accidents can be managed through the use of Hoopes Reservoir, as is done now. Hoopes was built, and serves, as a short-term emergency supply source. Practically all of the water in the Hoopes Reservoir is pumped from the Brandywine. Thus, even with Hoopes, the question becomes one of the quality of the water in the Brandywine. It is important to note that the water produced by the City of Wilmington meets or exceeds all quality requirements.

Wilmington is investigating treatment alternatives to deal with THM levels. It is an economic fact of life that the costs to remove even trace exotic elements and compounds from drinking water supplies rise exponentially as compared to those associated with primary and secondary treatment.

The preceding is a capsule view of the legal, technical and political dynamics related to the Brandywine Creek. Since the Brandywine drainage basin is substantially located upstream in Pennsylvania, we are largely dependent upon that state for the quality of the stream's water. Any effort to maintain or improve the Brandywine must involve appropriate agencies in Pennsylvania. We are at a crossroads with respect to the Brandywine. We can choose to work cooperatively in managing this valuable and important resource, which would involve the resources and talents available to both states, possibly through a sub-basin commission, or we can dig in our heels and pursue an adversarial course, issue by issue. The former may be too idealistic to expect. The latter will most certainly require the expenditure of considerable time and effort in further sub-dividing a fragile resource.

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- B) Browntown/Hedgeville
- C) Delaware Avenue
- D) Eastside
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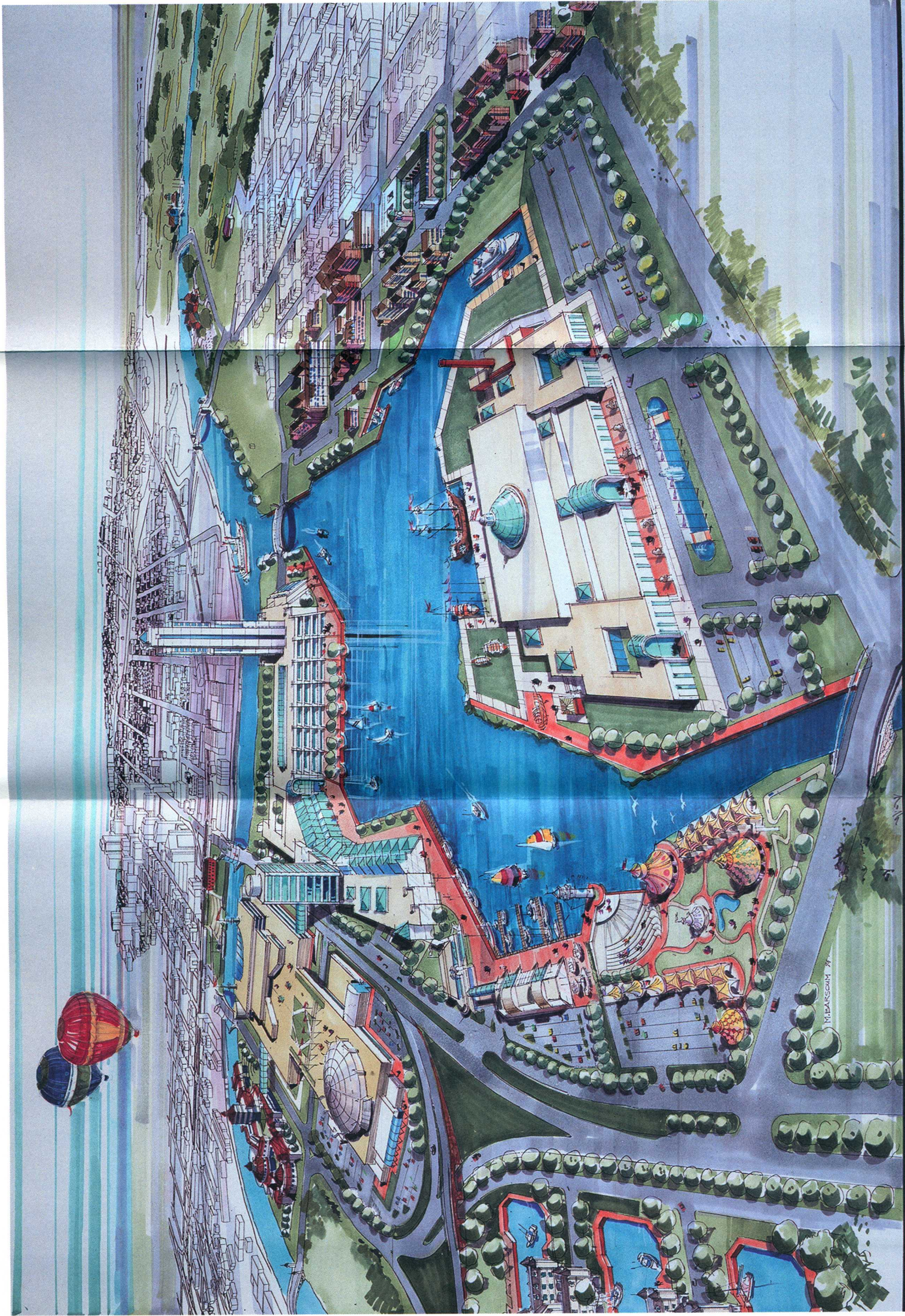
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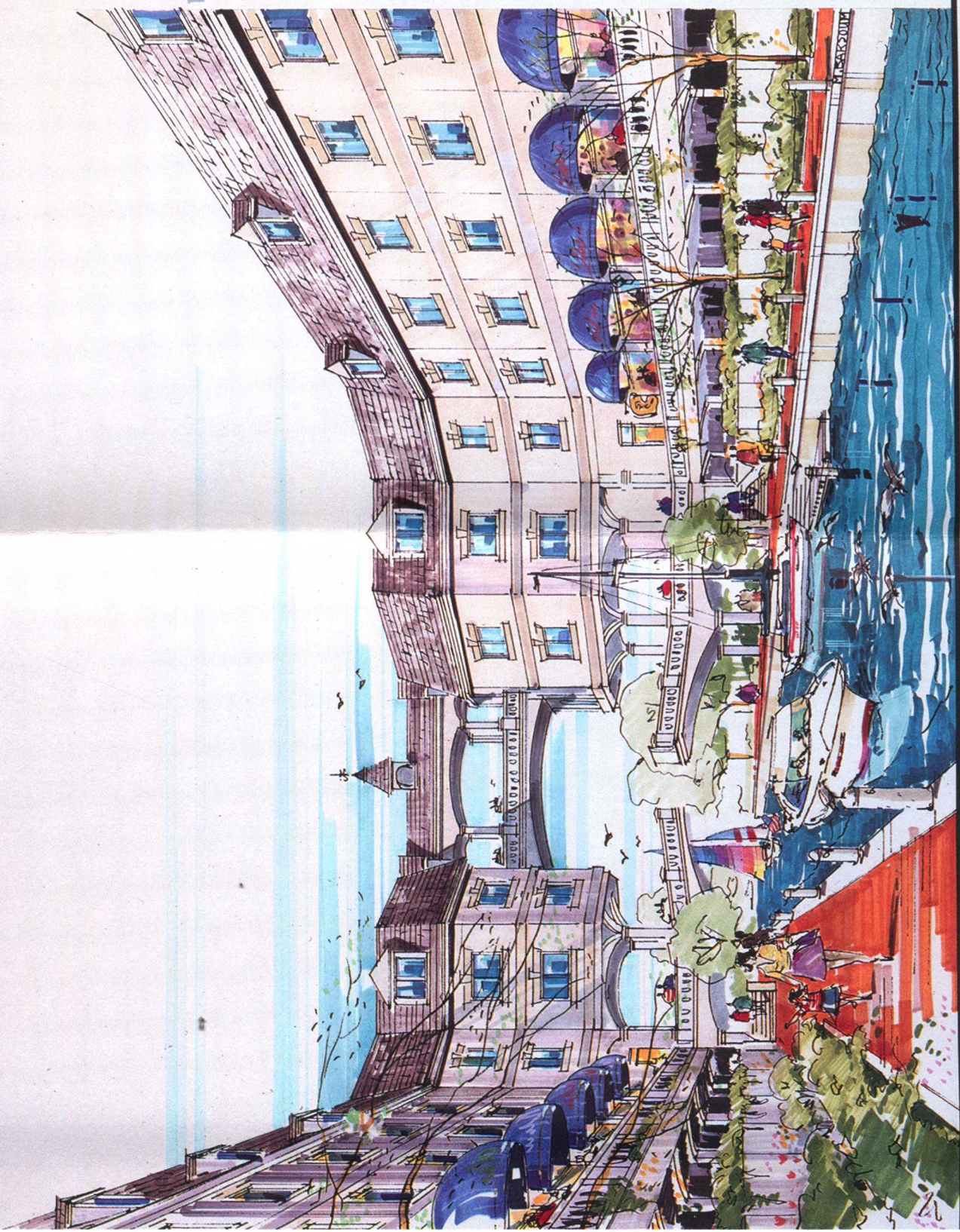


DELANE ARCHITECTS WATERFRONT DESIGN TEAM
FOR THE
GOVERNOR'S TASK FORCE ON THE FUTURE OF
THE BRANDYWINE AND CHRISTINA RIVERS

BRANDYWINE & CHRISTINA RIVERS

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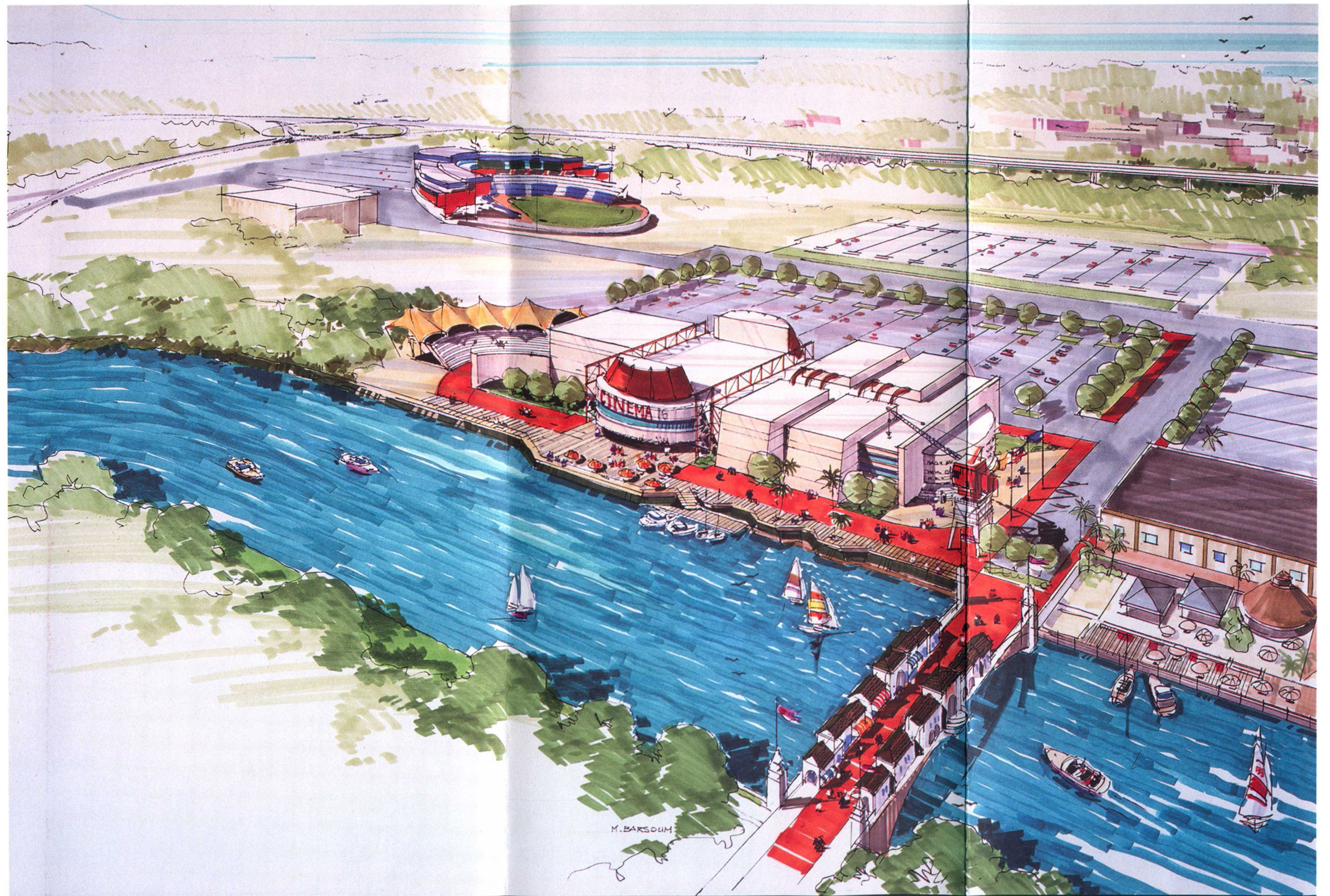
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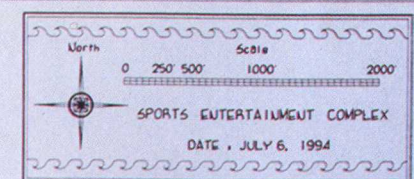
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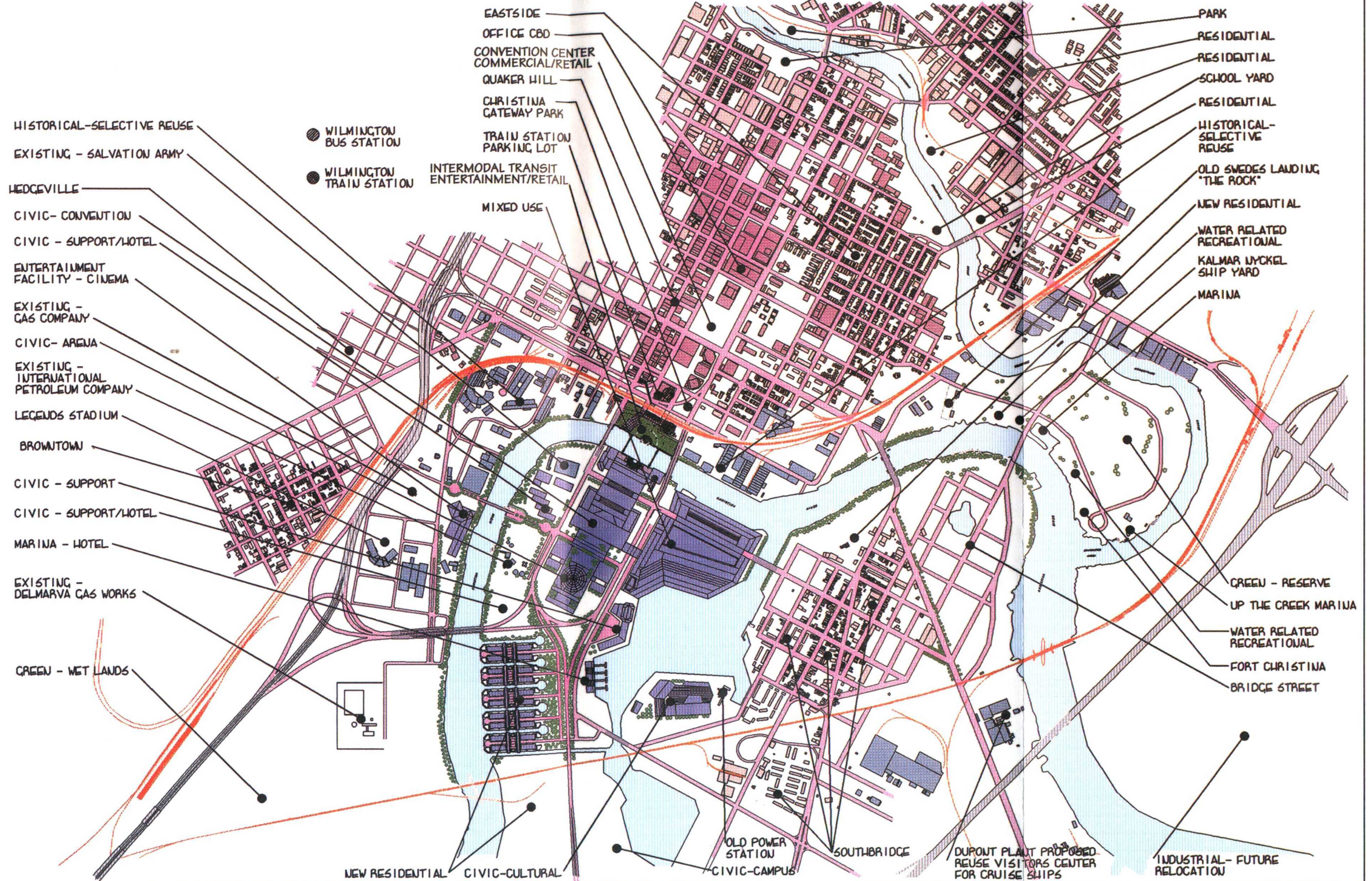
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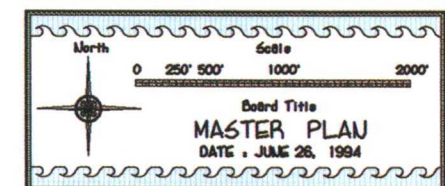
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BRANDYWINE & CHRISTINA RIVERS

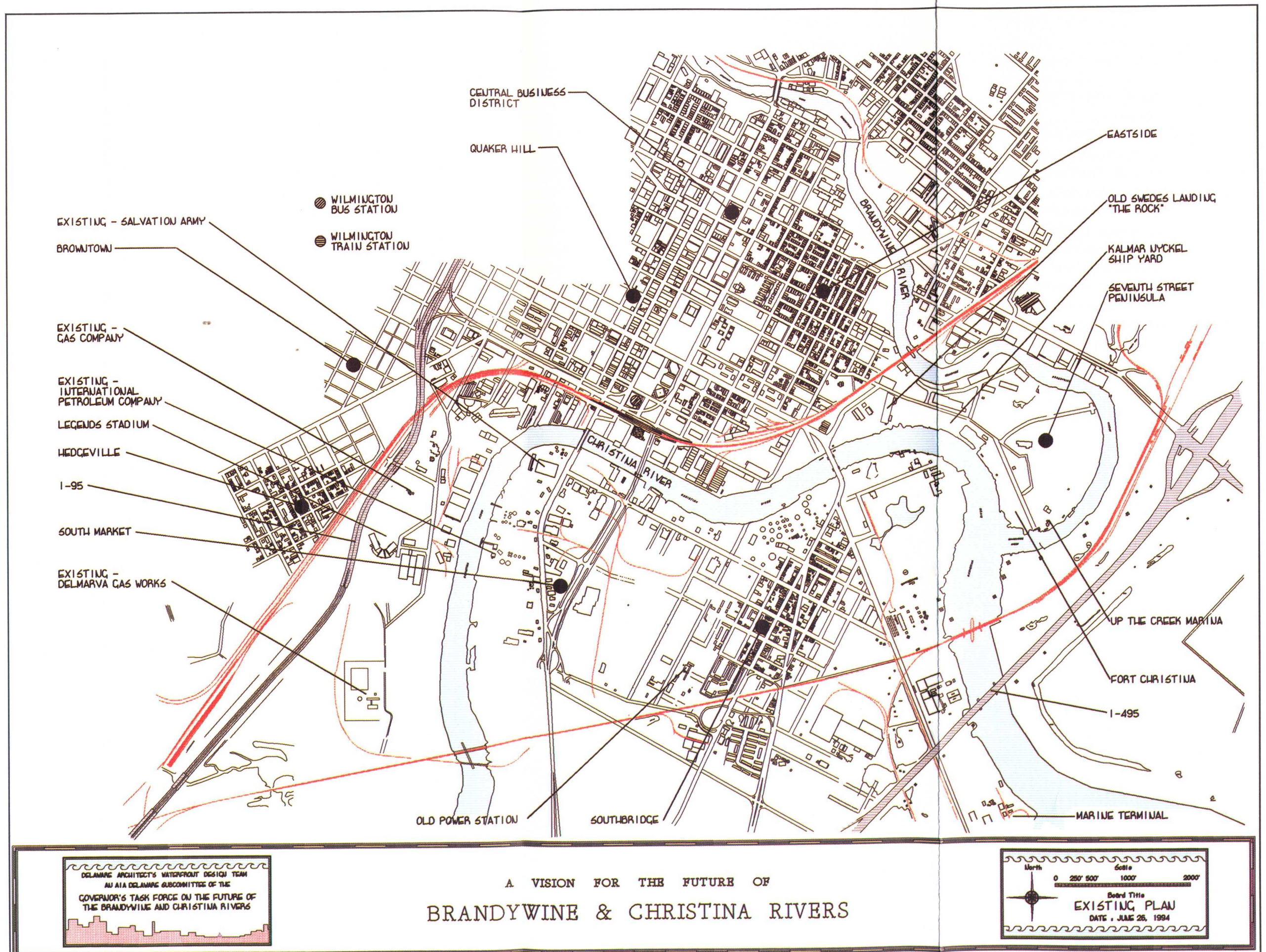




DELAWARE ARCHITECT'S WATERFRONT DESIGN TEAM
AN AIA DELAWARE SUBCOMMITTEE OF THE
GOVERNOR'S TASK FORCE ON THE FUTURE OF
THE BRANDYWINE AND CHRISTINA RIVERS

A VISION FOR THE FUTURE OF BRANDYWINE & CHRISTINA RIVERS







M. BARSOUD

DELAWARE ARCHITECT'S WATERFRONT DESIGN TEAM
FOR THE
GOVERNOR'S TASK FORCE ON THE FUTURE OF
THE BRANDYWINE AND CHRISTINA RIVERS

A VISION FOR THE FUTURE OF BRANDYWINE & CHRISTINA RIVERS

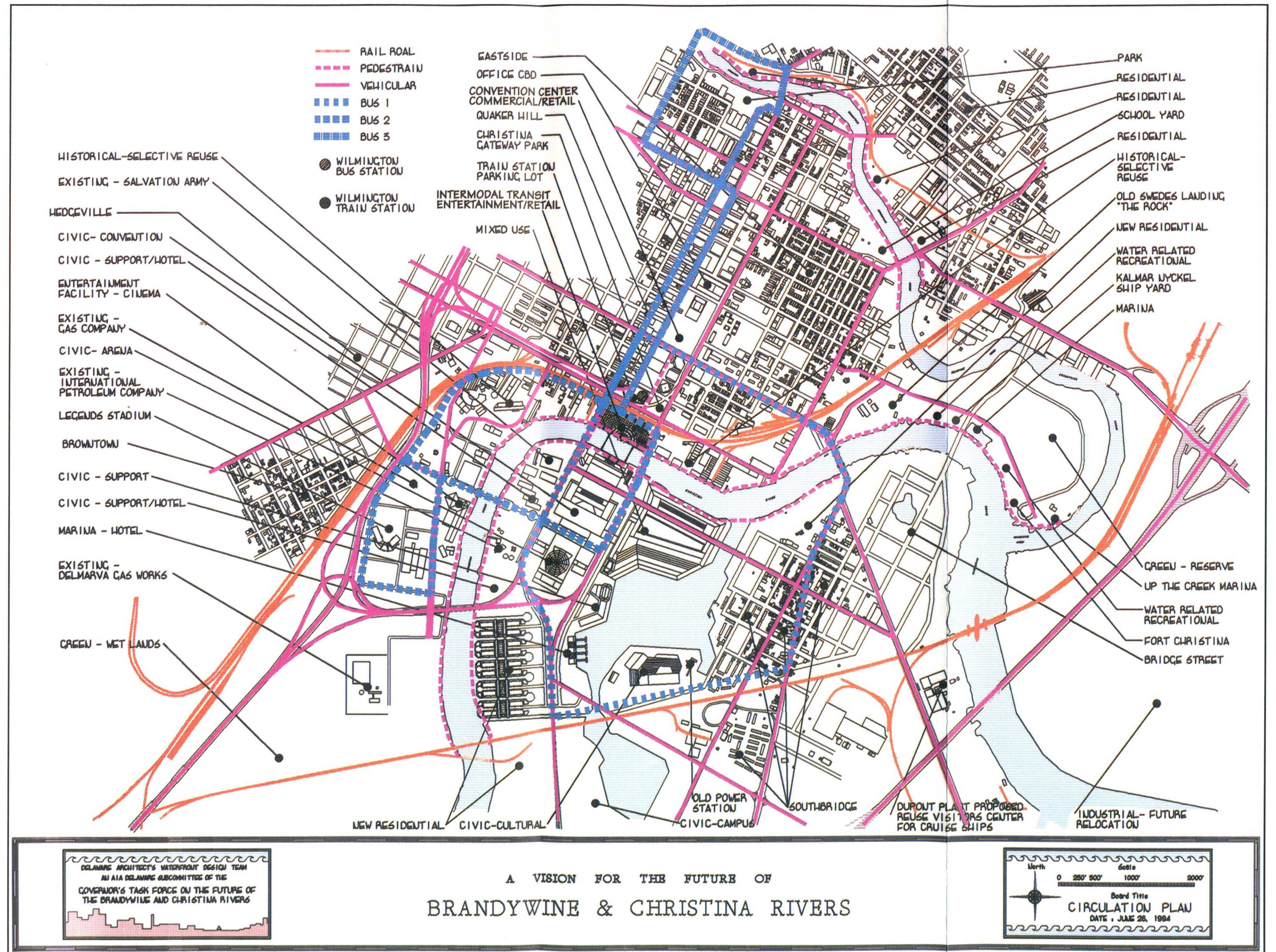
North

Scale







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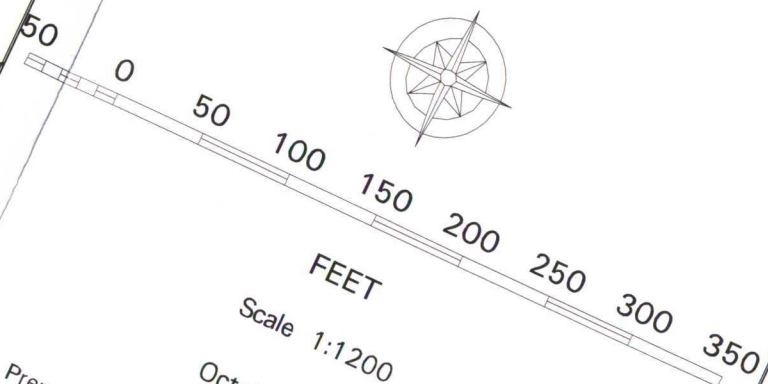
WILMINGTON WILDLIFE REFUGE

DATE: JULY 6, 1994

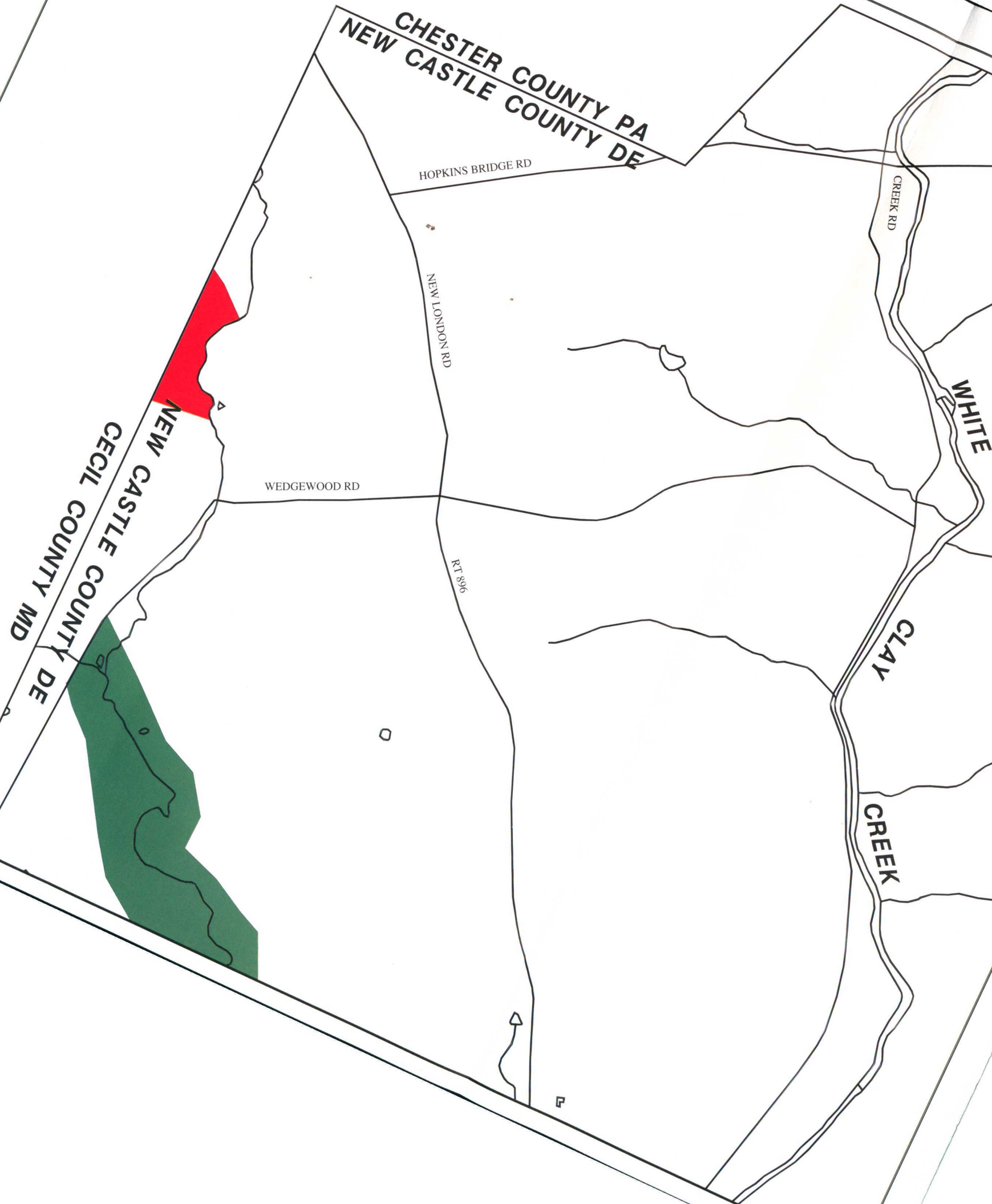


Map 12
Public Acquisition and Use
Upper Christina River

-  Protected
-  Recommended for Acquisition or Easement
-  Private Protection Anticipated
-  Major Institutional and/or Private Lands
-  Open Water
-  Public Access



Scale 1:1200
October, 1994
Prepared for the Governor's Task Force on the
Future of the Brandywine and Christina Rivers
and by the Department of Natural Resources
and Environmental Control and the Water
Resources Agency for New Castle County.



Public Acquisition and Use

North Newark

- Protected
- Recommended for Acquisition or Easement
- Private Protection Anticipated
- Major Institutional and/or Private Lands
- Open Water
- Public Access



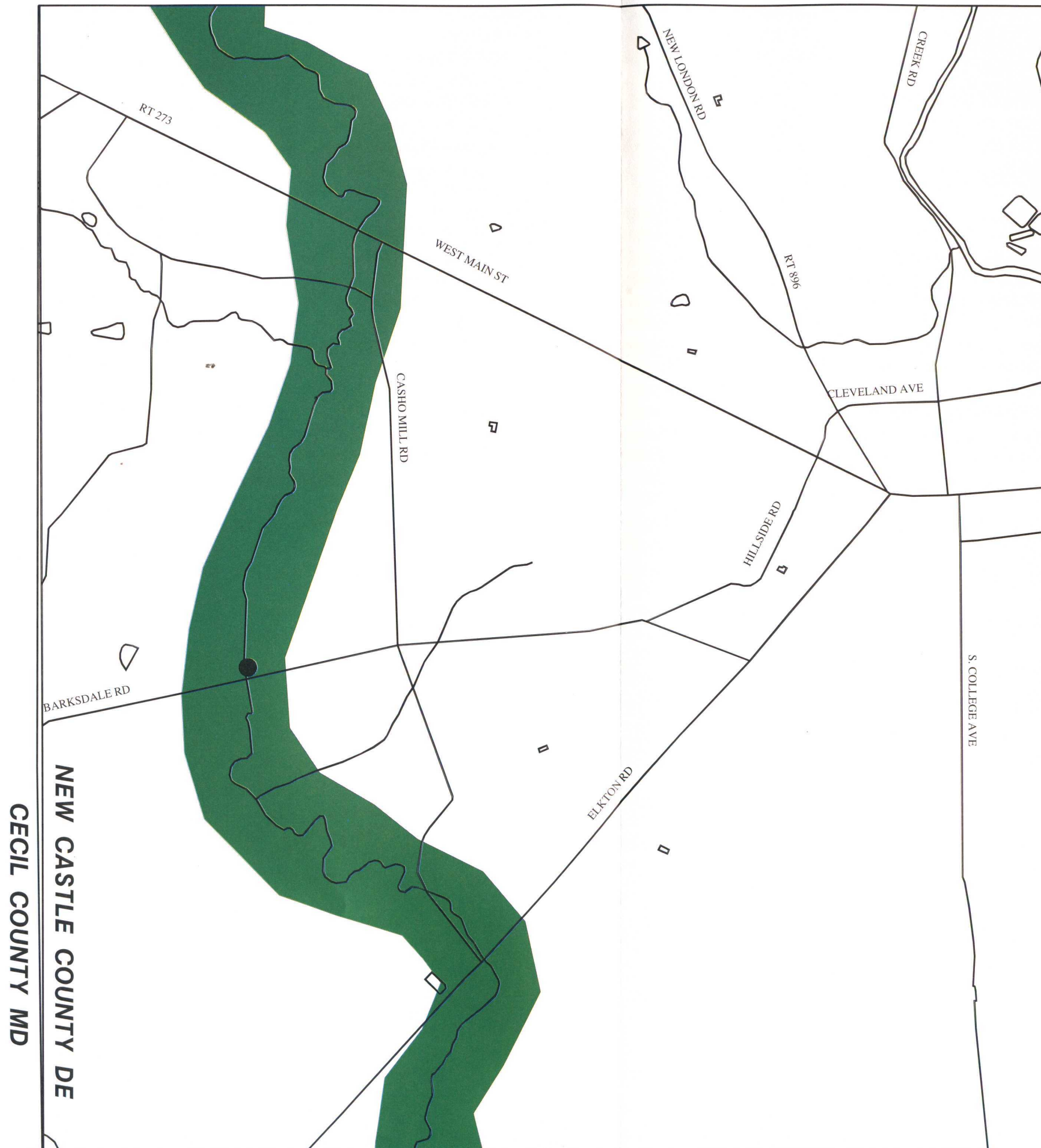
FEET

Scale 1:1200

October, 1994

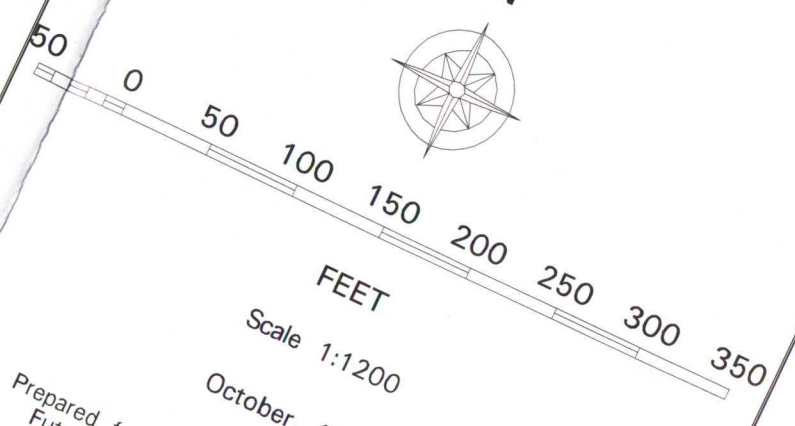
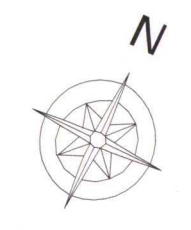
Prepared for the Governor's Task Force on the Future of the Brandywine and Christina Rivers.

Prepared by the Department of Natural Resources and Environmental Control and the Water Resources Agency for New Castle County.

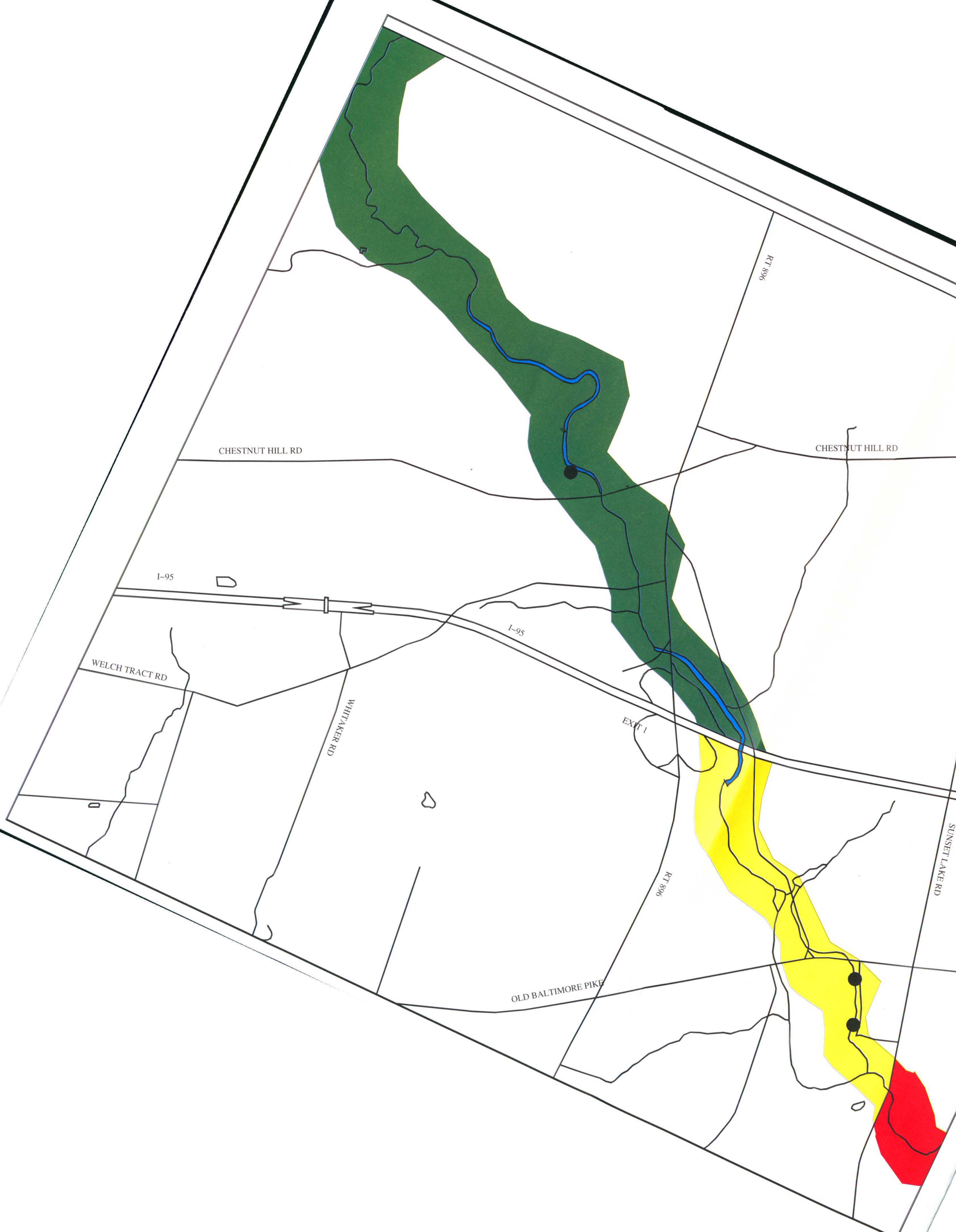


Map 10
Public Acquisition and Use
South Newark

- Protected
- Recommended for Acquisition or Easement
- Private Protection Anticipated
- Major Institutional and/or Private Lands
- Open Water
- Public Access



Prepared for the Governor's Task Force on the Future of the Brandywine and Christina Rivers
and Environmental Control and the Water Resources Agency for New Castle County.



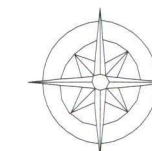
Map 9

Public Acquisition and Use

Salem Church Road Area

- Protected
- Recommended for Acquisition or Easement
- Private Protection Anticipated
- Major Institutional and/or Private Lands
- Open Water
- Public Access

N



50 0 50 100 150 200 250 300 350

FEET

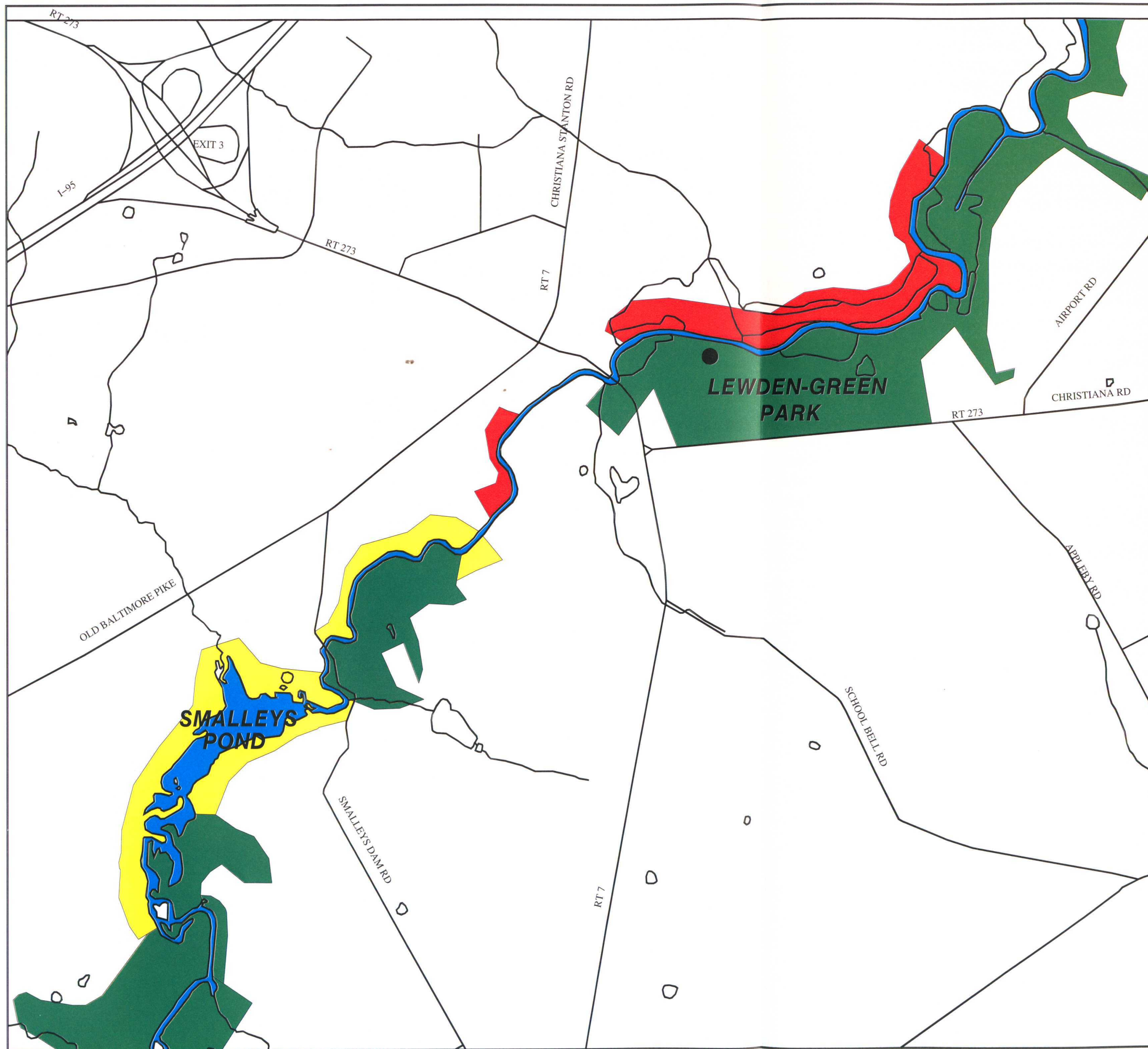
Scale 1:1200

October, 1994

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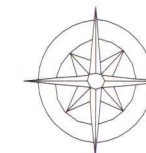


Map 8

Public Acquisition and Use *Smalleys Pond /* **Lewden-Green Park**

- Protected
- Recommended for Acquisition or Easement
- Private Protection Anticipated
- Major Institutional and/or Private Lands
- Open Water
- Public Access

N



50 0 50 100 150 200 250 300 350

FEET

Scale 1:1200

October, 1994

Prepared for the Governor's Task Force on the Future of the Brandywine and Christina Rivers.

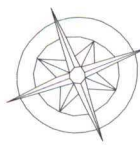
Prepared by the Department of Natural Resources and Environmental Control and the Water Resources Agency for New Castle County.



Public Acquisition and Use Churchmans Marsh

Map 7

- Protected for Acquisition or Easement
- Recommended for Acquisition or Easement
- Private Institutional Anticipated
- Major Institutional and/or Private Lands
- Open Water
- Public Access

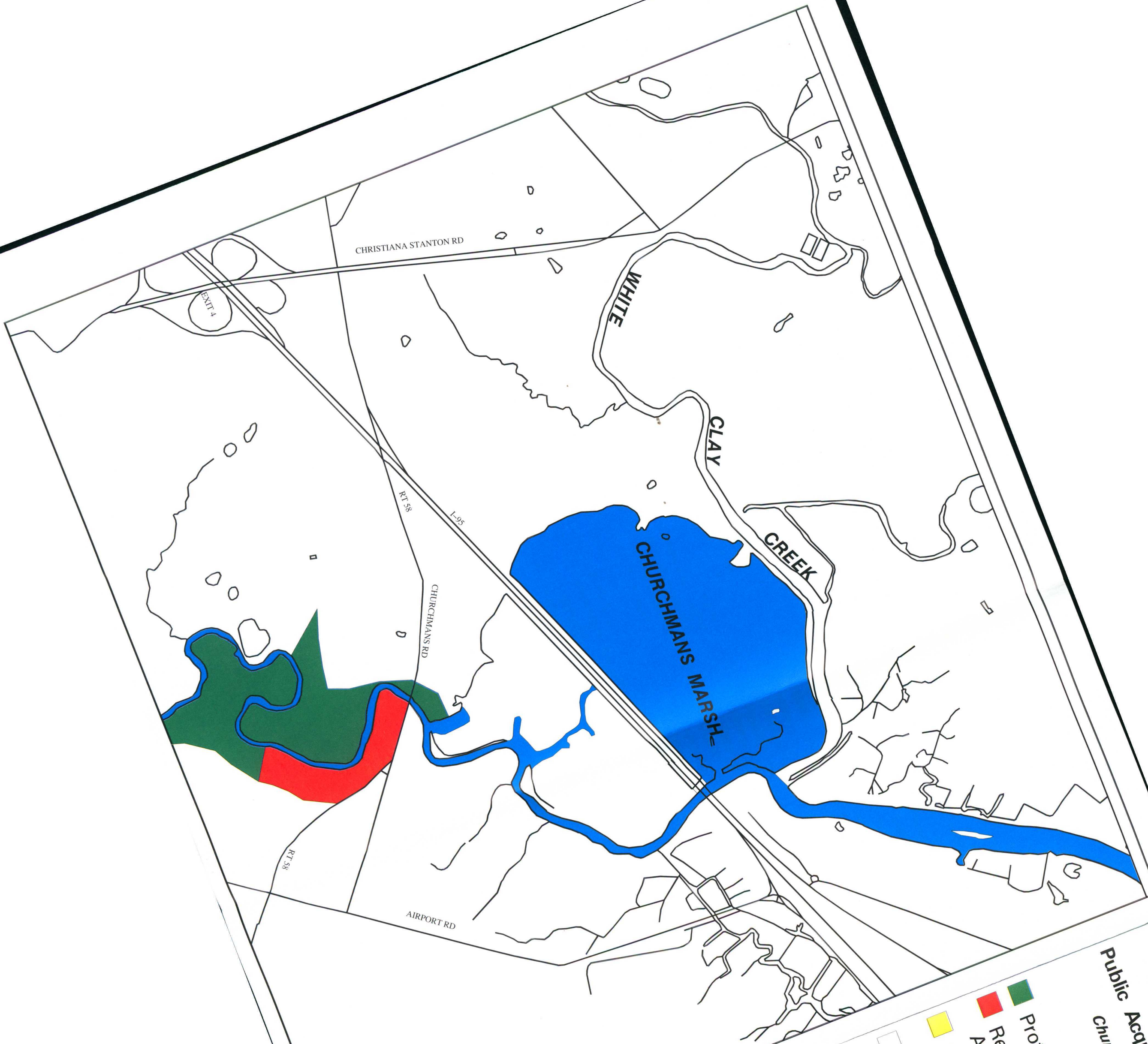


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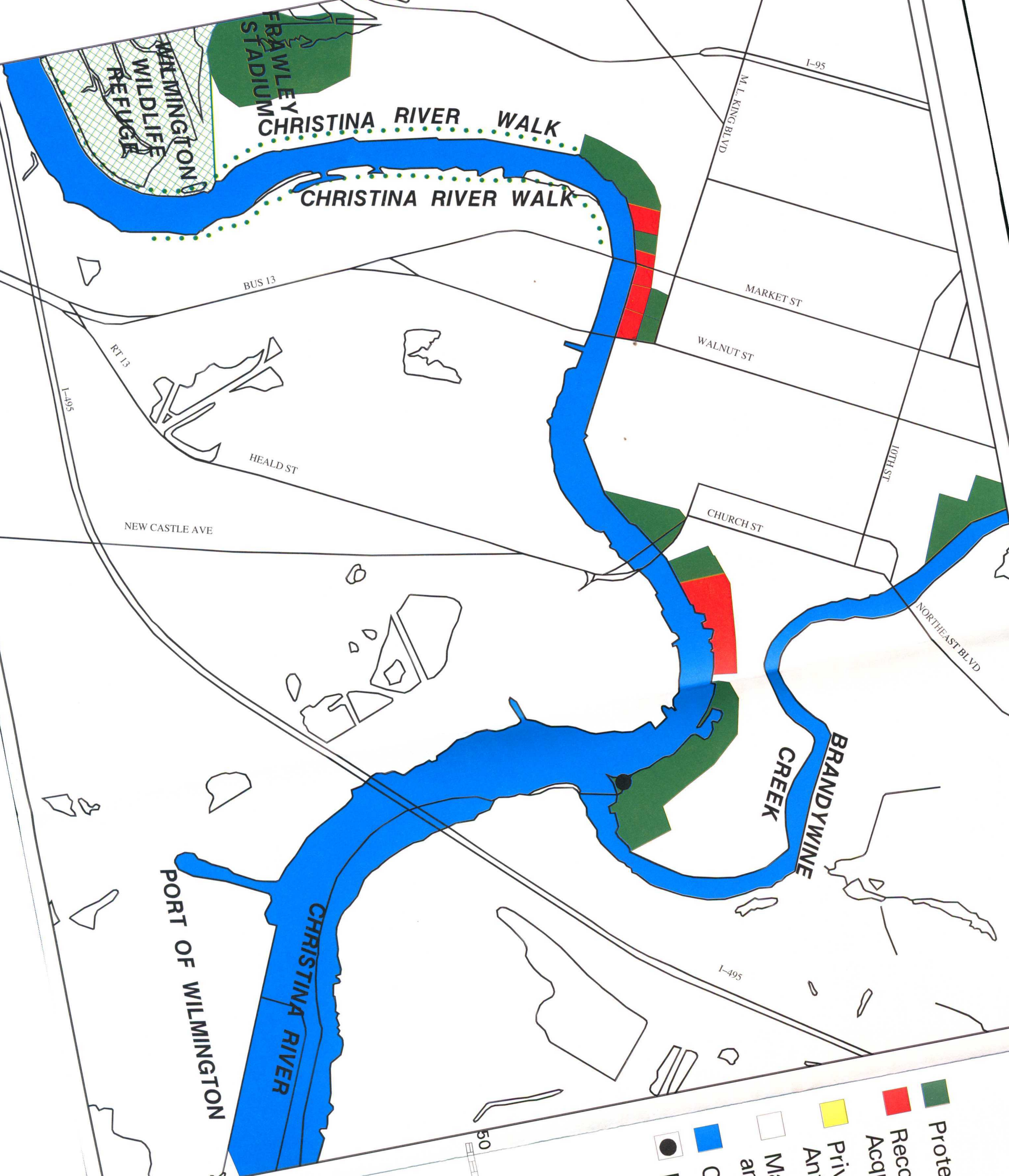
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October, 1994

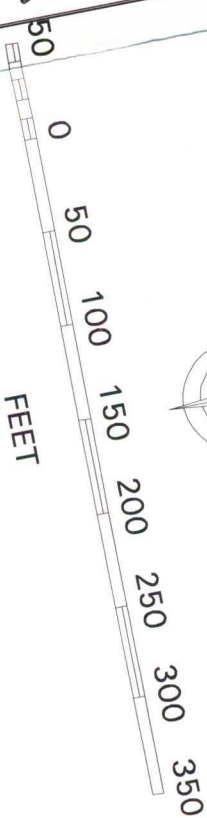
Prepared for the Governor's Task Force on the Future of the Brandywine and Christina Rivers and Environmental Control and the Water Resources Agency for New Castle County.



Map 5
Public Acquisition and Use
Lower Christina River/
City of Wilmington



- Protected
- Recommended for Acquisition or Easement
- Private Protection Anticipated
- Major Private Lands and/or Institutional
- Open Water
- Public Access



Scale 1:1200
October, 1994



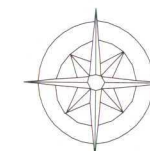
Prepared for the Governor's Task Force on the Future of the Brandywine and Christina Rivers
Prepared by the Department of Natural Resources and Environmental Control and the Water Resources Agency for New Castle County.

Public Acquisition and Use

Newport / Richardson Park

- Protected
- Recommended for Acquisition or Easement
- Private Protection Anticipated
- Major Institutional and/or Private Lands
- Open Water
- Public Access

N



50 0 50 100 150 200 250 300 350

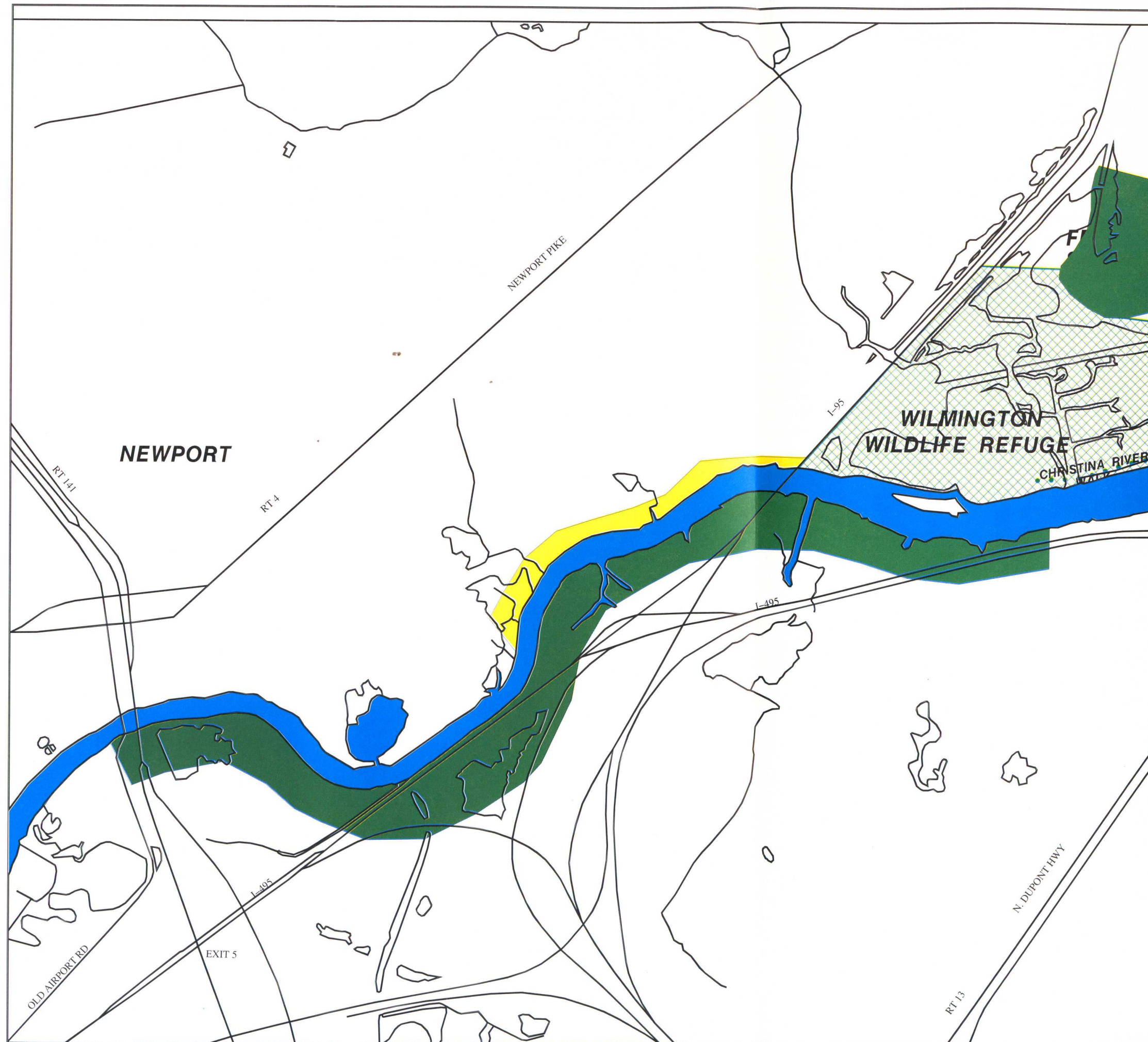
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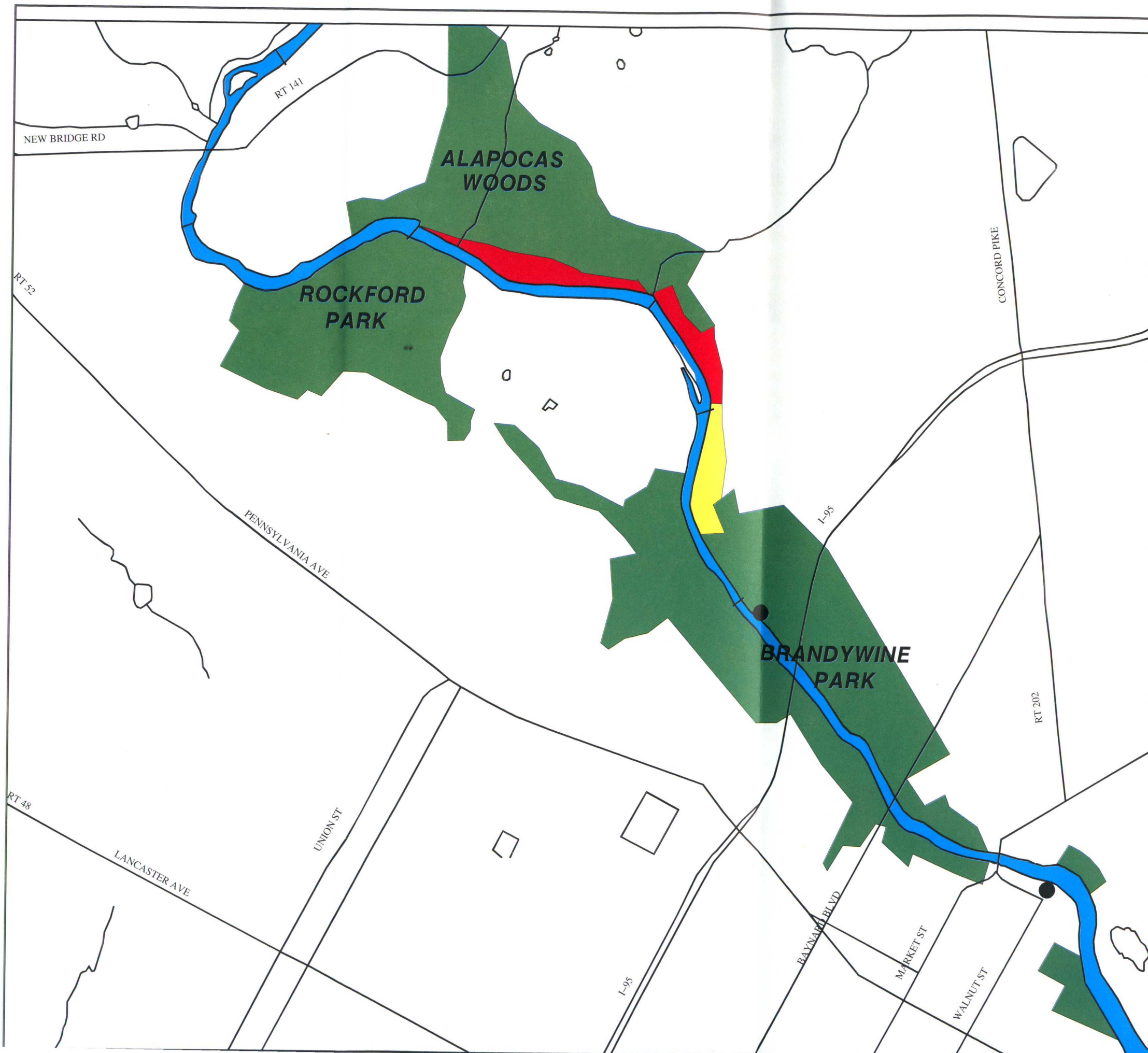
Scale 1:1200

October, 1994

Prepared for the Governor's Task Force on the Future of the Brandywine and Christina Rivers.

Prepared by the Department of Natural Resources and Environmental Control and the Water Resources Agency for New Castle County.





Map 4

Public Acquisition and Use

Urban Brandywine Creek

- Protected
- Recommended for Acquisition or Easement
- Private Protection Anticipated
- Major Institutional and/or Private Lands
- Open Water
- Public Access

N



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FEET

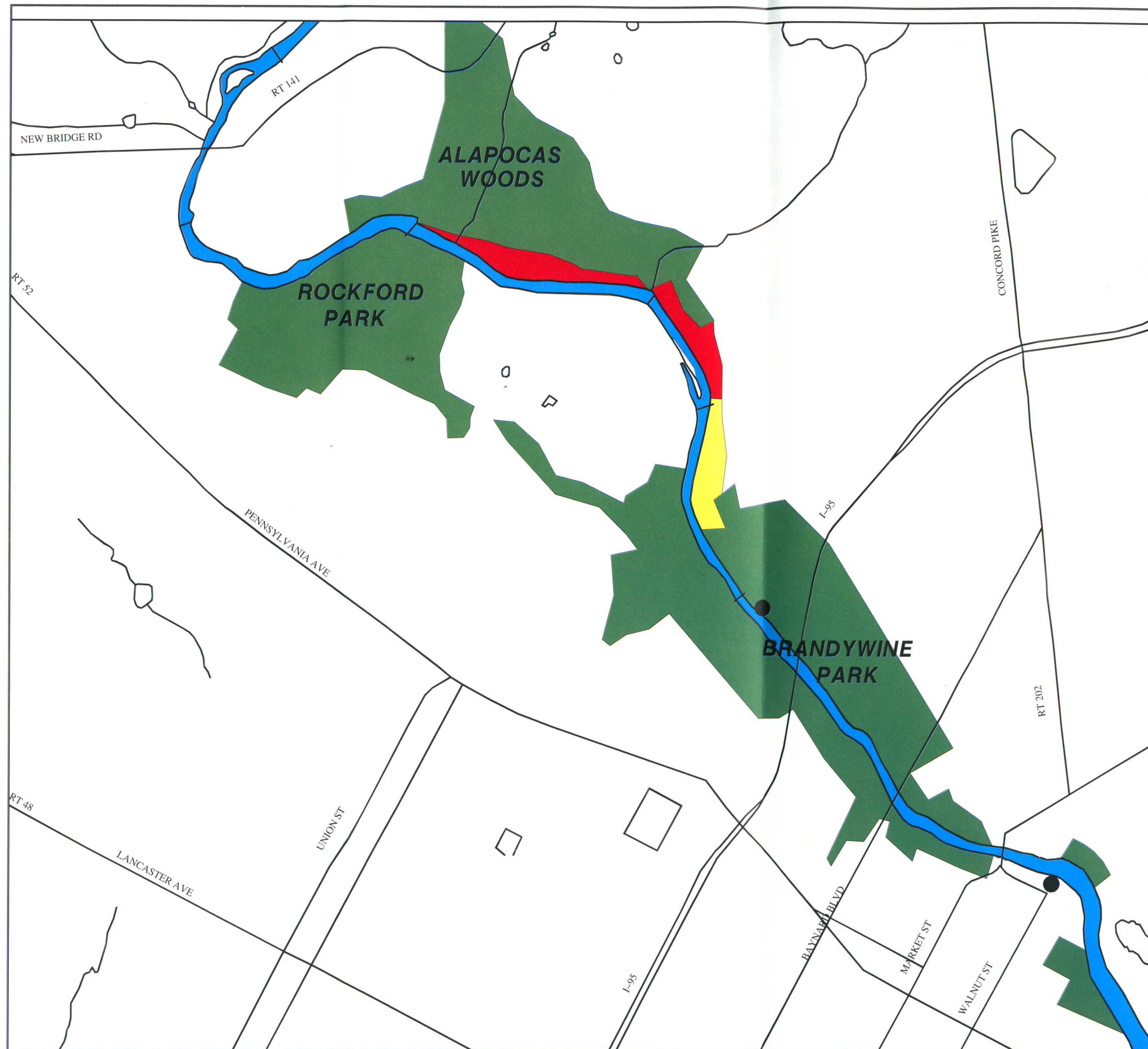
Scale 1:1200

October, 1994

Prepared for the Governor's Task Force on the Future of the Brandywine and Christina Rivers.

Prepared by the Department of Natural Resources and Environmental Control and the Water Resources Agency for New Castle County.





Map 4

Public Acquisition and Use

Urban Brandywine Creek

- Protected
- Recommended for Acquisition or Easement
- Private Protection Anticipated
- Major Institutional and/or Private Lands
- Open Water
- Public Access

N



50 0 50 100 150 200 250 300 350

FEET

Scale 1:1200

October, 1994

Prepared for the Governor's Task Force on the Future of the Brandywine and Christina Rivers.

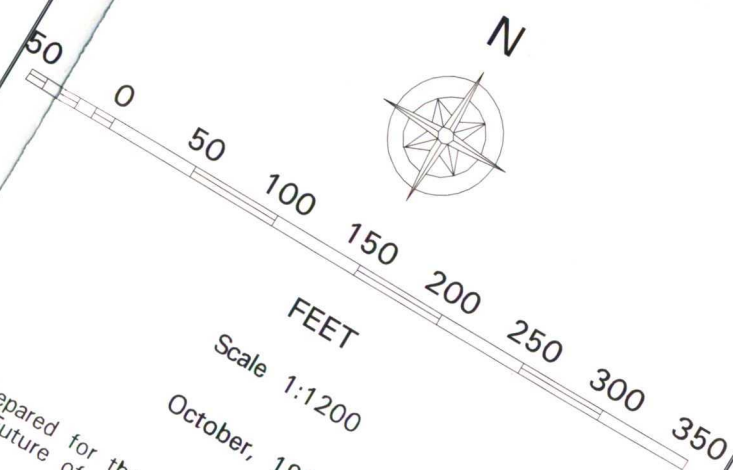
Prepared by the Department of Natural Resources and Environmental Control and the Water Resources Agency for New Castle County.





Map 3
Public Acquisition and Use
Mid-Brandywine Creek

- Protected
- Recommended for Acquisition or Easement
- Private Protection Anticipated
- Major Institutional and/or Private Lands
- Open Water
- Public Access



Prepared for the Governor's Task Force on the Future of the Brandywine and Christina Rivers
Prepared by the Department of Natural Resources and Environmental Control and the Water Resources Agency for New Castle County.

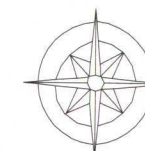


Public Acquisition and Use

Upper Brandywine Creek

- Protected
- Recommended for Acquisition or Easement
- Private Protection Anticipated
- Major Institutional and/or Private Lands
- Open Water
- Public Access

N



50 0 50 100 150 200 250 300 350

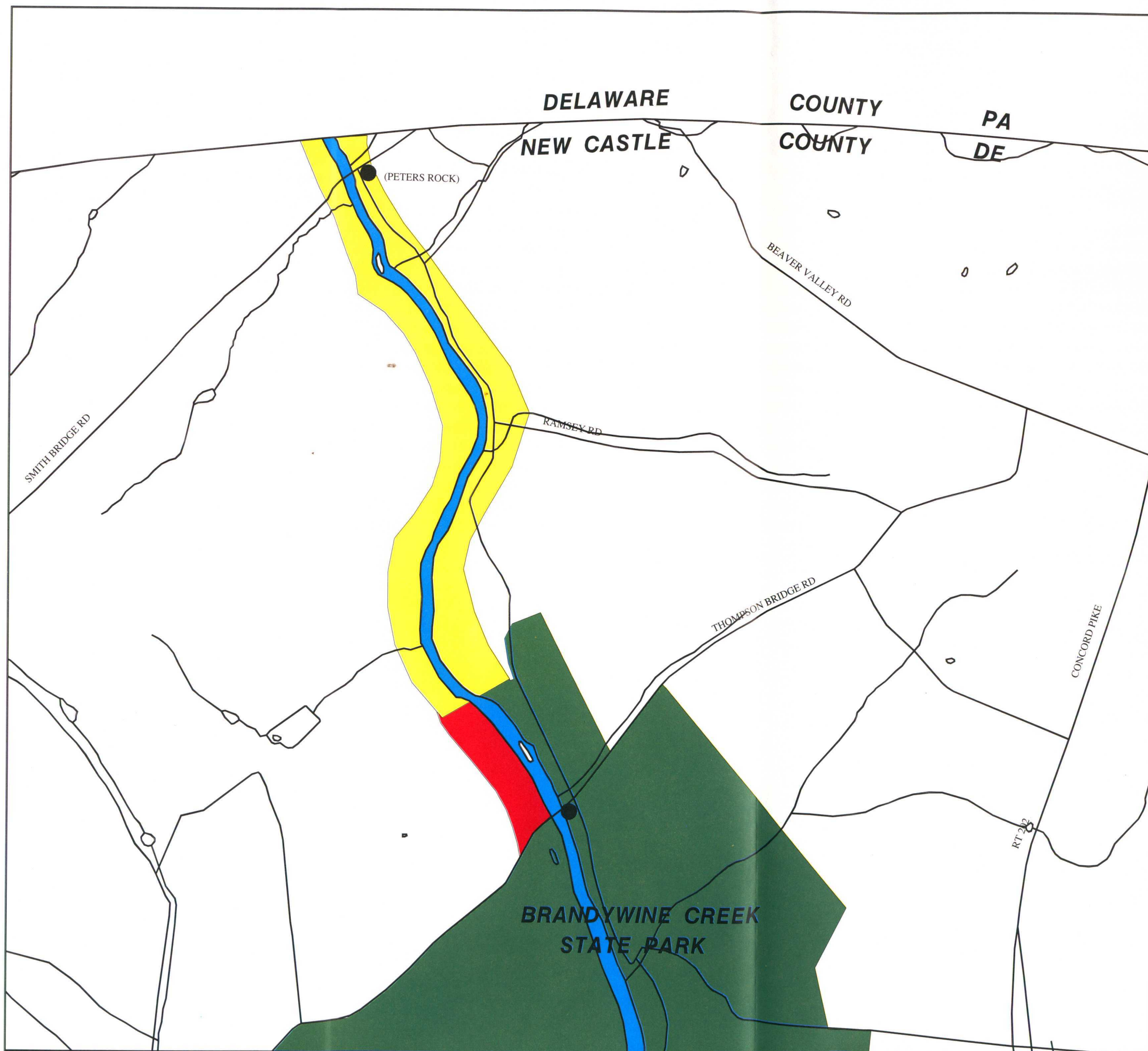
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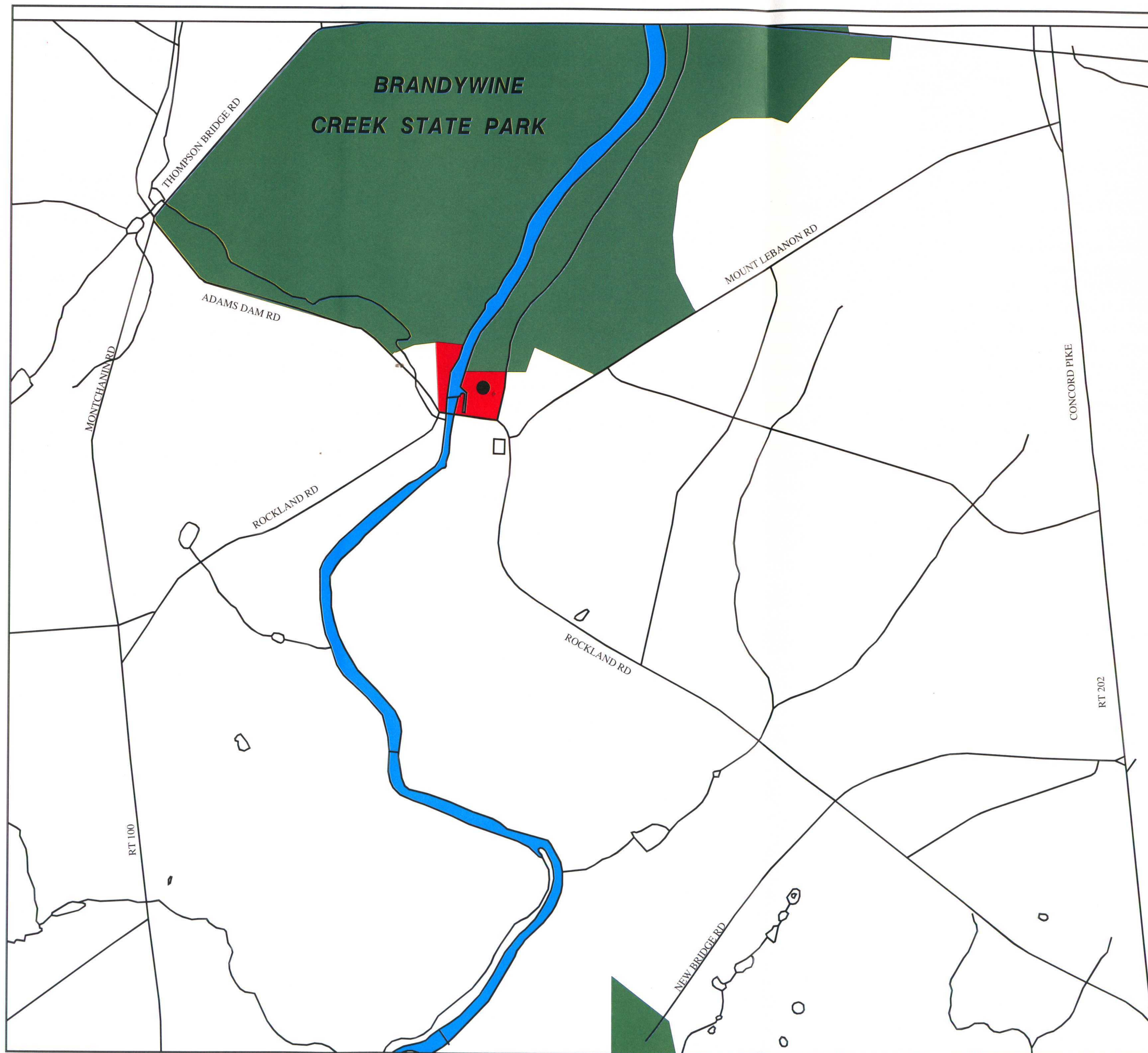
Scale 1:1200

October, 1994

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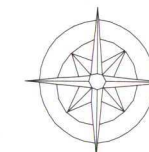
Map 3

Public Acquisition and Use

Mid-Brandywine Creek

- Protected
- Recommended for Acquisition or Easement
- Private Protection Anticipated
- Major Institutional and/or Private Lands
- Open Water
- Public Access

N



50 0 50 100 150 200 250 300 350

FEET

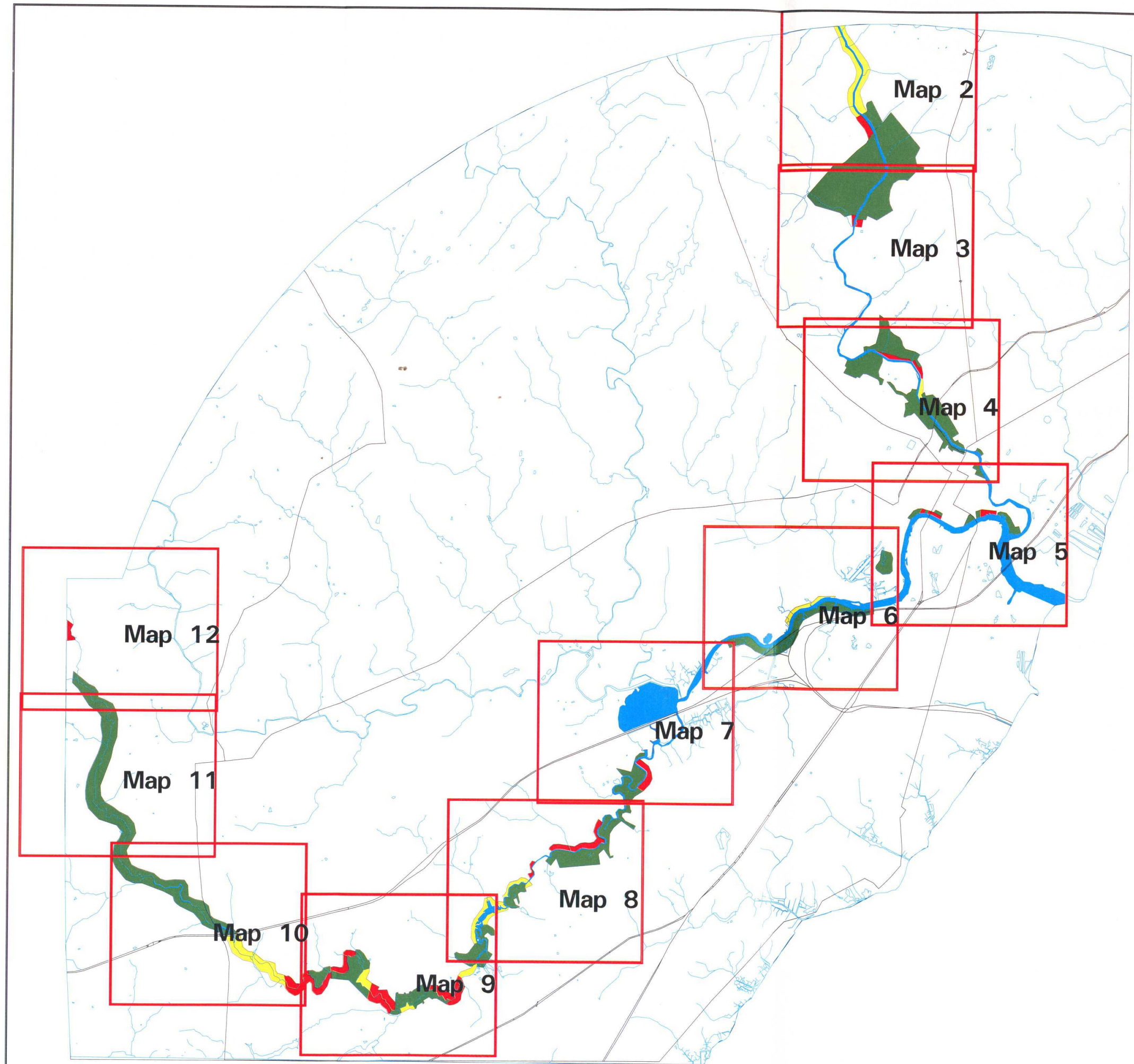
Scale 1:1200

October, 1994

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Map 1

Public Acquisition and Use Overview

The sources listed below pertain to this map, as well as, the next 11 maps.

SOURCES OF DATA:

Stream Network and Roads:
United States Department of the Interior Geological Survey

Protected Lands:
Brandywine Conservancy, City of Newark, City of Newport, Delaware Nature Society, Department of Natural Resources and Environmental Control, New Castle County Parks and Recreation, Wilmington Planning Department, and Woodlawn Trustees Inc.

State and County Parks:
New Castle County Department of Parks and Recreation, 1992-1993.

NOTE:

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Scale 1:7600
October, 1994

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FIGURE 4
BIO-ASSESSMENT
SAMPLING LOCATIONS

TETRA TECH RICHARDSON
ENGINEERS/ARCHITECTS/SCIENTISTS

Plaza 273 55 West Main Street Christiana, DE 19702 (302) 738-7551
Home Office

DATE: 11/24/93	DRAWN BY: E.M.T.	CHECKED BY: D.J.A.	SCALE: 1" = 24,000'
TEN 0024	FILE NO.	COMPUTER FILE NO.	SHEET NO.
			FIGURE 4.DWG