

*20<sup>th</sup>*  
*Anniversary*

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**1994 Annual Report**



Water Resources Agency  
for New Castle County

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**T**he Water Resources Agency for New Castle County (WRA) is a cooperative program by the City of Newark, the City of Wilmington, New Castle County, and the State of Delaware in water supply planning and management and water quality planning and management. The WRA originated with the establishment of a Water and Sewer Management Office by New Castle County in the late 1960's to address problems encountered with water supply (drainage, flooding, future water supply) and with the formation in 1974 of a Water Quality Management Program by Newark, Wilmington, and New Castle County under the U.S. Environmental Protection Agency auspices. In that year, New Castle County was designated by the Governor as an urban-industrial area confronted with existing and potential water quality problems and in need of an area-wide plan to address them. An inter-jurisdictional agreement signed by the three executives and concurrent resolutions passed by the respective councils established the planning program. Following the development and approval of a water quality plan in 1977, the separate County and regional activities were merged under the direction of a Policy Board for water resources planning and management. By amendment of the agreement in 1990, the State of Delaware was added as a voting member of the Policy Board. A member of the Water Resources Advisory Committee and a representative of the private water utilities serve as non-voting members of the Policy Board.

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*"Somewhere in the world rain falls even when the sun is shining here."*

*Anonymous*

*The cover photo of the Brandywine Creek is a reminder of the most significant water event in New Castle County during 1994 – an abundance of ice and snow. 1994 also marked TWENTY YEARS since the creation of the Water Resources Agency for New Castle County. The cover photo was taken by Eric Crossan.*

## Message From the Administrator ...


*1994 marked the passage of twenty years of operation of the Water Resources Agency for New Castle County (WRA). My, how time flies! Milestones like a 20th Anniversary prompt a pause to reflect on and take stock of matters that have taken place with the WRA. And, it has indeed been a busy two decades.*

*If you measure the success of an organization based upon its growth in size and scale, people and programs, then we in the WRA have not done very well. However, if you measure success in terms of consistently good work, continuity in effort, completion of projects, and in the satisfaction of seeing changes that were generated by your work, then we have done quite well. From the WATER 2000/2020 PLAN for water supply, to the Federal Water Quality Plan, to the Water Resource Protection Area laws, a significant amount of actions have been fostered through the WRA and its supporting jurisdictions. These accomplishments plus others that involve specific water supply and water quality circumstances give testimony to improvements in water resources management and planning in New Castle County during this period.*

*As pleased and proud as we are in what has been done, it has also been, as with most things in life, a mixture of progress and problems, setbacks and challenges. In reporting on 1994, I must also share with you a certain weariness with some of the water resources matters described herein.*

*The inaugural 1993 Annual Report introduced the organization of the WRA. This Annual Report focuses on people in the WRA through their work. We are a staff small in number with a blend of professional skills and abilities. Our size, bolstered by University interns and part-time students, gives us flexibility and adroitness to address water resource matters. You will read of work from the Upper Christina River in Maryland, across the Chesapeake & Delaware Canal in Southern New Castle County to the rolling hills surrounding Hoopes Reservoir. We do not issue permits, promulgate regulations, or operate water systems. What we do is provide the technical information, analysis and assistance in an advisory capacity that fosters better water resources planning and management. We believe this Annual Report captures the breadth and scope of water issues underway in the WRA. Most importantly, it provides a view of our mission as an agency.*

*An Annual Report should review the past year, cite highlights of accomplishments and set the strategy for the next year. My lament is with the slow pace of progress in getting things accomplished in the public sector in today's world and the dilemma it presents in planning for next year. Nothing is simple, straight forward or direct anymore. As the path forward has become encumbered, we also seem to have lost the will and the want to act. Water resources planning and management means we have to look beyond the near term and act now so that we will be in a certain position at some future date. Our work in developing a future water supply source and resource protection requires that. If continued progress is to be made in ensuring an abundant, reliable water supply and the quality of our water resources, we will need to regain the will and ability to act. That is our first order of business for 1995 as we begin the next 20 years.*

  
**Bernard L. Dworsky**



# Policy Board

## *Alternates*

### **State**

Gerard Esposito

### **New Castle County**

Robert Maxwell

### **Newark**

Carl Luft

### **Wilmington**

James Holloway, Jr.

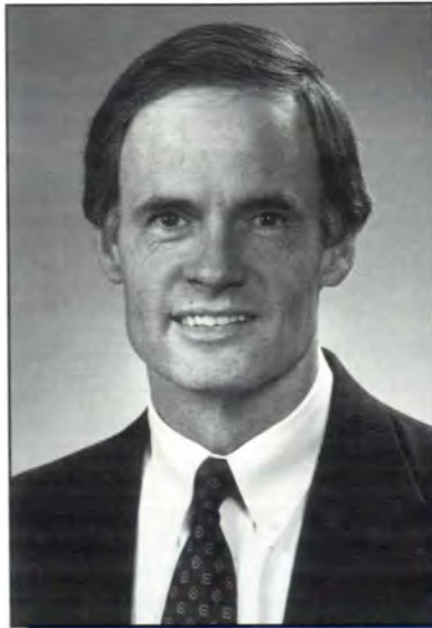
## *Non-Voting Members*

### **Artesian Water Company**

Dian Taylor

### **Water Resources Advisory Committee**

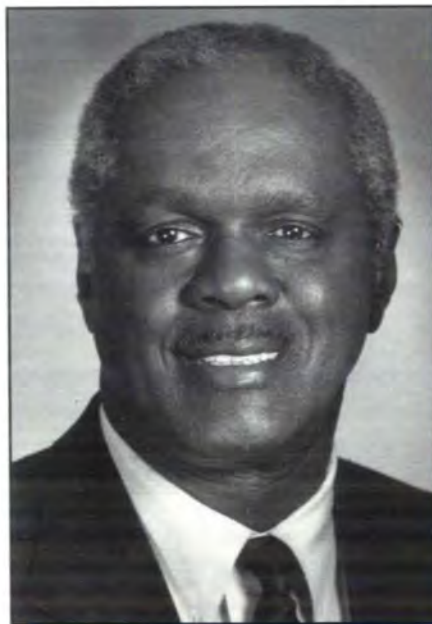
Dorothy Miller



**State of Delaware**  
Governor Thomas Carper



**New Castle County**  
Executive Dennis Greenhouse



**City of Wilmington**  
Mayor James Sills, Jr.



**City of Newark**  
Mayor Ronald Gardner

**T**he Agency is governed by a Policy Board that meets bimonthly and directs all program activities. Voting members are the chief elected officials of the three local governments and the Governor of the State of Delaware or their designees. The Administrator of the WRA serves as the Secretary. Non-voting members include a representative of the water utilities in New Castle County and the chair of WRA's citizen advisory committee.



# Water Resources Advisory Committee

**T**he Agency's **Water Resources Advisory Committee (WRAC)** is comprised of citizens which represent a variety of organizations that have an interest in water resources issues. Many of the eleven WRAC members have served on the Committee for more than a decade and several have been actively involved in water related matters for over twenty years. The WRAC provides public input to the Agency, meeting four times a year in the evening. The 1994 members are:

Dorothy Miller, **Chair**  
M. Clayton Burgy  
Susan Burns  
Joseph Hardman  
Roland Leathrum  
D. Preston Lee, Jr.  
Jerome Lewis  
Kathleen Lord  
Glen Schmiesing  
Victor Singer  
Christopher Wicks, Jr.



# Water Resources Technical Coordinating Committee

**T**he WRA regularly convenes a **Technical Coordinating Committee (WRTCC)** to exchange information on programs and issues of mutual interest. The WRTCC consists of representatives of the water utilities and local, State, and regional organizations which are involved in water resources management. The following are represented on the WRTCC:



Artesian Water Company  
City of Newark  
City of Wilmington  
Delaware DNREC  
Delaware Division of Public Health  
Delaware Geological Survey  
Delaware River Basin Commission  
New Castle Board of Water and Light  
New Castle Conservation District  
New Castle County Planning Department  
Tidewater Utilities, Inc.  
Town of Middletown  
Water Resources Advisory Committee  
Wilmington Suburban Water Corporation.



# Hoopes Reservoir

## Our Only Major Water Storage Facility Turns 63 Years Old

**B**ack in the 1920's, the City of Wilmington had a vision. The City would continue to grow as the major metropolitan area in Delaware. Its growing population and businesses would require more energy and more water. And since the City was totally dependent on the daily flow in the Brandywine Creek to meet its water needs, it realized its supply was vulnerable to droughts and contamination.

The decision was made to construct a major facility to store Brandywine water. This impoundment would ensure that Wilmington would have a reliable source of good quality water for all its future needs. After studying a variety of sites, an area located about four miles west of the Brandywine Creek known as the Old Mill Stream Valley was selected.

An engineering firm was hired to design the reservoir, completing its drawings in 1929. Construction, which began in 1930, included the excavation of 70,000 cubic yards of earth and the pouring of 105,000 cubic yards of concrete. By February 1931, the concrete dam structure was complete. Work continued, including the

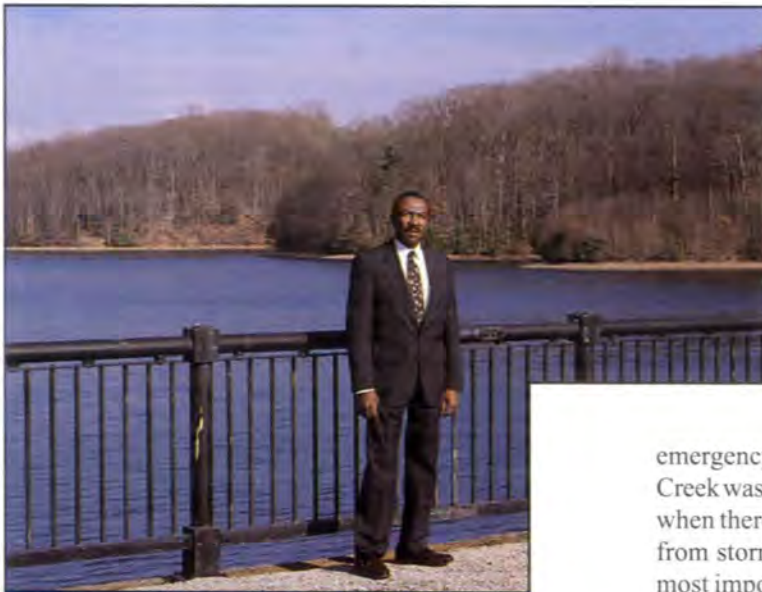
pumping water from the Brandywine, the reservoir was full and overflowing by April 1933.

The reservoir was originally called the Old Mill Stream Reservoir, but was soon renamed to honor Edgar M. Hoopes, former Chief Engineer and member of the Wilmington Board of Water Commissioners. The reservoir holds about two billion gallons of raw water. The concrete dam stretches approximately 900 feet across a narrow valley and stands about 135 feet high. The dam is about 90 feet thick at its base, tapering to 16 feet at the top. The storage pool inundates 192 acres and is surrounded by a buffer of wooded land. Since it is located within a very small drainage area, the water level in Hoopes is maintained by pumping water about four miles from the Brandywine Creek to the reservoir.

There's a good chance that if you are like most people in New Castle County, you have never seen Hoopes Reservoir. The facility is located in the Greenville area and is only visible from a couple of spots. A narrow road, Campbell Road, traverses its most northern boundary and Valley Garden Park, a Wilmington park facility, is located adjacent to the northeast section of the reservoir. The reservoir and surrounding land is closed to the public for its safety and to maintain water quality.

Historically, Hoopes Reservoir has been used principally by Wilmington as an emergency supply when water from the Brandywine Creek was unavailable. Hoopes is also used by Wilmington when there is excessive sedimentation in the Brandywine from storm events. However, Hoopes plays perhaps its most important role as a component of our regional water supply network.

In the 1980's when the WRA developed New Castle County's water management plan, entitled the WATER 2000 PLAN, the Agency introduced facility optimization as a key part of the PLAN. WATER 2000 PLAN Volume V: "Water Supply Facility Optimization in Northern New Castle County" recommended that we should make the



Wilmington Public Works Commissioner James Holloway, Jr. surveys Hoopes Reservoir.

installation of a large water main to the Brandywine Creek, the clearing of the land, and the relocation of roads. The reservoir was officially completed and publicly dedicated on June 4, 1932. After several months of





most effective and efficient use of our existing water supplies. The practice of interconnecting the systems of the public water suppliers in New Castle County originated from this recommendation.

Hoopes is the only major storage facility in the five-system regional water supply network in northern New Castle County. Because of its importance, a regional agreement was developed involving the other major water suppliers in New Castle County - Wilmington Suburban, Artesian, and the City of Newark. The agreement calls for the release of water from Hoopes to the Red Clay Creek when additional water is needed downstream by Wilmington Suburban. This water is then withdrawn at Wilmington Suburban's Stanton facility and, after treatment, is proportionately distributed to the other suppliers through system interconnections. Although this agreement has been in place for many years, it is only recently that it has been utilized.

Hoopes Reservoir is now being used for streamflow augmentation as part of the operational plan for Wilmington Suburban's Stanton facility. As part of its recent permitting requirements from the Delaware River Basin Commission, the Stanton treatment plant must allow a specific quantity of streamflow to pass by its intakes on the Red and White Clay Creeks for instream needs. When flows drop below a specified quantity, Wilmington Suburban must either reduce its withdrawal or add to the flow via a release from Hoopes to maintain the minimum streamflow.

In 1994, a normal precipitation year, about 150 million gallons were released to augment streamflow in the Red Clay Creek for Wilmington Suburban. Additionally, the City of Wilmington had to use water from Hoopes throughout the year for its water supply needs. This resulted in the water level at Hoopes being drawn down to its lowest level in recent history.

This changing role for Hoopes Reservoir is now being investigated by the City of Wilmington to determine if the facility can serve these multiple functions and continue to serve the City for its designed role, emergency supply. Changing regulatory requirements and growing water demands in New Castle County will stress our only major water storage facility in New Castle County. In 1995, Hoopes Reservoir will be 63 years old; we should all be thankful for the foresight of its builders. 💧

*--Martin Wollaston*



# Interconnections

## Optimizing Our Developed Water Supplies

There are five major public water suppliers that provide service to the New Castle County area north of the Chesapeake and Delaware Canal. Each of the suppliers has developed its own facilities to withdraw, treat, and distribute water to its customers. For years, the many miles of suppliers' water pipes that crisscrossed the County were isolated from each other.

Then in the late 1970's, the Water Resources Agency developed the concept of facility optimization as part of the WATER 2000 PLAN for New Castle County. In the fifth volume of the WATER 2000 PLAN, the WRA recommended that suppliers maximize the use of developed water supplies by interconnecting their systems. Interconnections are pipes, valves, and meters that enable the suppliers to transfer water between systems. The water suppliers quickly realized the mutual benefits of system interconnections.

Initially, the suppliers selected points where both had water mains closely situated that could easily be connected. These first intra-County interconnections were established principally for emergency situations. They enabled each supplier to continue to provide water to customers through a system crisis, such as a pipe breakage or fire hydrant use.

Through the 1980's, the water demands in New Castle County changed. The predominant water use sector shifted from industrial use to residential use. Along with this came a shift in the location of daily water

demands. These two changes resulted in some water suppliers experiencing decreases in water demands while others encountered record high demands.

Some suppliers found they had more production capability than customer demands while others needed additional supply to meet their growing demands. The quickest and most economically efficient solution to resolve this situation was the increased use of interconnections among the systems.

Some of the initial areas that were good locations for interconnections were easily determined. These were areas where a larger size water main was close to a large main belonging to another supplier. However, there were also areas where water was needed, but large mains did not cross each other. This was where the WRA was most able to help.

For years, the WRA had developed and maintained a computer model of the water systems in New Castle County. This hydraulic model simulated supply and demand at various points in each supplier's distribution network. The model could also simulate the operation of





# CYBER-WATER

**F**or two decades, the WRA has used a computer model to study and analyze the water distribution systems of the water suppliers in New Castle County. Our model, dubbed WATR, simulates the flow and pressure in water mains to determine the availability of water at specific points.


The WRA has recently upgraded the software it uses for its modeling work. For years, WATR was based on the hydraulic modeling program KYPIPE, developed by the University of Kentucky. Recently, the WRA purchased an advanced adaption of KYPIPE, called CYBERNET. This new software is fast, accurate, and flexible. But more importantly, CYBERNET can also provide the output of the modeling work as a graphic instead of the listing of numbers provided by KYPIPE. This means the results of the simulation can be easily displayed and more easily understood.

the separate systems as if they were connected into one large network. This feature was used to determine potential areas where systems could be interconnected. Simulations were performed to determine how much water could be transferred, the sizing of the pipes and pumps needed, and the effects the transfer would have on the respective systems.

From 1981 to 1992, the total amount of water transferred through intra-County interconnections increased every year, starting at about 1.5 million gallons per day (MGD) and peaking at 8.6 MGD in 1992. Most of the water was produced by the City of Wilmington and the Wilmington Suburban Water Corporation and sold to the Artesian Water Company and the City of Newark. This decade-long trend of increasing intra-County transfers changed in 1993 when Artesian began purchasing water through an interstate interconnection with the Chester Water Authority from Pennsylvania.

Over the years, this practice of interconnecting systems has enabled the water suppliers in New Castle County to meet the demands of their customers while proceeding with the development of new supplies. To-

day, there are 21 intra-County and 2 interstate interconnections in New Castle County, as displayed in the adjoining map. Additionally, interconnections have enabled the suppliers that constructed large production facilities years ago in anticipation of continued industrial growth to more fully use their facilities even though industrial water use has decreased. Today, the biggest customers of several suppliers are other water suppliers.

Interconnections have been the key to meeting the water demands of the residents and businesses of New Castle County during the 1980's. And, these interconnections will continue to be critical to meeting our growing use of water through the 1990's. 

--Martin Wollaston



# A Southern Strategy

Anyone driving south over the Chesapeake & Delaware (C & D) Canal has to notice the difference. The landscape of southern New Castle County is changing. What were once fields of corn and potatoes are now housing lots. Green fields are becoming green lawns, and farm lanes are becoming subdivision streets.

Land development has come quickly to southern New Castle County and with it comes a variety of potential opportunities and problems. The WRA's interest is focused on two water resources issues - future water supply and future wastewater treatment.

This area south of the C & D Canal is solely dependent on groundwater for drinking water supply. Future growth will require an adequate supply of good quality water. Since we will continue to rely on groundwater as the sole source of public supply, it is essential that we improve our knowledge and protection of this resource.

During 1994, the WRA contracted with the Delaware Geological Survey (DGS) to initiate a work program to determine the current quality and quantity of groundwater in southern New Castle County. Funded by New Castle County, the DGS will establish a groundwater monitoring network and assemble a computerized data base for tracking water quality. This work will enable New Castle County to assess the adequacy of groundwater quality for future use and to measure the impact of changing land use on this resource.



Information will be collected with the cooperation of the water utilities from existing sources, such as water supply wells. New wells will also be proposed where necessary as part of the overall monitoring strategy. In addition, the DGS will re-evaluate the potential quantity of groundwater south of the C & D Canal. This will update work previously published by the DGS, providing a better foundation for quantifying our groundwater resources for the future.

Additionally, wastewater treatment infrastructure in this area is limited. Past practices of large scale development using septic systems on small lots can result in groundwater contamination. And, although the New Castle County Department of Public Works is now expanding the Middletown-Odessa-Townsend (M-O-T) treatment facility utilizing spray irrigation technology, the added capacity will only be sufficient to treat wastewater from the immediate M-O-T area. Therefore, it is important that we develop an environmentally responsible, long-term solution to disposing of the additional wastewater that will come with development.

In 1991, the WRA initiated an update of the existing Wastewater Management Plan for New Castle County originally completed in 1975. Funded by New Castle County and the State of Delaware, the goal of the Plan update was to assess long term wastewater treatment needs in southern New Castle County and develop a 20-year plan to meet these future needs. A consulting firm, Roy F. Weston Inc., was hired to draft the updated Plan.

The Plan recommended that New Castle County discourage the wide-spread use of individual sep-



Aerial view of spray irrigation facilities being constructed to treat wastewater in the M-O-T area. Photo by NCC Department of Public Works.




tic systems on small lots. Options for future wastewater treatment included further expansion of the M-O-T treatment facilities, the creation of a new sewer service area in the Boyds Corner-Summit region, and the increased use of spray irrigation facilities.

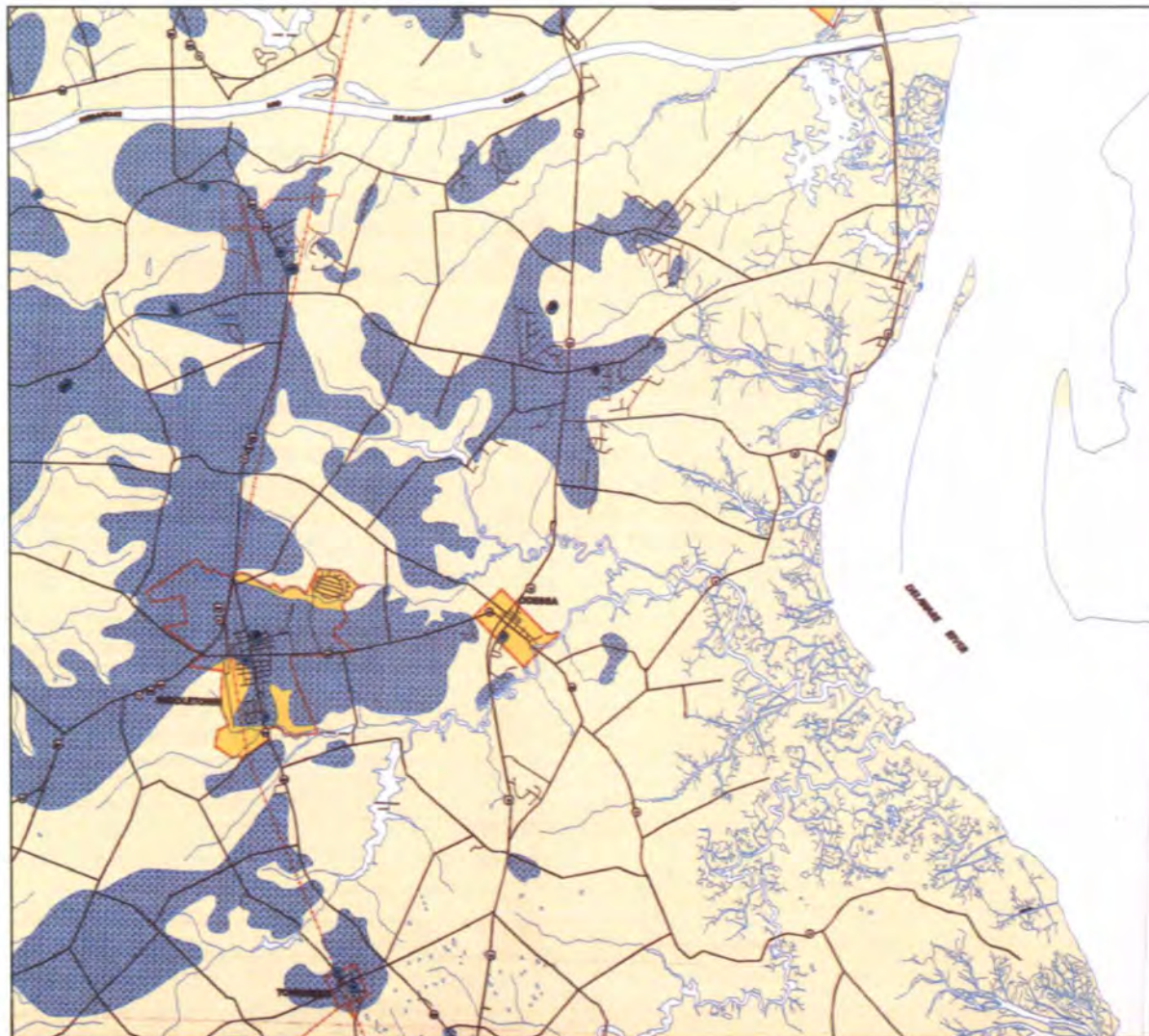
The "Wastewater Needs Evaluation and Plan for Southern New Castle County" was adopted by New Castle County Council in July 1994 and forwarded to the Delaware Department of Natural Resources and Environmental Control and the U.S. Environmental Protection Agency for review and adoption. Ordinances to implement the Plan are being reviewed by the New Castle County Department of Planning as part of its Comprehensive Plan update due by the end of 1995.

Another action taken that improves the protection of groundwater was the adoption of the revised Water Resource Protection Area (WRPA) maps in January 1994. These updated maps resulted from contractual

work conducted by the Delaware Geological Survey for the WRA. The maps designate areas of excellent groundwater recharge potential utilizing a more definitive methodology and more data than the original 1987 WRPA maps. Also included are the location of Community Public Water Supply Wellhead Protection Areas. New Castle County Code requires measures to be taken to assure the maintenance of groundwater quantity and quality when land is developed within a WRPA.

The WRA is currently updating Volume VIII of the WATER 2000/2020 PLAN which focuses on water supply issues in New Castle County south of the C & D Canal. This revision will include new information on water supply, water quality, and future water demands. The update will provide a more comprehensive strategy for managing our water resources in southern New Castle County into the next century. 

--Thomas Russell



Updated WRPA maps designate areas requiring additional measures to protect groundwater quality and quantity.



# Streamflow

## Is There Enough For Man and Fish?

The streams of the Christina River Basin provide many uses for New Castle County residents. The four major streams in the Christina Basin - the Brandywine Creek, Red Clay Creek, White Clay Creek, and the Christina River - provide over 75% of the potable water supply for County residents and businesses. Surface water is withdrawn from these streams by the City of Wilmington, City of Newark, and the Wilmington Suburban Water Corporation. In addition, the streams also provide aquatic habitat for various fish species such as smallmouth bass, white perch, and brown trout. Sufficient flow is necessary for these streams to be used as water supply sources and also to maintain a healthy aquatic habitat.

In 1994, the WRA and the State DNREC approached the Delaware General Assembly for funds to study if there is enough streamflow in these four major streams to satisfy our existing water supply needs and the needs of the aquatic environment. The need for this analysis was prompted when the Delaware River Basin Commission required the City of Newark and Wilmington Suburban to monitor their withdrawals and maintain sufficient flow in the White Clay Creek for habitat protection.

With funding secured, the DNREC retained a consultant, Mr. David Yaeck, to coordinate the project. Mr. Yaeck formed a multi-disciplinary Joint Task Force consisting of water resource professionals to conduct the analysis. In addition to the WRA and the DNREC, the multi-agency task force includes staff from the:

- Delaware Geological Survey;
- Cities of Wilmington and Newark;
- Artesian Water Company;
- Wilmington Suburban Water Corporation;
- Delaware Nature Society;
- Pennsylvania Department of Environmental Resources.

The overall purpose of the Instream Flow Needs Analysis is to determine the adequacy of the statistical 7Q10 streamflow standard for protecting the aquatic habitat while addressing impacts on surface water supplies. The 7Q10 is the minimum streamflow which is likely to occur for 7 consecutive days, once every 10 years. It is the standard currently being applied in surface water withdrawal permits by the DRBC in New Castle County to define the minimum flow that must remain in the stream at all times for aquatic life. The City of Newark

and Wilmington Suburban currently operate under DRBC permits which require this 7Q10 instream flow standard be followed.


The Joint Task Force commenced work on Phase I of the Instream Flow Needs Analysis in August of 1994. The first task was to define the four study areas adjacent to the water supply intakes on the Brandywine Creek at Wilmington, the White Clay Creek at Newark, the White Clay Creek at Stanton, and the Christina River at Smalleys



Digital map of White Clay Creek at Newark study area.

Pond. The four study areas were then delineated on digital maps created by the WRA on its AERI II data management system. The Task Force must also consider the unique flow needs of the study areas, including the tidal environment of the White Clay Creek at Stanton and the network of dams and canals along the Brandywine Creek.

Additionally, biologists on the Task Force have identified fish species requiring habitat protection. These biologists have defined criteria for healthy stream habitats, including adequate flow, velocity, and substrate. The WRA has assisted with the hydraulic analyses to determine existing streamflow, depth, and velocity at the four study locations. The Agency has utilized the HEC-2 computer modeling program to conduct these analyses. The Joint Task Force will also conduct a field study of the fishery habitat within these four stream study areas.

The project consultant is scheduled to complete the Phase I report by June 1995, summarizing conclusions regarding the adequacy of the 7Q10 as the flow standard for the streams of the Christina Basin. Public meetings will continue to be held to discuss the progress of this project. The 7Q10 standard will be made permanent in August 1996 by the DRBC unless an alternative, acceptable standard is proposed. 

--Gerald Kauffman



# Churchmans EIS Progressing

In the 1980's, the WRA developed the WATER 2000 PLAN which provided the framework for water management activities in New Castle County. An important part of the PLAN was the recommendation that NCC initiate the process necessary to provide for additional water supplies for the future.

The preferred project resulting from the WATER 2000 PLAN was a basin-like reservoir near I-95 and Route 7 in an area called Churchmans Marsh. The State DNREC and the Delaware River Basin Commission adopted the WATER 2000 PLAN conditional upon the completion of an Environmental Impact Statement for the Churchmans Reservoir project. The WRA initiated the EIS process by filing for the appropriate permits from the U.S. Army Corps of Engineers. The Corps responded that an EIS would be necessary for the permits.

Funding for the initial EIS work was provided by the State General Assembly, the Artesian Water Company, and the Wilmington Suburban Water Corporation. Each party committed \$200,000 towards the project. New Castle County has also committed funding (\$400,000) for subsequent phases of the EIS project.

An EIS Project Management Committee was assembled to oversee the EIS work. The EIS-PMC is a nine member committee with representation from New Castle County, Artesian, Wilmington Suburban, Wilmington, Newark, DNREC, Delaware Development Office, State Department of Finance, and the WRA. Representatives from a variety of Federal and regional organizations also serve on the PMC as non-voting advisors to the project.

In 1990, the consulting firm Metcalf & Eddy, Inc. was hired to

conduct the initial phase of EIS work. At this time, M & E has completed a future water supply needs assessment and documented its findings in a report entitled, "Final Report Subtask 1.6: Water Supply Needs." The report was accepted by the EIS Project Management Committee and forwarded to the U.S. Army Corps of Engineers, which has the ultimate responsibility for preparing the formal EIS document. This water supply needs report was accepted by the Corps in October 1993.

Concurrently, the second task of this project was also being prepared by Metcalf & Eddy — an assessment of alternatives to meet the projected water needs. This work, summarized in its report entitled, "Final Report Subtask 2.1 : Preliminary Screening of Alternatives" was reviewed by a variety of local, State, and Federal agencies. However, the Corps' review resulted in its request for additional information on the projects. This re-examination of the alternatives under the guidance of the Corps is currently underway, principally through the efforts of staff from the WRA and the DNREC.

During 1994, work focused on reviewing the alternatives under the direction of the Corps. Initially, the Corps sent a letter to the PMC detailing information it required to review the projects. The PMC argued that many of the projects did not warrant detailed responses since major factors associated with these projects made it highly unlikely many of them could ever be developed.

Instead of detailed information, the Corps agreed that the PMC would first document these major factors, dubbed "fatal flaws," for Corps' review. The Corps would consider the fatal flaws and determine if the projects could be eliminated from further consideration. At this time, the Corps has agreed to eliminate a number of alternatives through this process. This fatal flaw assessment work will be completed by early 1995, with the initial listing of alternatives reduced from 68 to about 15 projects.

Alternatives remaining on the list will be examined during 1995 following a work scope to be developed with the direction of the Corps. This work should be completed by the end of 1995 and should result in a listing of about six projects that would



Aerial photo of Churchmans Reservoir site.

satisfy the future water needs of northern New Castle County.

Public workshops have been held to provide people the opportunity to comment on the work. Workshops will continue to be held as progress is realized on this important water supply project for New Castle County.

--Martin Wollaston




# Upper Christina Plan Update

**F**or years, the Upper Christina River has periodically risen and eroded its banks during storm events as it flowed through Newark. In 1993, the U.S. Soil Conservation Service (SCS) completed a study of this issue that was requested, and funded, by the City of Newark. Among the SCS recommendations offered was the formation of two committees to address current and future problems.

The Water Resources Agency was asked by the City of Newark to assist with coordinating the activities of these two committees. One of them, an Interstate Committee for the Upper Christina Watershed consists of representatives from the three states through which the Upper Christina River flows: Pennsylvania, Maryland, and Delaware. The second group, dubbed the "Arbour Park/Christina River Working Group" consists of residents, the City of Newark, and the SCS.

The Interstate Committee is developing a Watershed Action Plan designed to prevent increased flooding and erosion from development in the most rural areas of the watershed located primarily in Maryland and Pennsylvania. This interstate cooperation is important because the Upper Christina originates in these undeveloped areas of Pennsylvania and Maryland before flowing across the Mason-Dixon line into suburbanized New Castle County. Components of the Watershed Action Plan include strengthening of existing floodplain, stormwater, and erosion control ordinances, and preserving open spaces. The Interstate Watershed Committee meets regularly on a rotating basis in each of the three states to promote active communication across state lines.

The SCS also recommended that the City form a local Working Group to examine potential solutions to the erosion and flooding concerns. After a year-long study, the local Working Group submitted its report to the City of Newark Council recommending several structural and non-structural alternatives.

However, there were severe disagreements among the Group's members and a dissenting group prepared and submitted its own report for Council. The City of Newark Council is considering the recommendations of each of these reports and the costs and benefits of their implementation to resolving erosion and flooding along the Upper Christina River. 

--Gerald Kauffman

# National Park Service Focuses on the White Clay Creek

**I**n 1991, the U.S. Congress authorized the National Park Service (NPS) to study the White Clay Creek watershed to evaluate it for potential inclusion in the National Wild and Scenic Rivers System (NWSRS). The NWSRS was established by Congress to permanently protect rivers that have outstanding natural, cultural, and recreational attributes.

This is the first time a Wild and Scenic study has looked at the entire watershed of a stream. If the Wild and Scenic designation is granted by Congress, it will guarantee that the protected portion of the White Clay Creek will remain free-flowing. Additionally, all Federal actions within the designated area would have to be consistent with the Watershed Management Plan being developed for the area.

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*The Water Resources Agency's major concern has been to impress upon the National Park Service the critical value of the White Clay Creek for current and future public water supply.*

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The Water Resources Agency has participated in the Study since its inception. The WRA was asked by the NPS to serve as a member of the Study Task Force. In addition, the Agency chairs the Water Resources Subcommittee. As chair, the WRA's major concern has been to impress upon the NPS the critical value of the White Clay Creek for current and future public water supply. Both the City of Newark (3 MGD) and the Wilmington Suburban Water Corporation (30 MGD) withdraw water from the Creek.



Additionally, the WRA's WATER 2000 PLAN, the State and regionally adopted water plan for New Castle County, recommended two sites within the White Clay Creek watershed for future reservoirs. These sites, known as the Churchmans Reservoir and Thompson Station Reservoir sites, would be jeopardized if included in the Wild and Scenic designated area. The Delaware River Basin Commission has adopted the WATER 2000 PLAN as part of its regional plan.

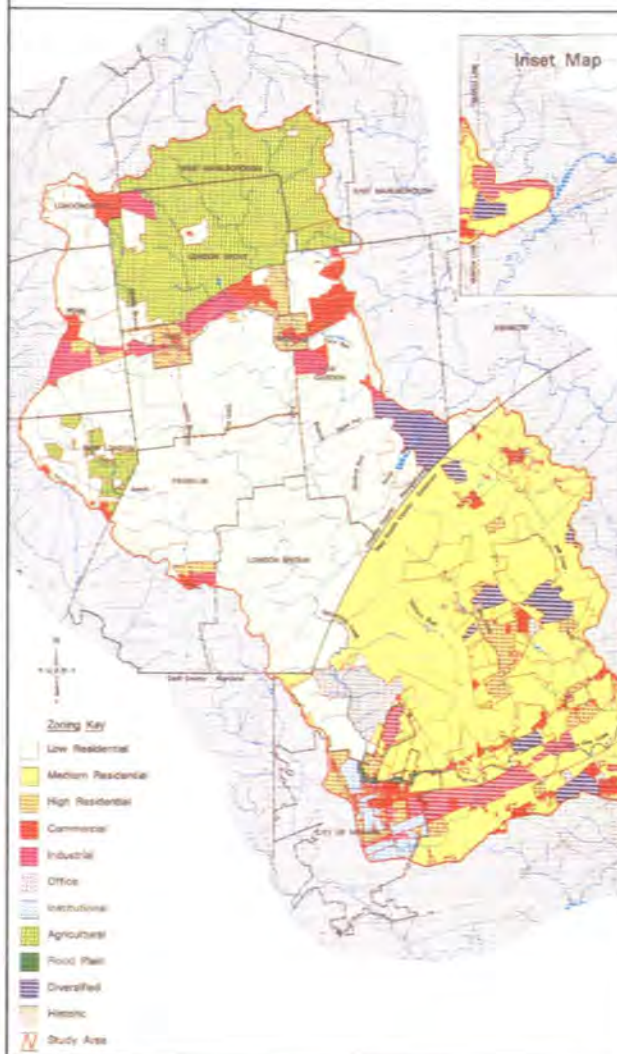
Currently, these reservoir sites are being evaluated as future water supply alternatives in the Churchmans Reservoir Environmental Impact Statement project under the supervision of the U.S. Army Corps of Engineers. The WRA believes that Federal designation of these sites as Wild and Scenic would be inconsistent with the Federally directed Churchmans EIS and the DRBC's adopted plan. The WRA has, and will continue to insist that these two areas are excluded from any of the Wild and Scenic designated areas and remain eligible for future reservoir development.

The WRA is currently developing a series of maps of the White Clay Creek Wild and Scenic study area through a contract with the NPS. The maps detail features within the study area, including hydrology, jurisdictional boundaries, zoning, and land use. The NPS will utilize these maps in developing the Watershed Management Plan for the study area.


To date, the NPS has released a "Resources and Issues Report," a "Landowner Survey," and a draft "Eligibility Report." During 1995, a Watershed Management Plan for the White Clay Creek study area will be developed and presented to local and State jurisdictions and the Federal government for formal adoption. The Study is scheduled for completion by the end of 1995. 

--Thomas Russell

## White Clay Creek Wild and Scenic River Study Area Base Zoning



## Cooperation On The Christina

lean water in the streams of the Christina River Basin is necessary for the citizens and businesses of New Castle County. These streams form in Pennsylvania and Maryland and flow through the hills of northern New Castle County to the Delaware River at Wilmington. There are four major streams in the Basin: the Brandywine Creek, White Clay Creek, Red Clay Creek and Christina River. Preservation of the quality of these streams is an important concern since they provide over 75% of the public drinking water supply for northern New Castle County.

In 1994, a bi-state Christina Basin Water Resources Management Committee was established by the Delaware River Basin Commission (DRBC) to examine water quality issues involving the Christina Basin streams of Delaware and Pennsylvania. The Water Resources Agency for New Castle County was requested to participate on this Committee. Other agencies represented on this DRBC-chaired Committee include the Delaware Department of Natural Resources and Environmental Control, the New Castle Conservation District, the Pennsylvania Department of Environmental Resources, the Chester County Conservation District, the Chester County



Water Resources Authority, the U.S. Geological Survey, and the U.S. Environmental Protection Agency.


Prior to the creation of this Committee, the two states had differing priorities regarding stream water quality management in the Christina Basin. The principal purpose of this watershed-based effort is to coordinate the water quality management policies of Pennsylvania and Delaware. Currently, the streams in the Christina Basin have impaired water quality with higher than normal levels of sediment and bacteria. Additionally, the quantity of nutrients, such as nitrogen and phosphorous, exceed acceptable limits during the summer and fall when streamflows are low. The Christina Basin Water Resources Committee is developing a unified strategy to improving the quality of these streams which supply drinking water to residents on both sides of the Mason-Dixon Line.

The Christina Basin Water Resources Committee is addressing point and non-point source water quality concerns through a two-part strategy. Part I consists of a 5-year stream monitoring program aimed at controlling point sources of pollutants such as wastewater discharges from pipes. This point source program, known as a Total Maximum Daily Load (TMDL) approach, is being conducted by assessing the quality of wastewater discharges from pipes and collecting stream water quality data at over 30 monitoring stations. The monitoring data will be used to develop a water quality management model of the watershed.

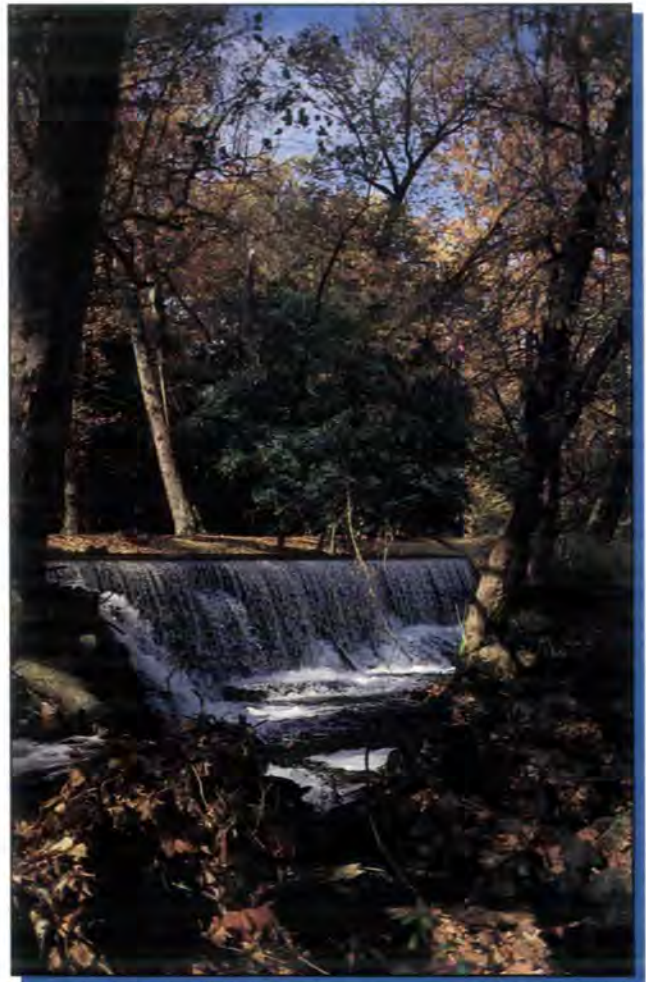
The second part of the strategy has also been initiated. Part II consists of identifying the contribution of pollutants which originate from non-point sources such as urban and rural stormwater runoff. Non-point sources contribute pollutants such as sediment, road oils, fertilizers, and metals to the streams. The contribution of the non-point pollutants will be quantified by collecting land use and soils data and establishing a stormwater monitoring program. The watershed model developed in Part I will be modified to include the non-point information determined in Part II.

Using the results of the Christina Basin watershed model, sub-watersheds will be prioritized for water quality improvements. Programs will be developed for addressing point and non-point sources of pollutants. Point source programs may include improvements to wastewater treatment plants aimed at reducing pollutant loads to streams. Non-point source programs may include techniques such as public education, detention ponds, and stream buffers to control stormwater runoff and reduce water quality impacts to the receiving streams.

The Water Resources Agency is assisting with this watershed-based approach to improving stream water quality in the Christina Basin. The WRA has requested matching funds to support the 5-year Part I "Point Source Monitoring Program." During the Part II "Non-Point Source Pollutant Program," the WRA is serving as a local coordinator of the work in New Castle County. The WRA will also provide assistance by mapping information about the Christina Basin watershed, such as drainage boundaries, land use, zoning, soils, and topography using the Agency's AERI II data management system.

The Christina Basin Water Resources Management Strategy represents a 5-year cooperative effort by Pennsylvania, Delaware, and the Federal government toward improving the quality of the streams which are used for the primary source of drinking water in New Castle County. 

-- Gerald Kauffman





# FINANCIAL SUMMARY

FISCAL YEAR 1995

## *Operating Budget Overview*

### Estimated Expenditures

Personnel	343,858
Fringe Benefits	103,939
Travel / Civic	6,500
Communication / Utilities	4,500
Materials / Supplies	6,000
Contractual Services *	68,880
Equipment (AERI)	10,000
<b>Total</b>	<b>543,677</b>

### **\* Contractual Services**

Data Management	29,880
Automobiles	9,000
Stream Gage	4,000
Printing	25,000
Conservation Program	1,000
<b>Total</b>	<b>68,880</b>

### Revenues

#### **Source**

New Castle County	351,677
City of Wilmington	34,500
City of Newark	34,500
State of Delaware	83,000
New Castle Board of Water & Light	5,000
Carry-Over	15,000
Income	20,000
Grant	0
Contribution	0
<b>Total</b>	<b>543,677</b>



# FINANCIAL SUMMARY

## FISCAL YEAR 1989 - 2000 *Capital Budget Overview*

Capital Projects	Authorized FY'89 - FY'94	Approved FY'95	Proposed FY'96 - 2000
Glasgow Recharge Project	50 [50]	0	0
Cockeysville Formation Analysis	130 [33]	0	0
Christina Basin Network	0	0	310
Churchmans EIS Phase II*	200 [600]	200	400
Churchmans Reservoir Land	0	0	1920
Thompson Station Reservoir Land	0	0	6775
Pipeline Crossing C&D Canal	57	530	0
AERI System Enhancement	130 [25]	0	90
WRPA Phase III	0	0	175
Groundwater Monitoring/Preserves	100**	100**	2140
Multi-Media Education Center	0	0	50
Water Resources Education Center	0	0	120
<b>TOTAL</b>	<b>667</b> <b>[708]</b>	<b>830</b>	<b>11980</b>

(Funding in Thousands)

Notes: [ ] Denotes funding from non- New Castle County Sources

\* Previous EIS Phase I Funding was \$600,000

\*\* Approved in New Castle County Public Works Budget





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Information for this report was developed by the staff of the Water Resources Agency for New Castle County. The report was edited by Martin W. Wollaston; the layout and design was prepared by Nicole M. Minni and Marcia L. Horner. For more information contact the Water Resources Agency: 2701 Capitol Trail, Newark, DE 19711 (302) 731-7670.

