



## Water Resources

Water resources have shaped settlement patterns in this region long before the inception of Broome County, from indigenous peoples settled along its rivers using them for sustenance, travel, and navigation to settlers who envisioned a new village at the meeting of the Chenango and Susquehanna Rivers, providing transportation and a corridor for economic development.

Since then, due to the establishment of the railroad and highway systems, the rivers have become less important as a means of transportation, but they still provide essential services. Today, the County depends on surface and ground water for drinking, recreation, industry and agriculture. Along with their associated wetlands and floodplains, they provide significant services including a healthy public water supply, groundwater recharge, sediment and erosion control, flood protection, scenic enhancement, recreation and tourism opportunities, and agricultural productivity.



*Confluence of the Susquehanna and Chenango Rivers*

Clearly, the provision of clean and plentiful water is essential to the success and prosperity of the County. Residents need water for drinking and daily activities, and businesses rely on water for daily operations, from industrial operations to local farms and tourism. Therefore, water resources are extremely important in county-wide comprehensive planning. The ability to provide this resource can be impacted by programs and policies at every level of government, including decisions about permitting development and where to construct infrastructure, as well as the development of zoning laws or other land use ordinances.

By extension, these decisions impact the bottom line because maintaining and preserving water resources can be expensive. Communities need to assess how to invest dollars in water quality. Should we invest public dollars on building and maintaining infrastructure or take a more proactive approach, anticipating what problems may occur and implementing programs and policies to mitigate those issues. It is essential to understand the associated costs, benefits and alternatives when making these decisions.

Properly managing our water resources is a complicated issue and can be a tremendous challenge that leaves many local communities paralyzed by the increasing complexity of regulations and technical data. Furthermore, impacts on water resources are intermunicipal



and land use and water impacts in one municipality may be seen in the water resources of their neighbor, or further downstream. In order to identify the most effective management strategies for managing water resources it is essential that we take an approach that integrated and collaborative. By examining these issues them at a County-wide scale, there is an opportunity to leverage resources and partnerships, recognizing that this is a shared resource.

This chapter aims to identify the various water resources in the county and the associated management issues that we are facing. While water infrastructure is touched upon, more information can be found in the Infrastructure chapter.

## Surface Waters

There are two major watersheds located in Broome County. The majority of the County, nearly 90%, drains to the Susquehanna River, the largest river basin on the Atlantic Seaboard. There are several major tributaries in Broome including the Chenango, Tioughnioga and Otselic Rivers and major streams such as Occanum, Choconut, Nanticoke, and Castle Creeks. The remaining 10% of the County is located in the Delaware River watershed, along a small portion of Broome's south-eastern boundary. The Delaware's main tributary in Broome is Oquaga Creek.

There are two significant lakes in Broome County. Whitney Point Reservoir, the largest lake in the County, drains 255 square miles and is a US Army Corps of Engineers (ACE) flood control structure located on the Otselic River. Oquaga Lake, located in the eastern portion of Broome, is 134 acres. Other small lakes and ponds are scattered throughout the area.

The NYS DEC has designated parts of the Susquehanna River in Broome County as "Class A" indicating that its highest and best use is for water supply for human consumption. A significant portion of the City of Binghamton, along with some of the neighboring communities that tap into their system, depends on these surface waters for consumption, amounting to about 20% of the public water use in the County.

## Streams

All waters of the state are provided designation based on best usage of each waterway. AA or A are waters best used as drinking water, B for swimming and other recreation, C for waters supporting fisheries and the lowest classification is D. The NYS DEC requires a permit to alter the banks or bed of a protected stream, those classified as C or better. As stated previously parts of the Susquehanna are designated as Class A. All others in the County are Class C or better. Waters may also have a standard of (T) or (TS), indicating that they may



support a trout population or trout spawning. These waters may have additional permitting requirements. In Broome County Dudley, Nanticoke and Oquaga Creeks are listed with this designation.

In general, stream buffers of at least 100 feet are recommended to provide adequate stream protection. About 16.8 square miles in the County are encompassed in the zone within 100 feet of major streams. In addition, maintaining vegetated buffers around lake shores can help maintain the water quality of these systems.

## **Aquifers**

In Broome County, about 80% of water for public use in comes from ground water sources. There are several aquifers located beneath the Susquehanna River, the Chenango River and their surrounding floodplains. These are referred to as unconsolidated aquifers, characterized as having frequent discharge/recharge with the streams that lie above them. Bedrock aquifers are common in rural parts of the County, which are hydrologically isolated from large streams and hold water in fractures in the bedrock.

Aquifers are classified based on importance as a public water supply, productivity, and vulnerability to pollution. Johnson City, Endwell, Endicott, and Vestal are dependent on primary aquifers (highly productive, vulnerable aquifers being used, mainly as a water supply, by a large percentage of residents). There are also a number of principal aquifers which are classified as highly productive, but used by a lower percentage of the population.

In addition, all of Broome County that is contained within the Susquehanna River Watershed is federally designated by the Environmental Protection Agency (EPA) as a sole source aquifer, the Clinton Street-Ballpark Aquifer System. Sole source aquifers are those supplying 50 percent or more of the area's drinking water, which, if contaminated, would create a significant hazard to public health and could not be replaced by another source. This designation ensures that an environmental review will occur for development projects involving federal financial assistance. These include highway improvements and new road construction, public water supply wells and transmission lines, wastewater treatment facilities, and others.

## **Floodplains**

Flooding has historically been a significant threat to property in Broome County, with multiple significant flooding events, including two historic floods in June of 2006 and September of 2011. The Federal Emergency Management Agency has recently gone through the process of updating the floodplain maps in Broome County. According to these new



maps, about 26 square miles in Broome County, lie within the Special Flood Hazard Area, the area inundated by a flood having a 1-percent chance of occurring in any given year, and another 3.7 square miles is located in the 500-year floodplain. This includes several urbanized areas, which makes flooding a primary concern for the region.

## **Wetlands**

Any development impacting wetlands requires a permit from the state or federal government. Wetlands are periodically or permanently flooded areas that support plant and animal species adapted to living in those conditions, including swamps, bogs, marshes, and ponds. They function to trap and slowly release surface water providing natural flood control often otherwise provided by expensive dams and levees. Wetlands and their buffers are also important to protect water quality and hydrology.

There are approximately 2,190 acres of state designated wetlands in Broome County. New York State protects all wetlands at least 12.4 acres in size. Smaller wetlands may be protected by the State if deemed locally unusual or important.

The US Army Corps of Engineers (ACE) has the authority to protect wetlands that are larger than 1 acre. There are about 13,600 acres (21.25 mi<sup>2</sup>) listed on the National Wetlands Inventory, protected by the federal government, including the Susquehanna, Chenango and Tioughnioga Rivers which comprise 3700 acres. The surface acreage of all other federally protected wetlands is about 9900 acres (15.5 mi<sup>2</sup>).



## Management Issues

When considering water resource management issues it is important to remember that the relationship between surface water and groundwater are not isolated from one another. Water moves through gravel layers underlying the river or stream beds between the two. Similarly, land is connected to water systems through wetlands and floodplains. These provide valuable services that help to naturally maintain healthy water resources including storing and slowly releasing surface water, reducing flood peaks and velocities, reducing erosion, reducing sediment and filtering nutrients and impurities, promoting infiltration and aquifer recharge, and reducing the frequency and duration of low flow. In turn, they enhance wildlife diversity and increase recreation and tourism opportunities.

This section aims to identify those management issues that are currently facing Broome County. It also examines the actions being taken to deal with these issues by various agencies or organizations at all levels from local to federal initiatives.

## Water Monitoring and Reporting

At the state level, New York maintains several lists intended to track the status of water quality and meet Federal requirements. They use these to help set statewide priorities for programs and funding. As a result, when setting local priorities it is prudent to take these into consideration as they may be priorities for state programs and funding opportunities. Furthermore, some of the listings may be associated with regulatory requirements intended to improve the identified water quality issues. While it is important to take these into consideration, it is also important to note that it is essential for local municipalities to look at their own priorities and local knowledge as well when considering associated actions. Often additional requirements are integrated into existing water quality programs that are included in this chapter. Therefore, programs are ever changing to meet varying circumstances and new issues as they arise.

State programs intended for the assessment and monitoring of water quality issues include the following:

- Priority Waterbodies List (PWL) – This list characterizes information on general water quality, the degree to which designated uses are supported and identify water quality issues.
- NYS Water Quality Report (Section 305(b) Report) – This is based on a federal requirement that states are to submit a report on the quality of waters in their state every two years. It is a compilation of water quality assessment information contained in all PWL Basin Reports.



- List of Impaired/TMDL Waters (Section 303(d) List) – Section 303(d) of the Clean Water Act requires states to compile and submit a list of waters that do not meet water quality standards and thereby do not support their designated uses. This results in the development of a Total maximum Daily Load (TMDL) or other appropriate strategy to restore the water use.

## **Flooding**

While being located in a scenic river valley is a valuable asset to Broome County, the tendency toward flooding creates a hazard to its communities. History has shown the Susquehanna River Basin to be one of the most flood-prone regions in the nation. Higher gradient streams in the lower basin and highly erodible soils result in frequent flash flooding and excessive erosion. Recently, Broome County has been subject to multiple major flooding events which have received federal disaster declarations. The County suffered historical river flooding in June of 2006 and again, only five years later, in September of 2011, both of which received a federal disaster declaration. Flooding due to high river levels is not the only concern, there have also been impacts related to ineffective drainage and flash flooding, most significantly during November of 2006, which also received a federal disaster declaration.

Locally, flooding events have had devastating community impacts. These include immediate impacts such as the displacement of residents and business, and the endangerment of public health and safety. There are long term impacts including economic hardships for residents, businesses and local municipalities, damage to local infrastructure and negative impacts on local economies. Environmental impacts include disrupted wastewater treatment for wastewater treatment plants and private septic systems, as well as the threat of chemicals and other pollutants washed away from flooded commercial and industrial properties.

Currently there is a significant system of publicly owned flood control structures that are operated and maintained within the County. There are several federally owned flood control structures within the County, located in the City of Binghamton, Towns of Union and Vestal, and the Villages of Endicott, Johnson City, Lisle, Port Dickinson, and Whitney Point. These structures were federally built by the US Army Corps of Engineers, and are maintained by the NYS Department of Environmental Conservation. In addition Broome County owns and maintains twenty-four flood control structures, referred to as “watersheds”.

In addition to these structural flood mitigation measures, local communities have also incorporated floodplain ordinances into their local code. These ensure that development within the floodplain is built to acceptable standards, minimizing impacts to the structure or



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neighboring properties, and discourage inappropriate land use in the floodplain (i.e. businesses dealing with hazardous chemicals). Local communities have also participated in the acquisition of properties substantially damaged during flooding events. Development is prohibited on these properties, thus removing vulnerable structures and aiding in flood mitigation.

There are several County lead initiatives that aim to provide information and guidance for reducing flooding impacts in our community. The goal is to prevent the loss of property and life through mitigation actions. One of these is the development of a County-wide Hazard Mitigation Plan. In order to receive funding for hazard mitigation projects from the Federal Emergency Management Agencies (FEMA) communities are required to have a FEMA approved hazard mitigation plan in place outlining a strategy for reducing vulnerability to hazards. While the plan addresses all hazards, the primary focus is on flooding. The plan was originally adopted in 2008, with the most recent update completed in early 2013. The Broome County Department of Planning and Economic Development led this planning process with cooperation from all 24 Broome County municipalities. The most recent plan focuses on specific projects with measurable impacts flooding and other hazards.

Broome County Planning also coordinates a group called the Flood Task Force. This group has representatives from local, state and federal government, including engineers, Soil and Water Conservation District staff, code officers and elected officials. The group serves to educate its members on topics related to flooding such as flood map amendments, flood insurance, and mitigation funding programs, as well as advocating for changes in federal and state regulations related to flood policy and hazard mitigation.

### **Stormwater**

There is a history of flash flooding and poor drainage in Broome County which exacerbates flooding events due to high river levels. Furthermore, localized flooding and erosion problems lead to significant damage to infrastructure and property during less significant storm events, most notably in the federally declared event in November of 2006. Improperly managed stormwater is a leading cause of flooding and erosion, which can lead to property damage, cause road safety hazards, and clog catch basins and culverts with sediment and debris. In addition it carries materials and pollutants from paved surfaces to our waterways. This can degrade the quality of drinking water, damage plant and wildlife habitat, and makes water resources generally unsuitable for consumption, recreation, or other uses.

In order to minimize these stormwater impacts New York State, as a requirement under federal regulations, has issued three State Pollutant Discharge Elimination System (SPDES) general permits required for activities associated stormwater discharges.



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- One of these requires permits for stormwater discharges from Municipal Separate Storm Sewer Systems (MS4s) in urbanized areas. MS4 refers to a stormwater conveyance or system of conveyances owned or operated by a public body (i.e. state, city, county, or district). Permittees are required to develop Stormwater Management Program (SWMP) and submit annual reports to the State. There are 14 municipally operated MS4s in Broome County; City of Binghamton, Town of Binghamton, Chenango, Conklin, Dickinson, Endicott, Fenton, Johnson City, Kirkwood, Maine, Port Dickinson, Union, Vestal and Windsor.
- Construction activities disturbing one or more acres of soil must be authorized under the General Permit for Stormwater Discharges from Construction Activities. All municipalities are responsible for ensuring that local projects are adhering to the conditions of the general permit.
- The Multi- Sector General Permit for Stormwater Discharges Associated with Industrial Activities (MSGP) addresses stormwater runoff from industry specific activities, including wastewater treatment plants.
- Special requirements apply when stormwater is discharged to a water body identified on the New York State 303(d) list or covered by an EPA-approved Total Maximum Daily Load (TMDL), used to identify waters where designated uses are not fully supported by existing water quality. Water bodies in Broome County that are currently listed on the 303(d) list are Whitney Point Lake (Triangle), Fly Pond and Deer Lake (Sanford).

Broome County and all other municipally operated MS4's, as identified above, along with Tioga County and the Town of Owego have an intermunicipal agreement in place to work together on stormwater issues through the Broome-Tioga Stormwater Coalition. The group works together to share information and collaborate on ways to meet the requirements set forth in state and federal stormwater regulations. This includes utilizing mapping resources, collaborating on annual reporting, working together to develop education and outreach materials, and the development of local laws and ordinances.

One of the most recent issues is the incorporation of green infrastructure practices into the NYS Stormwater Design Manual and stormwater regulations. These are strategies that maintain or restore the natural flow pattern by allowing water to slowly permeate into the ground. The idea behind using these strategies, including rain gardens, bioretention areas, vegetated swales, green roofs, porous pavement, et cetera, is that they will be less costly to maintain than traditional grey infrastructure project managing stormwater. The design manual provides designers with information on how to size, design, select, and locate stormwater management practices at a development site to comply with State stormwater performance standards. However, barriers to their incorporation locally include regulatory limitations in local codes and a lack of familiarity with these strategies, limiting local progress.





## Wastewater

Wastewater consists of domestic or sanitary wastewater, coming from residential sources with the primary concern being disease organisms, and industrial wastewater, discharged by manufacturing processes and commercial enterprises, potentially containing chemicals and other waste products used in their processes. Effective wastewater treatment is essential to ensure that these waste products do not reach local water bodies, creating concern for public health and safety and other water quality problems.

Wastewater treatment plants in Broome County primarily serve the Binghamton metropolitan area with the exception of several small systems in the eastern part of the county. There are a total of ten wastewater treatment plants located in the County, the Binghamton-Johnson City Joint Plant having the largest capacity. There are also plants located in the Village of Endicott, Town of Chenango, Village of Deposit, Town of Sanford, Town of Windsor, Town of Fenton, Town of Binghamton and Village of Whitney Point.

A major issue for the communities dependent on these treatment facilities is proper planning and decision making to ensure the plant's capability to discharge increased volumes of wastewater necessary for growth. This is especially an issue for Binghamton-Johnson City plant which services a large portion of the population, and also has a system with several Combined Sewer Overflows (CSOs). CSOs collect runoff, domestic and industrial wastewater in the same pipe. As a result during periods of heavy rainfall, capacity may be exceeded causing the excess to overflow directly into the receiving waterbody without treatment.

Another major issue for local wastewater treatment plants is ensuring that systems are upgraded to accommodate changing and new State and Federal regulations regarding new contaminants or acceptable levels of known contaminants. This can be a very costly endeavor, especially for the smaller, more remote plants.

A major wastewater management issue that is being dealt with at the Binghamton-Johnson City Joint Sewage Treatment Plant (B-JC STP) is the development of the Flow Management Plan, completed in 2012. The Flow Management Program as described in the plan is in response to a 2007 Consent Order from the NYS Department of Environmental Conservation. While the plan found that the collection systems are currently in compliance with NYS permits, the purpose of the program is to proactively manage wet-weather wastewater flow so that levels do not exceed the design and treatment capacity of the plant in the future.



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The plan is intended as a tool to enhance economic development opportunities and community growth while promoting more efficient use of current capacity. The four major components of the plan to remain in compliance with discharge permits are a sewer connection application program, an offset program requiring an equal amount of infiltration and inflow removal for any added flow, a Capacity, Management, Operation and Maintenance Program to help municipal users operate and maintain their sewage collection systems, and a Treatment Management Plan to forewarn of potential noncompliance events and correct them. The plan will be implemented sometime in 2013 or 2014 pending state approval.

Private septic systems are the primary method for sewage disposal in more rural and suburban parts of the County. The Broome County Health Department permits, monitors and documents all new and replacement septic systems to ensure they function according to the Broome County Health Code. A faulty septic system can cause impairments to water quality and aesthetics. Violations due to faulty septic system are regulated by the Health Department who ensures that these systems are brought back up to code.

### **Agriculture**

Poor agricultural practices can pose a threat to water bodies through the discharge of fertilizers, wastes and chemicals from farming operations to surface waters or through the loss of soils most suitable for farming. New York's Agricultural Environmental Management (AEM) program was developed to identify and correct environmental risks to watersheds and promote public understanding and support for agricultural and environmental initiatives. The AEM program consists of problem identification, planning, and implementation of environmental stewardship practices, effective and confidential environmental risk assessments, and cost sharing for implementation of best management practices to correct identified environmental risks.

AEM not only promotes environmentally sound agricultural practices, but aids compliance with water quality regulations impacting agriculture. Concentrated animal feeding operations (CAFOs) are agricultural facilities where large numbers of animals are kept within a much smaller area than traditional pasture operations. The concentration of the wastes from these animals increases the potential to pollute water and impact the environment. CAFOs are considered to be point sources under the federal Clean Water Act, and thus, must obtain a discharge permit. The NYSDEC has agreed to implement a general SPDES permit program for regulating CAFOs. All CAFOs covered by a general permit are required to have a site specific Certified Nutrient Management Plan (CNMP) developed in accordance with the Natural Resources Conservation Service (NRCS) that must be certified by NYSDEC.



## Chesapeake Bay TMDL

The Chesapeake Bay watershed covers 64,000 mi<sup>2</sup>, and includes portions of 6 states and the District of Columbia. The headwaters in the Upper Susquehanna watershed in New York include Broome County. Due to significant degradation from excess pollutants, a federal executive order was issued directing the US Environmental Protection Agency (EPA) to reduce pollution entering the Bay. The EPA, through the Chesapeake Bay Program, developed a total annual allocation for nitrogen (N), phosphorus (P) and sediment considered the maximum that the Bay can receive and meet water quality standards, a Total Maximum Daily Load or “TMDL”.

Primary nutrient sources are sewage, cattle manure, inorganic fertilizer and atmospheric nitrogen, and primary sediment sources are agriculture, stream bank erosion and construction. All states (and the District of Columbia) in the watershed were required to submit Watershed Implementation Plans (WIP) to meet the target allocations and provide reasonable assurance that reductions will be achieved and maintained by 2025. If not, the EPA will institute backstops (actions to ensure progress), including program review, denying permits, and targeting compliance and enforcement actions as necessary to meet water quality goals.

New York's Phase I WIP was developed and submitted by the NYS Department of Environmental Conservation (DEC) in cooperation with the Upper Susquehanna Coalition (USC) in September 2010, and in January of 2013 New York's final Phase II WIP was submitted to the EPA. USC, NYSDEC, Soil and Water Conservation Districts and other agencies have begun implementing the WIP, tracking progress and reporting to the EPA. In Phase II New York expended considerable effort to determine the best balance of load reductions among the agriculture, wastewater and stormwater sectors, impacting many of the issues noted above. Reductions in agricultural loads represent the greatest proportion of the total controllable load from New York and the most cost effective reductions. Wastewater reductions will be implemented through robust legal requirements (numeric effluent limits) to meet numeric nutrient criteria. Reductions in stormwater load through retrofit requirements are by far the most cost intensive and are a very small proportion of the total New York load and therefore will not be the major focus of Phase II.

## Natural Gas Drilling

As a result of the increased accessibility of natural gas due to advances in technology, natural gas production is expected to increase in the near future pending the completion of state level studies and approval of state regulations regarding the drilling technique referred to as hydrofracking. While it is difficult to assess what programs and policies will be



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implemented prior to the establishment of policy at the state level, there are several aspects of water resource management that may need to be addressed as the process moves forward.

- Water Consumption - Due to the nature of the drilling process, water withdrawals and consumptive uses require monitoring to ensure that surface and ground water levels are adequately maintained. The Susquehanna River Basin Commission (SRBC) regulates all water withdrawals and consumptive water uses within the Susquehanna basin for natural gas. Prior approval from SRBC through an application process is required.
- Water Quality - The NYS Department of Environmental Conservation (DEC) has developed draft regulations that are intended to protect against water contamination. These include mandated casing and cementing program for each well to prevent the flow of oil, gas or salt water underground and setbacks from municipal water wells, surface water bodies and streams.
- Wastewater Disposal – Wastewater, also known as flowback water, resulting from hydrofracking that is not recycled, requires proper disposal due to contamination that occurs during the process. According to recommended regulation the NYS DEC will permit the disposal of flowback water associated with natural gas development. Measures include a required DEC-approved plan for disposal of flowback water and production brine, monitoring through drilling and production waste tracking, and treatment capacity analysis for water treatment facilities that wish to accept flowback water, along with a contingency plan.

While the role of local municipalities in the water resource management associated with increased natural gas development in this region still remains unclear, awareness and education regarding water management policies and programs among local municipalities and agencies, as well as residents and businesses is key as this process moves forward.