

water resources

Tompkins County is fortunate to have an abundant supply of water. Water is essential for all human, plant, and animal life and helps to maintain a variety of ecosystems. Water in streams and in aquifers supplies drinking water to residents. Water is used by industry directly as an input to industrial processes and indirectly as a vehicle for disposing of waste heat. Water is used for a variety of recreational purposes, including boating, swimming, and fishing.

PRINCIPLE

Tompkins County should be a place where water resources are clean, safe, and protected.

POLICIES

It is the policy of Tompkins County to:

- Protect the ecological, economic, and recreational functions of Cayuga Lake.
- Protect aquifers from contamination by limiting development within groundwater recharge areas.
- Protect streams and their watersheds to maintain water quality, manage stormwater and flooding, and enhance ecological diversity.
- Preserve existing wetlands and restore wetland functions.
- Support water-dependent or -enhanced development of the City's urban waterfront while conserving important natural resources and providing public enjoyment of the waterfront.

SNAPSHOT OF THE COUNTY TODAY

Tompkins County accounts for about half of Cayuga Lake's watershed. Fully 80 percent of the county's water drains into Cayuga Lake and, eventually, north into Lake Ontario. The remainder drains south to the Susquehanna River and eventually into the Chesapeake Bay.

The three major categories of water resources are surface water, groundwater, and wetlands. Surface water consists of streams, creeks, lakes, and ponds.

CAYUGA LAKE. Cayuga Lake is the most prominent water feature in Tompkins County. One of the eleven Finger Lakes, Cayuga Lake is the longest and widest, and it takes approximately ten years for water to cycle through the lake. Over 300 species of birds make seasonal use of Cayuga Lake. Although water quality is generally high, a number of specific concerns have been identified. Chief among these is sedimentation which is a significant impairment to water quality and wildlife habitat.



Photo by: TCGPD

Cayuga Lake from Ithaca Town Park

Sedimentation is a significant impairment to water quality and wildlife habitat.

Glacial action and centuries of scouring and erosion have created dramatic landforms, including a variety of gorges, waterfalls, and steep escarpments that provide great scenic value around the lake. From many locations along the steep hillsides and roads bordering the lake, views of the water, the Ithaca urban area, and the opposite shore are spectacular.

Regional efforts are underway to create

and promote the Cayuga Lake Scenic Byway and Blueway Trail, encircling the lake, to enhance this tourism resource. While sail and motorboat operators are served by public and private marinas, boat launches, and public parks, and there are some public access points around the lake, there is an ongoing call for more places to fish, launch a canoe or kayak, dock a boat, swim, and enjoy waterfront activities.

Due to its role as a major transportation route, Cayuga Lake was a center of commerce throughout much of the nineteenth century. Today you can still see evidence of the area's role as a passenger transportation center and trans-shipment point for goods in Ithaca's west end. The natural beauty of Cayuga Lake has also long attracted the development of cottages and year-round homes along its shores. Its abundant cool waters have attracted industries dependent on its chilling capacity: Cayuga Power Plant and Cornell's Lake Source Cooling heat exchange facility are both located on the east shore.

The lake is also one of the major sources of drinking water for the central part of the county. The Bolton Point Water System, located on the east shore, provides water to residents

Water Resources



Source: Tompkins County GIS

in the Towns of Dryden, Ithaca, Lansing, and Ulysses, and in the Villages of Cayuga Heights and Lansing. This water supply supported much of the residential growth in Tompkins County in the latter decades of the twentieth century.

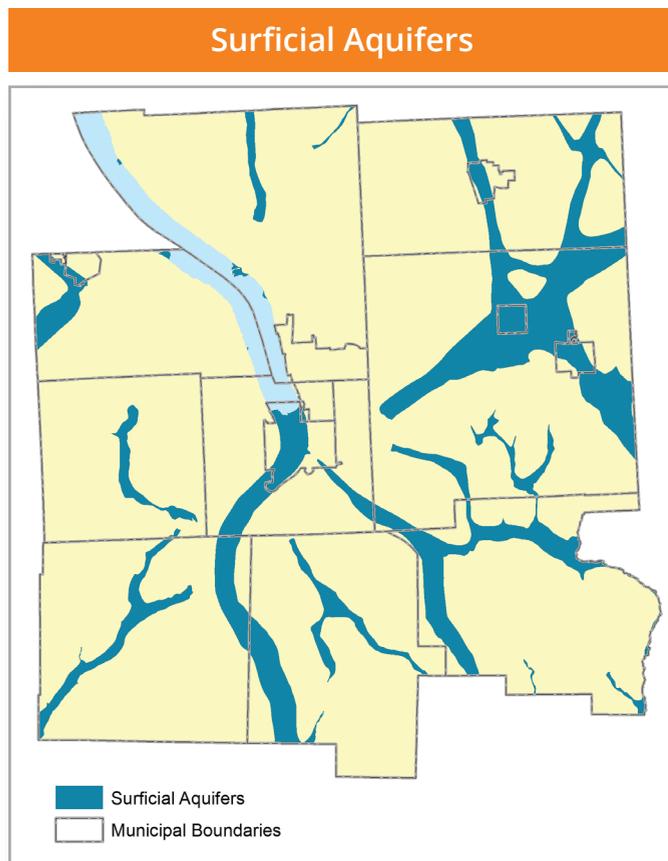
STREAMS. There are over 300 miles of perennial streams in the county that contain flowing water year round, countless intermittent, seasonal streams, and 11 lakes and ponds greater than ten acres in size. Major streams running through the county, include Salmon Creek, Fall Creek, Cascadilla Creek, Sixmile Creek, Cayuga Inlet, Enfield Creek, Trumansburg Creek, and Taughannock Creek. Over time, streams can shift location as they seek equilibrium within the existing geology.

GROUNDWATER. Groundwater is stored in the underground pores between grains of sand, gravel, and silt and in the cracks in bedrock. Groundwater deposits that can be expected to yield significant quantities of water to wells are called aquifers. Areas where surface water infiltrates into these aquifers are called recharge areas and are particularly important to the protection of groundwater quantity and quality. Surficial aquifers that have the potential for significant yields cover a total area of nearly 70 square miles, or

approximately 15 percent of the county’s land area. These aquifers largely consist of sand and gravel and are present mostly in large creek valleys.

WETLANDS. Wetlands are land areas either inundated with water year-round or dry for part of the year but collect water seasonally. They are identified by the presence of hydric soils and specific wetland vegetation types. Wetlands are a critical component of natural ecosystems and provide a variety of benefits such as: (1) filtering harmful toxins, nutrients, and sediment from surface water and stormwater runoff; (2) temporarily storing floodwaters and reducing the magnitude of flood events; (3) providing valuable habitat for a diverse array of flora and fauna, including many rare, threatened, or endangered species; and (4) maintaining surface water flow during dry periods. The recreational uses associated with wetlands are also diverse and include bird watching, hunting, and botanical tourism, all of which provide indirect economic benefits to local communities. Tompkins County contains about 20,000 acres of identified wetlands, or more than six percent of the landscape.

The Tompkins County Water Resources Council’s Wetlands Committee has completed a pilot study of wetland resources in the Town of Dryden. That study, funded by the Cayuga Lake Watershed Network and the Tompkins County Soil and Water Conservation District, used more accurate and detailed data and imaging than was available when the National Wetlands Inventory (NWI) was conducted. It identified approximately 60 percent more acres of wetlands in Dryden than identified in the NWI. The study is currently being expanded to cover the entire land area of the County.



Source: Todd Miller, U.S. Geological Survey

Wetlands, by Municipality	
Municipality	Acres
Town of Caroline	1,021
Town of Danby	1,187
Town of Dryden	3,763
Town of Enfield	695
Town of Groton	1,549
Town of Ithaca	447
Town of Lansing	1,160
Town of Newfield	527
Town of Ulysses	606
City of Ithaca	127

Source: National Wetlands Inventory

AN INTERCONNECTED WATER SYSTEM. These three major classifications of water resources are distinct parts of a larger interconnected water resources system and benefit from management as a complete system. Highlighting this interconnectedness, the United States Geological Survey (USGS) has determined that approximately 60 percent of the flow in surface water streams in central New York originates from groundwater resources.

WATERFRONT. Tompkins County has approximately 26 miles of shoreline along Cayuga Lake, much of which is developed with parks, trails, retail, restaurants, utilities, housing, and a wide variety of other uses. The waterfront is home to many businesses that are water-dependent. Facilities such as marinas, boat rental services, boathouses, and the like, are absolutely dependent on a waterfront location. Many utilities take advantage of a location on or near a water body. Examples in Tompkins County include wastewater treatment facilities in the City of Ithaca and the Village of Cayuga Heights, Bolton Point Water Treatment Plant, Cayuga Power Plant, and the Cornell Lake Source Cooling heat exchange facility.

These same waterfront lands also serve important environmental and recreational functions. The Lakeshore Natural Features Focus Area was identified for the benefits this area provides for outdoor recreation, scenic views, fishing, critical habitat and biodiversity, and water quality. From boating and swimming, to biking and hiking, to picnicking at lake-side parks, the lake is a recreational draw for residents and visitors. Scenic views from the various parks are part of what makes Cayuga Lake and Tompkins County special.

ISSUES AND OPPORTUNITIES

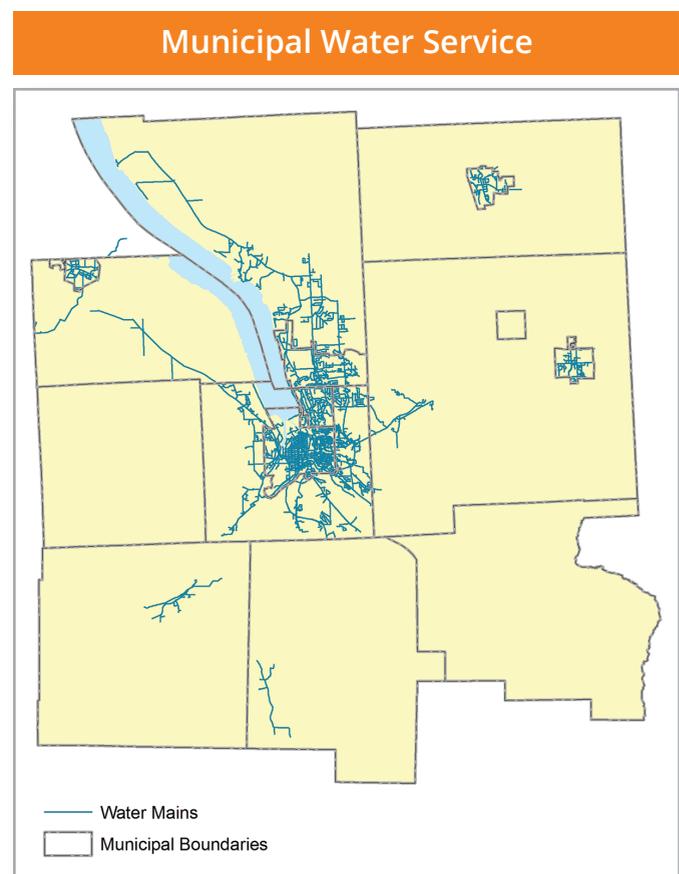
Drinking Water Supplies

Eight municipal water supply and treatment facilities serve at least portions of twelve municipalities in Tompkins County. Seven of these facilities are owned and operated by individual municipalities. Of these, three supply water to users outside of their municipal boundaries. The eighth municipal water supply and treatment facility is the Southern Cayuga Lake Intermunicipal Water Commission, also known as Bolton Point, which is owned and operated by five member-municipalities (the Towns of Dryden, Ithaca, and Lansing and the Villages of Cayuga Heights and Lansing). In addition, Cornell University owns and maintains its

own water system, serving its main campus and portions of the surrounding community. Throughout the nation, aging water infrastructure is an issue and addressing it requires assessing existing conditions; rehabilitating the system where necessary; and combining innovative infrastructure designs, management procedures, and operations for maintaining this infrastructure for future generations.

Drinking water for approximately 55 percent of Tompkins County residents comes from three water treatment facilities that rely on surface water: Bolton Point, which draws its water from Cayuga Lake; the Cornell Water Filtration Plant, which draws from Fall Creek; and the City of Ithaca Water Treatment Plant, which uses water from Sixmile Creek. Many homes also withdraw their drinking water directly from Cayuga Lake for their personal use.

Sodium is a concern in the three major public water systems as they all rely on surface water. The NYS Department of Health recommends that people who are on severely restricted sodium diets should not drink water containing more than 20 mg/l of sodium. Since the 2013 level of sodium in Bolton Point was 27 mg/l, Cornell water was 18 mg/l, and the City of Ithaca's average level was 21 mg/l, customers on



Source: Bolton Point Municipal Water; Tompkins County Planning Department

severely restricted sodium diets are recommended to consult their health care providers. People who are on moderately restricted sodium diets should not drink water containing more than 270 mg/l of sodium. The sodium levels of the water from all three systems are well below this level at this time, and monitoring continues to assess salinity levels in these water systems in the future.

Groundwater is the source of drinking water for approximately 45 percent of residents. Five municipal water systems, namely the Villages of Dryden, Groton, and Trumansburg, and the hamlets of Newfield and West Danby, use ground water resources to supply drinking water. Nearly 150 other groundwater-reliant public water systems are monitored by the County Department of Health, including those that serve mobile home parks, apartments, restaurants, hotels, schools, and factories. In addition, there are thousands of private well systems that serve individual homes and businesses scattered throughout the county.

The amount of available drinking water is primarily an issue in rural areas that obtain drinking water from groundwater. As more homes and businesses are built in these areas, they are supported by new wells withdrawing more water from groundwater supplies. In some parts of the county it has been observed that new wells noticeably decrease the supply of water in nearby wells.

Recently, naturally-occurring arsenic levels that exceeded the U.S. Environmental Protection Agency's drinking water maximum contaminant level of 10 micrograms per liter have been identified in wells in Tompkins County. These are found primarily in confined sand and gravel aquifers such as those found in the Virgil Creek, lower Six-mile Creek, and Fall Creek valleys. Of particular concern is the elevated levels found in the Jay Street well that serves the Village of Dryden. The Village is working to identify an alternative source of water or treatment methods in order to comply with an order of the County Board of Health.

Drinking water quality is an issue county-wide. Some water supplies are threatened by the potential contamination of an entire aquifer or surface water body that can result from a single accidental chemical spill or leaking fuel storage tank. Another potential threat to drinking water supplies is aging, inadequately sized, or improperly maintained onsite wastewater treatment systems, often called septic systems.

Land uses and facilities that pose the greatest threats to groundwater should be located away from areas that contribute to drinking water supplies. In 2003 the County established a 20-year capital project to conduct aquifer studies to determine the extent of the major surficial aquifers and define their recharge areas. These studies have been undertaken through the joint efforts of the County, the USGS, and local municipalities.

While conducting aquifer studies will help to determine recharge areas for confined aquifers, most aquifers in the county are unconfined and thus are recharged by waters percolating directly through the soil above the aquifer making the entire surficial extent of the aquifer the effective recharge area. This may be extensive and in unconfined aquifers protection zones are often established based on the time it would take a contaminant to reach a well that is a public water supply. Any kind of liquid material spill above these aquifers has the potential to contaminate groundwater resources.

Wastewater Disposal

Seven municipal wastewater treatment facilities serve at least portions of eleven municipalities. Six of these facilities are owned and operated by individual municipalities. Of these six, three treat wastewater from users outside of their municipal boundaries. The seventh wastewater treatment facility is the Ithaca Area Wastewater Treatment Facility (IAWWTF) which is owned and operated by the City of Ithaca, Town of Ithaca, and Town of Dryden.

Treated wastewater from these various facilities is discharged into:

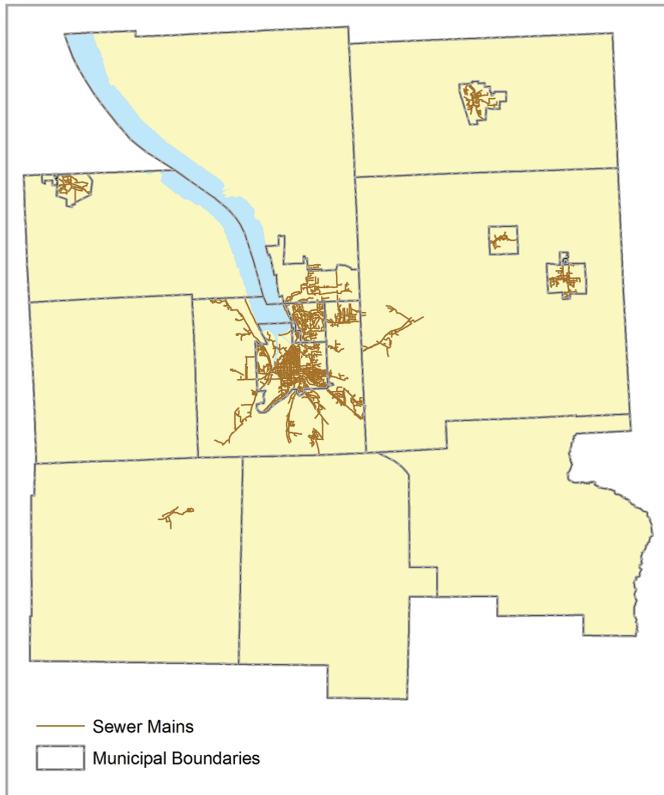
- Cayuga Lake, by Cayuga Heights and the IAWWTF,
- Fall Creek, by the Villages of Dryden and Freeville,
- Trumansburg Creek, by the Village of Trumansburg, and
- Owasco Inlet, by the Village of Groton.

The Town of Newfield utilizes absorption fields discharging into groundwater to treat its wastewater.

As with water infrastructure, aging wastewater collection and treatment systems are a national issue. Pipes, both nationally and locally, are the largest capital need and improvements can address sanitary sewer overflows. Locally, treatment

In 2003 the County established a 20-year capital project to conduct aquifer studies with the USGS and municipalities.

Municipal Sewer Service



Source: Tompkins County Planning Department

plants are periodically upgraded to comply with new regulatory requirements.

While many residences and businesses in Tompkins County are connected to sewer systems and large centralized wastewater treatment plants, a significant number are served by onsite wastewater treatment systems. Currently, these privately owned systems, including septic systems, serve approximately 40 percent of all households. When properly designed, these systems can be effective at reducing phosphorus and pathogens to levels that protect public health and the environment. However, poor routine maintenance, excessive density of systems, and undersized and overused systems can all lead to onsite system failure and water quality impacts.

The Tompkins County Health Department manages onsite wastewater systems through permitting, design, and inspection. On average, the Health Department permits about 150 new systems annually and an equal number of replacement systems.

Water quality impacts can result from improperly maintained, undersized, or overused onsite wastewater treatment systems.

State Pollutant Discharge Elimination System

New York State regulates pollution discharge into waters through its State Pollutant Discharge Elimination System (SPDES) permit program, including the control of all point source discharges to surface waters. The program is designed to maintain water quality consistent with public health, public enjoyment of water bodies, protection and propagation of fish and wildlife, and industrial development in the state.

The SPDES permit program applies to both public and private facilities. In Tompkins County, there are 21 SPDES permits. Of these permits, 11 are for publicly owned facilities, two are for Cornell University, three are for mobile home parks, and the remaining five are for industrial facilities. The industrial facilities with SPDES permits are the Cayuga Power Plant (two permits), the Cargill Salt Mine, the Emerson Plant, and the Therm plant.

Discharges from these systems are monitored and, if problems are identified, the owners of the systems are required to bring their systems into compliance. For example, the Trumansburg Wastewater Treatment Plant is undertaking upgrades in order to comply with its SPDES permit requirements. Construction activities are expected to begin in the spring of 2015.

One of the permits for the Cayuga Power Plant is for its coal ash disposal facility. Coal ash disposal has been identified as a national issue and in December 2014 the EPA established a new set of requirements for the disposal of coal ash, focusing on addressing the structural integrity of surface impoundments.

Water Quality in Cayuga Lake

In Tompkins County, the impacts of land use on water resources culminate primarily in Cayuga Lake. The shallow southern end of Cayuga Lake is inherently more vulnerable to pollution than other, deeper portions of the lake. Fall Creek, Cayuga Inlet, and Sixmile Creek play a significant role in determining the quality of water in the southern basin of Cayuga Lake as they contribute approximately 40 percent of all the surface water entering the southern end of the lake.

The Federal Clean Water Act requires states to periodically assess and report on the quality of their waters, and to identify impaired waters where designated uses, such as public drinking water, are not fully supported. For waters that are determined to be impaired, states must consider the development of a Total Maximum Daily Load (TMDL) or other strategies to reduce the input of the specific pollutants. Impaired water bodies and their related pollutants, are published by the New York State Department of Environmental Conservation (NYSDEC) on the *New York State Section 303(d) List of Impaired/TMDL Waters*. The most recent list published in 2012 identified the southern end of Cayuga Lake as impaired by three pollutants: phosphorus, silt/sediment, and pathogens.

Most of the phosphorus that enters the southern end of Cayuga Lake is bound up with the sediment carried by Fall Creek, Cayuga Inlet, and Sixmile Creek. This sediment is largely the result of stormwater runoff and erosion of stream banks. The loss of natural wetlands in the valley at the south end of the lake that would act as sediment traps has contributed to sedimentation in the southern end of Cayuga Lake. A TMDL or other strategy to address phosphorus will likely need to address methods to reduce the amount of phosphorus found in these tributaries. In addition to sediment-bound phosphorus, phosphorus also enters the southern end of the lake from point sources, including wastewater treatment plants and the Cornell Lake Source Cooling heat exchange facility. In recent years, tertiary phosphorus treatment systems have been installed at the Ithaca Area Wastewater Treatment Facility and at the Cayuga Heights Wastewater Treatment Plant, significantly reducing their contributions of phosphorus.

As a condition of continuing the SPDES permit for the Lake Source Cooling facility, NYSDEC and Cornell University have agreed to conduct a detailed study of the sources and ultimate use of phosphorus in Cayuga Lake. The study will build a mathematical water quality model of Cayuga Lake and its watershed and a detailed analysis of the shallow southern end of the lake in order to provide a better understanding of where phosphorus comes from and how it affects the lake ecosystem. Once completed, the model will help NYSDEC determine whether a TMDL or other strategy is necessary to address the amount and concentration of phosphorus in the southern end of Cayuga Lake. Completion of the model is expected in June 2016.

Erosion and Sedimentation

As discussed above, many of the threats to water quality in Tompkins County come from dispersed non-point sources. The basic geography of the county plus past land development practices have led to increased erosion and sedimentation, loss of wetlands and riparian areas, greater amounts of stormwater runoff and pollutants, and an increase in flooding. Other impacts of increased rates of stormwater runoff include accelerated channel erosion and alteration of streambed composition, which can dramatically degrade aquatic habitats. Another impact is increased water treatment costs for public water supplies utilizing streams as their water source, such as the costs to the City of Ithaca for treatment of water with high sediment loads and dredging of their reservoir. Though sedimentation is often related to changes in land use, construction, and land management practices, it can also result from natural geological processes.

Sedimentation is related to changes in land use, construction, and land management practices as well as from natural geological processes.

Efforts to address stream bank erosion and flooding impacts on a single property often caused unintended changes to stream behavior both upstream and downstream, increasing erosion and potential flood impacts on other properties. An assessment of the Sixmile Creek watershed revealed that much erosion and sedimentation in that watershed is directly attributed to natural processes as well as previous land use impacts. As a result, the County restructured its Flood Hazard

Mitigation Program to incorporate a watershed approach, considering impacts of changes to streams and adjoining land areas both upstream and downstream of proposed activities, when assessing proposed projects.

Similar threats to water quality throughout the United States have prompted the U.S. Environmental Protection Agency (EPA) to issue stormwater regulations. These regulations require all construction projects that disturb more than one acre of land to implement practices to minimize erosion and improve treatment of runoff. The EPA regulations also require certain local governments, including Tompkins County and ten municipalities, to develop regulations and plans to help manage stormwater. These eleven organizations and Cornell University have joined together since 2003 as the Stormwater Coalition of Tompkins County in order to share information and foster cooperation to comply with the EPA regulations.

Stormwater Runoff and Flooding*

Increased stormwater runoff has a significant impact on floodplain management. As land area is converted to more urbanized uses, the amount of impervious surface associated with that land use generally increases, causing water to flow into streams more quickly and allowing less water to replenish the groundwater. This increases both the frequency and magnitude of flood events. Flooding and stormwater runoff concerns are exacerbated in many parts of Tompkins County because the steep slopes and glacially dominated soils do a poor job of absorbing runoff during heavy rains or snowmelt. Major storm events occur relatively frequently and the capacity of many streams can be quickly overwhelmed. Climate change is expected to increase the number and intensity of extreme weather events, particularly heavy rainfall, increasing the frequency and intensity of floods.

Green infrastructure practices can help control stormwater at its source – removing pollutants and reducing the amount of runoff that ends up in sewer systems and local water bodies. Green infrastructure encompasses a variety of strategies including preserving and restoring natural landscape features such as forests, floodplains, and wetlands; installing check dams in stormwater channels; and installing on-site features such as green roofs, pervious pavement, rain gardens, catchment systems, such as rain barrels, and vegetated swales. New development is currently required to address stormwater runoff on-site and not rely on existing wetlands to serve that purpose.

Given the county's topography, historic settlements were located in valleys and along the shores of creeks. Unfortunately, but predictably, these areas are particularly vulnerable to repetitive flooding. Over the last 19 years, 24 flash flood events have been documented in Tompkins County. Additionally, lake flood events caused by rising lake levels happen approximately once per decade. A slight shift in the winds from Hurricane Lee and Tropical Storm Irene could have caused those devastating weather events to center over Tompkins County instead of neighboring communities to the south.

Green infrastructure can help control stormwater at its source, removing pollutants and reducing the amount of runoff.

Roadside Ditches

Roadside ditches serve an important function of collecting and conveying stormwater away from roadways and therefore serve as important components of state, county, and municipal stormwater management facilities. Roadside ditches also provide drainage for stormwater runoff originating from properties adjacent to the road right-of-way. It has been estimated that in a typical watershed about 20 percent of all runoff is captured within roadside ditches.

Ditches, however, are also a source, and a conduit, of sediment and associated contaminants to downstream waters.

Maintaining vegetative cover within and along roadside ditches both slows the speed that stormwater leaves an area and reduces the amount of pollutants that enter the water. Other strategies to achieve the goal of slowing down and removing sediment from stormwater are to install check dams and to connect roadside ditches to infiltration basins, bioswales, or constructed wetlands prior to discharging runoff into natural streams and lakes. By controlling these upstream impacts, flooding and water quality concerns are reduced in area streams and lakes.



Ditch Grading in Tompkins County

* For more information see the Adaptation Chapter, "Protecting Natural and Physical Infrastructure" section.

Wetland Protection

In 2001, the U.S. Supreme Court issued a decision limiting federal regulation of isolated wetlands not adjacent to or connected to a navigable body of water. Since that decision, and other similar court decisions, the EPA and the U.S. Army Corps of Engineers have been asked to develop a rule to clarify which streams and wetlands are subject to federal jurisdiction. A new rule was proposed in April 2014 and is still in the public comment stage.¹ The Tompkins County Water Resources Council is studying the issue to determine potential impact on regulated wetlands in the county. Until a new rule is adopted and implemented the impact on regulated wetlands in Tompkins County will be difficult to estimate.

At the state level, NYSDEC regulates wetlands of at least 12.4 acres in size and smaller wetlands of unusual local importance. Taken together, these regulations have the effect of leaving responsibility for regulation of isolated wetlands of less than 12.4 acres to local governments. Identification and protection of these otherwise newly unregulated wetlands is a priority.



Wetland on Ellis Hollow Road

Riparian Corridors

Riparian corridors are the lands bordering streams and represent a transition zone from aquatic to terrestrial ecosystems. Maintaining lands adjacent to streams in their undeveloped state helps to support the natural functions associated with stream buffers, including protecting water quality, stabilizing stream banks and preventing erosion, trapping sediment and nutrients, improving floodwater retention and groundwater recharge, and shading stream channels in summer.

Riparian stream buffers in headwaters have proportionally greater impact on watershed health than buffers in downstream waters. Clean and healthy headwater streams are critical for protecting the water quality, stream stability, and wildlife habitat of an entire watershed. The downstream effects of even minimal disturbances in small upstream creeks may be compounded as waters join to feed into larger and larger streams.

Providing vegetated buffers of at least 100 feet either side of stream banks, or 50 feet from intermittent streams, is critical in achieving water quality benefits. Communities are beginning to recognize the benefits of stream buffer protection and are institutionalizing standards through land use regulations and development requirements.

Dredging

The south end of Cayuga Lake and the Cayuga Inlet has numerous marinas, transient docking facilities, tour boats, and boat repair facilities dependent on maintaining a navigable channel. Dredging at the south end of Cayuga Lake last occurred in 1982 and dredge spoils were deposited in the Alan Treman State Marine Park, northwest of the marina. In 1999, the U.S. Army Corps of Engineers coordinated the dredging of the flood control channel between the fish ladder to the south and the northern tip of Inlet Island. Marina operators and boat owners have identified dredging of the Inlet as a critical and immediate need.

In 2011, the Corps of Engineers prepared a hydraulic analysis² of Cayuga Inlet, finding that sediment deposition has severely reduced the capacity of the Cayuga Inlet to convey floodwaters. The Corps recommended removal of roughly 663,000 cubic yards of sediments which have shoaled in the channel to re-establish the original channel capacity.

Thus, dredging is important not only for navigation, but also critical to the proper functioning of the Corps of Engineers' flood control system in Ithaca. While not the sole contributor to flooding issues in the City of Ithaca, the need for dredging is one that needs to be addressed.

Identification of a site or sites to handle dredged material has been the major impediment preventing periodic dredging to maintain channel capacity and navigational use of Cayuga Inlet and adjacent waterways such as lower Cascadilla Creek. Finding a site that is both close enough (within one mile) and large enough (20 acres) limits the options available for consideration. Other issues to be addressed include tech-

nological constraints, environmental impacts, consistency with other public strategies, and public acceptance.

Waterfront Development

The City of Ithaca's waterfront, along Cayuga Inlet, offers a tremendous opportunity to develop an urban waterfront experience for residents and tourists alike. Recent and ongoing efforts to enhance this waterfront include the Inlet Island Promenade, the Cayuga Waterfront Trail which will eventually connect the Visitors Center to Cass Park, and relocation of the New York State Department of Transportation's Maintenance Facility.

The amount of undeveloped land along the lake, and along Cayuga Inlet in the City of Ithaca, is a limited resource that would best be used for water-dependent and water-enhanced uses. Water-dependent uses include facilities like marinas and boathouses that cannot be located anywhere except directly on the water. Some other land uses, while not dependent on a waterfront location, are considered water-enhanced, in other words, uses whose location on the waterfront adds to the public use and enjoyment of the water's edge, even though they do not require a location adjacent to the water. Water-enhanced uses are primarily recreational, cultural, retail, or entertainment uses but may include mixed-use facilities with residential or lodging components. These uses are also important to the economy, character, and public enjoyment of a community's waterfront and can help draw tourists to the waterfront.

Much of the land along the shoreline in the City of Ithaca is located within the 500-year floodplain and some significant areas are in the 100-year floodplain. With the trend toward increased amounts of rainfall occurring in short durations in recent years, some areas currently determined to be in a 500-year floodplain may actually now be at greater risk for flooding. This may be reflected in future revised flood maps. Development of these higher-risk areas should address the impact of the development on potential flooding not only on the site, but also upstream and downstream of the site. In addition, natural vegetative buffers should be maintained along streams to protect water quality and reduce severity of flooding.

The City's waterfront offers a tremendous opportunity to develop an urban waterfront experience for residents and tourists.



Allan H. Treman State Marine Park on City's Waterfront

Development along the waterfront, both along Cayuga Inlet and Cayuga Lake, should also recognize and conserve that which makes the waterfront unique. Cayuga Lake has a diversity of fish species and high quality fishing experiences. Birds also take advantage of these waters and the surrounding landscape, as evidenced by the area's designation by National Audubon Society and New York State as an Important Bird Area. The majestic cliffs, wooded hillsides and abundant wetlands along the Lakeshore provide critical habitat for a variety of rare and scarce plants.

The Lake is also a major source of drinking water for thousands of residents of Tompkins County. Any development along the Cayuga Lake waterfront should protect these important environmental benefits.

TAKING ACTION

STRATEGIES. *The Tompkins County Water Quality Strategy* (2012) was prepared by the Water Resources Council and serves to guide policy and activities. The Strategy laid out broad goals for surface water, groundwater, riparian corridors, and wetlands and emphasized the need to coordinate activities and educate and inform municipal officials, the public, and others about water quality concerns, policies, and practices. *The Tompkins County Conservation Strategy* (2012) also addressed water quality issues. *The Cayuga Lake Waterfront Plan* (2004) was a joint project of the municipalities along the lake and addressed issues related to protection and development along the entire Cayuga Lake and Cayuga

Inlet waterfront and envisioned increasing public access to the waterfront, improving boating facilities, and encouraging appropriate economic development.

Protecting water quality can best be accomplished by protecting the quality of the water that enters streams, lakes, and aquifers. Certain places are key, stream corridors, wetlands, and aquifer recharge areas. Along the edges of streams, maintaining naturally vegetated buffers can help remove many of the pollutants carried via runoff. Protecting wetlands, and in some cases replacing lost ones, can also help keep waters clean. Water flow slows in wetlands allowing suspended sediments to settle to the wetland floor and nutrients dissolved in the water can be absorbed by plants and other organisms. Preserving existing wetlands and stream buffers within watersheds would significantly protect water quality in those watersheds. Re-establishing those wetlands and stream buffers that have been lost over time would improve water quality.

Certain places are key to protecting water quality: stream corridors, wetlands, and aquifer recharge areas.

Aquifer recharge areas are places where water infiltrates into the ground and replenishes aquifers. Contaminants from aboveground activities can infiltrate with the water. In most cases, the location of aquifer recharge areas is unknown, requiring detailed scientific study to identify. The County in conjunction with local governments and the USGS have been funding these studies for local aquifers. The next step is to put in place protection mechanisms for these important recharge areas.

PARTNERS. Important players in this work are local municipalities who can help to protect these important resources. To help coordinate and execute this effort, the Tompkins County Water Resources Council brings together the agencies that manage and protect the county's water resources, including representatives from Cornell Cooperative Extension, the Soil and Water Conservation District, and the County Division of Environmental Health and Planning Department. The Council also includes representatives representing diverse water interests, including municipalities,

agriculture, business and industry, recreation, watershed organizations, and water purveyors. Other important watershed organizations include the Cayuga Lake Watershed Intermunicipal Organization, the Upper Susquehanna Coalition, and the Stormwater Coalition of Tompkins County.

COUNTY ROLE. County Government plays several important roles with respect to water resources. The Department of Health, through the Environmental Health Division, is active in protecting drinking water and in regulating sewage systems. The Highway Division is responsible for stormwater management facilities maintained by the County. The Planning Department is charged with maintaining data, undertaking studies and plans, and implementing programs related to protecting water resources. Three specific programs funded, in part, by the County are the Stream Corridor Restoration and Flood Hazard Mitigation Program, the Aquifer Study Program, and a community water quality monitoring program managed by the Community Science Institute. Two advisory boards play an active role in monitoring and protecting water quality: the Water Resources Council and the Environmental Management Council.

County Actions to be Initiated within Two Years

- Contribute to NYSDECs work assessing and improving water quality in the southern end of Cayuga Lake.
- Develop an integrated green infrastructure program that combines existing efforts to identify and protect the quality of stream corridors, wetlands, and aquifers.
- Complete the NYSDOT Relocation and Site Redevelopment Feasibility Study.
- Support the Water Resources Council in its work to update delineation of wetland resources in the County.

¹ Under the proposed rule, most seasonal and rain-dependent streams would be protected; wetlands near rivers and streams would be protected; and other types of waters would be evaluated on a case-by-case basis.

² *Hydraulic Analysis and Impacts of Long Term Shoaling for Flood Risk Management Project, Cayuga Inlet, Ithaca, New York.* May 2011. US Army Corps of Engineers.