

**ECOLOGY IN MOTION:  
USING TRANSPORTATION FUNDS FOR WATERSHED MANAGEMENT**

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## ABSTRACT

The Pequonnock River watershed is a 29-mile drainage area covering portions of five communities in southwestern Connecticut. Its headwaters are in the Town of Monroe and it flows through Trumbull and the City of Bridgeport, before emptying into Long Island Sound. A portion of the river is diverted to public supply reservoirs and at the southern end it expands to become Bridgeport Harbor. Land uses are varied and diverse, ranging from undeveloped woodlands at its headwaters to intense developed, city-center uses and former heavy industrial lands. The Pequonnock River has been an important commercial waterway, serving the industries that located along its navigable reaches. These commercial activities fueled the construction of the Housatonic Railroad that essentially paralleled the river.

Today, about 80% of the river does not meet minimum water quality standards for recreation and habitat for aquatic life. Impairment is due to elevated bacteria levels and the result of industrial land use and urbanization. A watershed management plan was prepared that promotes riparian restoration, sustainable land uses, habitat and wildlife protection, improved water quality and education and stewardship.

Travel within the watershed is dominated by the State Route 25 Expressway and the non-limited access portion of the state highway. Severe congestion occurs within the corridor and few alternate modes are available. Portions of the historic Housatonic Railroad rail bed, abandoned in late 1930s, were lost for the Route 25 Expressway. However, remaining segments were converted into a shared-use trail. Today the trail extends from Downtown Bridgeport with connections to bus, rail and ferry services to suburban communities to the north.

Work on the Pequonnock River watershed management plan occurred at the same time as the final design of sections of the Pequonnock River Trail. Coordination of these two projects became a critical task with the intent to use the construction of the trail as way to implement projects consistent with the watershed plan. The design engineer for the trail project worked closely with the consultant to the watershed management plan committee. The result of this collaboration was integration of objectives and identification of actions that implement recommendations of two planning efforts. Specifically, the trail project will remove non-native, invasive vegetation, restore and repair riparian buffers, use permeable material for the trail surface, install rain gardens for storm water control and install information signs to educate users about the river and its ecosystem.

Construction and implementation of these actions is scheduled for spring 2013 and their effectiveness will be determined upon completion and over time. However, the trail project already highlights how transportation planners and engineers can partner with natural resource agencies on efforts to restore the water quality of the Pequonnock River. While transportation projects often place stresses on the natural environment, this project illustrates that an alternative transportation mode can achieve both mobility and ecological resiliency.

## **INTRODUCTION – GEOGRAPHIC SETTING**

The Greater Bridgeport Regional Council is comprised of six municipalities located in the southwestern part of Connecticut, within the Bridgeport-Stamford urbanized area. The six communities are the City of Bridgeport and the towns of Easton, Fairfield, Monroe, Stratford and Trumbull. Combined, the region has a population of roughly 316,200 people. Although the region covers a land area of only about 145 square miles, it has the highest population density in the state at 2,180 persons per square mile. The region is situated about 50 miles east of New York City and about 150 miles southwest of Boston.

Land use is diverse and reflects an early agrarian history that transitioned to manufacturing during the mid-19<sup>th</sup> century. Early settlements were located on the coast and along the various waterways. Because of access to Long Island Sound commerce grew and towns along the coast became important debarkation points for products grown in the northern parts of the region. Railroads were then built, first along the shore to provide connections to New York City, followed by branch lines that headed north.

Today, the region's more intense development is found in its southern half with more rural and suburban development concentrated in the northern part. The City of Bridgeport, a traditional blue collar manufacturing city, remains the region's core for offices, banking, government, education and associated activities. Higher density development is also located along the southern portions of Fairfield and Stratford. Most of the region's remaining open areas, recreation uses and farmlands are located in Easton, northern Fairfield, Monroe and Trumbull.

The Greater Bridgeport Region is a coastal region, with Long Island Sound forming its southern border. Its coastline is interspersed with a several sandy beaches, natural harbors and coves, and saltwater marshes, including a portion of the Stewart McKinney National Wildlife Refuge. The coastal lands give way to rolling hills in the northern half of the region that are the headwaters of the numerous rivers and streams that flow into the Sound. While most of the region is located in the Southwest Coastal Major Watershed, there are 15 designated sub-regional drainage basins centered around various rivers and streams. All flow in a north-to-south direction, eventually emptying into Long Island Sound.

The region is also home to three large capacity public supply reservoirs. The lands surrounding the reservoirs help protect water quality and act to filter runoff. In 2002, Connecticut, in partnership with The Nature Conservancy (TNC), acquired ownership of roughly 6,000 acres of public supply watershed lands, as well as, conservation and public access easements on an additional 9,000 acres. These lands, collectively known as the Centennial Watershed State Forest, are a patchwork of hundreds of scattered parcels throughout mostly Fairfield County of varying size. Public ownership of these lands afford the important function of protecting drinking water, while expanding recreational opportunities.

## **PEQUONNOCK RIVER WATERSHED**

One of the larger sub-regional drainage basins in the region is the Pequonnock River watershed. It is a 29-square mile drainage area covering portions of five communities in southwestern Connecticut. The headwaters of the Pequonnock River are in the northern part of Monroe and the

river flows in a southerly direction through Trumbull and the City of Bridgeport, before emptying into Long Island Sound.

The Pequonnock River is comprised of a main channel, stretching about 12.64 miles from its headwaters to the end of the estuary. The West Branch Pequonnock River is the main tributary and adds about 4.35 miles to the river's total length. A portion of the west branch is diverted to public supply reservoirs located in Easton. The Connecticut Department of Energy and Environmental Protection (CT-DEEP) has divided the river into six sections:

- Section 1: From the end of the estuary downstream of Glenwood Avenue at its crossing of US Route 1 to the upper end of Bunnell's Pond in Beardsley Park – about 1.35 miles.
- Section 2: From the upper end of Bunnell's Pond in Beardsley Park to the crossing of Daniels Farm Road in Trumbull – about 2.92 miles. This section passes through the Beardsley State Park and Preserve, Unity Park (municipal) and Twin Brooks Park (municipal).
- Section 3: From the crossing of Daniels Farm Road in Trumbull to the crossing of Route 111 – about 4.19 miles. This section passes through the Pequonnock Valley State Wildlife Preserve and Old Mine Park (municipal).
- Section 4: From the crossing of Route 111 in Trumbull to the outlet of Great Hollow Lake in Wolfe Park (municipal) in Monroe – about 1.83 miles.
- Section 5: From the inlet to Great Hollow Lake in Wolfe Park (municipal) to the headwaters at the outlet from Stepney Pond in Monroe – about 2.35 miles.
- Section 6: West Branch Pequonnock River from the outlet from the West Pequonnock Reservoir in Monroe to its confluence with the Pequonnock River near the crossing of Maple Drive in Monroe – about 1.51 miles. The headwaters of the West Branch Pequonnock River are about 2.84 miles upstream of the inlet to the West Pequonnock Reservoir. This section has not been designated by the CT-DEEP.

Several smaller streams and tributaries flow into the Pequonnock River and create local watersheds.

Downstream of Bunnell's Pond, the Pequonnock River flows through Glenwood Park before being buried for a short distance. It emerges near the confluence with Island Brook. At this point, tidal forces influence the Pequonnock River and its outlets to and is classified as part of the Bridgeport Estuary. The River also changes from freshwater to saltwater.

Travel within the watershed is dominated by the State Route 25 Expressway and the non-limited access portion of the state highway. Severe congestion occurs within the corridor and few alternate modes are available. Portions of the historic Housatonic Railroad rail bed, abandoned in late 1930s, were lost for the Route 25 Expressway. However, remaining segments were converted into a shared-use trail. Today the trail extends from Downtown Bridgeport with connections to bus, rail and ferry services to suburban communities to the north.

Land uses within the watershed are varied and diverse, ranging from undeveloped woodlands at its headwaters to intensely developed, city-center uses and former heavy industrial lands at its mouth. About 60% of the land use within the watershed is classified as urban. The Pequonnock River has been an important commercial waterway, serving the industries that located along its

navigable reaches. Industries were not only reliant upon the river for transportation but also for power. Many early plants located along the river in Trumbull and used it to power mills. Small impoundments were built to hold back water needed for power generation. These commercial activities fueled the construction of the Housatonic Railroad that essentially paralleled the river. Today, almost all of the industries that once relied on the Pequonnock River are gone. The heavy manufacturing plants in Bridgeport have been demolished and the land remains vacant. In Trumbull, only remnants of the historic mills are visible, with the land now a state park and preserve.

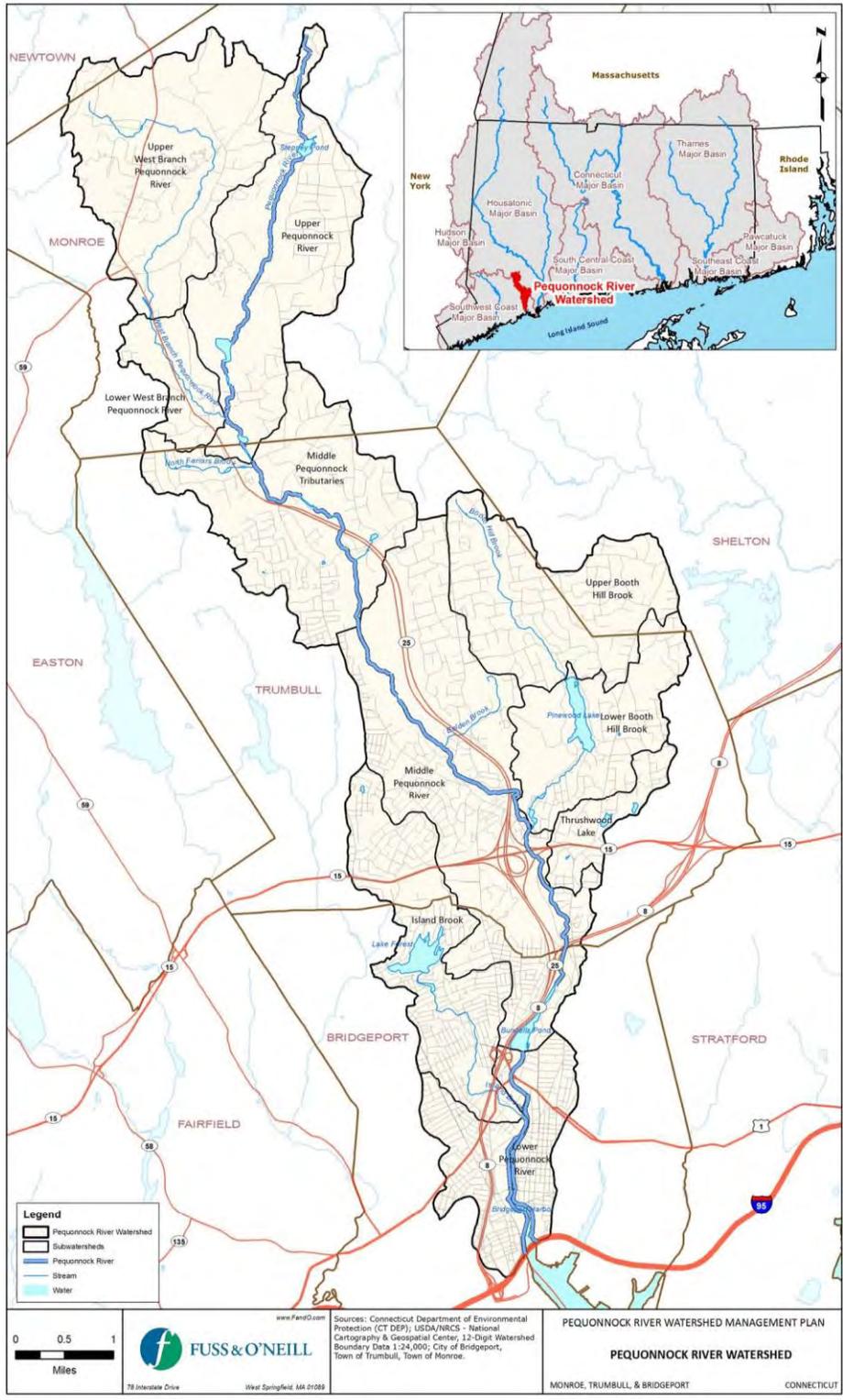


FIGURE 1 Pequonnock River Watershed.

## **WATER QUALITY OF THE PEQUONNOCK RIVER**

The Pequonnock River is classified as a Class A freshwater river by the Connecticut Department of Energy and Environmental Protection (CT-DEEP). Applicable uses of a Class A river are potential drinking water supply, habitat for fish and other aquatic life and wildlife, recreational, and industrial agricultural water supply.

Today, almost the entire length of the Pequonnock River, as well as the lower section of the West Branch, has been designated by the CT-DEEP as impaired for recreation use, specifically for non-designated swimming and other water contact related activities. The impairment is due to elevated bacteria levels. Despite this impairment, the river fully supports the consumption of fish. The only section not designated as impaired is Section 1, defined above as downstream of Bunnell's Pond. However, this classification is based on it not being assessed.

The potential sources of elevated bacteria levels include both point and non-point sources. These include failing septic systems, agricultural activity, stormwater runoff and nuisance wildlife. Permitted discharges, such as municipal stormwater outflows, also contribute to the impairment of the river. Most of the Pequonnock River watershed is developed with over 60% of the land designated as urban by the Bureau of the Census. This land type is characterized by significant impervious surface cover. Stormwater runoff tends to flow off these surfaces instead of infiltrating the soil. The extent of impervious material is greater in the lower portions of the watershed in Trumbull and Bridgeport. The upper watershed in Monroe is less developed and more wooded. Leaking septic systems, runoff from agricultural activity and wildlife waste are the likely primary sources of elevated bacteria levels in the upper watershed.

The estuary portion the river system extends from the mouth of Bridgeport Harbor near Pleasure Beach to the saltwater limit in the Pequonnock River, downstream of Glenwood Park. The Bridgeport Estuary has a water quality classification of Class SA. Designated uses include shellfish harvesting for direct human consumption, recreation, habitat for marine fish and other aquatic life and wildlife, industrial water supply, and navigation.

The CT-DEEP has classified the estuary as impaired because of elevated bacteria concentrations. Commercial shell-fishing, recreation use and marine aquatic life are not support by the current water quality. The elevated bacteria levels result from various sources, including permitted activities that are allowed to discharge directly into the estuary and stormwater runoff. Because of the high concentration of impervious surface material, runoff is collected by storm sewer systems and outflows directly into the harbor with little infiltration into the soil. A complicating problem in the Downtown Bridgeport area is the presence of combined sanitary and storm sewer systems. During high rain events, the combined systems are not capable of adequately handling the volume of flow and overflows of raw sewage are discharged before treatment.

Nuisance wildlife, discharges from marinas and illicit discharges also contribute to the elevated bacteria levels.

## **PEQUONNOCK RIVER WATERSHED MANAGEMENT PLAN**

The poor water quality along the impaired sections of the Pequonnock River is generally the result of historic land uses and urbanizations. Similarly, the tidal portions of the river are

impaired because of combined sewer overflows (CSO), storm runoff, extensive impervious surfaces, direct discharge from industries and marina/vessel discharges.

To address the poor water, the City of Bridgeport applied for and received a Section 319 Grant under the Clean Water Act from the CT-DEEP. The City partnered with the towns of Monroe and Trumbull, Save the Sound (a program of the Connecticut Fund for the Environment), and the Southwest Conservation District to prepare a watershed management plan. The City hired a consulting firm to prepare the plan and Save the Sound led the formation of a watershed coalition (steering committee), organized workshops and meetings, and performed public education and outreach efforts. During the plan development process, the current conditions within the watershed were assessed to develop a baseline. This included a review of CT-DEEP water quality reports and conducting field inventories along the river to identify hotspots and common issues and problems.

The goals of the *Pequonnock River Watershed Management Plan* are to promote riparian restoration, sustainable land uses, habitat and wildlife protection, improve water quality, educate the public, and promote stewardship. It identifies specific, measurable actions to address the water quality impairments in the Pequonnock River and Bridgeport Harbor. The actions include recommendations that can be implemented throughout the Pequonnock River watershed, as well as those tailored to issues within specific sub-watersheds or areas. Site-specific projects are also included. These latter address issues at selected sites that were identified during the watershed field inventories. A key to the successful implementation of the Plan is building a strong foundation among the three communities covered by the Pequonnock Watershed, non-governmental organizations interested in the quality and health of the river, residents, business and other stakeholders. Several recommendations related to continuing the work of the watershed management planning team to identify funding sources for enhancement projects, setting regional priorities, coordinating and leading public education and outreach and monitoring water quality.

While it is not the purpose of this paper to list or describe all of the recommended actions from the management plan, the common theme of proposed improvements is promoting Low Impact Development (LID), green infrastructure and buffer restoration. LID and green infrastructure actions can be cost effective and environmentally beneficial approaches to capturing and filtering stormwater runoff and reducing its impacts on water quality.

Riparian buffers encourage infiltration of rainfall and runoff, and provide absorption for high stream flows. Naturally vegetated buffers filter out pollutants, capture sediment, regulate stream water temperature and process many contaminants through vegetative uptake. Maintaining and restoring buffers is critical to improving the water quality of the Pequonnock River.

Other actions included in the watershed management plan are:

- Manage and control nuisance waterfowl;
- Manage and remove invasive plant species;
- Reduce the amount of impervious surface material;
- Protect and restore aquatic and stream corridor habitat; and
- Preserve and protect open space.

## REGIONAL PEQUONNOCK RIVER MULTI-USE TRAIL PROJECT

The GBRC has worked with the City of Bridgeport and towns of Monroe and Trumbull to develop a regional multi-use trail concept in response to the federal *Intermodal Surface Transportation Efficiency Act (ISTEA)*, passed in 1991. The trail concept envisioned a continuous, interconnected trail extending from Downtown Bridgeport to the northern part of Monroe. Once completed, the trail will be slightly over 16 miles in length and will connect the region's urban core with its more suburban and rural areas. In Downtown Bridgeport, the trail will provide intermodal access to commuter rail, local bus and passenger ferry services. Over the years and since the passage of the *ISTEA*, the regional multi-use trail concept has gone from planning document concept to reality.

The alignment of the trail generally follows the corridor of the abandoned Housatonic Railroad and runs parallel to the Pequonnock River. Although some sections of the rail bed had been lost over time from highway construction and urbanization, a substantial portion of it existed. Its proximity to the Pequonnock River also provided a great opportunity as numerous state and municipal parks and open space had been designated within the corridor. The trail project has been able to reclaim the old rail bed and connect several public open spaces.

Since planning for the regional trail started in the early 1990s, several sections have been constructed. Although the intent from the very beginning was to create a regional trail, early projects were locally based and stand-alone. The first project was the construction of a 4.2 mile section in Monroe, known as the Housatonic Railway Rail-Trail in Monroe. Completed in 1999, this section was built on the existing abandoned rail-bed and started in Wolfe Park (municipal) and ended at the town line. The next section completed (in 2001) involved the conversion of the Berkshire rail spur line into a shared-use path. This project included demolition of elevated structures, removal of rail and ties, and environmental remediation, and was built as part of a road rehabilitation project. Beginning in the downtown area, 1.6 miles were added to the trail.

A major extension of the PRT was completed in 2008 with the construction of a 4.5 mile section through the Town of Trumbull. The trail follows the old rail bed through the Pequonnock Valley, a state owned park and preserve, and passes through an area rich in history. The Pequonnock River Valley is a scenic, steep walled valley with large outcrops of granite rocks and cliffs. The area was once the industrial center of Trumbull with several mills located along the river. Many remnants of Trumbull's industrial past are still evident throughout the park. The Housatonic Railroad was built through the Pequonnock Valley, serving the industries located there. It also provided passenger service allowing riders to travel to Bridgeport and make a connection to the main rail line. As a way of attracting riders and generating business, the Housatonic Railroad Company built and operated the Parlor Rock Amusement Park within the Valley. The railroad was the only way to access the amusement park.

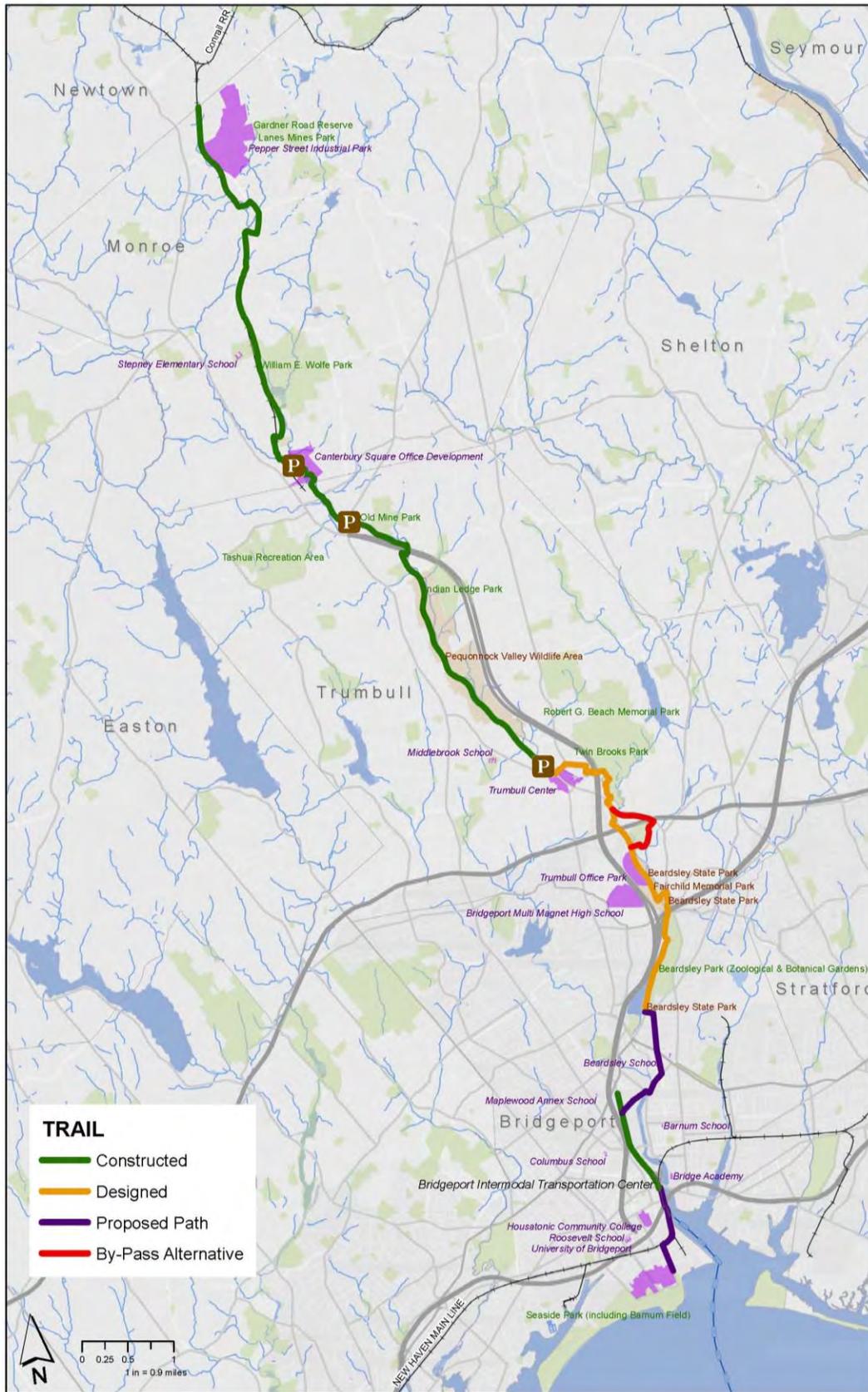


FIGURE 2 Pequot River Trail.

These three projects have created 10.2 miles of trail, almost all located on a discrete right-of-way, separated from the road. The PRT only crosses a public road at ten locations, making for a very comfortable and safe experience, despite the urban environment. However, none of the sections were connected and, since they were built at different times and by different communities, there was not a common, unifying brand and each section was known by a different name.

To continue efforts to realize a regional vision of the trail, the GBRC has been working with municipal partners to close the gaps in the trail alignment, establish a common and consistent naming convention and re-brand the trail as an interconnected, regional path.

A connection between the Monroe and Trumbull trail sections was constructed through an office park development. The large parcel was, at one time, the site of a private day camp. The old rail bed and the Pequonnock River flow through the parcel and pinpointed a logical path for the trail. However, the site was subsequently sold to a developer who submitted a site plan for an office park development. Alternate alignments around the parcel were not feasible and bridging the gap by an on-road route along Main Street (Route 25) was not desirable because of high traffic volumes (in excess of 20,000 vehicles per day), high traffic speeds and limited shoulder widths. Given these prospects, the town initiated discussions with the developer on allowing the trail to pass through the development. During these early discussions, the private developer realized the potential benefits of having the trail aligned through the office park and worked with the town on creating a public-private partnership. He subsequently agreed to donate a permanent easement for the trail through the property as well as construct it. This partnership extended beyond the office park development to include the entire “gap” section from the town line to the existing trail that starts in Wolfe Park.

To re-brand the disconnected sections, a unique name for the trail was established and the regional trail became known as the Pequonnock River Trail, in deference to the primary feature within the corridor. Along with this naming convention, new signage is being designed and will be installed along the entire stretch of the trail that will identify the trail by the PRT name. The signs will also feature a new logo. A website is being created to provide a history of the PRT as well as information on points of interest, attractions and natural and cultural features along the trail. Launch of the website is anticipated in the summer of 2013.

With the consent of the three host communities, the GBRC also initiated the design of a 4.1-mile extension and coordinated actions to close the gaps in the trail. This extension would align the trail through Trumbull Center commercial area, across a major expressway interchange area and through two municipal parks and one state park. Unique features of the planned extension are:

- Development of a “river-walk” style section through the rear parking lot of a shopping center directly adjacent to the Pequonnock River.
- Crossing of an interchange between two expressways, one the Merritt Parkway which is designated as a National Scenic Byway and is listed on the National Register of Historic Places. The trail would also re-use an abandoned railroad bridge that crosses the Parkway.
- Creating and enhancing public access to the Pequonnock River through the Beardsley State Park and Preserve.

- Re-configuring an existing internal park road to accommodate pedestrian and bicycle travel through Beardsley Park. The park was designed Frederick Law Olmsted and is an example of Olmsted's large country parks designed to serve a variety of recreational activities for the entire city. Beardsley Park also contains Connecticut's only zoological garden which was developed in the 1920s as an outgrowth of the park being used as a place to exercise circus animals from the Barnum and Bailey circus.

Because of financial constraints, the extension project has been divided into six sections and several phases. Different funding mechanisms and approaches were adopted. One section, through Twin Brooks Park in Trumbull, was the first to be completed. Because it was aligned through a town park and involved a straightforward design and construction plan, the Town of Trumbull undertook the construction. Construction and implementation of the other sections is expected to begin during the summer of 2013. Contracts for the construction of three sections with a total estimated value of about \$3.4 million have been advertised.

A key section of the extension project is the crossing of the interchange area. The crossing of the Merritt Parkway will be a unique and signature part of the trail and will help save and reuse a historical railroad bridge. However, the cost of constructing of this section is beyond the financial capabilities of the region and its municipal partners. In response to the Connecticut Department of Transportation's new approach to constructing and completing multi-use trails of state-wide significance, the Mayor of Bridgeport and the First Selectmen of Monroe and Trumbull requested the state to assume responsibility for designing and constructing the interchange section. Without state support and assistance this section will be delayed for many years and a critical gap will continue to exist, putting users at risk as they will have to travel on a busy state road to get around the interchange area. The request to have the state take over responsibility for completing this section is consistent with the new policy. The Department has agreed to design the section and fund its construction.

The remaining section of the planned extension project, the "riverwalk" concept through Trumbull Center, has been advertised for the design phase. A consultant engineer has been selected and work is expected to be initiated this summer. Design will involve frequent coordination with the owner of the shopping plaza and include plans for the renovation of a house into a visitor and information center. Construction is anticipated for 2015.

Future plans envision completing the trail from Beardsley Park to Seaside Park in the south end of Bridgeport. An application for federal aid funding under the Congestion Mitigation and Air Quality program was awarded for the project. It will close the remaining gap in the trail and represent the final piece in the 16-mile regional trail. Because this section will traverse an intensely developed and urban area, most of it will be completed as an on-road bicycle route. The project will provide enhancements to neighborhoods traditionally underserved by the transportation planning process. The actions will contribute to efforts to revitalize these areas and make them more sustainable, walkable and livable.

## **USE OF THE REGIONAL PEQUONNOCK RIVER TRAIL PROJECT TO IMPLEMENT WATERSHED MANAGEMENT ACTIONS**

The planned extension of the PRT is not only within the Pequonnock River watershed but it will be aligned in proximity to the river. The design of the extension project occurred at the same

time as work on the Pequonnock River watershed management plan. Coordination of these two projects became a critical task with the intent to use the construction of the trail as way to implement projects consistent with the watershed plan. The design engineer for the trail project worked closely with the consultant to the watershed management plan committee. The result of this collaboration was the integration of objectives and identification of actions that could implement recommendations of both planning efforts.

Specific actions included in the watershed management that were incorporated into the design of the trail project include:

- Removal of non-native, invasive vegetation along the banks of the Pequonnock River. Invasive plants displace native species and threaten local biodiversity. Two areas were targeted: the area through the Trumbull Center shopping plaza and along the southern section of the trail within the Beardsley State Park. As part of the design, the presence and abundance of invasive species were noted and a management plan was prepared. The management plan discussed control strategies for the eradication and treatment of invasive species. Design plans included the removal of the invasive vegetation and the re-planting of the areas with native plants,
- Restore and repair riparian buffers. The existing stream channel has eroded over time and buffers have become overgrown with invasive vegetation and encroached upon by roadways and development. As part of the design plans, the clearing and grubbing along the trail within the riparian buffer will be limited. Along sections where existing structures, such as sidewalks, have encroached on the river, repairs will be made and structures will be relocated outside of the buffer area. In some cases, this will require the installation of new riprap material to stabilize the stream banks. Restoring and enhancing the riparian buffer will encourage infiltration of rainfall and provide absorption for high stream flows, which will help reduce flooding.
- Protect and restore tree canopy and forest. Forest cover provides numerous benefits by providing habitat, reducing storm water runoff, and reducing stream and channel erosion. Tree removal will be limited during the construction of the trail and existing, mature trees will be protected. An extensive tree re-planting plan has been prepared for the section along Quarry Road to replace the trees lost because of clearing for the trail.
- Cleaning of existing drainage structures. The PRT will be aligned along two abandoned local roads. The existing catch basins and drainage pipes have become clogged with debris. These will be cleaned and upgrade as part of the project. This action will help alleviate sediment and pollutants from entering the river.
- Removal of concrete curbing along the existing road through Beardsley Park. The curbing channels storm water to catch basins for discharge into the Pequonnock River. As an alternative, the trail project will remove the curbing and allow storm water to sheet across the road and trail and infiltrate the land between the trail and the river. This will prevent pollutants from being discharged directly into the river.
- Use permeable material for the trail surface. The trail will be aligned along sections of two abandoned local roads that have been closed to vehicle traffic for more than thirty years. Although the pavement structure is in poor condition, it still exists and creates a non-previous surface adjacent to the river. These sections will be removed and the trail will be constructed using a porous surface material to allow storm water to filter through

and enter the ground. This will help remove sediment and pollutants and reduce the amount entering the river.

- Install rain gardens for storm water control. These structures are used to capture, treat and infiltrate storm water before it is discharged to a water body. Opportunities exist to install rain gardens, bio-swales or storm water planters along the planned “riverwalk” section through the Trumbull Center shopping plaza. Currently, the area adjacent to the Pequonnock River is a large expanse of paved surface used for parking. The design of this section will investigate rehabilitation and reconfiguration of the parking lot to better accommodate parking and help capture runoff.
- Install information signs to educate users about the river and its ecosystem. A key recommendation of the watershed management plan is public outreach and education about the value of the river eco-system and benefits to protecting it. The signage plan for the trail project will include references to the watershed management and educational materials on the plants, species and habitat of the river environment.

The trail project highlights how transportation planners and engineers can partner with natural resource agencies on efforts to restore the water quality of the Pequonnock River. While transportation projects often place stresses on the natural environment, this project illustrates that an alternative transportation mode can achieve both mobility and ecological resiliency.

An example of this coordination is the project to restore the Pequonnock River edge in Old Mine Park at the head of the PRT. The area features an uneven paved surface, an irregular shape, undefined parking spaces and over-grown and eroded buffer to the river. A streamside buffer project near the site was completed in 2012.

An application has been submitted under an EPA Section 319 grant to restore this area. Recommended actions include: removing the existing asphalt, replace much of the pavement area with a low maintenance vegetation, plant various native shrubs along the river’s edge, install six parking spaces for trail users with porous pavement, and install a storm water retention garden. These actions will provide an aesthetically pleasing and attractive entrance for the trail while, at the same time, help reduce sediment and pollutants from entering the river.



**FIGURE 3** Old Mine Park trailhead to the Pequonnock River Trail.

The proposed plan for the area is shown in the following diagram.



**FIGURE 4** Old Mine Park river edge restoration project area and site plan.

### **INNOVATIVE FINANCING PLAN FOR THE PEQUONNOCK RIVER TRAIL**

Implementation and construction of the PRT has been funded mainly by federal aid funds authorized under the Federal Highway Administration's Transportation Enhancement (TE) program. These federal aid funds have been supplemented by state grants, Recreational Trails Program (FHWA) funds, local contributions and private donations. Because of the variety of and the use of non-traditional funding sources, an Innovative Financing Plan was developed for the trail project. Section 323 of the National Highway System Designation Act of 1995 includes provisions for innovative financing techniques that allow donated funds, material and services, the value of land donated by private individuals and companies for the right-of-way, and the value of the construction of sections of the trail completed without federal participation to be used as the non-federal matching share.

Typically, the local sponsor is required to provide a 20% match of federal aid funds. The Innovative Financing Plan provided a credit for the non-traditional funding sources as the non-federal match to federal funds, in this case, the value of the trail completed by private sources and without federal participation. The IFP allowed the following:

- Established a single federal aid project for the entire Pequonnock River Trail consisting of several design, right-of-way and construction phases located in the three municipalities. This allows the expenditures on the various sections to be accounted as part of an overall project instead of separate projects for individual sections.
- Credited the value of the donated defined permanent easement through an office park in Monroe to the non-federal match requirement. The developer donated a defined, permanent 25-foot easement to the Town of Monroe with the right to build and maintain a multi-use trail through the Canterbury Square development. The value of the easement was appraised at \$62,000. No other private property was needed to be acquired for the trail.
- Credited the value of the construction of the section of the trail through an office park by a private developer to the non-federal match requirement. Work included excavating and grading, labor, material and equipment. The value of the work was credited at \$160,600.
- Credited the value of the construction of the section of the trail through Twin Brooks Park in Trumbull by the Town of Trumbull without federal participation to the non-federal match requirement. Work included excavating and grading, labor, material and equipment. The value of the work was credited at \$492,000.
- Stipulated that any credits designated in the IFP can be allocated to match future federal allocations for the design and construction of remaining sections of the trail, as the funds become available.

The IFP was developed so that the work completed by non-traditional means would leverage federal dollars instead of merely reducing the cost of the project. It was approved by the Federal Highway Administration (FHWA). The credits for non-traditional sources have been allocated to the preliminary and final design activities for the trail extension from the end of the Pequonnock Valley in Trumbull and for the construction of three of the sections. Given the financial constraints of the TE program and the difficulty local communities have with appropriating the entire 20% local match, it is evident that the design and construction of the Pequonnock River Trail would not have occurred without supplementing federal aid funds and obtaining funds from various sources. The most vital component of the innovative financing strategies was receiving credit for the value of the work completed by a private developer and being authorized to use that credit as the local match and leverage federal aid funds. Without the approved Innovative Financing plan, it is unlikely the region would be nearing the completion of the project.

## **BIOGRAPHICAL SKETCHES**

Brian Bidolli is the Executive Director of the Greater Bridgeport Regional Council. Through his experience at the local and regional level, he has supported numerous quality of life initiatives in the San Diego and Greater Bridgeport region with a focus on integrating environmental mitigation strategies into land use and transportation plans. Mr. Bidolli is a graduate of City University of New York-Hunter College, and holds Masters Degrees in Public Administration from California State University and in City Planning from San Diego State University.

Mark C. Nielsen has been working at the Greater Bridgeport Regional Council for the past 32 years, mostly as the senior transportation planner and is responsible for overseeing the regional planning program for the six-town region centered on the City of Bridgeport, Connecticut, including development of the long range regional transportation plan and short range transportation improvement program. In recent years, the focus of the regional transportation planning program has shifted to non-motorized transportation options, alternative transportation modes and complete streets planning. And, in response to change in focus, Mark has completed the regional and local bicycle and pedestrian plans, various congestion management plans and a complete streets plan for the City of Bridgeport. He has also been actively involved in planning, designing and implementing the Regional Pequonnock River Trail project, a project that is nearing completion. A life-long cyclist and a daily rail commuter, Mark is a strong advocate for promoting bicycling, walking and public transportation in the region. Mark is a graduate of the University of Connecticut with a dual degree in economics and urban studies and attended graduate school at the University of Rhode Island in its Community Planning and Area Development program.