APPENDIX A: ROOSEVELT COMMONS SHORELINE RESTORATION PROJECT

I. Title

Watershed Restoration and Protection Plan for the Tenakill Brook Watershed
Roosevelt Commons Shoreline Restoration Project
RP 07-001

II. Waterbody Improved

The Roosevelt Commons Park Pond is located in Tenafly, New Jersey. The pond is an impoundment located in a recreational park. The pond was found to have high levels of fecal coliform and *E. coli*. This pond was determined to be a source of bacteria for the Tenakill Brook Watershed based on the sampling results from the development of the Watershed Restoration and Protection Plan for the Tenakill Brook Watershed. The Tenakill Watershed has a fecal coliform Total Maximum Daily Load (TMDL) of 96%. The TMDL was established in 2003. The park is frequently inhabited with Canada Geese at or near the pond. This project used a combination of two different Best Management Practices to improve the water quality in the pond. A geese management service was hired to keep the geese out of the park, temporarily. While the geese were absent a buffer was established along the shoreline of the entire pond that has an average width of 17 feet. The objective of the project was to alter the landscape of the pond while the geese were absent to make the park much less appealing to them so they would permanently leave the park. The Rutgers Cooperative Extension Water Resources Program and Borough of Tenafly worked as partners in this project.

III. Problem

The Roosevelt Commons Park Pond has a surface area of approximately 0.5 acres. The Roosevelt Commons Park is part of the Tenafly Middle School. The park and middle school have nine tennis courts, a baseball field and a track. The park and middle school are approximately 3 acres. The park is used by the school for gym class and recreational activities but the park is also used by greater community. In the morning, one can see several residents using the track before school starts. The pond is a simple impoundment on a small tributary that runs through the park and discharges to the Tenakill Brook. There is no boating allowed in the pond but fishing is allowed.

Goose populations were monitored during the initial sampling period. The population consistently included more than 30 Canada geese during each sampling event, and on many occasions, exceeded 50 Canada geese. In addition to the waterfowl's impact on water quality, the population has disrupted the use of the park and deterred residents from using the walking trails that pass by the pond.

The TMDL was proposed and approved in 2003 for a 96% reduction of fecal coliform in the Tenakill Brook. The TMDL was established at the monitoring station on Cedar Lane in Closter. The site ID is 01378387. The Tenakill Brook feeds the Oradell Reservoir.

IV. Project Highlights

This project re-vegetated and stabilized 685 linear feet of degraded shoreline around Roosevelt Commons Park Pond. The geese management service was hired weeks before the installation of the buffer was scheduled to prevent the geese from interfering with the installation. The service continued for over a year to allow the buffer to establish itself undisturbed. The buffer was installed in one day with the help from students, Borough officials, municipal employees and staff from the Water Resources Program volunteering their time. The site was prepped for the buffer installation the day before by the Department of Public Works. The materials were secured with a grant from the New Jersey Department of Environmental Protection.

The initial water quality monitoring began in July 2007 and was able to capture ten samples that would be geometrically averaged to represent the "before" conditions of the pond. The shoreline was restored and the buffer was installed approximately a year after the initial sampling had started. The follow up water quality monitoring started approximately year after the restoration effort was completed. The follow-up sampling lasted for three months (June, July and August) of 2009 for total of 15 sampling events. Although maturity of the vegetation is expected to produce even greater results, the results already show a significant impact on the water quality of the Roosevelt Commons Park Pond.

V. Results

The follow up water quality monitoring was designed to measure the impact that the shoreline restoration project had on the quality of the water discharging from the pond in the park. Flow was measured and water quality samples were collected at three sample points for 15 different sampling events during the entire summer (5 sampling events per month for June, July and August). The sampling points were located just upstream of the pond (TB6b), just downstream of the pond (TB6a) and further downstream from an established sampling point from the summer of 2007 (TB4).

The data collected from the sampling during the summer of 2009 show that the water quality of the discharge from the pond has significantly improved from two years ago. The average concentration of fecal coliform and *E. coli* at TB6a was 8,834 colonies/100 ml and 5,258 colonies/100 ml (The standard is 200 and 235 colonies/100 ml, respectively). The concentrations have been reduced by 91 and 84%, respectively. This is a significant reduction in 99% confidence interval for both fecal coliform and *E. coli* using the student t-test after the data had been log normalized. The average loading rates for fecal coliform and *E. coli* at TB6a are 60,000 and 60,000 colonies/hour, respectively. These values are down 96 and 94% from the average values recorded during the sampling in the summer 2007. Once again, that reduction is significant to a 99% confidence interval after the data had been made log normal. Furthermore, at TB4, the bacteria loading rates for fecal coliform and *E. coli* were 3.37 and 2.58 million colonies/hour, respectively. These values are now 2.01 and 2.17 million colonies/hour, respectively. This was a 60 and 16% reduction. Finally, the data conclusively shows that the pond operates as a sink for both bacterial parameters. The concentration of bacteria is reduced by 40% (fecal coliform) and 48% (*E. coli*). The loading rates have been reduced by 65% and 70%, respectively. These results were significant to an 88 and 95% confidence interval for fecal

coliform and *E. coli*, respectively. These data clearly demonstrates that the project is a success and has resulted in substantial water quality improvements to the Tenakill Brook.

Table 1: Geometric Avg. Loading Rates and Concentrations in 2009

Sampling Location	FC Geometric Mean Conc.	EC Geometric Mean Conc.	FC Geometric Mean Loading Rate	EC Geometric Mean Loading Rate
	(org/100 ml)	(org/100 ml)	(million org/hr)	(million org/hr)
TB6a (2009)	764.06	1278.67	0.06	0.06
TB6b (2009)	814.06	1575.91	0.17	0.21

Table 2: Geometric Avg. Loading Rates and Concentrations in 2009 and 2007 at TB6a

Sampling Location	FC Geometric Mean Conc.	EC Geometric Mean Conc.	FC Geometric Mean Loading Rate	EC Geometric Mean Loading Rate
	(org/100 ml)	(org/100 ml)	(million org/hr)	(million org/hr)
TB6a (2007)	764.06	814.06	0.06	0.06
TB6a (2009)	8,834.84	5,258.61	1.31	0.99

Table 3: Average Loading Rates and Concentrations in 2009

Sampling Location	FC Geometric Mean Conc.	EC Geometric Mean Conc.	FC Geometric Mean Loading Rate	EC Geometric Mean Loading Rate
	(org/100 ml)	(org/100 ml)	(million org/hr)	(million org/hr)
TB4 (2007)	2,058.73	2,219.16	2.01	2.17
TB4 (2009)	2,744.65	1,994.25	3.37	2.58

The community of Tenafly has expressed positive feedback for the project. After the geese management service had prevented the geese from entering the park, the residents of Tenafly started using the park more. By preventing the geese from accessing the park, the park grounds are free of geese waste, and residents feel more encouraged to use and enjoy the park.

IV. Partners and Funding

Rutgers Cooperative Extension Water Resources Program worked with the Bergen County Health Department for the sampling portion of the project. The Water Resources Program collaborated with the Borough of Tenafly for the shoreline restoration project. The Water Resources Program and the Borough of Tenafly provided staff and volunteers to complete the restoration effort. The grant was provided by the New Jersey Department of Environmental Protection though their Section 319(h) funding program.

V. Photos

Figure 1: Photograph of the pond before buffer installation

Figure 2: Photograph of the pond after buffer installation

VI. Contacts

Sean Walsh
Program Associate in Water Resources
Rutgers Cooperative Extension
Rutgers, The State University of New Jersey
14 College Farm Road, Room 241
New Brunswick, NJ 08901-8551
Phone: 732-932-9800 ext. 6162
Fax: 732-932-8644
E-mail: swalsh@envsci.rutgers.edu

Christopher C. Obropta, Ph.D., P.E.
Extension Specialist in Water Resources
Rutgers Cooperative Extension/Department of Environmental Science
Rutgers, The State University
14 College Farm Road
New Brunswick, NJ 08901-8551
Phone: 732-932-9800 ext. 6209
Fax: 732-932-8644
E-mail: obropta@envsci.rutgers.edu