

## Urban Water Resources Management

Watershed Characterization, Restoration and Management

Stormwater Permitting and Compliance

Stormwater Management Plans

Best Management Practices

Erosion and Sedimentation Control Plans

Training Workshops

## Drinking Water Supply

Source Water Assessment and Protection Plans

Reservoir Management Plans

Drought Contingency Plans

Water Conservation Plans

Water Supply Well Rehabilitation

Water Intake Design

## Water Quality

NPDES Permitting and Compliance

Water Quality Studies

CWA Section 303(d) Impaired Waters De-listing

Total Maximum Daily Load (TMDL) Consulting

Regulatory Assistance/Negotiations

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Enforcement/Consent Order Response Strategy and Negotiations

## Aquatic Community and Wetland Resources

Fish Population and Macroinvertebrate Community Studies

Habitat Inventory and Assessment

Ecological Risk Assessment

NEPA - Environmental Impact Statements

Fish Kill Investigations

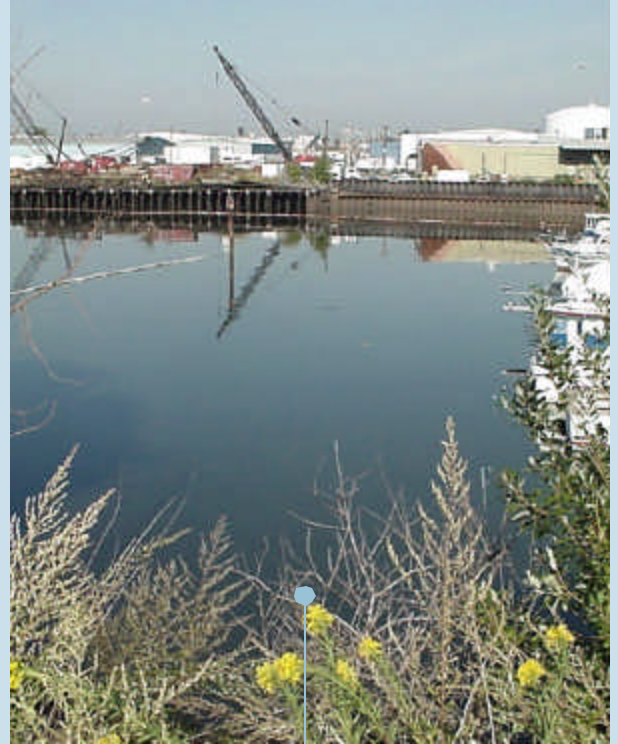
Sediment Sampling and Mapping

CWA Section 404 Wetland Permitting

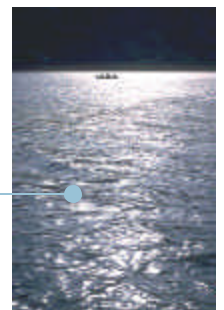
CWA Section 401 Water Quality Certification

Threatened and Endangered Species Surveys

Stream Relocation, Permitting, Engineering Design, and Construction Oversight



## Surface Water and Natural Resources Management



*Solving Water  
Resource Problems*

## ASCE/EPA National Stormwater Best Management Practices Database

Client/Owner:  
ASCE/EPA

Start Date:  
June 1997

Completion Date:  
Ongoing

Services Provided:

- BMP data analysis
- Literature review
- Statistical Analysis
- BMP design evaluation
- Database management
- Guidance Manual Development

### ***Project Highlights***

GeoSyntec participates on a team with the Denver Urban Drainage and Flood Control District, Wright Water Engineers, and other members of the American Society of Civil Engineers (ASCE) Urban Water Resources Research Council (UWRRC) on an ASCE project to develop a scientifically based approach and management tools to evaluate the effectiveness of stormwater runoff for BMPs nationwide.

### ***Project Success***

The goal of the project is to promote technical design improvements for BMPs and to better match their selection and design to local stormwater problems. The effort has included development of a set of monitoring and reporting protocols for use by researchers in performing BMP monitoring that will make individual BMP studies much more useful for design evaluation when comparing multiple studies. Additional tasks include gathering currently available data on BMP performance, including attempting to gather as many of the protocol data as possible, and developing an initial assessment of BMP design and performance.

### ***Project Technical Summary***

GeoSyntec's role is to perform the technical evaluation of the data currently in the database to investigate effects of design on BMP effectiveness and to develop a national level guidance document on how to conduct BMP effectiveness studies such that the monitoring and reporting protocols are met. In addition, GeoSyntec is providing technical support as requested to database users. The knowledge gained from this work is directly beneficial to clients who are looking for proven stormwater technologies to apply in their projects.



# Nonpoint Source "MegaManual" Massachusetts

**Client/Owner:**  
Massachusetts  
Department of  
Environmental  
Protection

**Start Date:**  
April 2002

**Completion Date:**  
Expected August  
2003

- Services Provided:**
- Manual Development
  - Web Site Development
  - Training and Education

***Project Highlights***

The Massachusetts Department of Environmental Protection has selected Geosyntec Consultants to revise the Massachusetts Nonpoint Source Management Manual, also known as "The MegaManual", originally published in 1993. The original manual will be replaced with a concise, compact, updated manual accompanied by a comprehensive web-based document and searchable bibliography.

***Project Success***

The revised MegaManual will provide local officials with easy access to the tools and resources they need to manage Nonpoint source pollution in Massachusetts. The web-based version of the manual is designed to help users navigate through material, including design requirements, regulations and cost comparisons. Updates to the web Manual will be made quarterly in order to ensure that the information is current and to bring government entities throughout the state up to date with current standards, technologies and regulations.

***Project Technical Summary***

Nonpoint source pollution in Massachusetts has been addressed by local governments in the form of a variety of zoning restrictions and bylaws. State and federal initiatives have woven a complex web of regulations and guidance documents. The goal of this project is the compilation of a compact, user-friendly Manual to simplify the tasks of overseeing compliance with Nonpoint source-related requirements, meeting these requirements, and developing community-based initiatives. The interactive, web-based Manual, also available on CD-ROM, will provide downloadable chapters, fact sheets, figures and tables, links to electronic resources and a searchable electronic bibliography.



## FHWA Guidance Manual for Monitoring Highway Runoff Water Quality (FHWA-EP-01-022)

Client/Owner  
USDOT/FHWA

Start Date:  
May 2000

Completion Date:  
September 2001

Services Provided:

- Guidance Manual Development
- Stormwater monitoring data analysis and interpretation
- Alternatives analysis for stormwater monitoring equipment selection

### **Project Highlights**

GeoSyntec has developed a nationally-distributed guidance manual for state, county, and local departments of transportation to better monitor highway stormwater runoff for water quality.

### **Project Success**

GeoSyntec developed and delivered the manual and technical summary to FHWA. FHWA published the hard copy of the Manual in June 2001.

### **Project Technical Summary**

Many State DOTs and County and City Road Departments have asked the Federal Highway Administration (FHWA) for guidance in their efforts to comply with the stormwater discharge requirements of their Stormwater NPDES permit, TMDL compliance programs, and the Coastal Zone Act Reauthorization Amendments (CZARA) Nonpoint Source Pollution Management Measures. These requirements often include a stormwater monitoring component to aid in identifying pollution sources, assessing resultant environmental impacts, and assessing the effectiveness of Best Management Practices (BMP) employed for pollution reduction.

GeoSyntec developed a technical guidance manual targeted at selection and use of stormwater runoff monitoring equipment in the near highway environment. The intent of the manual is to help State and Local transportation agencies establish and achieve stormwater monitoring program goals by collecting useful and representative rainfall, flow, and water quality information. The ultimate goal of this manual is to promote better decision-making with respect to highway runoff management.



## Technical Support for the National Watershed Protection Program U.S. Environmental Protection Agency - National Coverage

**Client/Owner:**  
The Cadmus Group/  
U.S. Environmental  
Protection Agency  
**Contract 68-C-02-109**

**Start Date:**  
October 2002

**Completion Date:**  
December 2007

**Services Provided:**

- Watershed Assessment
- Stormwater BMP Assessment
- Nonpoint Source Controls
- TMDL Support
- Technical Watershed Tools Development
- GIS Services

**Project Highlights**

GeoSyntec Consultants is a member of a project team led by The Cadmus Group, Inc. that recently won a large, multi-year contract to provide a range of technical support services to the USEPA in the area of watershed assessment and management, nonpoint source control, and Total Maximum Daily Load development assistance. Project and technical support will be provided to the Assessment and Watershed Protection Division (AWPD) of the Office of Wetlands, Oceans, and Watersheds (OWOW).

**Project Technical Summary**

Work under the contract can include: watershed protection and restoration, water quality monitoring, pollution control, outreach and technology transfer, guidance and tool development, and support to AWPD in implementing the National Watershed Protection Program.

The primary purpose of this contract is to advance the protection and restoration of the nation's watersheds and water bodies through the use of point and nonpoint source pollution controls, water quality monitoring, and the development of tools for ecosystem restoration and, ultimately, improve water quality.



## WERF Critical Assessment of Stormwater Treatment and Control (BMP) Selection Issues

Client/Owner:  
WERF

Start Date:  
January 1, 2003

Completion Date:  
June 30, 2004

**Services Provided:**

- BMP process evaluation & modeling
- BMP documentation
- Develop guidance methodology & documentation
- Provide community outreach programs
- Create a BMP characterization module

### ***Project Highlights***

As principle investigator, GeoSyntec leads this project, in conjunction with the University of Colorado, Oregon State University, Louisiana State University, and Aquatus Environmental for the Water Environment Research Foundation's (WERF). This project will identify and show, in an objective manner, how design factors influence the selection and sizing of controls for specific receiving water protection needs/goals and for the location and climatic conditions in which they are used. It is the intent of this project to provide guidance to stormwater managers and their consultants for selection and use of stormwater controls that are specific for their geographic area and needs.

### ***Project Success***

This project will assist stormwater managers and their consultants in the selection and design of controls to protect receiving waters in the most effective manner possible. The target audience for the information to be developed during this project includes the local governmental agencies and private developers.

### ***Project Technical Summary***

GeoSyntec's goal for this research project is to apply fundamental environmental engineering principles of unit operations to evaluation and selection of BMPs for urban and urbanizing areas. Stormwater system control options will be defined, along with factors affecting their evaluation. The selection methodology will result in the development of a listing of suitable treatment processes and evaluation parameters that have highest potential for treating stormwater to the levels desired and to best mitigate impacts on receiving waters, as needed to meet specific local goals and objectives.



## NCHRP Evaluation of Best Management Practices for Highway Runoff Control

Client/Owner:  
NAS/NCHRP

Start Date:  
August 22, 2002

Completion Date:  
August 21, 2004

**Services Provided:**

- BMP development/  
design evaluation
- BMP Methodology  
Evaluation
- Analyze Statistical  
Data
- Quality Assurance/  
Quality Control
- User Manual  
Development

### ***Project Highlights***

GeoSyntec participates as a team member with Oregon State University and the University of Colorado on a National Cooperative Highway Research Program (NCHRP) project for the National Academy of Sciences. The purpose of the project, funded through the Transportation Research Board, is to provide highway practitioners with the scientific and economic information needed for selection and design of Best Management Practices (BMPs) to control highway runoff.

### ***Project Success***

The purpose of this project is to evaluate the basic scientific and technical criteria that can be used for the quantitative assessment of wet-weather flow control (WWC) alternatives (often referred to as Best Management Practices or BMPs) for highways and other highway-related facilities, and to apply the results of the evaluation for use in facilitating effective implementation of these controls. GeoSyntec efforts will include creation of an extensive BMP taxonomy, summarizing BMP options for groups of pollutants and providing the starting point for development of the BMP evaluation methodology. GeoSyntec will also play a primary role in evaluation and design of low impact development techniques as applied to the highway environment.

### ***Project Technical Summary***

GeoSyntec will determine the assessment and capabilities of the many possible BMPs in the project, in order to provide a defensible evaluation of their performance at a unit process level. The most effective BMPs for a suite of constituents and highway environments will be provided. GeoSyntec will provide cost and maintenance estimates for these controls, utilizing life-cycle analysis. The goal is to combine fundamental unit process analysis with best available monitoring data to translate research and special studies to practice, with the most emphasis given to the best estimate of BMP effluent quality.



## **AMY S. GREENE ENVIRONMENTAL CONSULTANTS - COMPANY SERVICES**

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**AMY S. GREENE ENVIRONMENTAL CONSULTANTS, INC. (ASGECI)** is headquartered in Flemington, New Jersey with offices in New Cumberland and Easton, Pennsylvania. For 17 years, ASGECI has provided our services on many public and private sector environmental projects at over 2,200 sites throughout New Jersey, New York, Pennsylvania as well as other Mid-Atlantic States. We have a staff of 23 individuals with educational backgrounds encompassing the various scientific disciplines vital to achieving excellence in addressing environmental issues. These disciplines include ecology, botany, wildlife biology, geography, soils, water resources, forestry and geology. ASGECI has a USFWS certified bog turtle surveyor and GIS specialists on staff.

**ASGECI** offers a wide variety of high quality services and is particularly experienced in:

- ◆ Wetlands Delineations and Permitting
- ◆ Wetlands Mitigation and Restoration Plans and Monitoring
- ◆ Vegetation and Wildlife Surveys
- ◆ Endangered and Threatened Species Surveys
- ◆ Aquatic and Terrestrial Ecological Surveys
- ◆ Ecological Risk Assessment and Baseline Ecological Evaluation
- ◆ Environmental Impact Assessments Statements
- ◆ Forest Management Plans
- ◆ Environmentally Sensitive Area Mapping - DPCC/DCR Plans
- ◆ Open Space and Greenway Plans
- ◆ Environmental Construction Monitoring.

**ASGECI** performs detailed field delineations for both tidal and freshwater wetland areas. We have successfully obtained on behalf of our clients over 1,000 regulatory approvals and permits related to activities and projects involving wetlands and waterways. For projects that are subject to Federal regulations and jurisdiction, we have obtained approvals of wetland delineations and authorizations for fill activities from the New York and Philadelphia Districts of the U.S. Army Corps of Engineers (USACOE). Approvals for wetland delineations and wetland mitigation plans have also been obtained from the U.S. Fish and Wildlife Service (USFWS) and the U.S. Environmental Protection Agency. ASGECI has worked on numerous wetland restoration and construction monitoring projects for storm water management using Best Management Practices (BMPs) on Staten Island, Richmond County, New York including the Blue Belt project highlighted in the February 2003 issue of the Civil Engineering Magazine. We also worked with the NJDEP Division of Science, Research and Technology in developing an indicator monitoring system to evaluate the status of wetland mitigation projects in New Jersey.

**ASGECI** has been certified as a Disadvantaged/Woman-owned Business Enterprise by multiple agencies including, but not limited to, the following:

Pennsylvania Department of General Services  
Pennsylvania Department of Transportation  
City of Philadelphia Transportation Authority  
Southeastern Pennsylvania  
NJ Department of Transportation  
NJ Highway Authority  
NJ Transit

NY Department of Transportation  
Port Authority of New York and New Jersey  
Maryland Department of Transportation  
NY Metropolitan Transportation Authority  
and NY City Transit  
Delaware Department of Transportation  
Massachusetts State Office of Minority and Women  
Business Assistance

We have performed over 50 transportation related projects since 1991 under multiple task order contracts with the NJDOT Bureau of Environmental Services. Tasks included wetland delineation, environmental permitting and identification and design of wetland mitigation sites. **ASGECI** was commended by the NJDOT for our ability to meet demanding deadlines, the quality of our work, and our success at obtaining timely approvals from the NJDEP.

ASGECI staff have provided training and presented seminars for Universities, public employees, professional organizations and the general public in wetland delineation, wetland construction, habitat and shore line restoration and environmental impact assessment.

# **SOUTHERN NEW JERSEY LIGHT RAIL TRANSIT SYSTEM**

## Trenton to Camden, New Jersey

### **Client**

Bechtel Infrastructure Corporation

### **Project Sponsor**

New Jersey Transit

### **Project Purpose and Scope**

The Southern New Jersey Light Rail Transit System (SNJLRTS) will be constructed between Camden and Trenton, NJ, a distance of 34 miles. Construction of the diesel-powered system includes construction of a second rail and rehabilitation of the right-of-way (ROW), bridge construction and rehabilitation. Construction of 3 park and ride locations along the alignment are also planned. Construction began in May 2000 and is anticipated to be complete by April 2002. The project alignment crosses and adjoins vegetated wetlands, open water, and forested habitats. Mitigation for wetland/open water impacts was required by the New Jersey Department of Environmental Protection (NJDEP) and US Army Corps of Engineers (USACOE). Amy S. Greene Environmental Consultants, Inc. (ASGECI) and our subconsultant, Normandeau Associates, Inc. (NAI) were contracted to implement the final wetland mitigation program. This included final mitigation plans, construction oversight and pre/post-construction monitoring at 3 wetland mitigation sites along the light rail alignment in Camden, Burlington and Mercer Counties.

### **Highlights and Results of Services**

ASGECI and NAI provided wetland mitigation final design services for the three mitigation sites. Tasks included preparation of the Grading Plan, Planting Plan, Soil Erosion and Sediment Control Plan; Details and Notes and Final Conditions. ASGECI has also performed pre-construction, construction, and post-construction monitoring tasks at all 3 sites. The following is a brief description of each of the three SNJLRTS mitigation sites:

- Mitigation Site #1 involves the creation and enhancement of a total of 2.0 acres of forested wetlands, on the south side of the Pennsauken Creek, east of the railroad tracks, in the Town of Pennsauken, Camden County. A tributary of Pennsauken Creek is located along the western side of the Site. The Site will be hydrologically connected to the tributary. Site #1 construction is delayed due to property acquisition issues.
- Wetland Mitigation Site #2 is located adjacent to the SNJLRT alignment in the Town of Riverside. The Site is bordered by Rancocas Creek to the north and is an existing wetland area specified for enhancement by removal of Phragmites from a 3.15-acre freshwater tidal wetland. The enhancement includes replanting of specific areas with a diversity of emergent plant species. The Site was constructed in spring 2001, through excavation of channels and grading to appropriate depths. The hydrology for final design was determined by performing a month of tidal monitoring using a TROLL 4000 data recorder in a channel adjacent to the Site. Herbicide treatment with Rodeo to eradicate Phragmites onsite was performed in fall 2000 prior to site grading and a follow-up treatment is planned in fall 2001. The site was planted in spring 2002 and is currently being monitored.
- Wetland Mitigation Site #3 is located adjacent to the SNJLRT alignment in the Town of Hamilton, within the New Jersey State Delaware & Raritan (D&R) Canal Park. The mitigation for Site #3 consists of restoring tidal flows to the western most segment (3.28 acres) of the D&R Canal by installing a new, permanent culvert under the utility access road. The culvert installation was completed in summer 2001.

ASGECI is currently performing post construction monitoring for the mitigation sites. All field assessments will be completed in accordance with the conditions of the NJDEP and USACOE permits. Vegetation and hydrologic monitoring will be performed for 5 years at Wetland Mitigation Sites #1 and #2. Vegetation and fish monitoring will be monitored for 3 years at Site #3.

### **Key Personnel**

Amy Greene – Principal Ecologist  
Curtis Helm - Project Manager

Anne Magliaro - Sr. Envir. Scientist

### **References**

Mr. Bruce Colvin  
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Mr. Nick Marton  
NJ Transit Corporation  
One Penn Plaza East  
Newark, NJ 07105-2246  
Tel. 973-491-8971

**ASGECI Project #:** 1889

**Project Start Date:** July 1999

**Project Completion Date:** November 2005

## **MERCK & CO. CONCEPTUAL DESIGN FOR RANGE ROAD LANDFILL**

City of Linden, Union County, New Jersey

### **Client:**

Merck & Co.

### **Project Purpose and Scope**

The Range Road site is located along the Rahway River, a tributary of the Arthur Kill. The site covers approximately 21.5 acres, of which about 6 acres were historically used as a landfill for the Merck Rahway manufacturing and research facility. ASGECI teamed with GeoSyntec Consultants, Inc. to implement the NJDEP approved Remedial Action Work Plan (RAWP) for the site. The RAWP calls for the permanent capping, stabilization and closure of the Range Road site. ASGECI provided design assistance and regulatory permitting services during all phases of the project. ASGECI met regularly with Merck environmental team staff to discuss project progress. ASGECI also met with New Jersey Department of Environmental Protection (NJDEP) staff in the field to review the RAWP and site's natural resources.

### **Highlights and Results of Service**

ASGECI performed site visits, evaluated and mapped the site's natural resources and revised the wetland delineation that had been previously prepared by others. A Letter of Interpretation was obtained for the site verifying the revised wetland boundaries. The soils that were being placed on the site were "remediated" soils that were determined by ASGECI to be extremely alkaline (pH 8.0+) and devoid of organic matter and biological activity. ASGECI initiated a nursery vegetation trial to identify herbaceous species tolerant of alkaline soil conditions and also prepared recommendations for soil treatments and amendments to improve soil quality. ASGECI worked with Geosyntec to develop biostabilization techniques using native plant species to stabilize the sideslopes of the landfill which are adjacent to the Rahway River corridor. ASGECI prepared applications to obtain a NJDEP General Permit #6 to authorize the filling of 3 isolated wetlands; a NJDEP General Permit #4 for solid waste cleanup activities in wetlands; and a Waterfront Development Permit for land use activities within 500 feet of the mean high water line. A Statement of Compliance with Coastal Resource Policies was also submitted to the NJDEP as required under the Coastal Program Permit rules. A US Army Corps of Engineers Nationwide Permit #38 for hazardous materials cleanup was obtained for activities in tidal wetland and freshwater wetlands within 1,000 feet of tidal waters. Wetland mitigation was required as a condition of the approval of the NJDEP General Permit #4 and USACOE Nationwide Permit #38. ASGECI and Geosyntec designed a tidal wetland mitigation plan to replace reed grass marsh with a saltmarsh vegetation community.

### **Key Personnel:**

Amy S. Greene, Principal Ecologist

Curtis W. Helm, Project Manager

Anne Magliaro, Environmental Scientist

### **Reference**

Mr. Eric Steinhauer, P.E., Project Manager

GeoSyntec Consultants, Inc.

10015 Old Columbia Road, Suite A-200

Columbia, MD 21046

Tel.: 410-381-4333

**Project Start Date:** October 2000

**Project Completion Date:** December 2002

# **ENVIRONMENTAL RESTORATION MONITORING SERVICES FOR EYLANDT STREET/JANSEN STREET PROJECT**

Staten Island, Richmond County, New York

## **Client:**

Bedford Construction Corporation

## **Project Sponsor:**

New York City Department of Design and Construction

## **Project Purpose and Scope**

Amy S. Greene Environmental Consultants, Inc. (ASGECI) was contracted to provide a full-time environmental restoration specialist to oversee the construction of improvements to the stormwater drainage system within the Arbutus Creek watershed. There are a variety of components involved with achieving this goal including storm sewer and sanitary sewer rehabilitation and installation and construction of Best Management Practices (BMPs). BMPs are facilities such as constructed wetlands and retention ponds that are designed to provide water quality improvements to stormwater before discharge. Water quality issues within the Arbutus Creek watershed include uncontrolled stormwater runoff from roads and parking areas, non-point source runoff from residential development and failing septic systems. The proposed storm sewer installation/improvements and BMP construction will improve stormwater capture and detention resulting in improved water quality and flood prevention. A side benefit often included wetland/wetland adjacent area creation/restoration/enhancement as well as, habitat improvement and creation for wildlife. Native plants are utilized exclusively for restoration of upland and wetland habitats.

## **Highlights and Results of Services**

ASGECI provided full-time on-site Restoration Specialist to monitor project activities including BMP construction, restoration and planting; plant salvage, storage and maintenance; tree marking, removal and grubbing operations; and installation and maintenance of soil erosion and sediment control measures. In addition, ASGECI provided detailed construction sequences for the four large BMPs that are integral to the overall project design. The construction sequences included detailed notes and plans for the contractor to follow while performing work in these environmentally sensitive areas. A detailed sequence was required to minimize impacts to water quality during construction. The ASGECI restoration specialist has also prepared restoration plans and sketches to address a number of disturbances to wetlands/wetland adjacent areas and stream corridors within the project area that were beyond the scope of the original project. ASGECI staff has worked closely with representatives of the NYCDDC, NYSDEC, the NYCDEP, the general contractor and the on-site construction supervisor/project engineer to ensure compliance with the New York State Department Conservation freshwater wetlands permit conditions. Inspection reports are prepared and submitted on a daily basis to the NYSDDC detailing the progress of the project. The project is ongoing.

## **Key Personnel**

Amy Greene – Principal

Curtis Helm - Project Manager

Paul Miller - Restoration Specialist

Sean Ronan - Restoration Specialist

## **References:**

Mr. Joseph Lione

PCS Construction Services, Inc.

19 Liberty Avenue

Staten Island, NY 10304

Tel.: 718-987-5652

Mr. A. Dean Cavallaro, New York City DEP

Deputy Director, Staten Island Bluebelt

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Corona, NY 11368

Tel.: 718-595-7457

**ASGECI Project #:** 1766

**Project Start Date:** August 23, 1999

**Project Completion Date:** Year 2003

### **Organization Information**

The Low Impact Development Center, Inc. is a non-profit 501 (c) (3) organization that was formed in 1998 to serve as the central research and training organizations for the use and development of Low Impact Development (LID) and other sustainable stormwater management technologies. The Center has been instrumental in developing and implementing LID guidance documents on planning and designing using LID at the national, state and local government levels. In addition, the Center has provided review and guidance on watershed protection measures and regulatory compliance. The Center has a small group of core employees who collaborate with nationally recognized experts in the fields of engineering, biology, planning, and public administration to develop and produce LID research and implementation projects. The experience of the staff includes direct participation of the development of water resource regulations and legislation at the federal, state, and local government levels. The Center's technical and administrative experience with grants, LID outreach, and LID design, as well as its multidisciplinary staff and extensive resources, will ensure a successful project. Although many of the projects that the Center works on are in the Chesapeake Bay region, the Center has been involved in significant water resource protection projects in other regions of the country and in international water research projects.

### **Low Impact Development Feasibility Study for Urban Areas**

*(October 1999 – October 2001)*

**Key Project Features:** Policy development, site investigations, modeling, cost analysis

The LID Center produced a document that explored the potential use of LID as a tool for compliance with Wet Weather Flow (e.g. NPDES, CSO, TMDL) regulatory and natural resource protection issues in urban areas. This document included background on the use of distributed microscale controls, developed protocols and checklists for the evaluation and use of the technology, and provided case studies. The case studies demonstrated the use of several management alternatives for different land uses and facilities. These included opinions of cost and analysis of marginal costs and

### **Southeast Federal Center Seawall Stormwater Management Design**

*(January 2002, estimated construction cost \$125,000)*

**Key Project Features:** Development of innovative technologies, facilitation of federal agency coordination with local government review agencies

The LID Center was brought into the contract to conduct value engineering and environmental analysis to determine if LID techniques could be used to reduce construction costs while still allowing the project to meet D.C. government stormwater regulatory compliance. The Center conducted an evaluation of the existing and proposed infrastructure and the D.C. stormwater regulations. The Center developed an alternative stormwater management plan that eliminated significant amounts of infrastructure and reduced construction costs by an estimated \$300,000. The Center then worked with the design engineer to develop details and calculations for the proposed design and then helped GSA and the design engineer negotiate and obtain the necessary local government permits.

### **United States Navy Yard LID Demonstration Projects**

*(January 2000 to February 2002, estimated construction cost \$400,000)*

**Key Project Features:** Pilot projects, environmental analysis, and development of technology

A series of pilot projects for LID technology was constructed to improve water quality and demonstrate the potential of using LID to address non-point source pollution. These projects included site evaluations, water quality reports, development of construction details and specifications, construction observation, development of Operations and Maintenance manual, and post construction monitoring. The site was particularly challenging because of coordination with utilities, site parking and operations constraints and environmental issues. Public outreach documents and sessions were also developed as part of this effort.

### **United States Naval Observatory Low Impact Development Master Plan**

*(January 2001 to November 2001, design cost \$30,000)*

**Key Project Features:** Facilities planning and watershed management

A comprehensive evaluation of opportunities to retrofit areas with LID techniques was conducted as part of a non-regulatory and voluntary program to improve water quality. The goal of the project was to identify opportunities where LID techniques can be conducted as part

of ongoing maintenance or storm drain rehabilitation projects. The opportunities were ranked and prioritized based on potential effectiveness and program costs. Designs for each of the techniques were then prepared for construction and permitting through the D.C. Government.

**GSA National Capitol Region LID Retrofit Analysis**

*(August 2001 – present, estimated construction cost \$50,000)*

**Key Project Features:** Conservation landscaping, urban retrofits, program compliance

This is a task order on call project to evaluate the potential to retrofit GSA facilities in the National Capitol Region in order to meet the goals of the Chesapeake Bay 2000 agreement, which requires federal facilities to incorporate LID techniques into their properties. This project has included participation in LEED reviews, site improvement investigations, and investigation of opportunities for new construction. The project requires an analysis of GSA construction and maintenance procedures, local government regulations, and utility and infrastructure investigations and analysis.

**NAVFAC Low Impact Development Design Manual**

*(May 2002 – present, estimated cost \$80,000)*

**Key Project Features:** National Policy, Design Guidance

The purpose of this document is to provide Facilities Engineering Commands with design guidance, standards, and specifications to incorporate LID into designs for the construction of new facilities and for the retrofit and rehabilitation of existing facilities for regulatory compliance and natural resource program management. This will include an analysis of existing regulatory programs and design criteria so that facility managers can evaluate how LID can be incorporated into existing facility plans. The second part will include detailed design guidance and specifications for LID techniques that will conform to Uniform Facilities Criteria and Construction Criteria Base formats.

**Low Impact Development Best Management Practices Monitoring Project**

*(September 2001 to September 2003, Mr. Tim Kari-Kari D.C.DOH 202-535-2248, estimated cost \$15,000)*

**Key Project Features:** Environmental analysis and reporting

This project is a 319 grant from the District of Columbia to determine the effectiveness of LID and other innovative ultra-urban best management practices. The LID Center is assisting Howard University in site selection, monitoring protocols, and data analysis.

**Maryland State Highway Administration Low Impact Development Demonstration Projects**

*(September 2000 to present, estimated cost \$50,000)*

**Key Project Features:** Development of innovative technologies, environmental analysis and reporting

The MSHA has contracted with the University of Maryland and the LID Center to conduct an evaluation of the ability of LID technology to meet regulatory objectives in urban areas. This project will be done by selecting retrofit opportunities and then constructing pre- and post-monitoring stations to determine the effectiveness of the practices. The Center has participated

in site selection, development of monitoring protocols, and design development of monitoring sites and LID techniques.

**Army Environmental Center Low Impact Development and Conservation Landscaping Workshop** (April 2002, estimated cost \$9,000)

**Key Project Features:** Training

The LID Center conducted a Three (3) day intensive LID workshop for DOD and other federal agencies. This workshop covered information for program managers, engineers, planners, and maintenance personnel. The workshop focused on compliance issues for Chesapeake Bay regulatory issues at the Federal and local government levels. This included information on conservation landscaping, stormwater management design, outreach, and maintenance issues.

**Low Impact Design Fact Sheets**

(May to June 2000, estimated cost \$10,000)

**Key Project Features:** Outreach and Publications

A series of fact sheets were developed for public outreach to engineers, planners, and program managers for distribution by USEPA. The fact sheets were developed for green roofs, bioretention, street storage, and permeable pavements. Each of the fact sheets includes information on design, construction, maintenance, and effectiveness of the practice for stormwater runoff control. The fact sheets are available at:

<http://www.epa.gov/owow/nps/urban.html>

**Low Impact Development Design Internet Resource**

(October 2001 to present, estimated cost \$60,000)

**Key Project Features:** Development of guidance documents, Internet based programs, public outreach

This project is a cooperative assistance agreement from USEPA to develop a comprehensive Internet based resource for engineers, planners, stakeholder, and program managers to gain detailed information on LID design approaches, effectiveness of LID techniques to meet water resource objectives, case studies, and prototypical designs. The format for the site was based on feedback from practitioners and beta testers so that the most user friendly and expandable format can be used.

**Low Impact Development Urban Retrofit Study through the National Fish and Wildlife Foundation Chesapeake Bay Small Watershed Grant Program**

(August 2001 – February 2002, estimated cost \$10,000)

**Key Project Features:** Environmental Analysis, Energy and Water Conservation

This project was successful in exploring, identifying and demonstrating the potential of using remote sensing at the local government level for comprehensive watershed management. The LID Center introduced techniques that can be used by watershed planners to rapidly identify areas of interest for restoring and protecting hydrologic functions in damaged watersheds. Targeted restoration efforts, enabled by the broad, comprehensive watershed view that satellite imagery provides, can play an important role in achieving federal, state and local water

resource goals. Planners or engineers can quickly and easily perform site characterization and data collection on the watershed scale using remotely derived maps of watershed features, such as soil moisture, existing vegetation cover, urban heat islands, imperviousness and exposed sediment. The techniques developed allow users to visualize and analyze the interaction between soils, climate, hydrology and vegetation for the protection and restoration of aquatic resources, riparian buffers and upland areas. Future plans for this work include its continuation and expansion through an application for additional funding from the Foundation's 2002 Chesapeake Bay Small Watershed Grant Program. The proposed continuation of the project will lead to the development and refinement of a planning process that can be used as a broad and comprehensive watershed management screening tool.

### **Low Impact Development Training for Linear Highway Projects**

*(July 2002 – present, estimated value \$85,000)*

**Key Project Features:** National Training Program

This project is being developed under an assistance agreement for USEPA for use as a module by FHWA in the National Highway Institute training program. The purpose of this project is to provide highway planners and engineers with basic knowledge about the potential use of LID for linear transportation projects. It will include the basic strategies for decentralized stormwater management, construction techniques, case studies, cost elements, and maintenance issues.

### **Ariel Rios Courtyard LID Demonstration Project**

*(September 2001 – present, estimated cost 250,000)*

**Key Project Features:** Urban Retrofit

Several LID features will be constructed as part of a demonstration project. This will include a green roof shelter, alternative pavement materials, conservation landscaping, and soil amendments. The project includes coordination with numerous design review agencies that include oversight of historic preservation and aesthetic elements of the design. The Center is providing planning, design, and construction observation services.

### **Sustainable Best Management Practices Evaluation Project**

*(February 2002 to May 2004, estimated cost \$700,000)*

**Key Project Features:** Cost estimates and environmental analysis

The LID Center is part of an international team that is evaluating the effectiveness and costs of using sustainable integrated source control stormwater management practices for the Water Environment Research Foundation. This project will examine the long-term efficiency of approximately fifteen practices at controlling a wide range of Wet Weather Flow management issues. The Center will be responsible for evaluating bioretention and conservation practices. The evaluation will also include determinations of construction costs, maintenance costs, life-cycle costs, and marginal costs. Ancillary benefits, such as aesthetics or energy conservation will also be explored.

## **QUALIFICATIONS AND EXPERIENCE**

The Pennsylvania Environmental Council is a statewide educational, non-profit, membership organization that serves as a catalyst for the protection and improvement of Pennsylvania's environment. Established in 1970 with offices in Harrisburg, Philadelphia, Pittsburgh, Wilkes-Barre and a project office in Meadville, the Council is governed by a statewide board of directors broadly representative of interests and geographic regions across the state. The Council's focus has been in three program areas: land use, watersheds and environmental innovation. The Council is able to simultaneously work on policy solutions and on applied projects. On the Delaware, the Schuylkill, the upper Susquehanna, the Allegheny and the Monongahela, PEC has active programs building long-term, citizen-based conservation and watershed restoration strategies. These new strategies seek to intervene at a watershed level to restore and protect complex ecosystems. They involve partnerships among private funders, local and state government, property owners, grassroots and watershed organizations and regional business.

PEC has extensive experience with outreach and education related to stormwater and other watershed protection and restoration issues. This experience includes developing watershed conservation plans, recruiting and educating stakeholders and designing and executing specific outreach projects. Through these efforts, PEC has worked with state and county agencies, municipal governments, academic institutions, businesses, nonprofit and grassroots organizations. In virtually all cases, PEC works on a watershed basis requiring intermunicipal interaction and cooperation.

Some PEC programs and projects that highlight these qualifications are as follows:

PEC is the *Outreach and Education Coordinator for the Darby-Cobbs and Tacony-Frankford Watershed Partnerships*. These Partnerships were organized primarily by the Philadelphia Water Department and the Department of Environmental Protection to serve as a mechanism for bringing together regulatory requirements and grassroots efforts in these highly urbanized watersheds. PEC is responsible for identifying and recruiting stakeholders into the partnership process. PEC has reached out to municipal and county representatives, environmental organizations, citizen groups, schools and businesses to create a broad-based watershed partnership. PEC has helped define the watershed partnership structure. PEC convenes and facilitates the general partnership meetings and public participation committee. PEC also serves on the steering committee, which sets direction for the partnership.

PEC has also led the *Philadelphia Water Department's (PWD) Stormwater Citizen's Advisory Committee*. PWD formed this committee as part of its NPDES Phase I permit requirements. The purpose of this committee is to advise PWD on how to conduct outreach to its service area. As a consultant to PWD, PEC recruited participants for the committee and convened regular scheduled meetings.

PEC has partnered with local organizations to create three *River Conservation Plans* (RCP). Each RCP requires extensive public outreach including surveys and interviews as well as meeting facilitation over an extended timeline of 2 or more years. The end result is a conservation plan that includes a series of locally developed recommendations for protecting and improving the quality of life in the watershed. PEC also served as the public outreach coordinator for the lower third of the Schuylkill River Conservation Plan.

PEC promotes the establishment of new municipal *Environmental Advisory Councils* and assists existing EACs. PEC works one on one with EACs, holds workshops on topics of common interests and holds an annual Southeast Pennsylvania regional conference. PEC has begun to link its watershed planning and implementation efforts with the establishment and coordination of EACs.

PEC is actively engaged in developing and delivering *Municipal Environmental Education Programs*. PEC recognizes that municipal officials face an increasing demand to make important and complicated decisions that impact land and water resources. It is essential that these officials be well-versed in environmental issues. PEC is involved with creating resources and programs to help municipal officials get the information they need. As one example of this effort, PEC was a primary organizer of *Beyond the Detention Basin: How to Improve Stormwater Management in Your Community*. This half-day workshop was offered in conjunction with the Pennsylvania Stormwater Symposium at Villanova University in October 2001.

Through its involvement with various partnerships, watershed organizations and EACs, PEC has directed or been a primary player in a number of specific projects. These include:

- Riparian restoration projects
- Organization of promotional events
- Greenway planning
- Riparian and streambank volunteer visual assessments
- GIS-based Environmental Resources Inventories
- Watershed educational and celebratory events
- Citizen watershed behavior survey
- Informational materials such as watershed brochures and status reports
- Watershed-based teacher training program