

The PACD Engineering Assistance Program

Protecting and enhancing Pennsylvania's watersheds by building local capacity for the stewardship of watershed resources.



The Pennsylvania Association of Conservation Districts, Inc. (PACD) Engineering Assistance Program provides statewide engineering and soils assistance to eligible entities to develop or implement a watershed assessment, watershed restoration plan, or watershed protection plan.

To provide this assistance, PACD employs professional engineers and conservation technicians as part of an interdisciplinary team to provide engineering services. Each team follows professional engineering principles and ensures that projects are completed according to PA Technical Guide Standards and adhere to federal, state, and local, laws and regulations.

Teams are regional and cover all river basins in Pennsylvania. They are comprised of specialists that can identify problems, scope solutions, identify engineering needs, estimate costs and realistic time frames, and identify assistance needed to implement solutions. They are also able to assist future Growing Greener applicants in the development of sound applications.



Program Offerings:

- Inventory & Evaluation
- Design & Specifications
- Construction Quality Assurance
- Training
- Topographic Survey
- Soils Investigation
- Technical Reviews
- Watershed Assessment

For more information, visit the Pennsylvania Association of Conservation Districts, Inc. website at www.PACD.org or contact your region's office:

- Northwest Region (Clarion, PA): 814.226.8160
- Southwest Region (Somerset, PA): 814.445.8979
- Northeast Region (Bloomsburg, PA): 570.784.4401
- Southeast Region (Lebanon, PA): 717.376-3510

Since its inception in 2001, the PACD Engineering Assistance Program has completed over 1,300 projects worth an estimated \$60 million in environmental improvements, while working in partnership with hundreds of local Pennsylvania organizations and individuals.



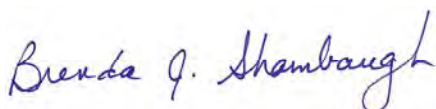
Dear Reader,

I am pleased to be able to share a few of the many success stories from the PACD Engineering Assistance Program. While this document highlights only a few of the projects completed through the program, we feel that they are representative of the many projects completed since the program's inception in 2001.

The PACD Engineering Assistance Program grew out of an identified need for additional engineering technical assistance for the new Growing Greener Program. It represents a true partnership effort between non-governmental organizations, local, state and federal governments, and has developed into an extremely successful program. Hundreds of local organizations including conservation districts, watershed organizations, and Resource Conservation and Development Councils, have utilized PACD engineering services to successfully implement local watershed improvement projects for agricultural operations, stream restoration, and acid mine drainage treatment.

Through this program, the PACD engineering staff has been able to design over \$22 million worth of environmental improvement projects in the Commonwealth of Pennsylvania. Without this program, many small projects would not have been completed. After many years, the program is still strong and continues to improve the environment for millions of Pennsylvanians.

PACD is grateful for the financial support provided by the PA Department of Environmental Protection (PA DEP) Growing Greener Program and the USDA Natural Resources Conservation Service, which continues to make the PACD Engineering Assistance Program possible.



Brenda Shambaugh
PACD Executive Director

Statewide demand for the PACD Engineering Assistance Program is strong. Observed benefits of the program include:

- **NRCS Standards are Met** - Every project that is completed is checked for compliance with NRCS standards and specifications.
- **Team Building and Partnering** - Individuals from various local organizations come together with PACD technical assistance to form a team that can often accomplish much more than any individual.
- **Increased Capacity at the Local Level** - The availability of PACD technical assistance allows local personnel to focus on other items, increasing the amount of work and number of projects that can be completed.
- **Quick Turnover of Work** - PACD staff can respond to unforeseen situations, provide technical assistance in a very short time, and make themselves available to local conservation groups who urgently need technical assistance.
- **Attention to Detail and Follow Up** - Once a project is released to a sponsor, PACD staff makes every effort to ensure that the project will be properly constructed, monitored, operated, and maintained.
- **Use of Sponsor Assets** - PACD staff makes an effort to use adequately trained local staff whenever possible. If a local person has surveying knowledge, we invite him to participate in the topographic survey. This allows PACD to do more and actively involves local personnel in the project planning, which enhances understanding and satisfaction upon the project's completion.
- **Small Projects Receive Same Attention as Large Projects** - Since all projects are planned to meet NRCS specifications, small projects receive a level of attention that may not be available elsewhere.
- **Specialized Knowledge and Experience** - PACD staff has developed a large amount of specialized technical knowledge over the course of the PACD Engineering Assistance Program that can be put to use to benefit future projects. Much of the knowledge gained by PACD staff during this time is uncommon to traditional engineering disciplines.
- **Development of Sound Growing Greener Applications** - PACD staff is able to help future Growing Greener applicants develop sound applications, as well as to provide technical assistance for an Inventory and Evaluation (I&E) to investigate a potential problem and recommend improvements. The I&E also includes the preparation of cost estimates for grant applications, which helps DEP to better estimate the use of its grant dollars. In addition, PACD staff is able to provide an unbiased assessment of a project because they are not seeking additional contractual work from the applicant through the approval of the grant.
- **In Case "Something Comes Up"** - Providing technical assistance ensures that when a circumstance arises that was initially unforeseen, the obstacle can be overcome and the project still successfully completed.

Streambank Restoration on the Mahoning Creek



Before the project was installed: a view of Mahoning Creek. Note the steep eroded banks where trees had fallen into the creek. A large gravel bar had also formed in the middle of the creek due to sediment accumulation.



Before the project was installed: erosion on the steep bank threatened to collapse the road & bike path above the Creek.

Project Background:

Mahoning Creek is a moderately sized watershed with five sub-watersheds that drain a primarily agricultural and wooded region of North Central Pennsylvania. At the downstream extent of the project, the watershed drainage area is 32.4 mi². The area of reconstruction includes two landowners: the borough of Danville and a private citizen. The borough utilizes the property as a recreation area for the community of Danville. The property facilitates fishing, hiking, and several field sports and is utilized on a very consistent basis. The private property consists of a roadway and recreational area directly adjacent to the restoration site.

The Mahoning Creek Watershed Association and Montour Conservation District conducted a preliminary watershed assessment to prioritize areas of concern throughout the watershed. This site was chosen as a stream restoration project because of the excess sediment entering the waterway. The stream was laterally migrating into a steep graded valley hillside and creating a highly erodible vertical bank along the entire length of the reach. The area adjacent to the existing stream channel is very flood prone, further adding to the erosion issues.

Project Implementation:

The purpose of the project was to create a natural, stable, working stream system. The stream stabilization aided in the reduction of sediment loading to the receiving stream and enhanced aquatic habitat.

The method of design utilized Natural Stream Channel Design concepts. The upper end of the site was stabilized with rock vane structures, while a tight meander on the lower extent of the reach was stabilized with riprap lining where a bedrock controlled portion of the reach can not be stabilized within the typical parameters of natural stream restoration design. A high flow shelf was also developed at the bankfull elevation to reduce near bank stresses where the stream was scouring the adjacent valley hillside. Riparian buffers on both properties were also established as part of the stabilization project. The construction of the project was completed within a two week interval.

Project Funding:

Funds were obtained through the Growing Greener Grant Program to finance the permitting and construction portions of the project, at a cost of \$63,000. All engineering support was provided by the technical staff of the Pennsylvania Association of Conservation District's Engineering Assistance Program.

Project Partners:

Mahoning Creek Watershed Association, Mr. and Mrs. Paul Roup (the private landowners), Montour Conservation District, Montour Area Recreation Commission, PA Department of Environmental Protection, PA Conservation Corps, and PACD.

"Without the very considerable assistance of PACD's Engineering Assistance Program, several of the projects now completed in our watershed would still be "on the drawing board." With their assistance in inspection, surveying, and general monitoring, we were able to implement the design and complete the project... Not only are the people we have dealt with very professional, they know how to work with community members. This is a critical component when working with grassroots groups where we rely on the expertise of others and their ability to build up a relationship of trust with our staff and volunteers." Beverly Braverman, Mountain Watershed Association, Westmoreland and Fayette Counties

Located in Valley Township, Montour County, Pennsylvania, this Streambank Restoration Project restored 800 linear feet of a portion of the Mahoning Creek, a tributary to the Susquehanna River, joining in the borough of Danville.



After the project was installed: a view of the cross-vane rock structure, looking downstream. Note the flow of water through the middle of the channel and away from the banks.



After the project was installed: new straight-vane rock structure, looking upstream. Note gently sloped and re-vegetated banks.

Project Outcomes:

This project produced measurable results in the health of Mahoning Creek, including reduced erosion and improved habitat. Additionally, this project has generated public interest in community watershed activities and serves as inspiration to landowners to implement best management practices.

- The project **improves sediment transport**, thereby reducing the turbidity of water during storm events (see post rain event photos below), improving water quality and reducing siltation within the streambed.
- The project **enhances stream stability** by creating a stable channel configuration that reduces bank erosion and protects the surrounding property.
- The project **improves stream habitat** because the rock structures create a variety of water depths and velocities that provide resting, feeding & hiding places for fish.
- The project **enhances recreation opportunities**. This portion of the stream is stocked by the PA Fish & Boat Commission and a non-profit sportsmen's organization and is heavily fished. In addition, the site is located near a sports complex and pedestrian/bike trail, both of which are currently being upgraded by the local Recreation Authority.
- The project **provides opportunities for public education** regarding watershed impacts and the health of local streams by providing a real life demonstration site, including educational signage.

Project Monitoring:

The monitoring program for this stream restoration effort included the completion of an As-Built survey of the project site immediately after construction, and on an annual basis, to assess the status of the project. Permanent monuments have been established to aid in the monitoring process; these include rebar and caps that indicate the location of permanent cross-sections. On an annual basis, these permanent cross-sections and the longitudinal profile have been resurveyed to demonstrate the current condition of the site. The field data from three subsequent surveys has consistently confirmed that the reach of stream has remained stable since the project was implemented nearly two years ago.

Photo documentation of the site also demonstrates stability of the site through re-established riparian plant growth throughout this section of the Mahoning creek corridor.

One week after installation, during a 4" rainfall event:



"The PACD Engineering Assistance Program is an invaluable resource which has directly aided many high priority Growing Greener projects in a way that assured their success. In addition, the regional engineers have assisted local watersheds and DEP on bond forfeiture sites that posed immediate environmental threats to local fisheries. The experience and competence of the PACD Engineers has been critical to our efforts to clean up Pennsylvania streams." Malcolm Crittenden, PA DEP, Watershed Management

Patterson Run Watershed in Armstrong County benefits from Runoff Reduction Efforts

Project Background: Several farms were targeted in the Patterson Run Watershed for reducing stormwater runoff in the Patterson Run Watershed.

Project Information: Stormwater runoff issues were addressed by stabilizing the feeding and watering facilities. The stormwater was then diverted around the feedlot via a belt diversion and waterway, thereby eliminating a muddy watering and feeding area by providing water on a stabilized pad. Gutters were installed, as well as downspouts and underground outlets, to collect clean stormwater and route it directly to the stream.

Project Funding: Phase I - \$36,000; Phase II - \$56,000

Project Partners: Armstrong Conservation District, PACD's Engineering Assistance Program, and NRCS' Kittanning field office for inspection services.



Before



After

Cambria County Rod & Gun Club turns AMD Problem into Fresh Water Resource

Project Background: The Bakerton Rod & Gun Club had an existing source water pond that was not of a suitable quality or quantity to support fish. The pond frequently dried up in summer. A short distance away was an existing AMD discharge that was a reliable source of water but of poor quality (pH 4.0, containing 60 mg/l of acidity and 3 mg/l of dissolved aluminum).

Project Implementation: PACD's Engineering Assistance Program designed a low cost passive treatment system to treat the water and provide approximately 50 gallons per minute of abandoned mine drainage for a low temperature constant source of clean water for the pond.

Project Funding: The project was funded by grants from Growing Greener, US Fish and Wildlife, and private donation. Project costs were \$25,000, with a savings of \$25,000 as a result of the Club's volunteer work.

Project Partners: Cambria Conservation District, US Dept. of the Interior - Office of Surface Mining, and the local community.

Project Outcomes: The water is currently pH 7.0 and 40 mg/l net alkaline with no metals, is low temperature, and near saturation of dissolved oxygen.

Project Monitoring: The Club monitors the project weekly and has reported consistent results.



Before



After

Renaissance Grant funds Indiana County AMD Treatment System

Project Background: As part of the first project of the first PA DEP Growing Greener Watershed Renaissance Grant, the Indiana Conservation District enlisted the PACD Engineering Assistance Program for the design of a 200 GPM AMD Passive treatment system for the Bear Run D7 discharge.

Project Implementation: PACD's Engineering Program provided survey, design, and quality assurance for construction of the passive treatment system.

Project Funding: \$80,000 **Project Partners:** Indiana Conservation District, US Dept. of the Interior - Office of Surface Mining

Project Outcomes: The project has been constructed and is anticipated to treat the water to within less than 1 mg/l of dissolved iron in the effluent water.

Project Monitoring: Ongoing monitoring / maintenance is performed by the Indiana Conservation District.



Before



After

"The PACD Engineering Program has been a key component in many remediation efforts and has contributed to AMD treatment site design, system installation, and oversight... Watershed organizations such as ours are very fortunate to be able to utilize the resources and competent staff that this program offers."
B. Drew Banas, Executive Director, Loyalhanna Watershed Association



PACD

PENNSYLVANIA ASSOCIATION OF
CONSERVATION DISTRICTS, INC.

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PACD Engineering Assistance Program project: Streambank restoration on the Mahoning Creek in Montour County, Pennsylvania.

