Floodplain Management and Mitigation Success Stories in Pennsylvania

**Category:** Drainage Improvements and Floodplain Enhancements  
**Topic:** Township of Derry Drainage Improvements, Dauphin County  
**Point of Contact:** James Negley, Township Manager, Township of Derry, (717) 533-2057

**Project Description:** Project entailed drainage design, sanitary design, stream restoration, obtaining (2) Water Obstruction & Encroachment permits, (3) NPDES permits, and (5) HOP permits. Hebert, Rowland & Grubic, Inc. (HRG), the Township Engineer, provided surveying, preliminary and final design, hydrology and hydraulic analysis, natural stream design, technical specifications, preparation of easement plats and negotiations with property owners, utility coordination, Norfolk Southern coordination, preparation of a Project Manual and bidding documents, contract award services, contract administration services, and construction observation services. Construction of the project lasted over two (2) years.

**Issues Encountered:** Issues encountered included deep pipe installation depths (20+ feet) and numerous sinkholes due to the karst geology underlining the Township. Over 50 temporary construction and permanent drainage easements were obtained to work on private property. Addressing all of the individual property owner’s expectations of final restoration was challenging.

**Funding Stream(s):** HRG developed a funding strategy, prepared the applications, and secured the necessary funds to make this project a reality. This project was funded through a $4.3 million dollar H20 Grant and a $1.8 million dollar Pennsylvania Infrastructure Bank (PIB) loan. The original construction contract awarded for $5,358,810.
Floodplain Management and Mitigation Success Stories in Pennsylvania

Category: Emergency Management/Planning  
Topic: Wyoming Valley Emergency Action Plan  
Point of Contact: Christopher J. Belleman, Luzerne County Flood Protection Authority, (570) 825-1601, chris.belleman@luzernecounty.org

**Project Description:** The Luzerne County Emergency Operations Plan was adopted in June 2011 and is written on the all-hazards concept. It provides a set of procedures that the Luzerne County Emergency Management Agency will do for any type of emergency that exists or can affect the County. The County does not have a specific flood operations plan, just as there is not a specific tornado, hazardous materials or winter weather emergency plan.

With respect to Susquehanna River flooding, the Emergency Operations Center (EOC) would generally activate at a river level of 20 feet when the levels are anticipated to exceed the 25 feet level. This would prompt minimal EOC staffing. When it is anticipated that the river levels would exceed 30 feet the EOC would have full staffing for the duration of the event.

**Issues Encountered:** The Luzerne County Flood Protection Authority works in cooperation with the Luzerne County Emergency Management Agency in the shared emergency response to any high water flood event on the Susquehanna River. In the Wyoming Valley, flood stage begins at 22 feet where the river overflows its natural banks and levee protection begins. For a
major flood event, which is a projected river crest at Wilkes-Barre in excess of 31 feet, the Authority will perform the following actions to ensure continued protection of the Wyoming Valley:

- Close the pedestrian opening in the floodwall along Riverside Drive in south Wilkes-Barre. The closure stop logs are stored at the adjacent Old River Road Pump Station.
- A stop log closure is in place across an existing abandoned railroad opening in Exeter Borough, adjacent to Route 92. Check the closure to ensure its continued structural integrity and that the tie-downs are properly secured.
- The Authority has 9,000 sandbags in inventory. Coordinate with an existing sand quarry to deliver sufficient material to immediately fill 2,000 sandbags ready for mobilization to various sites.
- Remove existing electrical lighting wallpacks, globes and ballasts from lights under the Market Street and Pierce Street Bridges. Throw light circuit breakers before river level reaches pole bases.
- Assemble the post and panel closure across an existing abandoned railroad opening off Swetland Lane in Wyoming.
- Assemble the Market Street Bridge post and panel closure approximately 8 hours in advance of a 34 feet projected river crest. This includes the installation of closures on both the Wilkes-Barre and Kingston sides. The attached left photo depicts the installation of the closure panels on the Wilkes-Barre side along River Street.
- At a projected 30 feet river crest, assemble the stop log closure across an existing Canadian Pacific Railroad opening adjacent to the Solomon Creek Pump Station in Hanover Township. Call CP as early as possible and inform them of the closure installation and shutting down of the rail line. Inform CP of the possible need to sandbag the Black Diamond Railroad Bridge openings at both the Riverside Drive and Kirby Park ends. These closures are in the freeboard area of the levee and do not need to be bagged unless necessary.
- Assemble the Luzerne County Courthouse closure after completion of the Market Street Bridge closure installation and prior to a river gauge reading of 33 feet.
- The Wilkern Street sandbag closure in Exeter Borough is also in the freeboard area of the levee and does not need to be assembled until a gauge reading of at least 38 feet.
- Assemble the Route 11 (Wyoming Avenue) post and panel closure in Edwardsville at a river gauge reading of 34 feet. Edwardsville Borough is informed that Route 11 will begin to become inundated in front of Mark Plaza at a river elevation of 33.5 feet. The attached right photo depicts the installation of the closure panels on Route 11 in Edwardsville.

The Authority has 13 pump stations that contain 39 vertical, deep well, impeller-type pumps in our flood control system. The pump stations are included in the project in order to reduce the risk of flooding at the low areas behind the levees and floodwalls in the boroughs of Kingston, Edwardsville and Plymouth, the City of Wilkes-Barre and Hanover Township. When the river level rises to flood stage, any inland storm water is trapped on the landside of the levee. This inland storm water is routed to the stations through overland flow or interconnected sewer
systems where it is pumped to the riverside of the levee. This action reduces the risk of inland flooding from localized storm events during high river stages.

The pump stations are activated as follows:

- At a river elevation of 10 feet, the Church Street (Kingston) and Delaney Street (Hanover Township) Pump Stations are activated.
- At a river elevation of 12 feet, D&H, Horton Street and Old River Road Pump Stations (Wilkes-Barre) are activated. Woodward Pump Station (Edwardsville) is activated.
- At a river elevation of 14 feet, Ross Street Pump Station (Wilkes-Barre) is activated.
- At a river elevation of 15 feet, Loveland Pump Station (Kingston) is activated.
- At a river elevation of 18 feet, Solomon Creek Pump Station (Hanover Township), Brown Creek and Wadham Creek Pump Stations (Plymouth Borough) are activated.
- At a river elevation of 19 feet, Market Street and Union Street Pump Stations (Wilkes-Barre) are activated.

Funding Stream(s):

In accordance with the Pennsylvania Municipal Authorities Act, the Authority assesses an annual “levee fee” on all residential, commercial, industrial and tax-exempt properties located within the 1972 Agnes floodplain, along the Susquehanna River in the Wyoming Valley. The fees collected cover the costs of the Authority to operate and maintain the project. The Authority receives no other revenue assistance from the Federal, Commonwealth, County or other local governments. The Authority’s annual budget to maintain and operate the project is approximately $1.5 million dollars.

When a declaration of a major disaster or emergency is made for Luzerne County, the Authority and the County of Luzerne may be eligible for reimbursement for costs associated with the disaster response and recovery.

The Wyoming Valley Flood Risk Management Project is active in the United States Army Corps of Engineers (USACE) Rehabilitation and Inspection Program (RIP) and is eligible for PL 84-99 rehabilitation assistance. Public Law 84-99 is a Federal law that provides the USACE the legal authority to conduct emergency preparation, response, and recovery activities and to supplement local efforts in the repair of flood damage reduction projects that are damaged by floods.
Project Description: The Sunbury Municipal Authority built a state-of-the-art office and emergency operations center (EOC) in 2004. This center contains a separate operations room where officials can: monitor all water levels on a display unit that is connected to all of their telemetry devices via radio signal, receive river and weather forecasts through a satellite connection with NWS’s Emergency Managers Weather Information Network (EMWIN), receive real-time local radar, and track hurricanes/tropical storms through the HURREVAC program. The center also includes workstations, a reception desk, a media room, and sleeping quarters for up to 8 people.

Issues Encountered: None

Funding Stream(s): The cost to erect and furnish the Flood Operations Center was approximately $300,000, and was 100% paid for using Sunbury Municipal Authority funds.
Project Description (project details, duration, etc.): Flood protection surrounds the 31 acre Kawneer Company, Inc. property near the Susquehanna River. Project built a dike, nominally 10 feet tall and 4680 feet in length. Most of the dike is earthen levee with two 300 foot sections of concrete T wall where space constraints made installation of an earthen levee impossible. The system includes a diesel powered pumping station and an emergency access road leading to non-flooding high ground. Started construction in Spring of 2011 and finished in Spring of 2013.

Issues Encountered: Significant construction delays due to unseasonably wet weather through the Spring and Summer of 2011 and then the historic Lee Flood of the Susquehanna River in the Fall of 2011 when the construction was approximately 25% complete.

Funding (cost, funding stream(s), etc.): Total project cost was $7.45 million which included a $6.0 million Pennsylvania H2O PA Grant to Columbia County with the remainder of the funding by Kawneer Company, Inc.
Project Description (project details, duration, etc.): Initially built in 1952, the Sunbury flood protection system currently consists of 2.6 miles of floodwall, 2.4 miles of earthen levee, 6 pumping stations, 6 closure structures, 9 drainage structures, and 3 gage stations. Since 1993, when the Sunbury Municipal Authority took over operations and maintenance of the system, the Authority has worked to eliminate or reduce the size of the 7 closure structures that existed at that time. The Authority has also rehabilitated 2.5 miles of floodwall, developed a comprehensive maintenance program for all pumping stations, and implemented a quarterly valve exercising program.

Issues Encountered: None

Funding (cost, funding stream(s), etc.): Have received more than $1 million in Hazard Mitigation funds since 1993 to eliminate one closure and to reduce the length of other closures by 140 ft. The funds have also been used to retrofit existing closures with easy to assemble components.
Floodplain Management and Mitigation Success Stories in Pennsylvania

Category: Flood Risk Management
Topic: Bloomsburg Airport Elevation
Point of Contact: Moses Abraham, PA Department of Transportation, Bureau of Aviation, (717) 705-1249, moabraham@pa.gov

Project Description (project details, duration, etc.): TBD

Issues Encountered: TBD

Funding (cost, funding stream(s), etc.): TBD
Project Description (project details, duration, etc.): On October 21, 2014, the Columbia County Commissioners anticipate advertising for bids for the construction of a 5,650 foot long flood control system to protect Autoneum North America, Inc. and the Windsor Foods facility. This project serves to protect approximately eight hundred fifty (850) family-sustaining jobs at a long-standing carpet manufacturing facility in the Town of Bloomsburg. The project is a combination of H-pile walls, MSE levees, and earthen levees, including nine (9) closure structures, most of which propose to use Flood-Break, an innovative self-actuating system. Additionally, the project includes three (3) sanitary pump stations, a large storm water pump station at Snyder’s Run, and the relocation of two (2) railroad switches. Because of the location of the project, in the very early developed portion of the Town of Bloomsburg, utility conflicts represented a significant challenge. It is anticipated that construction contracts will be awarded February 2015, with a 15 to 20-month construction period for completion late 2016.

Issues Encountered: Utility conflicts included PPL Electric, United Water, Bloomsburg Municipal Authority public sanitary sewer, storm water, high pressure United Gas line, Verizon Optical, and Verizon Voice. Real estate coordination, due to the large number of property impacts, and permitting were also challenging. At the onset of the project, the Columbia County Commissioners assembled a team which included the private industries; the engineer, Borton-Lawson Engineering; legal counsel; and SEDA-COG. With monthly team meetings, the team was able to design the project within the approximately 12-month period allowed by the funding agencies.

Funding (cost, funding stream(s), etc.): The project is funded with a fifteen million dollar ($15,000,000) U.S. Department of Commerce, Economic Development Administration grant, the largest ever awarded from the Philadelphia Region; eleven million, eight hundred fifty thousand, two hundred seventy dollars ($11,850,270) from the Commonwealth Financing Authority, through the H2O PA Program; and two million dollars ($2,000,000) of private funds from Autoneum North America, Inc. The estimated cost of construction is twenty-one million, three hundred five thousand dollars ($21,305,000).
Project Description: The purpose of the project was to repair damaged buildings and equipment in the Danville Area Middle School facility caused by the effects of Tropical Storm Lee and located in the Borough of Danville, PA.

The school experienced heavy flooding throughout the facility with more than 90,000 square feet flooded extensively throughout the first floor. Floodwaters, which ranged anywhere from six inches to six feet deep, were responsible for extensive damages to the gym/stage floor, wall panels and windows, chalk boards, lockers, doors, 7500 feet of urethane indoor athletic flooring, cabinets, 800 unit metal bleachers, HVAC controls, equipment and pipes, and various other school-related equipment.

More than $1 million of the grant was allocated for the mitigation project, designed to alleviate future damages to the middle school. In addition, some of the other hazard mitigation activities to be performed included the installation of 48 inch high walls and 76 inch removable gates at each exterior entry/exit doors; removing all vinyl tile flooring and replacing it with epoxy-type floor covering; and the removal and relocation of HVAC units and through-the-brick-wall HVAC vents.

Issues Encountered: The primary mitigation issue revolved around the issue of compliance w/ Danville Borough NFIP floodplain regulations (wet vs. dry). Complicating the FEMA funded flood recovery project was the issue of a partially completed Commonwealth of Pa sponsored flood protection levee and closure system and it impact on the applicability of NFIP floodproofing regulations. Although the design for the system had been completed, the necessary financing for the manufacturing and installation of the closures had not been approved or authorized. Therefore, a determination of flood protection compliance with FEMA NFIP A99 requirements, recognizing adequate 100 Yr / 1% chance flood protection could not be made.
Another issue affecting the community was whether the local district would abandon the damaged Middle School in favor of a flood free location outside the direct service area of the majority of the population served.

**Funding Stream(s):** The Federal Emergency Management Agency and the Commonwealth provided a $3,176,028.54 grant to the Danville Area School District. The grant represented a 75 percent federal share and a 25 percent Commonwealth share of the project costs.
Description: Along the Allegheny River in Oil City, PA, twenty-three new 20-feet long pontoons were fabricated and installed on existing cables in 2013 to replace the original pontoons installed in 1982 as part of an ice control project designed by the Army Corps of Engineers to prevent ice jams from forming near the mouth of Oil Creek just downstream of the project location. The purpose of the ice boom is to help form a stable ice cover upstream, thereby providing open water for ice break-ups from Oil Creek to flow unimpeded into the Allegheny River, which prevents flooding on Oil City’s Northside Business District.

Issues Encountered: During the first winter with the new pontoons in place, one of the pontoons broke away and floated downstream; the City was able to retrieve it. One of the four existing cables, which hold the pontoons in place, broke also, and the City is now trying to secure funds to replace all four cables.

Funding Stream(s): The project was funded by the Hazard Mitigation Grant Program using Federal and State monies in the total amount of $510,960.
Project Description: The Etna Municipal Building lies in the 100-year floodplain adjacent to Pine Creek, near Pittsburgh in Allegheny County. The building, which houses the Borough Office, Police and Fire Departments, is susceptible to floods of a 10-year or greater magnitude.
Significant damage to the building and contents occurred in 1986 and 2004. Damages in 2004 (Hurricane Ivan) approached $1 million dollars to the building and contents and loss of thousands of public records and documents. The Borough also experienced loss of function and services for a significant period of time following the 2004 flood and temporary relocation was required for several months.

In May 2013, a $203,000 Hazard Mitigation Grant Program project was approved to design and install removable flood barriers to protect the Municipal and Police offices, utilities access and document storage area to a 100-year flood elevation. The Fire Department vehicle bay was not included in the project.

The manufacture and delivery of the barriers and installation of mounting brackets was completed in early 2015. An installation exercise and closeout visit, attended by PEMA and USACE, was performed in June 2015. Borough personnel demonstrated deployment and installation of the flood barriers at the Municipal Building. Full deployment of the system required approximately two hours.

**Issues Encountered:** The susceptibility of the Municipal Building to flood was identified in the 2004 federal disaster. Efforts to develop a mitigation solution to this risk were frustrated by a number of factors. Initial proposals to relocate the Borough offices and services or elevate the existing building proved too costly based on the limits of the FEMA required benefit-cost effectiveness and lack of alternative locations for those borough functions.

Redesign to higher protection standards, difficulties in the bid process and identifying system elements of sufficient design, manufacture, and performance standards extended the time to complete the project (Although the project was completed within the original period of performance).

As noted above, the project did not include construction and installation of flood barriers to protect the three Fire Department vehicle bays due to the additional costs that could not be supported by the initial benefit-cost analysis. The Borough is exploring other funding opportunities to address this area of concern.

Current storage of the flood barriers at a separate location and the associated retrieval time adds significantly to the time required for deployment of the system. The Borough is currently in the process of designing and constructing a storage facility at the Municipal Building which will greatly decrease the time required for deployment in advance of a flood event.

**Funding:** The $203,000 project was funded by the FEMA Hazard Mitigation Grant Program (HMGP) with matching State (22%) and local (3%) funding.
Mitigation Success Stories in Pennsylvania

**Category:** Local Preparedness  
**Topic:** Storm Ready County  
**Point of Contact:** Charles Ross, National Weather Service, State College, PA; (814) 231-2434; charles.ross@noaa.gov

*Project Description (project details, duration, etc.):* Americans live in the most severe weather-prone country on Earth. Each year, Americans cope with an average of 100,000 thunderstorms, 10,000 of which are severe; 5,000 floods; 1,000 tornadoes; and an average of 2 landfalling deadly hurricanes. And this dangerous weather is in addition to winter storms, intense summer heat, high winds, wild fires and other deadly weather impacts. You can make sure your community is ready for the weather with the National Weather Service's StormReady® program.

Some 98% of all presidentially declared disasters are weather related, leading to around 500 deaths per year and nearly $14 billion in damage.

StormReady, a program started in 1999 in Tulsa, OK, helps arm America's communities with the communication and safety skills needed to save lives and property--before and during the event. StormReady helps community leaders and emergency managers strengthen local safety programs.

StormReady communities are better prepared to save lives from the onslaught of severe weather through advanced planning, education and awareness. No community is storm proof, but StormReady can help communities save lives. (http://www.nws.noaa.gov/stormready/)

**Issues Encountered:** None

**Funding (cost, funding stream(s), etc.):** NWS funded program
Project Description: The City of Altoona joined the Community Rating System (CRS) in October 2012 at a Class 8 rating. The Class 8 rating was achieved due to the current regulations and practices that were already in place, and the mitigation of 24 properties over an 8 year period (1999-2007).

The City acquired 11 properties in 1999, 1 house in 2000, 9 houses in 2006, and 3 houses in 2007. Eighteen properties were in one problem area and 6 were in another. Both locations are along the same stream, approximately 1 mile apart. These two areas were notorious for flooding problems for years. The January and July flooding of 1996 were the deciding factors for the City of Altoona, through PEMA, to offer buyouts.

The City received CRS points for mitigating the properties. Additional points were awarded because 5 of the properties were repetitive loss properties, and because the total square footage of the 24 properties was more than 5 acres. Regulations state that mitigated properties’ titles remain green space forever. The City also took it a step further and planted trees on those empty lots in 2011-2013.

Issues Encountered: None

Funding Stream(s): Hazard Mitigation Grant Program (HMGP) for buyouts
**Project Description:** American Rivers partnered with Wild Waterways, Inc. to remove the abandoned Harmony Junction Dam in Jackson Township, Butler County for public safety, water trail access, fish passage for river resident species, and flood risk reduction. Previously, 43 residences participated in an acquisition project after flooding from Hurricane Ivan in 2004. The dam was removed in June 2009. Approximately one year later, Jackson Township was notified by FEMA that the dam removal had resulted in decreased the flood-prone area and invited the community to redraw their FIRM to reflect changes. Two flood events have occurred since dam removal, with media reporting the flood intensity equal to Hurricane Ivan. Visual observation at the crests of these two events indicated that the dam-out flood levels are significantly lower than flooding experienced during the 2004 event.

**Issues Encountered:** Local anglers voiced opposition about the removal of the dam up to and during deconstruction, concerned that it would ruin their fishing hole. However, after the dam was taken out, anglers provided anecdotes that fishing was either unchanged or better.

**Funding Stream(s):** 100% of project funding was provided by foundations.
Project Description: American Rivers partnered with PA Fish & Boat Commission to remove the abandoned Cunningham Memorial Dam on Wolf Creek in Grove City, Mercer County. The borough became interested in dam removal after a drowning occurred and the borough’s insurance carrier required dam removal if they were to continue providing coverage. This dam was removed in 2006, after which residents and the borough noted a significant reduction in flood risk. FEMA contacted Grove City Borough in 2010 and urged them to redraw their FIRM to reflect the changes in flood-prone area due to dam removal.

Issues Encountered: There was significant community opposition to removing this dam.

Funding Stream(s): Growing Greener grant received by American Rivers Organization
Floodplain Management and Mitigation Success Stories in Pennsylvania

Category: Local Preparedness/Mitigation
Topic: Stage Inundation Map Library for the Susquehanna River at Harrisburg
Point of Contact: Ben Pratt, Susquehanna River Basin Commission, (717) 238-0425; or Stacey Underwood, USACE, (410) 962-4977

Project Description: The project provided a library of 28 maps that depict expected area and depth of flooding, for approximately 25 miles of the Susquehanna River, at 1’ increments from stage 11.0’ through stage 37.0’ as measured at the Susquehanna River at Harrisburg streamgage (USGS Gage No. 01570500) located on City Island in Harrisburg, Pennsylvania. Also generated and included in the library is a map which corresponds to inundation realized during Tropical Storm Agnes (flood of record) for stage 33.27’. The entire length of the study reach includes approximately 7000 parcels with potential flood risk. The completed libraries are available online through both the National Weather Service Advanced Hydrologic Prediction Service web page and the United States Geological Survey Flood Inundation Map Viewer. Also included in the project was an outreach effort that distributed tri-fold pamphlets, with refrigerator magnets attached, to impacted parcel owners, providing instructions on how to use the inundation maps for planning and where to obtain the maps.
**Issues Encountered:** Every stage inundation map project is unique and requires a multidiscipline approach to bring a successful product of value to fruition. Providing inundation maps for approximately 25 miles of the Susquehanna River required an extensive effort to validate the hydraulic model outputs and ensure a quality map product was delivered. Existing within the study reach were many small bridges on backwater affected tributaries and 9 bridges of varying design and structure that span the nearly mile wide river corridor. Each structure required field survey to insure accurate representation within the hydraulic model. The project benefited from an actual flood in September 2011, at the beginning of the effort, affording an opportunity to acquire calibration data for the hydraulic model which proved to be critical to validating the model and allowing for accurate representation of expected area of flooding.

In addition to many structures within the study reach, the study reach includes 20 different municipalities and more than 7000 parcels that lie within the highest stage mapped. Coordination across various municipal interest was critical to gaining acceptance and understanding of the map product at the municipal level of government, as well as providing access to community based data sets. Continued outreach regarding the availability of the inundation map product to all of the interested parties within the study reach will be required to insure the product is successfully used to protect life and property during flood events.

Online map viewers present a challenge to end users of the inundation map product in that necessary information being disseminated may be difficult to interpret or not directly accessible to the general public. In developing online platforms for dissemination of map products the needs of the end user must be considered and every attempt made to streamline dissemination of critical information, most specifically “At what stage does my property flood?” This project included direct outreach to over 7000 parcel owners which provided specific instructions to access the online information. While the outreach effort did drive traffic to the identified viewers it remains difficult to assess the effectiveness of the campaign.

Stage based inundation maps are commonly confused with FEMA flood map products and can be a source of confusion among impacted Communities and their residents. The stage based inundation maps provided here are non-regulatory and communicate risk based on stage at a local stream gage allowing for actionable response to any particular event in advance of, during, or after an event. FEMA flood maps direct insurance requirements and present flood risk on a frequency basis, which is difficult to relate to any particular forecast flood event.

**Funding Stream(s):** Primarily funded as a USACE Silver Jackets pilot project, the project also leveraged funding from many of the project partners including the Harrisburg Authority, United States Geological Survey, Susquehanna River Basin Commission, and National Weather Service.

**Links**

[United States Geological Study Report](#)
[United States Geological Survey Online Library](#)
[National Weather Service Online Library](#)
Floodplain Management and Mitigation Success Stories in Pennsylvania

**Category:** Local Preparedness/Mitigation  
**Topic:** Acquisition and Demolition of Ten Flood Prone Properties located on South Sixth Street in the Borough of Lewisburg, Union County  
**Point of Contact:** Chad Smith, Lewisburg Borough Manager, csmith@lewisburgborough.org; or Teri Provost, SEDA-COG, Project Coordinator, tprovost@seda-cog.org

**Project Description:**
The project was undertaken to address repeated flooding and to reduce risk to the citizenry and private property. Specifically, the project acquired and removed five (5) properties with HMGP funding and five (5) additional properties with RFC funding. These vulnerable structures were constructed within the Bull Run (Limestone Run) floodway, resulting in repetitive flooding. In Union County and the Borough of Lewisburg, development has been pursued often times in naturally occurring floodplains. As a result, the available alternatives for mitigation action have typically focused on property protection measures. Altering the waterway and changing land management practices have not been feasible or practical. If the structure were left in place and remained, it is certain that flooding in the future would damage the properties/structures, and the safety of the residents would surely be questionable. Given the current age and condition of the structures, having been repeatedly flooded throughout the years, elevation or relocation of the structures was not a viable option.

The Borough of Lewisburg has suffered the effects of floods since before it was established in the 1700’s and, as recently as 2011. Some of the events have caused significant loss of both life and property in the Borough. Flooding is expected to occur once every three years, with an estimated annual loss of
Given the location of the structures within the floodway and their usage, there is significant risk remaining to individuals and rescue responders in the area.

The acquisition and demolition of these ten (10) properties has reduced the potential loss of life and property in Union County, thereby, reducing the community’s reliance on disaster resources and the National Flood Insurance Program (NFIP). The goal of the Borough’s monumental undertaking was to ensure public safety, while minimizing future losses and reducing expenditures due to flooding. We are happy to report that these goals have now become reality and could not have been done without the Grants and technical assistance from FEMA and PEMA.

As part of the funding, in the particular context of mitigation projects for the purpose of creating open space, deed restrictions have been placed on the ten (10) properties acquired by the Borough. As part of the acquisition of the properties, deed restrictions were recorded for each property; enforcing the requirements of 44 CFR 80 to ensure that each remained as open space use in perpetuity.

The Borough acknowledges it’s responsibly for reporting on property compliance with the open space requirements during the Period of Performance (after acquisition) and after the Grant closeout. Likewise, the Borough will submit to PEMA and FEMA, in writing, proposed uses on the property (if any such proposals are made) for open space compatibility determination; and monitor and report, as needed, on property compliance. Furthermore, the Borough acknowledges that each property is no longer eligible for coverage under the NFIP for damage to structures occurring after the date of settlement; and as such, the properties will be dedicated and maintained in perpetuity as open space for the conservation of natural floodplain functions.

Issues Encountered:
The ten (10) properties acquired and demolished with HMGP and RFC funds were off-campus student housing rentals for those who attended Bucknell University. Acquiring these highly sought after rentals was difficult at first; however, Bucknell University issued a new off-campus housing policy that mandated the vast majority of its students move back on campus. With the new policy, some of the property owners became more interested in the buyout of their property and were willing to work with the Borough through the voluntary acquisition of their property. For example, a property owner that at one time voluntarily dropped out of the project requested that the Borough allow the property to again become part of the buyout. Therefore, the Borough worked closely with the property owner and PEMA to request a Period of Performance (POP) extension. The Period of Performance has been extended and the Borough has acquired and demolished all ten properties to-date.

Funding Stream(s):
Lewisburg Borough was approved for $1,383,922 (75% federal share and 25% state share) in Hazard Mitigation Grant Program (HMGP) funding on January 31, 2012, for the acquisition and demolition of 44, 54, 108/110, 204/206, and 208/210 South Sixth Street, located in the Borough of Lewisburg.

On March 13, 2012, Lewisburg Borough was approved for $1,470,400 (100% federally funded) of Repetitive Flood Claims Program (RFC) from PEMA for the acquisition and demolition of 40, 102, 112/114, 120 and 138/140 South Sixth Street, located in the Borough of Lewisburg.
Floodplain Management and Mitigation Success Stories in Pennsylvania

Category: Local Preparedness/Warning Notification
Topic: Outdoor Siren Warning System
Point of Contact: Kevin Johnson, Cameron County Office of Emergency Services, camoes@cameroncountypa.com (814) 486-9352

Project Description:
Create an outdoor warning system to be used in high water events at the George B Stevenson Dam to notify residents and visitors to evacuate the area if water levels meet the criteria in the Emergency Operations Plan (EOP). The dam is owned by the Pa Department of Conservation and Natural Resources (DCNR) and is one of four dams creating a flood control project for the West Branch Susquehanna river basin. The Baltimore District of the US Army Corp of Engineers (USACE) controls the water levels at the dam.

Issues Encountered:
The flood inundation area of the dam covers a large area in the southern half of the County indicated by the yellow lines on the above map. This area is sparsely populated with permanent residences but has a large presence of seasonal structures. The area also has limited TV, internet and commercial radio coverage and no cellular coverage. Many of the seasonal homes have no landline telephone service. During high water events major roads in the area can be closed due to flooded areas and/or rock slides creating issues with providing safe evacuation routes.
The Cameron County Emergency Operations Plan (EOP) states that the residents will be notified via route alerting by the local fire department, PA State Police (PSP) and DCNR employees. The first responders that live in the area have limited manpower and would be evacuating with their families therefor would not be available to do the route alerting. PSP and DCNR also have limited manpower and might not be able to access the area due to flooding so there was no one left to do route alerting.

Cameron County initiated meetings with PSP, DCNR, PA Emergency Management Agency (PEMA), USACE, Local First Responders and Department of Military & Veteran Affairs (DMVA) to address the issue of notification of inundation area residents and visitors. After several meetings and countless hours of discussion it was decided that an outdoor siren system along with some limited route alerting, commercial radio broadcasts and telephone calls was the only viable option to make notifications.

After funding was secured the county started looking at what type of system to install; mechanical or electronic. After much research and discussion the mechanical siren offered slightly better coverage but it was limited in the number or type of tones it could produce. Also there were no options to provide any voice announcements. The electronic siren is capable of producing various warning tones and can provide pre-recorded messages or live voice announcements. Once it was determined what type of siren to use a bid specification package was put together.

Two bids were received for the project; one didn’t meet the specifications put forth in the bid package so the winning bid was awarded to the Federal Signal Corporation for 2 - 360 degree coverage sirens and 4 – directional siren heads with solar panels and batteries for power. Solar power was chosen to eliminate the cost of electrical service and monthly electric bills for each site. Locations were chosen based upon acoustic studies provided by the selected vendor. Right-of-way installation permits were secured from PennDOT for installation along roadways making easy access to siren maintenance. This also eliminated the need for additional expenses due to private property and legal issues that might occur.

Currently, the project is in the installation stage. All permits are secured and the final siren tones and voice announcements are being recorded for installation in the controllers. There will be 2 controllers for the system; one in the Cameron County Office of Emergency Services and one at the Elk County 9-1-1 Center, the latter is the contracted 24 hour 9-1-1 center for Cameron County. The sirens will be activated using tones transmitted over a county-owned radio frequency. This frequency will also be used for testing and remote troubleshooting access.

After installation the public outreach segment will begin with newspaper articles, town meetings and door hanger bags containing material explaining the meaning of the 4 different tones and messages. The bags will be distributed by the local Fire Department and Mountaineer Search and Rescue Team. They will be hung on every residence and seasonal cabin using 9-1-1 addressing maps provided to them by the county.

The project is expected to be completed by September 2015.

**Funding Stream(s):** FEMA Hazard Mitigation Grant Program (HMGP) Federal 75%, State 25% and Local 3% Cost Share. This was a Pennsylvania 5% Initiative Project under DR-4030 (Tropical Storm Lee).
Floodplain Management and Mitigation Success Stories in Pennsylvania

**Category:** Planning  
**Topic:** Spatial Data Survey of 67 counties  
**Points of Contact:** Dr. Thomas Mueller (California Univ. of Pennsylvania), mueller@calu.edu; Cynthia McCoy (FEMA), cynthia.mccoy@fema.dhs.gov

---

**Survey Questions**
- Feature Geometry  
- Projection / Coordinate  
- Attributes – Capacity, etc.  
- When was Data updated?  
- Public Data or Fee?  
- Metadata

**Types of Data**
- Building Footprints  
- Bus Stations  
- City Blocks  
- Cultural Resources  
- Ferry Facilities  
- Fire and Police Stations  
- Government Buildings  
- Hazardous Materials  
- Highway segments and tunnels  
- Historic District and Structures  
- National Monuments  
- Parcels  
- Schools: K - 12, Colleges

---

**Project Description:** HAZUS uses Geographic Information Systems (GIS) technology to estimate physical, economic and social impacts of disasters. (https://www.fema.gov/hazus). HAZUS has datasets included. The estimates will be more useful if the data is more accurate. Better results help counties to be more prepared for hazards through proper planning. The Federal Emergency Management Agency (FEMA) contacted California University of Pennsylvania about surveying the counties of Pennsylvania on the county’s spatial data assets. The survey process had a few challenges and was finally initiated by students and faculty in spring 2014 and completed in fall 2014. The results were sent to FEMA.

**Issues Encountered:** None

**Funding Stream(s):** This was completed as service learning project by Dr. Mueller and his students – No Cost
Floodplain Management and Mitigation Success Stories in Pennsylvania

**Category:** Risk Communication/Outreach  
**Topic:** Pennsylvania Silver Jackets’ Flood Risk Management Resources Website  
**Point of Contact:** Stacey Underwood, USACE Baltimore District, (410) 962-4977, stacey.m.underwood@usace.army.mil

---

**Project Description:** In 2012, the Pennsylvania Silver Jackets team developed a website to provide Pennsylvania residents and business owners with the best resources for information related to flood preparedness and response. The site is divided into three sections: **Before the Flood/General Information**, **During the Flood**, and **After the Flood**. Each section contains some of the most frequently asked questions regarding floods and provides links to resources that can answer those questions.


**Issues Encountered:** None

**Funding Stream(s):** This project was an interagency effort – USACE compiled and built the site, and several other PA Silver Jackets team members helped to gather the most relevant resources to include.