

**Successful Mitigation Projects Submitted by Water/Wastewater Utilities (Project Information from FEMA)**

Project Title	Project Description	FEMA Category
<a href="#">Mitigation of Essential Structures Helps to Keep Wastewater Treatment Plant Open</a>	The City of Lincoln, NE wastewater treatment plant, Theresa Street location received Hazard Mitigation Grant Program (HMGP) funds to provide flood protection around an electrical substation and transformers that would be in danger of failing during a potential flood event.	Structural Preventive Measures
<a href="#">Simple Fix for Village of Greene Wastewater Treatment System</a>	Chenango County, NY village of Greene received FEMA Public Assistance (PA) Program mitigation funding to repair flood-affected parts of the village's wastewater treatment system. The three lift pump stations located in Greene have pumps that are about 20 to 25 feet deep in a manhole and are part of the wastewater treatment system that was knocked off line by flooding in June 2006. Another four feet of manhole collar was welded on top of the existing manhole collars. This lifted the manhole entries roughly a foot above the flood of record for this area.	Structural Preventive Measures
<a href="#">91st Avenue Wastewater Plant Salt River North Bank Mitigation</a>	The City of Tolleson, AZ wastewater treatment plant located along the bank of the Salt River had been at risk of severe erosion. Flooding greater than a 10-year event would undermine the bank and the resulting damage would affect the channels, chlorine contact chambers and holding ponds. This would create serious health threats to the community. Maricopa County received funds from FEMA's HMGP to mitigate the potential problem. Thus, the stabilization, strengthening, and extension of the bank was done.	Preventive Measures Natural Resources Management
<a href="#">City of Hardy Mitigation Project</a>	City of Hardy, AR received FEMA Public Assistance (PA) Program mitigation funding to implement measures that included replacing dry well sewer pumps with submersible pumps, building elevated platforms for electrical service and panels, and raising electrical controls above high water.	Structural Preventive Measures
<a href="#">Grants and Forward Thinking Prevent Sewer Backup</a>	Geneva County, AL conducted a project that included elevating a 350 kilowatt generator with a 1,500 gallon fuel tank to keep the plant running during power outages. Additionally all critical controls, motors, blowers, and a generator are elevated five feet above the 500-year flood level. Funding was secured through the FEMA's HMGP.	Preventive Measures Structural
<a href="#">Stream Bank Repairs More Effective Sewer Line Protected</a>	The Town of Vestal, NY repaired a section of a stream bank damaged by Tropical Depression Ivan, which included special measures that have proven to be successful in protecting an adjacent sewer line. Together with restoring the stream bank to its pre-disaster condition, the Coconut Creek project also involved installation of filter fabric and large stone rip rap to protect the sewer line from erosion.	Preventive Measures Natural Resource Protection
<a href="#">A Tribe's Path to Mitigation Study, Prioritize, and Implement</a>	In 2000, the Poarch Creek Indian Reservation obtained funding from Alabama Emergency Management Agency to conduct a comprehensive study of its 23 drainage basins covering 460 acres. The Storm Drainage Study, completed in January 2001, provided the Reservation with a sound assessment of the nature of its stormwater drainage problem, solutions for each of the 23 drainage basins, and a recommended prioritization for the improvements.	Property Protection Preventive Measures

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<a href="#">East Bay Seismic Program Utility District Seismic Program</a>	<p>The East Bay Municipal Utility District (EBMUD) is located in San Francisco, CA and three major active faults create a high seismic risk to EBMUD's water-supply facilities. EBMUD performed an in-depth evaluation of the seismic vulnerability of its water-treatment plants, reservoirs, buildings, pipelines, tunnels, pumping plants and communication facilities. The results showed that in the event of a magnitude 7 earthquake on the Hayward Fault, it would take approximately six months to restore partial service, and the costs to repair damage to facilities were estimated at \$245 million. The EBMUD Board of Directors decided to take action in 1994 by approving a 10-year, \$189 million capital improvement program to minimize damage to the water system, improve firefighting capabilities, and protect customers from long, disruptive water outages following a catastrophic seismic event. To date, the District has completed seismic upgrades for 21 reservoirs.</p>	Preventive Measures
<a href="#">Snake Warrior Island Mitigation and Improvement</a>	<p>Snake Warrior Island, South Broward County, FL, which at one point did not have an appreciable stormwater drainage system, has developed and is implementing a new drainage system that is designed to internally treat and convey the runoff from low intensity storms (3.5 inches of rainfall over a 24-hour period) without discharging to the wetlands system. In more localized storms, excessive runoff would flow into a canal that drains to the ocean. In more intensive, longer duration storms that raise the height of water in the canal system to full capacity, the water is then routed to the wetland system. At Snake Warrior Island a series of eight interconnected wetlands are being created. The project as a whole cost \$120 million funded primarily by utility operating funds and the tax-generated general fund. More than \$4.8 million has been designated for wetlands restoration at Snake Warrior's Island and runoff retention. FEMA is providing 50 percent of the HMGP funds.</p>	Natural Resource Protection Preventive Measures
<a href="#">Main Street Drainage Modification Improving Culverts, Basins and Drains</a>	<p>The Town of Plymouth, NH was faced with repeated flooding in the downtown area. This was caused by an undersized stormwater collection system. Existing culverts, catch basins and stormwater drains were inadequate to handle even low to moderate runoff. High velocity water moves down the streets causing stormwater backup through the drains and spouts as high as 2 feet. The mitigation project was planned in two phases to improve serious drainage problems in the downtown business district. The plan was to lay 1,500 feet of 24-inch subsurface drainage pipe along with three drainage manholes and six catch basins. The new drainage system outlet was directed into a stabilized portion of the Pemigewasset River. The system was designed to handle a 25-year flood event.</p>	Preventive Measures Natural Resource Protection
<a href="#">Electrical Retrofit Aids in Hurricane Response at Sanitary Sewer Lift Stations</a>	<p>The Pensacola, FL based Emerald Coast Utilities Authority (ECUA) has been retrofitting its sanitary sewer lift stations with electrical connections for portable generators. So far, 300 of the 332 lift stations have been retrofitted. ECUA plans to retrofit the remaining lift stations. Because the retrofit helps reduce damages during a disaster, a portion of the cost of the project was eligible for a grant provided by FEMA HMGP managed by the Florida Department of Community Affairs. The HMGP grant funded the retrofitting of 41 lift stations with a transfer switch and an electrical receptacle connection, along with the flood-proofing of 26 electrical panels located in low-lying areas. The rest was funded by ECUA.</p>	Preventive Measures Emergency Services Measures

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<a href="#">Critical Waterline Seismic Retrofit Success</a>	City of Lacey, WA Public Works Department conducted a critical waterline seismic retrofit project that included replacing 200 feet of pipeline on each side of the bridge and across the bridge totaling 450 feet. Flexible joints were designed to rotate, extend, retract and twist. Connections were high density 8-inch sleeved polyethylene water main pipes that were run through 10 inch steel pipes for extra protection.	Structural Preventive Measures
<a href="#">For the Town of Palo, Little Things Make a Big Difference in Flood Protection</a>	Palo, IA received assistance from the FEMA and Iowa Homeland Security and Emergency Management's Public Assistance Program mitigation program. The town received \$5,884 in funds from FEMA to elevate panels and controls at a sanitary lift station. Palo officials also changed the design criteria on the lift station. Before the floods of 2008, the town had two 10 horsepower pumps which pumped the sewage out of Palo. Now, the town has three 100 horsepower pumps.	Preventive Measures Emergency Services Measures
<a href="#">FEMA HMGP Funding Provides Security in Port Neches</a>	In January 2007, Port Neches, TX received eight FEMA HMGP grants, totaling \$1,512,825, to implement wind retrofit projects to mitigate wind damage from future hurricanes or other high wind events. Retrofitting measures were completed on the public works building, sewer plant, and six other facilities in Port Neches. The projects involved re-roofing using FM Global 1-150 rated roofs. This type of roofing meets design and installation criteria mandated by the Factory Mutual Research Corporation, the nonprofit research arm of the Factory Mutual Insurance Company. The 1-150 rating is laboratory tested using an uplift test load of 150 pounds per square foot. The mitigation projects also included replacing existing entry doors with heavy-duty, impact-resistant doors and adding electric roll-down storm shutters to windows.	Emergency Services Seasures Property Protection
<a href="#">Stormwater Pump Stations Alleviate Flooding on Barrier Island</a>	The City of Brigantine, NJ has experienced numerous flooding events since 1984, and five of those events were federally declared disasters. In an attempt to alleviate some of the long-term flooding problems, the city applied for and received a FEMA Flood Mitigation Assistance (FMA) grant to install two additional stormwater pump stations on existing force mains. The FMA grant was in the amount of \$747,708, with a federal share of \$560,781.	Preventative Measures
<a href="#">FEMA Projects Lower Flood Risks in Cogswell, North Dakota</a>	With funding from FEMA, the State of North Dakota, and local sources, the City of Cogswell, in Sargent County, ND was able to improve drainage and move a lift station. In the county, Drain 11 is an open ditch, a channel that meanders for 26 miles from the northwest corner of the county to the Wild Rice River on the south side. In recent years, many improvements have been made to Drain 11. The Sargent County Water Resource Board cleared the channel of cattails that had blocked the flow in places. Improvements that help prevent erosion of the bank include angling the culverts, use of caps, and installation of rocks and steel piling. In some places, the bank was made less steep. On the channel that leads from the city to the main drain, new double tiles have replaced the old. The new, perforated tiles consist of a corrugated outer channel that is stiff and strong and resists cave-ins and a smooth inner channel that helps the water keep flowing over the nearly flat grade.	Preventative Measures Structural Natural Resource Protection