

# Drainage Improvement Project Development for Successful Hazard Mitigation Funding

Michael T. Talbot, FEMA Mississippi Recovery Office  
 James E. Quarles, FEMA Mississippi Recovery Office  
 Daniel L. Bass, FEMA Mississippi Recovery Office  
 Nathaniel Jourdan, FEMA Mississippi Recovery Office  
 Gary Swagart, FEMA Mississippi Recovery Office

Over 100 drainage improvement project proposals were considered for Katrina Hazard Mitigation Grant Program (HMGP) funding in 2008 and 2009, by the Mississippi Emergency Management Agency, with assistance from FEMA. Many of these project proposals displayed technical merit and detailed the scope of work and estimated project costs. Completion of these projects could have reduced future flood levels and associated future flood damages in many communities. However, most of these proposals had insufficient damage history data needed to determine the benefits of the mitigation projects. Benefits are defined as avoided damages, disruptions, losses, etc., as a result of the mitigation. For HMGP funding approval, the FEMA Benefit Cost Analysis (BCA) must show that the benefits of a project are equal to or exceed the project cost. The FEMA Damage-Frequency Assessment (DFA) BCA module is used for localized drainage improvement projects when Flood Insurance Study (FIS) or comparable data are not available. This paper presents an overview of the DFA module and the necessary documentation requirements. Further, suggestions for developing routine collection of the needed documentation to apply the DFA module for drainage improvement projects are outlined. This information will assist communities to be better prepared to successfully apply for HMGP funds that might be available in the event of future disaster declarations.

Key words: Floods, Hydrology, Law, Management and Planning, Models

## Introduction

The objective of this paper is to assist local communities collect the necessary documentation to successfully compete for HMGP funding for local drainage improvement projects. The drainage improvement projects will be described. The broad scope of Federal Assistance for disaster response and recovery available through the FEMA will be discussed in general. The responsibilities of the each partner in the FEMA-State-Applicant Partnership will be explained. The Hazard Mitigation Assistance (HMA) component of FEMA federal assistance will be discussed in further detail with final emphasis on the HMGP Funding. In similar manner the FEMA BCA methodology will be discussed in detail with emphasis on the BCA DFA module. The MEMA HMGP efforts related to drainage im-

provements projects, pertaining to Katrina disaster number DR-1604-MS, during 2008-2009, will be presented. The data needed to develop the project scope of work and cost, along with the damage data needed to determine the cost effectiveness employing the DFA module will be covered. Finally a discussion of problems leading to inadequate documentations and suggestions to improve the procedures for routinely collecting damage history documentation will be outlined.

## Drainage Improvement Projects

One method to reduce future damages from floods is to modify existing drainage or storm water management facilities to reduce the risk of local flooding, i.e.: increase conveyance and capacity; construct new drainage facilities; construct new

detention facility; alteration of an existing drainage facility; and construction of a floodwall. Communities fund these projects using local funding, bonds, loans or through various types of grants.

### **Federal Disaster Assistance**

One source of grant funding is the federal assistance administered by FEMA if the President declares that a major disaster or emergency exists ([www.fema.gov/rebuild/recover/dec\\_guide.shtml](http://www.fema.gov/rebuild/recover/dec_guide.shtml)). This response and recover assistance is available through three major grant programs, Individual Assistance (IA) ([www.fema.gov/individual/grant.shtml](http://www.fema.gov/individual/grant.shtml)), Public Assistance (PA) ([www.fema.gov/government/grant/pa/index.shtml](http://www.fema.gov/government/grant/pa/index.shtml)) and Hazard Mitigation Assistance (HMA) ([www.fema.gov/government/grant/hma/index.shtml](http://www.fema.gov/government/grant/hma/index.shtml)). IA provides assistance to individuals and families in terms of temporary housing, individual and family grants and unemployment assistance. PA provides assistance to states, tribal and local governments, and certain types of Private Nonprofits in terms of debris removal, emergency protective measures, and permanent restorations. HM provides assistance to both individuals and families, and states, tribal and local governments, and certain types of Private Nonprofits in terms of grants for cost-effective measures to prevent or reduce threat of future damage.

IA is for individual assistance and does not apply to the projects under consideration. PA (also known as infrastructure) repairs facilities which could include drainage projects like those addressed and this is the appropriate method to have damages repaired. PA has a form of mitigation that can be applied at the time of repair. PA is important since damage documented by PA determines by formula how much funding is available for the HMGP grant program that will be discussed shortly.

FEMA's HMA grant programs provide funding for eligible mitigation activities that reduce disaster losses and protect life and property from future disaster damages. Currently, FEMA administers the following HMA grant programs: Hazard Mitigation Grant Program (HMGP) ([www.fema.gov/government/grant/hmgp/index.shtml](http://www.fema.gov/government/grant/hmgp/index.shtml)); Pre-Disaster Mitigation (PDM) ([www.fema.gov/government/grant/](http://www.fema.gov/government/grant/)

[pdm/index.shtml](http://www.fema.gov/government/grant/pdm/index.shtml)); Flood Mitigation Assistance (FMA) ([www.fema.gov/government/grant/fma/index.shtml](http://www.fema.gov/government/grant/fma/index.shtml)); Repetitive Flood Claims (RFC) ([www.fema.gov/government/grant/rfc/index.shtml](http://www.fema.gov/government/grant/rfc/index.shtml)); and Severe Repetitive Loss (SRL) ([www.fema.gov/government/grant/srl/index.shtml](http://www.fema.gov/government/grant/srl/index.shtml)).

FEMA's HMA grants are provided to eligible Applicants (States/Tribes/Territories) that, in turn, provide subgrants to local governments and communities. The Applicant selects and prioritizes subapplications developed and submitted to them by subapplicants. These subapplications are submitted to FEMA for consideration of funding.

Although a local drainage improvement project could be eligible for more than one of the HMA grant programs, most likely the HMGP would best assist such projects. The HMGP is authorized under Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (as amended) and provides grants to implement long-term hazard mitigation measures following a major disaster declaration. The purpose of the program is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster. Further, the program is managed by the state (MEMA).

The amount of funding available for HMGP after a disaster has been declared is limited. The program may provide a State with up to 7.5% of the total disaster grants awarded by FEMA. States that have an approved enhanced state mitigation plan at the time of disaster declaration will qualify to receive up to 15% HMGP funding.

The HMGP program contains a required cost share provision as part of the allowable funding. FEMA can fund up to 75% of the eligible costs of each project. The State or grantee must provide a 25% match, which can be fashioned from a combination of cash and in-kind sources or global match. Cost share is an important aspect of disaster assistance funding. Note that some states contribute a portion of the 25% non-Federal funding. For example FL provides 12.5% and the subgrantees (communities) provide 12.5%. In MS, the state has contributed 20% and the communities must contribute 5%.

As noted previously, applicants eligible for HMGP include: state and local governments; private non-profit organizations or institutions that own or operate a private not-for profit as defined in 44 CFR 206.221 (e) and Indian tribes or authorized tribal organizations and Alaskan Native villages. The HMGP applications can come from locals that are not within the disaster declared region. This might lead to less local knowledge of disaster assistance and data documentation requirements.

After a disaster occurs several actions are involved to initiate the HMGP. After the Presidential Declaration, the Standard State Plan must be approved. Then the HMGP Admin plan is updated/approved. Next, the State solicits program interest and assists applicants in developing applications. These applications must be representative of the State and Local Mitigation Plans. The applicants are responsible for submitting complete and accurate applications. Finally, FEMA reviews applications for eligibility.

There are a number of eligible HMGP activities, including: acquisitions; relocations; elevations; seismic or wind retrofit; drainage, storm shutters, flood proofing, and others. The local drainage improvement projects under consideration fall in the drainage category.

HMGP projects must be in conformance with the State and Local Mitigation Plan, have a beneficial Impact on the designated disaster area, whether or not located in the designated area. HMGP projects must also be in conformance with 44 CFR Part 9 Flood Plain Management and Protection of Wetlands and 44 CFR part 10, Environmental Considerations. HMGP projects must solve a problem independently or constitute a functional portion of a solution where there is assurance that the project as a whole can be completed. Finally, the HMGP projects must be cost effective and substantially reduce the risk of future damage, hardship, loss or suffering resulting from a major disaster. The grantee must demonstrate this by documenting that the project addresses the problem, will not cost more than the anticipated value of the benefits, and has been determined to be the most practical, effective, and environmentally sound alternative after

consideration of a range of options.

### **Benefit Cost Analysis**

The FEMA BCA Software is the designated methodology to determine cost-effectiveness required by law. States normally arrange for subgrantee training in the proper use of the BCA Software. Reference data is available on the BCA Tool Kit. Data Documentation Templates are a valuable resource in determining required amount of back up data needed for the BCA analysis. BCA Software Version 4.5 is now available ([www.bcahelpline.com](http://www.bcahelpline.com)). A well documented BCA means that a knowledgeable BC analyst can re-create the BCA from supporting documentation provided within the application.

The BCA Software has several modules applicable for all of the eligible HMGP activities listed above (Flood, Hurricane Wind, Earthquake, Tornado, Wildfire, and Damage Frequency Assessment). There are two BCA Methodologies available for Drainage Projects, the Full Data Flood Module and the Damage Frequency Assessment (DFA) Module. The Full Data Flood Module has two components, the Riverine Flood Module and the Coastal Flood Module. The Full Data Flood Module requires an existing flood study like a National Flood Insurance Program Flood Insurance Studies or new local study. It also requires preliminary design specifications at a minimum the basic design concept and the best available cost estimate. This module also requires a post mitigation profile to be determined to what level will the improvement minimize flooding and the software compares existing flood profiles to post-mitigation profiles to determine benefit.

The Damage Frequency Assessment (DFA) Module, which was formerly known as Limited Data Module (LDM), is the most appropriate module for local drainage improvement projects. The DFA module typically requires the most assumptions and engineering judgment, provides the most accurate analysis if no hazard data or specific building data are available. However, historical damage information is required including: date, extent and magnitude of impacts of previous floods; photos of historic flooding; overall cost of damages; and esti-

mated frequency of each event. The DFA performs an analysis based on historical hazard frequency data, damage observations, and engineering judgment. The DFA calculates project benefits based on two or more historical damage events and the frequencies of the events. The advantage of DFA module is its flexibility; it can be used for a wide range of hazards and project types including local drainage improvement projects.

However, with this flexibility also comes a requirement for detailed DFA input data. The DFA must have documented historical damages/losses from two or more hazard events of known frequencies based on FEMA Project Worksheets/Damage Survey Reports, Insurance or repair records, or Newspaper articles citing other credible sources. It must have documented frequencies associated with each hazard event based on comparison of observed flood elevations or discharges to FIS, stream gauge or tide gauge data, documented data from a credible source to estimate frequencies, or the unknown frequency calculator with supporting documentation when the requirements are met.

### **DR-1604-MS HMGP Drainage Applications**

MEMA set a high priority on DR-1604-MS HMGP Drainage Applications and set aside \$70M Federal of HMGP funding for drainage improvement projects. Over 120 projects with an estimated value of over \$100M Federal were considered. Only 12 drainage improvement applications have been submitted with an estimated project cost for all submitted of \$21.4M. To date only 2 of these projects have been approved and obligated with an estimated value of over \$2.6M Federal.

### **Damage History Documentation**

Why aren't more projects being funded? Inability to prove that the projects are cost effective, lack of funds to meet cost share, 75% maximum Federal Share, and lack of funds for initial project development (architectural and engineering).

What can be done to improve this damage history documentation? Perhaps a major step is through better education of the state and sub-

grantees. Some of the problems leading to inadequate documentation could include: HMGP involves all communities in state and some may have little experience with previous disasters and disaster documentation requirements such as for PA or HMGP; no plan to collect data on a year round basis; lack of education, reading and writing ability; lack of computer and electronic data skills; and the belief that large cost events (usually low frequency) are more important than low cost events (usually higher frequency). When probability is included and annualized, the benefits generated by the higher frequency, lower cost events generally are greater.

How should damage history data be managed? A designated person should coordinate accumulation of records. This person could be housed in any number of community agencies including: Grant Coordinating Office Official; Flood Plain Management Official; Building Official; Emergency Management Official; Publics Works Official; Road Department; or other responsible official, perhaps even a community volunteer. Next, events and expenses during disaster response/recovery should be collected accurately and continuously. An effective data collection system should be established in most communities. This should involve simple file systems; data bases systems: permitting data; public works data; road department data; local EMA data; utilities data; etc. One simple investment that could help with those employees, with limited reading and writing skills, would be the issuance and training on with digital voice recorders and digital cameras.

### **Conclusion**

Detailed data collection that is needed is much like the detailed data collection individuals use to file travel vouchers or income tax reports. Many communities already have data collection systems used for payroll, equipment usage, etc. There is no best solution; it depends on the needs, abilities and economics of each community. It should be obvious from the many unsuccessful local damage improvement projects mentioned in MS related to the Katrina Disaster DR-1640-MS, if detailed damage

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data is not collected, the opportunity of substantial HMGP Federal disaster assistance will not be seized. FEMA does not dictate how communities collect the damage history documentation, but will make suggestions and assist as requested. The time to act is now to establish a sound data collection system for local damage improvement projects in

order to be prepared for the next disaster funding opportunity, which unfortunately will likely reoccur. This effort will help citizens collect the necessary documentation to mitigate through local drainage improvement projects.