

# Getting to Drier Ground



A Best Practices Guide for Repetitive Flood Losses in Florida

FLORIDA DIVISION OF EMERGENCY MANAGEMENT



# Getting to Drier Ground: A Best Practices Guide for Repetitive Flood Losses in Florida

Report Prepared for:  
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Emergency Management**

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# Executive Summary

## Purpose

The purpose of this guide is to describe local government efforts that have proven successful in addressing repetitive flood problems through the implementation of structural and non-structural mitigation measures. The stories in this guide provide examples of the local settings in which successful mitigation typically takes place. The guide presents a broad range of successful mitigation measures applied to a diverse set of communities throughout the State of Florida and includes two out-of-state examples.

This guide is intended to aid state and local government staff and other parties who work in flood mitigation with their efforts to improve local mitigation activities and programs. The guide may be particularly helpful for staff whose primary focus is not mitigation, such as grant administrators, project managers,

and planners, to better understand the mitigation process. Additionally, homeowners and other community members interested in mitigation are likely to find this document informative. Although mitigation strategies exist for all hazard types, this document focuses on flooding hazards.

## Content

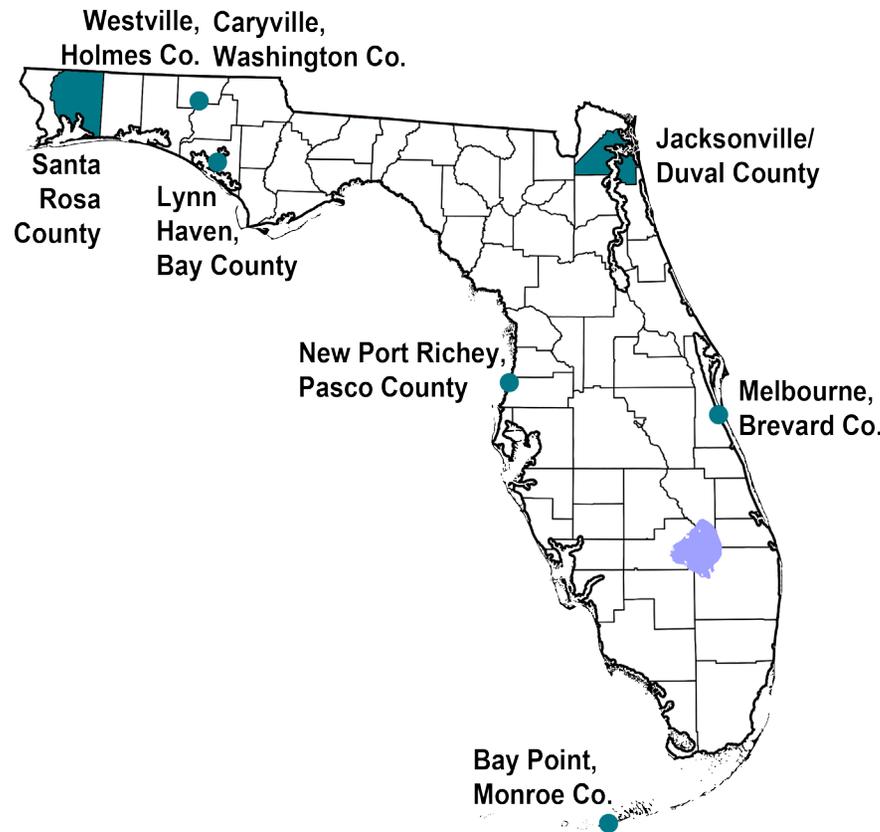
This document is organized into three sections, each providing successful solutions to challenges within the realm of flood mitigation. The first section discusses various methods of structural mitigation. The second section addresses barriers

to mitigation at the local level. The third, and final, section of this guide explores the beneficial potential of multi-jurisdictional partnerships. This best practices guide examines nine case studies that provide examples of the topics identified in this document. Seven of the case studies come from Florida and help to serve as models in successfully mitigating in hazard and governmental conditions within the state. Figure 1 indicates the locations of each case study from the State of Florida. Two case studies come from outside the state, one from North Carolina and one from Ohio. Out of state examples help to show how people have dealt with similar problems in different contexts, and although they may

Other types of mitigation efforts, aside from flood mitigation, may be briefly referred to in this document. In-depth information on other mitigation efforts can be obtained at <http://www.floridadisaster.org/Mitigation/index.htm>

not be directly applicable to the Florida hazard and government contexts, they provide new ideas that can be incorporated into future projects and may lead to even better mitigation strategies.

The first section of the guide presents success stories from communities that have successfully utilized federal funding for structural mitigation projects. The types of projects discussed include acquisition and reconstruction. Acquisition is a project in which a community purchases and demolishes a flood-prone structure and reverts the property to open space in perpetuity. Reconstruction is a project in which a structure is partially or completely demolished and subsequently reconstructed to better withstand future flooding. Three case studies are examined in this section. The first case looks at an acquisition project in Brevard County where Severe



**Figure 1: Florida Case Study Location Map**

Repetitive Loss funding was used to mitigate a structure damaged by storm water runoff. The second and third case studies examined in this section address two different types of reconstruction

projects. Respectively, a case in New Port Richey illustrates a total reconstruction and a story from Monroe County details a second story conversion of an existing structure.

The second section of this guide discusses barriers encountered at the local government level that may hinder the mitigation process and communities' success in overcoming them. The issues discussed in this section include a lack of public awareness and knowledge about available mitigation options that can be overcome through a local commitment to providing outreach and the limited organizational capacity of local governments to successfully address mitigation that can

be overcome through support from state government. Three case studies illustrate how jurisdictions in Florida have addressed the barriers of capacity building and gaining public support.

A case study from Santa Rosa County demonstrates how the state aided local governments in building capacity to successfully mitigate several properties. Examples from Lynn Haven and Jacksonville illustrate two different ways to build public support for mitigation projects. The City of Lynn Haven staff worked closely with Bay County staff to organize public outreach meetings to disseminate information and create interest in mitigation. In Jacksonville, staff focus on providing individual assistance to homeowners during the mitigation process to ensure a smooth process and successful outcomes.

Section Three of this guide describes ways that local governments have moved beyond site-by-site mitigation efforts and embarked on larger-scale mitigation projects, some of which have regional impact. This section includes examples of inter-jurisdictional partnerships forged within Florida and outside of the state. This section also discusses creative approaches to successfully mitigate against future risk, which include seizing an opportunity to implement comprehensive mitigation

strategies in a post-disaster scenario and creation of a flood mitigation partnership to increase regional collaboration. Three case studies are utilized in this section to illustrate mitigation at a broader scale. The first addresses a multiple structure mitigation project in Washington and Holmes counties. Not only was this a large-scale mitigation effort, but the case illustrates how multiple jurisdictions can work together successfully. The second and third case studies look to out of state examples. The second case study looks at a post-disaster redevelopment strategy in Kinston, North Carolina and how interagency partnership reinforced hazard mitigation projects through redevelopment programs and economic incentives for a successful outcome for the community that looked beyond mitigation alone. The third case study examines the Northwest Ohio Flood Mitigation Partnership and how the regional partnership that breaks boundaries of local governments has been successful in mitigating flooding hazards with a focus on watershed-scale issues.

The authors would like to note that in many of the examples in this guide, successful mitigation involved a combination of both structural and non-structural mitigation strategies. For example, the multi-structure mitigation project in Washington and Holmes counties also benefited from increased local government capacity. However, the sections of this document are classified by the primary mitigation feature or method that the authors felt was most relevant. It is important to note, in pursuance of The United States Privacy Act of 1974, 5 U. S. C. Section 552(a), the names of property owners and exact locations of structures cannot be included in this document.



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# Introduction

Florida's problems with repetitive flooding can be attributed to many factors, including high concentrations of development within floodplains and coastal high hazard areas, frequent tropical storms including hurricanes, and the lack of mitigation as a means to reduce vulnerability to flooding. This guide is designed to assist local government staff and other interested parties with their efforts to improve local mitigation activities and programs by providing examples of best practices in mitigation efforts.

## Repetitive Flood Losses in Florida

Florida's problems with repetitive flooding can be attributed to many factors, including the concentration of development within floodplains and coastal high hazard

areas, frequent hurricanes and coastal storms, and the lack of mitigation as a means to reduce vulnerability to flooding. Florida's geography makes the entire state susceptible to the damaging impacts from tropical storms and hurricanes. Because tropical storms and hurricanes are classified on the basis of wind speeds, the damaging effects from rain and subsequent flooding cannot be estimated based on storm classification. Some storms may move fast and have relatively little rain while others, like Tropical Storm Fay in 2008, moved slowly and dropped a lot of rain. According to the State of Florida Enhanced Hazard Mitigation Plan (Florida Division of Emergency Management [DEM], 2010), 115 hurricanes have impacted the state since 1851. Many more tropical storms than hurricanes have affected the state during the same time period. It can be said with a high degree of certainty that somewhere in the state will be affected by a tropical storm or hurricane each year.

As a result of the factors identified above, there are currently 17,000 structures classified as repetitive loss (RL) or severe repetitive loss (SRL) in the state of Florida. Although only three percent of these structures are classified as SRL (about 600), they are at the highest risk for future flooding and place the greatest financial strain on homeowners and local jurisdictions. In these cases, repetitive flood damage is an issue best addressed with the implementation of measures that promote mitigation.

In 2004, the National Flood Insurance Act of 1968 was amended to provide funding to reduce or eliminate the long-term risk of flood damage to SRL structures insured under the National Flood Insurance Program (NFIP) (Federal Emergency Management Agency [FEMA], 2011a). As a result of this legislation local governments in the United States are increasingly bearing the responsibility for repetitive flood

problems (Brody, Kang, & Bernhardt, 2010). Provisions in the legislation designate local governments as the sub-applicant to federal grant programs, requiring participation from local jurisdictions in securing funding for structural and non-structural mitigation. This mitigation work requires local governments to successfully solicit applications from homeowners, assist with mitigation projects, and coordinate with state officials to promote mitigation practices.

## Flood Mitigation

FEMA defines mitigation as “the effort to reduce loss of life and property by lessening the impact of disasters” (FEMA, 2010b). FEMA aims to achieve mitigation through risk analysis and flood insurance. Risk analysis provides information that forms a foundation for mitigation activities and includes flood hazard mapping and mitigation planning. Flood insurance, through the NFIP, protects financial investments. This document, however, focuses on risk reduction, which

includes floodplain management and mitigation projects eligible for funding through various Hazard Mitigation Assistance (HMA) Programs.

Flood hazard mapping is maintained and updated by the Federal Insurance and Mitigation Administration (FIMA) as a part of the NFIP. The maps are the basis for understanding flooding risk and are used as a guide for flood insurance and floodplain management. There are many floodplain designations utilized in the NFIP maps that describe the type and extent of risk. Throughout this document reference is made to various floodplain designations. The designations predominantly identified in the case studies described in this guide are A, AE, and VE. Each of these designations identifies areas with a 1% annual chance for flooding, also known as the 100-year floodplain. Areas designated “AE” provide base flood elevations (BFEs) on the Flood Insurance Rate Map (FIRM). Areas designated “A” are lacking sufficient analysis to determine and identify BFEs. Areas designated “VE” are coastal areas that are subject to storm waves and include BFEs.

Floodplain management is the operation of a community program of corrective and preventative measures for reducing flood damage” (FEMA, 2010c). These measures generally include requirements for zoning, subdivision or building, and special-purpose floodplain ordinances. By directing new development away from floodplains and enforcing building standards for those structures located within floodplains, losses due to flooding are reduced. The NFIP has minimum standards that communities who voluntarily join the program must enforce. To encourage communities to adopt standards that exceed the NFIP minimum standards the Community Rating System (CRS) was created. The CRS provides discounts to community insurance rates based on a rating system for mitigation measures (FEMA, 2010c). Floodplain management is intended to prevent development from occurring that will be vulnerable to flooding, however there is a lot of development in Florida that precedes floodplain management policies. Hazard mitigation addresses the elimination of existing situations that result in flood losses.

Hazard mitigation is the only phase of emergency management that is dedicated to breaking the cycle of damage, reconstruction and repeated damage (FEMA, 2010a). FEMA's Homeowner's Guide to Retrofitting (2009) describes six methods of retrofitting: elevation, wet floodproofing, relocation, dry floodproofing, levees and floodwalls, and demolition. This document includes case studies that explore successful demolition and reconstruction projects. Many mitigation projects can be supported with grants through FEMA's HMA programs detailed in the next section.

Those seeking information about flooding problems and flood mitigation should begin with local resources. Many local mitigation resources are available at the local level and building a relationship with local mitigation staff is the first step in successful mitigation. Local emergency management staff and/or planning staff can help individuals to understand floodplain designations and how individual properties are designated, provide information on what local regulations

are applicable, and what mitigation options are available. In Florida, each community revises and adopts a local mitigation strategy (LMS) every five years. These documents are tailored to the specific hazards that occur in each jurisdiction and provide a plan for mitigating those hazards. These plans provide valuable information on what projects a community has planned and how to obtain funding for mitigation. Working with local staff to understand these documents and how they may aid in the mitigation of individual properties will help homeowners understand and ease the process of mitigation.

## Funding for Flood Mitigation

There are five funding opportunities for mitigation projects under FEMA's Hazard Mitigation Assistance (HMA) grant programs (FEMA, 2011c). These programs share the common goal of reducing loss of life and property due to natural hazards. The HMA programs include

the Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM), Flood Mitigation Assistance (FMA), Repetitive Flood Claims (RFC), and Severe Repetitive Loss (SRL). The grant programs provide funding for pre- and post-disaster mitigation.

The grants are available to eligible applicants (states/tribes/territories) that then provide sub-grants to local communities and governments (FEMA, 2011c). Individuals and businesses are not eligible to apply directly for funding through these programs, and must work with the local and state governments. The Florida Division Emergency Management (DEM) acts as the state coordinating agency and is assigned with administering program funds under a partnership with the FEMA. DEM essentially acts as a pass-through for local grants as the sub-applications must be submitted to FEMA for consideration (FEMA, 2011c).

*Table 1* shows eligible mitigation projects by funding program. Many of the mitigation activities are eligible for funding under all five of the funding programs. Note, however,

that mitigation reconstruction is only available for funding under the SRL program and non-residential structures are not eligible under this program.

Generally, the cost share required for grants is 25%. Meaning, 75% of the cost of the project may be funded with federal funds, but the remaining 25% must be paid with a local or non-federal match. One of the few exceptions to

the limitation on federal funds used for a match is the US Department of Housing and Urban Development (HUD) Community Development Block Grants (CDBG). Variations in cost share requirements are based on the program and specific conditions for eligibility.

All HMA funded projects must be cost effective. FEMA determines cost effectiveness using a benefit-cost

analysis that evaluates future benefits, in terms of losses avoided, in relation to the cost of the project costs. In order to be eligible for funding through a HMA program, the proposed project must demonstrate a benefit-cost ratio of 1.0 or greater. This ratio represents that the future benefits of the project are equal to or greater than the cost.

**Table 1: Eligible Mitigation Projects by HMA Program**

Eligible Activities	HMGP	PDM	FMA	RFC	SRL
Property Acquisition and Structure Demolition	X	X	X	X	X
Property Acquisition and Structure Relocation	X	X	X	X	X
Structure Elevation	X	X	X	X	X
Mitigation Reconstruction					X
Dry Floodproofing of Historic Residential Structures	X	X	X	X	X
Dry Floodproofing of Non-residential Structures	X	X	X	X	
Minor Localized Flood Reduction Projects	X	X	X	X	X
Structural Retrofitting of Existing Buildings	X	X			
Non-structural Retrofitting of Existing Buildings and Facilities	X	X			
Infrastructure Retrofit	X	X			
Soil Stabilization	X	X			

Source: FEMA, 2010a

In addition to the above requirements and limitations, eligibility for HMA program funds is dependent on whether the state and community have a FEMA-approved hazard mitigation plan and are participating in the NFIP. Proposed projects must be consistent with the goals and objectives in both the state and local mitigation plans. For the FMA, RFC, and SRL programs, individual properties must be insured through the NFIP.

## Hazard Mitigation Grant Program

The key objective of the HMGP is to ensure that the opportunity to take critical mitigation measures to reduce the risk of loss of life and property from future disasters is not lost during the reconstruction process following a disaster (FEMA, 2011d). The HMGP is unique in that grants are awarded only within Presidentially-declared disaster areas. The HMGP is also the only HMA grant program that allows private non-profits to be the applicant.

Applications for the HMGP are processed through the National Emergency Management Information System. The funding availability for HMGP is the most variable of the HMA programs as funding is based on the number and severity of disasters. The range of funding experienced during the 2006 to 2010 fiscal years has a spread of over one billion dollars. FEMA's HMA Unified Guide (2010a) reports a funding low of \$232,227,932 in FY'06 and a funding high of \$1,246,236,812 in FY'08.

## Pre-Disaster Mitigation

The intent of the PDM program is to implement a sustained pre-disaster natural hazard mitigation program to reduce overall risk to the population and structures from future hazard events and reduce reliance on federal assistance (FEMA, 2010a). Using a National Ranking Score for each sub-application, PDM grants are awarded on a competitive basis, without reference

to state allocations, quotas, or other formula-based allocation of funds. FEMA, through the PDM process, is partnering with HUD to recognize and support the goals of the Sustainable Housing and Communities initiative and will take into consideration the sustainability principles presented in PDM planning and project applications (FEMA, 2011e).

Under the PDM program, small impoverished communities are eligible for a cost share of only 10%, instead of the typical 25%. This allows communities without financial resources to engage in mitigation projects. A small impoverished community has a population of 3,000 or fewer, an average per capita annual income not exceeding 80% of the national average, and an unemployment rate at least one percentage point more than the national rate. Available funding during the 2006-2010 fiscal years has ranged from \$50,000,000 in FY'06 to \$114,000,000 in FY'08 (FEMA, 2010a).

## Flood Mitigation Assistance

The goal of the FMA program is to reduce and eliminate claims under the NFIP. The FMA provides funds to assist states and communities implement measures that reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insured under the NFIP. Three types of FMA grants are available to states and communities: planning grants to prepare Flood Mitigation Plans, project grants to implement measures to reduce flood losses, and management cost grants for the state to help administer the FMA program and activities (FEMA, 2011b). Notably, this plan was created, in part, with the aid funds from FMA funding to DEM to promote mitigation. Funding available through the FMA has ranged from \$28,000,000 in FY'06 to \$40,000,000 in FY'10. Cost share may be reduced to 10% if the community has a repetitive loss strategy in their mitigation plan (FEMA, 2010a).

## Repetitive Flood Claims

The RFC program aims to reduce flood damages to individual properties for which one or more claim payments for losses have been made under flood insurance coverage and that will result in the greatest savings to the National Flood Insurance Fund (NFIF). Up to \$10 million is available annually for funding through the RFC program. FEMA may contribute up to 100% of the total amount approved under the RFC grant award to implement approved activities if the applicant has demonstrated that the proposed activities cannot be funded under the FMA Program (FEMA, 2011g).

## Severe Repetitive Loss

The purpose of the SRL Program is to reduce or eliminate claims under the NFIP through project activities that will result in the greatest savings to the NFIF. An SRL property is defined as a residential property that is covered under an NFIP flood insurance policy

and (a) that has at least four NFIP claim payments (including building and contents) over \$5,000 each, and the cumulative amount of such claims payments exceeds \$20,000; or (b) for which at least two separate claims payments (building payments only) have been made with the cumulative amount of the building portion of such claims exceeding the market value of the building. For both (a) and (b) above, at least two of the referenced claims must have occurred within any 10-year period, and must be greater than 10 days apart (FEMA, 2011h).

Up to 90% of the cost-share may be provided by FEMA for projects approved in states, territories, and federally-recognized Indian tribes with FEMA-approved standard or enhanced mitigation plans or Indian tribal plans that include a strategy for mitigating existing and future SRL properties. The range of funding for the SRL program during the FY'06-FY'10 years has a low of \$40 million and a high of \$80 million (FEMA, 2010a).

## Flood Mitigation Process

The flood mitigation process is generally the same for each type of HMA funding program, but details vary depending on performance criteria for each grant. There are four major steps in the mitigation process: determine eligibility, application, application review, and award administration (FEMA, 2010a). Only

eligible applicants can apply for HMA funding. Eligible applicants are state and territorial emergency management offices and tribal governments. Eligible subapplicants include state agencies, tribal governments, local governments, and non-profit organizations. Subapplicants must apply to applicants and cannot directly apply for funding to FEMA. Individuals and businesses must work with an eligible subapplicant to obtain funding for a mitigation project. In working with a subapplicant, there

are several aspects that must be met for a project to be eligible. Mitigation projects or activities must be matched with a funding program that supports the particular activity. Appendix A includes guidance for determining a project type and Table 1 shows the types of projects eligible for particular funding programs. The project must also be cost effective, feasible, be located in a community with an adopted and FEMA approved hazard mitigation plan, and be participating in the NFIP. Cost effectiveness is

More information on the hazard mitigation assistance grant programs is available online at <http://www.fema.gov/government/grant/hma/index.shtm>. Information on specific programs is available at the following links.

- Hazard Mitigation Grant Program: <http://www.fema.gov/government/grant/hmgp/index.shtm>
- Pre-Disaster Mitigation: <http://www.fema.gov/government/grant/pdm/index.shtm>
- Flood Mitigation Assistance: <http://www.fema.gov/government/grant/fma/index.shtm>
- Repetitive Flood Claims: <http://www.fema.gov/government/grant/rfc/index.shtm>
- Severe Repetitive Loss: <http://www.fema.gov/government/grant/srl/index.shtm>

determined by a cost-benefit ratio of 1.0 or greater and is discussed in more detail in the case studies. Feasibility is demonstrated by conformance with accepted engineering practices, codes, standards, and best practices. Hazard mitigation plans are known as local mitigation plans (LMS) in Florida, are often multi-jurisdictional plans, and can serve as a great resource for hazard information, local mitigation goals, and project prioritization. Working with an eligible subapplicant ensures these and other applicable requirements for projects are met and are a priority for the community.

Application is made by the subapplicant to the applicant (often the local government to the state emergency management office). FEMA sets time periods and deadlines for applications.

The applicant reviews subapplications for eligibility, consistency, sufficient information, feasibility, and other elements specific to grant types. Those subapplications that are deemed complete and eligible are prioritized by the applicant and compiled into a grant application to FEMA. FEMA reviews the applications for eligibility and completeness, cost effectiveness, feasibility, and environmental and historic preservation compliance. Eligible grant applications are selected based on applicant, HMA program, and in some cases national ranking criteria. Those that rise to the top are funded while others are not due to lack of funding, low priority, or inadequate application. Unfunded but eligible projects may add new information to the application and apply in future

funding cycles. FEMA notifies the applicant/grantee of awards and the applicant must then in turn notify their subapplicants/subgrantees. Carrying out of the funded project is a challenging process that requires attention to detail and well-kept records. The case studies in this guide provide details on this daunting process and how to best succeed in carrying it out. The grantee is responsible for delivering financial and progress reports to FEMA on a quarterly basis. Once the project is complete, inspections are conducted to make sure the project was completed in compliance with the grant funding and other applicable requirements. The grantee updates the repetitive loss database and the grantee and subgrantee are required to maintain records for at least three years.

# Section 1: Structural Mitigation

**H**azard mitigation is sustained action taken to reduce or eliminate long-term risk to people and their property from hazards and their effects. Mitigation's value to society is threefold. Mitigation creates safer communities by reducing losses of life and property, enables individuals and communities to recover more rapidly from disasters, and lessens the financial impact of disasters on individuals, the Treasury, state, local, and tribal communities (FEMA, 2011a). The two main types of mitigation are policy and structural. Policy oriented mitigation includes projects such as adopting and enforcing stringent building codes that comply with or exceed National Flood Insurance Program (NFIP) floodplain management regulations. This section

addresses structural mitigation projects that require physical modification to buildings and/or landscapes to protect against damage from flooding.

There are several structural or engineered types of mitigation methods designed to protect properties from flooding, including drainage improvements, barriers, wet floodproofing, dry floodproofing, elevation, relocation, and acquisition. Each type of mitigation must be considered based on the context of the flooding problem and the structure at risk. Considerations include type of structure, condition of structure, foundation type, number of stories, building footprint, flood protection depth, whether flash flooding occurs, flood velocity, and whether the

structure is located in the floodway. Acquisition is the only mitigation method that is potentially feasible for every flood impacted structure and is the only method that guarantees the elimination of future losses. However, acquisition is an expensive, lengthy, and disruptive process in which the local government purchases and clears the property and the former residents must relocate. Other methods are effective at reducing risk and may be less disruptive and more affordable, but the property will remain subject to potential losses.

This section discusses structural mitigation options available to local governments when faced with repetitive loss (RL) and severe repetitive loss (SRL) properties, including acquisition and reconstruction. In

addition to presenting mitigation options, this section presents three case studies from local governments in Florida, including an acquisition project in Brevard County and two types of mitigation reconstruction. The Monroe County case study examines a complete reconstruction project and the Pasco County case study describes a reconstruction project where a second story was built for living space.

## Mitigation Acquisition

**M**itigation acquisition, also known as buyout, is the most permanent way of mitigating repetitive flood damage to structures. Acquisition involves a local government purchasing property on which a vulnerable structure is present from a homeowner who is willing to sell. After purchasing a property, the structure(s) is removed from the site either by relocation or demolition and the land

is preserved as public open space. The land may be left to nature, maintained as a public park, or as a conservation area.

Though the community acquires the property, FEMA provides 75 percent of the funding for acquisition projects, requiring the local community and/or State to contribute 25 percent of the funding. The property is purchased for the appraised fair market value before the flooding damage occurred. As with any other real estate transaction, the purchaser (community) pays for appraisal, title search, and survey while the homeowner is responsible for any liens and mortgage balances. Because the acquisition/buyout process is voluntary, relocation costs for the homeowner are not included.

The acquisition process is complicated and may take several months to submit an application and agree to a buyout proposal. The community makes an application for assistance with input from the community and from the affected homeowner(s). The application is submitted to the State for review.

If the project is deemed appropriate, the State sends the application to FEMA for approval. FEMA checks the application for compliance with regulations, environmental concerns, and determines whether the project is cost effective. After FEMA approves the application, the State is notified and begins the acquisition process. Once the homeowner(s) accept a buyout offer, closing takes about 45 days. After the community acquires the property the structures are removed and if necessary, the site prepared for permanent use as open space.

Acquisition projects have several benefits. The greatest benefit is the elimination of flood risk for the property owner(s) and the freeing of funds that would otherwise be used for the repetitive loss property to benefit others in the community. Acquisition also allows the property owner(s) to recoup much of their financial investment in a property that has lost value and gives the homeowners a chance for a fresh start. The community may also directly benefit if the acquired

property is utilized for a public park or becomes habitat for wildlife.

Though acquisition is the most permanent and sure way to eliminate flooding risk, acquisition is neither the best solution nor available for every impacted property. Acquisition relies on a homeowner who is willing to sell the property. Many people have put down roots in a particular home and despite the risk of damage and cost of repair, they are unwilling to leave a home that holds meaning for them. Acquisition is also a costly endeavor and the benefit to the community must outweigh the cost of purchase of the property and removal of the structures. It is likely that only RL and SRL properties will have the documented damages and high cost of repair to warrant the use of acquisition to mitigate the flood risk. In order for a structure to be eligible for acquisition funding, it must meet the following criteria:

- The property is located in an area with known flooding problems;
- The property will be acquired from a willing, voluntary seller;

- The property contains a structure that may or may not have been damaged or destroyed due to an event;
- All incompatible easements or encumbrances can be extinguished;
- The property is not contaminated with hazardous materials at the time of acquisition, other than incidental demolition or household waste; and
- The property is not part of an intended, planned, or designated project area for which the land is to be acquired by a certain date, and/or where there is an intention to use the property for any public or private future use inconsistent with the open space deed restrictions and FEMA acquisition requirements (examples include roads and flood control levees).

## Process for Mitigation Acquisition

The scope of work for an MA project is generally more limited than other

mitigation project types, due to the fact that a new or improved structure is not constructed after demolition of the existing structure. The MA process can be broken down into four major steps.

### 1. Application Phase:

- Documentation of voluntary interest from the homeowner (Consultation Agreement);
- Examples of time assurances and deed restrictions;
- Hazardous material research of the land;
- Certification that the owner is a U.S. citizen;
- Proof of clear title;
- An appraisal of the property; and
- A final mitigation offer to the homeowner.

### 2. Demolition Phase:

- Removal of the existing building in accordance with the applicable laws within 90 days of closing and settlement of the property acquisition transaction.

## 3. Property Acquisition Closeout Phase:

- Photograph of the project site after project implementation;
- Copy of the recorded deed and attached deed restrictions;
- Signed statement of voluntary participation of the property; and
- For each property located on the FEMA Repetitive Loss database, a completed FEMA Form AW-501, documenting the completion of mitigation on the repetitive loss property.

## 4. Monitoring, Reporting, and Inspection Phase:

- Monitoring and inspections of the property every three years to ensure that the inspected parcels continue to be used for open space purposes.

## Mitigation Reconstruction

The Federal Emergency Management Agency (FEMA) defines Mitigation Reconstruction (MR) as constructing “an improved, elevated building on the same site where an existing building and/or foundation has been partially or completely demolished or destroyed” (FEMA, 2011). In other words, MR involves tearing down and rebuilding a structure that has been damaged by flooding on several occasions so that the structure can better withstand future flood events. Under the MR approach, the property is required to become fully compliant with current building codes and must be constructed outside the regulatory high hazard area (Zone V) – a classification identified by

the best available flood hazard data (FEMA, 2011). Furthermore, MR is only eligible for funding under the Severe Repetitive Loss (SRL) program.

The scope of work for Mitigation Reconstruction can be broken down into six general steps, which are briefly described below and will be explained further in the case studies (FEMA, 2011):

## 1. Pre-Construction:

- Project design, analysis, and permitting

## 2. Site Preparation:

- Demolition of existing structures
- Removal and disposal of project debris
- Site environmental restoration
- Utility relocation
- Site grading

For more information on property acquisition projects (buyouts) visit <http://www.fema.gov/government/grant/mitmeasures/buyouts.shtm> and/or download the Property Acquisition Handbook for Local Communities (FEMA 317) at <http://www.fema.gov/government/grant/resources/acqhandbook.shtm>

3. Foundation Construction:
  - Installation, monitoring and testing (if required) of foundations supporting the structure
4. Structural Shell Construction:
  - Framing, load-carrying elements, attachments, and building envelope components above the foundation
5. Interior Finishes:
  - Installation of interior walls, flooring, wiring/lighting fixtures, insulation, plumbing and mechanical fixtures, kitchen/bath counters, cabinets, sinks, toilets, tub/shower, and HVAC
6. Construction Completion:
  - Final inspections
  - Final elevation certificate (including digital photographs)
  - Certificate of Occupancy for the structure
  - Documentation necessary of the project's conformance with program requirements

# Case Study: Brevard County Mitigation Acquisition

The City of Melbourne is located in Brevard County midway between Jacksonville and Miami, approximately 60 miles southeast of Orlando. Melbourne is the county's second largest municipality with a population of 78,323 in 2009. Located on the east coast of Florida, structures throughout the county are vulnerable to natural hazards.

This case study focuses on a successful acquisition of an SRL structure. The building, constructed in 1976, was a 4,000 square foot two-story single-family dwelling (see Figure 2) that was repeatedly struck by severe storms. Over the course of 20 years, the NFIP program made eight payments for the repair of flood damages (see Table 2).

The key actors involved in this case study included the homeowner, the staff at the Florida Department of Emergency Management (DEM), and the Brevard County emergency management staff. The DEM staff provided oversight and acted as a liaison between the local and federal levels. Brevard County's staff role was the most involved as the county purchased the home from the homeowner, monitored home's demolition, and ultimately restored the property to open space.



**Figure 2: Brevard County Acquisition Site Prior to Mitigation**

Source: SRL Project Files, 2009

## The Mitigation Acquisition Process

Due to the fact that the structure received eight flood loss payments between the years of 1984 and 2004, Brevard County targeted this structure as a high priority acquisition. A ninth incident, caused by Tropical Storm Fay in 2008, occurred during the application process. As a result, the homeowners did not submit damage claims for that incident. In this case, the process began when the homeowners replied to an outreach letter from DEM describing mitigation options to affected property owners. The homeowners subsequently submitted a project application to the county, with a personal letter expressing their frustration with ongoing damages to their home due to flooding from storm events. In their letter, the homeowners described their constant struggle with flooding, and discussed how they unsuccessfully tried to mitigate their home utilizing flood-proofing materials. In the letter, the homeowners also indicated their willingness to proceed with the acquisition process. Brevard County forwarded the application and personal letter from the homeowners to DEM, and indicated that the county acknowledged a need to mitigate the structure. After reviewing the application and participating in a consultation between DEM and county staff, the homeowners determined that the SRL program's reimbursement options would be the most useful and beneficial.

After reviewing the funding and mitigation options, the homeowners decided to proceed with the acquisition project. Once deciding to proceed with the project, Brevard County staff and the homeowner worked together to prepare the application packet for the DEM. The contract between the homeowners, local government, DEM, and FEMA was ultimately signed in June of 2010.

Much of the application process was straightforward. The homeowners were U.S. citizens, they documented their voluntary interest in mitigation, they approved of the deed restrictions to be placed on the property, they held clear title to the property, and the property was solely residential and had no issues with hazardous waste. Additionally, a benefit-cost analysis was conducted for the proposed project that resulted in a score of 1.13, exceeding the minimum score of 1.0 for FEMA eligibility. Finally, the property was appraised and a final mitigation offer was made to the homeowners. Once the homeowners accepted the offer and the real estate transaction was closed, the local government became the owner of the structure and land, representing the end of the homeowners’ involvement in the process.

The demolition phase was also relatively uncomplicated. After closing on the property, Brevard County had 90 days to demolish and remove all debris associated with the structure. Once the structure was removed, the property was returned to a natural state. In order to return a site to a natural state, a demolition project may involve removal of septic tanks, fuel tanks, foundations of structures, and filling basements or other excavated areas with compact clean fill.

**Table 2: Brevard County Acquisition Site Claims Paid by Year of Damage**

Year	Building Payments	Contents Payments
1984, Apr.	\$8,911.79	\$5,378.45
1987, Nov.	\$5,944.60	\$3,670.35
1989, Oct.	\$11,191.91	-
1994, Nov.	\$13,003.87	\$10,839.35
1995, Aug.	\$38,879.22	\$28,564.19
1999, Sep.	\$39,829.15	\$33,513.73
2001, Jul.	\$21,199.99	-
2004, Sep.	\$13,180.73	\$9,960.07
<b>Category Totals</b>	<b>\$152,141.26</b>	<b>\$91,926.14</b>
<b>Overall Total</b>		<b>\$244,067.40</b>

Source: SRL Project Files, 2008

The final phase of the acquisition project is the closeout phase. The acquisition closeout phase occurs after the structure is demolished. During the closeout phase, photographs are taken of the site to document the restoration of the property to a natural state. In this case, the county staff that managed this project noted in the project file “the applicant has demolished the structure, re-vegetated the parcel where the residence once existed and left the site in a natural state” (SRL Project Files, 2011). Also included in the file was a copy of the recorded deed and deed restrictions that were placed upon the property in order to ensure the property remains open space, as well as signed statements from the homeowners certifying their voluntary participation. The acquisition closeout phase was completed in February 2011. From the time the contract was executed between all parties until completion, the duration of this project was eight months.

The cost of the project was \$350,000, including payment to the homeowner and the demolition and debris cleanup costs. The appraised value of the home was \$265,386; the homeowners received 90% (\$241,260) in accordance with the SRL program. The monitoring, reporting and inspection phase is required every three years, as such, this phase has not occurred as of the writing of this document and cannot be discussed.

# Case Study: Mitigation Reconstruction in Monroe County

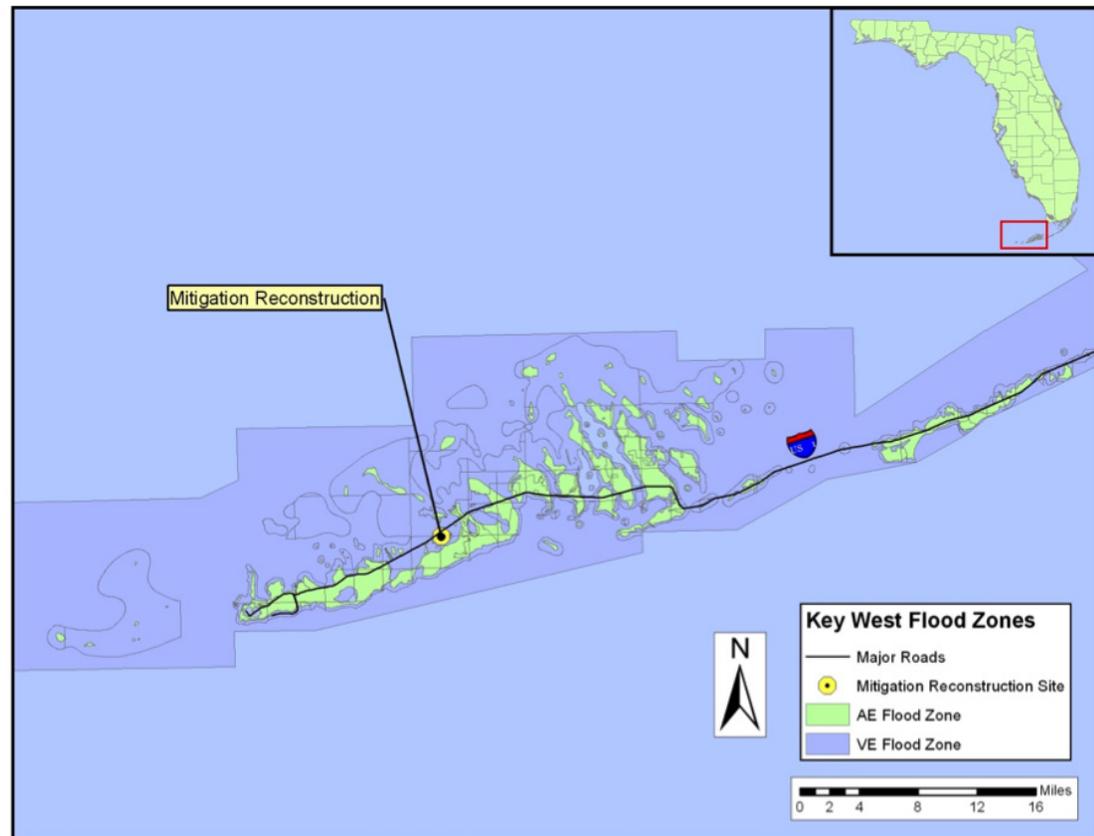
Located in Monroe County, Bay Point is a small island approximately 14 miles northeast of Key West (see Figure 3). Flat and surrounded by water, the landscape offers little in the way of protection against the elements and storm events. Consequently, many structures are susceptible to wind and flood damage – illustrated by Bay Point’s location in the AE and VE flood zones (see Figure 3). The AE and VE flood zones represent areas with a 1% annual chance of flooding. Structures in the VE zone, are additionally at risk from storm waves. Taking into account Bay Point’s exposure to natural hazards, strict adherence to contemporary building codes is imperative.

Complicating matters further, Monroe County is designated as an Area of Critical State Concern (ACSC) by the State of Florida.

The ACSC designation means that the state places a limit on the number of new construction projects that may be issued in a given year and reviews all building permits issued by local governments within the ACSC. These additional steps in the development process ensure future growth at a sustainable level for the county, but can also complicate and lengthen the construction and mitigation processes.

In this case study the SRL property that was redeveloped using the reconstruction approach was a 750 square foot mobile home originally constructed in 1968 (see Figure 4). Due to previous storm events and related damage (see Table 3), the structure was classified as an SRL property. The loss payments for this structure listed in Table 3 were drawn from the NFIP program.

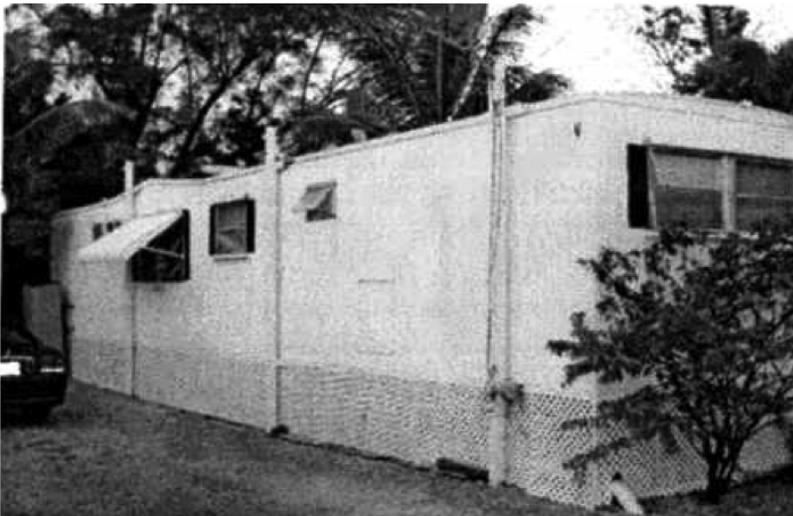
Monroe County's emergency project manager acted as the key figure involved in this project by acting as a liaison between the homeowner and the state and relaying information and funds for the project between the involved parties. Another key figure in



**Figure 3: Monroe County Flood Zone Designations and Reconstruction Location**

Source: SRL Project Files, 2008

this project was the homeowner, who bore the responsibility to ensure that funds were available to continue work on the project, as well as provide Monroe County staff with updates and information about the project. The DEM and FEMA staff also played significant roles in the project, as these staffs oversaw the grant program and worked to ensure that program requirements were met and that appropriate funds were distributed to the project.



**Figure 4: Monroe County Reconstruction Site Structure Prior to Mitigation**

Source: SRL Project Files, 2008

**Table 3: Monroe County Reconstruction Site Claims Paid by Year of Damage**

Year	Building Payments	Contents Payments
1998, Oct.	\$11,292.19	\$11,126.52
1999, Sep.	\$6,247.69	\$1,960.53
2005, Sep.	\$33,596.15	\$6,953.15
2005, Oct.	\$23,566.58	-
<b>Category Totals</b>	<b>\$74,702.61</b>	<b>\$20,040.20</b>
<b>Overall Total</b>		<b>\$94,742.81</b>

Source: SRL Project Files, 2008

## The Mitigation Reconstruction Process

Reconstruction projects are a “cost reimbursable” type of project in which the homeowner pays for construction up front and is then reimbursed after completion of the project. In the Monroe County case study, however, the homeowner began work on the project before the local project manager and county had time to complete the contract with the state. Ordinarily this would disqualify a claimant from reimbursement, but the homeowner explained the situation, requested a waiver, and was permitted to proceed once a contract was signed in August of 2009. After all the requisite paperwork was filed and all the required permits were granted, the pre-construction phase officially began. First, an engineer conducted an evaluation of the structure and concluded that, due to age and structural deficiencies, two reconstruction options could be ruled out: second story conversion or elevation of the existing mobile home. A second story conversion was neither technically nor economically feasible and an elevation of the mobile home was not technically feasible due to the age of the structure.

Next, a benefit-cost analysis was conducted and the project’s benefit-cost ratio of 1.23 qualified it to receive Hazard Mitigation Assistance (HMA) funding.

The site preparation phase occurred during the months of June and July 2009. The site preparation phase included execution of a demolition/site preparation permit by both the homeowner and Monroe County. The demolition permit ensured that debris resulting from demolition was

appropriately removed and disposed. This particular project involved the total demolition of the existing mobile home and the subsequent pouring of a new foundation during the foundation construction phase.

Staffers at DEM reported that the homeowner was very detailed with regard to his purchases, providing his own invoices and progress updates. The homeowner’s active participation in managing the project reduced the workload for DEM staff. One staff member commented during a May 2011 meeting that the homeowner provided, “everything and probably more” needed to report expenses. DEM staff also reported that, due to the fact that the emergency management offices are located in the City of Marathon and the reconstruction property was on Bay Point Key, which is roughly a 60-mile (hour and fifteen minute) drive, the project manager encountered difficulties in overseeing the site on a daily basis. Therefore, the regular updates from the homeowner were all the more helpful to the county and DEM staff. The homeowner’s willingness to front the funding necessary for construction aided in the relatively swift completion of the project, by keeping the project moving forward in lieu of a potential work stoppage caused by a lack of funding.

The next step in the process was to construct the shell of the building during the structural shell phase. In this case, the new home was modular; the pieces were already on site and merely required assembly. Use of a prefabricated, modular structure cut down on the time and additional expenses related to on-site construction. Installation of the interior elements began during this phase, but was not completed until the interior

finishes phase. This included the installation of the interior walls, flooring, wiring/light fixtures, plumbing and mechanical features, counter, cabinets, sinks, and all other interior features. After the fixtures and features were added to the home, the final construction completion phase was initiated. It encompassed all final inspections, preparation of the final elevation certificates (including digital photographs, one of which can be seen in Figure 5), and certificate of occupancy for the structure.

The project was completed in October of 2010. The project took 14 months from execution of the contract to completion. The total cost of the project was \$165,200. The grant funding covered 90% of the cost (\$148,680), while the other 10% (\$16,520) was the homeowner's required match.



***Figure 5: Monroe County  
Reconstruction Site Structure After  
Mitigation***

Source: SRL Project Files, 2009

# Case Study: Mitigation Reconstruction in Pasco County

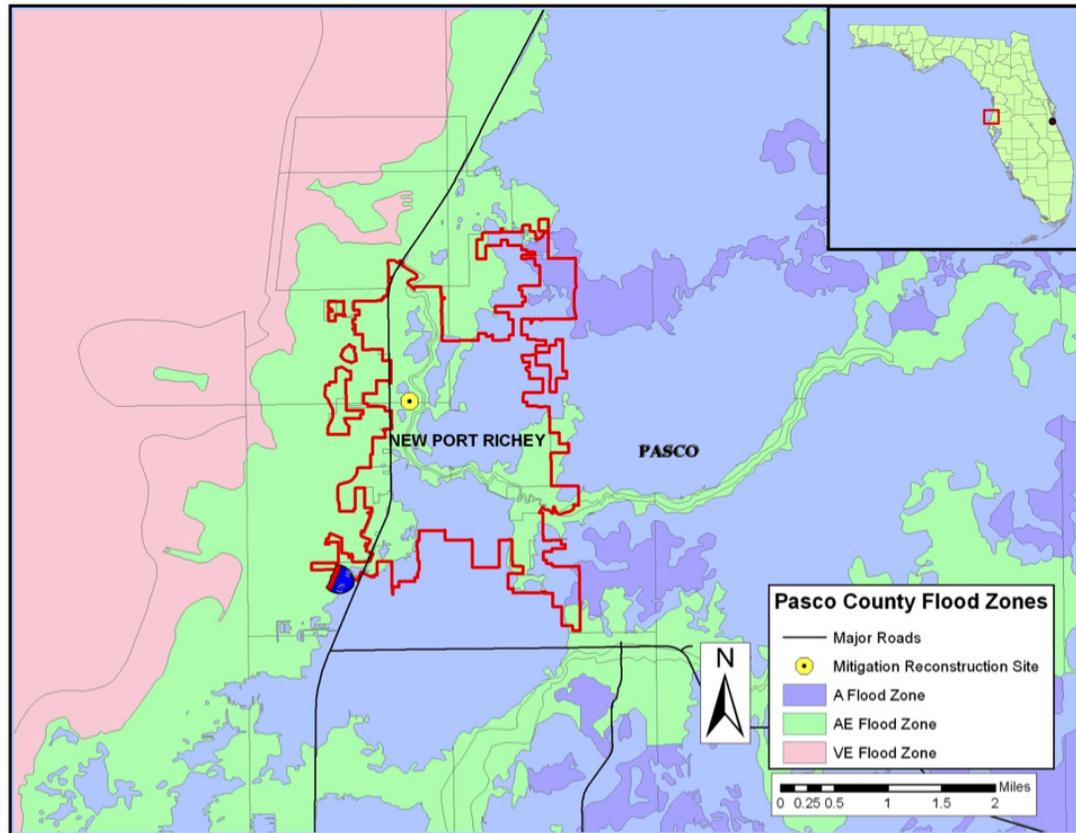
Located in Pasco County, the City of New Port Richey is approximately 30 miles north of Tampa on the western coast of Florida (see Figure 6). The city has grown over the past decade to an estimated population of 17,496 in 2009. The close proximity of the city limits to the Gulf of Mexico means that the structures located throughout the area are vulnerable to natural hazards – as demonstrated by the western portion of New Port Richey, which is located in an AE flood zone (see Figure 6).

This case study describes a SRL property located in New Port Richey that was mitigated utilizing the reconstruction approach. The case focuses on a single-family residence that was originally constructed in 1935. Unlike the previous case study in Monroe County, which involved total demolition of the existing structure, the New Port Richey example involved what is known as a second story conversion. This method involves

demolishing much of the original structure and constructing a new, elevated living area using the preexisting support structure as the base for the new construction.

Because of the structure's age, the funding that was utilized in this case was Federal Mitigation Assistance (FMA), which requires a 25% match from the homeowner, instead of the 10% homeowner match required in the SRL program. This structure was a good candidate for mitigation due to repeated flood losses. The property experienced five losses with building payments totaling \$36,000 and contents payments totaling \$60,451 for a grand total payout of \$96,451.

Similar to the Monroe County case study, the homeowner's active participation in the mitigation process contributed to the ultimate success of the project. Additional agency partners in the project were Pasco County emergency management and DEM staff.



**Figure 6: Pasco County Flood Zone Designations and Reconstruction Location**

Source: FMA Project Files, 2008

## The Mitigation Reconstruction Process

As mentioned previously, this case study describes mitigation in the form of a second story conversion, which involved the demolition of a majority of the existing structure, except for the walls, and rebuilding a new livable area on top of the walls. As with all reconstruction projects, this second story conversion project was a cost reimbursable project where the homeowners were responsible for paying the mitigation costs up-front and then seeking reimbursement after completion of the project. In this case, the homeowner provided a few things that helped aid the process of mitigation. Staff at the local and state level agreed that the homeowner was pleasant to work with and understood the time and financial commitments necessary to complete the process. The staff also indicated that the homeowner was fully engaged and maintained

detailed documentation of all funds expended in the form of canceled checks or receipts. Finally, the homeowner was able to relocate during the mitigation process and lived in another home away from the project site.

The project generally followed the same six-step process described in the Monroe County example, with some minor variations. During the Pre-Construction phase, the project received a benefit-cost ratio of 1.0, which is the minimum required to be eligible for funding. The homeowner, local government and state were then able to initiate the project in October of 2005. The design of the structure was completed using an expert engineer to determine the load bearing capacity of the existing walls and whether or not they would be able to hold the elevated structure. The homeowner was particularly interested in heavily reinforcing the structure. According to the staff at DEM, Pasco County has soil issues and extra reinforcement of the walls would aid in avoiding future risk to the structure. However, these reinforcement measures did not qualify for grant funding and all costs related to the reinforcement measures were borne by the homeowner.

The site preparation phase of this project involved tearing out the existing living area, including the walls, electric, and

the roof. FEMA requires five key components for the base level of an elevated structure, all of which were incorporated into this project (FEMA, 2009):

- The lowest floor must be at the Design Flood Elevation (DFE) level, which is the Base Flood Elevation (BFE) level plus the required elevation above the BFE known as “freeboard” (for this project, the BFE was located at 12 feet and the required freeboard was two feet for a DFE of 14 feet),
- Any enclosed area below the BFE must have minimum of two hydrostatic openings to allow for automatic entry and exit of floodwaters,
- All portions of the structure below the BFE must be constructed with flood resistant materials,
- Areas below the BFE shall not be partitioned into separate rooms or finished, and
- Electrical and mechanical equipment shall not be located below BFE except for essential lighting, which must be on a separate circuit.

The foundation phase of the project involved stress tests to ensure the remaining shell of the building was suitable for use as

the foundation for the elevated structure. The tests confirmed the walls would be able to support the weight of the new building. The next steps involved construction of the structural shell of the improved structure, including the addition of the load bearing elements, as well as the construction of the walls atop the existing structure. The installation of interior finishes, such as flooring and plumbing followed. Finally, the construction completion phase was carried out by a final inspection by the

County Building Department, issuance of a final elevation certificate (including photographs as documentation seen in Figure 8) and certificate of occupancy.

The total project cost came in \$9,632 less than the initial budget for a total of \$270,151. Since this project was funded with FMA dollars, the homeowner was required to match 25% (\$67,538), with the FMA grant covering the remaining 75% (\$202,613) of the project costs.



***Figure 7: Pasco County Reconstruction Site Structure During Mitigation***

Source: SRL Project Files, 2011



***Figure 8: Pasco County Reconstruction Site Structure After Mitigation***

Source: SRL Project Files, 2011

## Takeaways for Practice

The success story from Brevard County illustrates the successful acquisition of an SRL structure that had been a significant drain on resources. Once the county acquired the property, the structure was demolished and the land was returned to its natural state. In this case study, the homeowners were more than willing to participate in the mitigation process, as they had been struggling to maintain their home, which had flooded nine times. The homeowners' willingness to proceed through the mitigation process was a significant reason for the project's success.

Brevard County aided the process by being fully engaged and available to assist the homeowner through the process by providing advice to the homeowner, acting as a conduit between the homeowner and the state, and quickly proceeding with the demolition of the structure once the

property was acquired. Additionally, DEM staff provided input into the options for the homeowner, as well as quickly pursuing and acquiring grant funding from FEMA to help aid the local government's efforts.

The success story from Monroe County showcases the reconstruction of an SRL property in which an entire building was demolished and a new structure was built in its place. The only challenge expressed by the staff working on this project was the lack of information provided by the homeowner concerning the start date. This confusion nearly prevented the success of this project because the homeowner had already started spending money on the project and it was questionable whether or not the homeowner would receive reimbursement.

The lessons that can be drawn from the Monroe County project revolve primarily around the hard work and diligence of the homeowner. The homeowner provided the local and state officials detailed invoices, as well as pictures and project progress reports. This reliable flow of information helped

the staff at both the local and state levels to expedite the reimbursement process. Additionally, the fact that the new structure was a modular home aided in the quick completion of the project insofar that the building required only assembly rather than complete on-site construction.

Another takeaway from the Monroe County case study is the necessity for state and FEMA officials to allow flexibility, when possible, for issuance of waivers in limited circumstances when misunderstandings or other unexpected events in the field occur. A final factor aiding this project's success was the positive response and active partnership that the local staff built with the homeowner.

The New Port Richey case study demonstrates the success of a second story conversion of an SRL structure to reduce its vulnerability to natural hazards. Challenges included soil constraints pervasive in Pasco County and the impact these conditions had on the strength of the structure's walls and need for reinforcement after the demolition process was completed.

The homeowner's willingness to provide additional funding whenever needed, as well as demanding structural reinforcement of the existing walls, produced a finished structure that would be better able to withstand natural hazards. Similar to the Monroe County example, the homeowner in this project kept detailed records of funds spent to help aid the local and state emergency management staff and

streamline the reimbursement process. This case study reinforces the notion that it is critical to have an involved homeowner who maintains accurate and complete records as a partner in mitigation projects. Also, similar to the Monroe County example, the local and state agency staff were extremely responsive and helpful to such a cooperative partner in the mitigation process.

On another note, the homeowner in the New Port Richey project was able to relocate during the mitigation process, which greatly eased the process for him. Others considering a reconstruction project need to be informed of the potential disruption to their lives caused by a somewhat lengthy temporary move and be given time to arrange alternate housing arrangements during the construction process.

# Section 2: Overcoming Barriers to Successful Mitigation

Florida's high number of repetitive loss structures and the availability of federal mitigation funds should be driving forces in local efforts to solicit applications for mitigation projects. However, according to a 2011 conversation with Joy Duperault, the National Flood Insurance Program (NFIP) program manager at the Florida Division of Emergency Management (DEM), the 2010 fiscal year hazard mitigation assistance (HMA) grants from the repetitive flood claims (RFC) and severe repetitive loss (SRL) programs were not utilized to full capacity,

despite significant efforts from DEM to encourage local government utilization of the program funds. Underutilization of federal funding coupled with the increasing number of high-risk structures in Florida suggests that there are barriers to mitigation at the local level that need to be overcome.

Local governments successful in overcoming such barriers do so by promoting and implementing structural and non-structural mitigation measures. A 2010 study by Brody, Kang, and Bernhardt identified factors influencing the implementation of

successful flood mitigation at the local level. Organizational capacity was determined to be a significant factor associated with the implementation of a holistic mitigation strategy. Additionally, it was determined that while success in addressing flood mitigation varies among local settings, it generally correlates with some common issues including a local commitment to address flood mitigation, available financial resources, and the implementation of community-based outreach approaches.

While the 2010 Brody, Kang, and Bernhardt study focused on understanding how these factors influence mitigation, a better understanding is needed of the local conditions that foster the development of successful mitigation strategies. This guide highlights local governments that have successfully implemented structural or non-structural mitigation strategies to help build more flood resilient communities. This guide examines the lessons these successful communities have learned during their respective mitigation projects. These lessons can serve as inspiration for other communities facing similar mitigation projects.

The three case studies presented in this section illustrate how the use of outside consultants and working closely with local officials can provide public outreach to help smaller jurisdictions and ultimately mitigate repetitive loss (RL) and SRL designated properties. The first case study describes how Santa Rosa County educated the public on mitigation options and was able to obtain funding and successfully mitigate three properties in the county.

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The second case study describes how the City of Lynn Haven was able to use public outreach as a means of soliciting homeowners to participate in the mitigation process. The third case study describes how the City of Jacksonville provided constant outreach and support to homeowners throughout the outreach, application, and mitigation processes to ultimately conclude with a successful mitigation project.

## State Support for Organizational Capacity Building

Historically, state governments have played a pivotal role in addressing local flood problems by enacting non-structural mitigation measures such as building codes, local ordinances, land use restrictions, and other standards that reduce vulnerability to flooding (Brody, Kang, Zahran, Bernhardt, and Vedlitz, 2009). However, since the introduction of the NFIP in 1968, local governments have become the key decision makers for implementing

policies to reduce the impacts from repetitive flooding.

In their 2009 study, Brody, et al. examined the effects of organizational capacity on the implementation of successful policies related to flood mitigation. The findings indicate that the capacity of localities to address flood mitigation is limited by two key organizational factors: the staff and fiscal resources available to address mitigation. In Florida, small local governments with limited resources often have difficulty addressing flood mitigation effectively since mitigation projects can be time intensive. In these situations, technical assistance from the state can help to build the capacity of local governments and facilitate successful mitigation projects. The state's flood mitigation planners are the principle source for technical assistance for local governments.

Highlighted in the Santa Rosa County case study is the state's initiative to build the county's organizational capacity by connecting the local government with an outside contractor to assist with mitigation efforts. The

contractor successfully facilitated mitigation by promoting information sharing, supporting homeowners and local officials, and providing technical expertise needed by the county.

## Commitment to Building Public Support for Mitigation

Adopting and implementing successful mitigation measures is reliant on a local government's ability to promote mitigation as a viable option to reduce future damage from flooding. Unspent federal mitigation funds suggest there are barriers to implementation of mitigation projects. These barriers may be especially troubling in Florida because it is home to one of the highest rates of SRL properties in the United States. The challenges include a lack of public awareness and support for hazard mitigation, which results in a limited number of applications submitted

to FEMA for financial aid to mitigate eligible structures. Overcoming these barriers requires local commitment to implement strategies that build public support for and an understanding of mitigation.

The Association of State Floodplain Managers (ASFPM) identifies public outreach as a measure that is successful in building public support for floodplain management measures. According to the ASFPM (2010), public outreach builds support when carried out using a two-phase approach that generates interest and garners commitment. The first phase of successful public outreach should generate an interest in mitigation by providing information to the public about their options to reduce future damage to their homes. This type of community-based outreach should be conveyed to a large audience in a public forum, with the intention of increasing the number of sub-applications to mitigation grant programs at the local government level. The second phase of outreach focuses on the local commitment to ease the mitigation process for homeowners. This is accomplished by assigning local

government staff to assist homeowners in all aspects of mitigation, including the application process to obtain funding, the development of the scope of work for a mitigation project, and mitigation project management. The success of the local governments discussed in the Lynn Haven and Jacksonville case studies resulted from their commitment to overcoming the public support barrier by implementing effective public outreach. The Lynn Haven example focuses on the first phase of outreach and the Jacksonville case provides an example of how to carry out the second phase with commitment to helping homeowners navigate the mitigation process.

Traditional methods of outreach include informational mailings and public meetings. Modern technologies provide a wide range of methods for conducting outreach and building public support that were not available just a few years ago. Placing information on the Internet in forms such as informational web pages, blogs, and interactive mapping systems have become much easier to do in recent years. The public has become increasingly more attuned

to and comfortable with obtaining information by seeking it online. The rising ubiquity of smart phones and social media forums, such as Facebook and YouTube, has provided an alternative to traditional methods of outreach. Although technology has provided several exciting and effective options for involving the public, care needs to be taken by government officials that “sunshine” laws are not violated when utilizing modern forms of communication.

## Case Study: Santa Rosa County Capacity Building

Located in northwest Florida with a population of just over 150,000 people, Santa Rosa County accounts for nine percent of the SRL properties in the state (DEM, 2010). The southern portion of Santa Rosa County sits only a few feet above sea level and is frequently impacted by hurricanes, coastal storms, and heavy rainfall. These factors, combined with a significant amount of development in floodplains, have resulted in the designation of 52 SRL structures that have received over \$15 million of NFIP claim payments.

Despite heavily developed coastal areas, Santa Rosa County is a predominantly rural county with limited resources allocated to address flood problems. The two staff members tasked with promoting mitigation are the floodplain manager and the grants administrator. The high number of RL and SRL properties in the county coupled with the amount of work generated by a typical mitigation project makes mitigation a daunting task for the two officials in the jurisdiction. From start to finish, a mitigation project may require local mitigation staff to prepare a significant amount of paperwork, convey information to homeowners, coordinate with state officials, act as the mitigation project manager, and perform numerous other tasks. With such a large amount of responsibilities, smaller jurisdictions and those with limited staff dedicated to mitigation projects may have a difficult time managing multiple mitigation projects at one time. As a result, some jurisdictions may not be able to participate, or fully participate, in the mitigation programs available, as they do not have the organizational capacity to manage mitigation projects.

## Building Organizational Capacity

Even with the state acting as a liaison to local mitigation efforts, it became apparent by 2007 that Santa Rosa County had limited capacity to effectively implement mitigation measures with the increasing numbers of vulnerable structures in the county. To increase the organizational capacity of Santa Rosa County, the state provided technical assistance by connecting county staff with an outside contractor to increase their organizational capacity. Use of an outside expert provided a cost-effective solution to obtain temporary expert assistance to assist in the implementation of long-term strategies to reduce the county's vulnerability to flooding.

## Benefit of Hiring Outside Support

The main responsibilities of the contractor were focused on providing assistance to implement non-structural and structural mitigation measures. Tasks performed by the contractor included public outreach, assisting homeowners with the mitigation application process, and mitigation project management. The contractor participated in public outreach activities by presenting at the county's annual Flood Mitigation Property Owner's Workshop. The contractor's aid in project management was critical due to the range of duties, including assisting with the selection of cost-effective eligible mitigation activities, coordinating contractor services, and developing scopes of work for approved mitigation projects.

## Information Sharing

The technical help and support provided by the contractor showed immediately in his success in promoting information sharing between county officials and the general public. This occurred when the contractor organized an annual flood mitigation workshop in conjunction with local officials to educate citizens about their options for mitigation. By establishing an effective public outreach strategy, the contractor and county officials enhanced the organizational capacity by building public support for and understanding mitigation measures. This workshop proved successful and was an impetus to further mitigation efforts and provided a long-term solution of implementing structural mitigation throughout the county.

## Technical Support

Another direct benefit of the contractor's presence was to focus efforts on specific mitigation tasks. Tasks including paperwork and project management were completed by the contractor, which allowed other staff to focus on individual assistance to homeowners during mitigation. The assistance from the contractor allowed local officials to focus on recruiting mitigation projects from citizens without concern for their capacity to handle the extra workload generated by each project.

## Successful Mitigation Measures

The first year of the consultant's assistance enabled the county to successfully obtain funding for three mitigation projects including an elevation, an acquisition, and a reconstruction. A project that exemplifies this success was the mitigation of a structure that had incurred flood losses exceeding \$500,000 over an eight-year period. With the contractor acting as project manager, elevation of the existing structure took only four months to complete and the project was a tremendous success for the county. The contractor's experience working on structural mitigation projects allowed for a streamlined construction process and eased the experience for the homeowners.

After the first successful year of mitigation in Santa Rosa County, the contractor also provided assistance in updating the county's mitigation plan. According to the Santa Rosa Flood

Mitigation Task Force (2009) objectives from the updated plan focused on reducing the total number of SRL structures and addressed the need for the county to improve its rating for the NFIP community rating system (CRS).

*“Having access to a consultant was a blessing in many ways. Our county does not have the resources or available personnel to devote one person to deal with the mountain of paperwork and responsibility associated with these grants. Support of the state is invaluable during the process of applying for and executing the grants.”*

*- Sheila Harris*

Grant Coordinator for Santa Rosa County

In 2010, the objectives laid out in the mitigation plan were furthered by policies that called for implementing structural mitigation to remove structures from the floodplain. This led to mitigation of two homes through acquisition and conversion of the land to a natural drainage area. The technical expertise of the consultant helped persuade the homeowners to choose acquisition rather than elevation due to the fact that the county's freeboard requirement

was three feet above the base flood elevation. Had elevation been chosen as the mitigation method, the homes would not have met FEMA's cost-benefit analysis standards.

# Case Study: Building Community Support in the City of Lynn Haven

The City of Lynn Haven is located north of Panama City in Bay County. Lynn Haven has experienced moderate growth in the last ten years with a population estimated at just over 18,000 in 2010 (US Census Bureau, 2010). In 1995, the Florida panhandle experienced extensive flooding from Hurricane Opal and some homes in Lynn Haven were inundated with flooding up to three feet in depth. Flooding occurred again in 2004 and 2005 when hurricanes Dennis and Ivan hit the gulf coast.

The flooding from these events moved many properties in Lynn Haven into RL and SRL status and opened the door for federally funded mitigation under FEMA's RFC and SRL programs. However, the Lynn Haven's flood mitigation efforts at the time were limited to routine outreach in the form of informational letters mailed to homeowners of RL and SRL properties. This form of public outreach failed to entice most homeowners to participate in mitigation projects. Those who did participate were generally limited to homeowners who had previous knowledge of mitigation options or had particular interest in the process. The mailing outreach technique did not actively engage or encourage homeowners in the mitigation process.

## Local Commitment to Public Outreach

Often the lack of successful, comprehensive local public outreach strategies is directly correlated with limited fiscal resources (Duperault, 2011). Smaller municipalities, such as Lynn Haven, may not have the ability to add additional staff to address flood mitigation. In such localities, a personal commitment to address flood mitigation is one factor that can significantly increase the degree to which local flood mitigation occurs (Brody et al., 2009). Furthermore, strong leadership within a locality greatly impacts the success of flood mitigation policies (Brody et al., 2009).

In 2006, in an effort to develop a proactive response to Lynn Haven's flooding problems, the city's grants administrator partnered with Bay County officials to initiate a redesigned and improved public outreach approach aimed at promoting mitigation to the public. This local initiative utilized resources from both the city and the county in an effort to jumpstart mitigation efforts. With flooding affecting nearly all of Bay County, local officials organized a joint public meeting to address the mitigation of RL and SRL structures. Promoting mitigation

through public participation is the first step in implementing successful local outreach strategies (ASFPM, 2010).

## The Public Forum

The joint public forum proved superior to the previous measures pursued in Lynn Haven since the forum personalized local mitigation efforts and allowed for information to be conveyed more effectively by local staff in the venue of a public dialogue about mitigation options and strategies. Rather than solely targeting homeowners on FEMA's RL or SRL list with a general mailing, the public meeting was advertised in the local paper in an effort to attract a large audience and increase communitywide participation. Providing the public with an interactive venue to address their concerns regarding flood mitigation, turned out to be more effective than solely soliciting responses through mailings. Although holding a public meeting is an effective strategy to convey information to a large audience, public participation is often limited in this type of forum. This is especially true considering that a lack of public support for mitigation was a barrier already hindering mitigation in Lynn Haven.

In Building Public Support for Floodplain Management (ASFPM, 2010) some successful tactics are offered to increase participation in a public forum, including the stakeholder tactic and individual outreach. The stakeholder tactic, implemented successfully in Lynn Haven, fosters support for mitigation by involving the public in decision-making. This strategy involved soliciting public opinion of mitigation strategies in

the forum as well as in one-on-one meetings with interested homeowners. Phone calls and emails were also used to solicit opinions from the public and to educate the public and correct any misunderstanding regarding mitigation. These actions helped homeowners realize their vested interest in and their importance to the process. Homeowners involved in local decision-making often support initiatives directed towards mitigation (ASFPM, 2010).

## Success in the Public Forum

Lynn Haven's success began with adhering to the stakeholder tactic described above. While the public forum increased attendance and participation, local officials continued fostering public participation by establishing effective communication during the meeting. Tools, such as PowerPoint presentations and handouts, were aimed at maintaining the audience's attention and to help effectively convey information to the public. The key points listed below are other general recommendations provided by ASFPM (2010) for effectively addressing the public in an informational forum related to flood mitigation.

- Use plain language and avoid technical terms;
- Cast a positive outlook on the mitigation process by highlighting past successes in the area;
- Use words such as 'reconstruct' instead of 'demolish' when referring to structural mitigation measures;
- Assure homeowners they will be receiving assistance at every step in the process;

- Emphasize the cost-effectiveness of mitigation alternatives;
- Conduct preliminary benefit-cost analyses for target SRL properties to determine potential eligibility; and
- Establish a list of contacts and follow-up with an email or phone call to interested homeowners.

By implementing these recommendations, Lynn Haven was able to enhance communication and educate the community about mitigation. Using carefully chosen words, such as ‘reconstruct’ instead of ‘demolish’ provided a positive outlook on structural mitigation techniques that otherwise sound daunting to homeowners unfamiliar with the mitigation process. It is also helpful to provide handouts to attendees that outline meeting talking points. Additionally, attendees should sign in at the meeting, which allows officials to follow-up with interested parties. Following up with interested homeowners can help to spur mitigation and express the importance of choosing mitigation as a cost-effective approach to reducing the potential for future losses and damage to homes. These strategies contributed to the successful implementation of a revamped public outreach program in Lynn Haven.

With the help of dedicated local mitigation staff, homeowners in Bay County also began the application process to obtain funding for mitigating their properties. These mitigation measures, some of which are highlighted on the following pages, were determined eligible by FEMA as a cost-effective approach to reducing future damages from flooding. Local efforts to provide outreach and build public support for mitigation led to an increase in applications submitted to FEMA.

***“The end result of mitigation was worth all of the effort in assisting these homeowners. It was very rewarding to work with these folks knowing that mitigation would ultimately alleviate the heartache that flooding had caused their families.”***

***- Linda LuCante***

Project Manager

# Case Study: Building Public Support in the City of Jacksonville

Located in northeast Florida, the City of Jacksonville has a population of 850,000 persons and is the largest municipality in Florida in terms of land area (US Census Bureau, 2010). Jacksonville's past development patterns have resulted in almost 30,000 homes being located in floodplains (Joyce, 2010). This factor, along with hurricanes and frequent coastal storms, has led to an increase in structures classified as RL and SRL.

Since the inception of the SRL program, City of Jacksonville mitigation staff has been successful in building public support for mitigation by providing outreach to homeowners in many ways. The city's outreach approach consists of conducting open house public meetings to inform citizens of their NFIP status, as well as seeking public input regarding floodplain management practices in the city (Joyce, 2010). Additionally, the city sends multiple mailings to homeowners with vulnerable structures and will follow up the mailings with individual consultations if requested by the homeowner. These methods have proven successful in addressing the first phase of public outreach, resulting in an increase in applications submitted to FEMA for HMA funding. This case study discusses phase two of the outreach approach, which increases public support by assisting homeowners during the mitigation process.

## Local Commitment to Public Outreach

### Providing Outreach During Mitigation

Public outreach that solicits applications can effectively overcome initial public skepticism about flood mitigation. However, without assistance during the mitigation process, homeowners may become discouraged due to frustration with the application process, an inability to meet the required match, untimely completion of the project, or prolonged displacement during construction.

The City of Jacksonville's Emergency Preparedness Division employs two staff members to address flood mitigation: the floodplain manager and a project manager. The floodplain manager oversees the administrative procedures related to flood mitigation, such as working with the state and FEMA to secure funding. This allows the project manager to focus on providing technical assistance to homeowners during mitigation. This support involves assisting homeowners with the application process as well as with the technical aspects of mitigation during the project.

The project manager's duties begin with the preparation of the homeowner's application to obtain funding for mitigation. This phase should focus on enhancing cooperation between all parties, including the homeowner, contractor, and local officials. In Jacksonville, local officials executed this strategy by arranging meetings with homeowners to assist with

scope. During this stage, it is important for the local officials to make sure that the homeowner is completely informed on all aspects of the mitigation process and the large responsibility that the process entails, including descriptions of issues like displacement, cost overrun, and timely completion need to be stressed to the homeowner in order to prepare them for any

*“Communication is the key to a successful project ... frequent meetings by phone or at the site help alleviate anxieties of all parties in seeing the project to completion.”*

*- Laura D'Alisera*

Project Manager

applications and to provide information regarding project specifics. The Homeowner's Guide to Retrofitting (FEMA, 2009) provides a useful tool for project managers to use during consultations with homeowners and contractors. The decision-making matrix (included in Appendix A) can help hone in on structural mitigation methods that best meet the needs of the homeowner (FEMA, 2009). The matrix provides evaluation factors, including local codes and ordinances, accessibility, and cost that help to rule out ineligible mitigation options and reveal the preferences of the homeowner.

Upon approval of a mitigation project application, local officials begin the construction process by working with the homeowners and contractors to develop the mitigation project

problems that may occur. Local officials in Jacksonville were successful in this aspect of project management by providing homeowners with a consistent and reliable point of contact to address questions that arose during the mitigation process.

## **Success in Assisting Homeowners with Mitigation**

One project in particular that exemplifies success in providing outreach to homeowners during mitigation was a structure in Jacksonville that was to be elevated. However, upon further consulting with local officials, reconstruction was chosen as a cost-effective measure to prevent future flooding. The initial

estimation for the duration of the project was fifteen months. At twelve months and 95% completion, the project was running smoothly until the homeowners incurred financial hardships that left them unable to provide the 10% local match required by the SRL grant. Due to their financial situation and a cost overrun incurred on the project, supplemental funding was needed immediately to complete the final stages of the project. The homeowners, in conjunction with the City of Jacksonville and DEM, requested supplemental funding in the amount of \$4,843 to cover the increased cost of construction.

Fortunately for the homeowners, local officials were committed to providing assistance in navigating through the mitigation process. With help from state officials, money left over from a St. Lucie County project was used to cover overrun costs in this case. This assistance allowed for the mitigation project to be successfully finished. After completion, project managers conducted an exit interview with the property

owners seeking their input regarding the project outcome. Based on the interview - an outreach strategy recommended by the ASFPM - the homeowner's recommended homeowners ought to obtain a loan or line of credit from a financial institution or have a minimum of three draw amounts available in an account sufficient to pay the contractor for services necessary to complete mitigation. This amount is determined during the scoping process, in which homeowners should participate, to fully understand their financial obligations in the process. Furthermore, the homeowner emphasized the long lead-time required for reimbursement.

Stressing these points to homeowners prior to commencing a mitigation project can help prepare them for any potential unforeseen events that may arise during the mitigation process. Homeowners' understanding of the financial implications of mitigation will help facilitate a more fluid process and increase the likelihood of a successful outcome.

## Takeaways for Practice

The state's initiative to build organizational capacity in Santa Rosa County was successful because the contractor promoted information sharing, assisted with mitigation, and provided technical support. The update of the county's mitigation plan not only addressed current flood mitigation measures, but also included provisions for long-term strategies to promote mitigation, which supports DEM's longstanding goal to reduce vulnerability to future flooding. Currently, the county addresses flood mitigation without the assistance from a contractor. However, the help from the contractor provided an increase in organizational capacity that is still evident from the successful implementation of mitigation measures concurrent with the objectives established by the mitigation plan.

The Lynn Haven success story focuses on the first phase of implementing an effective public outreach strategy, aimed toward establishing an interest by the public in mitigation in order to solicit applications for obtaining mitigation funds. Public meetings tend to be the most productive approach for promoting mitigation to large audiences (ASFPM, 2010). Local governments using this approach will likely solicit an increased number of homeowner applications for mitigation.

The second phase of outreach highlighted in the City of Jacksonville example builds on the first phase outreach by providing support to homeowners during the mitigation process. Support can be accomplished through designation of a staff person to assist with the homeowner's application, provision of education about the process, and working with the homeowners to choose a mitigation option that is eligible for FEMA funding. Once this is achieved, local officials should continue to work with the homeowner to see the process through to completion and ensure a successful outcome.

Other takeaways for practice highlighted in this section include:

- Working with a third party knowledgeable about the mitigation process improves technical assistance and adds impartial expertise to ease the process.
- The experience of the contractor in dealing with mitigation projects promotes information sharing by adding a decision maker to the process who can work to solve problems that typically arise with mitigation.
- By updating the local mitigation plan, the county initiated a long-term strategy to address its flooding problems.
- Local governments with limited resources can utilize larger, joint public forums to increase capacity and target a larger audience.
- Lynn Haven's outreach strategy adhered to ASFPM's preferred strategy for increasing public participation, including treating the public as stakeholders.

- Public meetings, scheduled with ample notice to the public, promote communication better than mail outs because in-person information is relayed more effectively. In Lynn Haven, the active participation and good turnout at meetings was a large factor for their success in promoting mitigation.
- Focusing on the key points identified by ASFPM when conducting public meetings, promotes more effective and successful communication with the public.
- Implementing phase one of the public outreach approach requires a dedicated staff to organize meetings, correspond and interact with the public, and sometimes cooperate with other jurisdictions.
- Phase two of public outreach builds on the first phase by providing assistance to ease the mitigation process, starting with the application process.
- Providing continual, individualized assistance prevents a homeowner from becoming frustrated with the application process.
- It is crucial for local officials to establish a reliable point of contact with homeowners to address any concerns about mitigation.
- Issues such as the inability of the homeowners to meet the local match, untimely completion of the project, or prolonged displacement during mitigation should be stressed during the development of the scope of work for the mitigation project.
- Using a decision-making matrix streamlines the application and mitigation selection process.
- Conducting an exit interview with homeowners adheres to the stakeholder concept developed by the ASFPM and increases public support for mitigation by promoting participation. This strategy also facilitates successful mitigation in the future by providing guidance to local officials on measures to further ease the process.

# Section 3: Going Beyond Site-by- Site Mitigation

Unlike the mitigation process, flooding problems do not follow political or legal boundaries. More comprehensive programs to address flooding are incredibly beneficial in achieving mitigation and effectively reducing risk. Comprehensive programs are effective because they cut across jurisdictional boundaries and address the problem on a broader scale and bring a wider range of knowledge and expertise to the table. This section highlights how multi-jurisdictional partnerships and coordination between

unexpected government agencies can result in rapid mitigation with long-term benefits. Two of the case studies in this section are drawn from out of state. These cases are examined due to their unique methods and as models that serve to expand our understanding of how mitigation can be achieved. Though there are several examples of multi-jurisdictional efforts in Florida, the case study from North Carolina provides an example of a surprising partnership with redevelopment efforts and the Ohio example illustrates how a non-

profit organization made a difference in an area based on the watershed rather than political boundaries.

This section presents three case studies in flood mitigation that go well beyond the mitigation of individual structures and properties. Each case involves multiple stakeholders, jurisdictions, and methods in an attempt to resolve ongoing losses due to flood vulnerability. The first case study focuses on a case in northwest Florida where two cities and two counties pooled resources to hire a consultant in an effort to mitigate

several properties through acquisition. The second case study involves the City of Kinston in North Carolina, where the acquisition of properties in a floodplain was successfully coupled with a redevelopment strategy to produce open space and at the same time maintain the city's tax base. The third case study involves the efforts of a partnership organization to reduce flood vulnerability in the Blanchard River watershed in northwest Ohio through studies and the collaborative efforts of multiple jurisdictions.

## Multi-Structure Mitigation

Prior to the introduction of geographic information systems (GIS) and other mapping tools, communities were not always able to fully understand the location of floodplains and other vulnerable areas,

which led to continued loss of life and property. Today, counties and local governments have many more resources that aid in directing development and identifying target areas for mitigation. However, mitigation in these instances may not be very effective if local governments try to address properties individually. It could take a lengthy amount of time to mitigate all of the vulnerable structures and require a significant amount of resources and effort. Therefore, whenever possible, it is preferable to mitigate multiple structures at one time.

## Post-Disaster Redevelopment

The most successful way to achieve holistic post-disaster redevelopment is to be prepared before a disaster strikes (Florida Department of Community Affairs

(DCA), 2010). Local governments should strive to draft a comprehensive redevelopment plan prior to a post disaster scenario to create more disaster-resilient communities. However, when a natural disaster such as flooding strikes, there is a small window of opportunity presented to local governments to take advantage of post disaster recovery efforts by promoting holistic redevelopment. Local governments that seize this opportunity are able to expedite the redevelopment planning process due to an increase in community awareness of flood problems and availability of federal aid offered after a disaster strikes. By taking advantage of these two factors, local officials can initiate redevelopment focused on mitigation, economic vitality, and sustainability.

## Community Partnerships

In general, establishing collaboration between decision-makers increases collective support for local initiatives. Collective decision-making is especially beneficial to implementing successful flood mitigation at the local level, where a greater degree of collaboration among multiple parties is needed (Brody, 2009). Fostering partnerships is one method that has proved successful for establishing collaboration among stakeholders in a local setting. In Florida, local mitigation strategy (LMS) working groups are an example of a multi-jurisdictional partnership. These working groups are made up

of representatives from jurisdictions throughout the county who guide the development of local mitigation strategy documents, prioritize mitigation projects, and aid in the process of obtaining mitigation funds. The work of LMS working groups help to coordinate local mitigation efforts with county emergency management staff and help to make the mitigation process more efficient and effective. Though distinct government agencies within the Florida Department of Environmental Protection, Florida's water management districts are an example of a regulatory body that is determined not by political boundaries, but by watershed. By focusing on a natural system, such as a watershed, better understanding of the natural feature can be developed and seamless integration of planning

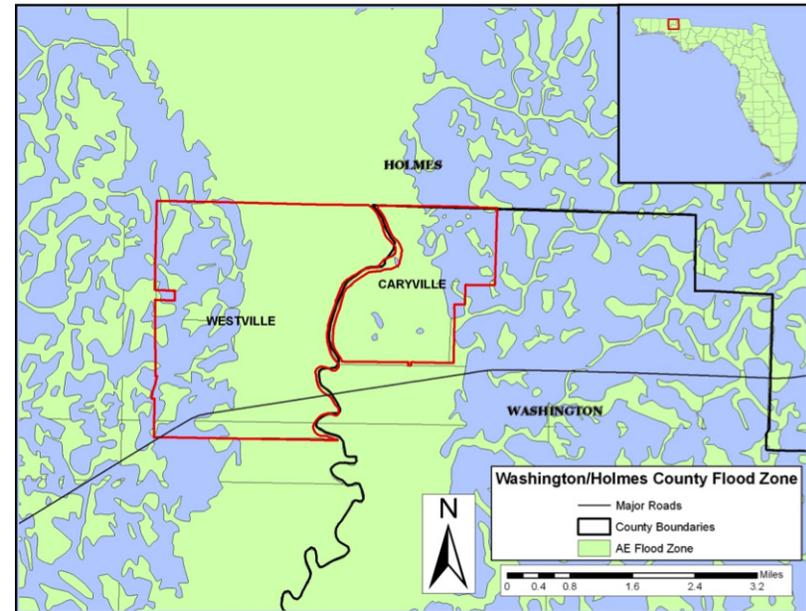
and policy across jurisdictions result in more effective strategies to reduce vulnerability.

The Northwest Ohio Flood Mitigation Partnership (NOFMP) utilized community partnerships to promote mitigation as a community strategy. The partnership has implemented mitigation measures geared towards finding long-term solutions to flooding problems, including multiple studies aimed at examining and reducing the Blanchard River Watershed's vulnerability to flooding, and public outreach to promote community awareness of flood issues. These measures were implemented successfully due to the partnership's ability to promote collective decision-making and allocate resources to flood mitigation.

# Case Study: Multi-Property Mitigation in Washington and Holmes Counties

A multi-property mitigation project was undertaken in Washington and Holmes counties, specifically the City of Caryville in Washington County and the City of Westville in Holmes County (see Figure 9). These cities are located in northwest Florida approximately 120 miles west of the City of Tallahassee, with a combined population of 439. Caryville and Westville had numerous homes located in the Choctawhatchee River floodplain. The cities sit on opposing sides of Choctawhatchee River, which flows southward. The majority of both cities are located in the FEMA AE flood zone (see Figure 9), areas with a 1% annual chance of flooding.

After the counties conducted research in 1998, it was determined that a total of 54 at-risk structures would need to be mitigated in order to reduce vulnerability to flooding. The major parties involved were the same as in other acquisition cases, including homeowners and local and state emergency management staff.



**Figure 9: Flood Zone Designations for Washington and Holmes Counties**

Source: HMGP Project Files, 2011

## The Multi-Structure Acquisition Process

During a series of storms in 1998, many of the homes in Caryville and Westville were flooded and required significant repair and reconstruction. Realizing that flooding was an ongoing problem, the cities developed a strategy to mitigate the structures by buying out as many properties located in the floodplain as possible. The project was approved for funding in December 2000.



Using the federal funds obtained for the project, both cities were able to obtain additional staffing through consultant services to help facilitate the mitigation process. The consultants ensured a smooth process for the homeowners during the acquisition of their properties. The use of consultants is similar to the example from Santa Rosa County discussed previously, in which the local government increased its capacity to address mitigation projects by adding outside expertise.

The first step in the multi-structure mitigation process was reaching out to the homeowners and informing them of their



***Figure 10: Post-Mitigation Photographs for Washington and Holmes Counties***

Source: DEM, 2011

options. The cities accomplished this by holding town meetings to explain the process in detail. Due to the fact that the towns are relatively small in terms of population, word spread quickly about these meetings. Furthermore, the emergency management directors lived nearby and also helped spread the word. The homeowners were then directed to visit the consultant's office in their city to begin the application process.

Using the same methods mentioned in the acquisition example from Brevard County, the two cities' emergency management staffs, consultants, and grant coordinators worked to develop applications for the 54 properties located in vulnerable areas. Given that this was a multi-structure project, the benefit-cost analysis was completed as an aggregate and surpassed the 1.0 score required for funding.

Once the applications were successfully submitted and the funding had been awarded, ownership of the properties was transferred to the municipalities, which began the demolition process.

The property acquisition closeout phase was an ongoing process. Once a structure was demolished and the debris removed, the consultant, along with local staff, coordinated with DEM staff to close out the project. Photographs were taken and the restrictions were placed on the deeds in order to ensure that the land would remain open space in perpetuity (see Figure 10).

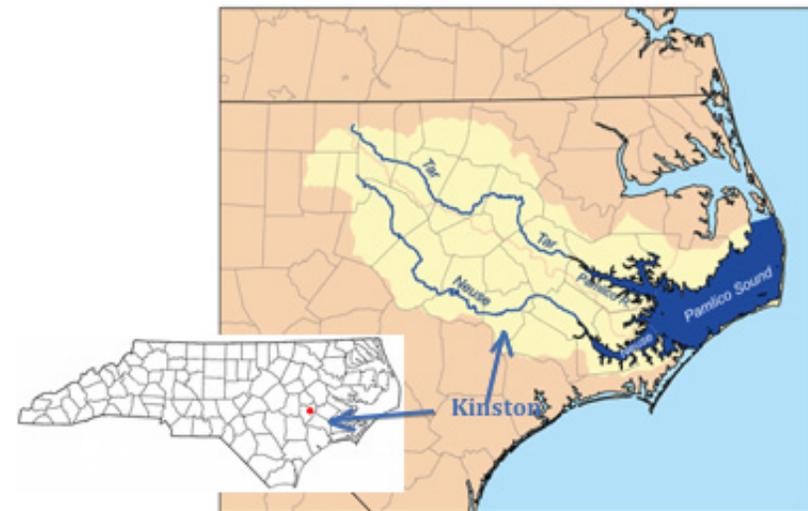
The final phase of the project was completed in June 2003, meaning that acquisition, demolition, and debris removal on the 54 properties took only 3 years and 4 months. The total cost to complete the project was \$996,649, of which the federal share was \$747,487.

The monitoring, reporting, and inspection phase has been completed twice since the closeout of the properties and the properties have remained in compliance with the federal code for land acquisition. There has been no construction on the properties and the land has been re-vegetated to its natural state. Most of the homeowners relocated to neighboring cities within the two counties, outside of the floodplain.

# Case Study: Post-Disaster Redevelopment in Kinston, North Carolina

The City of Kinston, North Carolina is situated on the banks of the Neuse River (see Figure 11). Most of the city is located within the 50-year floodplain and has experienced frequent flooding from coastal storms. In 1996, Hurricane Fran left 16 inches of rain in the Neuse River Basin, which caused major flooding and economic disruption throughout the city (North Carolina Emergency Management Division [NCEMD], 1999). More than 400 homes, dozens of businesses, and public infrastructure sustained flood damages, with total losses estimated in the tens of millions of dollars (NCEMD, 1999). Three years later, while Kinston officials were in the midst of recovering from Hurricane Fran, Hurricane Floyd brought even more devastating floodwaters to the city and disrupted recovery efforts. With an already decreasing tax-base as the result of frequent flooding, Kinston officials were in need of a redevelopment initiative that would reduce vulnerability to flooding and revitalize the community.

The post-disaster response initiated in Kinston was focused on the main objective of linking redevelopment with mitigation. To successfully implement measures aimed at achieving this objective, local officials seized the opportunity presented by



**Figure 11: Kinston, North Carolina**

Source: Godschalk, 2011

the post-disaster scenario to promote collaboration with state and federal agencies. In doing so, local officials increased support for their redevelopment strategy. The success of Kinston's redevelopment efforts rested on not only linking

redevelopment with mitigation, but also promoting community awareness, economic vitality, and sustainability.

## Buyout program

The cornerstone of Kinston's redevelopment plan was the buyout program made possible by federal and local aid, collective decision-making, and public support. Buyouts have been used throughout the country as a successful means of reducing a community's vulnerability to flooding (Salvesen, 2003). However, there are many pros and cons associated with implementing these programs. In the Kinston case, the pros and cons were amplified by the magnitude of the acquisition that took place. The buyout program proposed by the city involved the acquisition of 400 residential structures, three mobile home parks, and 68 vacant lots. Positive effects of this measure would be the removal of structures from the floodplain and relocation of citizens away from danger. However, without careful planning, the city stood to lose a significant amount of their tax base if those residents chose to relocate outside of the city.

To reduce the negative effects of the large-scale buyout program, Kinston officials had to successfully promote the idea of residents relocating within the city. Because over fifty percent of funding for the buyouts was obtained through HMGP funds, cooperation from homeowners was essential due to stipulations of the federal grants, which require voluntary participation from homeowners. Officials used educational and marketing tools such as GIS to increase public support of the buyout program. For example, during public

meetings, homeowners were presented with maps depicting the anticipated results of the acquisition, which included a revitalization of run-down neighborhoods near its downtown and the creation of a greenway along the Neuse River. Officials also presented citizens with information regarding avoided future losses from the buyout plan, estimated conservatively at \$6 million (NCEMD, 1999). To further increase public support under its "Call Kinston Home" initiative, the city provided financial incentives of up to \$10,000 to buyout participants who bought a new home within the city (Salvesen, 2003). As a result, ninety-eight percent of buyout participants relocated to homes within the city. New homes were constructed using infill and vacant lots outside of the floodplain.

## Sustainability

The acquisition of 400 homes and other structures and properties within the floodplain created an immense amount of open space. This presented an opportunity to incorporate sustainability into the city's redevelopment plan. Kinston officials seized this opportunity and partnered with the Conservation Fund and the University of North Carolina at Chapel Hill to develop a green infrastructure plan that redeveloped areas as open spaces, creating amenities and services to benefit the community (Godschalk, 2011). In doing so, the floodplain was restored to its natural function and its vulnerability to flooding was reduced. This initiative also resulted in an increase in community interaction and the open space gave residents a more meaningful sense of place with the new neighborhood amenities.

# Case Study: The Northwest Ohio Flood Mitigation Partnership

The Blanchard River Watershed, shown in Figure 12, primarily contains small towns and rural development. The Blanchard River Watershed frequently floods when heavy rainfall causes the river to crest. In August 2007, communities within the watershed experienced the second worst flood in Ohio's history with the Blanchard River cresting at 18.50 feet. As a result of the flooding, entire communities were inundated as depicted in Figure 13. In response to frequent flooding within the watershed, officials from multiple jurisdictions partnered to form the NOFMP. Members of the partnership direct mitigation initiatives towards creating flood-resilient communities (Buday, Reist, & Stuby, 2009). This non-profit organization focuses on building partnerships between public and private entities, including local governments, state officials, businesses, and civic and volunteer organizations.



**Figure 12: Maumee River Watershed**

Source: Wikipedia, 2011

## Allocating Resources for Flood Mitigation

The financial and technical support fostered by the partnership allowed members to implement comprehensive mitigation measures including multiple studies that lead to a better understanding of the issues affecting flood control. A flood damage reduction (FDR) study was initiated with the technical and financial aid of the partnership and focused on identifying issues and opportunities associated with the flood event of 2007. Listed below are some of the key factors addressed in the FDR study initiated by the NOFMP (Buday, Reist, & Stuby, 2009).

- Identify and evaluate the frequency and severity of flooding in the City of Findlay and Village of Ottawa.
- Develop a watershed based rainfall-runoff model to determine discharge-frequency runoff hydrographs.
- Develop research to aid in implementing mitigation measures and plans for flood risk management at Findlay and Ottawa.
- Coordinate the study progress and share results with local, state and federal agencies as well as the public.
- Encourage community development policies that address flooding.

Included as part of the FDR study was an environmental impact statement (EIS), prepared by the United States Army Corps of Engineers (USACE). The EIS fulfills requirements set

forth by the National Environmental Policy Act (NEPA), the Center for Environmental Quality (CEQ), and the environmental review requirements of the State of Ohio. While the FDR study examines the issues related to flooding within the watershed, the EIS evaluates the social, economic, and environmental impacts that would result from the action proposed to address the flooding problems within the watershed (USACE, 2008).

Another study funded with available resources from the partnership was the flood control governance (FCG) study. The FCG study examines the long and short-term solutions to flood control governance in northwest Ohio by first identifying the characteristics of reported successful public structures from around the country that have promoted responsible floodplain management practices (Baker & Daniels LLP, 2010). In identifying past success in flood control governance, the study then provides a comprehensive review of the available legal structures under Ohio law in which the necessary responsibilities of a flood control organization may be reposed (Baker & Daniels LLP, 2010). Jurisdictional structures successful in organizing flood control governance examined in the study include the Harris County Flood Control District created by Texas legislature. Findings from the study indicate that this special purpose district operates under four primary divisions, including communications, operations, administrative services, and infrastructure (Baker and Daniels LLP, 2010). Lead members in the NOFMP could use this model to create a more efficient structure within their organization, thus maximizing the efficiency of their efforts. Modeling organizations based

on past successes is the premise of this guide. Utilizing best practices has been shown to greatly increase the capacity of an organization to take the lead on most aspects of flood mitigation efforts.

## Success in Collective Decision-Making

A main objective of the NOFMP is to generate collaboration between decision-makers. The organization's capacity, which is increased with the addition of new members, allows for the collective prioritization of mitigation efforts (Buday, Reist, & Stuby, 2009). Prioritizing mitigation efforts is fundamental to the continuing success of the partnership because it creates pathways to resources for implementing the flood control measures. After flooding occurred in 2007, the organization's efforts were jumpstarted when members signed a resolution to expedite the design and development of a long-range flood mitigation plan with the goal of alleviating flooding throughout the Blanchard River Watershed (Buday, Reist, & Stuby, 2009).

This plan prompted local officials to develop a public scoping information package provided to Findlay and Ottawa citizens. In doing so, the community became involved with decision-making between state and local officials in regards to flood mitigation efforts in the region. This type of public participation



***Figure 13: Flooding of an Urban Area in the Blanchard River Watershed, 2007***

Source: Northwest Ohio Flood Mitigation Partnership, Inc., 2008

and interagency coordination was a large factor in the overall success of the partnership. NOFMP, as an organization, prides themselves on public involvement in flood mitigation issues. This has led to a collective support for initiatives aimed at structural mitigation, including the acquisition of multiple structures, which often requires a high level of public support. When planning for multiple acquisitions, NOFMP solicits public opinion through meetings where it identifies target areas for mitigation and presents the savings and benefits to citizens as a means to promote this type of measure. This has proved successful for the organization, as seen in their acquisition and removal of over fifty homes throughout the watershed (Buday, Reist, & Stuby 2009).

## Takeaways for Practice

The Washington and Holmes county case study shows that employing the appropriate type of funding can play an integral part in a project's success. The use of HMGP funding allowed the local emergency management staff flexibility in their resources. The cities were able to hire additional manpower to assist with the large number of projects and their respective applications. The staff did not let the large amount of work hold them back from helping homeowners individually, exemplified by the staff's success in this comprehensive mitigation project, which was completed relatively quickly, given its size.

In terms of the homeowners, the main takeaway point from the Washington and Holmes county case is the importance of patience. There were a large number of homeowners that needed to be contacted and whose applications needed to be processed, but all were ultimately included

in the mitigation process. State-level staff participation and resources were also very important. These small local governments were provided with all of the resources that they needed to complete their tasks. The local governments' budget and staff would not normally have been sufficient to address such a project, but staff at DEM provided successful technical assistance and funding to ensure a successful project.

Kinston's success in seizing the small window of opportunity presented by a post-disaster scenario allowed for effective implementation of policies to link redevelopment with mitigation. Results of these policies include the large-scale acquisition of flood-prone structures, neighborhood revitalization, and measures that promote sustainability.

The steps taken in Kinston-Lenoir County after major flooding devastated the area can be applied to other local settings to guide redevelopment. When planning community mitigation strategies, there are a number of political, emotional, and economical

issues involved (Salvesen, 2003). The City of Kinston set a benchmark for implementing a comprehensive approach to hazard mitigation and redevelopment. Furthermore, Kinston demonstrates how a disaster can highlight the need for mitigation in hazard-prone areas to the community-at-large that may otherwise not readily think about community safety, resilience, and sustainability through redevelopment. A natural disaster brings the issue of mitigation to the forefront of a community's consciousness, providing additional energy and focus to post-disaster redevelopment efforts due to an increase in community awareness, a realization of areas most vulnerable to flooding, and the availability of federal aid.

The success of NOFMP is reliant on active participation from members. The organization promotes comprehensive strategies for flood mitigation through regional partnerships, community involvement, and interagency coordination. Communities that establish partnerships tend to be more successful in implementing the full spectrum of mitigation measures to

reduce the potential for future damage from flooding. Establishing partnerships in a local setting can lead to collective decision-making that draws upon the experiences, resources, and policies already in place in a community and ties elements together by following the path of least resistance between members (Buday, Reist, & Stuby, 2009).

Other takeaways for practice highlighted in this section include:

- Kinston officials increased participation for the buyout program by using tools such as GIS to educate citizens about the positive effects of acquisition.
- To reduce the negative effects of the buyout, such as a decreased tax base, an incentive program was offered to citizens who relocated within the city.
- Open space from acquisition was utilized to promote economic vitality and environmental sustainability.
- Flood mitigation partnerships increase collaboration, leading to collective-decision making in support of initiatives directed towards reducing a community's vulnerability to flooding.
- The partnership's available resources allowed for the funding of multiple studies to examine flood control issues and increase the success of mitigation efforts for the region.
- Incorporating community outreach and interagency cooperation into floodplain management provides a comprehensive strategy to increase collective decision-making.



# Conclusions

Today, more than ever, local governments are looking for ways to accomplish much-needed projects to improve their community with increasingly limited resources. The case studies contained within this guide presents examples of successful local government mitigation projects and provide inspiration for communities seeking to participate in these programs.

Several unifying threads run between the mitigation case studies discussed in this guide, including:

- The importance of local government staff to seek owners of repetitive loss and severe repetitive loss properties who are willing to participate in mitigation activities.
- The importance of engaged local government staff to act as a conduit between the homeowner and the State and Federal mitigation programs.

- The importance of information sharing and technical assistance from the Florida Division of Emergency Management (DEM) and the Federal Emergency Management Agency (FEMA) staff to local government partners.

Other lessons gleaned from the case studies in this guide which are of particular interest to local governments, include:

- The importance of staff people at the local level to provide individualized assistance to homeowners participating at all phases of the mitigation efforts – from application through project closeout.
- The benefit of partnering with homeowners who are willing to actively participate in the mitigation process by having quick access to project funds (if required in the mitigation project)

and maintaining complete and accurate records of all project expenditures.

- The potential need for local governments to obtain temporary organizational support from outside entities to manage mitigation efforts.
- The benefit of working with a third party knowledgeable about the mitigation process to provide impartial, technical assistance to the local government and public.
- The importance of updating the local mitigation plan so that a local government can initiate a long-term strategy to address its flooding problems.
- The benefit of providing public outreach in a variety of forums to provide education on mitigation alternatives in a readily-accessible manner and avoiding overly technical terms and jargon.

- A disaster may provide a platform to educate the community about the need for mitigation projects to avoid future disasters and reinforce community safety, resilience, and sustainability through redevelopment in appropriate areas.
- While complicated, the benefit of forming multi-jurisdictional partnerships which may lead to multi-jurisdictional mitigation efforts, since floodplains do not follow political boundaries.

Certainly, some of the keys to successful mitigation projects do not fall within the control of a community considering a mitigation project, such as a participating homeowner's positive demeanor or organizational skills. However, many of the successful case study qualities are easily transferred to other jurisdictions and mitigation situations, including the regular coordination and communication between local government staff and DEM staff. Ultimately, this guide shows that when local governments make a

concerted effort toward prioritizing and implementing mitigation activities, the results are beneficial not only to local homeowners, but also to the local community, state, and federal emergency management resources. Local governments are encouraged to reach out and work with its state and federal partners to devise a strategy to reduce hazards and build healthy, resilient communities.

# Appendix A

This Appendix is comprised of the decision-making matrices contained in Chapter 4 of FEMA’s Homeowner’s Guide to Retrofitting (2009, p. 4-26 - 4-31). It is included here, in its entirety to help aid in understanding the mitigation options available and what might be best suited prior to seeking guidance from local emergency management staff.

## Decision-Making Matrices

### Condition: Substantial Improvement / Substantial Damage

If your home either is being substantially improved or has been substantially damaged, the NFIP regulations limit your choice of retrofitting methods to elevation, relocation, or demolition. Regulations, ordinances, or laws established by other agencies and organizations may further limit your choice. Also, you may have already decided that one or more methods is not suitable or will not meet your needs. This matrix (Table 4-2) can help you decide which retrofitting method best meets your needs if your home is being substantially improved or has been substantially damaged. You may need guidance when using the matrix, so take it with you when you meet with local officials, design professionals, and contractors.

The first step in using the matrix is to identify any methods eliminated by regulations or by your own needs. Mark each

eliminated method by placing an “X” in the box directly below the name of the method (on the line labeled “Prohibited by Federal, State, or Local Regulations or Eliminated by Homeowner”). An “X” in this row means that the method will not be considered in your decision.

The next step is to evaluate the remaining methods (those without an “X” under their names). Your evaluation will be based on the factors listed on the left-hand side of the matrix. (The factors are explained below the matrix.) For each evaluation factor under each method, discuss your concerns with your local official, design professional, and contractor. If your concerns cannot be resolved, place an “X” in the appropriate box. For example, if you decide that you would not be satisfied with the appearance of your home if it were elevated on extended foundation walls, you would place an “X” in the box on the Appearance line under the heading Elevation on Extended Foundation Walls. After you have worked through the entire matrix, add the number of “Xs” under each method and show the sum on the Total “Xs” line. The method with the lowest total is the one that best meets your requirements.

#### Evaluation Factors

Federal, State, and Local Restrictions – Federal, State, and local regulations may restrict a homeowner’s choice of retrofitting measures. Such regulations may include State and local building codes, floodplain management ordinances or

**Table 4: Retrofitting Methods for Substantially Improved or Substantially Damaged Homes**

Retrofitting Methods Substantially Improved or Substantially Damaged Homes					
Evaluation Factors	Elevation <sup>1</sup>			Relocation	Demolition
	Elevation on Extended Foundation Walls 	Elevation on Open Foundation 	New Living Area over Abandoned First Floor 		
Prohibited by Federal, State, or Local Regulations or Eliminated by Homeowner					
Appearance					
Cost					
Accessibility					
Code-Required Upgrades					
Human Intervention					
Other					
Total "Xs"					

1. Note that if you elevate a substantially improved or substantially damaged home, you can still wet floodproof an enclosed area under the home below the BFE, provided that area is only used for parking, building access, or storage.

laws, zoning ordinances, Federal regulations concerning the alteration of buildings classified as historic structures, deed restrictions, and the covenants of homeowners' associations. The homeowner and the homeowner's design professional or contractor should check with community officials to determine whether any such restrictions apply.

**Appearance** – The final appearance of a home and property after retrofitting will depend largely on the retrofitting method used and the DFE. For example, elevating a home several feet will change its appearance more than elevating it only 1 or 2 feet, and a home elevated on an open foundation will not look the same as a home elevated on extended foundation walls. However, a change in appearance will not necessarily be a change for the worse (see photographs in Chapter 3). The homeowner should discuss the potential effects of each method with local officials and with the design professional or contractor.

**Cost** – The cost of retrofitting will depend largely on the retrofitting method used and the DFE. For some methods, the construction type (frame, masonry, etc.) and foundation type (crawl space, slab, etc.) will also affect the cost. In general, costs will increase as the DFE increases, but there may be tradeoffs between alternative methods.

**Accessibility** – Accessibility refers to how easy or difficult it is to routinely reach and enter the home after the retrofitting project is completed. The retrofitting methods described in this guide affect accessibility in different ways. For example, elevating a home will usually require the addition of stairs, which may be unacceptable to some homeowners. The effect

of relocation on accessibility will depend on the location and configuration of the new site.

**Code-Required Upgrades** – State and local regulations may require that a retrofitted home be upgraded to meet current code requirements that were not in effect when the home was built. Portions of the electrical, plumbing, and HVAC systems could be affected. For example, the electrical panel might have to be upgraded from fuses to circuit breakers. These changes are required for the safety of the homeowner. Other possible code-required upgrades include those for increased energy efficiency. Any required upgrade can add to the scope and cost of the retrofitting project. The homeowner and the homeowner's design professional or contractor should check with community officials to determine whether such regulations apply.

**Human Intervention** – For retrofitting methods that require human intervention, homeowners must be willing, able, and prepared to take the necessary action, such as operating a closure mechanism in a floodwall or placing flood barriers across the doors of a dry floodproofed home. Also, the homeowner must always have adequate warning of a coming flood and must be at home or near enough to be able to reach the home and take the necessary action before floodwaters arrive. If these conditions cannot be met, retrofitting methods that require human intervention should be eliminated from consideration.

**Other** – Homeowners may need to consider other factors, such as the availability of Federal, State, and local financial assistance; the likelihood of future flooding vs. the temporary

inconvenience and cost of retrofitting; the amount of time required to complete the retrofitting project; and the need to move out of the home during construction (including the availability and cost of alternative housing).

## **Condition: NOT Substantial Improvement/NOT Substantial Damage**

Use the matrix in Table 4-3 if your home is NOT being substantially improved or has NOT been substantially damaged. In this case, the NFIP regulations do not prohibit your use of any of the methods described in this guide. However, regulations, ordinances, or laws established by State or other local agencies and organizations may prohibit one or more of the methods. Also, you may have already decided that one or more methods will not meet your needs.

This matrix can help you decide which retrofitting method best meets your needs. You may need guidance when using the matrix, so take it with you when you meet with local officials, design professionals, and contractors. The first step in using the matrix is to identify any methods eliminated by regulations or by your own needs. Mark each eliminated method by placing an “X” in the box directly below the name of the method (on the line labeled “Prohibited by Federal, State, or Local Regulations or Eliminated by Homeowner”). An “X” in this row means that the method will not be considered in your decision.

The next step is to evaluate the remaining methods (those without an “X” under their names). Your evaluation will be based on the factors listed on the left hand side of the matrix.

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(The factors are explained below.) For each evaluation factor under each method, discuss your concerns with your local official, design professional, and contractor. If your concerns cannot be resolved, place an “X” in the appropriate box. For example, if you decide that you would not be satisfied with the appearance of your home if it were elevated on extended foundation walls, you would place an “X” in the box on the Appearance line under the heading Elevation on Extended Foundation Walls. After you have worked through the entire matrix, add the number of “Xs” under each method and show the sum on the Total “Xs” line. The method with the lowest total is probably the one that best meets your requirements.

### **Evaluation Factors**

Federal, State, and Local Restrictions – Federal, State, and local regulations may restrict the homeowner’s choice of retrofitting measures. Such regulations may include State and local building codes, floodplain management ordinance or laws, zoning ordinances, Federal regulations concerning the alteration of buildings classified as historic structures, deed restrictions, and the covenants of homeowners’ associations. The homeowner and the homeowner’s design professional or contractor should check with community officials to determine whether any such restrictions apply.

Appearance – The final appearance of a home and property after retrofitting will depend largely on the retrofitting method used and the DFE. For example, elevating a home several feet will change its appearance much more than elevating it only 1 or 2 feet, and wet floodproofing will change its appearance very little. However, a change in appearance will not necessarily

**Table 5: Retrofitting Methods for Homes That are NOT Substantially Improved or Damaged**

Retrofitting Methods for Homes NOT Substantially Improved or Substantially Damaged								
Evaluation Factors	Elevation			Relocation	Dry Flood-proofing	Wet Flood-proofing	Levees or Flood-walls	Demolition
	Elevation on Extended Foundation Walls	Elevation on Open Foundation	New Living Area over Abandoned First Floor					
								
Prohibited by Federal, State, or Local Regulations or Eliminated by Homeowner								
Appearance								
Cost								
Accessibility								
Code-Required Upgrades								
Human Intervention								
Other								
Total "Xs"								

be a change for the worse. The homeowner should discuss the potential effects of each method with local officials and with the design professional or contractor.

**Cost** – The cost of retrofitting will depend largely on the retrofitting method used and the DFE. For some methods, the construction type (frame, masonry, etc.) and foundation type (crawl space, slab, etc.) will also affect the cost. In general, costs will increase as the DFE increases, but there may be tradeoffs between alternative methods. For example, elevating may be less expensive than relocation when a home is raised only 1 or 2 feet, but may become more expensive at greater heights. Other costs include those for both routine and long-term maintenance.

**Accessibility** – Accessibility refers to how easy or difficult it is to routinely reach and enter the home after the retrofitting project is completed. The retrofitting methods described in this guide affect accessibility in different ways. For example, elevating a home will usually require the addition of stairs, which may be unacceptable to some homeowners. Levees and floodwalls can make access more difficult unless they are equipped with openings, which require human intervention (see below). Wet floodproofing and dry floodproofing will have little if any effect on accessibility. The effect of relocation on accessibility will depend on the location and configuration of the new site.

**Code-Required Upgrades** – State and local regulations may require that a retrofitted home be upgraded to meet current code requirements that were not in effect when the home was built. Portions of the electrical, plumbing, and HVAC

systems could be affected. For example, the electrical panel might have to be upgraded from fuses to circuit breakers. These changes are required for the safety of the homeowner. Other code-required upgrades include those for increased energy efficiency. Any required upgrade can add to the scope and cost of the retrofitting project. The homeowner and the homeowner's design professional or contractor should check with community officials to determine whether such regulations apply.

**Human Intervention** – For retrofitting methods that require human intervention, homeowners must be willing, able, and prepared to take the necessary action, such as operating a closure mechanism in a floodwall or placing flood barriers across the doors of a dry floodproofed home. Also, the homeowner must always have adequate warning of a coming flood and must be at home or near enough to be able to reach the home and take the necessary action before floodwaters arrive. If these conditions cannot be met, retrofitting methods that require human intervention should be eliminated from consideration.

**Other** – Homeowners may need to consider other factors, such as the availability of Federal, State, and local financial assistance; the likelihood of future flooding vs. the temporary inconvenience and cost of retrofitting; the amount of time required to complete the retrofitting project; and the need to move out of the home during construction (including the availability and cost of alternative housing).

# Acronyms

<b>ACSC</b>	Area of Critical State Concern	<b>HMGP</b>	Hazard Mitigation Grant Program
<b>ASFPM</b>	Association of State Floodplain Managers	<b>HMA</b>	Hazard Mitigation Assistance Grant Programs
<b>BCR</b>	Benefit Cost Ratio	<b>HUD</b>	US Department of Housing and Urban Development
<b>BFE</b>	Base Flood Elevation	<b>HVAC</b>	Heating, Ventilation, and Air Conditioning
<b>CDBG</b>	Community Development Block Grant	<b>LMS</b>	Local Mitigation Strategy
<b>CEQ</b>	Center for Environmental Quality	<b>MA</b>	Mitigation Acquisition
<b>CRS</b>	Community Rating System	<b>MR</b>	Mitigation Reconstruction
<b>DCA</b>	Florida Department of Community Affairs	<b>NCEMD</b>	North Carolina Emergency Management Division
<b>DEM</b>	Florida Division of Emergency Management	<b>NEPA</b>	National Environmental Policy Act
<b>DEP</b>	Florida Department of Environmental Protection	<b>NFIP</b>	National Flood Insurance Program
<b>DFE</b>	Design Flood Elevation	<b>NOFMP</b>	Northwest Ohio Flood Mitigation Partnership
<b>EIS</b>	Environmental Impact Study	<b>PDM</b>	Pre-Disaster Mitigation
<b>FCG</b>	Flood Control Governance	<b>RFC</b>	Repetitive Flood Claims
<b>FDR</b>	Flood Damage Reduction	<b>RL</b>	Repetitive Loss
<b>FEMA</b>	Federal Emergency Management Agency	<b>SRL</b>	Severe Repetitive Loss
<b>FIMA</b>	Federal Insurance and Mitigation Administration	<b>USACE</b>	United States Army Corps of Engineers
<b>FMA</b>	Flood Mitigation Assistance		
<b>GIS</b>	Geographic Information System(s)		



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