

## EXECUTIVE SUMMARY

Every year, devastating floods impact the Nation by taking lives and damaging homes, businesses, public infrastructure, and other property. This damage could be reduced significantly by providing reliable flood hazard information so that the public and community officials can make more informed decisions about their flood risk. As part of the U.S. Department of Homeland Security (DHS), the Federal Emergency Management Agency (FEMA) is the Federal agency responsible for administering the National Flood Insurance Program (NFIP). FEMA develops Flood Insurance Rate Maps (FIRMs) to identify areas at risk of flooding, to reduce the loss of life, to determine

flood insurance rates, and for floodplain management and mitigation activities.

*Through Flood Map Modernization, FEMA is working to provide communities with flood maps and data that are more reliable, easier to use, and more readily available than ever before.*

Recognizing the connection between damage reduction and reliable flood maps, the President and the U.S. Congress have provided funding in Fiscal Year (FY) 2003 through FY06, with additional funding anticipated through FY08, for Flood Map Modernization. This MHIP defines FEMA's plan for updating these maps. Through Flood Map Modernization, FEMA is working to provide communities with flood maps and data that are more reliable, easier to use, and more readily available than

ever before. FEMA's vision for this nationwide undertaking provides measurable results while spending taxpayer dollars wisely. Specifically, FEMA is:

- Utilizing the Mapping Information Platform (MIP) (<https://hazards.fema.gov>), which is a Web-based infrastructure that provides the ability to manage, extract, share, and produce mapping information for Flood Map Modernization. The MIP is also a data production, management, and dissemination system for effective Digital Flood Insurance Rate Maps (DFIRMs) and other geospatial hazard information as well as providing users with engineering and mapping tools needed to produce DFIRMs. Additionally, the information and functionality are tailored to meet the needs of mapping partners, stakeholders, and the general public.
- Leveraging the use of local, State, and Federal resources, and transferring ownership and use of maps and data to communities and States. FEMA seeks to help local communities and States acquire and maintain data. To do this, FEMA is building and maintaining effective partnerships with community, State, and regional entities before and during development of maps and data. FEMA already has experienced considerable success with such transfers through the Cooperating Technical Partners (CTP) program.
- Reducing processing time and cost of map updates and increasing accountability for spending by implementing results-oriented systems and standards that will facilitate the

rapid exchange of data between mapping partners, stakeholders, FEMA staff, FEMA contractors, and other users.

- Communicating with mapping partners, stakeholders, and map users effectively, consistently, and continuously to maximize understanding of flood hazards and the risks that these hazards pose to life and property.
- Continuing to improve the quality and accuracy of national flood hazard data by developing Geographic Information Systems (GIS)-based products with the best available technologies that meet enhanced technical standards as detailed in FEMA's *Guidelines and Specifications for Flood Hazard Mapping Partners (Guidelines and Specifications)* ([http://www.fema.gov/plan/prevent/fhm/dl\\_cgs.shtm](http://www.fema.gov/plan/prevent/fhm/dl_cgs.shtm)).

The MHIP explains how it benefits the various program participants, facilitates long-term planning, and achieves national Flood Map Modernization goals. Additionally, this MHIP Version 2.0 discusses the impact of FEMA's Mid-Course Adjustment and the implementation of a new Floodplain Boundary Standard, a standard that requires the map producer to match flood boundaries to the best-available topographic information and merge both in an updated, digital format. This results in a digital map whose floodplain boundary line is generated based on a quality standard to minimize delineation discrepancies when referenced to the best-available topographic information.

The MHIP is also a vital tool for communicating with stakeholders on subjects such as the distribution of Flood Map Modernization funds, the mechanisms for forecasting and sequencing flood studies, and advancements in processes, procedures, and tools. Finally, the MHIP communicates program progress toward national goals.

### MHIP Benefits Stakeholders, Mapping Partners, FEMA, and Taxpayers

With support and funding from the President and Congress, a comprehensive overhaul of FEMA's flood map inventory is underway.

The complexity of this task requires a detailed plan for performance, schedule, and cost. This MHIP update presents FEMA's current plan for updating flood maps and provides:

- A planning tool to enable all stakeholders to anticipate future workload requirements such as new flood zone determinations and ordinance adoptions
- A planning tool to support the decision-making processes of local, State, and regional community partners
- A flexible tool that allows FEMA and its partners to balance national goals and local mapping needs

- An input process that maximizes stakeholder involvement and clear communication (to maintain stakeholder awareness of the planning effort and encourage partner participation and contributions)
- A methodology for Flood Map Modernization funding distributions
- Planned costs and schedules for current and future map updates for counties, parishes, boroughs, townships, tribal lands, cities, and territories where there is flood risk
- A dynamic method to revise scheduling for flood map production for studies funded through FY06 and future years
- A mechanism for clear reporting of progress for greater accountability

### MHIP Facilitates Long-Term Planning

The MHIP provides mapping partners with a dynamic plan for updating flood maps beginning in FY04. The MHIP is flexible enough to support the national goals while accommodating:

- Evolving needs
- New and updated data and technology
- Continuing stakeholder input
- Variability in funding

This MHIP update addresses flood map projects funded from FY04-FY06 and scheduled for funding through FY08 (some studies were funded and started in FY03 and prior). The MHIP gives FEMA, its partners, and stakeholders a high-level look at total Flood Map Modernization costs and a more detailed look at planned map production costs and schedules.

The MHIP provides a county-level look at planned Flood Map Modernization projects, including proposed project funding and schedules, and presents a series of maps reflecting the schedules.

### MHIP Helps FEMA Focus on National Flood Map Modernization Goals

FEMA designed its Flood Map Modernization Key Performance Parameter (KPP) to measure the percentage of the population for whom FEMA would provide accurate flood risk data in GIS format (DFIRMs). Ultimately, FEMA's goal is to improve public safety through the availability of reliable flood risk data. FEMA plans to provide accurate flood risk data in GIS format for at least 92 percent of the United States population. The KPP is expressed in table ES-1.

**Table ES-1. Flood Map Modernization National Performance Goal**

Parameter	Target
Percentage of the population whose safety is improved through availability of accurate flood risk data in GIS format	92%

To achieve this goal, FEMA has set targets for Key Performance Indicators (KPIs) through FY08. KPIs 1 and 2 are designed to measure population for whom maps are available online and population for whom counties have adopted flood maps, respectively. FEMA received stakeholder feedback regarding the absence of KPIs 3 and 4 from MHIP Version 1.5. These KPIs measure the annual percentage rate that financial (and in-kind) contributions by, and funding allocations to FEMA’s mapping partners are leveraged. Actual progress toward targets for future fiscal years and projections for KPIs 3 and 4 are included once again.

The four KPIs used to measure the success of Flood Map Modernization are shown in table ES-2.

**Table ES-2. Flood Map Modernization Key Performance Indicators**

Key Performance Indicator (KPI)		Targets				
KPI	Management Indicators	FY04	FY05	FY06	FY07	FY08
KPI 1	Percentage of population with digital GIS flood data available on-line	20%	50%	50%	60%	70%
KPI 2	Percentage of population with adopted maps that meet quality standards	10%	20%	25%	35%	50%
KPI 3	Percentage of leveraged contributions toward digital flood data	20%	20%	20%	20%	20%
KPI 4	Percentage of appropriated funds sent to CTPs	20%	25%	33%*	33%*	33%*

Note: KPIs 1 and 2 are cumulative. KPIs 3 and 4 are annual.

\* - These targets for FY06-FY08 depend on the ability to develop local and State capability. There are significant assumptions in KPI 4 and FEMA is examining strategies to achieve the target numbers.

The long-range planning in this MHIP gives FEMA a clear path to meeting these national goals while balancing community and State mapping needs. The MHIP provides the status of project goals and presents project performance as well as presents the levels of funding for FY03 through FY06. In addition, the MHIP describes how the actual performance compares to the national goals and summarizes the overall progress to date.

## MHIP Reflects the Mid-Course Adjustment

As the Flood Map Modernization initiative reached the halfway point, FEMA performed a review that considered input from Congress, the U.S. Government Accountability Office (GAO), DHS’s Inspector General, and other stakeholders. As a result of this adjustment, FEMA is implementing a Mid-Course Adjustment that will result in providing better-targeted and more accurate flood data,

while also producing digital flood maps for a significant portion of the Nation. The targets for KPIs 1 and 2 were revised as a result of the Mid-Course Adjustment; as a result of the change in Flood Map Modernization focus and in recognition of potential risks to the mapping schedule, the KPI 1 target for FY06 was maintained at 50 percent. The new targets are shown above in table ES-2. In implementing the Mid-Course Adjustment, FEMA identified a goal of providing new digital flood maps for 92 percent of the Nation’s population by the end of Flood Map Modernization.

As initially envisioned in 2003, Flood Map Modernization was focused on creating a digital flood layer for all communities at risk of flooding. Stakeholder recommendations indicated a preference for FEMA to focus on developing flood maps that meet new, higher standards for mapping and for allocating a greater percentage of resources to those communities at greatest flood risk. States and professional organizations have continued to express this preference, realizing that it would delay development of new maps for communities facing less flood risk. As a result of this stakeholder input, FEMA’s Mid-Course Adjustment has placed increased focus on the communities at greatest flood risk.

Table ES-3 shows the original projections for the end of Flood Map Modernization and the new projections described in FEMA’s Mid-Course Adjustment.

**Table ES-3. Comparison of Flood Map Modernization Output, Original Course vs. Adjusted Course**

	Original Course	Adjusted Course
Percentage of mapped stream and coastal miles meeting 2005 Floodplain Boundary Standard	57%	75%
Percentage of population covered by maps meeting 2005 Floodplain Boundary Standard	32%	80%
Percentage of mapped stream and coastal miles with new, updated, or validated engineering analysis	22%	30%
Percentage of population covered by maps with new, updated, or validated engineering analysis	15%	40%
Percentage of land area of continental United States covered by digital flood maps	100%	65%
Percentage of U.S. population covered by digital flood maps	100%	92%

The Mid-Course Adjustment will provide greater flexibility for FEMA to meet State needs. Estimates show that the Mid-Course Adjustment will result in a digital flood layer that covers

90 percent of the Nation's flood risk and 92 percent of the Nation's population at the end of the initiative. This mapping will be based on factors such as population, flood history, growth potential, and other characteristics.

## MHIP Addresses Map Quality

Early in the implementation of Flood Map Modernization, Congress, the GAO, and stakeholders expressed concern about the quality of maps being produced. In response, FEMA established a Floodplain Boundary Standard to complement its existing *Guidelines and Specifications* ([www.fema.gov/plan/prevent/fhm/dl\\_cgs.shtm](http://www.fema.gov/plan/prevent/fhm/dl_cgs.shtm)). This standard, which varies depending on the flood risk for an area, is aimed at ensuring flood hazard boundary lines are adequately supported with topographic information. In the coming months, FEMA may slightly revise Floodplain Boundary Standard thresholds based on experience gained from the first round of audits, particularly as it relates to the delineation of the floodplain boundary at a printed map scale associated with a visible horizontal tolerance. These potential changes will not compromise the intent of the standard (to ensure floodplain boundaries are supported with topographic data) for digital precision, nor will they change the national target of 75 percent compliance. Rather, they will make the audit procedures more efficient and effective; thereby further improving product quality throughout the program.

Equally important, FEMA is on the verge of implementing a "validation" standard regarding the engineering analysis used to develop flood elevations. As outlined in the Mid-Course Adjustment, FEMA estimated that by the end of the 5-year Flood Map Modernization initiative, 30 percent of the stream miles mapped will be based on new, updated, or validated engineering analysis. The new standard is aimed at helping mapping partners determine where new studies must be conducted, where updates to existing flood hazards should be performed, and what might deem a study to still be valid. Three main factors are being considered in the development of this standard:

- **Physical Changes** – These are changes in the watershed that can increase flood discharge, or changes within the watercourse, floodplain, or along the shoreline that can impact water flow. Examples of physical changes include increases in impervious surface, bridge construction, dam enhancements or changes in operations, wildfires, stream meandering and erosion, fill, and detention projects.
- **Changes in Climatology** – These can generally be thought of as changes in storm activity such as rainfall, hurricanes, or extratropical storms. For areas along rivers, periods of drought or above-average rainfall can impact estimated flood discharges which, in turn, can impact flood heights. Along the Nation's coasts, intense events can often have statistically significant impacts on estimated storm surges.

- **Changes in Methodology** – Typically, changes in the science used to estimate flood stages are modest year to year; however, over many years, they can have an impact – particularly as computing capability increases.

It is important to note that the above-listed factors do not always work in the same direction. Many years of drought coupled with increases in impervious surface can counter each other and result in a net-zero change in estimated 1-percent-annual-chance flood hazards. However, when all three factors work in the same direction, there almost surely will be an increase in estimated 1-percent-annual-chance flood stage.

Estimating the change in flood stage however is only part of the equation. There will likely need to be some consideration of the change in aerial extent as well as the estimated impact that change might have on the current or anticipated built environment.

The standard being considered will take into account both flood risk and the three above-mentioned factors in a way that allows FEMA to focus resources in areas that ultimately lead to reduced flood damages.

FEMA is committed to delivering high quality products in a timely manner. As the Flood Map Modernization initiative moves forward, FEMA will continue to focus on improving the accuracy of depicting flood hazards and producing more accurate flood maps so that risks to life and property can be assessed and appropriate action taken.

### MHIP Process Provides Opportunity for Clear Communication

The success of Flood Map Modernization relies upon clear communication among community, State, and regional partners; FEMA Regions; and other stakeholders. Stakeholder input has been and will continue to be of utmost importance as Flood Map Modernization moves forward. To date, FEMA has drawn input from State and FEMA Regional Office reports and business plans for Flood Map Modernization; from FEMA's Mapping Needs Update Support System; and from stakeholder groups, informal working groups, and other sources. FEMA also provided stakeholders the opportunity to submit comments on both MHIP Version 1.0 and Version 1.5.

The stakeholders who have provided input represent a wide range of groups. As the MHIP development and update process continues, FEMA will continue to accept input from these and other stakeholders. Continuous and consistent lines of communication at multiple levels will drive the development and update process, resulting in better-informed stakeholders and users and better mitigation planning.

A total of 32 government agencies, State and national associations, and private entities submitted comments during the 2-month comment period that followed release of MHIP Version 1.0. FEMA received comments from 12 parties during the 2-month MHIP Version 1.5 comment period.

FEMA categorized the comments to discern which issues were most frequently raised by stakeholders. Among comments sent in following the release of Version 1.0, these issues included:

- Performance standards and metrics
- Map quality
- Coordination, training, outreach, and stakeholder engagement
- Program scope and funding
- Local issues

In response to Version 1.5, nearly all comments FEMA received during the comment period reflected local issues.

The MHIP also provides details on FEMA's current and planned methods for soliciting and incorporating stakeholder input. This includes a list of States and other jurisdictions that submitted 2006 updated State business plans to FEMA. Appendix C, Flood Map Modernization Business Plans, of MHIP Version 1.5 provides a summary of each 2005 business plan that State and CTP mapping partners submitted to FEMA.

### MHIP Provides Risk-based Distribution of Funds, Balancing National Goals and Local Needs

The process used to distribute funding for mapping projects has evolved. In FY03, FEMA convened a group of stakeholders to gain a better understanding of what they saw as key factors for making cost and schedule decisions as Flood Map Modernization moved forward. Several factors identified involved flood risk; therefore, FEMA distributed FY03-FY06 funding to the Regions based on a national perspective of their flood risk.

In its March 2004 Report, the GAO recommended that FEMA continue to align resources with flood risk. Aligning available resources with risk will continue to be a major driver for funding distribution decisions and will allow the inclusion of other factors that better represent risk. FEMA's *Guidelines and Specifications* ([http://www.fema.gov/plan/prevent/fhm/dl\\_cgs.shtml](http://www.fema.gov/plan/prevent/fhm/dl_cgs.shtml)) contains guidance for enhanced mapping standards to align level of study with flood risk.

FEMA adjusted funding distributions in FY04 to reflect the fact that there is a minimum cost for producing each flood map, regardless of the number of map panels produced, and to reflect both projected and past growth (only past growth was considered in the FY03 funding distribution). The basic assumptions and procedures used since the start of Flood Map Modernization for funding distribution have remained largely unchanged. In May 2006, FEMA revised funding distribution to the Regions. Those changes were the result of extensive analysis of data at the Census block group level to ensure that funding was properly aligned in association with the Mid-Course Adjustment.

The MHIP provides details on the FY04-FY06 funding distribution for map production and planned funding for future years.

**Table ES-4. Map Production Funding Distribution by Region, FY04-FY08**

Region	FY04 Funding <sup>1</sup>	FY05 Funding <sup>1</sup>	FY06 Funding <sup>1</sup>	FY07 Funding <sup>2</sup>	FY08 Funding <sup>2</sup>
1	\$4,222,000	\$5,911,980	\$6,240,000	\$5,670,000	\$5,670,000
2	\$9,604,000	\$11,675,013	\$11,806,000	\$13,070,000	\$13,070,000
3	\$10,235,000	\$13,250,000	\$14,172,000	\$13,390,000	\$13,390,000
4	\$38,268,620	\$39,638,112	\$36,316,119	\$39,530,000	\$39,530,000
5	\$14,446,417	\$17,155,627	\$16,880,022	\$19,060,000	\$19,060,000
6	\$20,629,000	\$27,047,947	\$25,772,340	\$25,360,000	\$25,360,000
7	\$8,575,000	\$10,294,183	\$10,343,077	\$10,870,000	\$10,870,000
8	\$6,181,000	\$8,959,254	\$7,319,783	\$8,190,000	\$8,190,000
9	\$13,228,750	\$15,406,259	\$14,140,000	\$14,800,000	\$14,800,000
10	\$4,974,400	\$6,418,200	\$5,692,000	\$7,560,000	\$7,560,000
<b>Total</b>	<b>\$130,364,687</b>	<b>\$155,756,575</b>	<b>\$148,681,341</b>	<b>\$157,500,000</b>	<b>\$157,500,000</b>

1 – Actual  
2 – Proposed

## MHIP Provides Mechanism for Forecasting and Sequencing DFIRM Production

FEMA forecasts map production for flood maps based on anticipated funding through FY08 using data compiled by FEMA’s Regional Offices, contractors, and other mapping partners. FEMA will review and update these data regularly at the regional level and will compile and evaluate the data at the national level. These regular reviews will help FEMA evaluate its effectiveness in meeting Flood Map Modernization production goals and report on current progress. The MHIP offers a detailed description of FEMA’s process for sequencing of flood study projects to meet national goals and provide reliable, digital flood hazard data for areas of the Nation at flood risk. In addition, the MHIP shows the planned fiscal year for initial funding, issuing of preliminary maps, and completion of effective maps as well as planned funding for each year for every county at flood risk nationwide.

## MHIP Provides a Means for Reporting Progress toward National Goals and Performance Metrics

Flood Map Modernization flood study projects are now in progress. FEMA is monitoring the ongoing activities related to these projects, including DFIRM production and adoption, through the MIP (<https://hazards.fema.gov>). The MIP promotes FEMA’s objectives of sharing data openly to enable States and local communities to significantly increase their role in developing and

maintaining data about hazards. The following features and capabilities are offered through the MIP:

- Access to hazard data managed by FEMA and its partners via easy-to-navigate geospatial tools that can be used to locate maps and data, program news, and information
- An automated, workflow-driven process for flood map production
- Access to state-of-the-art flood map production tools
- Capture of intermediate engineering and mapping deliverables (data) to reduce the cost of revisions
- Tools for managing, monitoring, reporting, and tracking flood mapping studies
- Secure, single sign-on to key MIP capabilities and multiple levels of access based on user needs
- Access to training and education for FEMA contractors and mapping partners
- Access to interoperable, standards-based Web services such as Geospatial One-Stop and other business systems used by partners

This MHIP provides information on funding, preliminary, and effective dates of flood study projects in FY03 through FY08.

Through the end of FY04, FEMA distributed preliminary DFIRMs to communities in 211 counties, and effective DFIRMs were available for communities in 112 counties. At the end of FY05, studies for more than one-third of the Nation’s counties had already begun.

The MHIP reports on actual production of map updates for past fiscal years and also provides forecasts of out-year map update production. Table ES-5 shows the actual production for Flood Map Modernization through the end of FY05.

**Table ES-5. Flood Map Modernization Production through FY05**

Key Performance Indicator (KPI)		Production
KPI	Management Indicators	FY05
KPI 1	Percentage of population with digital GIS flood data available on-line	39%
KPI 2	Percentage of population with adopted maps that meet quality standards	16%
KPI 3	Percentage of leveraged contributions toward digital flood data	35%
KPI 4	Percentage of appropriated funds sent to CTPs	40%

Based on data available as of the end of the third quarter for FY06, FEMA anticipates that by the end of FY06, 49 percent of the population will have digital GIS data available online and 23 percent of the population will have adopted maps that meet quality standards. Annual results for KPIs 3 and 4 are projected at 27 percent and 39 percent, respectively, by the end of FY06.

### MHIP Helps to Manage Risks to Production Schedules

As mapping studies progress from scoping meeting to an adopted FIRM, many challenges may, and often do, arise. FEMA maintains a risk management inventory, in which potential risks – as well as possible ways to mitigate them – are cataloged and described. The following are some of these potential risks that may affect the planned map production schedule:

- **Recognition of levee system protection on FIRMs** – Approximately one-quarter of all counties being mapped under Flood Map Modernization show levees on their existing FIRMs and therefore, the recognition of those levees on FIRMs will need to be addressed within the mapping process. FEMA will only recognize those levee systems that meet, and continue to meet, minimum design, operation, and maintenance standards. Code of Federal Regulations 44 (44 CFR) Section 65.10 describes the information needed to recognize whether a levee system provides protection from the base flood event. The required information must be supplied to FEMA by the community or other party seeking recognition of the levee system. To acquire FEMA's recognition that a levee system protects an area against the base flood event, a community or levee owner must supply FEMA with such data as certification and design criteria (including information on freeboard, closures, embankment protection, embankment and foundation stability, settlement, interior drainage, etc.), and operation and maintenance plans.
- **Coordination and timeframe of community review of updated FIRMs** – To facilitate community adoption of updated FIRMs, coordination of an adequate review and comment period with all impacted communities is necessary to provide due process. This coordination can be impacted by community ordinance or state law that requires the community to adopt the maps under strict guidelines or at a given time of year (e.g., annual meeting). When a community or other interested party files an appeal of its proposed Base Flood Elevations, FEMA or the mapping partner must review the data to determine if they are technically or scientifically correct. This appeals process is important to develop the most accurate maps possible. Data provided during this process can assist in this endeavor. However, this can result in delays to the map production schedule.
- **New Mapping Partners** – Mapping partners who are new to Flood Map Modernization may not be familiar with the complete map production process and workflow. The time required to coordinate and provide additional assistance and outreach to impacted

communities and new flood mapping partners may impact projected timeframes for map update completion.

- **Natural Disasters** – In the event of a natural disaster, FEMA staff supporting the Flood Map Modernization effort may be tasked to provide support to areas impacted by natural disasters.
- **Funding** – The planned map production schedule is based on planned funding for Flood Map Modernization. Changes to planned funding amounts could impact the schedule for flood map production.

### MHIP Allows FEMA to Build on the National Flood Layer

Flood Map Modernization provides an infrastructure and resource investment that allows management of flood hazard information, including data identification, collection, coordination, access, analysis, and dissemination of hazards data for risk mitigation activities. FEMA's National Flood Layer and the MIP (<https://hazards.fema.gov>) will provide access to and delivery of shared data resources nationwide. This infrastructure and network of users and data resources will provide the structure to coordinate, partner, develop, and apply reliable flood data and information to support risk management applications and operations.

### MHIP Updates

FEMA released its initial plan for implementation of Flood Map Modernization, MHIP Version 1.0, in November 2004. FEMA released its first revision, MHIP Version 1.5, in June 2005.

Appendix F: Fiscal Year 2005 Flood Map Production (Version 1.6) was then released in December 2005; it reports on flood map production actions performed in FY05. This newest revision, dated September 2006, is MHIP Version 2.0.

FEMA will continue to seek the input of stakeholders to ensure that the plan reflects national goals and stakeholder needs. The cyclical process will continue with planned releases through FEMA's Flood Hazard Mapping Web site ([http://www.fema.gov/plan/prevent/fhm/mh\\_main.shtm](http://www.fema.gov/plan/prevent/fhm/mh_main.shtm)) and the most recently released plan will amend the prior plans.