WatershedConcepts
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TESTIMONY

Watershed Concepts,
a Division of Hayes, Seay, Mattern & Mattern, Inc.

before the

Subcommittee on Housing and Community Opportunity

House Committee on Financial Services

FLOOD MAP MODERNIZATION AND THE FUTURE OF THE NATIONAL FLOOD INSURANCE PROGRAM

presented by

Mr. Scott K. Edelman, President

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Introduction

Watershed Concepts, a Division of Hayes, Seay, Mattern & Mattern, Inc., is a recognized leader in the water resources field. Members of Watershed Concepts' staff have been conducting water resources studies and analyses for more than 20 years, including: hydrologic and hydraulic studies, development and revision of Flood Insurance Rate Maps, and the design and development of customized Geographic Information Systems software.

Watershed Concepts plays a leading role in the production of automated hydrologic and hydraulic studies for projects in throughout the nation. Generally, the firm uses its proprietary Watershed Information System (WISE)® to perform engineering analysis and mapping. Watershed Concepts has worked closely with FEMA headquarters staff and FEMA Regional staff, as well as state and local authorities.

Watershed Concepts also has considerable experience working with the State of North Carolina, the country's first Cooperating Technical Partner with FEMA, in the North Carolina Floodplain Mapping Project. This project is a great example of collaboration between FEMA and the State.

Drawing upon this experience, Watershed Concepts is honored to provide testimony on the topic of this hearing, the National Flood Insurance Program (NFIP) and the flood map modernization strategy of the Federal Emergency Management Agency (FEMA).

This document addresses the questions submitted to Watershed Concepts, as listed below, and constitutes the written statement of the proposed testimony. Each individual question within a numbered item is addressed by a subsection of this document.

1. How important is it to update the Flood Insurance Rate Maps, and what negative consequences may result from delaying modernization?
2. Who makes the decisions about which of the approximately 92, 200 maps to modernize and how the modernization is achieved on a practical level? How much of the decision making is done by FEMA, and how much is left to local authorities? Is this the most efficient means of reaching the ultimate goal of a completely modernized set of flood maps for the United States?
3. According to FEMA, the map modernization program, as currently implemented, is using "the best available topographic information." For much of the country, however, the best available topographic data is U.S. Geological Survey information that can be up to 40 years old. What value is there in updating these maps when the basic topography depicted could have undergone fundamental changes from the time they were first issued?
4. Please assess FEMA's overall map modernization strategy. Is FEMA effectively coordinating with their regional personnel, local authorities, industry, and other potential partners? Are resources being expended as efficiently as possible?

1. How important is it to update the Flood Insurance Rate Maps, and what negative consequences may result from delaying modernization?

National Flood Insurance Program Goals Provide Insurance against Loss and Reduce Future Flood Damages

The two key objectives of the National Flood Insurance Program are to provide insurance protection against losses from flooding and to reduce future flood damages. The program currently protects more than 4.5 million policy holders and provides $650 billion in coverage. Flood damages need to be reduced because losses are estimated at $1.1 billion annually. Without flood map updates, Watershed Concepts believes the damages are likely to grow.

FIRM Age Interferes with the Goals of the Program

Flood Insurance Rate Maps (FIRMs) are the critical tools used to accomplish these two objectives. The average age of these FIRMs is over 15 years old (FEMA, 2004) and hundreds more of these FIRMs are over 20 years old. Even more importantly, much of the data that is used to develop these maps is older still. In general, Watershed Concepts believes that maps greater than six years old begin to lose their usefulness unless they are verified.

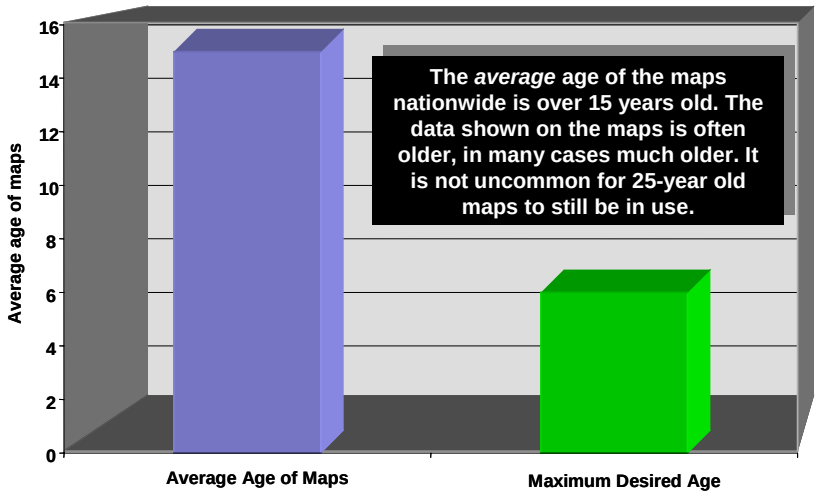

Figure 1 – Old Maps defeat program goals.

One clear indicator that aging maps hinder program objectives is the number of citizens requesting changes to the maps through the amendment and revision process. When citizens find their property inaccurately depicted in the floodplain, they request that the maps be amended or revised to reflect actual conditions. As can be seen in the following figure, the number of requests has steadily risen, from an average of less than 15,000 requests in 2000, to over 23,000 requests in 2003—over a 50 percent increase in just three years. Watershed Concepts believes that modernized maps will reverse this trend, and reduce the large costs to homeowners and FEMA related to resolving these mapping inaccuracies.

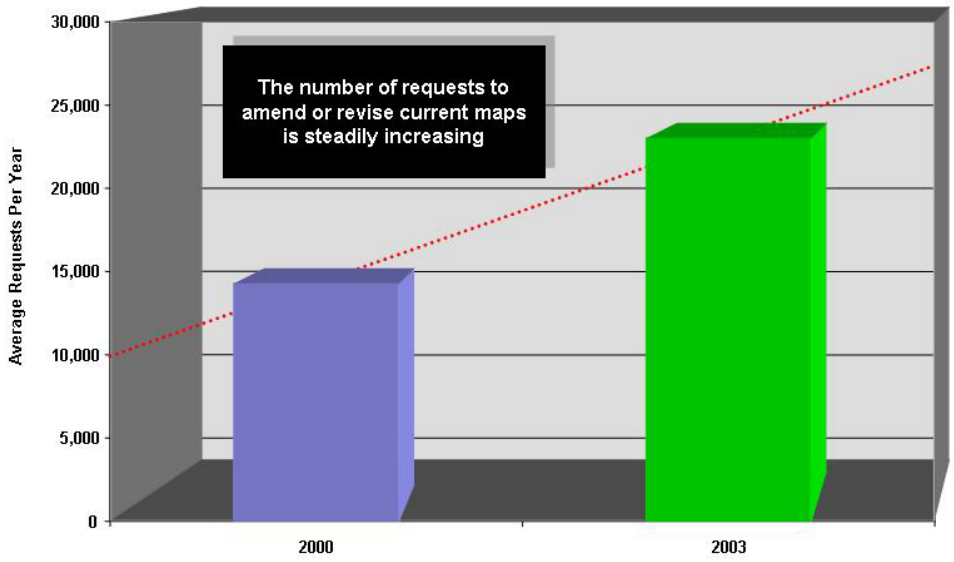

Figure 2 – Requests for map changes are increasing.

Inaccurate Maps Create Hardships

Inaccurate maps can cause citizens economic hardship. For example, the map shown below shows houses located in a floodplain in Clay County, Florida. These homeowners, potentially including retired couples on fixed incomes, discovered that the homes they had just purchased were in the flood zone. The insurance premiums were sometimes as high as $2,000, an unexpected and substantial annual expense.

Figure 3 – Inaccurate maps can have serious consequences to homeowners.

Watershed Concepts View of Mapping Updates

Watershed Concepts believes that the flood maps (FIRMs) will need to be continually updated because of the following:

1. **FEMA has not studied every flooding source in the nation.** FEMA has studied one third of the possible streams in the nation. Many of the remaining areas will never need to be studied because they are on Federal lands, and development is unlikely to occur. However, as the population grows and shifts from one region of the country to the next, pressure is applied to develop in areas that were never considered for potential development. In order to prevent future flood losses, these new areas need to be studied to provide developers with proper guidance to allow for responsible development.
2. **FEMA may need to upgrade the existing studies to take development into account.** FEMA's flood maps have been created using a wide range of different procedures to allow for low-cost analyses to be performed in low-risk areas, while reserving medium and high-cost analyses for medium and high-risk areas. It is very difficult to predict growth patterns more than a few years into the future. In addition, FEMA's maps are used for insurance purposes, which must reflect existing land use conditions. As a watershed develops, more pavement is added, which reduces the amount of rain water that can be absorbed by the soil, and leads to increased flooding in the streams and rivers. Watershed Concepts has performed studies that show that

development within a watershed can create an increase in flood elevation of more than ten feet. Therefore, as growth occurs in areas that were not anticipated, or within the watershed in general, the engineering studies that created the flood maps may need to be upgraded to a higher level of analysis.

Watershed Concepts believes that the success of the NFIP hinges on accurate and up-to-date, modernized, (digital) flood insurance rate maps (DFIRMs). New technologies allow for cost-effective use of more accurate data than was available in the past. It is important to update the maps, not just to keep up the status quo, but to leverage technological advances to provide a better, more accurate product.

The result:

- Citizens understand their risk.
- Actuarial rates are based on a sound foundation.
- Communities institute sound floodplain management policies to further reduce future flood loss.

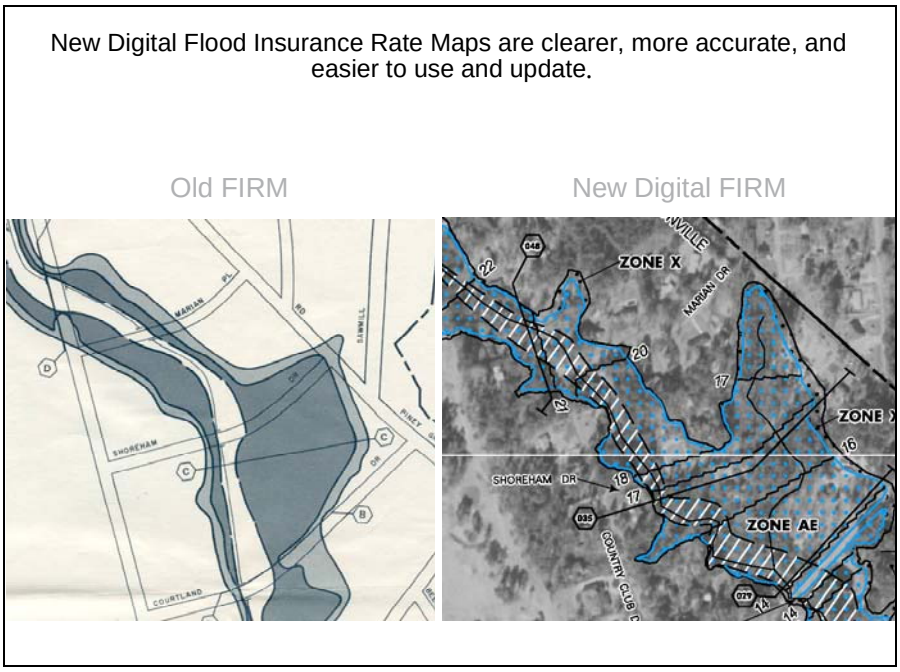

Figure 4 – Comparison of Old FIRM Map to New DFIRM Map
Generated by Watershed Concepts

Delaying Modernization would have Negative Consequences

Delaying modernization would have severe negative consequences. Without new FIRMs, the maps would age and become less accurate, to the point where the user community would lose confidence in the maps. The large investment made since the program began would be in jeopardy.

- Using the maps to set insurance rates would become increasingly difficult.
- The engineering and planning community would no longer trust the maps, and would undertake duplicate efforts to map the floodplain, at great cost.
- The number of challenges and appeals to the maps would increase.
- Citizens who are at risk for flood damages would not be made aware. Others, who might be at minimal risk would needlessly be paying for flood insurance.
- Future flood losses would increase.
- The many areas across the country currently undergoing rapid development would not have the necessary tools needed for sound floodplain management.

Good mapping is essential to the goals of the NFIP. The current maps are becoming increasingly less useful for our communities and their citizens. Delay will only worsen the situation and increase the cost of fixing the problem.

2.a Who makes the decisions about which of the approximately 92,200 maps to modernize and how the modernization is achieved on a practical level?

Watershed Concepts has directly observed FEMA perform the following actions when determining who makes the decisions to modernize the maps:

1. FEMA Headquarters (HQ) sets the overall guidelines and goals for the entire program. It is the responsibility of FEMA HQ to divide the study money between the ten FEMA Regions based on flood risk, and to monitor the actions of each of the FEMA Regions.
2. The FEMA Regions prioritize the specific projects within their region to meet the national goals. This generally dictates which fiscal year a study will be funded. The FEMA Region sets the budget of the individual study. FEMA then meets with the local stakeholders. The local stakeholders inform FEMA which areas need to be restudied due to changes in the watershed, and which areas need to be studied because of anticipated growth. The local stakeholders prioritize their needs, and then the FEMA Region finalizes the budget for the community that will conform to meeting their highest priorities. Rarely does FEMA fund all of the local needs.

Watershed Concepts believes that setting the national goals and decisions through FEMA headquarters and implementing the program at the FEMA Region level, with input from local stakeholders, is the most efficient manner to determine which areas should be studied.

As the caretakers of the $1 billion, 5-year Flood Map Modernization effort, it is critical for FEMA to define a management program that ensures the most efficient use of that money over the 5-year period. It is imperative to prioritize and address critical studies first. While the direction and goals of Flood Map Modernization are formulated and directed at FEMA headquarters, FEMA is aware that effective implementation of the dollars spent must come at the FEMA region level. Only at the regional level could effective decisions be made that would address the necessary priorities.

Given the sheer magnitude (almost 93,000 maps to modernize, plus mapping of counties that have never been mapped), a nationwide consistent approach for all communities would lead to the certain demise of the Flood Map Modernization Program. Additionally, the diversity of needs amongst the regions — coastal flooding vs. riverine flooding vs. arid region concern, etc.,— dictated that a regional approach be implemented. Therefore, a decentralization of the decision making process was executed, pushing the implementation down to the regional level. This regional approach allows FEMA to:

- Set the priorities of the regional efforts. Regional staff members are the most knowledgeable about the needs of their states and how those needs should be addressed.
- Work closely with state representatives to identify each state's needs. States have the opportunity to voice their needs and priorities, which can then be incorporated at the regional level. The needs of all states and all communities must be coordinated at the regional level to ensure that everyone benefits from Flood Map Modernization.

- Maintain a big picture view of spending in each region. This helps ensure that each state receives a fair share of Flood Map Modernization resources.
- Make the key decisions about how funding is utilized. Only at the regional level can decisions be made about the distribution of funds that will properly address the priorities of the entire region.
- Leverage other local resources. With FEMA currently unable to meet all of the Flood Map Modernization needs at the current funding levels, it is even more important that local resources are leveraged to the maximum level. Knowledge of the resources comes at the regional level.

2.b How much of the decision-making is done by FEMA, and how much is left to local authorities?

Watershed Concepts has observed that FEMA is the final decision authority on all of the contracted projects. FEMA does include other stakeholders in this process. FEMA requests that all of the states and regional water authorities provide detailed business plans for their areas of interest. FEMA uses this additional information in the planning of the overall program. The result of this planning is an annual report entitled, *Multi-Year Flood Hazard Identification Plan* (MHIP). FEMA utilizes the MHIP as an outlet to inform the user community when a particular county-wide study will be performed. The decision about when a study is done is the responsibility of FEMA.

When a specific project is initialized, Watershed Concepts has observed that FEMA sets the budget for the local project, but the local authorities provide significant input about where the specific studies within the community should occur. FEMA then determines the type of analysis that is required for a specific project area. In many cases, FEMA mixes the type of study with respect to the flood risk related to loss of property and life. Therefore, it is very common to have a mixture of study types within one county study. Watershed Concepts agrees with this approach. This approach allows FEMA to allocate funds to the highest risk areas within a particular study. FEMA sets the budget and type of studies that will be performed while getting information from the local communities about where within the community the specific study should be performed.

Watershed Concepts believes that the key to success for Flood Map Modernization is the ability of the regional FEMA offices to make the key implementation decisions. With needs currently outpacing the resources necessary to address them, it is crucial that FEMA regional staff construct and implement a strategy of modernizing their regional maps on a prioritized basis, addressing those areas deemed most critical to protecting life and property. Regional staff members are the best equipped to make decisions about how their local allotment of funding is utilized. While input from state and local community officials is important, it is the FEMA regional office that must make the final decisions about how best to fulfill the needs of all the states within their region.

2.c Is this the most efficient means of reaching the ultimate goal of a completely modernized set of flood maps for the United States?

Watershed Concepts believes that FEMA has implemented the most efficient means of reaching the ultimate goal of modernizing maps. FEMA has implemented a Mapping Information Platform (MIP). The MIP allows for the most efficient and consistent method for producing Digital Flood Insurance Rate Maps (DFIRMs) by providing all mapping partners access to state-of-the-art tools. These tools include the Watershed Information System™ (WISE) software, the DFIRM Production tools, and other tools. Available through the Internet, these tools assist mapping partners in the engineering analyses and mapping tasks associated with the production of DFIRMs.

In addition, FEMA is currently developing a DFIRM production management console for the MIP that will allow FEMA to track the performance of every Flood Insurance Study in the nation at a task level. The management console will use a concept of dashboards that will enable FEMA to easily and visually identify the status of those studies and determine those which may require additional attention and resources. Since FEMA has nearly 1,000 active studies, Watershed Concepts believes that this will be an invaluable innovation to help FEMA to better manage these studies with fewer management staff.

3.0 According to FEMA, the map modernization program, as currently implemented, is using "the best available topographic information." For much of the country, however, the best available topographic data is U.S. Geological Survey information that can be up to 40 years old. What value is there in updating these maps when the basic topography depicted could have undergone fundamental changes from the time they were first issued?

Accuracy of U.S. Geological Survey Information

FEMA requires that all studies performed for the National Flood Insurance Program conform to the standards outlined in the *Guidelines and Specifications for Flood Hazard Mapping Partners*. These guidelines state the minimum topographic requirements for FEMA's detailed studied streams. The areas that receive detailed study are the areas that have a moderate to high risk of flooding. According to FEMA specifications, USGS quadrangle maps do not meet FEMA's minimum specifications, and can not be used for the hydraulic calculations or mapping in these areas. USGS quadrangle maps, however, can be used in very low flood risk areas for approximate analyses. These are areas that have negative or very little population growth, and have no indicators for flood risk potential.

Watershed Concepts has performed over 18,000 miles of flood studies under the Flood Map Modernization program. In areas of moderate to high risk, Watershed Concepts has never used USGS quadrangle maps for the hydraulic analysis or mapping. However, Watershed Concepts has used USGS quadrangle maps for hydraulic analysis and mapping in areas of very low flood risk. In these areas, we have used USGS quadrangle maps to perform approximate analyses.

Use of Best Available Topography

FEMA has a very limited budget to perform studies. In the course of performing studies, Watershed Concepts has observed that FEMA focuses its resources in areas that are moderate to high risk, and that have a high return on their investment. Accordingly, FEMA does not implement "best available topography" universally. Watershed Concepts is currently performing studies for FEMA in moderate to high risk areas where the best available topographic data would not result in the level of accuracy required. In these areas, FEMA is obtaining new detailed topographic data. In many areas of moderate to high risk, however, the local community already has detailed topographic data that can be used. For these areas, FEMA leverages this local data to create the flood maps. This is one area in which the Cooperating Technical Partners Program (CTP) is of potentially greater benefit to the communities. The communities typically supply topographic data as a non-monetary contribution toward their CTP obligations. Many communities utilize this type of data for purposes other than flood mapping, and therefore have an interest in the development and verification of the produced data. This allows the primary Federal funding to go toward the actual study rather than the base data.

If FEMA were to state that high accuracy topographic data be required for all areas within the nation, then the majority of FEMA's entire budget would be used to create new topographic maps. Funds would not be available to perform the hydraulic and hydrologic

studies and subsequent flood mapping. If the topographic data is only used for the FEMA program, then this strategy would result in a significant amount of funding being spent in areas with a very low return on the investment.

Evaluation of Topographic Alternatives for Areas of Low Flood Risk

Traditionally, in areas of low risk, where the local community does not have any topographic data, USGS quadrangle maps would be used. Even though USGS quadrangle maps do not meet the FEMA standards for detailed study, FEMA has determined that using the USGS quadrangle maps to show these low risk areas is beneficial to the program's goals of reducing flood loss and preventing loss of life.

Watershed Concepts has performed studies for FEMA using immerging technologies to determine if the engineering analyses and floodplain mapping can be improved upon using other low-cost sources of topographic information. One of these studies was a comparison of USGS topographic data with Interferometric Synthetic Aperture Radar (IFSAR) developed by Intermap Technologies Corporation. It is important to note that IFSAR is not suited for areas requiring detailed study (moderate to high risk areas), or for areas that are covered by vegetation (trees or brush). Therefore, the Watershed Concepts study was intended for the application of IFSAR generally for areas west of the Mississippi River and east of the Rocky Mountains that have sparse vegetation cover.

The result of the analysis showed that IFSAR data does result in a better final product than the USGS topographic information. However, before IFSAR can be utilized as the standard in selective portions of the Country, the following items need to be resolved:

1. **IFSAR is a Licensed Dataset.** FEMA generally utilizes datasets and expends funds on tasks that can be made available to the public free of charge. Watershed Concepts has attended meetings with FEMA and Intermap in which it was made clear that the users of the map data will not have free access to the source topographic data unless a higher cost is paid. If the source data is not made available to the users, then these low risk areas, which are generally in rural America, will have an additional financial burden placed upon them while other areas of the country will not. This has been an open issue for approximately two years.
2. **IFSAR Cost/Benefit.** The result of IFSAR data is clearly better than the USGS data under certain conditions. However, what is not clear is the benefit of the better analysis to the community or the nation. If better flood analyses are performed in areas where development is not likely to occur, then the benefit is very limited. A case-by-case evaluation should be made with the local community for the applicability of IFSAR to a study area.

Watershed Concepts performed an analysis during a recent study to compare results of using different topographic data sources on the final flood map. The sources utilized in the evaluation included data obtained from the City of Amarillo, Texas, USGS and IFSAR. (Note that the data from Amarillo met the FEMA specifications for use in studies of moderate to high risk areas.) The results of the study on the flood boundary are shown in the

following diagram. In general, the IFSAR data produced more accurate results than the USGS data.

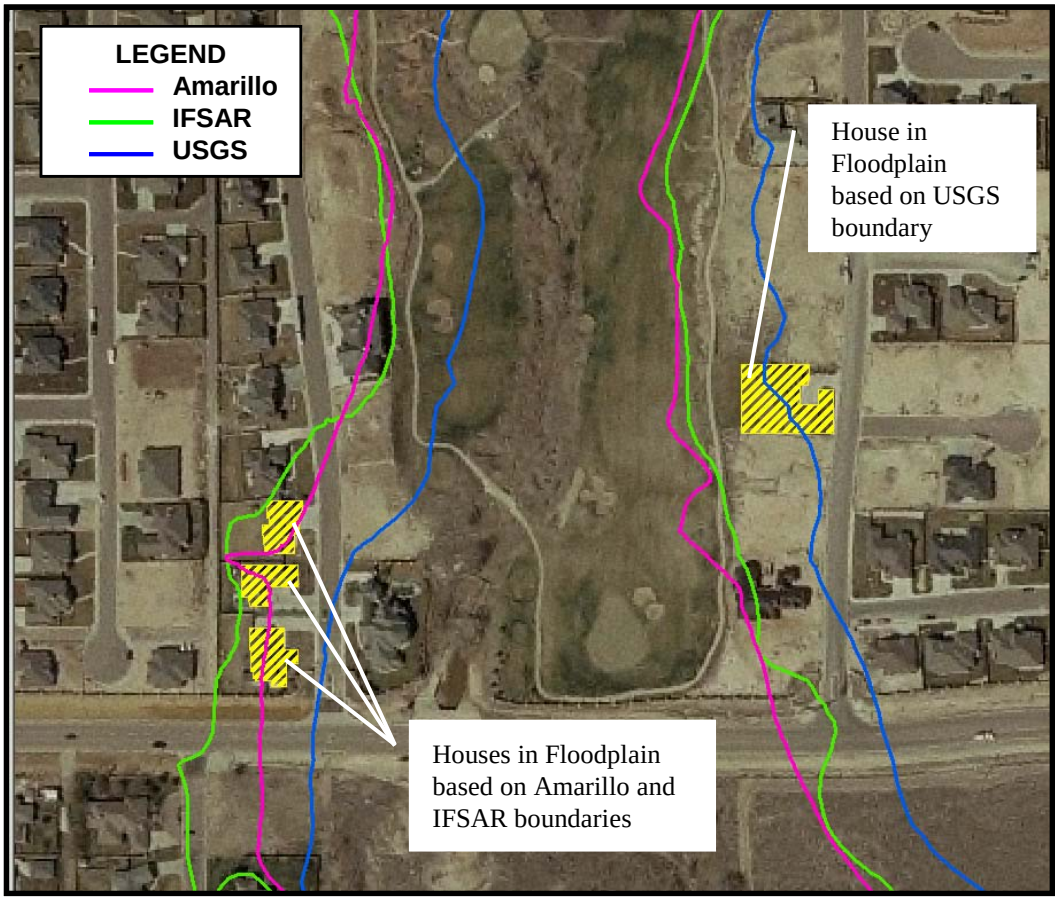

Figure 5 – Impacts of Amarillo, IFSAR, and USGS Data on Floodplain Boundaries

4.a Please assess FEMA's overall Map Modernization strategy.

FEMA's Flood Map Modernization Strategy brings the NFIP up to Accepted Standards

The National Flood Insurance Program (NFIP) was initiated in 1968, and over these intervening years, flood mapping has evolved in a piecemeal fashion, responding to new techniques and methods that have periodically become available. However, this incremental approach to defining flood hazard areas has not been efficient or cost-effective. Faced with rising damage costs from flood disasters, and a growing population with ever-increasing land development pressures, FEMA has decided to modernize the mapping program in one unified effort. Central to this effort is the incorporation of modern computer technology and methods in the map production process. Watershed Concepts believes many of these computer-oriented changes (such as GIS mapping and Internet-based platforms) are already familiar to NFIP communities and the public; so in many respects, the flood map modernization strategy is intended to bring the NFIP up to standards currently accepted by end-users. Watershed Concepts believes FEMA is taking a reasonable approach by applying uniform standard to the products produced under Flood Map Modernization.

Comprehensive Approach to Modernizing the Nation's Flood Maps will save Money over Time

Watershed Concepts believes that under the Flood Map Modernization program, the conversion of the mapping process from a paper product to a digital product will lead to significant cost-savings. Given the proliferation of the use of the Internet in recent years, FEMA's objective to make flood maps available online will increase the distribution of maps with minimal increased costs. Watershed Concepts' opinion is that FEMA's nationwide approach to Flood Map Modernization is reasonable.

Flood Map Modernization Approach to New Technologies and Methodologies

In addition to mapping, Flood Map Modernization involves efforts to update methodologies and technologies used for performing flood studies. Watershed Concepts has participated in, and has observed FEMA's careful application of immerging technologies. For example, the following cases highlight FEMA's approach:

1. Watershed Concepts recently assisted FEMA with the preparation of new guidelines and specifications for study contractors to perform coastal flood studies and mapping along the Pacific Ocean as part of Flood Map Modernization. This was an intensive review process to obtain the best knowledge in the industry.
2. Watershed Concepts has assisted FEMA in applying new techniques and standards to allow automated computerized methods for delineating flood hazards in lower risk areas. This has resulted in an improved product for the public.
3. Watershed Concepts performed a detailed evaluation of new techniques for obtaining topographic data for low-risk areas through the use of IFSAR data. This was a detailed study that compared the results of more costly and less costly techniques.

Watershed Concepts has experienced FEMA's approach to new technologies and techniques first-hand, and is supportive of the process that FEMA has adopted.

Watershed Concepts' Assessment of FEMA's Strategy

Watershed Concepts supports FEMA and Flood Map Modernization. Watershed Concepts feels strongly that the nation will greatly benefit from this effort. As a matter of fact, one of the more prevalent comments made by local stakeholders is that there is a need for even more studies in their communities. FEMA is left to balance the needs of the local communities with the available resources.

4.b Is FEMA effectively coordinating with their regional personnel, local authorities, industry, and other potential partners?

Watershed Concepts believes that FEMA is reaching out to all stakeholders who are involved with Flood Map Modernization in a very effective manner. Watershed Concepts has observed the manner in which FEMA coordinates with these stakeholders through programs such as the Cooperating Technical Program. FEMA achieves this goal by involving the industry and by participating in a large array of coordination meetings ranging from conferences to specialty.

One of the more critical aspects of Flood Map Modernization—FEMA's Cooperating Technical Partners (CTP) Program—was developed to provide communities with a more formal method to actively participating in the flood hazard mapping program. This program essentially divides the responsibilities of mapping projects between FEMA and a CTP, from the initial Scoping Phase of a study through the map adoption phase at the conclusion of a study.

Coordination between the local communities and various other government agencies with FEMA's regional staff (including FEMA's study contractor) has always been a fundamental factor in the success of a flood study. However, with the CTP Program, the roles played by the potential partner have definitely expanded beyond being just a source of data.

Watershed Concepts has direct experience working with CTPs by working as a contractor for North Carolina, South Carolina, Mississippi and the Southwest Florida Management District. This direct experience demonstrates how FEMA can transfer control on portions of the program and communicate very effectively with the state and local officials.

4.c Are resources being expended as efficiently as possible?

Watershed Concepts has been involved with creating maps for FEMA since 1984. During this time, the firm has witnessed many changes within FEMA and the Flood Insurance Program. Watershed Concepts believes that the current approach that FEMA is taking to produce maps efficiently is highly effective. FEMA did not use this program to grow internally, but rather to leverage the industry and partners' abilities.

Foundation of Flood Map Modernization Built on Partnerships to Leverage Resources

Historically, FEMA flood maps and other flood insurance products were produced somewhat independently of the end-users, as stand-alone efforts to establish flood zones, fulfilling FEMA's traditional mandate to provide the insurance industry with a basis to establish actuarial insurance rates. It appears that FEMA remains committed to this mandate to serve the insurance industry; however, FEMA products have found many uses over the years from disciplines as varied as fisheries to land use planning. Watershed Concepts has seen that FEMA has recognized this and has made a concerted effort to establish partnerships with potential end users of new flood maps produced through Flood Map Modernization. These partnerships are central to the ability of FEMA to expend resources as efficiently as possible.

The Cooperating Technical Partner (CTP) Program leverages the capabilities and expertise of local agencies and officials. From our work with CTP's, and in comparison to the traditional FEMA approach to floodplain mapping projects, Watershed Concepts feels that this program has essentially provided the end user with more influence and leverage into the floodplain mapping process than ever before.

With CTP projects, FEMA is allowed to oversee and provide assistance to the project at an upper management level, and the CTPs are responsible for coordinating the operational details. Watershed Concepts has witnessed instances where the familiarity of the CTP staff with community officials reduced time-consuming bureaucracy, which would otherwise have delayed the project schedule. The acceleration of certain tasks due to the involvement of the CTP is always an asset when facing a myriad of other potential delays.

Level of Flood Risk Paired with Commensurate Level of Effort to Obtain Flood Mapping

Watershed Concepts has witnessed that FEMA recognizes that the risk of flooding varies substantially across the nation and even within a given watershed. Accordingly, significant efforts have been made to pair the level of effort in establishing flood hazard zones with the level of flood risk to insured structures and to the public. This has resulted in a systematic process whereby flood study mapping efforts of varying levels of detail are assigned to efficiently expend resources required for mapping. For example, in heavily developed urban areas, detailed flood studies are prioritized to update flood risk zones where numerous insured structures and human activity exist. Conversely, in rural areas where structures and human inhabitants are sparse, limited detailed flood studies, which rely more on lower cost automated computerized methods, may be appropriate to define flood zones.

Conclusion

Watershed Concepts is honored to be able to provide testimony based on our experience with the Federal Emergency Management Agency and with the National Flood Insurance Program as the Subcommittee considers the most efficient methods to prevent or reduce flooding losses.

For more information or for any questions concerning this testimony, contact Scott Edelman, President, (336) 855-8422, (sedelman@watershedconcepts.com).