GEORGIA'S MAP MODERNIZATION SCOPING EFFORT

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Abstract. This paper describes critical issues for floodplain mapping project scoping in the Georgia Map Modernization Program. The entire State of Georgia is currently being remapped through the Georgia Flood Map Modernization Program. This paper details issues that community, State, and Federal officials will face during the early phases of the project and how those issues will impact the final product. The flood map study scoping process is described, including the following major steps: the identification of map update needs, library research, determination of the base map to be used, the conduct of the scoping meeting with the communities, the cursory review of data submitted for inclusion in the mapping project, the determination of study methodologies, the development of the proposed paneling scheme, the finalization of the scope of work, the review of the budget versus needs, project management, and database population.

INTRODUCTION

The State of Georgia, Environmental Protection Division, has embarked upon a historic effort to update the majority of the Flood Insurance Rate Maps (FIRMs) in the State. In concert with the Federal Emergency Management Agency (FEMA), the State has taken full management responsibility for the flood map production process. To date, the results have been impressive, with over 22 counties having complete preliminary maps issued to the communities. Another 30 counties are in production at this time. Seven counties have adopted final FIRMs The State has received accolades from FEMA and others for their aggressive outreach and study scoping techniques, both of which have resulted in substantive cost savings.

THE SCOPING PROCESS

Digital Flood Insurance Rate Map (DFIRM) scoping is a detailed process that requires attention to many facets of the project. In this task it is important to predict the potential hurdles that must be faced during the project and to devise a way to overcome those hurdles. Therefore it is critical to identify inherent inaccuracies in the current FIRM and issues such as levees that can result in processing delays is DFIRM production and additional costs. The requirements for scoping flood mapping projects are contained in Appendix I of FEMA's guidelines and specifications. This appendix contains many useful documents to help the mapping partner along with the process. However, the process has been substantially altered in the State of Georgia to account for the unique interests and requirements of the project.

The flood mapping project process is typically at least 24 months in duration. Scoping occurs over about a four month period. Scoping typically begins in the early spring of each year, and culminates in the signing of a Mapping Activity Statement in approximately July of the same year. Between July and the following September, a span of approximately 14 months, the production of the flood map occurs. In the following year from September to September, the due process for the map occurs. Due process includes formal appeals periods and time to make modifications to the maps based on public input at the map presentation meetings.

There are three major phases to DFIRM scoping. These include pre-scoping, the scoping meeting, and activities after the scoping meeting. Prior to the scoping meeting the two major tasks that occur are identification of map update needs and library research. During the scoping meeting the principal activities that occur are related to determination of the base map to be used and also any additional flood map update needs that have not already been gathered. The scoping meeting is also an educational meeting for the public and general officials, to set realistic expectations and timelines for the project ahead. After the scoping meeting is when the bulk of the work for scoping actually occurs. During this phase there is a cursory review of data provided for inclusion in the project a determination of study methodologies, development, the proposed flood map paneling scheme, development of preliminary and final scopes of work and cost of work, review of budget constraints versus the scope of work, preparation of the project management plan, and population of the various FEMA databases to track the scoping process.

The key issues in identifying map update needs are to catalog existing flood map inaccuracies and sources of update information. Another key at this step is to prioritize map update needs and to determine which of the potential methods of study would meet the largest number of the

needs. Verification of map update needs is accomplished using a variety of sources including FEMA's Map Needs Update Support System (MNUSS) database as well as conversations with the community, state and federal officials. Identification of map update needs also requires comparing the existing FEMA maps to community topographic maps or more recent and detailed topographic data, as well as the growth patterns in the community since the previous effective map. At this phase engineering data is collected if it is available and citizen reports are taken into consideration in the process. The identification of map update needs is a relatively data intensive and labor-intensive process, and requires comparing and tabulating the needs for each individual stream segment or flooding source in the community.

Library research is the next phase of the pre-scoping process. The first purpose of this phase is to find information on Letters of Map Change (LOMCs) that must be incorporated into the new maps. LOMCs include small-scale submissions to FEMA that have been provided by individual homeowners and engineers to show where the map should be corrected. Typically these map changes affect small areas such as individual lots or subdivisions. Another important reason for library research phase is to gather data on the format of the current FIRM and the ability to reuse the data. At this phase it is important to determine if the effective firm is available in digital format or if it must be digitized for future use. Library research also helps in determining the miles of effective stream that have already been studied, as well as areas that currently show a Special Flood Hazard Area (SFHA) on the map. The current SFHA mileage must be retained as the minimum level of study for any new flood mapping project. SFHA limits may be updated through new engineering study, but may not in general be deleted from the map. Another important task at the library research phase of the scoping process is to determine if the effective hydrologic and hydraulic models are available in electronic format. If this is the case, the updates to these models are made much easier. Another step that occurs at the library research phase of the project is to determine if all communities have Community Identification Numbers (CIDs). This requires examination of census data to determine if new communities have been created since the effective map. If so, then those communities need to have CID numbers created for them in coordination with the FEMA headquarters office. And finally, an important step at the library research phase is determine if any major boundaries have changed, such as County boundaries. While rare this can have profound impacts on the mapping process

The scoping meeting itself is the next phase of the project. Typically this meeting begins with a description of the purpose of the meaning and the benefits of the flood map modernization project to the communities involved. Next a description of the national Flood Map Modernization Program is provided. Third the state flood map modernization program is described, including how the state program ties in with local efforts and the national program. Next follows a description of the organizational roles in the process. This includes a description of the federal role, the state role, the local role, and the citizen role. At this stage there is a description of the flood mapping process to set realistic expectations and time frames for the flood mapping project. Finally, a breakout session occurs where community officials and citizens attending the meeting can assemble and point out specific flood map update needs to the staff involved. Some of the most important things to obtain at the scoping meeting include information on new flood mapping needs and the rationale for each need. In addition there is an effort to obtain information on any new or existing flood studies that are available, any new or recent topographic data or survey that has occurred, and any flood reduction projects that have occurred in the area. There is also identification of areas on the current FIRMs that are floodprone but are not shown as floodplains on the current flood maps or vice versa. And finally there is a need to identify a point of contact for all of the participants of the meeting for follow-up as necessary.

At the scoping meeting it is also critical to convey information on what data can and cannot be used in the flood mapping process. In general topographic information must be two to four foot contour equivalent, current, have well-documented accuracy statements, and be able to be used and distributed in a manner consistent with flood mapping. Orthophotos have similar requirements in that they must be current must have a known pixel resolution, projection, and tiling scheme and must have permission to use and distribute. In general the pixel resolution must be one meter or better. Engineering data must generally have a professional engineering stamp, include a 100 year flood analysis, check versus the USGS regression equations for hydrology, have a floodway defined if possible, make use of FEMA acceptable models, and tie into the existing flood study.

At the scoping meeting there is also discussion of the base map to be used. There are two potential types of base maps. The first is the orthophoto base map. This is the default standard for all FEMA maps unless a community requests otherwise. The second available option is the vector roadway base map. This map is only available when the community has good, countywide vector roadway information. The vector roadway information must meet strict map accuracy standards, and in general must be as accurate as the best available orthophoto. There are

detailed requirements on the accuracy required in FEMA's guidelines and specifications. The decision as to which base map to be used will have a profound impact on the final version of the product. While the orthophoto base is typically more useful in helping the user find the location on the map, and the vector base system has a longer shelf life, since not every single road is shown on this type of map.

The next action and project scoping is to conduct a cursory review of engineering data submitted from outside sources for use in the map. This data must have the following characteristics. First, it must tie into the effective flood mapping information both hydrologically and hydraulically. Second, it must provide at least the 100-year flood elevation and delineation, and preferably a 500-year delineation as well. If at all possible, it must contain a floodway model, especially if a floodway exists on the current FIRM. It is mandatory that new engineering data use FEMA acceptable models. It is also mandatory that the data be stamped by a professional engineer and prepared to sound engineering standards. In cases where the state is required to review the information, there must be evidence that this has occurred. There must also be suitable backup data for the files, including a work map showing the floodplain limits versus best available topography and electronic model information.

The next phase of the project is to determine the study methodologies. For each stream or coastal reach the scoping lead must determine the type of study to be applied, the limits of the study type, and any constraints on the study. Some important factors are economy of scale and the ability to use continuous hydrologic modeling. The economy of scale is achieved by having long continuous segments of study rather than many independent segments.

One study methodology is digital conversion. This is used when the effective FEMA data is accurate in both elevation and floodplain extents. The technique for this includes digitizing the paper map or using existing digitized flood data and overlaying it on the basemap. The data is then adjusted to fit. One important factor to consider in the digital conversion process is to ensure that the process needs the Procedure Memo 38 (PM38) standards on matching topography. PM38, also known as the Floodplain Boundary Standard, requires that all floodplains shown on new FEMA FIRMs match the best available topography and consider the risk classification of the flooding source in the process.

Another possible study methodology is Redelineation. This is used when the effective FEMA data is accurate in flood elevation, but not in flood extents, and new community topographic data is available to refine the floodplain limits. In this technique, flood elevations are defined at cross-section locations and intermediate points. The flood elevations are then read off of the effective FEMA profile and attributed to these cross-sections. The flood limits are then plotted using the attributed flood elevation. At this stage is also necessary to adjust the vertical datum of the study to NAVD88 as necessary. Redelineation is also an important tool in meeting the PM 38 Floodplain Boundary Standards.

A third study methodology -- and one that is being much more widely used with the introduction of the Floodplain Boundary Standard -- is approximate study. This technique is used when no flood map exists in an area and such data is needed for floodplain management, or the existing Zone A on the FEMA flood map is known to be inaccurate and must be replaced. In this technique automated programs for hydrology and hydraulics are used for the flood mapping process. Hydrology is typically based on USGS regression equations, and hydraulics is typically based on HEC-RAS hydraulic models. Typically, in the HEC-RAS hydraulic model no hydraulic structures are considered. However, bridges and culverts may be approximated using weir flow techniques. There is typically no significant calibration of the model, usually because no calibration data is available in the area studied by Zone A methods. This technique provides a base hydraulic model that may be further refined in the future as money and time permit. This technique also generates a Zone A floodplain map, but does not generate flood profiles, cross-section locations on the map, base flood elevations, or floodways.

Another study methodology that is also now being much more commonly used is the limited detail study. This is specified when the community has accurate digital topographic information available for the entire study area, and an improved Zone A model is needed. In this technique automated programs for hydrology and hydraulics are used for the flood mapping process. Like the Zone A method, this method provides a base model for future refinement. Similarly, like the Zone A method, regression equations hydrology is used. A HEC-RAS hydraulic model is created in this method, and hydraulic structures are considered. The structures are not surveyed, but rather field measured and included in an approximate manner in the models. There is limited calibration of the models where data is available. This product also generates a Zone A flood map. Profiles are developed but they are not published with the Flood Insurance Study however, these profiles are made available to the community for floodplain management purposes. Cross-section locations, base flood elevations, and floodways are not shown on the DFIRM, but a stream stationing system is used to help the reader locate positions on the map.

The final -- and most expensive technique for flood insurance study -- is the detailed study methodology. This is used when major map updates are required in hydraulically complex areas. It is almost exclusively used

in highly urbanized areas. In this technique traditional detailed hydrology and hydraulics are performed. This may include a detailed HEC-HMS model, and detailed HEC-RAS model. The hydrology is calculated and calibrated to available information such as river gages. For hydraulics, detailed field studies of the cross-sections and the bridges and structures along the route are performed and included in the model. The final results of this technique include full mapping of the floodplain including base flood elevations, floodways, creation of a floodway data table, and creation of flood profiles. Selected cross-sections developed in the flood mapping process are also shown on the final FIRM

Once the study techniques for each reach have been determined, the process progresses to the determination of the DFIRM paneling scheme. This is done using FEMA standards for the size of the map panel versus the type of information to be displayed on that panel. It is essential to know where detailed flood study, where approximate flood study, and where no study will occur to properly develop the panel scheme for particular county. In addition it is also important to know where the effective information for a county displays these types of study. The panel scheme creation process, detailed study areas are usually panelized at a scale of 1 inch equals 500 feet, while approximate study areas are panelized at a scale of 1 inch equals 2000 feet. Unstudied areas are panelized at a scale of 1 inch equals 2000 feet, and a determination is made as to whether or not the panel must even be printed if no floodplain boundary information is to be shown on that panel. The remaining panels are then panelized at scales of 1 inch equals 1000 feet to fill in the gaps between the two different panel scales. Panel scale and the total number of map panels have a profound impact on the overall cost of the project, and change frequently with the type of information to be shown on the FIRM.

The next stage in the processes is the finalization of the scope of work. At this stage of the process it is necessary to balance all the requirements of the study, the flood mapping needs, FEMA procedural requirements, the guidelines and specifications, and the available budget. It is also important to clearly define who does what portion of the project and when they must complete it. FEMA procedural memorandums such as PM 38 on the Floodplain Boundary Standard, and numbers 43 and 34 on the levee standards, factor heavily into the scope of work. During the finalization of the scope of work there will be a necessity to prioritize new study in most cases since the available budget will be less than the total amount that will cost to perform all requested new study. It is also important at this stage to remember to include management and reporting costs over the life of the project.

When considering the budget constraints versus the scope of work, there a number of different techniques that could be used to reduce cost while minimally affecting the quality of the final product. One possibility is to convert detailed study to limited detail study. This has a dramatic cost reduction effect, but produces a highly comparable product. Another possibility is to convert limited detail study to straight Zone A study. When Zone A study is specified it reduces the costs of field measurements of the bridges and structures, but still allows their consideration through simple weir flow techniques. It is also important to aggregate the mileages used into fewer short segments and more long segments of study, as this provides for an increased economy of scale. During this phase it will be necessary to adjust the flood map paneling scheme in concert with the changes to the flood map study types and standards. Another way to reduce costs at this stage may be to require engineering data from outside sources to go through the Letter of Map Revision (LOMR) process rather than directly incorporating it into the map. This places the burden of engineering review more on the submitting party, but still allows for the inclusion of the data. And, as always, is important to include more interim reviews in the process, as this results in fewer surprises at the end of the project

Following the finalization of the scope of work is the preparation of the project management plan. This step verifies the project management team, assigns tasks, sets budgets and schedules, and begins the negotiation process with contractors. The project management plan should be a fluid document and should change regularly with changes in the project itself.

After this step it is necessary to populate the various FEMA database concerned with scoping. These include the Map Needs Update Support System (MNUSS) and the WISE scoping tool. Needs must be identified as either met or unmet. Here it is also important to set up the project and Mapping Information Portal (MIP), showing schedules, budgets, and responsibilities. It is also critical to gather information on the metadata for the project including the needs and the rationale for the needs.

Once the population of the various databases has occurred and the project scope has been finalized a Memorandum of Agreement (MOA) may be generated. This technique is used in Georgia to convey the agreement between the community and the state. All parties agree to cooperate and sharing scoping and study information. All parties also agreed to share data with the State. The State agrees to provide any created data back to the community. The scope of work in the community is included as an attachment to the Memorandum of Agreement.

At this point, the scoping process is complete. Flood map production may now begin. However, there is a high likelihood that some small changes to the scope of work may occur as the project progresses. It is vital to convey these scope changes back to all parties involved in the

flood mapping process, especially the community. Good communication is essential throughout the scoping process, and throughout the flood map production process in general.

As shown here, the flood map scoping process in Georgia consists of many steps, and involves many parties. The coordination of these parties, determination of their input to the various steps, and acceptance of the data they can provide to the process, is critical to the overall success of the program. The methodology described above has been finely tuned through scoping meetings with over 50 counties in the State, and continues to evolve today.

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