Leslie A. Bond Associates

Flood Hydrology ♦ Floodplain Management ♦ Stormwater Management

Toward a Working Group on Floodplain Management Issues Related to Dams

Leslie A. Bond, CFM, LA Bond Associates

August 22, 2008

ASFPM Chair Al Goodman, CFM, has appointed me to develop a Working Group to address floodplain management issues related to dams. Ideally, I think this Working Group should include the following:

- All ASFPM members who have an interest in this subject;
- FEMA headquarters staff in dam safety and floodplain mapping;
- At least one state dam safety official who is current with ASDSO activities;
- A Corps staffer in dam safety/NID;
- A dam staffer from NRCS; and
- At least one community official who is affected by dam issues

I am not looking for "representatives" of agencies or organizations. We need professionals who are familiar with various aspects of dams, dam issues and connections between dam issues and floodplain management issues. Later on, ASFPM can officially present its position(s) to other organizations and agencies and seek their concurrence.

The objectives of this Working Group will be:

- To educate ourselves on all aspects of dams and dam issues related to floodplain management;
- To identify dam-related issues that relate to floodplain management;
- To quantify, categorize and/or prioritize aspects of these issues to make them easier for ASFPM members and Board Members to understand;
- To draft a white paper on dam-related issues for consideration by the ASFPM Board; and
- To suggest policies and policy statements for adoption by ASFPM.

The work of the working group will be conducted primarily by conference call and email. Once there are enough members to start, I will schedule regular teleconference meetings, probably one per month. I think regular meetings are essential to maintaining interest and making progress. We may establish committees within the working group to assemble specific types of information or work on specific problems.

The attached paper summarizes my current knowledge and thinking on these issues, and will serve as a starting point for discussion. Each member of the Working Group should add issues to my list and present reasons why things on my list should not be considered by the Working Group.

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Working Group on Dam Issues Related to Floodplain Management
Proposed Agenda for Organizational Meeting 10:00 AM MDT, September ??, 2008

1. Call to order.

2. Attendance.

3. New Business.

   a. Discussion of seven issues raised in Les Bond's August 22, 2008 paper - **30 minutes.**

      Issue 1: National Inventory of Dams (NID)

      Issue 2: FEMA policies for mapping floodplains below dams and spillways

      Issue 3: Emergency Action Plans (EAPs)

      Issue 4: Connections and disconnects between floodplain management and dam safety

      Issue 5: Environmental issues are related to dams

      Issue 6: Effect of national security concerns on dams and floodplain management

      Issue 7: Other issues

      a.1. Are there additional issues we should include? – **10 minutes**

      a.2. Should these issues be divided or combined? – **10 minutes**

      a.3. Should these issues be prioritized? On what basis? – **10 minutes**

   b. Are we agreed on the objectives of the working group? – **20 minutes**

      - To educate ourselves on all aspects of dams and dam issues related to floodplain management;
      - To identify dam-related issues that relate to floodplain management;
      - To quantify, categorize and/or prioritize aspects of these issues to make them easier for ASFPM members and Board Members to understand;
      - To draft a white paper on dam-related issues for consideration by the ASFPM Board; and
      - To suggest policies and policy statements for adoption by ASFPM.

b.1. Are there additional objectives we should include? – **20 minutes**

c. Other new business – **10 minutes**

4. Adjourn

What Do We Know About Dams Related to Floodplain Management?

Prepared by Les Bond

August 22, 2008

This is the beginning of a list of dam-related issues that impact floodplain management. The first two tasks of the Dam Issues Working Group are to educate ourselves on dams and identify these issues. These are just my initial observations. All members of the Working Group are invited to offer corrections and additions to this list. I have a lot to learn. Lab

The issues and related questions are highlighted in gray.

Quoted information from various sources is highlighted in yellow.

My comments are highlighted in light blue.

Issue 1: National Inventory of Dams (NID)

With the National Dam Inspection Act (P.L. 92-367) of 1972, Congress authorized the U.S. Army Corps of Engineers (USACE) to inventory dams located in the United States. The Water Resources Development Act of 1986 (P.L 99-662) authorized USACE to maintain and periodically publish an updated National Inventory of Dams (NID). The Water Resources Development Act of 1996 (P.L. 104-303), Section 215, re-authorized periodic update of the NID by USACE, and continued a funding mechanism.

The current NID is the result of this evolutionary process. The USACE continues to work closely with the Association of State Dam Safety Officials (ASDSO), FEMA, and other state and federal agencies to update and publish the NID. The success of the NID maintenance and publication program can be attributed to the cooperative participation of the 50 states and Puerto Rico (as facilitated by ASDSO), and 17 federal agencies, who provide information on approximately 79,000 dams currently in the NID.

The Interagency Committee on Dam Safety (ICODS) created a subcommitee to advise USACE on the update of the NID. The NID Subcommittee provides guidance and recommendations concerning the data elements, format, and publication media for the NID. Its membership consists of representatives of non-federal and federal agencies who participate in the NID…

The Corps of Engineers and ASDSO are continuously improving the process of inventory data collection and transmission by the states and federal agencies to take advantage of current PC computers, software and the Internet. Software tools have been recently developed to improve the process of managing, inputting, and transmitting NID data… In 2003, a quality assurance tool was developed to assist in the NID publication process. The Corps [checks the quality of] the incoming data and resolve[s] duplicate dam submittals. With the assistance of ASDSO, the states and federal agencies, the Corps published the updated 2005 NID on the Internet in February 2005…

Note that the objectives of the program to update the NID are the same as those stated in the 1989 manual *ASDSO National Inventory of Dams Methodology*:

- Update the Dam Inventory data with information from the states and federal agencies.
- Foster state self-sufficiency through assistance for states to maintain and update their own inventory systems, and transfer the information to the National Inventory.
- Obtain participation of all states in the National Inventory.
- Maintain state control of information they submit.[1]

a. What can we learn from the NID?

b. What do we need to know from the NID?

c. How current is the NID?

d. Does the NID need to include additional information to support floodplain management?

[1] http://crunch.tec.army.mil/nidpublic/webpages/nid.cfm

Issue 2: FEMA policies for mapping floodplains below dams and spillways

What FEMA is Doing About Dam Safety

For more than 25 years, the Federal Government has been working to protect Americans from dam failure through the National Dam Safety Program (NDSP). The NDSP, which is led by FEMA, is a partnership of the states, federal agencies, and other stakeholders to encourage individual and community responsibility for dam safety.

- **Information Needs**
  Under the leadership of FEMA, state assistance funds have enabled all participating states to better their programs through increased inspections, emergency action planning, and the purchase of needed equipment...

- **Research**
  There is now a national research program in dam safety that is focusing on priorities, producing products for both the layperson and the expert, and developing technological tools that drive data collection and analysis toward a better understanding of risk and remediation needs...

- **Training**
  In the training arena, FEMA has been able to expand existing training programs and begin new training programs to enhance the sharing of expertise between the federal and state sectors... [2]

a. What are FEMA's mapping policies?

C.1.1.1 Floodplain Storage Considerations [February 2002]

Large storage areas in a floodplain will significantly attenuate flooding within a community. The Mapping Partner shall evaluate attenuation using a standard flood routing technique. Storage in the floodplain may be uncontrolled, such as in detention ponds, isolated small natural depressions, and in wide floodplains of large rivers, or controlled with reservoirs. The requirements for performing hydrologic analyses of uncontrolled flood storage and controlled flood storage are presented below.

Uncontrolled Flood Storage

Uncontrolled detention ponds and natural depressions both provide uncontrolled flood storage. Detention ponds typically are used in developed areas for onsite storage, and these ponds limit post-development peak flow rates from a design storm to those of the pre-development stage. The ponds also are used for regional detention based on a master plan for the watershed area of interest. Depending on climate characteristics and local design standards that vary across the nation, detention ponds may be able to attenuate peak flow rates for a 1-percent-annual-chance storm for arid areas; however, in more humid areas, most ponds are designed for 20- to 50-percent-annual-chance storms.

Usually, an ungated spillway and a low-level, ungated conduit comprise the detention pond outflow structure. The effectiveness of a detention pond in attenuating peak flow

[2] http://www.fema.gov/plan/prevent/damfailure/what.shtm

rates in the downstream reach depends on the pond's location in the watershed and its storage and release characteristics. While an onsite detention pond may be effective for a single development site, it may not be as effective for a large urban watershed that has many onsite detention facilities that are not located and designed systematically (Maidment, 1993). The Mapping Partner performing the hydrologic analysis shall analyze floodplain storage in small isolated natural depressions, where outflow is only through overflow, as uncontrolled detention ponds with appropriate outflow characteristics.

The Mapping Partner may use both hydrologic and hydraulic routing methods to route the flow through ponds. Hydrologic routing methods are to be used when the outflow from the pond is not dependent on tailwater. Most of the single-event hydrologic models (e.g., HEC-HMS, HEC-1, TR-20) use hydrologic routing methods. The Mapping Partner shall use hydraulic routing methods when outflow from the pond is dependent on tailwater conditions. For example, tailwater condition is a control factor where a series of interconnected detention ponds are used for flood attenuation in a relatively flat watershed. The hydraulic routing for ponds is often performed with an unsteady-flow model. A list of models accepted by FEMA for this purpose may be found on FEMA's Flood Hazard Mapping Web site at http://www.fema.gov/fhm/en_modl.shtm.

Wide floodplains with significant storage areas often exist along large rivers in relatively flat watersheds. The Mapping Partner performing the hydrologic analysis may use the unsteady-flow models (one-dimensional models with quasi-two-dimensional capabilities and two-dimensional models) that appear on the FEMA accepted models list to simulate flood attenuation due to this type of storage.

Controlled Flood Storage

Most large reservoirs on large river systems are operated with outflow controls. In these reservoirs, gates are used for regulating flow through outlet structures. The gates are operated according to established rules that determine the relationship between inflow, outflow, storage, and water demand.

The Mapping Partner performing the hydrologic analysis normally shall not consider storage capability below the Normal Pool Elevation of reservoirs operated primarily for purposes other than flood control because the availability of such storage is uncertain. The exception is when all of the following conditions have been met:

- Operation of the project in accordance with its documented water control plan could affect the 1-percent-annual-chance flood elevations in a community by 1 foot or more.

- The storage capability to be considered is totally dedicated to flood control. Where different amounts of storage can be totally dedicated during different parts of the year, the Mapping Partner shall obtain flood discharges from the joint probability combination of frequency curves established for each part of the year that the different storage levels are dedicated. Joint use storage based on forecasted inflow is not acceptable for NFIP purposes.

- A project water control plan providing explicit details of operation during flooding conditions is in effect and has been reviewed and approved by FEMA or another Federal agency responsible for Federal flood-control activities. The Mapping Partner shall contact the RPO to discuss the review and approval process.

- A written commitment to dedication of the flood-storage capacity and to the approved reservoir operation plan is assured through a mandatory condition of Federal or State licensing or through a direct agreement between the project operator and FEMA for non-Federal projects. [3]

This does not include instructions to evaluate the possibility of dam failure during a food event. Is there another section in the *Guidelines and Specifications* that discusses this? - lab

b. Do the FEMA mapping policies for dams support floodplain management?

Certification of the Rio Grande levees in southern NM and southwest TX is currently a mapping issue. Interstate highway I-25 and I-10 run beside the Rio Grande from Albuquerque to El Paso. There are several SCS dams from the 1960's or 1970's above the highways. Would a failure of one of these dams exceed the capacity of the Rio Grande levees? Is there a 1% annual chance that one of these 10 or twelve 50-year dams will fail? - lab

[3] *Guidelines and Specifications for Flood Hazard Mapping Partners*, FEMA, April 2003: Appendix C - Guidance for Riverine Flooding Analyses and Mapping

Issue 3: Emergency Action Plans (EAPs)

a. How many EAPs are there? – NID?

The NID includes this info. I have a 1999 version of the NID, but the current version is not available on the internet. - lab

b. How many EAPs are needed? – NID?

Dams are classified as high, moderate and low hazard, depending on the downstream damage potential. Everyone seems to agree that EAPs are needed for all high and moderate hazard dams. This leads to two questions:

(1) How many high and moderate hazard dams have (do not have) EAPs?

(2) How often is the hazard classifications reviewed in light of new development below the dam? - lab

c. What information is in EAPs?

d. Does the methodology used for EAPs get results that support floodplain management?

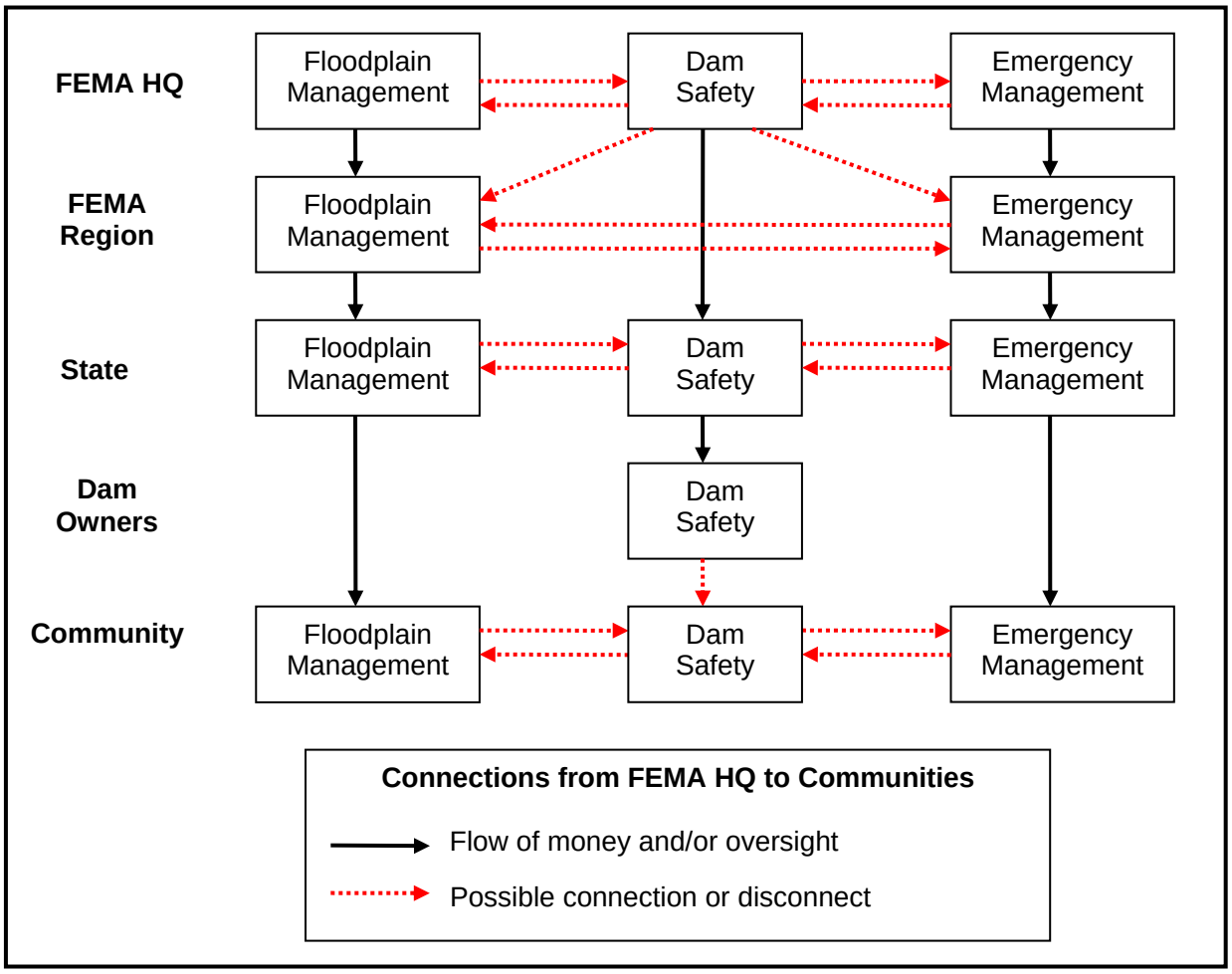
I have looked at the FEMA/ASDSO guidance for preparing EAPs and several state standards for EAPs. They are based on probable maximum precipitation (PMP) and do not mention the 1% chance flood. If FEMA floodplain mapping ignores any event larger than the 1% chance flood, EAPs will be ignored in floodplain mapping. - lab

e. How is information from EAPs being integrated into floodplain management?

The Community Rating System provides credit to communities that integrate information for EAPs into their emergency preparedness and response plans. Of about 1,100 CRS communities, only two have received this credit. - lab

Issue 4: Connections and disconnects between floodplain management and dam safety

The figure below is my *impression* of the flow of funds from FEMA to communities and the flow of information and/or responsibilities. This figure should be refined by those who know more about it. Does other federal money go to communities for dam-related issues? Should we develop similar charts for the Corps, NRCS, Bureau of Reclamation, TVA, others? – lab



Assuming for the moment that floodplain management, dam safety and emergency management should be strongly connected at the community level to facilitate flood damage reduction and public safety:

- How strong are the connections at the FEMA HQ, FEMA Region, state and community levels?

- Note that FEMA Regions, which have major responsibilities in floodplain management and emergency management, are not in the FEMA HQ/state loop in dam safety.

- Note that there is a different group of players (dam owners) between the states and communities in dam safety.

How well are EAPs integrated into state and community emergency response plans, hazard mitigation plans, floodplain management plans land-use plans, etc? – lab

Issue 5: Environmental issues are related to dams

a. How do dams affect wetlands, riparian habitats and other sensitive areas?

b. How much of a threat do dams pose to water and sewage treatment plants, chemical plants and storage facilities, etc.?

Issue 6: The effect of national security concerns relative to dams and floodplain management

Dam Inspection Data Withheld From Press Under Patriot Act

By Joe Strupp
Published: June 25, 2008 11:15 AM ET

New York news outlets seeking inspection and safety data on local dams, in light off the recent string of floods in the Midwest, have been stonewalled by government officials who have withheld such data as part of the Patriot Act, according to Investigative Reporters and Editors.

IRE Data Base Library Director Jeremy Milarsky, who oversees the group's handling of data requests from news organizations, said at least a dozen news outlets requested such background data on dam inspections from IRE in the last week. He said that is up from the usual three or four in any given year.

Such information, however, has been unavailable since 2002, when the U.S. Army Corps of Engineers began rejecting such requests as part of a U.S. Patriot Act stipulation.

"Among other things, the data included when each dam was last inspected, whether there was an evacuation plan for the area, and whether there was populated area close to the dam that would be impacted," Milarsky said. "It is basically a list of dams with information about how safe the dams were."

Milarsky said the data for nearly 70,000 dams is in the data base, which IRE had access to prior to 2002 when the Patriot Act changes took effect. He adds that IRE has annually requested access to the data, being rejected each time.

"The searchable database comprising the NID (National Inventory of Dams) concerns dams that meet the definition of 'critical infrastructure' as defined by the USA Patriot Act of 2001," the last rejection letter from the Department of the Army, sent to IRE in June 2007, stated. It later adds that the requested database "contains certain information that constitutes a vulnerability assessment."

Timothy L. Felker, the Army Corps of Engineers counsel who wrote the letter, could not immediately be reached for comment Wednesday.

Milarsky said keeping such information from the press, and the public, adds to safety concerns. "Reporters last week, all over the country, were asking officials about the infrastructure designed to protect people during flooding," he explained. "This is one more category of infrastructure that is a very useful tool for investigations."

James Wilkerson, a data editor for the Des Moines Register, is one of the journalists who recently sought the dam data from IRE, only to find it was withheld. "With all of the problems with the flooding, the information would be very useful," he told E&P. "It makes it hard for the public to understand how these dams are maintained."

Among IRE's many activities is maintaining such data for reporters to access. Last year, after the tragic Minnesota bridge collapse, the organization was swamped with requests for bridge inspection data, which was available.

"The public interest in being updated on the condition of these dams outweighs the security concerns about giving out the information," said IRE Executive Director Mark Horvit. "Our concern is that this information is important to the public because it talks about inspection data and safety."[4]

[4] Quoted from email from James Demby to Leslie A. Bond and others at 5:59 AM 7/8/2008.

Issue 7: Other issues

Public safety, flood warning, public and private infrastructure, flood insurance? - lab