

MEMORANDUM

TO: Dale Frink, State Engineer
FROM: Patrick Fridgen, Planning Division
SUBJECT: Status of current flood-related studies
DATE: August 11, 2009

As part of our efforts to coordinate flood studies across North Dakota, in conjunction with the new Flood Mitigation Multi-Agency Task Force, we should begin with an inventory of current and proposed study efforts.

Flooding has occurred in most areas of North Dakota over the years, which has resulted in a multitude of flood control/mitigation studies and many successful projects. In the wake of 2009 flooding, there is a need to revisit some of the previous work and initiate new efforts. The State Water Commission is involved in, or is helping sponsor, a number of flood damage control studies, which are in various stages of completion. In addition, federal funding has been made available for several other studies. The following is a listing and summary of current studies, as well as some that have been proposed.

Proposed Studies & Those Under Consideration**James River Watershed:**

Federal funding of up to \$200,000 may be available (pending Congressional approval) for an Army Corps of Engineers (COE) reconnaissance study of the James River watershed. The city of Jamestown, and Stutsman and LaMoure Counties have all sent letters or resolutions to the COE Omaha District office requesting that they proceed with the study.

Knife River Watershed:

The Mercer County Commission passed a resolution requesting that the Mercer County Water Board undertake a Knife River watershed study to identify flood damage reduction solutions. The resolution was prepared following a public meeting in Beulah, on May 7, 2009, that included citizens and representatives from Beulah, Hazen, Zap, and surrounding areas. To date, the Mercer County Water Board has made a formal request to the COE to have them initiate a Section 205 flood study. However, at an August 5 Mercer County Commission meeting, the COE indicated that because of the no new starts policy, the COE does not have the authority to initiate a study in the Knife River watershed at this time.

Red River Basin Long-Term Flood Solutions Study:

This is a study being coordinated by the Red River Basin Commission with funding support from the North Dakota State Water Commission and the Minnesota Board of Water and Soil Resources. A work plan is being developed and should be approved soon. The process will include three phases: first, to inventory potential flood solutions; second, to analyze those solutions and how they might be integrated; and third, to develop an implementation strategy.

Sheyenne River Watershed:

There are two separate flood-related studies that will likely proceed in the near future in the Sheyenne River watershed: 1) a COE reconnaissance study, which will proceed as a continuation of an existing Red River reconnaissance study; and 2) a locally sponsored watershed floodwater retention study.

Federal funding of up to \$200,000 may be available (pending Congressional approval) for a COE reconnaissance study of the Sheyenne River watershed. This study will proceed under authorization of an existing Red River reconnaissance study. Discussions with the Upper Sheyenne and Lower Sheyenne River Joint Water Boards have been initiated to establish a local sponsor. The Upper Sheyenne Joint Board will be coordinating a formal request to the COE to encourage their pursuit of the study.

In addition, the Water Commission recently agreed to cost-share on a Sheyenne River watershed floodwater retention study. The purpose of this study is to determine the potential of constructing floodwater retention structures throughout the watershed. The study will consist of general information development; preliminary meetings; review of existing FIS HEC-RAS computer models; sub-watershed delineation and analysis of the Sheyenne River above and below Baldhill Dam; identification of floodwater storage potential between Lisbon and Valley City, and between Kindred and Lisbon; identification of the storage potential on the three largest tributaries downstream of Baldhill Dam; a benefit-cost analysis of the Baldhill Creek detention site, and of the mainstem and tributary sites identified from the Sheyenne River mainstem and tributary site analyses; completion of a study report; and public meetings to include study modifications.

The Sheyenne River Joint Water Resource District is the local sponsor of this study.

Studies Currently Underway

Antelope Creek Feasibility Study – Potential Water Retention Alternatives:

This study is being locally sponsored by the Southeast Cass Water Resource District. The purpose of this study is to determine the potential of constructing floodwater retention structures throughout the Antelope Creek watershed. Previous studies completed by Moore Engineering (for the SE Cass WRD), identified several potential floodwater storage sites on the mainstem of the Wild Rice River. However, an investigation had not been completed for the Antelope Creek sub-watershed of the Wild Rice River.

Beaver Creek Watershed:

Significant flooding in the City of Linton in 2009 caused them to request Water Commission technical assistance - that is currently in progress. At the request of the Emmons County Flood Recovery Task Force, the State Water Commission is conducting an investigation with the Emmons County Water Resources Board. This investigation will consider the hydrology of the Beaver Creek basin in an attempt to find opportunities to provide flood storage above the city of Linton. It will also include a hydraulic analysis of Beaver Creek through Linton, extending for some distance upstream and downstream

of the city. This effort will attempt to identify measures, especially non-structural, that may be undertaken to reduce flooding from both a planning and emergency standpoint.

The hydrologic model was previously developed and is ready for use. Survey work for the hydraulics is in progress.

Also, in order to determine if there is potential for a federally supported flood control project, Water Commission staff have encouraged local officials to request a COE Section 205 flood control study. However, the no new starts COE policy will likely prevent them from starting a study for Linton anytime soon.

Boise de Sioux River Water Retention Feasibility Study:

This study, locally sponsored by the Southeast Cass Water Resource District, will determine the potential benefits of constructing a floodwater retention structure near the North Dakota/South Dakota border, downstream of Lake Traverse. The purpose of the study is to discover the best location based on storage potential, benefits, and downstream impacts.

Devils Lake Basin Studies:

There is a long history of flooding in the Devils Lake Basin. Numerous studies by federal, state, and local agencies have been undertaken over time. Since major flooding began in 1993, site-specific studies at the city of Devils Lake, city of Minnewaukan, and the Spirit Lake Reservation have been completed, or are in progress. The COE is nearing completion of a flood control feasibility study at the city of Devils Lake. And, the State Water Commission is studying a major upgrade to the state's emergency outlet works.

Fargo-Moorhead and Upstream Area, North Dakota, South Dakota and Minnesota:

This COE feasibility study is looking for opportunities to reduce flood damages and restore aquatic ecosystems in the entire watershed upstream of Fargo-Moorhead. The study began in August 2004. Phase 1a was completed in June 2005 and concluded that a system of impoundments could reduce the 1-percent-chance flood stage in Fargo-Moorhead up to 1.6 feet, but the system is not likely to be economically justified based on economic benefits alone. Phase 1b began in April 2008 to develop hydrologic and hydraulic models of the Wild Rice River in North Dakota to assess specific potential storage sites. Scoping for Phase 2 of the study is underway and will include more detailed investigations of environmental benefits and site-specific economic benefits.

Fargo-Moorhead Metropolitan Area, North Dakota and Minnesota:

This is a COE feasibility study of flood risk management measures for the entire Fargo-Moorhead metropolitan area, which began in September 2008.

The COE is currently in the middle of the initial NEPA scoping and screening process. They are wrapping up the initial geotechnical analyses and borings, and are preparing preliminary layouts and cost estimates for three different levee heights through Fargo-Moorhead and nine different versions of diversion channels around the urban areas. The COE Economics Team is building an economic model to calculate the benefits associated with each preliminary alternative.

The cities of Fargo and Moorhead are working with Moore Engineering, Houston Engineering and Barr Engineering to provide in-kind services - analyzing the diversion alternatives, building an unsteady HEC-RAS model, looking at interior flood control with XP-SWMM, and conducting public information meetings.

The COE Non-structural Flood Proofing Committee is preparing a non-structural plan. And, their Environmental staff is coordinating with resource agencies and will have meetings to define the environmental impacts of these alternatives and begin to prepare the EIS.

Using all of this information, in September, the COE plans to screen out plans that are not likely to be viable (for many reasons) and focus on a few plans and combinations of features that look the most promising. In late October, the COE will have public meetings to share the results of the initial screening. Between October and December the COE is planning to narrow the field down to one tentatively recommended plan that can go through the COE internal and external review process.

Fargo Southside Flood Control Project:

As mentioned in the Metro Study section above, the COE is expected to identify preferred options for local flood control later this fall. It is not known at this time if this project will be pursued as part of the larger metro project, or separately.

Pembina River Basin Study:

The COE and the State of North Dakota began a study of the Pembina River in August 2008 under the Section 22 Planning Assistance to States program. The study will develop a HEC-RAS unsteady flow model of the lower Pembina River and the Red River of the North from Drayton, North Dakota to the international border.

A reconnaissance study of the Pembina River basin is under way but on hold pending identification of a non-federal sponsor for the feasibility phase of study. The reconnaissance study began in April 2006. The draft report identified flooding in the lower Pembina valley from Walhalla, North Dakota, to Pembina, North Dakota, as the primary problem in the study area. An existing dike along the international border is the subject of ongoing litigation; and uncertainty regarding the future of that dispute has complicated the study efforts. The COE reconnaissance study focuses on potential solutions that lie within the United States, but it appears that more creative and beneficial solutions to flooding in the lower Pembina River basin would be possible with a cooperative United States-Canadian planning effort.

Red River Basin Watershed Study:

The COE began a basin-wide watershed study in June 2008. The first phase of the study will use LIDAR to collect detailed topographic information and develop a digital elevation model of the entire watershed in cooperation with the International Water Institute. Subsequent phases will be pursued to build and refine basin-wide hydraulic and hydrologic models, develop a decision support system, and prepare a comprehensive watershed management plan.