



DEPARTMENT OF THE ARMY
CHIEF OF ENGINEERS
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WASHINGTON, DC 20310-2600

DAEN

APR 16 2019

SUBJECT: Souris River Basin Flood Risk Management Study, Bottineau, McHenry, Renville, and Ward Counties, North Dakota

THE SECRETARY OF THE ARMY

1. I submit for transmission to Congress my report on flood risk management in the Souris River Basin, within the City of Minot, North Dakota. It is accompanied by the report of the district and division engineers. The study is authorized by Section 209 of the Rivers and Harbors Act of 1966, Public Law 89-789, which authorizes a study for flood control and allied purposes, including channel and major drainage improvements, for the Souris River and its tributaries within the United States. This report addresses the most critical and vulnerable portions of the authorized study area in the City of Minot, which was heavily damaged by the flood of record in spring of 2011. The 2011 flood overwhelmed a majority of levees and exhausted flood fighting efforts along the entire reach of the Souris River through North Dakota. The intensive flooding caused extensive damage to homes, businesses, public facilities, infrastructure and rural areas with estimates of approximately \$700 million in damages to about 4,700 commercial, public and residential structures in Ward and McHenry counties. Approximately 11,000 people were displaced from their homes. The city has an important role in national security and the energy sector due to the presence of nearby Minot Air Force Base and given its proximity to the Bakken oil field. Hydrologic conditions in the basin are significantly different now than when the existing projects were designed. The estimated 1-percent annual chance exceedance has increased from 5,000 cubic feet per second (cfs) to approximately 10,000 cfs. This results in a significant increase in the risk of flood damages in the basin and warrants a re-evaluation of the effectiveness of existing and potential flood risk management measures.

2. The reporting officers recommend authorizing a plan to reduce flood risk by the construction of a diversion channel with associated features, a north diversion levee with a 1.21 mile recreation trail connecting to an existing trail system, and west tieback levee. The recommended plan includes approximately 4,900 linear feet of diversion channel and 3,700 linear feet of earthen levee on the north side of the diversion along the Souris River in Minot and 1,600 linear feet of levee at the west tieback location. The diversion channel would bypass flood water on the Souris River downstream of the downtown area thereby avoiding significant flooding. The recommended plan would significantly reduce flood damages and flood risk in the Minot area,

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but it would not completely eliminate flood risk. The plan will reduce flood stages on the Souris River in north Minot, North Dakota benefiting over 3,500 structures.

3. This plan is proposed concurrently with a larger non-federal plan for flood risk management, the Mouse River Enhanced Flood Protection Project (MREFFP), being implemented by the Souris River Joint Water Resources Board (SRJB). This larger plan is a flood risk management project consisting of new construction; and alteration of existing federal projects, receiving conceptual approval under Section 14 of the Rivers and Harbors Act of 1899, 33 U.S.C. Section 408 on December 19, 2017. The MREFFP is proposed to be constructed and permitted in five stages over 25 years at an estimated cost of \$1 billion. Complete construction of the MREFFP would include approximately 18.1 miles of new levees, 2.6 miles of new floodwalls, 2 channel realignments totaling 1.6 miles, 2 high flow bypass diversions, 20 transportation closure structures, the reconstruction or modification of 6 bridges, 111.6 acres of overbank excavation, and the acquisition of over 900 properties. Four phases of the larger MREFFP, comprising construction stage 1, are assumed as part of the Future without Project and Section 408 permission was approved in 2017 granting the SRJB the authority to move forward with construction. Construction of the first three phases of the MREFFP commenced in 2018, and a fourth phase is in the final stages of design. The recommended plan ties into the phases currently being constructed and is a critical component of the overall system.

4. The recommended plan is the National Economic Development (NED) plan and is estimated to reduce equivalent annual damages (EAD) by approximately \$3,901,000 or 62%, with a residual EAD of \$2,400,000. The recommended plan reduces the overtopping residual risk by more than an order of magnitude as compared to the current federal project (and Future Without Project conditions) which has residual damages starting around the 2-percent annual chance of exceedance flood event (approximately 5,000 cfs). The SRJB is responsible for maintaining the existing federal project, which is a key component to reduce system wide flood risk. Once the remaining stages of the larger MREFFP are complete, the level of flood risk for the community will be reduced further. Interim impacts associated with the staging of the phases of the entire MREFFP have been assessed as part of the Section 408 for the various construction stages. SRJB also has a System Wide Improvement Framework plan accepted and is currently implementing the plan, reducing risk to the existing system during design and construction and reducing the temporary transference of risk during construction stages. Overall the increased transference of risk is negligible between construction stages.

5. The SRJB is the non-federal cost-sharing sponsor for the authorized project. The total estimated first cost of the NED plan based on 2019 price levels is \$87,323,000, with the federal and non-federal shares of total first cost estimated at \$56,586,500 and \$30,736,500, respectively.

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The flood risk management features have an estimated total first cost of \$86,164,000, with the federal and non-federal shares estimated at \$56,007,000 and \$30,157,000, respectively. The recreation features have an estimated total first cost of \$1,159,000, with the federal and non-federal shares estimated at \$579,500 and \$579,500, respectively. The SRJB would also be responsible for the operation, maintenance, repair, replacement and rehabilitation (OMRR&R) of the project after construction, a cost currently estimated at \$457,000 per year. Based on a 2.875-percent discount rate and a 50-year period of analysis, the total equivalent annual costs of the project, including OMRR&R, are estimated to be \$3,846,000. The equivalent average annual benefits are estimated to be \$3,901,000. The benefit-to-cost ratio is 1.1 to 1.

6. Risk and uncertainty was factored into the economic analysis through the use of statistical risk based models to formulate and evaluate the alternatives. HEC-FDA, a probability based economic model was used to compute stage-damage curves and equivalent annual damages (with and without project) based on water surface profiles by flood event probability, asset (structure) inventory and damage relationship functions. Uncertainty or error distributions associated with estimating the depth damage functions, structure values, content value ratios, other value ratios and first flood stage were used to develop the total aggregated stage damage-uncertainty functions by damage categories for the damage reach to identify the NED plan. The project is intended to address flood inundation and prevent damages to structures; it is not intended to, nor will it, reduce the risk to loss of life during major storm events. Loss of life can only be prevented by residents and visitors following the local evacuation plans that are already in place. These residual risks have been communicated to the residents of the communities in the study area.

7. In accordance with the Corps' guidance on review of decision documents, all technical, engineering and scientific work underwent an open, dynamic and vigorous review process to ensure technical quality. This included District Quality Control, an Agency Technical Review (ATR), a Type I Independent External Peer Review (IEPR) and a Headquarters USACE policy and legal review. All concerns of the ATR have been addressed and incorporated in the final review. The ATR comments helped to more clearly communicate the information that was provided in the report. The IEPR was managed by Battelle Memorial Institute. All comments from the above referenced reviews have been addressed and incorporated into the final documents. Overall, the reviews resulted in improvements to the technical quality of the report. A safety assurance review, Type II IEPR, will be conducted during the design phase of the project.

8. Washington level review indicates that the project recommended by the reporting officers is technically sound, environmentally and socially acceptable, and economically justified. The plan

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complies with all essential elements of the 1983 U.S. Water Resources Council's Economic and Environmental Principles and Guidelines for Water and Land Related Resources Implementation Studies and complies with other administrative and legislative policies and guidelines. The views of interested parties, including federal, state and local agencies have been considered. An environmental assessment has been prepared and was made available to the public from October 2017 to November 2017 in accordance with the National Environmental Policy Act of 1969. No compensatory mitigation is required, as the recommended plan will have negligible adverse impacts to fish and wildlife resources. This finding is consistent with Department of the Army permit number NWO-2014-01468-BIS for Stages 1 and 1.5 of the MREFPP.

9. I concur in the findings, conclusions, and recommendations of the reporting officers. Accordingly, I recommend that the plan to reduce flood damage in Minot, North Dakota, be authorized in accordance with the reporting officers' recommended plan at an estimated cost of \$87,323,000 with such modifications as in the discretion of the Chief of Engineers may be advisable. My recommendation is subject to cost sharing, financing, and other applicable requirements of federal laws and policies, including Section 103 of P.L. 99-662, Water Resources Development Act (WRDA) of 1986, as amended (33 U.S.C. 2213). These requirements include, but are not limited to, the following items of local cooperation from the non-federal sponsor:

a. Provide a minimum of 35 percent, but not to exceed 50 percent, of the total structural flood damage reduction costs, and 50 percent of total recreation costs, as further specified below:

(1) Provide, during design, 35 percent of design costs allocated to structural flood damage reduction and 50 percent of design costs allocated to recreation in accordance with the terms of a design agreement entered into prior to commencement of design work for the project;

(2) Pay, during construction, a contribution of funds equal to 5 percent of total structural flood damage reduction costs;

(3) Provide all lands, easements, and rights-of-way, including those required for relocations, the borrowing of material, and the disposal of dredged or excavated material; perform or ensure the performance of all relocations; and construct all improvements required on lands, easements, and rights-of-way to enable the disposal of dredged or excavated material as determined by the Federal Government to be required or to be necessary for the construction, operation, and maintenance of the project, all in compliance with applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act

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of 1970, P.L. 91-646, as amended (42 USC 4601–4655) and the Uniform Regulations contained in 49 CFR Part 24; and

(4) Pay, during construction, any additional funds necessary to make its total contribution equal to at least 35 percent of total structural flood damage reduction costs and 50 percent of total recreation costs.

b. Provide, during construction, 100 percent of the total recreation costs that exceed 10 percent of the federal share of total structural flood damage reduction costs;

c. Prevent obstructions or encroachments on the project (including prescribing and enforcing regulations to prevent such obstructions or encroachments) such as any new developments on project lands, easements and rights-of-way or the addition of facilities that might reduce the outputs produced by the project, hinder operation and maintenance of the project, or interfere with the project's proper function;

d. Inform affected interests, at least yearly, of the extent of protection afforded by the flood risk management features; participate in and comply with applicable federal floodplain management and flood insurance programs; comply with Section 402 of the WRDA 1986, as amended (33 USC 701b-12); and publicize floodplain information in the area concerned and provide this information to zoning and other regulatory agencies for their use in adopting regulations, or taking other actions, to prevent unwise future development and to ensure compatibility with protection levels provided by the flood risk management features;

e. Operate, maintain, repair, rehabilitate and replace the project at no cost to the Federal Government, in a manner compatible with the project's authorized purposes and in accordance with applicable federal laws and regulations and any specific directions prescribed by the Federal Government;

f. Give the Federal Government a right to enter, at reasonable times and in a reasonable manner, upon property that the non-federal sponsor owns or controls for access to the project for the purpose of completing, inspecting, operating, maintaining, repairing, rehabilitating or replacing the project;

g. Hold and save the United States free from all damages arising from the construction, operation, maintenance, repair, rehabilitation and replacement of the project and any betterments, except for damages due to the fault or negligence of the United States or its contractors;

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h. Perform, or ensure performance of, any investigations for hazardous substances that are determined necessary to identify the existence and extent of any hazardous substances regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 USC 9601–9675, that may exist in, on, or under lands, easements, or rights-of-way that the Federal Government determines to be necessary for the construction or operation and maintenance of the project;

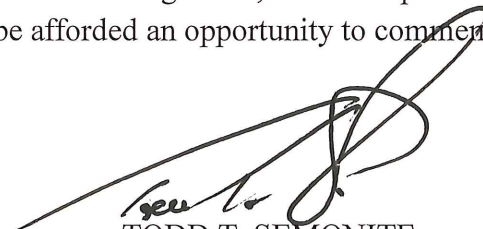
i. Assume, as between the Federal Government and the non-federal sponsor, complete financial responsibility for all necessary cleanup and response costs of any hazardous substances regulated under CERCLA that are located in, on, or under lands, easements, or rights-of-way required for construction, operation, maintenance, repair, rehabilitation or replacement of the project;

j. Agree, as between the Federal Government and the non-federal sponsor, that the non-federal sponsor shall be considered the operator of the project for the purpose of CERCLA liability, and to the maximum extent practicable, operate, maintain, repair, rehabilitate and replace the project in a manner that will not cause liability to arise under CERCLA; and

k. Keep the recreation features, and access roads, parking areas, and other associated public use facilities, open and available to all on equal terms;

10. The recommendation contained herein reflects the information available at this time and current departmental policies governing formulation of individual projects. It does not reflect program and budgeting priorities inherent in the formulation of a national civil works construction program or the perspective of higher review levels within the executive branch. Consequently, the recommendation may be modified before it is transmitted to the Congress as a proposal for authorization and implementation funding. However, prior to transmittal to Congress, the sponsor, the state, interested federal agencies, and other parties will be advised of any significant modifications and will be afforded an opportunity to comment further.

HAVE PERSONALLY VISITED AND VALIDATED THE IMPORTANT LINK THE FEDERAL PORTION OF THIS PROJECT PROVIDES TO THE SYSTEM! OVERALL LIFE/SAFETY



TODD T. SEMONITE
Lieutenant General, USA
Chief of Engineers