SUPPLEMENT TO INVENTORY AND ANALYSES OF INFORMATION

FOR FLOOD PLAIN MANAGEMENT IN NORTH DAKOTA

By Douglas G. Emerson and James D. Wald

U.S. Geological Survey

Open-File Report 85-700

Prepared in cooperation with the

OFFICE OF THE NORTH DAKOTA STATE ENGINEER

and the U.S. ARMY CORPS OF ENGINEERS

Bismarck, North Dakota

1985

UNITED STATES DEPARTMENT OF THE INTERIOR

DONALD PAUL HODEL, Secretary

GEOLOGICAL SURVEY

Dallas L. Peck, Director

For additional information write to:

District Chief, WRD
U.S. Geological Survey
821 East Interstate Avenue
Bismarck, ND 58501

North Dakota State Engineer
900 East Boulevard Avenue
Bismarck, ND 58505

For sale by:

Open-File Services Section
Western Distribution Branch
U.S. Geological Survey
Box 25425, Federal Center
Denver, CO 80225
(Telephone: (303) 236-7476)

CONTENTS

ILLUSTRATIONS

TABLES

SELECTED FACTORS FOR CONVERTING
INCH-POUND UNITS TO THE INTERNATIONAL SYSTEM (SI)
OF METRIC UNITS

For those readers who may prefer to use the International System (SI) of metric units rather than inch-pound units, the conversion factors for the terms used in this report are given below.

Multiply inch-pound unit	By	To obtain SI unit
Acre	0.4047	hectare
Cubic foot per second (ft^3/s)	0.02832	cubic meter per second
Foot (ft)	0.3048	meter
Gallon per second (gal/s)	3.785	liter per second
Square mile (mi^2)	2.590	square kilometer

National Geodetic Vertical Datum of 1929 (NGVD of 1929): A geodetic datum derived from a general adjustment of the first-order nets of both the United States and Canada, formerly called "Mean Sea Level."

SUPPLEMENT TO INVENTORY AND ANALYSES OF INFORMATION FOR FLOOD PLAIN MANAGEMENT IN NORTH DAKOTA

By Douglas G. Emerson and James D. Wald

ABSTRACT

Governmental units that have been identified as having flood hazard areas but do not have detailed base flood information are required to use the "best available data" to regulate new development or expansion of existing development in flood prone areas. Information for flood plain management has been identified for 31 governmental units in North Dakota and includes the determination of what data are available regarding flood hazards, hydraulics, and hydrology, and a review of these data to determine their adequacy for use in flood plain management.

INTRODUCTION

The North Dakota Floodplain Management Act of 1981 establishes State policy as one of guiding "...development of the floodplains of this State..., to reduce flood damages through sound floodplain management, stressing nonstructural measures such as floodplain zoning and floodproofing, acquisition and relocation, and flood warning practices; and to ensure as far as practicable that the channels and those portions of the floodplains of watercourses which are floodways are not inhabited and are kept free and clear of interference or obstruction..." The act also identifies the policy of the State to provide "...state coordination and assistance to communities in floodplain management activities, and to encourage communities to adopt, administer, and enforce sound floodplain management ordinances..." The State Legislature intended that communities with identified flood hazard areas regulate flood plain development in compliance with the National Flood Insurance Program (NFIP).

With these State policies, the North Dakota State Engineer has been assigned several duties: (1) Collect and distribute information relating to flooding and flood plain management; (2) coordinate local, State, and Federal flood plain management activities; (3) assist communities and districts in their flood plain management activities; and (4) do all other things which result in limiting potential flood damages.

The North Dakota State Engineer has identified governmental units (i.e., cities, townships, and counties) in North Dakota that have flood hazard areas but do not have detailed base flood (100-year flood) information available from the Federal Emergency Management Agency (FEMA) Flood Insurance Studies, Soil Conservation Service (SCS) Flood Hazard Analyses, or U.S. Army Corps of Engineers Flood Plain Information Reports. To be in compliance with the standards of the National Flood Insurance Program, these governmental units are required to use the "best available data" to regulate new development or expansion of existing development in flood prone areas.

The determination of the "best available data" can be a difficult task for these governmental units. To solve this problem, the North Dakota State Engineer has asked the U.S. Geological Survey to identify flood hazard information that can be used by local governmental unit officials in planning and regulating new development or expansion of existing development. The objectives of this investigation are to determine what data are available regarding flood hazards, hydrology, and hydraulics for particular areas; and to review these data to determine their adequacy for use in flood plain management. The investigation is statewide. The governmental units that were surveyed for this report are shown in figure 1. Data for other governmental units are published in Emerson and Wald (1983).

CONCEPTS OF A FLOOD STUDY

The optimum information needed for flood plain management is a flood study. A flood study defines the flood hazards for an area and provides necessary technical data to implement an effective flood plain management program for protection of life and property. Technical data in a flood study include water-surface elevations, profiles, and flood plain boundary maps. Water-surface elevations are the heights of the flood waters; profiles are graphs or plots of the water-surface elevations against distance along a channel; and flood plain boundary maps delineate for a specific area the boundaries and the elevations of the base flood plain. To obtain these technical data for a flood study, two analyses are required:

(1) hydrologic analysis, and
(2) hydraulic analysis.

Hydrologic Analysis

The specific hydrologic analysis needed is a frequency analysis. Frequency analysis is a procedure whereby the flood is determined for a given probability of occurrence. The flood frequency is the probability or chance that a flood of a particular magnitude will be equaled or exceeded in a given year. For example, a 100-year flood is a flood whose magnitude has a 1 percent chance of being equaled or exceeded in any given year.

Frequency analysis requires various hydrologic data. Such hydrologic data can include:

(1) discharge (measured amount of water),
(2) drainage area (area that surface runoff drains), and
(3) runoff model analysis (computer generated discharge data).

If adequate discharge data are available, frequency analysis can be made by using a method based on mathematical distribution of the peak discharges. The most widely accepted method for frequency evaluation is described in detail by the U.S. Geological Survey (1982).

If discharge data are not available, frequency analysis can be performed either by regional frequency analysis or by synthesizing discharge data. Regional frequency analysis is a method using statistical techniques to transfer data. The method involves transfer of frequency data by accounting for significant differences between the locations of known frequency data

page 4 follows

and the location of interest. Regional frequency analysis creates generalized charts and equations that will yield the desired flood frequency at locations of interest. Crosby (1975) developed a regional frequency analysis for small drainage basins in North Dakota that requires drainage area and a soil-infiltration index for the location of interest.

Discharge data can be synthesized by precipitation-runoff computer models. The procedures used in computer models can vary greatly along with the required input data, time to run the model, and accuracy of the results. The discharges generated by precipitation-runoff models are not as reliable as measured discharges. Once discharge data have been generated, frequency analysis can be performed.

Hydraulic Analysis

The specific hydraulic analysis needed is a step-backwater analysis. Step-backwater analysis is the conversion of the discharges that have been determined by frequency analysis to profiles. Step-backwater analysis requires various hydraulic data. Such hydraulic data can include:

(1) bridge opening and cross sections,
(2) discharge rating curves (plots of the relationship between stage and discharge),
(3) stream or bed profiles,
(4) flood stages,
(5) maps, and
(6) aerial photographs.

DATA SEARCH

A systematic and comprehensive data search was performed to determine what data are available regarding flood hazards, hydrology, and hydraulics in identified flood prone areas (fig. 1). The data search included files of Federal agencies, State agencies, and private firms, and direct contact with local governmental units that are responsible for the area. The results of the data search are presented in table 1. This table describes the "best available data" for flood plain management purposes for each local governmental unit and consists of descriptions, watershed changes and special problems, hydrologic data, and hydraulic data for each governmental unit listed in figure 1. The addresses of governmental agencies and private firms identified in table 1 as having data available are listed in table 2.

Description

The description consists of either specific gaged (measured) data or general flood statements. Data locations are identified by an identification number which is a downstream order number (i.e., 05120000).

The downstream order number is a unique number assigned to the gaging station by the U.S. Geological Survey. The number increases as location of the gaging station is further downstream. For example, the order number for the gaging station on the Souris River at Velva is 05119500 and the number for the gaging station downstream on the Souris River near Verendrye is 05120000.

Included with the identification number is the name of the gaging station (i.e., Souris River at Velva); the type of gaging station (i.e., continuous record); the period of record; and the date, stage, and discharge of the maximum recorded flood. If known, information for a large flood outside the period of record also is included. The identification number may be used in other parts of table 1 and refers to data for that location.

Watershed Changes and Special Problems

Watershed changes and special problems have been identified in table 1. Common watershed changes are levees, retention structures, and drains. Drains are identified by a number or name. Detailed information for a drain may be obtained from the North Dakota State Engineer or the local governmental authority.

Hydrologic Data

The various hydrologic data (upper part of table 1) that can be used in a frequency analysis are discharge, drainage area, and runoff model analysis. Much of the data are referred to by a gaging station identification number. Drainage area is used in both regional frequency analysis and runoff model analysis.

Hydraulic Data

The various hydraulic data (lower part of table 1) that can be used in a step-backwater analysis are bridge opening and cross sections, discharge rating curves, stream or bed profiles, flood stages, maps, and aerial photographs.

Bridge openings, cross sections, and stream or bed profiles can be used in determining the water-surface elevation for a particular volume of water. The North Dakota State Highway Department has assigned a unique number to each bridge in the State (i.e., 17-109-28). All bridges that may be of importance are listed. However, when data are given for counties, bridges are too numerous to list; therefore, only the bridges for the main streams are listed. The amount of data available for bridges varies but usually will include elevations of bridges and bed profiles. Specific information for a bridge may be obtained at the North Dakota State Highway Department by presenting the number of that bridge.

Discharge rating curves can be used to obtain the water-surface elevation for a particular discharge. Identification numbers of gaging stations (see description column in table 1) are used to note the locations for which discharge rating curves are available.

Flood stages can be used to create discharge rating curves and to verify the water-surface elevation for a particular discharge. Again, identification numbers of gaging stations are used to note the locations for which flood stage data are available.

Flood Hazard Boundary Maps can be used for determining approximate area of a flood plain and do not indicate any elevations. Flood Hazard Boundary Maps published by the Federal Emergency Management Agency are listed for each governmental area. These maps are available from the North Dakota State Engineer.

Mapping of certain soil types can indicate the approximate area of the flood plain. Soil survey maps published by the U.S. Department of Agriculture, Soil Conservation Service, are listed. These maps are available from the local Soil Conservation Service Office.

Approximate elevations, channel lengths, and cross sections can be obtained from topographic maps. Topographic maps published by the U.S. Geological Survey are listed for each governmental area. These maps are available from the North Dakota State Engineer.

Additional information such as street and gutter elevations and plots of subdivisions is listed. This information is available from the governmental agencies or private firms listed.

Elevations, channel lengths, cross sections, and flood plain delineation also can be obtained from aerial photographs. Governmental agencies or private firms from which aerial photographs are available are listed.

ADEQUACY OF DATA

The ultimate information needed for flood plain management is a detailed flood study. Flood prone areas that have been identified in this investigation do not have detailed flood studies. Therefore, the governmental unit for each of these areas must use the "best available data" to manage the flood plain.

The data available for each governmental unit are evaluated for their adequacy for use in completing a flood study. Flood study requirements that are specified in "Flood Insurance Study Guidelines and Specifications for Study Contractors" (Federal Emergency Management Agency, 1982B) are used as criteria for the evaluation of the data's adequacy. The evaluation is in narrative form and is included at the bottom of table 1. The type, amount, applicability, and accuracy of data, and the watershed changes and special problems for each governmental unit varies. For a thorough evaluation, the North Dakota State Engineer or a consulting engineering firm should be contacted.

GLOSSARY

This glossary defines terms frequently encountered in flood plain management. The definitions are simplified to meet the needs of those who are not specialists in the field. More detailed and scientific definitions of these and other terms can be found in several of the publications listed in the references.

Annual flood--The peak discharge in each year of record.

Backwater effect--The rise in water-surface elevation caused by some obstruction such as a narrow bridge opening, a building, fill material, or ice that limits the area through which the water must flow.

Base flood--A term used in the National Flood Insurance Program to indicate the minimum size flood to be used by a community as a basis for its flood plain management regulations; presently required by regulations to be that flood which has a 1 percent chance of being equaled or exceeded in any given year. Also known as a 100-year flood or 1 percent chance flood.

Base flood elevation--The elevation of the water surface reached during the base flood.

Base flood plain--The flood plain that would be inundated by a base flood.

Basin--The total area from which surface runoff is carried away by a drainage system. Other comparable terms are "drainage area," "catchment area," and "watershed."

Building code--Regulations adopted by a governmental body that set forth standards for the construction of buildings and other structures for the purpose of protecting the health, safety, and general welfare of the public.

Channel--A natural or artificial watercourse having definite bed and banks to confine and conduct flowing water.

Channel alterations--The improvement of the water-carrying capacity or flow characteristics of a natural or artificial channel by clearing, excavation, bank stabilization, or other means. Also referred to as channelization.

Channel capacity--The maximum flow that can pass through a channel without overflowing the banks.

Crest-stage gage--Noncontinuous gage that records maximum stage only.

Cross section--A graph or plot of ground elevation across a stream valley or portion of it, usually along a line perpendicular to the stream or direction of flow.

Cubic feet per second (CFS or ft^3/s)--The volume of water passing a given point within a given period of time. One cubic foot per second is equivalent to approximately 7.5 gallons per second.

Design flood--Commonly used to mean the magnitude of flood used for design and operation of flood control structures or other protective measures. It is sometimes used to denote the magnitude of flood used in flood plain regulations.

Designated floodway--The channel of a stream and that portion of the adjoining flood plain designated by a regulatory agency to be kept free of further development to provide for unobstructed passage of flood flows.

Discharge--The volume of water that passes a given point within a given period of time.

Discharge rating curve--A plotted curve showing the relationship between elevations (stage) and discharges at a point in a stream; also stage discharge curve.

Drainage area--That area from which direct surface runoff from precipitation normally drains by gravity into the stream above the specified point.

Equal degree of encroachment--A rule, used in determining permissible flood plain encroachments, that the flood plain on each side of a stream must be capable of conveying a proportionate share of the design flood flow.

Exceedance frequency--Probability that a random event will exceed a specified magnitude in a given time period, usually 1 year unless otherwise indicated.

Flash flood--A flood that reaches its peak flow in a short length of time (hours or minutes) after the storm or other event causing it. Often characterized by high velocity flows.

Flood or flooding--Temporary inundation of normally dry land areas from the overflow of a river or stream and(or) from the unusual and rapid accumulation or runoff of surface waters from any source. The rise in water may be caused by excessive rainfall, snowmelt, and natural stream blockages.

Flood control--Keeping flood waters away from specific developments and(or) populated areas by the construction of flood storage reservoirs, channel alterations, dikes and levees, bypass channels, or other engineering works.

Flood crest--The maximum stage or elevation reached or expected to be reached by the waters of a specific flood at a given location.

Flood duration--The length of time a stream is above flood stage or overflowing its banks.

Flood fighting--Actions (such as evacuation, emergency sandbagging and diking, and provision of assistance to flood victims) that are taken immediately before or during a flood to protect human life and to reduce flood damages.

Flood forecasting--The purpose of predicting the occurrence, magnitude, and duration of an imminent flood through meteorological and hydrological observations and analysis.

Flood frequency--The probability of a flood of a certain magnitude occurring in a given year. For example, a 100-year flood has a magnitude expected to be equaled or exceeded on the average of once every hundred years; such a flood has a 1 percent chance of being equaled or exceeded in any given year. Often used interchangeably with "recurrence interval."

Flood fringe--The portion of the flood plain outside of the floodway but still subject to flooding. Sometimes referred to as "floodway fringe." Also refers to areas subject to flooding by water with little or no velocity.

Flood Hazard Boundary Map--An official map of a community, issued by the Federal Emergency Management Agency, on which the boundaries of the base flood plain (i.e., subject to the 100-year flood) have been drawn.

Flood hydrograph--A graph showing, for a given point on a stream, the discharge, height, or some other characteristic of a flood with respect to time.

Flood insurance--Insurance on structures and(or) their contents for restoration or replacement if damaged by floodwater. The term usually is applied to flood insurance under the National Flood Insurance Act of 1968 as administered by the Federal Insurance Administration.

Flood Insurance Emergency Program--A phase of the National Flood Insurance Program intended primarily as an interim program to provide a limited amount of insurance at Federally subsidized rates on all existing and new construction begun prior to publication of a detailed Flood Insurance Rate Map for an area.

Flood Insurance Rate Map--An official map of a community on which the Federal Emergency Management Agency has delineated the boundaries of the base flood plain, the elevations of the base flood, and the actuarial rate zone applicable to such area.

Flood Insurance Regular Program--The phase of the National Flood Insurance Program under which actuarial rates have been determined.

Flood of record--The greatest flood recorded for a location. Usually referred to as the "maximum flood of record." The term is also used to mean any flood for which there is a measurement of height or other systematic or reliable record useful for technical analysis.

Flood plain--The lowlands adjoining the channel of a river or stream that have been or may be inundated by floodwater.

Flood plain delineation--The process of showing in a graphical form, usually on a map or photo mosaic, areas that have been inundated by a specific flood or that can be expected to be inundated by a predicted flood of specific magnitude.

Flood plain management--The operation of a program intended to lessen the damaging effects of floods, maintain and enhance natural values, and make effective use of related water and land resources within the flood plain. It is an attempt to balance values obtainable from use of flood plains with potential losses arising from such use. Flood plain management stresses consideration of the full range of measures potentially useful in achieving its objective.

Flood plain regulations--A general term for the full range of codes, ordinances, and other regulations concerned with the use of land and construction within stream channels and flood plain areas. The term encompasses zoning ordinances, subdivision regulations, building and housing codes, encroachment line statutes, open-space regulations, and other similar methods of control affecting the use and development of these areas.

Flood probability--A statistical expression of the chance (usually as a percentage) that a flood of given magnitude has of being equaled or exceeded in any one year (see flood frequency).

Flood proofing--A combination of structural changes and adjustments to new or existing structures and facilities, their contents, and(or) their sites for the purpose of reducing or eliminating flood damages by protecting against structural failure, keeping water out, or reducing the effect of water entry.

Flood warning--The issuance and dissemination of information about an imminent or current flood.

Floodway--The channel and those portions of the adjoining flood plain that are required in order to provide for the passage of the selected flood (normally the 100-year flood) with an insignificant increase in the flood levels by encroachments above that of natural conditions. As used in the National Flood Insurance Program, floodways must be large enough to pass the 100-year flood without causing an increase in elevation of more than a specified amount (1 foot in most areas).

Gage height--The water-surface elevation referred to some arbitrary gage datum. Gage height often is used interchangeably with the more general term "stage."

Gaging station--A particular site on a stream, canal, lake, or reservoir where systematic observations or hydrologic data are obtained.

Hydrodynamic loads--Forces imposed on structures by floodwaters due to the impact of moving water on the upstream side of the structure, drag along its sides, and eddies or negative pressures on its downstream side.

Hydrograph--A graph showing, for a given point on a stream, the discharge, height, or some other characteristic of a flood with respect to time.

Hydrostatic loads--Forces imposed on a flooded structure due to the weight of the water.

Level (degree) of protection--The greatest flood level against which a protective measure is designed to be fully effective; often expressed as a recurrence interval (e.g., 100-year level of protection) or as an exceedance frequency (e.g., 1 percent chance of exceedance).

Mean sea level--The average height of the sea for all stages of the tide over a 19-year period, usually determined from hourly height readings.

Natural values of flood plains--The desirable qualities of or functions served by flood plains including but not limited to water resources values (e.g., moderation of floods, water-quality maintenance, and ground-water recharge), living resources values (e.g., fish, wildlife, and plant resources and habitat), cultural resources values (e.g., open space, natural beauty, scientific study, outdoor education, and recreation), and cultivated resource values (e.g., agriculture, aquaculture, and forestry).

Nonstructural measures--All flood plain management measures excepting structural flood control works. Examples of nonstructural measures are flood warning/preparedness systems, relocation, flood proofing, regulation, land acquisition, and public investment policy.

One-hundred year flood--A flood having a 1 percent chance of occurring in any given year and that, over a very long period of time, can be expected to be equalled or exceeded on the average of once every hundred years.

Overland runoff--That portion of precipitation that is not intercepted by vegetation, absorbed by the land surface, or evaporated, and thus flows overland into a depression, stream, lake, or ocean.

Peak discharge--The largest discharge attained during a flood.

Percent chance--A probability multiplied by 100.

Precipitation-runoff model--A physical or mathematical representation of the qualities and properties of the hydrologic system for the prediction of the runoff response of a watershed for a specified amount of precipitation.

Preserve--To prevent modification of the natural flood plain environment or to maintain it as close as possible to its natural state.

Probable maximum flood--The most severe flood that may be expected from a combination of the most critical meteorological and hydrological conditions that are reasonably possible in the drainage basin. It is used in designing high-risk flood protection works and in siting structures and facilities that must be subject to almost no risk of flooding. The probable maximum flood is usually much larger than the 100-year flood.

Profile--A graph or plot of the water-surface elevation against distance along a channel. Also termed "flood profile" if drawn for a specific flood or level of flooding.

Recurrence interval--A statistical expression of the average time between floods equalling or exceeding a given magnitude (see flood frequency).

Reservoir--A natural or artificially created pond, lake, or other space used for storage, regulation, or control of water. May be either permanent or temporary.

Restore--To reestablish a setting or environment in which the natural functions of the flood plain can again operate.

Stage--The height of a water surface above an established datum; also gage height.

Stage discharge curve--A plotted curve showing the relationship between elevations (stage) and discharges at a point on a stream; also discharge rating curve.

Standard project flood--A term used by the U.S. Army Corps of Engineers to designate a flood that may be expected from the most severe combination of meteorological and hydrological conditions that is considered reasonably characteristic of the geographical area in which the drainage basin is located, excluding extremely rare combinations. The peak flow for a standard project flood is generally 40 to 60 percent of the probable maximum flood for the same location.

Stream--A body of water flowing in a natural surface channel. Flow may be continuous or only during wet periods. Streams that flow only during wet periods are termed "intermittent streams."

Structural measures--Flood control works such as dams and reservoirs, levees and floodwalls, channel alterations, and diversion channels that are designed to keep water away from specific developments and(or) populated areas or to reduce flooding in such areas.

Subdivision regulations--Ordinances or regulations governing the subdivision of land with respect to such things as adequacy and suitability of building sites, utilities, and public facilities.

Substantial improvement--A term used in connection with the National Flood Insurance Program for determining when its regulations must be applied to actions involving existing structures. It means any repair, reconstruction, or improvement of a structure, the cost of which equals or exceeds 50 percent of the market value of the structure either (a) before the improvement or repair is started; or (b) if the structure has been damaged and is being restored, before the damage occurred.

Watercourse--A natural or artificial channel in which a flow of water occurs either continually or intermittently.

Watershed--A drainage basin or area that collects and transmits runoff to the outlet of the basin.

Watershed boundary or basin boundary--The divide separating one drainage basin from another.

Water-surface elevation--The heights, usually in relation to mean sea level, reached by flows of various magnitudes and frequencies at pertinent points in the flood plain.

Wave crest--The summit or highest point of a wave.

Zoning ordinance--An ordinance under the state or local government's police power that divides an area into districts and, within each district, regulates the use of land and buildings, the height and bulk of buildings or other structures, and the density of population.

SELECTED REFERENCES

Brockmann, L. C., Evenson, E. E., Strum, J. F., Anderson, T. C., Jr., Freymiller, W. F., Weiser, P. K., and Howey, R. L., 1979, Soil survey of McLean County, North Dakota: U.S. Department of Agriculture, 218 p.

Crósby, O. A., 1975, Magnitude and frequency of floods in small drainage basins in North Dakota: U.S. Geological Survey Water-Resources Investigations 19-75, 24 p.

DesLauriers, L. L., 1982, Soil survey of Bottineau County, North Dakota: U.S. Department of Agriculture, 160 p.

Edwards, M. J., and Ableiter, J. K., 1944, Soil survey, Billings County, North Dakota: U.S. Department of Agriculture, Series 1934, No. 25, 109 p.

Edwards, M. J., and Ableiter, J. K., 1951, Soil survey, Morton County, North Dakota: U.S. Department of Agriculture, Series 1936, No. 28, 145 p.

Emerson, D. G., and Wald, J. D., 1983, Inventory and analyses of information for flood plain management in North Dakota: U.S. Geological Survey Open-File Report 84-053, 201 p.

Emerson, D. G., and Macek-Rowland, K. M., draft, Flood analysis along the Little Missouri River within and adjacent to Theodore Roosevelt National Park, North Dakota: U.S. Geological Survey Water-Resources Investigations Report (in preparation).

Federal Emergency Management Agency, 1980, Flood insurance rate map, city of Anamoose, North Dakota, McHenry County: Scale 1:7,200.

-----1982A, Flood hazard boundary map, township of Kenmare, North Dakota, Ward County: Scale 1:24,000.

-----1982B, Flood insurance study guidelines and specifications for study contractors: 108 p.

Howey, R. L., Farris, Cornelius, Glatt, Francis, Hauff, Floyd, Lahlum, Simon, Larson, Stuart, Neubauer, Leonard, and Wahl, Frank, 1974, Soil survey of Ward County, North Dakota: U.S. Department of Agriculture, 92 p.

Kermit, E. L., Bahr, A. F., Freymiller, William, Kukowski, Richard, Opdahl, Donald, Stoner, Howard, and Weiser, P. K., 1968, Soil survey of Stark County, North Dakota: U.S. Department of Agriculture, 116 p.

Knobel, E. W., Walster, H. L., Metzger, Hutzel, Buster, Spencer, and Peightal, M. F., 1925, Soil survey of McHenry County, North Dakota: U.S. Department of Agriculture, in Advance Sheets--Field Operations of the Bureau of Soils, 1921, p. 929-973.

Seago, J. B., Wright, M. B., Wiesner, C. H., and Smith, R. S. E., 1970, Soil survey of Wells County, North Dakota: U.S. Department of Agriculture, 84 p.

Souris-Red-Rainy River Basins Commission, 1972, Souris-Red-Rainy River basins comprehensive study--Flood damage reduction and drainage, volume 3: 205 p.

Thiele, J. H., Hauff, Floyd, Haugen, L. P., Howey, R. L., and Neubauer, L. A., 1977, Soil survey of Renville County, North Dakota: U.S. Department of Agriculture, 76 p.

Thompson, D. G., and Sweeney, M. D., 1971, Soil survey, LaMoure County and parts of James River valley, North Dakota: U.S. Department of Agriculture, 119 p.

Thompson, K. W., 1978, Soil survey of Slope County, North Dakota: U.S. Department of Agriculture, 170 p.

U.S. Army Corps of Engineers, 1977, Flood control, Burlington Dam, Souris River, North Dakota, Supplement No. 1 to design memorandum No. 1, Hydrology and hydraulic analysis: 54 p.

-----1982, Lake Darling flood control project, Souris River, North Dakota, Design memorandum No. 4, Velva improvements: 238 p.

-----1983A, Lake Darling flood control project, Souris River, North Dakota, Design memorandum No. 3, Velva improvements: 136 p.

-----1983B, North Dakota emergency and permanent levee inventory: 86 p.

U.S. Department of Agriculture, 1966, Work plan for watershed protection and flood prevention, Boundary Creek watershed, Bottineau County, North Dakota: 48 p.

-----1969, Work plan for watershed protection and flood prevention, Square Butte Creek watershed, Oliver and Morton Counties, North Dakota: 39 p.

-----1980, Forbes flood prevention R, C, and D measure plan: 14 p.

-----draft A, Flood hazard analyses, Willow Creek and Oak Creek, Bottineau and McHenry County, North Dakota.

-----draft B, Soil survey of Golden Valley County, North Dakota.

-----draft C, Soil survey of McHenry County, North Dakota.

-----draft D, Soil survey of Mountrail County, North Dakota.

U.S. Department of Housing and Urban Development, no date, Flood hazard boundary map, city of Stanley, North Dakota, Mountrail County: Scale 1:9,600.

-----1973, Flood hazard boundary map, city of New Rockford, North Dakota, Eddy County: Scale 1:9,600.

-----1974A, Flood hazard boundary map, city of Columbus, North Dakota, Burke County: Scale 1:9,600.

-----1974B, Flood hazard boundary map, city of Glen Ullin, North Dakota, Morton County: Scale 1:9,600.

-----1974C, Flood hazard boundary map, city of Marmarth, North Dakota, Slope County: Scale 1:9,600.

-----1974D, Flood hazard boundary map, city of Medora, North Dakota, Billings County: Scale 1:7,273.

-----1974E, Flood hazard boundary map, city of Montpelier, North Dakota, Stutsman County: Scale 1:9,600.

-----1974F, Flood hazard boundary map, city of Rolette, North Dakota, Rolette County: Scale 1:9,600.

-----1974G, Flood hazard boundary map, city of St. John, North Dakota, Rolette County: Scale 1:9,600.

-----1974H, Flood hazard boundary map, city of Souris, North Dakota, Bottineau County: Scale 1:9,600.

-----1974I, Flood hazard boundary map, city of Washburn, North Dakota, McLean County: Scale 1:9,600.

-----1974J, Flood hazard boundary map, city of White Earth, North Dakota, Mountrail County: Scale 1:9,600.

-----1975A, Flood hazard boundary map, city of Edgeley, North Dakota, LaMoure County: Scale 1:9,600.

-----1975B, Flood hazard boundary map, city of Sykeston, North Dakota, Wells County: Scale 1:9,600.

-----1976A, Flood hazard boundary map, city of Dunseith, North Dakota, Rolette County: Scale 1:9,600.

-----1976B, Flood hazard boundary map, city of Ft. Yates, North Dakota, Sioux County: Scale 1:4,800.

-----1976C, Flood hazard boundary map, city of Richardton, North Dakota, Stark County: Scale 1:9,600.

-----1977A, Flood insurance rate map, city of Velva, North Dakota, McHenry County: Scale 1:4,800.

-----1977B, Flood insurance study, city of Velva, North Dakota, McHenry County: 15 p.

-----1980A, Flood hazard boundary map, township of McKinney, North Dakota, Renville County: Scale 1:24,000.

-----1980B, Flood hazard boundary map, township of Stafford, North Dakota, Renville County: Scale 1:24,000.

U.S. Geological Survey, 7.5-minute series topographic maps: Scale 1:24,000.

-----1959A, Compilation of records of surface waters of the United States through September 1950; Part 5, Hudson Bay and Upper Mississippi River basins: U.S. Geological Survey Water-Supply Paper 1308, 708 p.

-----1959B, Compilation of records of surface waters of the United States through September 1950; Part 6-A, Missouri River Basin above Sioux City, Iowa: U.S. Geological Survey Water-Supply Paper 1309, 672 p.

-----1964A, Compilation of records of surface waters of the United States, October 1950 to September 1960; Part 5, Hudson Bay and Upper Mississippi River basins: U.S. Geological Survey Water-Supply Paper 1728, 576 p.

-----1964B, Compilation of records of surface waters of the United States, October 1950 to September 1960; Part 6-A, Missouri River basin above Sioux City, Iowa: U.S. Geological Survey Water-Supply Paper 1729, 507 p.

-----1969, Surface-water supply of the United States, 1961-65; Part 6, Missouri River basin, volume 2, Missouri River basin from Williston, North Dakota, to Sioux City, Iowa: U.S. Geological Survey Water-Supply Paper 1917, 560 p.

-----1971, Surface-water supply of the United States, 1961-65; Part 5, Hudson Bay and Upper Mississippi River basins, volume 1, Hudson Bay basin: U.S. Geological Survey Water-Supply Paper 1913, 407 p.

-----1973, Surface-water supply of the United States, 1966-70; Part 6, Missouri River basin, volume 2, Missouri River basin from Williston, North Dakota, to Sioux City, Iowa: U.S. Geological Survey Water-Supply Paper 2117, 612 p.

-----1976, Surface-water supply of the United States, 1966-70; Part 5, Hudson Bay and Upper Mississippi River basin, volume 1, Hudson Bay basin: U.S. Geological Survey Water-Supply Paper 2113, 425 p.

-----1970-84, Water resources data for North Dakota: U.S. Geological Survey Water-Data Reports.

-----1982, Guidelines for determining flood flow frequency: Interagency Advisory Committee on Water Data, Office of Water Data Coordination, 28 p.

Weiser, P. K., 1975, Soil survey of Oliver County, North Dakota: U.S. Department of Agriculture, 121 p.

Wright, M. R., and Sweeney, M. D., 1977, Soil survey of Eddy County and parts of Benson and Nelson Counties, North Dakota: U.S. Department of Agriculture, 202 p.

Table 1.--Data available regarding flood hazards, hydraulics, and hydrology for selected areas

FLOOD HAZARD AREA: Billings County

COUNTY: Billings

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
06336000--Little Missouri River at Medora Continuous-record gaging station. Period of record--May 1903 through Oct. 1908, Oct. through Nov. 1921, Mar. through June and Nov. through Dec. 1922, May 1923 through Sept. 1924, Sept. 1928 through Sept. 1934, and Oct. 1945 through Sept. 1975: 03/23/47--Stage = 20.5 ft; Discharge = 65,000 ft^3/s. (U.S. Geological Survey, 1959A-84). 06336100--Sheep Creek tributary near Medora Crest-stage gaging station. Period of record--Nov. 1954 through Sept. 1973: 06/20/60--Stage = 6.55 ft; Discharge = 147 ft^3/s. (U.S. Geological Survey, 1959A-84). 06336200--Sheep Creek tributary no. 2 near Medora Crest-stage gaging station. Period of record--Nov. 1954 through Sept. 1973: 06/20/60--Stage = 5.40 ft; Discharge = 139 ft^3/s. (U.S. Geological Survey, 1959A-84).	Information concerning dams (North Dakota State Water Commission).	Log-Pearson type III frequency analysis for gaging station 06336000; 100-year recurrence interval--Discharge = 65,300 ft^3/s (Emerson and Macek-Rowland, draft). Regression type frequency analysis for Knutson Creek; 100-year recurrence interval--Discharge = 31,800 ft^3/s (Emerson and Macek-Rowland, draft). Regression type frequency analysis for Paddock Creek; 100-year recurrence interval--Discharge = 18,500 ft^3/s (Emerson and Macek-Rowland, draft).	Gaging stations 06336000--Approximately 6,190 mi^2. 06336100--0.29 mi^2. 06336200--0.42 mi^2. 06336300--0.32 mi^2. 06336400--3.80 mi^2. 465200103320000--51.8 mi^2. 465300103320000--29.5 mi^2.	Gaging stations 06336000 06336100 06336200 06336300 06336400 465200103320000 465300103320000	

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
06336300--Little Missouri River tributary near Medora Crest-stage gaging station. Period of record--Nov. 1954 through Sept. 1973: 06/20/60--Stage = 10.9 ft; Discharge = 200 ft^3/s. (U.S. Geological Survey, 1959A-84).					
06336400--Jules Creek near Medora Crest-stage gaging station. Period of record--Nov. 1954 through Sept. 1973: 06/09/71--Stage = 9.69 ft; Discharge = 629 ft^3/s. (U.S. Geological Survey, 1959A-84).					
465200103320000--Davis Creek near Medora Indirect measuring station. 06/26/55--Discharge = 5,480 ft^3/s. (U.S. Geological Survey, 1959A-84).					
465300103320000--Sully Creek near Medora Indirect measuring station. 06/26/55--Discharge = 3,270 ft^3/s. (U.S. Geological Survey, 1959A-84).					

HYDRAULIC DATA

Step-backwater derived profiles	Bridge openings and cross-section data	Discharge rating curves	Stream or bed profiles	Flood stage data	Maps	Aerial photographs
Step-backwater derived profiles for Knutson Creek (Emerson and Macek-Rowland, draft). Step-backwater derived profiles for Little Missouri River (Emerson and Macek-Rowland, draft). Step-backwater derived profiles for Paddock Creek (Emerson and Macek-Rowland, draft).	Bridges Andrews Creek 0094-900.094L 0094-900.117R 0094-901.376 Little Missouri River 0094-024.315L 0094-024.315R 0094-025.204 0094-025.593L 0094-026.155AL 0094-026.217M 0094-026.422L Unnamed creeks 0085-084.342 0085-087.681 0085-088.002 0085-089.111 0085-092.442 0085-104.991 Knutson Creek (Emerson and Macek-Rowland, draft). Little Missouri River (Emerson and Macek-Rowland, draft). Paddock Creek (Emerson and Macek-Rowland, draft).	Gaging stations 06336000 06336100 06336200 06336300 06336400	Bridges Andrews Creek 0094-900.094L 0094-900.117R 0094-901.376 Little Missouri River 0094-024.315L 0094-024.315R 0094-025.204 0094-025.593L 0094-026.155AL 0094-026.217M 0094-026.422L Unnamed creeks 0085-084.342 0085-087.681 0085-088.002 0085-089.111 0085-092.442 0085-104.991 Knutson Creek (Emerson and Macek-Rowland, draft). Little Missouri River (Emerson and Macek-Rowland, draft). Paddock Creek (Emerson and Macek-Rowland, draft).	Gaging stations 06336000 06336100 06336200 06336300 06336400	Additional information: Street and gutter elevations (Veigel Engineering). Flood Hazard Boundary Map (1:7,273): City of Medora (U.S. Department of Housing and Urban Development, 1974D). Flood prone maps (1:24,000): Belfield, Fryburg, Medora, Roosevelt Creek East, and Wannagan Creek East (U.S. Geological Survey). Soil survey map: Billings County (Edwards and Ableiter, 1944). Topographic maps (1:24,000): Belfield, Belfield SW, Bullion Butte, Chimney Butte, Daglum NW, Eagle Draw, Fairfield, Fairfield SE, Fryburg, Fryburg NE, Fryburg NW, Gorham, Gorham NW, Gorham SE, Gorham SW, Grassy Butte SE, Grassy Butte SW, Hanks Gully, Hungry Man Butte, Medora, Rattlesnake Butte, Rocky Ridge, Roosevelt Creek East, Roosevelt Creek West, Scairt Woman Draw, Squaretop Butte, Tracy Mountain, Wannagan Creek East, and Wannagan Creek West (U.S. Geological Survey).	1:12,000--08/ /82 (Horizon, Inc.). 1:7,920 (Local Agriculture Stabilization and Conservation Service).

ADEQUACY	If hydrologic data are obtained for Railroad Creek, then there should be adequate data to prepare appropriate technical information for flood plain management of the Medora area. There are adequate data to prepare appropriate technical information for flood plain management of the Little Missouri River for the Medora area.

FLOOD HAZARD AREA: Souris

COUNTY: Bottineau

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
	Boundary Creek watershed improvements (U.S. Department of Agriculture, 1966). Flood damage and watershed protection for Boundary Creek watershed (U.S. Department of Agriculture, 1966).				

HYDRAULIC DATA

Step-backwater derived profiles	Bridge openings and cross-section data	Discharge rating curves	Stream or bed profiles	Flood stage data	Maps	Aerial photographs
	Bridges Boundary Creek 05-135-7 05-137-8 05-135-7.1 05-138-8		Bridges Boundary Creek 05-135-7 05-137-8 05-135-7.1 05-138-8		Additional information: Water and sewer system (Wold Engineering). Flood Hazard Boundary Map (1:9,600): City of Souris (U.S. Department of Housing and Urban Development, 1974H). Soil survey map: Bottineau County (DesLauriers, 1982). Topographic map (1:24,000): Souris (U.S. Geological Survey).	1:7,920 (Local Agriculture Stabilization and Conservation Service).

ADEQUACY	If additional hydrologic and hydraulic information are obtained, then there should be adequate data to prepare appropriate technical information for flood plain management.

FLOOD HAZARD AREA: Columbus

COUNTY: Burke

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis

HYDRAULIC DATA

Step-backwater derived profiles	Bridge openings and cross-section data	Discharge rating curves	Stream or bed profiles	Flood stage data	Maps	Aerial photographs
	Bridges Unnamed creeks 07-107-5 07-108-6 07-107-5.1 07-108-7 07-107-6 0005-057.540 0005-060.078		Bridges Unnamed creeks 07-107-5 07-108-6 07-107-5.1 07-108-7 07-107-6 0005-057.540 0005-060.078		Additional information: Water and sewer system (North Central Consultants, Ltd.). Flood Hazard Boundary Map (1:9,600): City of Columbus (U.S. Department of Housing and Urban Development, 1974A). Topographic maps (1:24,000): Atcoal, Columbus, Columbus SE, and Columbus SW (U.S. Geological Survey).	1:7,920 (Local Agriculture Stabilization and Conservation Service).

ADEQUACY	If hydrologic and additional hydraulic data are obtained, then there should be adequate data to prepare appropriate technical information for flood plain management.

FLOOD HAZARD AREA: Forbes

COUNTY: Dickey

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
Unnamed creek 1916--Rainstorm caused flooding.	Railroad embankment causes backwater.	Frequency analysis for Forbes, North Dakota (U.S. Department of Agriculture, 1980).			

HYDRAULIC DATA

Step-backwater derived profiles	Bridge openings and cross-section data	Discharge rating curves	Stream or bed profiles	Flood stage data	Maps	Aerial photographs
	Bridges Unnamed creeks 11-111-23 11-111-24.1 11-111-24		Bridges Unnamed creeks 11-111-23 11-111-24.1 11-111-24		Topographic map (1:24,000): Forbes (U.S. Geological Survey).	1:7,920 (Local Agriculture Stabilization and Conservation Service).

ADEQUACY	If additional hydraulic data are obtained, then there should be adequate data to prepare appropriate technical information for flood plain management.

FLOOD HAZARD AREA: New Rockford

COUNTY: Eddy

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
06468000--James River at New Rockford Continuous-record gaging station. Period of record--Aug. 1950 through Sept. 1969 and Oct. 1969 through Sept. 1973 (stage only): 04/12/69--Stage = 11.13 ft; Discharge = 2,800 ft^3/s. (U.S. Geological Survey, 1959A-84).	New Rockford Railroad Dam (North Dakota State Water Commission).		Gaging station 06468000--714 mi^2 of which about 435 mi^2 is noncontributing.	Gaging station 06468000	

HYDRAULIC DATA

Step-backwater derived profiles	Bridge openings and cross-section data	Discharge rating curves	Stream or bed profiles	Flood stage data	Maps	Aerial photographs
	Bridges James River 14-106-11 14-108-12 0281-128.331 James River (U.S. Bureau of Reclamation).	Gaging station 06468000	Bridges James River 14-106-11 14-108-12 0281-128.331 James River (U.S. Bureau of Reclamation).	Gaging station 06468000	Additional information: Street and gutter elevations (City of New Rockford). Flood Hazard Boundary Map (1:9,600): City of New Rockford (U.S. Department of Housing and Urban Development, 1973). Flood prone maps (1:24,000): New Rockford and New Rockford NE (U.S. Geological Survey). Soil survey map: Eddy County (Wright and Sweeney, 1977). Topographic maps (1:24,000): New Rockford and New Rockford NE (U.S. Geological Survey).	1:7,920 (Local Agriculture Stabilization and Conservation Service).

ADEQUACY	If additional hydraulic data are obtained, then there should be adequate data to prepare appropriate technical information for flood plain management.

FLOOD HAZARD AREA: Sentinel Butte

COUNTY: Golden Valley

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
	Camel Butte Dam (North Dakota State Water Commission). Reservoir on the south side of town was built by the railroad and has silted in. Sentinel Butte Dam (North Dakota State Water Commission).				

HYDRAULIC DATA

Step-backwater derived profiles	Bridge openings and cross-section data	Discharge rating curves	Stream or bed profiles	Flood stage data	Maps	Aerial photographs
	Bridges Unnamed creeks 17-108-28.2 17-112-28 17-109-28 17-112-28.2 17-110-29 Camel Butte Dam (North Dakota State Water Commission). Sentinel Butte Dam (North Dakota State Water Commission).		Bridges Unnamed creeks 17-108-28.2 17-112-28 17-109-28 17-112-28.2 17-110-29 Camel Butte Dam (North Dakota State Water Commission). Sentinel Butte Dam (North Dakota State Water Commission).		Additional information: Drainage system (Veigel Engineering). Soil survey map: Golden Valley County (U.S. Department of Agriculture, draft B). Topographic map (1:24,000): Sentinel Butte (U.S. Geological Survey).	1:7,920 (Local Agriculture Stabilization and Conservation Service).

ADEQUACY	If hydrologic and additional hydraulic data are obtained, then there should be adequate data to prepare appropriate technical information for flood plain management.

FLOOD HAZARD AREA: Edgeley

COUNTY: LaMoure

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis

HYDRAULIC DATA

Step-backwater derived profiles	Bridge openings and cross-section data	Discharge rating curves	Stream or bed profiles	Flood stage data	Maps	Aerial photographs
	Bridges Unnamed creeks 23-114-20 23-117-17 0013-275.920 0013-278.823 0281-031.471		Bridges Unnamed creeks 23-114-20 23-117-17 0013-275.920 0013-278.823 0281-031.471		Additional information: Industrial site (Veigel Engineering). Additional information: Street and gutter elevations (Interstate Engineering, Inc.). Flood Hazard Boundary Map (1:9,600): City of Edgeley (U.S. Department of Housing and Urban Development, 1975A). Soil survey map: LaMoure County and parts of James River valley (Thompson and Sweeney, 1971). Topographic map (1:24,000): Edgeley (U.S. Geological Survey).	1:7,920 (Local Agriculture Stabilization and Conservation Service).

ADEQUACY	If hydrologic and additional hydraulic data are obtained, then there should be adequate data to prepare appropriate technical information for flood plain management.

FLOOD HAZARD AREA: Lebanon Township

COUNTY: McHenry

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05119500--Souris River at Velva Miscellaneous gaging station. Period of record--1966 through Apr. 1976: 04/20/76--Stage = 109.86 ft; Discharge = 10,000 ft^3/s. (U.S. Geological Survey, 1959A-84). 05120000--Souris River near Verendrye Continuous-record gaging station. Period of record--Feb. through June 1933 (stage only) and Apr. 1937 through Sept. 1983: 04/19/76--Stage = 17.84 ft; Discharge = 9,900 ft^3/s. (U.S. Geological Survey, 1959A-84).	Flood damage reduction (Souris-Red-Rainy River Basins Commission, 1972). Levee system (U.S. Army Corps of Engineers, 1983B). 1979 flood damages: Three roads were washed over and two culverts were washed out (Federal Highway Administration).	Frequency analysis for Souris River at mouth of Stink Creek; 100-year recurrence interval--Discharge = 17,300 ft^3/s (U.S. Army Corps of Engineers, 1983A). Log-Pearson type III frequency analysis for gaging station 05119500; 100-year recurrence interval--Discharge = 16,200 ft^3/s (Souris-Red-Rainy River Basins Commission, 1972). Log-Pearson type III frequency analysis for gaging station 05120000; 100-year recurrence interval--Discharge = 16,400 ft^3/s (Souris-Red-Rainy River Basins Commission, 1972).	Gaging station 05120000--11,300 mi^2 of which about 6,900 mi^2 is noncontributing.	Gaging stations 05119500 05120000	

HYDRAULIC DATA

Step-backwater derived profiles	Bridge openings and cross-section data	Discharge rating curves	Stream or bed profiles	Flood stage data	Maps	Aerial photographs
HEC-2 step-backwater derived profiles for Souris River (U.S. Army Corps of Engineers, 1977 and 1983A).	Bridges Souris River 25-110-37 25-112-36 Unnamed creeks 25-109-42 25-114-40 25-113-37 25-114-41 25-113-38 Souris River (U.S. Army Corps of Engineers).	Gaging stations 05119500 05120000	Bridges Souris River 25-110-37 25-112-36 Unnamed creeks 25-109-42 25-114-40 25-113-37 25-114-41 25-113-38 Souris River (U.S. Army Corps of Engineers).	Gaging stations 05119500 05120000	Additional information: Road and bridge design (Wold Engineering). Flood prone maps (1:24,000): Velva and Voltaire (U.S. Geological Survey). Soil survey map: McHenry County (Knobel and others, 1925). Soil survey map: McHenry County (U.S. Department of Agriculture, draft C). Topographic maps (1:24,000): Velva and Voltaire (U.S. Geological Survey).	1:20,000--1969 flood and other years and 1:12,000--1972 flood (KBM, Inc.). 1:7,920 (Local Agriculture Stabilization and Conservation Service).

ADEQUACY	There should be adequate data to prepare appropriate technical information for flood plain management of the Souris River.

FLOOD HAZARD AREA: McHenry County

COUNTY: McHenry

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05120200--Wintering River near Bergen Continuous-record gaging station. Period of record--Oct. 1956 through Sept. 1978: 04/10/69--Stage = 5.90 ft; Discharge = 900 ft^3/s. (U.S. Geological Survey, 1959A-84). 05123510--Deep River near Upham Continuous-record gaging station. Period of record--Sept. 1957 through Sept. 1980: 04/12/69--Stage = 18.18 ft; Discharge = 6,760 ft^3/s. (U.S. Geological Survey, 1959A-84). 05123600--Egg Creek near Granville Continuous-record gaging station. Period of record--Oct. 1956 through Sept. 1981: 04/10/69--Stage = 7.28 ft; Discharge = 1,710 ft^3/s. (U.S. Geological Survey, 1959A-84). 05123700--Cut Bank Creek at North Lake Outlet near Granville Continuous-record gaging station. Period of record--Oct. 1956 through Sept. 1980: 03/29/76--Stage = 4.60 ft; Discharge = 780 ft^3/s. (U.S. Geological Survey, 1959A-84).	Information concerning dams (North Dakota State Water Commission). Levee system (U.S. Army Corps of Engineers, 1983B). 1979 flood damages: 14 roads were washed out, 66 roads were washed over, 39 culverts were washed out, 10 bridges were damaged, and three bridges were washed out (Federal Highway Administration).	Frequency analysis for Souris River, Bantry to Red Cross School NR 1; 100-year recurrence interval--Discharge = 15,200 ft^3/s (U.S. Army Corps of Engineers, 1977). Frequency analysis for Souris River, Verendrye to Stink Creek; 100-year recurrence interval--Discharge = 15,400 ft^3/s (U.S. Army Corps of Engineers, 1977).	Gaging stations 05120200--176 mi^2 of which about 50 mi^2 is noncontributing. 05123510--975 mi^2 of which about 605 mi^2 is noncontributing. 05123600--289 mi^2 of which about 150 mi^2 is noncontributing. 05123700--534 mi^2 of which about 290 mi^2 is noncontributing. 05123750--722 mi^2 of which about 450 mi^2 is noncontributing.	Gaging stations 05120200 05123510 05123600 05123700 05123750	

FLOOD HAZARD AREA: McHenry County--Continued

COUNTY: McHenry

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05123750--Cut Bank Creek at Upham Continuous-record gaging station. Period of record--Oct. 1974 through Sept. 1980: 04/01/76--Stage = 7.24 ft; Discharge = 820 ft^3/s. (U.S. Geological Survey, 1959A-84).					

HYDRAULIC DATA

Step-backwater derived profiles	Bridge openings and cross-section data	Discharge rating curves	Stream or bed profiles	Flood stage data	Maps	Aerial photographs
HEC-2 step-backwater derived profiles for Souris River (U.S. Army Corps of Engineers, 1977 and 1983A).	Bridges Cut Bank Creek 25-102-1 25-114-3.1 25-103-1 25-114-14 25-104-2 25-114-17 25-104-3 25-115-4 25-105-3 25-115-5 25-106-3 25-115-5.1 25-107-3 25-115-6 25-108-4.1 25-115-7 25-112-11 25-115-9 25-113-11 25-115-10 25-113-13 25-115-11 25-114-3 25-116-10 Deep River 25-109-4 25-112-3 25-110-4 25-112-3.1 25-111-3 25-113-2 Little Deep Creek 25-101-16 25-108-5 25-101-17 25-108-5.1 25-102-17 25-108-6 25-103-17 25-108-7 25-103-18 25-108-9 25-105-17 25-108-11 25-106-16 25-108-11.1 25-107-13 25-109-5 25-107-14 25-109-9 25-108-4 25-109-10 25-108-4.2 Souris River 25-115-35.1 25-125-28 25-116-34 25-129-9 25-118-3.2 25-130-18 25-119-3 25-131-16 25-120-2	Gaging stations 05120200 05123510 05123600 05123700 05123750	Bridges Cut Bank Creek 25-102-1 25-114-3.1 25-103-1 25-114-14 25-104-2 25-114-17 25-104-3 25-115-4 25-105-3 25-115-5 25-106-3 25-115-5.1 25-107-3 25-115-6 25-108-4.1 25-115-7 25-112-11 25-115-9 25-113-11 25-115-10 25-113-13 25-115-11 25-114-3 25-116-10 Deep River 25-109-4 25-112-3 25-110-4 25-112-3.1 25-111-3 25-113-2 Little Deep Creek 25-101-16 25-108-5 25-101-17 25-108-5.1 25-102-17 25-108-6 25-103-17 25-108-7 25-103-18 25-108-9 25-105-17 25-108-11 25-106-16 25-108-11.1 25-107-13 25-109-5 25-107-14 25-109-9 25-108-4 25-109-10 25-108-4.2 Souris River 25-115-35.1 25-125-28 25-116-34 25-129-9 25-118-3.2 25-130-18 25-119-3 25-131-16 25-120-2	Gaging stations 05120200 05123510 05123600 05123700 05123750	Additional information: Road and bridge design (Wold Engineering). Flood Insurance Rate Map (1:7,200): City of Anamoose (Federal Emergency Management Agency, 1980). Flood prone maps (1:24,000): Deep, Denbigh, Karlsruhe NE, Karlsruhe NW, Kramer, Newburg SE, Sawyer, Towner, Towner NW, Upham, Upham SE, Velva, Voltaire, Willow City, and Willow City SW (U.S. Geological Survey). Soil survey map: McHenry County (Knobel and others, 1925). Soil survey map: McHenry County (U.S. Department of Agriculture, draft C). Topographic maps (1:24,000): Anamoose, Balfour, Balfour NW, Bantry, Bantry NW, Bergen, Butte, Deep, Deering, Deering SE, Denbigh, Drake, Drake NW, Eckman, Eckman SE, Gardena, Granville, Granville NE, Granville NW, Granville SW, Karlsruhe, Karlsruhe NE, Karlsruhe NW, Kief, Kongsberg NE, Kongsberg NW, Kongsberg SE, Kongsberg SW, Kramer, Newburg, Newburg SE, Newburg SW, Norwich, Rangeley, Rangeley NE, Rangeley NW, Rangeley SE, Riga, Sawyer, Sawyer NE, Simcoe, Towner, Towner NE, Towner NW, Towner SE, Upham, Upham NE, Upham SE, Velva, Voltaire, Willow City, and Willow City SW (U.S. Geological Survey).	1:20,000--1969 flood and other years (KBM, Inc.). 1:7,920 (Local Agriculture Stabilization and Conservation Service).

FLOOD HAZARD AREA: McHenry County--Continued

COUNTY: McHenry

HYDRAULIC DATA

Step-backwater derived profiles	Bridge openings and cross-section data	Discharge rating curves	Stream or bed profiles	Flood stage data	Maps	Aerial photographs
	Bridges--Continued Wintering River 25-121-38 25-124-41 25-121-38.1 25-125-41 25-121-39 25-125-42 25-122-37 25-126-44 25-122-37.1 25-127-47 25-122-40 25-128-47 25-123-41 0052-141.164 Souris River (U.S. Army Corps of Engineers).		Bridges--Continued Wintering River 25-121-38 25-124-41 25-121-38.1 25-125-41 25-121-39 25-125-42 25-122-37 25-126-44 25-122-37.1 25-127-47 25-122-40 25-128-47 25-123-41 0052-141.164 Souris River (U.S. Army Corps of Engineers).			

ADEQUACY	There should be adequate data to prepare appropriate technical information for flood plain management of the Souris River. If additional hydrologic and hydraulic data are obtained, then there should be adequate data to prepare appropriate technical information for flood plain management of other major streams.

FLOOD HAZARD AREA: McHenry County--Continued

Additional flood hazard information for McHenry County is contained in table 1 under the following governmental units: Lebanon Township, Newport Township, Velva Township, Villard Township, and Willow Creek Township.

FLOOD HAZARD AREA: Newport Township

COUNTY: McHenry

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05121500--Souris River near Towner Miscellaneous gaging station. Period of record--Apr. 1971 through Apr. 1976: 04/22/76--Stage = 56.58 ft; Discharge = 9,420 ft^3/s. (U.S. Geological Survey, 1959A-84).	1979 flood damages: Four roads were washed over (Federal Highway Administration).	Frequency analysis for Souris River at Eaton Dam; 100-year recurrence interval-- Discharge = 17,300 ft^3/s (U.S. Army Corps of Engineers, 1983A). Frequency analysis for gaging station 05121500; 100-year recurrence interval-- Discharge = 17,100 ft^3/s (U.S. Army Corps of Engineers, 1983A).		Gaging station 05121500	

HYDRAULIC DATA

Step-backwater derived profiles	Bridge openings and cross-section data	Discharge rating curves	Stream or bed profiles	Flood stage data	Maps	Aerial photographs
HEC-2 step-backwater derived profiles for Souris River (U.S. Army Corps of Engineers, 1977 and 1983A).	Bridges Souris River 25-131-16 0002-187.740L 0002-187.740R 0014-115.957 Unnamed creeks 25-129-18 25-129-19 0002-188.658 0002-188.684 0014-108.511 0014-116.423 0014-117.105 Souris River (U.S. Army Corps of Engineers).	Gaging station 05121500	Bridges Souris River 25-131-16 0002-187.740L 0002-187.740R 0014-115.957 Unnamed creeks 25-129-18 25-129-19 0002-188.658 0002-188.684 0014-108.511 0014-116.423 0014-117.105 Souris River (U.S. Army Corps of Engineers).	Gaging station 05121500	Additional information: Road and bridge design (Wold Engineering). Flood prone map (1:24,000): Towner (U.S. Geological Survey). Soil survey map: McHenry County (Knobel and others, 1925). Soil survey map: McHenry County (U.S. Department of Agriculture, draft C). Topographic map (1:24,000): Towner (U.S. Geological Survey).	1:20,000--1969 flood and other years and 1:12,000--1972 flood (KBM, Inc.). 1:7,920 (Local Agriculture Stabilization and Conservation Service).

ADEQUACY	There should be adequate data to prepare appropriate technical information for flood plain management of the Souris River.

FLOOD HAZARD AREA: Velva Township

COUNTY: McHenry

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05119410--Bonnes Coulee near Velva Miscellaneous gaging station. Period of record--Aug. 1962 through Apr. 1973: 08/10/62--Discharge = 26,300 ft^3/s. (U.S. Geological Survey, 1959A-84). 05119500--Souris River at Velva Miscellaneous gaging station. Period of record--1966 through Apr. 1976: 04/20/76--Stage = 109.86 ft; Discharge = 10,000 ft^3/s. (U.S. Geological Survey, 1959A-84).	Flood control design (U.S. Army Corps of Engineers, 1982). Flood damage reduction for Souris River (Souris-Red-Rainy River Basins Commission, 1972). Levee system (U.S. Army Corps of Engineers, 1983B). 1979 flood damages: One road was washed out, one road was washed over, and one bridge was damaged (Federal Highway Administration).	Frequency analysis for Souris River at mouth of Bonnes Coulee; 100-year recurrence interval--Discharge = 16,900 ft^3/s (U.S. Army Corps of Engineers, 1983A). Frequency analysis for Souris River at mouth of Stink Creek; 100-year recurrence interval--Discharge = 17,300 ft^3/s (U.S. Army Corps of Enginners, 1983A). Frequency analysis for Souris River at Velva (U.S. Department of Housing and Urban Development, 1977B). Log-Pearson type III frequency analysis for gaging station 05119500; 100-year recurrence interval--Discharge = 16,200 ft^3/s (Souris-Red-Rainy River Basins Commission, 1972).	Gaging station 05119410--52.5 mi^2.	Gaging stations 05119410 05119500	Unit hydrograph for seven watersheds near Velva (U.S. Army Corps of Engineers, 1982).

HYDRAULIC DATA

Step-backwater derived profiles	Bridge openings and cross-section data	Discharge rating curves	Stream or bed profiles	Flood stage data	Maps	Aerial photographs
HEC-2 step-backwater derived profiles for Souris River (U.S. Army Corps of Engineers, 1977 and 1983A). HEC-2 step-backwater derived profiles for Souris River at Velva (U.S. Department of Housing and Urban Development, 1977B).	Bridges Bonnes Coulee 0052-115.888 Oak Creek 0052-115.225 Souris River 0041-074.063 Unnamed creeks 25-106-40 25-107-40 25-106-40.1 Souris River (U.S. Army Corps of Engineers).	Gaging stations 05119410 05119500	Bridges Bonnes Coulee 0052-115.888 Oak Creek 0052-115.225 Souris River 0041-074.063 Unnamed creeks 25-106-40 25-107-40 25-106-40.1 Souris River (U.S. Army Corps of Engineers).	Gaging stations 05119410 05119500	Additional information: Street and gutter elevations and road and bridge design (Wold Engineering). Flood Insurance Rate Map (1:4,800): City of Velva (U.S. Department of Housing and Urban Development, 1977A). Flood prone maps (1:24,000): Sawyer and Velva (U.S. Geological Survey). Soil survey map: McHenry County (Knobel and others, 1925). Soil survey map: McHenry County (U.S. Department of Agriculture, draft C). Topographic maps (1:24,000): Sawyer and Velva (U.S. Geological Survey).	1:20,000--1969 flood and other years, 1:14,000--Velva, and 1:12,000--1972 flood (KBM, Inc.). 1:7,920 (Local Agriculture Stabilization and Conservation Service).

ADEQUACY	There should be adequate data to prepare appropriate technical information for flood plain management.

FLOOD HAZARD AREA: Villard Township

COUNTY: McHenry

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05120000--Souris River near Verendrye Continuous-record gaging station. Period of record--Feb. through June 1933 (stage only) and Apr. 1937 through Sept. 1983: 04/19/76--Stage = 17.84 ft; Discharge = 9,900 ft^3/s. (U.S. Geological Survey, 1959A-84). 05120500--Wintering River near Karlsruhe Continuous-record gaging station. Period of record--Mar. 1937 through Sept. 1983: 04/07/49--Stage = 12.0 ft; Discharge = 3,000 ft^3/s. (U.S. Geological Survey, 1959A-84).	Flood damage reduction for Souris River (Souris-Red-Rainy River Basins Commission, 1972). 1979 flood damages: One road was washed out, two roads were washed over, and two bridges were damaged (Federal Highway Administration).	Frequency analysis for Souris River at mouth of Wintering River; 100-year recurrence interval--Discharge = 17,400 ft^3/s (U.S. Army Corps of Engineers, 1983A). Log-Pearson type III frequency analysis for gaging station 05120000; 100-year recurrence interval--Discharge = 16,400 ft^3/s (Souris-Red-Rainy River Basins Commission, 1972). Log-Pearson type III frequency analysis for gaging station 05120000; 100-year recurrence interval--Discharge = 17,500 ft^3/s (U.S. Army Corps of Engineers, 1983A).	Gaging stations 05120000--11,300 mi^2 of which about 6,900 mi^2 is noncontributing. 05120500--705 mi^2 of which about 420 mi^2 is noncontributing.	Gaging stations 05120000 05120500	

FLOOD HAZARD AREA: Villard Township-Continued

COUNTY: McHenry

HYDRAULIC DATA

Step-backwater derived profiles	Bridge openings and cross-section data	Discharge rating curves	Stream or bed profiles	Flood stage data	Maps	Aerial photographs
HEC-2 step-backwater derived profiles for Souris River (U.S. Army Corps of Engineers, 1977 and 1983A).	Bridges Souris River 25-122-30 Unnamed creek 25-121-31 Wintering River 25-123-31 25-124-35 25-123-36 25-125-33 25-124-32 25-126-32 25-124-34 Souris River (U.S. Army Corps of Engineers).	Gaging stations 05120000 05120500	Bridges Souris River 25-122-30 Unnamed creek 25-121-31 Wintering River 25-123-31 25-124-35 25-123-36 25-125-33 25-124-32 25-126-32 25-124-34 Souris River (U.S. Army Corps of Engineers).	Gaging stations 05120000 05120500	Additional information: Road and bridge design (Wold Engineering). Flood prone maps (1:24,000): Karlsruhe NE and Karlsruhe NW (U.S. Geological Survey). Soil survey map: McHenry County (Knobel and others, 1925). Soil survey map: McHenry County (U.S. Department of Agriculture, draft C). Topographic maps (1:24,000): Bergen, Karlsruhe, Karlsruhe NE, and Karlsruhe NW (U.S. Geological Survey).	1:20,000--1969 flood and other years and 1:12,000--1972 flood (KBM, Inc.). 1:7,920 (Local Agriculture Stabilization and Conservation Service).

ADEQUACY	There should be adequate data to prepare appropriate technical information for flood plain management of the Souris River.

FLOOD HAZARD AREA: Willow Creek Township

COUNTY: McHenry

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05122000--Souris River near Bantry Continuous-record gaging station. Period of record--Mar. 1937 through Sept. 1983: 04/23/76--Stage = 14.59 ft; Discharge = 9,330 ft^3/s. (U.S. Geological Survey, 1959A-84). 05123400--Willow Creek near Willow City Continuous-record gaging station. Period of record--Aug. 1956 through Sept. 1983: 04/12/69--Stage = 16.76 ft; Discharge = 5,900 ft^3/s. (U.S. Geological Survey, 1959A-84).	1979 flood damages: Two roads were washed over and two culverts were washed out (Federal Highway Administration).	Frequency analysis for Willow Creek (U.S. Department of Agriculture, draft A).	Gaging stations 05122000--12,300 mi^2 of which about 7,600 mi^2 is noncontributing. 05123400--1,160 mi^2 of which about 430 mi^2 is noncontributing.	Gaging stations 05122000 05123400	

HYDRAULIC DATA

Step-backwater derived profiles	Bridge openings and cross-section data	Discharge rating curves	Stream or bed profiles	Flood stage data	Maps	Aerial photographs
Step-backwater derived profiles for Willow Creek (U.S. Department of Agriculture, draft A).	Bridges Souris River 25-125-6 Unnamed creek 25-126-4.1 Willow Creek 25-125-4 25-129-2 25-126-4 25-129-2.1 25-128-4 25-129-3 Souris River (U.S. Army Corps of Engineers). Willow Creek (U.S. Department of Agriculture, draft A).	Gaging stations 05122000 05123400	Bridges Souris River 25-125-6 Unnamed creek 25-126-4.1 Willow Creek 25-125-4 25-129-2 25-126-4 25-129-2.1 25-128-4 25-129-3 Souris River (U.S. Army Corps of Engineers). Willow Creek (U.S. Department of Agriculture, draft A).	Gaging stations 05122000 05123400	Additional information: Road and bridge design (Wold Engineering). Flood prone maps (1:24,000): Upham SE and Willow City SW (U.S. Geological Survey). Soil survey map: McHenry County (Knobel and others, 1925). Soil survey map: McHenry County (U.S. Department of Agriculture, draft C). Topographic maps (1:24,000): Gardena, Upham NE, Upham SE, and Willow City SW (U.S. Geological Survey).	1:20,000--1969 flood and other years and 1:12,000--1972 flood (KBM, Inc.). 1:7,920 (Local Agriculture Stabilization and Conservation Service).

ADEQUACY	There should be adequate data to prepare appropriate technical information for flood plain management of Willow Creek.

FLOOD HAZARD AREA: McLean County

COUNTY: McLean

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
06337600--East Branch Douglas Creek tributary near Garrison Crest-stage gaging station. Period of record--Oct. 1956 through Sept. 1957 and Oct. 1958 through Sept. 1973: 07/ /57--Stage = 8.54 ft; Discharge = 76 ft^3/s. (U.S. Geological Survey, 1959A-84). 06337900--Snake Creek tributary near Garrison Crest-stage gaging station. Period of record--Oct. 1958 through Sept. 1973: 04/05/69--Stage = 5.01 ft; Discharge = 65 ft^3/s. (U.S. Geological Survey, 1959A-84). 06338490--Missouri River at Garrison Dam Flow meter and gate readings. Period of record--Oct. 1969 through Sept. 1983: 07/25/75--Maximum daily discharge = 65,200 ft^3/s. (U.S. Geological Survey, 1959A-84). 06339000--Missouri River below Garrison Dam Continuous-record gaging station. Period of record: Apr. 1948 through Sept. 1969 and Oct. 1969 through Sept. 1976 (stage only): 04/05/52--Stage = 1,700.10 ft; Discharge = 348,000 ft^3/s. (U.S. Geological Survey, 1959A-84).	Garrison Dam (U.S. Army Corps of Engineers). Information concerning dams (North Dakota State Water Commission). Missouri River bank stabilization (U.S. Army Corps of Engineers). 1979 flood damages: 18 roads were washed out, 75 roads were washed over, six culverts were damaged, 23 culverts were washed out, six bridges were damaged, and two bridges were washed out (Federal Highway Administration).	Log-Pearson type III frequency analysis for gaging station 06337600; 50-year recurrence interval--Discharge = 115 ft^3/s (Crosby, 1975). Log-Pearson type III frequency analysis for gaging station 06337900; 50-year recurrence interval--Discharge = 109 ft^3/s (Crosby, 1975).	Gaging stations 06337600--1.39 mi^2. 06337900--1.22 mi^2. 06338490--Approximately 181,400 mi^2. 06339000--Approximately 181,400 mi^2. 06340890--9.8 mi^2. 06340900--Approximately 183,000 mi^2. 06340905--70.5 mi^2 of which about 53.3 mi^2 is noncontributing. 06340930--57.3 mi^2 of which about 30 mi^2 is noncontributing. 06341400--Approximately 310 mi^2 of which about 195 mi^2 is noncontributing. 06341800--Approximately 427 mi^2 of which about 310 mi^2 is noncontributing.	Gaging stations 06337600 06337900 06338490 06339000 06340890 06340905 06340930 06341400 06341800	

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
06340890--Missouri River tributary no. 2 near Hensler Continuous-record gaging station. Period of record--Oct. 1978 through Sept. 1981: 04/17/79--Stage = 9.45 ft; Discharge = 455 ft^3/s. (U.S. Geological Survey, 1959A-84).					
06340900--Missouri River near Hensler Stage gaging station. Period of record--May 1959 through Sept. 1983: 03/20/65--Maximum daily stage = 27.77 ft. (U.S. Geological Survey, 1959A-84).					
06340905--Coal Lake Coulee near Hensler Continuous-record gaging station. Period of record--Oct. 1977 through Sept. 1983: 08/20/80--Stage = 8.61 ft; Discharge = 926 ft^3/s. (U.S. Geological Survey, 1959A-84).					
06340930--Buffalo Creek near Washburn Continuous-record gaging station. Period of record: Oct. 1978 through Sept. 1983: 04/19/79--Stage = 17.0 ft; Discharge = 3,800 ft^3/s. (U.S. Geological Survey, 1959A-84).					

FLOOD HAZARD AREA: McLean County--Continued

COUNTY: McLean

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
06341400--Turtle Creek near Turtle Lake Continuous-record gaging station. Period of record: Oct. 1956 through Sept. 1976: 06/29/75--Stage = 5.43 ft; Discharge = 610 ft^3/s. (U.S. Geological Survey, 1959A-84).					
06341800--Painted Woods Creek near Wilton Continuous-record gaging station. Period of record: Oct. 1957 through Sept. 1981 and Aug. 1982 through Sept. 1983: 04/19/79--Stage = 9.64 ft; Discharge = 4,050 ft^3/s. (U.S. Geological Survey, 1959A-84).					

HYDRAULIC DATA

Step-backwater derived profiles	Bridge openings and cross-section data	Discharge rating curves	Stream or bed profiles	Flood stage data	Maps	Aerial photographs
	Bridges Buffalo Coulee 0083-131.330 Deep Water Creek 0037-019.759 0804-213.097 McClusky Canal 0041-015.892 0041-037.132 0200-206.536 Middle Branch Douglas Creek 0037-049.625 Painted Woods Creek 0041-008.742 0083-122.370L 0083-122.370R Snake Creek 0083-156.511 Turtle Creek 0083-124.791 Yanktoni Creek 0083-117.027L 0083-117.027R	Gaging stations 06337600 06337900 06338490 06339000 06340890 06340905 06340930 06341400 06341800	Bridges Buffalo Coulee 0083-131.330 Deep Water Creek 0037-019.759 0804-213.097 McClusky Canal 0041-015.892 0041-037.132 0200-206.536 Middle Branch Douglas Creek 0037-049.625 Painted Woods Creek 0041-008.742 0083-122.370L 0083-122.370R Snake Creek 0083-156.511 Turtle Creek 0083-124.791 Yanktoni Creek 0083-117.027L 0083-117.027R	Gaging stations 06337600 06337900 06339000 06340890 06340900 06340905 06340930 06341400 06341800	Additional information: Road and bridge design (Interstate Engineering, Inc.). Flood prone maps (1:24,000): Garrison, Stanton, and Washburn (U.S. Geological Survey). Topographic maps (1:24,000): Alkali Lake, Benedict, Benedict SW, Blackwater Lake, Blackwater Lake NW, Blackwater Lake SE, Blackwater Lake SW, Blue Hill, Butte, Coleharbor, Coleharbor NE, Coleharbor NW, Douglas East, Douglas West, Emmet, Emmet NE, Emmet SE, Emmet SW, Garrison, Garrison Dam North, Garrison Dam South, Garrison NE, Horseshoe Valley, Kief, Kongsberg, Kongsberg SW, Lake Nettie, Long Lake, Makoti SW, Max, Mercer, New Town, New Town SW, Parshall SE, Parshall SW, Pelican Lake, Peterson Lake, Raub, Raub NW, Raub SE, Riverdale North, Riverdale South, Roseglen, Saddle Butte, Sanger, Siebold Lake, Stanton SE, Turtle Creek NE, Turtle Lake, Twin Buttes, Underwood, Washburn, Washburn NE, Washburn SW, and Wilton (U.S. Geological Survey).	1:7,920 (Local Agriculture Stabilization and Conservation Service).

ADEQUACY	There should be adequate data to prepare appropriate technical information for flood plain management of the main streams.

FLOOD HAZARD AREA: McLean County--Continued

Additional flood hazard information for McLean County is contained in table 1 under Washburn.

FLOOD HAZARD AREA: Washburn

COUNTY: McLean

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
06341000--Missouri River at Washburn Stage gaging station. Period of record--Aug. 1960 through Sept. 1983: 01/11/64--Maximum daily stage = 22.76 ft. (U.S. Geological Survey, (1959A-84).	Garrison Dam (U.S. Army Corps of Engineers). Missouri River bank stabilization (U.S. Army Corps of Engineers).		Gaging station 06341000--Approximately 184,000 mi^2.		

HYDRAULIC DATA

Step-backwater derived profiles	Bridge openings and cross-section data	Discharge rating curves	Stream or bed profiles	Flood stage data	Maps	Aerial photographs
	Bridges Buffalo Creek 28-156-38 Missouri River 0200-924.623 Turtle Creek 28-162-39		Bridges Buffalo Creek 28-156-38 Missouri River 0200-924.623 Turtle Creek 28-162-39	Gaging station 06341000	Additional information: Street and gutter elevations (Interstate Engineering, Inc.). Additional information: Street and gutter elevations (Moore Engineering, Inc.). Flood Hazard Boundary Map (1:9,600): City of Washburn (U.S. Department of Housing and Urban Development, 1974I). Flood prone map (1:24,000): Washburn (U.S. Geological Survey). Soil survey map: McLean County (Brockmann and others, 1979). Topographic maps (1:24,000): Washburn and Turtle Creek SW (U.S. Geological Survey).	

ADEQUACY	If additional hydrologic and hydraulic data are obtained for the Missouri River, then there should be adequate data to prepare appropriate technical information for flood plain management.

FLOOD HAZARD AREA: Glen Ullin

COUNTY: Morton

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
06347500--Big Muddy Creek near Almont Continuous-record gaging station. Period of record--Oct. 1945 through Sept. 1970: 04/17/50--Stage = 30.7 ft; Discharge = 20,200 ft^3/s. (U.S. Geological Survey, 1959A-84).	Glen Ullin Railroad Dam (North Dakota State Water Commission).		Gaging station 06347500--456 mi^2.	Gaging station 06347500	

HYDRAULIC DATA

Step-backwater derived profiles	Bridge openings and cross-section data	Discharge rating curves	Stream or bed profiles	Flood stage data	Maps	Aerial photographs
	Bridges Big Muddy Creek 30-113-11 0049-071.212 Unnamed creeks 30-112-12 30-112-12.2 30-112-12.1 30-112-12.3 0049-066.534 0049-072.457 Glen Ullin Dam (North Dakota State Water Commission).	Gaging station 06347500	Bridges Big Muddy Creek 30-113-11 0049-071.212 Unnamed creeks 30-112-12 30-112-12.2 30-112-12.1 30-112-12.3 0049-066.534 0049-072.457 Glen Ullin Dam (North Dakota State Water Commission).	Gaging station 06347500	Additional information: Street and gutter elevations (Veigel Engineering). Flood Hazard Boundary Map (1:9,600): City of Glen Ullin (U.S. Department of Housing and Urban Development, 1974B). Flood prone map (1:24,000): Glen Ullin (U.S. Geological Survey). Soil survey map: Morton County (Edwards and Ableiter, 1951). Topographic map (1:24,000): Glen Ullin (U.S. Geological Survey).	1:7,920 (Local Agriculture Stabilization and Conservation Service).

ADEQUACY	If additional hydrologic and hydraulic data are obtained, then there should be adequate data to prepare appropriate technical information for flood plain management.

FLOOD HAZARD AREA: Stanley

COUNTY: Mountrail

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
	Stanley Dam (North Dakota State Water Commission). 1980 flood caused water in trailer court.				

HYDRAULIC DATA

Step-backwater derived profiles	Bridge openings and cross-section data	Discharge rating curves	Stream or bed profiles	Flood stage data	Maps	Aerial photographs
	Bridges Little Knife River 0008-155.110 Unnamed creek 0002-091.422 Stanley Dam (North Dakota State Water Commission).		Bridges Little Knife River 0008-155.110 Unnamed creek 0002-091.422 Stanley Dam (North Dakota State Water Commission).		Additional information: Street and gutter elevations (Webster, Foster, and Weston). Flood Hazard Boundary Map (1:9,600): City of Stanley (U.S. Department of Housing and Urban Development, no date). Soil survey map: Mountrail County (U.S. Department of Agriculture, draft D). Topographic maps (1:24,000): Stanley and Stanley SE (U.S. Geological Survey).	1:7,920 (Local Agriculture Stabilization and Conservation Service).

ADEQUACY	If hydrologic and additional hydraulic data are obtained, then there should be adequate data to prepare appropriate technical information for flood plain management.

FLOOD HAZARD AREA: White Earth

COUNTY: Mountrail

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
06332000--White Earth River at White Earth Continuous-record gaging station. Period of record--Aug. 1954 through Sept. 1981: 04/18/79--Stage = 20.12 ft; Discharge = 5,200 ft^3/s. (U.S. Geological Survey, 1959A-84).	White Earth Dam (North Dakota State Water Commission).		Gaging station 06332000--780 mi^2 of which about 290 mi^2 is noncontributing.	Gaging station 06332000	

HYDRAULIC DATA

Step-backwater derived profiles	Bridge openings and cross-section data	Discharge rating curves	Stream or bed profiles	Flood stage data	Maps	Aerial photographs
	Bridges Unnamed creeks 31-106-12 31-106-12.4 31-106-12.2 31-107-12 White Earth River 31-106-12.1 31-106-12.3 White Earth Dam (North Dakota State Water Commission).	Gaging station 06332000	Bridges Unnamed creeks 31-106-12 31-106-12.4 31-106-12.2 31-107-12 White Earth River 31-106-12.1 31-106-12.3 White Earth Dam (North Dakota State Water Commission).	Gaging station 06332000	Flood Hazard Boundary Map (1:9,600): City of White Earth (U.S. Department of Housing and Urban Development, 1974J). Soil survey map: Mountrail County (U.S. Department of Agriculture, draft D). Topographic maps (1:24,000): Manitou, Ross NW, Tioga SE, and White Earth (U.S. Geological Survey).	1:7,920 (Local Agriculture Stabilization and Conservation Service).

ADEQUACY	If additional hydraulic data are obtained, then there should be adequate data to prepare appropriate technical information for flood plain management.

FLOOD HAZARD AREA: Oliver County

COUNTY: Oliver

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
06339560--Brush Creek near Beulah Continuous-record gaging station. Period of record--Oct. 1974 through Sept. 1983: 03/29/82--Stage = 8.40 ft; Discharge = 940 ft^3/s. (U.S. Geological Survey, 1959A-84). 06340200--West Branch Otter Creek near Beulah Continuous-record gaging station. Period of record--Apr. 1965 through Sept. 1983: 06/24/66--Stage = 17.2 ft; Discharge = 23,700 ft^3/s. (U.S. Geological Survey, 1959A-84). 06340300--Otter Creek near Hannover Crest-stage gaging station. Period of record--Mar. 1965 through Sept. 1973: 06/24/66--Stage 12.48 ft; Discharge = 45,300 ft^3/s. (U.S. Geological Survey, 1959A-84). 06340780--Alderin Creek near Fort Clark Continuous-record gaging station. Period of record--Oct. 1977 through Sept. 1983: 04/17/79--Stage = 9.95 ft; Discharge = 1,540 ft^3/s. (U.S. Geological Survey, 1959A-84).	Flood damage and watershed protection for Square Butte Creek watershed (U.S. Department of Agriculture, 1969). Information concerning dams (North Dakota State Water Commission). 1979 flood damages: Three roads were washed out, nine roads were washed over, two culverts were damaged, four culverts were washed out, two bridges were damaged, and one bridge was washed out (Federal Highway Administration).	Log-Pearson type III frequency analysis for gaging station 06340200; 25-year recurrence interval--Discharge = 849 ft^3/s (Crosby, 1975). Log-Pearson type III frequency analysis for gaging station 06340300; 25-year recurrence interval--Discharge = 942 ft^3/s (Crosby, 1975). Log-Pearson type III frequency analysis for gaging station 06342050; 50-year recurrence interval--Discharge = 9,760 ft^3/s (Crosby, 1975). Log-Pearson type III frequency analysis for gaging station 06342100; 50-year recurrence interval--Discharge = 2,710 ft^3/s (Crosby, 1975). Log-Pearson type III frequency analysis for gaging station 06342150; 50-year recurrence interval--Discharge = 45 ft^3/s (Crosby, 1975). Log-Pearson type III frequency analysis for gaging station 06342250; 50-year recurrence interval--Discharge= 165 ft^3/s (Crosby, 1975).	Gaging stations 06339560--Approximately 23.92 mi^2. 06340200--26.5 mi^2. 06340300--42.9 mi^2. 06340780--21.9 mi^2 of which about 1.1 mi^2 is noncontributing. 06340900--Approximately 183,000 mi^2. 06341000--Approximately 184,000 mi^2. 06342020--Approximately 185,000 mi^2. 06342040--16.9 mi^2. 06342050--56.8 mi^2. 06342100--13 mi^2. 06342150--0.19 mi^2. 06342200--75.8 mi^2. 06342230--45.6 mi^2. 06342250--1.68 mi^2. 06342260--146 mi^2.	Gaging stations 06339560 06340200 06340300 06340780 06342040 06342050 06342100 06342150 06342200 06342230 06342250 06342260	

FLOOD HAZARD AREA: Oliver County--Continued

COUNTY: Oliver

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
06340900--Missouri River near Hensler Stage gaging station. Period of record--May 1959 through Sept. 1983: 03/20/65--Maximum daily stage = 27.77 ft. (U.S. Geological Survey, 1959A-84).					
06341000--Missouri River at Washburn Stage gaging station. Period of record--Aug. 1960 through Sept. 1983: 01/11/64--Maximum daily stage = 22.76 ft. (U.S. Geological Survey, 1959A-84).					
06342020--Missouri River at Price Stage gaging station. Period of record--Nov. 1959 through Sept. 1983: 01/22/67--Maximum daily stage = 30.12 ft. (U.S. Geological Survey, 1959A-84).					
06342040--Square Butte Creek near Hannover Continuous--record gaging station. Period of record--Oct. 1971 through Sept. 1981: 04/17/79--Stage = 9.08 ft; Discharge = 1,440 ft^3/s. (U.S. Geological Survey, 1959A-84).					

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
06342050--Square Butte Creek at Center Crest-stage gaging station. Period of record--Mar. 1956 through Sept. 1973: 06/24/66--Stage = 10.96 ft; Discharge = 8,000 ft^3/s. (U.S. Geological Survey, 1959A-84).					
06342100--Square Butte Creek tributary no. 2 near Center Continuous-record gaging station. Period of record--Dec. 1954 through Apr. 1965 (annual maximum only) and May 1965 through Sept. 1976: 07/16/57--Stage = 7.98 ft; Discharge = 2,500 ft^3/s. (U.S. Geological Survey, 1959A-84).					
06342150--Square Butte Creek tributary near Center Crest-stage gaging station. Period of record--Dec. 1954 through Sept. 1973: 07/16/57--Stage = 6.34 ft; Discharge = 51 ft^3/s. (U.S. Geological Survey, 1959A-84).					
06342200--Square Butte Creek above Nelson Lake near Center Continuous-record gaging station. Period of record--Oct. 1977 through Sept. 1982: 04/17/79--Stage = 9.96 ft; Discharge = 3,670 ft^3/s. (U.S. Geological Survey, 1959A-84).					

FLOOD HAZARD AREA: Oliver County--Continued

COUNTY: Oliver

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
06342230--Hagel Creek near Center Continuous-record gaging station. Period of record--Oct. 1977 through Sept. 1982: 04/17/79--Stage 7.41 ft; Discharge = 1,150 ft^3/s. (U.S. Geological Survey, 1959A-84).					
06342250--Square Butte Creek tributary no. 3 near Center Crest-stage gaging station. Period of record--Dec. 1954 through Sept. 1973: 04/06/69--Stage = 9.40 ft; Discharge = 130 ft^3/s. (U.S. Geological Survey, 1959A-84).					
06342260--Square Butte Creek below Center Continuous-record gaging station. Period of record--May 1965 through Sept. 1983: 06/24/66--Stage = 14.35 ft; Discharge = 9,700 ft^3/s. (U.S. Geological Survey, 1959A-84).					

HYDRAULIC DATA

Step-backwater derived profiles	Bridge openings and cross-section data	Discharge rating curves	Stream or bed profiles	Flood stage data	Maps	Aerial photographs
	Bridges Hagel Creek 33-122-18 33-125-16 Otter Creek 33-105-11 33-105-17 33-105-11.1 33-105-17.1 33-105-13 33-107-12 33-105-14 33-107-13 33-105-14.1 33-108-13 33-105-15 33-109-15 Unnamed creeks 0025-009.557 0025-010.886 0025-011.246 0025-012.228 0025-022.149 0025-026.867 0025-031.221 0025-034.731 0025-089.531 0031-086.670 0048-007.341 0200-911.994 0200-912.732 0200-913.186 0200-914.544 0200-917.117 0200-918.828 0200-924.623	Gaging stations 06339560 06340200 06340300 06340780 06342040 06342050 06342100 06342150 06342200 06342230 06342250 06342260	Bridges Hagel Creek 33-122-18 33-125-16 Otter Creek 33-105-11 33-105-17 33-105-11.1 33-105-17.1 33-105-13 33-107-12 33-105-14 33-107-13 33-105-14.1 33-108-13 33-105-15 33-109-15 Unnamed creeks 0025-009.557 0025-010.886 0025-011.246 0025-012.228 0025-022.149 0025-026.867 0025-031.221 0025-034.731 0025-089.531 0031-086.670 0048-007.341 0200-911.994 0200-912.732 0200-913.186 0200-914.544 0200-917.117 0200-918.828 0200-924.623	Gaging stations 06339560 06340200 06340300 06340780 06340900 06341000 06342020 06342040 06342050 06342100 06342150 06342200 06342230 06342250 06342260	Additional information: Road and bridge design (Interstate Engineering, Inc.). Flood prone map (1:24,000): Washburn (U.S. Geological Survey). Soil survey map: Oliver County (Weiser, 1975). Topographic maps (1:24,000): Bluegrass, Center, Crown Butte, Fort Clark, Fort Clark NE, Fort Clark SE, Glen Ullin NE, Hailstone Butte, Hannover, Hannover NE, Hannover NW, Harmon, Medicine Butte NE, Medicine Butte SE, Nelson Lake, New Salem NE, New Salem NW, Otter Creek, Price, Red Butte, Red Butte NW, Red Butte SW, and Sanger (U.S. Geological Survey).	1:7,920 (Local Agriculture Stabilization and Conservation Service).

ADEQUACY	If additional hydraulic data are obtained, then there should be adequate data to prepare appropriate technical information for flood plain management of the major streams.

FLOOD HAZARD AREA: McKinney Township

COUNTY: Renville

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05114000--Souris River near Sherwood Continuous-record gaging station. Period of record--Mar. 1930 through Sept. 1983: 04/10/76--Stage = 25.15 ft; Discharge = 14,800 ft^3/s. (U.S. Geological Survey, 1959A-84). 05115500--Lake Darling near Foxholm Continuous-record gaging station. Period of record--Apr. 1936 through Sept. 1983: 04/17/76--Stage = 24.24 ft. (U.S. Geological Survey, 1959A-84).	Lake Darling (U.S. Fish and Wildlife Service). 1979 flood: No road or bridge damage was reported (Federal Highway Administration).	Frequency analysis for Souris River above Lake Darling; 100-year recurrence interval--Discharge = 23,200 ft^3/s (U.S. Army Corps of Engineers, 1983A). Log-Pearson type III frequency analysis for gaging station 05114000; 100-year recurrence interval--Discharge = 23,500 ft^3/s (U.S. Army Corps of Engineers, 1983A).	Gaging stations 05114000--8,940 mi^2 of which about 5,900 mi^2 is noncontributing. 05115500--9,450 mi^2 of which about 6,200 mi^2 is noncontributing.	Gaging station 05114000	

HYDRAULIC DATA

Step-backwater derived profiles	Bridge openings and cross-section data	Discharge rating curves	Stream or bed profiles	Flood stage data	Maps	Aerial photographs
HEC-2 step-backwater derived profiles for Souris River (U.S. Army Corps of Engineers, 1977 and 1983A).	Bridges Souris River 38-110-13 38-113-18 38-111-14 0005-113.828 Souris River (U.S. Army Corps of Engineers).	Gaging station 05114000	Bridges Souris River 38-110-13 38-113-18 38-111-14 0005-113.828 Souris River (U.S. Army Corps of Engineers).	Gaging stations 05114000 05115500	Additional information: Road and bridge design (Wold Engineering). Flood Hazard Boundary Map (1:24,000): Township of McKinney (U.S. Department of Housing and Urban Development, 1980A). Soil survey map: Renville County (Thiele and others, 1977). Topographic maps (1:24,000): Mouse River Park and Tolley (U.S. Geological Survey).	1:20,000--04/19/75 and 04/25/75 and 1:3,500--04/24/82 (KBM, Inc.). 1:7,920 (Local Agriculture Stabilization and Conservation Service).

ADEQUACY	If additional hydraulic data are obtained for the Souris River, then there should be adequate data to prepare appropriate technical information for flood plain management.

FLOOD HAZARD AREA: Stafford Township

COUNTY: Renville

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05114000--Souris River near Sherwood Continuous-record gaging station. Period of record--Mar. 1930 through Sept. 1983: 04/10/76--Stage = 25.15 ft; Discharge = 14,800 ft^3/s. (U.S. Geological Survey, 1959A-84).	1979 flood damages: One bridge was washed out (Federal Highway Administration).	Log-Pearson type III frequency analysis for gaging station 05114000; 100-year recurrence interval--Discharge = 23,500 ft^3/s (U.S. Army Corps of Engineers, 1983A).	Gaging station 05114000--8,940 mi^2 of which about 5,900 mi^2 is noncontributing.	Gaging station 05114000	

HYDRAULIC DATA

Step-backwater derived profiles	Bridge openings and cross-section data	Discharge rating curves	Stream or bed profiles	Flood stage data	Maps	Aerial photographs
HEC-2 step-backwater derived profiles for Souris River (U.S. Army Corps of Engineers, 1977 and 1983A).	Bridges Souris River 38-104-2.1 38-105-5.1 Unnamed creeks 38-104-1 38-105-5.2 38-104-2 38-105-6 38-104-3 38-105-6.1 38-104-3.1 38-105-6.2 38-105-5 38-106-7 Souris River (U.S. Army Corps of Engineers).	Gaging station 05114000	Bridges Souris River 38-104-2.1 38-105-5.1 Unnamed creeks 38-104-1 38-105-5.2 38-104-2 38-105-6 38-104-3 38-105-6.1 38-104-3.1 38-105-6.2 38-105-5 38-106-7 Souris River (U.S. Army Corps of Engineers).	Gaging station 05114000	Additional information: Road and bridge design (Wold Engineering). Flood Hazard Boundary Map (1:24,000): Township of Stafford (U.S. Department of Housing and Urban Development, 1980B). Soil survey map: Renville County (Thiele and others, 1977). Topographic maps (1:24,000): Bowbells NE and Mouse River Park NW (U.S. Geological Survey).	1:20,000--04/19/75 and 04/25/75 (KBM, Inc.). 1:7,920 (Local Agriculture Stabilization and Conservation Service).

ADEQUACY	If additional hydrologic and hydraulic data are obtained for the Souris River, then there should be adequate data to prepare appropriate technical information for flood plain management.

FLOOD HAZARD AREA: Dunseith

COUNTY: Rolette

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05122500--Willow Creek at Dunseith Crest-stage gaging station. Period of record--Sept. 1953 through Sept. 1971 (continuous-record gaging station) and Oct. 1971 through Sept. 1973: 04/19/69--Stage = 14.60 ft; Discharge = 476 ft^3/s. (U.S. Geological Survey, 1959A-84).		Log-Pearson type III frequency analysis for gaging station 05122500; 50-year recurrence interval--Discharge = 974 ft^3/s (Crosby, 1975).	Gaging station 05122500--142 mi^2 of which about 51 mi^2 is noncontributing.	Gaging station 05122500	

HYDRAULIC DATA

Step-backwater derived profiles	Bridge openings and cross-section data	Discharge rating curves	Stream or bed profiles	Flood stage data	Maps	Aerial photographs
	Bridges Unnamed creek 0005-193.925 Willow Creek 40-105-15 0005-195.685	Gaging station 05122500	Bridges Unnamed creek 0005-193.925 Willow Creek 40-105-15 0005-195.685	Gaging station 05122500	Additional information: Street and gutter elevations (Wold Engineering). Flood Hazard Boundary Map (1:9,600): City of Dunseith (U.S. Department of Housing and Urban Development, 1976A). Flood prone map (1:24,000): Dunseith (U.S. Geological Survey). Topographic map (1:24,000): Dunseith (U.S. Geological Survey).	1:7,920 (Local Agriculture Stabilization and Conservation Service).

ADEQUACY	If additional hydraulic data are obtained, then there should be adequate data to prepare appropriate technical information for flood plain management.

FLOOD HAZARD AREA: Rolette

COUNTY: Rolette

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
	Rolette City Storm Water Outlet (North Dakota State Water Commission).				

HYDRAULIC DATA

Step-backwater derived profiles	Bridge openings and cross-section data	Discharge rating curves	Stream or bed profiles	Flood stage data	Maps	Aerial photographs
	Rolette City Storm Water Outlet (North Dakota State Water Commission).		Rolette City Storm Water Outlet (North Dakota State Water Commission).		Additional information: Street and gutter elevations (Wold Engineering). Flood Hazard Boundary Map (1:9,600): City of Rolette (U.S. Department of Housing and Urban Development, 1974F). Flood prone map (1:24,000): Rolette (U.S. Geological Survey). Topographic map (1:24,000): Rolette (U.S. Geological Survey).	1:7,920 (Local Agriculture Stabilization and Conservation Service).

ADEQUACY	If hydrologic and additional hydraulic information are obtained, then there should be adequate data to prepare appropriate technical information for flood plain management.

FLOOD HAZARD AREA: St. John

COUNTY: Rolette

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
	Runoff through town causes flooding of homes.				

HYDRAULIC DATA

Step-backwater derived profiles	Bridge openings and cross-section data	Discharge rating curves	Stream or bed profiles	Flood stage data	Maps	Aerial photographs
					Additional information: Proposed drainage system (Wold Engineering). Flood Hazard Boundary Map (1:9,600): City of St. John (U.S. Department of Housing and Urban Development, 1974G). Topographic map (1:24,000): St. John (U.S. Geological Survey).	1:7,920 (Local Agriculture Stabilization and Conservation Service).

ADEQUACY	If hydrologic and additional hydraulic data are obtained, then there should be adequate data to prepare appropriate technical information for flood plain management.

FLOOD HAZARD AREA: Sioux County

COUNTY: Sioux

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
06352300--Cedar Creek near North Lemmon Continuous-record gaging station. Period of record--May 1959 through Sept. 1963: 05/31/62--Stage = 7.92 ft; Discharge = 444 ft^3/s. (U.S. Geological Survey, 1959A-84). 06352500--Cedar Creek near Pretty Rock Continuous-record gaging station. Period of record--Apr. 1943 through Sept. 1976: 04/17/50--Stage = 26.5 ft; Discharge = 48,000 ft^3/s. (U.S. Geological Survey, 1959A-84). 06353000--Cedar Creek near Raleigh Continuous-record gaging station. Flood of 04/18/50--Stage = 18 ft; Discharge = 45,000 ft^3/s. Period of record--Apr. through Sept. 1939 and Mar. 1962 through Sept. 1983: 03/28/78--Stage = 13.70 ft; Discharge = 13,400 ft^3/s. (U.S. Geological Survey, 1959A-84).	Backwater from ice causes flooding in Solen. Information concerning dams (North Dakota State Water Commission). Levee system (U.S. Army Corps of Engineers, 1983B). Oahe Dam (U.S. Army Corps of Engineers).		Gaging stations 06352300--901 mi^2. 06352500--Approximately 1,340 mi^2. 06353000--Approximately 1,750 mi^2. 06353500--Approximately 3,670 mi^2. 06354000--Approximately 4,100 mi^2.	Gaging stations 06352300 06352500 06353000 06353500 06354000	

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
06353500--Cannonball River near Timmer Continuous-record gaging station. Flood of 04/18/50--Stage = 22.6 ft; Discharge = 90,000 ft^3/s. Period of record--June 1903 through Dec. 1909; Mar., Apr., and Aug. 1911 through Dec. 1918; Oct. through Sept. 1922; Oct. through Sept. 1924; and Apr. 1928 through Nov. 1935: 06/10/32--Stage = 12.66 ft; Discharge = 10,400 ft^3/s. (U.S. Geological Survey, 1959A-84). 06354000--Cannonball River at Breien Continuous-record gaging station. Period of record--Aug. 1934 through Sept. 1983: 04/19/50--Stage = 22.30 ft; Discharge = 94,800 ft^3/s. (U.S. Geological Survey, 1959A-84).					

HYDRAULIC DATA

Step-backwater derived profiles	Bridge openings and cross-section data	Discharge rating curves	Stream or bed profiles	Flood stage data	Maps	Aerial photographs
	Bridges Antelope Creek 0031-009.584 Battle Creek 43-162-12 43-162-14 0024-018.647 Cannonball River 43-158-2 0006-035.187 0006-035.470 0806-034.280 Cedar Creek 43-108-27 43-121-99 43-113-27 0031-010.364 0049-007.354 Coal Mine Creek 0024-023.554 Four Mile Creek 0024-000.320 Leaf on the Hill Creek 43-140-26	Gaging stations 06352300 06352500 06353000 06353500 06354000	Bridges Antelope Creek 0031-009.584 Battle Creek 43-162-12 43-162-14 0024-018.647 Cannonball River 43-158-2 0006-035.187 0006-035.470 0806-034.280 Cedar Creek 43-108-27 43-121-99 43-113-27 0031-010.364 0049-007.354 Coal Mine Creek 0024-023.554 Four Mile Creek 0024-000.320 Leaf on the Hill Creek 43-140-26	Gaging stations 06352300 06352500 06353000 06353500 06354000	Additional information: Road and bridge design (Veigel Engineering). Flood Hazard Boundary Map (1:4,800): City of Fort Yates (U.S. Department of Housing and Urban Development, 1976B). Topographic maps (1:24,000): Barren Butte, Cannonball, Cannonball SE, Cannonball SW, Fort Yates, Fort Yates NE, Fort Yates NW, Fort Yates SE, Froelich Dam, Half Timber Butte, Hump Butte, Keldron, Lookout Butte, Lookout Butte SE, Mahto NE, Mahto NW, Maple Leaf, McIntosh, McLaughlin, Morristown, Pamplin Hills, Park Hills, Pitt Creek, Porcupine, Pretty Rock Butte SE, Round Top, Selfridge, Selfridge SE, Shields, Shields SW, Solen SW, Tatanka Lake, Thunder Hawk, Timmer, Walker, and Watauga (U.S. Geological Survey).	1:7,920 (Local Agriculture Stabilization and Conservation Service).

HYDRAULIC DATA

Step-backwater derived profiles	Bridge openings and cross-section data	Discharge rating curves	Stream or bed profiles	Flood stage data	Maps	Aerial photographs
	Bridges--Continued Porcupine Creek 43-160-16 0006-014.296 0006-027.176 0024-015.004		Bridges--Continued Porcupine Creek 43-160-16 0006-014.296 0006-027.176 0024-015.004			

ADEQUACY	If additional hydraulic data are obtained, then there should be adequate data to prepare appropriate technical information for flood plain management of the Cannonball River and Cedar Creek.

FLOOD HAZARD AREA: Slope County

COUNTY: Slope

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
06335000--Little Beaver Creek near Marmarth Continuous-record gaging station. Period of record--Apr. 1938 through Sept. 1979: 04/06/52--Stage = 13.9 ft; Discharge = 12,700 ft^3/s. (U.S. Geological Survey, 1959A-84). 06335500--Little Missouri River at Marmarth Continuous-record gaging station. Period of record--Mar. 1938 through Sept. 1983: 03/23/47--Stage = 21.7 ft; Discharge = 45,000 ft^3/s. (U.S. Geological Survey, 1959A-84). 06335750--Deep Creek near Amidon Continuous-record gaging station. Period of record--Oct. 1977 through Sept. 1983: 03/27/78--Stage = 8.28 ft; Discharge = 1,680 ft^3/s. (U.S. Geological Survey, 1959A-84). 06349900--Cannonball River at New England Continuous-record gaging station. Period of record--Oct. 1978 through Sept. 1981: 04/10/79--Stage = 10.50 ft; Discharge = 1,450 ft^3/s. (U.S. Geological Survey, 1959A-84).	Information concerning dams (North Dakota State Water Commission). Levee system for Marmarth (U.S. Army Corps of Engineers, 1983B). 1979 flood: No road or bridge damage was reported (Federal Highway Administration).		Gaging stations 06335000--Approximately 587 mi^2. 06335500--Approximately 4,640 mi^2. 06335750--Approximately 250 mi^2. 06349900--Approximately 285 mi^2.	Gaging stations 06335000 06335500 06335750 06349900	

HYDRAULIC DATA

Step-backwater derived profiles	Bridge openings and cross-section data	Discharge rating curves	Stream or bed profiles	Flood stage data	Maps	Aerial photographs
	Bridges Cannonball River 44-142-10 44-147-5 44-142-10.1 44-149-4 44-145-6 44-151-3 0021-003.078 0085-048.305 Cedar Creek 44-140-22 44-142-24 44-141-22 Deep Creek 44-124-4 44-125-11 Little Missouri 0012-006.555 North Fork Cedar Creek 44-143-16 44-149-21 44-147-19 44-151-21 44-148-19 44-152-22 0067-016.894 Philbrick Creek 44-149-3 0085-054.228	Gaging stations 06335000 06335500 06335750 06349900	Bridges Cannonball River 44-142-10 44-147-5 44-142-10.1 44-149-4 44-145-6 44-151-3 0021-003.078 0085-048.305 Cedar Creek 44-140-22 44-142-24 44-141-22 Deep Creek 44-124-4 44-125-11 Little Missouri 0012-006.555 North Fork Cedar Creek 44-143-16 44-149-21 44-147-19 44-151-21 44-148-19 44-152-22 0067-016.894 Philbrick Creek 44-149-3 0085-054.228	Gaging stations 06335000 06335500 06335750 06349900	Additional information: Road and bridge design (Brosz Engineering). Additional information: Road and bridge design (Veigel Engineering). Flood Hazard Boundary Map (1:9,600): City of Marmarth (U.S. Department of Housing and Urban Development, 1974C). Topographic maps (1:24,000): Amidon, Amidon SE, Ballard Draw, Black Butte, Boyce Creek, Cedar Lake, Daglum SE, Daglum SW, Deep Creek North, Deep Creek South, East Rainy Butte, Juniper Spur, Marmarth SE, Marmarth 2NE, Marmarth 2NW, Marmarth 2SW, Mineral Springs, New England SW, Ollie, Rocky Ridge, Spring Creek, Stewart Lake, Three V Crossing, Warnke Hill, Waterhole Creek, West Fork Deep Creek, West Rainy Butte, White Lake, Williams Lake (U.S. Geological Survey).	1:7,920 (Local Agriculture Stabilization and Conservation Service).

HYDRAULIC DATA

Step-backwater derived profiles	Bridge openings and cross-section data	Discharge rating curves	Stream or bed profiles	Flood stage data	Maps	Aerial photographs
	Bridges--Continued Sand Creek 44-129-10 44-132-15.1 0085-032.124		Bridges--Continued Sand Creek 44-129-10 44-132-15.1 0085-032.124			

ADEQUACY	If additional hydraulic data are obtained, then there should be adequate data to prepare appropriate technical information for flood plain management of the Little Missouri River and near the mouth of Deep Creek.

FLOOD HAZARD AREA: Richardton

COUNTY: Stark

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
	Assumption Abbey Dam (North Dakota State Water Commission).				

HYDRAULIC DATA

Step-backwater derived profiles	Bridge openings and cross-section data	Discharge rating curves	Stream or bed profiles	Flood stage data	Maps	Aerial photographs
	Bridges Unnamed creeks 45-144-7 45-147-7 45-144-7.1 45-147-8 45-145-8 45-147-8.1 Assumption Abbey Dam (North Dakota State Water Commission).		Bridges Unnamed creeks 45-144-7 45-147-7 45-144-7.1 45-147-8 45-145-8 45-147-8.1 Assumption Abbey Dam (North Dakota State Water Commission).		Additional information: Street and gutter elevations (Veigel Engineering). Flood Hazard Boundary Map (1:9,600): City of Richardton (U.S. Department of Housing and Urban Development, 1976C). Soil survey map: Stark County (Kermit and others, 1968). Topographic maps (1:24,000): Richardton and Richardton SE (U.S. Geological Survey).	1:7,920 (Local Agriculture Stabilization and Conservation Service).

ADEQUACY	If hydrologic and additional hydraulic data are obtained, then there should be adequate data to prepare appropriate technical information for flood plain management.

FLOOD HAZARD AREA: Montpelier

COUNTY: Stutsman

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
06470000--James River at Jamestown Continuous-record gaging station. Period of record--June 1928 through Sept. 1934, Mar. through May 1935, Aug. 1937 through Sept. 1939, and Mar. 1943 through Sept. 1983: 05/13/50--Stage = 15.82 ft; Discharge = 6,390 ft^3/s. (U.S. Geological Survey, 1959A-84).			Gaging station 06470000--2,820 mi^2 of which about 1,650 mi^2 is noncontributing.	Gaging station 06470000	

HYDRAULIC DATA

Step-backwater derived profiles	Bridge openings and cross-section data	Discharge rating curves	Stream or bed profiles	Flood stage data	Maps	Aerial photographs
	Bridges James River 47-142-44 47-142-45	Gaging station 06470000	Bridges James River 47-142-44 47-142-45	Gaging station 06470000	Additional information: Water system (Olson-Kaufman, Inc.). Flood Hazard Boundary Map (1:9,600): City of Montpelier (U.S. Department of Housing and Urban Development, 1974E). Flood prone map (1:24,000): Montpelier (U.S. Geological Survey). Soil survey map: LaMoure County and parts of James River valley (Thompson and Sweeney, 1971). Topographic map (1:24,000): Montpelier (U.S. Geological Survey).	1:7,920 (Local Agriculture Stabilization and Conservation Service).

ADEQUACY	If additional hydrologic and hydraulic data are obtained, then there should be adequate data to prepare appropriate information for flood plain management.

FLOOD HAZARD AREA: Kenmare Township

COUNTY: Ward

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05116500--Des Lacs River at Foxholm Continuous-record gaging station. Period of record--June 1904 through July 1906 and Oct. 1945 through Sept. 1983: 04/19/79--Stage = 21.23 ft; Discharge = 4,260 ft^3/s. (U.S. Geological Survey, 1959A-84).	Des Lacs Lake (U.S. Fish and Wildlife Service). 1979 flood damages: One culvert was washed out (Federal Highway Administration).		Gaging station 05116500--939 mi^2 of which about 400 mi^2 is noncontributing.	Gaging station 05116500	

HYDRAULIC DATA

Step-backwater derived profiles	Bridge openings and cross-section data	Discharge rating curves	Stream or bed profiles	Flood stage data	Maps	Aerial photographs
	Bridges Niobe Coulee 51-107-8.1 Souris River 51-107-8.2 Unnamed creeks 51-106-10 0052-047.232	Gaging station 05116500	Bridges Niobe Coulee 51-107-8.1 Souris River 51-107-8.2 Unnamed creeks 51-106-10 0052-047.232	Gaging station 05116500	Flood Hazard Boundary Map (1:24,000): Township of Kenmare (Federal Emergency Management Agency, 1982A). Flood prone map (1:24,000): Donnybrook (U.S. Geological Survey). Soil survey map: Ward County (Howey and others, 1974). Topographic maps (1:24,000): Coulee, Donnybrook, Kenmare, and Norma (U.S. Geological Survey).	1:7,920 (Local Agriculture Stabilization and Conservation Service).

ADEQUACY	If additional hydrologic and hydraulic data are obtained for the Des Lacs River, then there should be adequate data to prepare appropriate technical information for flood plain management.

FLOOD HAZARD AREA: Sykeston

COUNTY: Wells

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
	Sykeston Dam (North Dakota State Water Commission).				

HYDRAULIC DATA

Step-backwater derived profiles	Bridge openings and cross-section data	Discharge rating curves	Stream or bed profiles	Flood stage data	Maps	Aerial photographs
	Bridges Pipestem Creek 52-132-25 52-132-25.1 0030-088.503 0052-208.121 Unnamed creek 0052-208.481 Sykeston Dam (North Dakota State Water Commission).		Bridges Pipestem Creek 52-132-25 52-132-25.1 0030-088.503 0052-208.121 Unnamed creek 0052-208.481 Sykeston Dam (North Dakota State Water Commission).		Flood Hazard Boundary Map (1:9,600): City of Sykeston (U.S. Department of Housing and Urban Development, 1975B). Soil survey map: Wells County (Seago and others, 1970). Topographic maps (1:24,000): Dover and Sykeston (U.S. Geological Survey).	1:7,920 (Local Agriculture Stabilization and Conservation Service).

ADEQUACY	If hydrologic and additional hydraulic data are obtained, then there should be adequate data to prepare appropriate technical information for flood plain management.

FLOOD HAZARD AREA: Buford and Trenton Townships

COUNTY: Williams

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
06185500--Missouri River near Culbertson Continuous-record gaging station. Period of record--July 1941 through Dec. 1951 and Apr. 1958 through Sept. 1983: 03/26/43--Stage = 14.80 ft; Discharge = 78,200 ft^3/s. (U.S. Geological Survey, 1959A-84). 06185600--Missouri River stage gage no. 4 near Nohly Stage gaging station. Period of record--Mar. 1959 through Sept. 1983: 03/23/60--Maximum daily stage recorded = 21.20 ft. (U.S. Geological Survey, 1959A-84). 06185650--Missouri River stage gage no. 5 at Nohly Stage gaging station. Period of record--Apr. 1959 through Sept. 1983 (seasonal): 03/15/72--Maximum daily stage recorded = 77.22 ft. (U.S. Geological Survey, 1959A-84).	Buford-Trenton Irrigation Project #222 (North Dakota State Water Commission).		Gaging stations 06185500--91,557 mi^2. 06185600--Approximately 93,000 mi^2. 06185650--Approximately 93,000 mi^2. 06329500--Approximately 69,103 mi^2. 06329590--Approximately 70,000 mi^2. 06329610--Approximately 70,000 mi^2. 06329620--Approximately 70,000 mi^2. 06329640--Approximately 164,000 mi^2. 06329650--Approximately 164,000 mi^2. 06329660--Approximately 164,000 mi^2. 06329670--Approximately 164,000 mi^2. 06329680--Approximately 164,000 mi^2. 06330000--Approximately 164,500 mi^2.	Gaging stations 06185500 06329500 06330000	

FLOOD HAZARD AREA: Buford and Trenton Townships--Continued

COUNTY: Williams

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
06329500--Yellowstone River near Sidney Continuous-record gaging station. Period of record--Oct. 1910 through Sept. 1931 and Oct. 1933 through Sept. 1983: 06/02/21--Stage = 12.6 ft; Discharge = 159,000 ft^3/s. (U.S. Geological Survey, 1959A-84).					
06329590--Yellowstone River stage gage no. 1 near Fairview Stage gaging station. Period of record--Mar. 1959 through Sept. 1983 (seasonal): 03/21/60--Maximum daily stage recorded = 23.78 ft. (U.S. Geological Survey, 1959A-84).					
06329610--Yellowstone River stage gage no. 2 near Cartwright Stage gaging station. Period of record--Apr. 1959 through Sept. 1983 (seasonal): 03/23/78--Maximum daily stage recorded = 87.08 ft. (U.S. Geological Survey, 1959A-84).					

FLOOD HAZARD AREA: Buford and Trenton Townships--Continued COUNTY: Williams

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
06329620--Yellowstone River stage gage no. 3 near Buford Stage gaging station. Period of record--Apr. 1959 through Sept. 1983 (seasonal): 03/15/72--Maximum daily stage recorded = 29.55 ft. (U.S. Geological Survey, 1959A-84).					
06329640--Missouri River stage gage no. 5A at Buford Stage gaging station. Period of record--Apr. 1960 through Sept. 1983 (seasonal): 03/23/78--Maximum daily stage recorded = 19.37 ft. (U.S. Geological Survey, 1959A-84).					
06329650--Missouri River stage gage no. 6 near Buford Stage gaging station. Period of record--Dec. 1959 through Sept. 1983 (seasonal): 06/29/75--Maximum daily stage recorded = 24.15 ft. (U.S. Geological Survey, 1959A-84).					

FLOOD HAZARD AREA: Buford and Trenton Townships--Continued

COUNTY: Williams

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
06329660--Missouri River stage gage no. 7 near Trenton Stage gaging station. Period of record--Mar. 1959 through Sept. 1983 (seasonal): 07/10/75--Maximum daily stage recorded = 21.56 ft. (U.S. Geological Survey, 1959A-84).					
06329670--Missouri River stage gage no. 7A near Trenton Stage gaging station. Period of record--Apr. 1960 through June 1964 (seasonal): 06/21/63--Maximum daily stage recorded = 18.72 ft. (U.S. Geological Survey, 1959A-84).					
06329680--Missouri River stage gage no. 8 near Trenton Stage gaging station. Period of record--Mar. 1959 through Nov. 1979 (seasonal): 03/25/78--Maximum daily stage recorded = 28.50 ft. (U.S. Geological Survey, 1959A-84).					
06330000--Missouri River near Williston Continuous-record gaging station. Period of record--Oct. 1897 through July 1965 and Apr. 1966 through Sept. 1983 (stage only): 04/04/30--Stage = 18.6 ft; Discharge = 231,000 ft^3/s. (U.S. Geological Survey, 1959A-84).					

HYDRAULIC DATA

Step-backwater derived profiles	Bridge openings and cross-section data	Discharge rating curves	Stream or bed profiles	Flood stage data	Maps	Aerial photographs
	Bridges Irrigation canals 53-105-45 53-111-42 53-105-45.1 53-111-43 53-106-44 53-111-44 53-107-46 53-112-39 53-108-45 53-112-40 53-109-42.1 53-112-42 53-109-42.3 53-112-43 53-109-43.1 53-113-39 53-110-41 53-114-40 53-111-40 53-115-3 53-111-41 53-115-39.1 Missouri River MonDak Bridge (North Dakota State Highway Department). Unnamed creeks 53-102-44 53-110-38 53-103-44 53-110-38.1 53-107-43 53-111-38 53-109-42.2 53-111-39 53-109-43 53-111-39.1 53-110-37 53-113-38	Gaging stations 06185500 06329500 06330000	Bridges Irrigation canals 53-105-45 53-111-42 53-105-45.1 53-111-43 53-106-44 53-111-44 53-107-46 53-112-39 53-108-45 53-112-40 53-109-42.1 53-112-42 53-109-42.3 53-112-43 53-109-43.1 53-113-39 53-110-41 53-114-40 53-111-40 53-115-39 53-111-41 53-115-39.1 Missouri River MonDak Bridge (North Dakota State Highway Department). Unnamed creeks 53-102-44 53-110-38 53-103-44 53-110-38.1 53-107-43 53-111-38 53-109-42.2 53-111-39 53-109-43 53-111-39.1 53-110-37 53-113-38	Gaging stations 06185500 06185600 06185650 06329500 06329590 06329610 06329620 06329640 06329650 06329660 06329670 06329680 06330000	Topographic maps (1:24,000): Bainville SE, Buford, Cartwright NE, Dore, Trenton, Trenton SW, and Williston SW (U.S. Geological Survey).	1:7,920 (Local Agriculture Stabilization and Conservation Service).

ADEQUACY	If additional hydraulic data are obtained for the Missouri River, then there should be adequate data to prepare appropriate technical information for flood plain management.

Table 2.--Names and addresses of agencies and private firms who have flood related data

---

Brosz Engineering
315 South Main Street
Bowman, ND 58623
(701) 523-3340

City of New Rockford
Auditor's Office
New Rockford
North Dakota 58356
(701) 947-2461

Federal Emergency Management Agency
Federal Regional Center
Building 17
Denver, CO 80225
(303) 234-6582

Federal Highway Administration
3rd Street and Rosser Avenue
Bismarck, ND 58501
(701) 255-4011, Extension 204

Horizon, Inc.
P.O. Box 3134
Deadwood Avenue
Rapid City, SD
(605) 343-0280

Interstate Engineering, Inc.
1903 12th Avenue SW
Jamestown, ND 58401
(701) 252-0234

KBM, Inc.
1604 South Washington Street
Grand Forks, ND 58201
(701) 772-7156

Moore Engineering, Inc.
1042 14th Avenue East
West Fargo, ND 58078
(701) 282-4692

North Central Consultants, Ltd.
1201 6th Avenue Northeast
P.O. Box 1670
Jamestown, ND 58401
(701) 252-2060

North Dakota State Highway Department
LeRoy Sorenson
600 East Boulevard Avenue
Bismarck, ND 58501
(701) 224-4448

North Dakota State Water Commission
Dale L. Frink
900 East Boulevard Avenue
Bismarck, ND 58505
(701) 224-4951

Olson-Kaufman, Inc.
512 4th Street
Devils Lake, ND 58301
(701) 662-2119

U.S. Army Corps of Engineers
Omaha District
Larry Buss
6014 U.S. Post Office and Courthouse
215 North 17th Street
Omaha, NE 68102
(402) 221-3020

U.S. Army Corps of Engineers
St. Paul District
Stuart Dobberpuhl
Room 1521, U.S. Post Office & Custom House
St. Paul, MN 55101
(612) 725-7704

U.S. Bureau of Reclamation
304 East Broadway
Bismarck, ND 58501
(701) 255-4011, Extension 242

U.S. Department of Agriculture
Soil Conservation Service
John E. Nestoss
3rd and Rosser Avenue
Bismarck, ND 58501
(701) 255-4011 Extension 431

U.S. Fish and Wildlife Service
1500 Capitol Avenue
Bismarck, ND 58501
(701) 255-4011, Extension 418

U.S. Geological Survey
Russell E. Harkness
821 East Interstate Avenue
Bismarck, ND 58501
(701) 255-4011, Extension 604

Veigel Engineering
Highway 10 East
Dickinson, ND 58601
(701) 227-1284

Webster, Foster, and Weston
515 University Avenue
Williston, ND 58801
(701) 572-6352

Wold Engineering, PC
1035 Forestry Drive
Bottineau, ND 58318
(701) 228-2292
