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

By Douglas G. Emerson and James D. Wald

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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."

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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 95 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 are shown in figure 1.

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

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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. Water Resources Council (1981).

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 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 has 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 openings 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 which 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 either a downstream order number (i.e., 05059000) or a landline description (i.e., 130-096-36DDD).

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 Red River at Fargo is 05054000 and the number for the gaging station downstream on the Red River at Grand Forks is 05082500.

The landline description used in this report is based on a system of land survey used by the U.S. Bureau of Land Management. The system is illustrated in figure 2. The first numeral denotes the township north of a base line, the second numeral denotes the range west of the fifth principal meridian, and the third numeral denotes the section in which the site is located. The letters A, B, C, and D designate, respectively, the northeast, northwest, southwest, and southeast quarter section, quarter-quarter section, and quarter-quarter-quarter section.

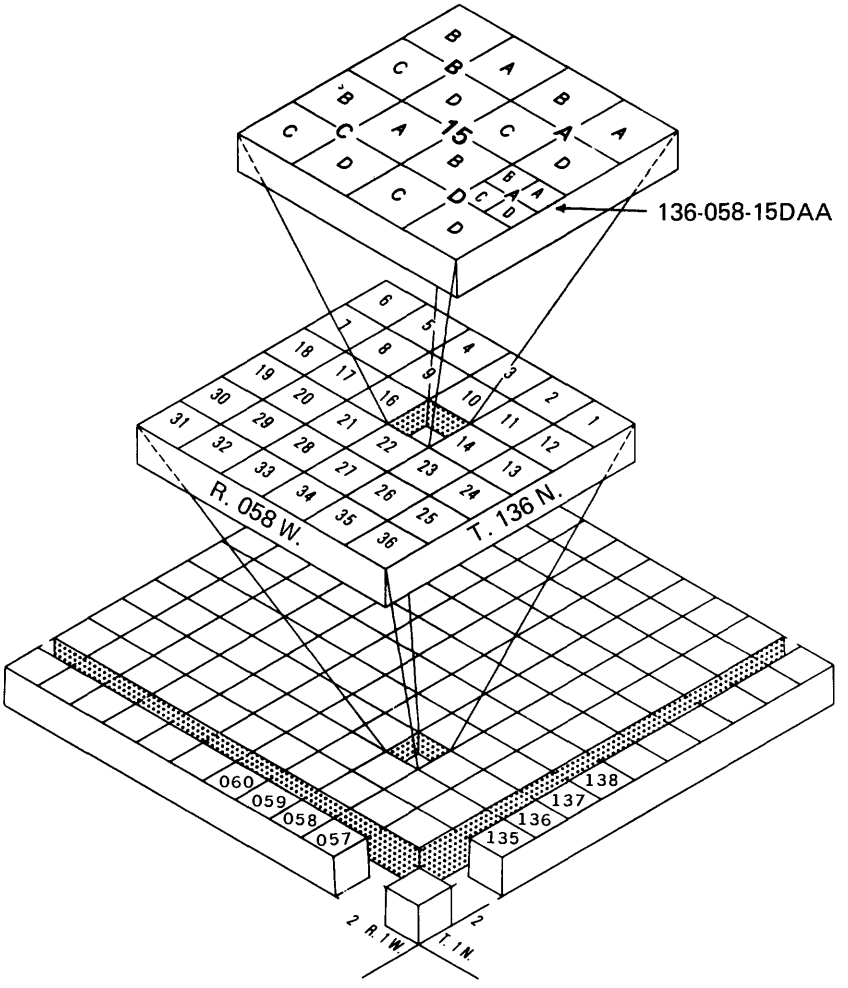

FIGURE 2.–System of numbering data locations using landline descriptions.

Included with the identification number is the name of the gaging station (i.e., Sheyenne River near Kindred); 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 is also 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 a 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 openings 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., 20-115-25). 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 will usually 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 which 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 is evaluated for its 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, 1982I) 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 maximum 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 which 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 artifical watercourse having definite bed and banks to confine and conduct flowing water.

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

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.

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

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.

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

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.

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.

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.

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

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.

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 from 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 process 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 is usually 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 which 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 which have been inundated by a specific flood or which 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 is often used interchangeably with the more general term "stage."

Gaging station--A particular site on a stream, canal, lake, or reservoir where systematic observations of 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 acquistion, and public investment policy.

One-hundred year flood--A flood having a 1 percent chance of occurring in any given year and which, 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 which 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 which 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 which 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 which 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 which 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.

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_____1980E, Flood insurance rate map, city of Grand Forks, North Dakota, Grand Forks County: Scale 1:12,000.

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

FLOOD HAZARD AREA: Hettinger

COUNTY: Adams

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
130-096-36DDD--Flat Creek tributary near Hettinger Indirect measuring station. Flood of July 12, 1966: Discharge = 2,790 ft^3/s. (U.S. Geological Survey).	Mirror Lake Dam--Constructed in 1909; capacity about 40 acres; restoration in progress (North Dakota State Water Commission).		Gaging station 130-096-36DDD--1.1 mi^2. Mirror Lake--71.2 mi^2 (North Dakota State Water Commission).	Gaging station 130-096-36DDD	

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 Flat Creek 01-117-19 0008-003.883 0012-071.167N 0012-073.283 Unnamed creeks 01-119-22.1 0012-072.289 Gaging station 130-096-36DDD		Bridges Flat Creek 01-117-19 0008-0D3.883 0D12-071.167N 0012-073.283 Unnamed creeks 01-119-22.1 0012-072.289		Additional information: Street and gutter elevations (Veigel Engineering). Flood Hazard Boundary Map (1:9,600): City of Hettinger (U.S. Department of Housing and Urban Development, 1975J). Soil survey map: Adams County (U.S. Department of Agriculture, draft B). Topographic map (1:24,000): Mirror Lake Reservoir (North Dakota State Water Commission). Topographic maps (1:24,000): Hettinger North, Hettinger South, Kid Rich Butte, and Taylor Butte SE (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.

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDRDLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05057200--Bald Hill Creek near Dazey Continuous-record gaging station. Period of record--Mar. 1956 through Sept. 1982: 04/19/79--Stage = 17.78 ft; Discharge = 9,000 ft^3/s. (U.S. Geological Survey, 1959A-82). 05058000--Sheyenne River below Bald Hill Dam Continuous-record gaging station. Period of record--Oct. 1949 through Sept. 1982: 04/24/79--Stage = 36.26 ft; Discharge = 4,740 ft^3/s. (U.S. Geological Survey, 1959A-82). 05058500--Sheyenne River at Valley City Continuous-record gaging station. Period of record--Mar. through Aug. 1919, Mar. through June 1938, Aug. 1938 through Sept. 1975, and Oct. 1979 through Sept. 1981 (stage and annual maximum discharge): 04/28/48--Stage = 17.51 ft; Discharge = 4,580 ft^3/s. (U.S. Geological Survey, 1959A-82). 137-059-18DCB- Spring Creek at Clausen Springs Indirect measuring station. 06/29/75--Discharge = 540 ft^3/s. (Lindskov, 1975).	Bald Hill Dam (U.S. Army Corps of Engineers). Flood control: Sheyenne River (U.S. Army Corps of Engineers, 1982C and 1982D). Flood control surveys, 1940's and 1970's (U.S. Army Corps of Engineers). Flood damage reduction (Souris-Red-Rainy River Basins Commission, 1972). Flood information study: City of Valley City (U.S. Army Corps of Engineers, 1970). Flood insurance study: City of Kathryn (Federal Emergency Management Agency, 1982F). Levee system for Valley City (U.S. Army Corps of Engineers, 1983A). Miller's Addition near Valley City had water at north end of development (Barnes County Highway Department). 1979 flood damages: 5 bridges on Sheyenne River and 4 bridges on Bald Hill Creek were washed out, 23 roads had gravel washed off, and 50 culverts and roads were washed out (Federal Highway Administration).	Log-Pearson type III frequency analysis for Bald Hill Creek near Dazey; 100-year recurrence interval--Discharge = 9,800 ft^3/s (U.S. Army Corps of Engineers, 1982B). Log-Pearson type III frequency analysis for gaging station 05058500; 100-year recurrence interval--Discharge = 9,300 ft^3/s (Souris-Red-Rainy River Basins Commission, 1972). Log-Pearson type III frequency analysis for Sheyenne River at Valley City; 100-year recurrence interval--Discharge = 11,000 ft^3/s (U.S. Army Corps of Engineers, 1982B). U.S. Soil Conservation Service's time of concentration procedure for Spring Creek at Kathryn; 100-year recurrence interval--Discharge = 1,450 ft^3/s (Federal Emergency Management Agency, 1982F).	Gaging stations 05057200--691 mi^2 of which about 340 mi^2 is noncontributing. 05058000--Approximately 7,470 mi^2 of which about 5,560 mi^2 is noncontributing. 05058500--Approximately 7,810 mi^2 of which about 5,700 mi^2 is noncontributing. 137-059-18DCB--87 mi^2. 138-058-22DAD--3 mi^2.	Gaging stations 05057200 05058000 05058500 137-059-18DCB 138-058-22DAD	

FLOOD HAZARD AREA: Barnes County--Continued

COUNTY: Barnes

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
138-058-22DAD--Sheyenne River tributary near Kathryn Indirect measuring station. 06/30/75--Discharge = 420 ft^3/s. (Lindskov, 1975).					

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 Sheyenne River (U.S. Army Corps of Engineers). HEC-2 step-backwater derived profiles for Spring Creek at Kathryn (Federal Emergency Management Agency, 1982F). Profiles for Sheyenne River at Valley City (U.S. Army Corps of Engineers, 1970).	Bridges Bald Hill Creek 02-117-1 02-119- 02-117-3 0026-005.888 Sheyenne River 02-118-15 02-122-27 02-118-16 02-122-29 02-118-18 02-123-30 02-119-18 02-123-33 02-120-19 02-123-35 02-121-20 02-123-38 02-122-6 02-124-2 02-122-21 02-124-39.3 02-122-25 02-124-40 02-122-26 02-125-39 0000-VCO.1 0000-VCO.2 0000-VCO.3 0000-VCO.4 0000-VCO.5 0000-VCO.6 0000-VCO.7 0026-012.634 0094-291.511L Spring Creek 02-115-36 02-119-39 02-115-38 02-124-39 0001-055.761 Gaging stations 05057200 05058000 05058500	Gaging stations 05057200 05058000 05058500	Bridges Bald Hill Creek 02-117-1 02-119-7 02-117-3 0026-005.888 Sheyenne River 02-118-15 02-122-27 02-118-16 02-122-29 02-118-18 02-123-30 02-119-18 02-123-33 02-120-19 02-123-35 02-121-20 02-123-38 02-122-6 02-124-2 02-122-21 02-124-39.3 02-122-25 02-124-40 02-122-26 02-125-39 0000-VCO.1 0000-VCO.2 0000-VCO.3 0000-VCO.4 0000-VCO.5 0000-VCO.6 0000-VCO.7 0026-012.634 0094-291.511L Spring Creek 02-115-36 02-119-39 02-115-38 02-124-39 0001-055.761 Sheyenne River (U.S. Army Corps of Engineers). Sheyenne River at Valley City (U.S. Army Corps of Engineers, 1970).	Gaging stations 05057200 05058000 05058500 High water elevation for Sheyenne River (U.S. Army Corps of Engineers).	Flood Hazard Boundary Map (1:7,273): City of Valley City (U.S. Department of Housing and Urban Development, 1979A). Flood Insurance Rate Map (1:4,800): City of Kathryn (Federal Emergency Management Agency, 1982C). Soil survey map: Barnes County (U.S. Department of Agriculture, draft C). Topographic maps (1:24,000): Bald Hill Dam, Clementsville, Colgate, Dazey, Dazey NE, Eckelson, Eckelson SE, Eckelson SW, Fingal, Fingal SW, Hastings, Kathryn, Leal, Litchville, Lucca, Marion NE, Marion NW, Moon Lake, Nome, Oriska, Page SW, Pillsbury, Pillsbury SE, Pillsbury SW, Rogers, Sanborn, Sanborn SE, Sibley, Spiritwood, Tower City, Tower City SW, Valley City East, Valley City West, Wimbledon, and Wimbledon NE (U.S. Geological Survey).	1:7,920 (Local Agriculture Stabilization and Conservation Service). Several sets, 1950's and 1970's; 1:24,000--1979 (U.S. Army Corps of Engineers).

FLODD HAZARD AREA: Barnes County--Continued

COUNTY: Barnes

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
	Gaging stations--Continued 137-059-18DCB 138-058-22DAD Sheyenne River (U.S. Army Corps of Engineers). Sheyenne River at Valley City (U.S. Army Corps of Engineers, 1970).					

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

FLOOD HAZARD AREA: Barnes County--Continued

Additional flood hazard information for Barnes County is contained in table 1 under Litchville.

FLOOD HAZARD AREA: Litchville

COUNTY: Barnes

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
Litchville June 28-30, 1975: 11 inches of rain.					

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
	Bridge Unnamed creek 0046-058.904		Bridge Unnamed creek 0046-058.904		Flood Insurance Rate Map (1:6,000): City of Litchville (U.S. Department of Housing and Urban Development, 1979C). Soil survey map: Barnes County (U.S. Department of Agriculture, draft C). Topographic map (1:24,000): Litchville (U.S. Geological Survey).	1:7,920 (Local Agriculture Stabilization and Conservation Service).

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

FLOOD HAZARD AREA: Esmond

COUNTY: Benson

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
					Additional information: Street and gutter elevations (North Central Consultants, Ltd.). Soil survey map: Benson County (U.S. Department of Agriculture, 1979). Topographic maps (1:24,000): Esmond and Harlow 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: Medora

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-82).			Gaging station 06336000--Approximately 6,190 mi^2.	Gaging station 06336000	

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
	Bridge Little Missouri River 0094-901.376	Gaging station 06336000	Bridge Little Missouri River 0094-901.376	Gaging station 06336000	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 map (1:24,000): City of Medora (U.S. Geological Survey). Soil survey map: Billings County (Edwards and Ableiter, 1944). Topographic map (1:24,000): Medora (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 the Railroad Creek, then there should be adequate data to prepare appropriate technical information for flood plain management. There should be adequate data to prepare appropriate technical information for flood plain management of the Little Missouri River.

FLOOD HAZARD AREA: Bowman

COUNTY: Bowman

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
	Bridge *Unnamed creek* 0012-033.337		Bridge *Unnamed creek* D012-033.337		Additional information: Street and gutter elevations (Veigel Engineering). Flood Hazard Boundary Map (1:9,600): City of Bowman (U.S. Department of Housing and Urban Development, 1975C). Soil survey map: Bowman County (U.S. Department of Agriculture, 1975A). Topographic map (1:24,000): Bowman (U.S. Geological Survey).	1:12,000--05/19/81 (Horizon, Inc.). 1:7,920 (Local Agriculture Stabilization and Conservation Service). Some photographs (Veigel Engineering).

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: Argusville

COUNTY: Cass

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05059500--Sheyenne River at West Fargo Continuous-record gaging station. Period of record--Mar. through Nov. 1902 (stage only), Apr. 1903 through Oct. 1905, Mar. through Aug. 1919, and Sept. 1929 through Sept. 1982: 04/21/79--Stage = 22.12 ft; Discharge = 3,480 ft^3/s. (U.S. Geological Survey, 1959A-82). 05064500--Red River of the North at Halstad Continuous-record gaging station. Spring flood of 1897: Stage $\cong$ 38.5 ft. Period of record--Apr. 1936 through June 1937 (no winter records), Apr. 1942 through Sept. 1960 (spring and summer months only), and May 1961 through Sept. 1982: 04/22/79--Stage = 39 ft; Discharge = 42,000 ft^3/s. (U.S. Geological Survey, 1959A-82).	Dike built around town after 1979 flood (Moore Engineering, Inc.). Flood control surveys, 1940's and 1970's (U.S. Army Corps of Engineers). Flood damage reduction (Souris-Red-Rainy River Basins Commission, 1972). Levee system maps (1:4,800): Sheyenne River (U.S. Army Corps of Engineers).	Log-Pearson type III frequency analysis for gaging station 05059500; 100-year recurrence interval--Discharge = 6,350 ft^3/s (Souris-Red-Rainy River Basins Commission, 1972). Log-Pearson type III frequency analysis for gaging station 05064500; 100-year recurrence interval--Discharge = 54,500 ft^3/s (Souris-Red-Rainy River Basins Commission, 1972).	Gaging stations 05059500--Approximately 8,870 mi^2 of which about 5,780 mi^2 is noncontributing. 05064500--Approximately 21,800 mi^2 which includes 3,800 mi^2 of closed basins.	Gaging stations 05059500 05064500	

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 county road 13 ditch in vicinity of Argusville (U.S. Army Corps of Engineers). HEC-2 step-backwater derived profiles for county road 29 ditch in vicinity of Argusville (U.S. Army Corps of Engineers). HEC-2 step-backwater derived profiles for Red River (U.S. Army Corps of Engineers). HEC-2 step-backwater derived profiles for Sheyenne River (U.S. Army Corps of Engineers).	Bridges Unnamed creeks 09-137-12 09-137-13.2 09-137-13 09-137-14 09-137-13.1 County road 13 ditch in vicinity of Argusville (U.S. Army Corps of Engineers). County road 29 ditch in vicinity of Argusville (U.S. Army Corps of Engineers). Gaging stations 05059500 05064500 Red River (U.S. Army Corps of Engineers). Sheyenne River (U.S. Army Corps of Engineers).	Gaging stations 05059500 05064500	Bridges Unnamed creeks 09-137-12 09-137-13.2 09-137-13 09-137-14 09-137-13.1 County road 13 ditch in vicinity of Argusville (U.S. Army Corps of Engineers). County road 29 ditch in vicinity of Argusville (U.S. Army Corps of Engineers). Red River (U.S. Army Corps of Engineers). Sheyenne River (U.S. Army Corps of Engineers).	Gaging stations 05059500 05064500 High water elevation for Red River (U.S. Army Corps of Engineers). High water elevation for Sheyenne River (U.S. Army Corps of Engineers).	Flood Hazard Boundary Map (1:12,000): City of Argusville (U.S. Department of Housing and Urban Development, 1980A). Levee system maps (1:4,800): Sheyenne River (U.S. Army Corps of Engineers). Soil survey map: Cass County (U.S. Department of Agriculture, draft D). Topographic map (1:24,000): Argusville (U.S. Geological Survey).	1:7,920--1979 flood and other dates (KBM, Inc.). 1:7,920 (Local Agriculture Stabilization and Conservation Service). Several sets, 1950's and 1970's; 1:24,000--1979 (U.S. Army Corps of Engineers).

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

FLOOD HAZARD AREA: Arthur

COUNTY: Cass

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
	Channel modification (Moore Engineering, Inc.). Railroad bridge restricts flow through town.				

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 09-123-10 0018-090.769		Bridges Unnamed creeks 09-123-10 0018-090.769		Flood Hazard Boundary Map (1:12,000): City of Arthur (U.S. Department of Housing and Urban Development, 1975A). Soil survey map: Cass County (U.S. Department of Agriculture, draft D). Topographic map (1:24,000): Arthur (U.S. Geological Survey).	1:7,920 (Local Agriculture Stabilization and Conservation Service).

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

FLOOD HAZARD AREA: Durbin Township COUNTY: Cass

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
)5059900--Swan Creek near Casselton Crest-stage gaging station. Period of record--Nov. 1954 through Sept. 1973: 04/10/69--Stage = 9.19 ft; Discharge = 2,000 ft^3/s. (U.S. Geological Survey, 1959A-82). 05059950--Swan Creek tributary near Casselton Crest-stage gaging station. Period of record--Nov. 1954 through Sept. 1973: 04/11/69--Stage = 8.47 ft; Discharge = 225 ft^3/s. (U.S. Geological Survey, 1959A-82). 05060000--Maple River near Mapleton Continuous-record gaging station. Period of record--Apr. 1944 through Sept. 1975: 07/02/75--Stage = 15.03 ft; Discharge = 11,660 ft^3/s. (U.S. Geological Survey, 1959A-82).	Drain 37 Flood damage reduction (Souris-Red-Rainy River Basins Commission, 1972). Flood retention for the Maple River basin (Moore Engineering, Inc., 1982B). Levee system for Mapleton (U.S. Army Corps of Engineers, 1983A). Maple River channelization (Southeast Cass County Drain Board). Railroad bridge in section 30 of Durbin Township causes backwater.	Log-Pearson type III frequency analysis for gaging station 05059900; 50-year recurrence interval--Discharge = 1,920 ft^3/s (Crosby, 1975). Log-Pearson type III frequency analysis for gaging station 05059950; 50-year recurrence interval--Discharge = 399 ft^3/s (Crosby, 1975). Log-Pearson type III frequency analysis for numerous locations along Buffalo Creek (U.S. Department of Agriculture, 1981A). Log-Pearson type III frequency analysis for numerous locations along Maple River (U.S. Department of Agriculture, 1981A). Log-Pearson type III frequency analysis for numerous locations along Swan Creek (U.S. Department of Agriculture, 1981A). Peak flow frequency analysis for gaging station 05059900; 100-year recurrence interval--Discharge = 3,840 ft^3/s (Moore Engineering, Inc., 1982B). Peak flow frequency analysis for gaging station 05059950; 100-year recurrence interval--Discharge = 580 ft^3/s (Moore Engineering, Inc., 1982B). Peak flow frequency analysis for gaging station 05060000; 100-year recurrence interval--Discharge = 12,910 ft^3/s (Moore Engineering, Inc., 1982B).	Gaging stations 05059900--57 mi^2. 05059950--14 mi^2. 05060000--1,450 mi^2 of which about 71 mi^2 is noncontributing.	Gaging stations 05059900 05059950 05060000	HEC-1 analysis for Maple River basin (Moore Engineering, Inc., 1982B).

FLOOD HAZARD AREA: Durbin Township--Continued

COUNTY: Cass

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
Profile analysis for stretches of Buffalo Creek (U.S. Department of Agriculture, 1981A). Profile analysis for stretches of Maple River (U.S. Department of Agriculture, 1981A). Profile analysis for stretches of Swan Creek (U.S. Department of Agriculture, 1981A).	Bridges Buffalo Creek 09-125-30.1 09-126-29 Maple River 09-127-30 09-129-26.1 09-128-29 09-129-26.2 09-129-26 09-131-24.1 0094-337.335L 0094-337.335R 0094-337.335T Swan Creek 09-125-25 09-128-26 09-126-25 0094-334.998L 0094-334.998R 0094-334.998T Unnamed creeks 09-126-27 09-131-26 09-126-27.1 09-131-27 09-128-26 09-131-28 09-128-30 09-131-29 09-130-29 09-131-30 0094-333.452T 0094-333.715N 0094-333.961T 0094-334.848T Buffalo Creek (U.S. Department of Agriculture, 1981A).	Gaging stations 05059900 05059950 05060000	Bridges Buffalo Creek 09-125-30.1 09-126-29 Maple River 09-127-30 09-129-26.1 09-128-29 09-129-26.2 09-129-26 09-131-24.1 0094-337.335L 0094-337.335R 0094-337.335T Swan Creek 09-125-25 09-128-26 09-126-25 0094-334.998L 0094-334.998R 0094-334.998T Unnamed creeks 09-126-27 09-131-26 09-126-27.1 09-131-27 09-128-26 09-131-28 09-128-30 09-131-29 09-130-29 09-131-30 0094-333.452T 0094-333.715N 0094-333.961T 0094-334.848T Buffalo Creek (U.S. Department of Agriculture, 1981A). Maple River (U.S. Department of Agriculture, 1981A).	Gaging stations 05059900 05059950 05060000	Soil survey map: Cass County (U.S. Department of Agriculture, draft D). Topographic maps (1:24,000): Casselton, Casselton SE, Durbin, and Mapleton (U.S. Geological Survey).	1:9,600--1978 (Horizon, Inc.). 1:7,920--1979 flood and other dates (KBM, Inc.). 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
	Gaging stations 05059900 05059950 05060000 Maple River (U.S. Department of Agriculture, 1981A). Swan Creek (U.S. Department of Agriculture, 1981A).		Swan Creek (U.S. Department of Agriculture, 1981A).			

ADEQUACY	There should be adequate data to prepare appropriate technical information for flood plain management of the Maple River and Swan Creek.

FLOOD HAZARD AREA: Empire Township

COUNTY: Cass

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05059800--Swan Creek near Absaraka Crest-stage gaging station. Period of record--Nov. 1954 through Sept. 1973: 04/11/69--Stage = 5.69 ft; Discharge = 930 ft^3/s. (U.S. Geological Survey, 1959A-82). 05060500--Rush River at Amenia Continuous-record gaging station. Period of record--July 1946 through Oct. 1982: 04/19/79--Stage = 10.37 ft; Discharge = 3,490 ft^3/s. (U.S. Geological Survey, 1959A-82).	Flood damage reduction (Souris-Red-Rainy River Basins Commission, 1972). Flood retention for Swan Creek basin (Moore Engineering, Inc., 1982B).	Log-Pearson type III frequency analysis for gaging station 05059800; 50-year recurrence interval--Discharge = 970 ft^3/s (Crosby, 1975). Peak flow frequency analysis for gaging station 05059800; 100-year recurrence interval--Discharge = 1,255 ft^3/s (Moore Engineering, Inc., 1982B).	Gaging stations 05059800--28.8 mi^2. 05060500--116 mi^2.	Gaging stations 05059800 05060500	HEC-1 analysis for Swan Creek basin (Moore Engineering, Inc., 1982B).

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 Rush River 09-118-12 09-118-14 09-118-13 09-118-15 Swan Creek 09-112-17 09-115-17 09-113-17 09-116-18 09-114-17 09-117-18 Unnamed creeks 09-114-13 09-116-13.1 09-114-14 09-116-14 09-114-16 09-116-15 09-115-13 09-116-17 09-115-15 09-116-18.1 09-115-16 09-117-13 09-115-17.1 09-117-14 09-116-13 09-117-14.1 Gaging stations 05059800 05060500	Gaging stations 05059800 05060500	Bridges Rush River 09-118-12 09-118-14 09-118-13 09-118-15 Swan Creek 09-112-17 09-115-17 09-113-17 09-116-18 09-114-17 09-117-18 Unnamed creeks 09-114-13 09-116-13.1 09-114-14 09-116-14 09-114-16 09-116-15 09-115-13 09-116-17 09-115-15 09-116-18.1 09-115-16 09-117-13 09-115-17.1 09-117-14 09-116-13 09-117-14.1	Gaging stations 05059800 05060500	Soil survey map: Tri-County Area (U.S. Department of Agriculture, 1966). Topographic maps (1:24,000): Absaraka, Ayr, Ayr SE, and Wheatland (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 Rush River and Swan Creek.

FLOOD HAZARD AREA: Gardner Township

COUNTY: Cass

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
	Drains 13, 22, 23, 24, 25, 26, 29				

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 09-131-8 09-136-8 09-132-8 09-136-9 09-133-8 09-136-9.1 09-134-8 09-136-10 09-135-6 09-136-10.1 09-135-8 09-136-11 09-136-6 09-136-11.1 0029-084.749 Drains 13, 22, 23, 24, 25, 26, 29		Bridges Unnamed creeks 09-131-8 09-136-8 09-132-8 09-136-9 09-133-8 09-136-9.1 09-134-8 09-136-10 09-135-6 09-136-10.1 09-135-8 09-136-11 09-136-6 09-136-11.1 0029-084.749 Drains 13, 22, 23, 24, 25, 26, 29		Soil survey map: Cass County (U.S. Department of Agriculture, draft D). Topographic maps (1:24,000): Gardner and Grandin (U.S. Geological Survey).	1:7,920 (Local Agriculture Stabilization and Conservation Service).

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

FLOOD HAZARD AREA: Kindred

COUNTY: Cass

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05059000--Sheyenne River near Kindred Continuous-record gaging station. Spring flood of 1947 or 1948: Stage = 22.1 ft; Discharge ≅ 3,600 ft^3/s. Period of record--July 1949 through Sept. 1982: 04/15/69--Stage = 21.03 ft; Discharge = 4,690 ft^3/s. (U.S. Geological Survey, 1959A-82).	Flood control: Sheyenne River (U.S. Army Corps of Engineers, 1982C and 1982D). Flood control surveys, 1940's and 1970's (U.S. Army Corps of Engineers). Flood damage reduction (Souris-Red-Rainy River Basins Commission, 1972). Levee system maps (1:4,800): Sheyenne River system (U.S. Army Corps of Engineers).	Log-Pearson type III frequency analysis for gaging station 05059000; 100-year recurrence interval--Discharge = 8,700 ft^3/s (Souris-Red-Rainy River Basins Commission, 1972). Log-Pearson type III frequency analysis for Sheyenne River above Kindred; 100-year recurrence interval--Discharge = 13,500 ft^3/s (U.S. Army Corps of Engineers, 1982B).	Gaging station 05059000--Approximately 8,800 mi^2 of which about 5,780 mi^2 is noncontributing.	Discharge data for Sheyenne River (U.S. Army Corps of Engineers). Gaging station 05059000	

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 Sheyenne River (U.S Army Corps of Engineers).	Bridges Sheyenne River 09-135-42 39-114-2.1 39-112-2 39-114-2.2 39-114-2 0046-112.266 Gaging station 05059000 Sheyenne River (U.S. Army Corps of Engineers).	Gaging station 05059000	Bridges Sheyenne River 09-135-42 39-114-2.1 39-112-2 39-114-2.2 39-114-2 0046-112.266 Sheyenne River (U.S. Army Corps of Engineers).	Gaging station 05059000 High water elevation for Sheyenne River (U.S. Army Corps of Engineers).	Contour map: City of Kindred. Flood Hazard Boundary Map (1:9,600): City of Kindred (U.S. Department of Housing and Urban Development, 1975L). Levee system maps (1:4,800): Sheyenne River (U.S. Army Corps of Engineers). Soil survey map: Cass County (U.S. Department of Agriculture, draft 0). Topographic map (1:24,000): Kindred (U.S. Geological Survey).	1:7,920--1979 flood and other dates (KBM, Inc.). 1:7,920 (Local Agriculture Stabilization and Conservation Service). Several sets, 1950's and 1970's; 1:24,000--1979 (U.S. Army Corps of Engineers).

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

FLOOD HAZARD AREA: Normanna Township

COUNTY: Cass

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05059000--Sheyenne River near Kindred Continuous-record gaging station. Spring flood of 1947 or 1948: Stage = 22.1 ft; Discharge $\approx$ 3,600 ft^3/s. Period of record--July 1949 through Sept. 1982: 04/15/69--Stage = 21.03 ft; Discharge = 4,690 ft^3/s. (U.S. Geological Survey, 1959A-82).	Drains 34, 35 Flood control: Sheyenne River (U.S. Army Corps of Engineers, 1982C and 1982D). Flood control surveys, 1940's and 1970's (U.S. Army Corps of Engineers). Flood damage reduction (Souris-Red-Rainy River Basins Commission, 1972). Levee system maps (1:4,800): Sheyenne River system (U.S. Army Corps of Engineers).	Log-Pearson type III frequency analysis for gaging station 05059000; 100-year recurrence interval--Discharge = 8,700 ft^3/s (Souris-Red-Rainy River Basins Commission, 1972). Log-Pearson type III frequency analysis for Sheyenne River above Kindred; 100-year recurrence interval--Discharge = 13,500 ft^3/s (U.S. Army Corps of Engineers, 1982B).	Gaging station 05059000--Approximately 8,800 mi^2 of which about 5,780 mi^2 is noncontributing.	Discharge data for Sheyenne River (U.S. Army Corps of Engineers). Gaging station 05059000	

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 Sheyenne River (U.S. Army Corps of Engineers).	Bridges Sheyenne River 09-135-42 09-136-41 09-136-37 09-137-36 09-136-37.1 09-137-40 09-136-39.1 0046-112.266 Unnamed creeks 09-132-36 09-135-37 09-132-38 09-135-37.1 09-132-39 09-135-39 09-132-40 09-136-39 09-132-41 09-137-37 09-133-38 09-137-38 09-134-38 Gaging station 05059000 Sheyenne River (U.S. Army Corps of Engineers).	Gaging station 05059000	Bridges Sheyenne River 09-135-42 09-136-41 09-136-37 09-137-36 09-136-37.1 09-137-40 09-136-39.1 0046-112.266 Unnamed creeks 09-132-36 09-135-37 09-132-38 09-135-37.1 09-132-39 09-135-39 09-132-40 09-136-39 09-132-41 09-137-37 09-133-38 09-137-38 09-134-38 Sheyenne River (U.S. Army Corps of Engineers).	Gaging station 05059000 High water elevation for Sheyenne River (U.S. Army Corps of Engineers).	Flood Hazard Boundary Map (1:9,600): City of Kindred (U.S. Department of Housing and Urban Development, 1975L). Levee system maps (1:4,800): Sheyenne River (U.S. Army Corps of Engineers). Soil survey map: Cass County (U.S. Department of Agriculture, draft D). Topographic maps (1:24,000): Kindred and Norman (U.S. Geological Survey).	1:7,920--1979 flood and other dates (KBM, Inc.). 1:7,920 (Local Agriculture Stabilization and Conservation Service). Several sets, 1950's and 1970's; 1:24,000--1979 (U.S. Army Corps of Engineers).

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

FLOOD HAZARD AREA: Tower City

COUNTY: Cass

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 09-101-22 09-102-22.1 09-102-22 09-102-22.2 0094-309.127L 0094-309.127R		Bridges Unnamed creeks 09-101-22 09-102-22.1 09-102-22 09-102-22.2 0094-309.127L 0094-309.127R		Flood Hazard Boundary Map (1:12,000): City of Tower City (U.S. Department of Housing and Urban Development, 1975Q). Soil survey map: Cass County (U.S. Department of Agriculture, draft D). Topographic map (1:24,000): Tower City (U.S. Geological Survey).	1:7,920 (Local Agriculture Stabilization and Conservation Service).

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

FLOOD HAZARD AREA: Warren Township

COUNTY: Cass

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05059000--Sheyenne River near Kindred Continuous-record gaging station. Spring flood of 1947 or 1948: Stage = 22.1 ft; Discharge ≅ 3,600 ft^3/s. Period of record--July 1949 through Sept. 1982: 04/15/69--Stage = 21.03 ft; Discharge = 4,690 ft^3/s. (U.S. Geological Survey, 1959A-82). 05059400--Sheyenne River near Horace Stage and maximum annual discharge station. Period of record--Oct. 1979 through Sept. 1982: 04/07/80--Stage = 12.86 ft; Discharge = 800 ft^3/s. (U.S. Geological Survey, 1959A-82).	Drains 2, 14, 21, 36, 48, 50 Flood control: Sheyenne River (U.S. Army Corps of Engineers, 1982C and 1982D). Flood control surveys, 1940's and 1970's (U.S. Army Corps of Engineers). Flood damage reduction (Souris-Red-Rainy River Basins Commission, 1972). Flood insurance study: City of Horace (Federal Emergency Management Agency, 19810). Levee system maps (1:4,800): Sheyenne River (U.S. Army Corps of Engineers).	Log-Pearson type III frequency analysis for gaging station 05059000; 100-year recurrence interval--Discharge = 8,700 ft^3/s (Souris-Red-Rainy River Basins Commission, 1972). Log-Pearson type III frequency analysis for Horace; 100-year recurrence interval--Discharge = 5,500 ft^3/s (Federal Emergency Management Agency, 19810). Log-Pearson type III frequency analysis for Sheyenne River above Kindred; 100-year recurrence interval--Discharge = 13,500 ft^3/s (U.S. Army Corps of Engineers, 1982B).	Gaging stations 05059000--Approximately 8,800 mi^2 of which about 5,780 mi^2 is noncontributing. 05059400--Approximately 8,850 mi^2 of which about 5,780 mi^2 is noncontributing.	Discharge data for Sheyenne River (U.S. Army Corps of Engineers). Gaging stations 05059000 05059400	

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 Sheyenne River (U.S. Army Corps of Engineers).	Bridges Sheyenne River 09-136-37 09-137-35 09-137-34 09-137-36 Unnamed creeks 09-131-35 09-136-32 09-132-31 09-136-32.1 09-132-32 09-136-33 09-132-34 09-136-34 09-132-35 09-137-30 09-132-36 09-137-31 09-133-30 09-137-32 Gaging stations 05059000 05059400 Sheyenne River (U.S. Army Corps of Engineers).	Gaging stations 05059000 05059400	Bridges Sheyenne River 09-136-37 09-137-35 09-137-34 09-137-36 Unnamed creeks 09-131-35 09-136-32 09-132-31 09-136-32 1 09-132-32 09-136-33 09-132-34 09-136-34 09-132-35 09-137-30 09-132-36 09-137-31 09-133-30 09-137-32 Sheyenne River (U.S. Army Corps of Engineers).	Gaging stations 05059000 05059400 High water elevation for Sheyenne River (U.S. Army Corps of Engineers).	Flood Hazard Boundary Map (1:24,000): Warren Township (Federal Emergency Management Agency, 1981G). Levee system maps (1:4,800): Sheyenne River (U.S. Army Corps of Engineers). Soil survey map: Cass County (U.S. Oepartment of Agriculture, draft D). Topographic maps (1:24,000): Casselton SE, Fargo SW, Kindred, and Norma (U.S. Geological Survey).	1:7,920--1979 flood and other dates (KBM, Inc.). 1:7,920 (Local Agriculture Stabilization and Conservation Service). Several sets, 1950's and 1970's; 1:24,000--1979 (U.S. Army Corps of Engineers).

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

FLOOD HAZARD AREA: Langdon

COUNTY: Cavalier

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
	Drain Mulberry Lake.				

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 0001-213.431 0005-277.438 Drain Mulberry Lake.		Bridges Unnamed creeks 0001-213.431 0005-277.438 Drain Mulberry Lake.		Additional information: Street and gutter elevations (KBM, Inc.). Flood Hazard Boundary Map (1:7,272): City of Langdon (U.S. Department of Housing and Urban Development, 1975M). Soil survey map: Cavalier County (U.S. Department of Agriculture, draft E). Topographic maps (1:24,000): Easby, Langdon East, Langdon West, and Nekoma NW (U.S. Geological Survey).	1:7,920 (Local Agriculture Stabilization and Conservation Service).

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

FLOOD HAZARD AREA: Beach

COUNTY: Golden Valley

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
Unnamed tributary of Little Beaver Creek that runs through the town of Beach 1929--About 3 ft deep at railroad station. 1968--Bank full.	Damage to lagoons may result from flooding. Poor drainage system of the northwest part of town. Small dry dam on tributary.				

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 Beaver Creek 17-103-27 17-104-28 0094-002.234		Bridges Little Beaver Creek 17-103-27 17-104-28 0094-002.234		Additional information: Street and gutter elevations (Veigel Engineering). Flood Hazard Boundary Map (1:12,000): City of Beach (U.S. Department of Housing and Urban Development, 1975B). Soil survey map: Golden Valley County (U.S. Department of Agriculture, draft F). Topographic maps (1:24,000): Beach SE and Beach West (U.S. Geological Survey).	1:63,360 (Soil Conservation Service). 1:12,000--12/29/78 and 1:10,200--12/12/80 (Horizon, Inc.) 1:7,920 (Local Agriculture Stabilization and Conservation Service). Some photographs (Veigel Engineering).

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

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05082680--Saltwater Coulee tributary near Emerado Crest-stage gaging station. Flood of 1950: Stage ≅ 7 ft; Discharge ≅ 1,200 ft^3/s. Period of record--Oct. 1954 through Sept. 1973: 04/12/65--Stage = 6 ft; Discharge = 290 ft^3/s. (U.S. Geological Survey, 1959A-82). 05082700--Saltwater Coulee near Emerado Crest-stage gaging station. Flood of 1950: Stage ≅ 11.3 ft; Discharge ≅ 3,500 ft^3/s. Period of record--Oct. 1954 through Sept. 1973: 04/09/70--Stage = 7.71 ft; Discharge = 730 ft^3/s. (U.S. Geological Survey, 1959A-82).		Log-Pearson type III frequency analysis for gaging station 05082680; 50-year recurrence interval--Discharge = 466 ft^3/s (Crosby, 1975). Log-Pearson type III frequency analysis for gaging station 05082700; 50-year recurrence interval--Discharge = 930 ft^3/s (Crosby, 1975).	Gaging stations 05082680--22 mi^2. 05082700--110 mi^2.	Gaging stations 05082680 05082700	

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 Saltwater Coulee 18-124-19 18-125-19.1 18-125-19	Gaging stations 05082680 05082700	Bridges Saltwater Coulee 18-124-19 18-125-19.1 18-125-19	Gaging stations 05082680 05082700	Additional information: Street and gutter elevations (KBM, Inc.). Flood Hazard Boundary Map (1:4,800): City of Emerado (U.S. Department of Housing and Urban Development, 1978B). Soil survey map: Grand Forks County (U.S. Department of Agriculture, 1981B). Topographic maps (1:24,000): Arvilla and Emerado (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.

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05082500--Red River of the North at Grand Forks Continuous-record gaging station. Period of record--Apr. 1882 through Sept. 1982: April 10, 1897--Stage = 50.2 ft; Discharge = 85,000 ft^3/s. (U.S. Geological Survey, 1959A-82). 05082600--English Coulee tributary near Grand Forks Crest-stage gaging station. Flood of 1950: Stage $\cong$ 5.9 ft. Period of record--Oct. 1954 through Sept. 1973: 04/10/69--Stage = 3.08 ft; Discharge = 164 ft^3/s. (U.S. Geological Survey, 1959A-82). 05082680--Saltwater Coulee tributary near Emerado Crest-stage gaging station. Flood of 1950: Stage $\cong$ 7 ft; Discharge $\cong$ 1,200 ft^3/s. Period of record--Oct. 1954 through Sept. 1973: 04/12/65--Stage = 6 ft; Discharge = 290 ft^3/s. (U.S. Geological Survey, 1959A-82).	Changes in flood response of the Red River (Miller and Frink, 1982). Drains 1, 2, 3, 4, 9, 10, 11, 11A, 12, 13, 13A, 14, 18, 19, 23, 27, 28, 30, 33, 37, 38A, 38B, 39, 40, 42 English Coulee Floodway, Falconer 2, Falconer 3, Falconer 4, Falconer 5, Rye Township 1, Rye Township 2, Rye Township 3, and Strabane Township 1. Flood control: City of Grand Forks (U.S. Army Corps of Engineers, 1981). Flood damage reduction for Forest River (Souris-Red-Rainy River Basins Commission, 1972). Flood damage reduction for Goose River (Souris-Red-Rainy River Basins Commission, 1972). Flood damage reduction for Red River (Souris-Red-Rainy River Basins Commission, 1972). Flood damage reduction for Red River (U.S. Army Corps of Engineers). Flood damage reduction for Turtle River (Souris-Red-Rainy River Basins Commission, 1972). Flood factors and damage reduction (Harrison and Bluemle, 1980). Levee inventory for Grand Forks (U.S. Army Corps of Engineers, 1983A). 1979 flood damages: 17 bridges were damaged, 24 culverts were washed out, and 165 roads had gravel washed off (Federal Highway Administration).	Frequency analysis for Elm Coulee (U.S. Department of Agriculture, 1976). Frequency analysis for English Coulee (U.S. Department of Agriculture, draft A). Frequency analysis for gaging station 05082500; 100-year recurrence interval--Discharge = 89,000 ft^3/s (U.S. Department of Housing and Urban Development, 1977B). Frequency analysis for Turtle River (U.S. Department of Agriculture, 1983). Log-Pearson type III frequency analysis for gaging station 05082500; 100-year recurrence interval--Discharge = 100,000 ft^3/s (Souris-Red-Rainy River Basins Commission, 1972). Log-Pearson type III frequency analysis for gaging station 05082600; 50-year recurrence interval--Discharge = 183 ft^3/s (Crosby, 1975). Log-Pearson type III frequency analysis for gaging station 05082680; 50-year recurrence interval--Discharge = 466 ft^3/s (Crosby, 1975). Log-Pearson type III frequency analysis for gaging station 05082700; 50-year recurrence interval--Discharge = 930 ft^3/s (Crosby, 1975).	Gaging stations 05082500--Approximately 30,100 mi^2 which includes 3,800 mi^2 of closed basins. 05082600--4.68 mi^2. 05082680--22 mi^2. 05082700--110 mi^2. 05082900--31 mi^2. 05083000--613 mi^2 of which about 57 mi^2 is noncontributing. 05083500--Approximately 31,200 mi^2 which includes 3,800 mi^2 of closed basins.	Gaging stations 05082500 05082600 05082680 05082700 05082900 05083000 05083500	

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05082700--Saltwater Coulee near Emerado Crest-stage gaging station. Flood of 1950: Stage ≅ 11.3 ft; Discharge ≅ 3,500 ft^3/s. Period of record--Oct. 1954 through Sept. 1973: 04/09/70--Stage = 7.71 ft; Discharge = 730 ft^3/s. (U.S. Geological Survey, 1959A-82).		Log-Pearson type III frequency analysis for gaging station 05083000; 100-year recurrence interval--Discharge = 33,000 ft^3/s (Souris-Red-Rainy River Basins Commission, 1972). Log-Pearson type III frequency analysis for gaging station 05083500; 100-year recurrence interval--Discharge = 103,000 ft^3/s (Souris-Red-Rainy River Basins Commission, 1972).			
05082900--Freshwater Coulee near Emerado Crest-stage gaging station. Flood of 1950: Stage ≅ 11.5 ft. Period of record--Oct. 1954 through Sept. 1973: 09/01/57-09/02/57 and 1965--Stage = 5 ft; Discharge = 1,180 ft^3/s. (U.S. Geological Survey, 1959A-82).					
05083000--Turtle River at Manvel Continuous-record gaging station. Period of record--Oct. 1945 through Sept. 1970 (discharge), Oct. 1971 through Sept. 1973 (stage and annual maximum discharge), and Dec. 1979 through Sept. 1982 (stage and annual maximum discharge): 04/19/50--Stage = 21.5 ft; Discharge = 28,000 ft^3/s. (U.S. Geological Survey, 1959A-82).					

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05083500--Red River of the North at Oslo Nonrecording gaging station. Period of record--Apr. 1936 through June 1937, Apr. 1941 through Apr. 1943, and Mar. 1945 through Sept. 1960: 05/10/50--Stage = 31.83 ft; Discharge = 63,000 ft^3/s. (U.S. Geological Survey, 1959A-82).					

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 Grand Forks (U.S. Department of Housing and Urban Development, 1977B). HEC-2 step-backwater derived profiles for Red River (U.S. Army Corps of Engineers). Modified step-backwater derived profiles for Turtle River (U.S. Department of Agriculture, 1983). Step-backwater derived profiles for Elm Coulee (U.S. Department of Agriculture, 1976). Step-backwater derived profiles for English Coulee (U.S. Department of Agriculture, draft A). Systematically derived profiles for Red River (North Dakota State Water Commission and Minnesota Department of Natural Resources Division of Waters, Soils, and Minerals, 1971).	Bridges Forest River 18-110-1 18-115-1 18-112-2 18-116-1 0018-182.408 Goose River 18-101-25.1 18-109-30 18-102-27 18-110-30 18-103-29 18-111-29 18-104-28 18-111-30 18-105-28 18-113-32 18-106-28 18-113-33 18-106-29 18-114-34 18-108-30 18-114-35 0015-106.930 0018-152.371 Red River 18-145-30 0000-GF0.2 0002-358.090 0054-009.958 Turtle River 18-117-19.1 18-125-13.1 18-120-17 18-125-13.3 18-120-18 18-125-13.4 18-121-16 18-126-12 18-121-16.1 18-126-12.1 18-122-16 18-127-12 18-123-13 18-128-12 18-123-15 18-128-12.1 18-123-15.1 18-128-13 18-124-13 18-129-13.1 18-125-12 18-131-13 18-125-13 18-132-13.1	Gaging stations 05082500 05082600 05082680 05082700 05082900 05083000 05083500	Bridges Forest River 18-110-1 18-115-1 18-112-2 18-116-1 0018-182.408 Goose River 18-101-25.1 18-109-30 18-102-27 18-110-30 18-103-29 18-111-29 18-104-28 18-111-30 18-105-28 18-113-32 18-106-28 18-113-33 18-106-29 18-114-34 18-108-30 18-114-35 0015-106.930 0018-152.371 Red River 18-145-30 0000-GF0.2 0002-358.090 0054-009.958 Turtle River 18-117-19.1 18-125-13.1 18-120-17 18-125-13.3 18-120-18 18-125-13.4 18-121-16 18-126-12 18-121-16.1 18-126-12.1 18-122-16 18-127-12 18-123-13 18-128-12 18-123-15 18-128-12.1 18-123-15.1 18-128-13 18-124-13 18-129-13.1 18-125-12 18-131-13 18-125-13 18-132-13.1	Gaging stations 05082500 05082600 05082680 05082700 05082900 05083000 05083500	Flood Insurance Rate Map (1:12,000): City of Grand Forks (U.S. Department of Housing and Urban Development, 1980E). Topographic maps (1:24,000): Aneta, Ardoch, Bygland, Climax, Dahlen, Emerado SE, Emerado SW, Finley NE, Fordville, Fordville SE, Fordville SW, Forest River, Gilby, Grand Forks, Grand Forks SW, Hatton, Holmes, Inkster, Inkster NE, Inkster SE, Kelly, Lake Pickard, Larimore East, Larimore SW, Larimore West, Logan Center, Manvel, Mekinock, Niagara, Niagara SW, Northwood NW, Orr, Oslo, Oslo SE, and Thompson (U.S. Geological Survey).	1:7,920--1979 flood and other dates (KBM, Inc.). Several sets for Forest River, Goose River, Red River, and Turtle River; 1:24,000--1979 (U.S. Army Corps of Engineers).

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 Turtle River, Continued 18-133-10 18-134-5 18-133-11 18-134-6 18-133-11.1 18-134-6.1 18-133-11.2 18-134-8 18-133-11.3 18-134-9 18-133-12 18-134-11 18-133-12.2 0000-TRS.P01 0000-TRS.P03 0000-TRS.P04 0002-335.886L 0002-335.886R 0029-153.750L 0029-153.750R 0081-164.184 Drains 1, 2, 3, 4, 9, 10, 11, 11A, 12, 13, 13A, 14, 18, 19, 23, 27, 28, 30, 33, 37, 38A, 38B, 39, 40, 42 English Coulee Floodway, Falconer 2, Falconer 3, Falconer 4, Falconer 5, Rye Township 1, Rye Township 2, Rye Township 3, and Strabane Township 1. Elm Coulee (U.S. Department of Agriculture, 1976). English Coulee (U.S. Department of Agriculture, draft A). Forest River (U.S. Army Corps of Engineers).		Bridges--Continued Turtle River, Continued 18-133-10 18-134-5 18-133-11 18-134-6 18-133-11.1 18-134-6.1 18-133-11.2 18-134-8 18-133-11.3 18-134-9 18-133-12 18-134-11 18-133-12.2 0000-TRS.P01 0000-TRS.P03 0000-TRS.P04 0002-335.886L 0002-335.886R 0029-153.750L 0029-153.750R 0081-164.184 Drains 1, 2, 3, 4, 9, 10, 11, 11A, 12, 13, 13A, 14, 18, 19, 23, 27, 28, 30, 33, 37, 38A, 38B, 39, 40, 42 English Coulee Floodway, Falconer 2, Falconer 3, Falconer 4, Falconer 5, Rye Township 1, Rye Township 2, Rye Township 3, and Strabane Township 1. Elm Coulee (U.S. Department of Agriculture, 1976). English Coulee (U.S. Department of Agriculture, draft A). Forest River (U.S. Army Corps of Engineers). Goose River (U.S. Army Corps of Engineers).			

FLOOD HAZARD AREA: Grand Forks County--Continued

COUNTY: Grand Forks

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
	Gaging stations 05082500 05082600 05082680 05082700 05082900 05083000 05083500 Goose River (U.S. Army Corps of Engineers). Red River (U.S. Army Corps of Engineers). Turtle River (U.S. Army Corps of Engineers). Turtle River (U.S. Department of Agriculture, 1983).		Red River (U.S. Army Corps of Engineers). Turtle River (U.S. Army Corps of Engineers). Turtle River (U.S. Department of Agriculture, 1983).			

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

FLOOD HAZARD AREA: Grand Forks County--Continued.

Additional flood hazard information for Grand Forks County is contained in table 1 under Northwood, Reynolds, and Emerado.

FLOOD HAZARD AREA: Northwood

COUNTY: Grand Forks

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
	Bridge Unnamed creek 0015-106.930		Bridge Unnamed creek 0015-106.930		Additional information: Street and gutter elevations (KBM, Inc.). Soil survey map: Grand Forks County (U.S. Department of Agriculture, 1981B). Topographic maps (1:24,000): Kempton and Northwood (U.S. Geological Survey).	1:7,920 (Local Agriculture Stabilization and Conservation Service).

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

FLOOD HAZARD AREA: Reynolds

COUNTY: Grand Forks

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 18-137-36 49-118-1 49-117-1		Bridges Unnamed creeks 18-137-36 49-118-1 49-117-1		Additional information: Street and gutter elevations (KBM, Inc.). Flood Hazard Boundary Map (1:6,000): City of Reynolds (U.S. Department of Housing and Urban Development, 1976E). Soil survey map: Grand Forks County (U.S. Department of Agriculture, 1981B). Topographic maps (1:24,000): Buxton NW and Reynolds (U.S. Geological Survey).	1:7,920 (Local Agriculture Stabilization and Conservation Service).

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

FLOOD HAZARD AREA: Cooperstown

COUNTY: Griggs

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
					Additional information: Street and gutter elevations (Moore Engineering, Inc. and North Central Consultants, Ltd.). Flood Insurance Rate Map (1:6,000): City of Cooperstown (U.S. Department of Housing and Urban Development, 1979B). Topographic maps (1:24,000): Cooperstown East and Cooperstown West (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: Hannaford

COUNTY: Griggs

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05057200--Bald Hill Creek near Dazey Continuous-record gaging station. Period of record--Mar. 1956 through Sept. 1982: 04/19/79--Stage = 17.78 ft; Discharge = 9,000 ft^3/s. (U.S. Geological Survey, 1959A-82).			Gaging station 05057200--691 mi^2 of which about 340 mi^2 is noncontributing.	Gaging station 05057200	

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 Bald Hill Creek 20-115-25 0001-105.102 Gaging station 05057200	Gaging station 05057200	Bridges Bald Hill Creek 20-115-25 0001-105.102	Gaging station 05057200	Flood Hazard Boundary Map (1:7,273): City of Hannaford (U.S. Department of Housing and Urban Development, 1975I). Topographic map (1:24,000): Hannaford (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.

FLDOD HAZARD AREA: New England

COUNTY: Hettinger

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
06349900--Cannonball River at New England Continuous-record gaging station. Apr. 13, 1982: Stage = 13.8 ft; Discharge = 2,900 ft^3/s. Period of record--Oct. 1978 through Sept. 1981: 04/10/79--Stage = 10.5 ft; Discharge = 1,450 ft^3/s. (U.S. Geological Survey, 1959A-82).			Gaging station 06349900--Approximately 285 mi^2.	Gaging station 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 21-102-6 21-103-7 0022-045.841 Unnamed tributaries 21-104-6 21-104-6.1 0022-046.073 0022-046.619	Gaging station 06349900	Bridges Cannonball River 21-102-6 21-103-7 0022-045.841 Unnamed tributaries 21-104-6 21-104-6.1 0022-046.073 0022-046.619	Gaging station 06349900	Additional information: Street and gutter elevations (Veigel Engineering). Flood Hazard Boundary Map (1:9,600): City of New England (U.S. Department of Housing and Urban Development, 1976D). Soil survey map: Hettinger County (U.S. Department of Agriculture, draft G). Topographic maps (1:24,000): New England and New England SW (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: Regent

COUNTY: Hettinger

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
06350000--Cannonball River at Regent Continuous-record gaging station. Apr. 16, 1950: Stage = 26.1 ft; Discharge = 20,300 ft^3/s. Period of record--Sept. 1950 through Sept. 1982: 03/27/78--Stage = 20.55 ft; Discharge = 10,000 ft^3/s. (U.S. Geological Survey, 1959A-82).			Gaging station 06350000--Approximately 580 mi^2.	Gaging station 06350000	

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
	Bridge Cannonball River 21-118-15 Gaging station 06350000--Two-section slope area indirect measurement.	Gaging station 06350000	Bridge Cannonball River 21-118-15	Gaging station 06350000	Additional information: Street and gutter elevations (Veigel Engineering). Flood Hazard Boundary Map (1:9,600): City of Regent (U.S. Department of Housing and Urban Development, 19750). Flood prone map (1:24,000): City of Regent (U.S. Geological Survey). Soil survey map: Hettinger County (U.S. Department of Agriculture, draft G). Topographic map (1:24,000): Regent (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 technical information for flood plain management.

FLOOD HAZARD AREA: Anamoose

COUNTY: McHenry

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
					Additional information: Street and gutter elevations (Veigel Engineering). Flood Insurance Rate Map (1:7,200): City of Anamoose (Federal Emergency Management Agency, 1980B). Soil survey map: McHenry County (U.S. Department of Agriculture, draft H). Topographic maps (1:24,000): Anamoose, Anamoose SW, Drake, and Drake 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: Alexander

COUNTY: McKenzie

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 Lonesome Creek 27-119-21 27-120-21.1 27-119-21.1 27-120-21.2 27-120-21 0085-161.243		Bridges Lonesome Creek 27-119-21 27-120-21.1 27-119-21.1 27-120-21.2 27-120-21 0085-161.243		Flood Hazard Boundary Map (1:7,200): City of Alexander (U.S. Department of Housing and Urban Development, 1978A). Soil survey map: McKenzie County (Edwards and Ableiter, 1942). Topographic map (1:24,000): Alexander (U.S. Geological Survey).	1:12,000--04/14/81 (Horizon, Inc.). 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: Watford City

COUNTY: McKenzie

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 Cherry Creek 27-137-2.2 0023-001.227 0085-141.443		Bridges Cherry Creek 27-137-2.2 0023-001.227 0085-141.443		Contour map: 2-ft interval (Veigel Engineering). Flood Hazard Boundary Map (1:7,200): City of Watford City (Federal Emergency Management Agency, 1983A). Soil survey map: McKenzie County (Edwards and Ableiter, 1942). Topographic map (1:24,000): Watford City (U.S. Geological Survey).	1:14,400--04/14/81 and 1:10,200--04/14/81 (Horizon, Inc.). 1:7,920 (Local Agriculture Stabilization and Conservation Service). Some photographs (Veigel Engineering).

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

FLOOD HAZARD AREA: Aneta

COUNTY: Nelson

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
					Soil survey map: Nelson County (U.S. Department of Agriculture, draft I). Topographic maps (1:24,000): Aneta and Kloten (U.S. Geological Survey).	1:7,920 (Local Agriculture Stabilization and Conservation Service). Additional photographs (City of Aneta).

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: Michigan

COUNTY: Nelson

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
	Drain Michigan City.				

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
	Drain Michigan City.		Drain Michigan City.		Additional information: Street and gutter elevations (Interstate Engineering, Inc.). Flood Insurance Rate Map (1:4,800): City of Michigan (U.S. Department of Housing and Urban Development, 1980F). Soil survey map: Nelson County (U.S. Department of Agriculture, draft I). Topographic maps (1:24,000): Michigan East and Michigan West (U.S. Geological Survey).	1:7,920 (Local Agriculture Stabilization and Conservation Service).

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

FLOOD HAZARD AREA: Petersburg

COUNTY: Nelson

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
					Additional information: Street and gutter elevations (Richmond Engineering, Inc.). Flood Insurance Rate Map (1:4,800): City of Petersburg (U.S. Department of Housing and Urban Development, 1980I). Soil survey map: Nelson County (U.S. Department of Agriculture, draft I). Topographic maps (1:24,000): Fordville SW, Lake Pickard, Lambs Lake, and Michigan East (U.S. Geological Survey).	1:7,920 (Local Agriculture Stabilization and Conservation Service).

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

FLOOD HAZARD AREA: Drayton Township

COUNTY: Pembina

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05092000--Red River of the North at Drayton Continuous-record gaging station. Spring flood of 1897: Stage ≅ 41 ft. Period of record--Apr. 1936 through June 1937 and Apr. 1941 through Sept. 1982: 04/28/79--Stage = 43.66 ft; Discharge = 92,900 ft^3/s. (U.S. Geological Survey, 1959A-82).	Drains 2, 13, 55 Flood damage reduction for Red River (Souris-Red-Rainy River Basins Commission, 1972). Flood damage reduction for Red River (U.S. Army Corps of Engineers). 1979 flood damages: Six roads had gravel washed off (Federal Highway Administration).	Log-Pearson type III frequency analysis for gaging station 05092000; 100-year recurrence interval--Discharge = 99,000 ft^3/s (Federal Emergency Management Agency, 1980E). Log-Pearson type III frequency analysis for gaging station 05092000; 100-year recurrence interval--Discharge = 99,000 ft^3/s (North Dakota State Water Commission and Minnesota Department of Natural Resources Division of Waters, Soils, and Minerals, 1971). Log-Pearson type III frequency analysis for gaging station 05092000; 100-year recurrence interval--Discharge = 115,000 ft^3/s (Souris-Red-Rainy River Basins Commission, 1972).	Gaging station 05092000--Approximately 34,800 mi^2 which includes 3,800 mi^2 of closed basins.	Gaging station 05092000	

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 Drayton (Federal Emergency Management Agency, 1980E). HEC-2 step-backwater derived profiles for Red River (U.S. Army Corps of Engineers). Systematically derived profiles for Red River (North Dakota State Water Commission and Minnesota Department of Natural Resources Division of Waters, Soils, and Minerals, 1971).	Bridges Red River 0066-138.720 Unnamed creeks 34-131-28 34-135-31 34-132-28 34-135-32 34-133-28 34-136-28 34-134-28 34-136-28.1 34-134-31 34-137-28 34-135-28 0029-184.891L 0029-184.891R 0029-189.434L 0029-189.434R Drains 2, 13, 55 Gaging station 05092000 Red River (U.S. Army Corps of Engineers).	Gaging station 05092000	Bridges Red River 0066-138.720 Unnamed creeks 34-131-28 34-135-31 34-132-28 34-135-32 34-133-28 34-136-28 34-134-28 34-136-28.1 34-134-31 34-137-28 34-135-28 0029-184.891L 0029-184.891R 0029-189.434L 0029-189.434R Drains 2, 13, 55 Red River (U.S. Army Corps of Engineers).	Gaging station 05092000	Additional information: Elevations of farm buildings (U.S. Army Corps of Engineers). Flood Hazard Boundary Map (1:24,000): Township of Drayton (Federal Emergency Management Agency, 1981E). Flood Insurance Rate Map (1:4,800): City of Drayton (Federal Emergency Management Agency, 1981J). Soil survey map: Pembina County (U.S. Department of Agriculture, 1977A). Topographic maps (1:24,000): Bowesmont, Drayton, Glasston NE, and North Salt Lake (U.S. Geological Survey).	1:7,920--1979 flood and other dates (KBM, Inc.). 1:7,920 (Local Agriculture Stabilization and Conservation Service). Several sets, 1960's and 1970's; 1:24,000--1979 (U.S. Army Corps of Engineers).

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

FLOOD HAZARD AREA: Hamilton

COUNTY: Pembina

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 34-122-14 34-123-14 0005-320.567		Bridges Unnamed creeks 34-122-14 34-123-14 0005-320.567		Flood Hazard Boundary Map (1:6,000): City of Hamilton (U.S. Department of Housing and Urban Development, 1977A). Soil survey map: Pembina County (U.S. Department of Agriculture, 1977A). Topographic map (1:24,000): Hamilton (U.S. Geological Survey).	

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

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05092000--Red River of the North at Drayton Continuous-record gaging station. Spring flood of 1897: Stage ≅ 41 ft. Period of record--Apr. 1936 through June 1937 and Apr. 1941 through Sept. 1982: 04/28/79--Stage = 43.66 ft; Discharge = 92,900 ft^3/s. (U.S. Geological Survey, 1959A-82).	Drains 5, 6, 7, 34, 39, 64 Flood damage reduction for Red River (Souris-Red-Rainy River Basins Commission, 1972). Flood damage reduction for Red River (U.S. Army Corps of Engineers). 1979 flood damages: 1 bridge was damaged and 19 roads had gravel washed off (Federal Highway Administration).	Log-Pearson type III frequency analysis for gaging station 05092000; 100-year recurrence interval--Discharge = 99,000 ft^3/s (North Dakota State Water Commission and Minnesota Department of Natural Resources Division of Waters, Soils, and Minerals, 1971). Log-Pearson type III frequency analysis for gaging station 05092000; 100-year recurrence interval--Discharge = 115,000 ft^3/s (Souris-Red-Rainy River Basins Commission, 1972).	Gaging station 05092000--Approximately 34,800 mi^2 which includes 3,800 mi^2 of closed basins.	Gaging station 05092000	

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 Red River (U.S. Army Corps of Engineers). Systematically derived profiles for Red River (North Dakota State Water Commission and Minnesota Department of Natural Resources Division of Waters, Soils, and Minerals, 1971).	Bridges Red River 0005-335.813 Unnamed creeks 34-131-8 34-134-15.1 34-131-9 34-134-17 34-131-10 34-135-15 34-131-11 34-135-15.1 34-134-10 34-136-17 34-134-10.1 34-137-20 34-134-15 0005-320.567 0005-333.634 0005-335.263 0029-198.582 0029-199.648 0029-200.772 0029-203.114L 0029-203.114R 0081-227.013N 0081-227.392N 0081-227.526N 0081-228.050N Drains 5, 6, 7, 34, 39, 64 Gaging station 05092000 Red River (U.S. Army Corps of Engineers).	Gaging station 05092000	Bridges Red River 0005-335.813 Unnamed creeks 34-131-8 34-134-15.1 34-131-9 34-134-17 34-131-10 34-135-15 34-131-11 34-135-15.1 34-134-10 34-136-17 34-134-10.1 34-137-20 34-134-15 0005-320.567 0005-333.634 0005-335.263 0029-198.582 0029-199.648 0029-200.772 0029-203.114L 0029-203.114R 0081-227.013N 0081-227.392N 0081-227.526N 0081-228.050N Drains 5, 6, 7, 34, 39, 64 Red River (U.S. Army Corps of Engineers).	Gaging station 05092000	Additional information: Elevations of farm buildings (U.S. Army Corps of Engineers). Flood Hazard Boundary Map (1:24,000): Township of Joliette (Federal Emergency Management Agency, 1981F). Soil survey map: Pembina County (U.S. Department of Agriculture, 1977A). Topographic maps (1:24,000): Bathgate NE, Bathgate SE, Bowesmont, Glasston NE, Joliette, and Pembina (U.S. Geological Survey).	1:7,920--1979 flood and other dates (KBM, Inc.). 1:7,920 (Local Agriculture Stabilization and Conservation Service). Several sets, 1960's and 1970's; 1:24,000--1979 (U.S. Army Corps of Engineers).

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

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05089200--North Branch Park River at Gardar Crest-stage gaging station. Flood of 1909: Stage = 11 ft. Period of record--Oct. 1954 through Sept. 1973: 04/ /69--Stage = 5.53 ft; Discharge = 1,200 ft^3/s. (U.S. Geological Survey, 1959A-82). 05089500--Cart Creek at Mountain Continuous-record gaging station. Period of record--June 1954 through Sept. 1982: 06/18/64--Stage = 9.18 ft; Discharge = 1,300 ft^3/s. (U.S. Geological Survey, 1959A-82). 05089700--Cart Creek at Crystal Crest-stage gaging station. Period of record--Oct. 1954 through Sept. 1973: 04/19/56--Stage = 10.4 ft; Discharge = 2,950 ft^3/s. (U.S. Geological Survey, 1959A-82). 05089800--Cart Creek tributary near Crystal Crest-stage gaging station. Period of record--Oct. 1954 through Sept. 1973: 04/19/56--Stage = 6.86 ft; Discharge = 187 ft^3/s. (U.S. Geological Survey, 1959A-82).	Dams Goschke, Herzog, Morrison, Renwick, and Weiler. Drains 3, 4, 16, 16A, 17, 18, 18A, 19, 22, 24, 25, 27, 28, 29, 30, 37, 38, 42, 43, 47, 50, 51, 60, 66, 66-1, 66-2, 66-3, 67-A, 67-B Peplow 1. 1979 flood damages: 7 bridges were washed out, 9 bridges were damaged, 26 culverts or roads were washed out, and 62 roads had gravel washed off (Federal Highway Administration).	Frequency analysis for Tongue River in vicinity of Bathgate; 100-year recurrence interval--Discharge = 6,020 ft^3/s (Federal Emergency Management Agency, 1979A). Log-Pearson type III frequency analysis for gaging station 05089700; 100-year recurrence interval--Discharge = 5,200 ft^3/s (Federal Emergency Management Agency, 1980D). Log-Pearson type III frequency analysis for gaging station 05099600; 100-year recurrence interval--Discharge = 22,200 ft^3/s (Federal Emergency Management Agency, 1979D). Log-Pearson type III frequency analysis for gaging station 05100000; 100-year recurrence interval--Discharge = 12,640 ft^3/s (Federal Emergency Management Agency, 1980H). TR-20 derived frequency analysis for Tongue River in vicinity of Cavalier (Federal Emergency Management Agency, 1981N). TR-20 derived frequency analysis for Tongue River in vicinity of Cavalier Township (Federal Emergency Management Agency, 1981P).	Gaging stations 05089200--51.8 mi^2. 05089500--16.9 mi^2. 05089700--74 mi^2. 05089800--3.77 mi^2. 05092200--80 mi^2. 05099600--Approximately 3,350 mi^2. 05100000--Approximately 3,410 mi^2. 05100500--18.9 mi^2. 05101000--160 mi^2.	Gaging stations 05089200 05089500 05089700 05089800 05092200 05099600 05100000 05100500 05101000	

FLOOD HAZARD AREA: Pembina County--Continued

COUNTY: Pembina

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05092200--Pembina County drain 20 near Glasston Continuous-record gaging station. Period of record--Oct. 1971 through Sept. 1982: 04/20/79--Stage = 9.3 ft; Discharge = 940 ft^3/s. (U.S. Geological Survey, 1959A-82).					
05099600--Pembina River at Walhalla Continuous-record gaging station. Period of record--Oct. 1939 through Sept. 1982: 04/18/50--Stage = 19.2 ft; Discharge = 20,400 ft^3/s. (U.S. Geological Survey, 1959A-82).					
05100000--Pembina River at Neche Continuous-record gaging station. Period of record--May 1903 through Sept. 1908, June 1909 through Sept. 1915, and Apr. 1919 through Sept. 1982: 04/20/50--Stage = 21.58 ft; Discharge = 10,700 ft^3/s. (U.S. Geological Survey, 1959A-82).					
05100500--Herzog Creek near Concrete Continuous-record gaging station. Period of record--June 1954 through Sept. 1977: 04/02/55--Stage = 9.74 ft; Discharge = 260 ft^3/s. (U.S. Geological Survey, 1959A-82).					

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05101000--Tongue River at Akra Continuous-record gaging station. Period of record--Apr. through June 1950 and Oct. 1951 through Sept. 1982: 04/18/50--Stage = 48.7 ft; Discharge = 11,800 ft^3/s. (U.S. Geological Survey, 1959A-82).					

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 Cart Creek in vicinity of Crystal (Federal Emergency Management Agency, 1980D). HEC-2 step-backwater derived profiles for Pembina River in vicinity of Neche (Federal Emergency Management Agency, 1980H). HEC-2 step-backwater derived profiles for Pembina River in vicinity of Walhalla (Federal Emergency Management Agency, 1979D). HEC-2 step-backwater derived profiles for Tongue River in vicinity of Bathgate (Federal Emergency Management Agency, 1979A). HEC-2 step-backwater derived profiles for Tongue River in vicinity of Cavalier (Federal Emergency Management Agency, 1981N). HEC-2 step-backwater derived profiles for Tongue River in vicinity of Cavalier Township (Federal Emergency Management Agency, 1981P).	Bridges Pembina River 34-102-7 34-116-3 34-106-6 34-119-2 34-109-5 34-119-2.3 34-112-2 34-123-3 34-112-3 34-124-3 34-115-3 0018-241.409 0032-230.260 Tongue River 34-101-19 34-115-15.1 34-101-19.1 34-116-12 34-102-19 34-118-11 34-103-19 34-119-10 34-105-18 34-121-10 34-105-18.1 34-122-9.1 34-106-17 34-124-7 34-106-17.1 34-124-8 34-107-16.1 34-124-9 34-110-16 34-125-11 34-111-16 34-126-10 34-112-16 34-128-8 34-113-16 34-128-9 34-114-15 0005-302.364 0005-313.750 0018-231.872 0032-215.360 Drains 3, 4, 16, 16A, 17, 18, 18A, 19, 22, 24, 25, 27, 28, 29, 30, 37, 38, 42, 43, 47, 50, 51, 60, 66, 66-1, 66-2, 66-3, 67-A, 67-B Peplow 1.	Gaging stations 05089200 05089500 05089800 05092200 05099600 05100000 05100500 05101000	Bridges Pembina River 34-102-7 34-116-3 34-106-6 34-119-2 34-109-5 34-119-2.3 34-112-2 34-123-3 34-112-3 34-124-3 34-115-3 0018-241.409 0032-230.260 Tongue River 34-101-19 34-115-15.1 34-101-19.1 34-116-12 34-102-19 34-118-11 34-103-19 34-119-10 34-105-18 34-121-10 34-105-18.1 34-122-9.1 34-106-17 34-124-7 34-106-17.1 34-124-8 34-107-16.1 34-124-9 34-110-16 34-125-11 34-111-16 34-126-10 34-112-16 34-128-8 34-113-16 34-128-9 34-114-15 0005-302.364 0005-313.750 0018-231.872 0032-215.360 Drains 3, 4, 16, 16A, 17, 18, 18A, 19, 22, 24, 25, 27, 28, 29, 30, 37, 38, 42, 43, 47, 50, 51, 60, 66, 66-1, 66-2, 66-3, 67-A, 67-B Peplow 1.	Gaging stations 05089200 05089500 05089800 05092200 05099600 05100000 05100500 05101000	Flood Insurance Rate Map (1:4,800): City of Bathgate (U.S. Department of Housing and Urban Development, 1980C). Flood Insurance Rate Map (1:6,000): City of Cavalier (Federal Emergency Management Agency, 1981H). Flood Insurance Rate Map (1:4,800): City of Crystal (Federal Emergency Management Agency, 1981I). Flood Insurance Rate Map (1:2,400): City of Neche (U.S. Department of Housing and Urban Development, 1980G). Flood Insurance Rate Map (1:6,000): City of Walhalla (U.S. Department of Housing and Urban Development, 1980J). Flood Insurance Rate Map (1:12,000): Township of Cavalier (Federal Emergency Management Agency, 1981M). Topographic maps (1:24,000): Backoo, Cavalier, Cavalier NW, Concrete, Crystal, Crystal NE, Crystal SE, Gardar, Glasston, Hallson, Hanks Corner, Hensel, Leroy, Mattson, Mountain, Neche, Saint Thomas, Union, and Walhalla (U.S. Geological Survey).	

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
	Gaging stations 05089200 05089500 05089700 05089800 05092200 05099600 05100000 05100500 05101000					

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

FLOOD HAZARD AREA: Pembina County--Continued.

Additional flood hazard information for Pembina County is contained in table 1 under Drayton Township, Hamilton, Joliette Township, and Pembina Township.

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05100000--Pembina River at Neche Continuous-record gaging station. Period of record--May 1903 through Sept. 1908, June 1909 through Sept. 1915, and Apr. 1919 through Sept. 1982: 04/20/50--Stage = 21.58 ft; Discharge = 10,700 ft^3/s. (U.S. Geological Survey, 1959A-82). 05102000--Tongue River near Pembina Nonrecording gaging station. Period of record--Oct. 1939 through Sept. 1942: 04/07/42--Stage = 15.7 ft; Discharge = 1,450 ft^3/s. (U.S. Geological Survey, 1959A-82). 05102500--Red River of the North at Emerson Continuous-record gaging station. Period of record--Mar. through Nov. 1902 (stage only), May 1912 through Sept. 1929 (monthly discharge), and Oct. 1929 through Sept. 1982: 05/13/50--Stage = 90.89 ft; Discharge = 95,500 ft^3/s. (U.S. Geological Survey, 1959A-82).	Drains 8, 11, 33, 34, 62, 69 Flood damage reduction for Pembina River (Souris-Red-Rainy River Basins Commission, 1972). Flood damage reduction for Pembina River (U.S. Army Corps of Engineers). Flood damage reduction for Red River (Souris-Red-Rainy River Basins Commission, 1972). Flood damage reduction for Red River (U.S. Army Corps of Engineers). Flood damage reduction for Tongue River (Souris-Red-Rainy River Basins Commission, 1972). Levee inventory (U.S. Army Corps of Engineers, 1983A). Watershed changes for Tongue River (U.S. Department of Agriculture, Soil Conservation Service). 1979 flood damages: 1 bridge was damaged and 28 roads had gravel washed off (Federal Highway Administration).	Log-Pearson type III frequency analysis for gaging station 05100000; 100-year recurrence interval--Discharge = 12,640 ft^3/s (Federal Emergency Management Agency, 1980H). Log-Pearson type III frequency analysis for gaging station 05100000; 100-year recurrence interval--Discharge = 9,100 ft^3/s (Souris-Red-Rainy River Basins Commission, 1972). Log-Pearson type III frequency analysis for gaging station 05102500; 100-year recurrence interval--Discharge = 112,000 ft^3/s (North Dakota State Water Commission and Minnesota Department of Natural Resources Division of Waters, Soils, and Minerals, 1971). Log-Pearson type III frequency analysis for gaging station 05102500; 100-year recurrence interval--Discharge = 130,000 ft^3/s (Souris-Red-Rainy River Basins Commission, 1972).	Gaging stations 05100000--Approximately 3,410 mi^2. 05102000--Approximately 460 mi^2. 05102500--Approximately 40,200 mi^2 which includes 3,800 mi^2 of closed basins.	Gaging stations 05100000 05102000 05102500	

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 Pembina River (U.S. Army Corps of Engineers). HEC-2 step-backwater derived profiles for Pembina River at Neche (Federal Emergency Management Agency, 1980H). HEC-2 step-backwater derived profiles for Red River (U.S. Army Corps of Engineers). Profiles for Pembina (U.S. Army Corps of Engineers, 1971). Systematically derived profiles for Red River (North Dakota State Water Commission and Minnesota Department of Natural Resources Division of Waters, Soils, and Minerals, 1971).	Bridges Pembina River 34-125-4 34-130-5.1 34-129-5 34-133-3.1 0029-214.223L 0029-214.223R 0059-000.732 Red River 0059-001.010 Tongue River 34-128-8.1 34-130-5 34-129-6 Unnamed creeks 34-124-7 34-128-7 34-125-5 34-128-7.1 34-125-7 34-128-8 34-126-5 34-128-8.2 34-126-8 34-129-8 34-126-8.1 34-131-2 34-127-2 34-131-5 34-127-5 34-131-6 34-127-6 34-131-7 34-127-7 34-131-8 34-128-3 34-133-3 0029-214.223L 0029-214.223R 0029-216.237 0029-217.113 Drains 8, 11, 33, 34, 62, 69	Gaging stations 05100000 05102000 05102500	Bridges Pembina River 34-125-4 34-130-5.1 34-129-5 34-133-3.1 0029-214.223L 0029-214.223R 0059-000.732 Red River 0059-001.010 Tongue River 34-128-8.1 34-130-5 34-129-6 Unnamed creeks 34-124-7 34-128-7 34-125-5 34-128-7.1 34-125-7 34-128-8 34-126-5 34-128-8.2 34-126-8 34-129-8 34-126-8.1 34-131-2 34-127-2 34-131-5 34-127-5 34-131-6 34-127-6 34-131-7 34-127-7 34-131-8 34-128-3 34-133-3 0029-214.223L 0029-214.223R 0029-216.237 0029-217.113 Drains 8, 11, 33, 34, 62, 69	Gaging stations 05100000 05102000 05102500	Additional information: Elevations of farm buildings (U.S. Army Corps of Engineers). Flood Hazard Boundary Map (1:24,000): Township of Pembina (Federal Emergency Management Agency, 1982A). Flood Insurance Rate Map (1:4,800): City of Pembina (U.S. Department of Housing and Urban Development, 1978E). Soil survey map: Pembina County (U.S. Department of Agriculture, 1977A). Topographic maps (1:24,000): Bathgate, Bathgate NE, and Pembina (U.S. Geological Survey).	1:7,920--1979 flood and other dates (KBM, Inc.). 1:7,920 (Local Agriculture Stabilization and Conservation Service). Several sets, 1960's and 1970's; 1:24,000--1979 (U.S. Army Corps of Engineers).

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
	Gaging stations 05100000 05102000 05102500 Pembina River (U.S. Army Corps of Engineers). Red River (U.S. Army Corps of Engineers). Tongue River (U.S. Army Corps of Engineers).		Pembina River (U.S. Army Corps of Engineers). Red River (U.S. Army Corps of Engineers). Tongue River (U.S. Army Corps of Engineers).			

ADEQUACY	There should be adequate data to prepare appropriate technical information for flood plain management of the Pembina River and Red River. If additional hydrologic data are obtained for the Tongue River, then there should be adequate data to prepare appropriate technical information for flood plain management.

FLOOD HAZARD AREA: Coulee Township

COUNTY: Ramsey

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05056260--Lake Irvine near Churchs Ferry Partial-record gaging station. Period of record--1974 through 1982 (some stages for each year). (U.S. Geological Survey, 1959A-82).	Flood damage reduction for Devils Lake basin (Souris-Red-Rainy River Basins Commission, 1972). Flooding impacts of agricultural land in Devils Lake basin (Leitch and Scott, 1977). History of flooding and investigations, flood damages, and flood plain management (Devils Lake Basin Advisory Committee, 1976). Mauvais Coulee channel improvements (North Dakota State Water Commission).				Watershed model for Devils Lake basin (Parekh, no date).

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 Coulee 36-101-20 36-102-19 0002-250.554 Unnamed creeks 0002-253.246 0002-253.890 Mauvais Coulee channel improvements (North Dakota State Water Commission).		Bridges Big Coulee 36-101-20 36-102-19 0002-250.554 Unnamed creeks 0002-253.246 0002-253.890 Mauvais Coulee channel improvements (North Dakota State Water Commission).	Gaging station 05056260	Soil survey map: Ramsey County (U.S. Department of Agriculture, draft J). Topographic maps (1:24,000): Cando SE, Churches Ferry, Penn, and Tilden (U.S. Geological Survey).	1:7,920 (Local Agriculture Stabilization and Conservation Service). Several sets, 1951, 1956, 1965, and 1969; 1:24,000--1979 (U.S. Army Corps of Engineers).

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

FLOOD HAZARD AREA: Crary

COUNTY: Ramsey

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
	Flood damage reduction for Devils Lake basin (Souris-Red-Rainy River Basins Commission, 1972). Flooding impacts of agricultural land in Devils Lake basin (Leitch and Scott, 1977). History of flooding and investigations, flood damages, and flood plain management (Devils Lake Basin Advisory Committee, 1976). 1974 flood damages: Water in basements and water pooled in parts of town.				Watershed model for Devils Lake basin (Parekh, no date).

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
	Bridge Unnamed creek 36-125-35		Bridge Unnamed creek 36-125-35		Flood Hazard Boundary Map (1:9,600): City of Crary (U.S. Department of Housing and Urban Development, 1974A). Soil survey map: Ramsey County (U.S. Department of Agriculture, draft J). Topographic map (1:24,000): Crary (U.S. Geological Survey).	1:7,920 (Local Agriculture Stabilization and Conservation Service).

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

FLOOD HAZARD AREA: Creel Township

COUNTY: Ramsey

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05056500--Devils Lake near Devils Lake Continuous-record gaging station. Period of record--1867, 1879, 1883, 1887, 1890, and 1896 (one stage reading for each year); 1901 through 1963 (fragmentary); and 1964 through Sept. 1982: 1867--Stage = 1,438.4 ft. (U.S. Geological Survey, 1959A-82).	Drains Devils Lake 1 and Devils Lake 2. Flood damage reduction for Devils Lake basin (Souris-Red-Rainy River Basins Commission, 1972). Flood protection for city of Devils Lake (U.S. Army Corps of Engineers, 1983B). Flooding impacts of agricultural land in Devils Lake basin (Leitch and Scott, 1977). History of flooding and investigations, flood damages, and flood plain management (Devils Lake Basin Advisory Committee, 1976).		Gaging station 05056500--Approximately 3,130 mi^2 of which about 1,000 mi^2 is noncontributing.		Watershed model for Devils Lake basin (Parekh, no date).

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 Devils Lake 0057-012.180 Unnamed creek 0002-270.835 Cross sections for Devils Lake, 1960's (U.S. Army Corps of Engineers). Drains Devils Lake 1 and Devils Lake 2.		Bridges Devils Lake 0057-012.180 Unnamed creek 0002-270.835 Drains Devils Lake 1 and Devils Lake 2.	Gaging station 05056500	Additional information: Street and gutter elevations (Devils Lake city engineer). Additional information: Water disposal (Olson-Kaufman, Inc.). Flood Hazard Boundary Map (1:7,200): City of Devils Lake (U.S. Department of Housing and Urban Development, 1975E). Soil survey map: Ramsey County (U.S. Department of Agriculture, draft J). Topographic maps (1:24,000): Camp Grafton, Devils Lake, Grand Harbor, and Sweetwater (U.S. Geological Survey).	1:7,920 (Local Agriculture Stabilization and Conservation Service). Several sets, 1951, 1956, 1965, and 1969; 1:24,000--1979 (U.S. Army Corps of Engineers).

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

FLOOD HAZARD AREA: Devils Lake

COUNTY: Ramsey

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05056500--Devils Lake near Devils Lake Continuous-record gaging station. Period of record--1867, 1879, 1883, 1887, 1890, and 1896 (one stage reading for each year); 1901 through 1963 (fragmentary); and 1964 through Sept. 1982: 1867--Stage = 1,438.4 ft. (U.S. Geological Survey, 1959A-82).	Drains Devils Lake 1 and Devils Lake 2. Flood damage reduction for Devils Lake basin (Souris-Red-Rainy River Basins Commission, 1972). Flood protection for city of Devils Lake (U.S. Army Corps of Engineers, 1983B). Flooding impacts of agricultural land in Devils Lake basin (Leitch and Scott, 1977). History of flooding and investigations, flood damages, and flood plain management (Devils Lake Basin Advisory Committee, 1976).		Gaging station 05056500--Approximately 3,130 mi^2 of which about 1,000 mi^2 is noncontributing.		Watershed model for Devils Lake basin (Parekh, no date).

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
	Bridge Unnamed creek 0002-270.835 Cross sections for Devils Lake, 1960's (U.S. Army Corps of Engineers). Drains Devils Lake 1 and Devils Lake 2.		Bridge Unnamed creek 0002-270.835 Drains Devils Lake 1 and Devils Lake 2.	Gaging station 05056500	Additional information: Street and gutter elevations (Devils Lake city engineer). Flood Hazard Boundary Map (1:7,200): City of Devils Lake (U.S. Department of Housing and Urban Development, 1975E). Soil survey map: Ramsey County (U.S. Department of Agriculture, draft J). Topographic maps (1:24,000): Camp Grafton, Devils Lake, Grand Harbor, and Sweetwater (U.S. Geological Survey).	1:7,920 (Local Agriculture Stabilization and Conservation Service). Several sets, 1951, 1956, 1965, and 1969; 1:24,000--1979 (U.S. Army Corps of Engineers).

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

FLOOD HAZARD AREA: Edmore

COUNTY: Ramsey

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05056200--Edmore Coulee near Edmore Continuous-record gaging station. Period of record--Apr. through June 1956 and June 1957 through Sept. 1982: 04/25/79--Stage = 7.31 ft; Discharge = 1,110 ft^3/s. (U.S. Geological Survey, 1959A-82).	Flood damage reduction for Devils Lake basin (Souris-Red-Rainy River Basins Commission, 1972). Flooding impacts of agricultural land in Devils Lake basin (Leitch and Scott, 1977). History of flooding and investigations, flood damages, and flood plain management (Devils Lake Basin Advisory Committee, 1976). 1979 flood damages: One basement caved in (Edmore city auditor).	Log-Pearson type III frequency analysis for gaging station 05056200; 100-year recurrence interval--Discharge = 1,520 ft^3/s (Souris-Red-Rainy River Basins Commission, 1972).	Gaging station 05056200--382 mi^2 of which about 100 mi^2 is noncontributing.	Gaging station 05056200	Watershed model for Devils Lake basin (Parekh, no date).

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 Edmore Coulee 36-132-11 36-134-8 36-133-10 36-135-7 0017-077.572 Unnamed creeks 36-134-9 36-136-10.1 36-135-10 36-136-10.2 36-136-10	Gaging station 05056200	Bridges Edmore Coulee 36-132-11 36-134-8 36-133-10 36-135-7 0017-077.572 Unnamed creeks 36-134-9 36-136-10.1 36-135-10 36-136-10.2 36-136-10	Gaging station 05056200	Flood Hazard Boundary Map (1:4,800): City of Edmore (U.S. Department of Housing and Urban Development, 1975F). Soil survey map: Ramsey County (U.S. Department of Agriculture, draft J). Topographic map (1:24,000): Edmore (U.S. Geological Survey).	1:7,920 (Local Agriculture Stabilization and Conservation Service).

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

DESCRIPTIDN	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05058700--Sheyenne River at Lisbon Continuous-record gaging station. Period of record--Sept. 1956 through Sept. 1982: 07/01/75--Stage = 19.04 ft; Discharge = 5,270 ft^3/s. (U.S. Geological Survey, 1959A-82). 05059700--Maple River near Enderlin Continuous-record gaging station. Period of record--May 1956 through Sept. 1982: 06/30/75--Stage = 15.41 ft; Discharge = 7,610 ft^3/s. (U.S. Geological Survey, 1959A-82). 133-055-30BB--Dead Colt Creek near Gwinner Indirect measuring station. 06/30/75--Discharge = 3,890 ft^3/s. (Lindskov, 1975). 135-057-04AAA--Sheyenne River tributary no. 2 near Fort Ransom Indirect measuring station. 06/29/75--Discharge = 2,840 ft^3/s. (Lindskov, 1975). 136-055-09DD--South Branch Maple River at Enderlin Indirect measuring station. 06/29/75--Discharge = 6,390 ft^3/s. (Lindskov, 1975).	Drains Tri-County and Shemford. Emergency levee system for Enderlin (U.S. Army Corps of Engineers, 1983A). Emergency levee system for Lisbon (U.S. Army Corps of Engineers, 1983A). Flood control surveys, 1940's and 1970's (U.S. Army Corps of Engineers). Flood damage reduction (Souris-Red-Rainy River Basins Commission, 1972). Flood insurance study: City of Lisbon (U.S. Department of Agriculture, 1974). Flood retention for the Maple River basin (Moore Engineering, Inc., 1982B). 1979 flood damages: 3 roads had gravel washed off and 13 culverts were washed out (Federal Highway Administration).	Log-Pearson type III frequency analysis for gaging station 05058700; 100-year recurrence interval--Discharge = 10,700 ft^3/s (Souris-Red-Rainy River Basins Commission, 1972). Log-Pearson type III frequency analysis for Lisbon; 100-year recurrence interval--Discharge = 14,200 ft^3/s (U.S. Army Corps of Engineers, 1982B). Log-Pearson type III frequency analysis for numerous locations along Maple River (U.S. Department of Agriculture, 1981A). Peak flow frequency analysis for gaging station 05059700; 100-year recurrence interval--Discharge = 15,080 ft^3/s (Moore Engineering, Inc., 1982B).	Gaging stations 05058700--Approximately 8,190 mi^2 of which about 5,700 mi^2 is noncontributing. 05059700--843 mi^2 of which about 47 mi^2 is noncontributing. 133-055-30BB--34.3 mi^2. 135-057-04AAA--7 mi^2. 136-055-09DD--36.6 mi^2. 136-058-35CAD--14.2 mi^2. 137-055-30BCB--42.4 mi^2.	Gaging stations 05058700 05059700 133-055-30BB 135-057-04AAA 136-055-09DD 136-058-35CAD 137-055-30BCB	HEC-1 analysis for Maple River basin (Moore Engineering, Inc., 1982B).

FLOOD HAZARD AREA: Ransom County--Continued

COUNTY: Ransom

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
136-058-35CAD--Sheyenne River tributary near Fort Ransom Indirect measuring station. 06/29/75--Discharge = 5,300 ft^3/s. (Lindskov, 1975).					
137-055-30BCB--Maple River tributary near Enderlin Indirect measuring station. 06/30/75--Discharge = 3,210 ft^3/s. (Lindskov, 1975).					

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 Sheyenne River (U.S. Army Corps of Engineers). Profile analysis for Enderlin (U.S. Department of Agriculture, 1971). Profile analysis for stretches of Maple River (U.S. Department of Agriculture, 1981A). Step-backwater derived profiles for Lisbon (U.S. Department of Agriculture, 1974).	Bridges Bear Creek 37-101-8 37-101-11.1 37-101-9 37-101-18 37-101-11 Dead Colt Coulee 37-116-23 37-120-19 37-119-22 37-120-21 0032-026.956 Maple River 37-122-1 0046-083.657 0046-086.404 Sheyenne River 37-105-1 37-114-11 37-105-6 37-114-12 37-105-7 37-115-12 37-105-7.1 37-117-15 37-105-8 37-118-14 37-106-8 37-118-16 37-107-2 37-120-17 37-107-4 37-123-18 37-107-8 37-126-9 37-108-9 37-126-17 37-110-8 37-129-9 37-110-8.1 37-131-8 37-113-9 37-133-9 37-113-11 37-135-8 0027-018.913 0027-027.907 0032-036.894 0046-067.147	Gaging stations 05058700 05059700	Bridges Bear Creek 37-101-8 37-101-11.1 37-101-9 37-101-18 37-101-11 Dead Colt Coulee 37-116-23 37-120-19 37-119-22 37-120-21 0032-026.956 Maple River 37-122-1 0046-083.657 0046-086.404 Sheyenne River 37-105-1 37-114-11 37-105-6 37-114-12 37-105-7 37-115-12 37-105-7.1 37-117-15 37-105-8 37-118-14 37-106-8 37-118-16 37-107-2 37-120-17 37-107-4 37-123-18 37-107-8 37-126-9 37-108-9 37-126-17 37-110-8 37-129-9 37-110-8.1 37-131-8 37-113-9 37-133-9 37-113-11 37-135-8 0027-018.913 0027-027.907 0032-036.894 0046-067.147	Gaging stations 05058700 05059700 High water elevation for Sheyenne River (U.S. Army Corps of Engineers).	Flood Hazard Boundary Map (1:4,800): City of Enderlin (U.S. Department of Housing and Urban Development, 1975G). Flood Hazard Boundary Map (1:9,600): City of Lisbon (U.S. Department of Housing and Urban Development, 1973). Flood Hazard Boundary Map (1:24,000): Ransom County (Federal Emergency Management Agency, 1981C). Soil survey map: Richland County and Sheyenne National Grassland area of Ransom County (U.S. Department of Agriculture, 1975B). Soil survey map: Tri-County area (U.S. Department of Agriculture, 1966). Topographic maps (1:24,000): Buttzville, Coburn, De Lamere, Elliott, Elliott SE, Elliott SW, Enderlin South, Englevale, Ft. Ransom, Lisbon, Lisbon NE, Lisbon SE, Lisbon SW, Litchville, McLeod, Milnor, Nome SE, Sheldon, Venlo, Verona, and Verona NE (U.S. Geological Survey).	1:7,920 (Local Agriculture Stabilization and Conservation Service). Several sets, 1950's and 1970's; 1:24,000--1979 (U.S. Army Corps of Engineers).

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
	Enderlin (U.S. Department of Agriculture, 1971). Gaging stations 05058700 05059700 133-055-30BB 135-057-04AAA 136-055-09DD 136-058-35CAD 137-055-30BCB Lisbon (U.S. Department of Agriculture, 1974). Maple River (U.S. Department of Agriculture, 1981A). Sheyenne River (U.S. Army Corps of Engineers).		Enderlin (U.S. Department of Agriculture, 1971). Lisbon (U.S. Department of Agriculture, 1974). Maple River (U.S. Department of Agriculture, 1981A). Sheyenne River (U.S. Army Corps of Engineers).			

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

FLOOD HAZARD AREA: Abercrombie

COUNTY: Richland

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
Flooding problems due to overland flow. 05051500--Red River of the North at Wahpeton Continuous-record gaging station. Spring flood of 1897: Stage = 17 ft; Discharge = 10,500 ft^3/s. Period of record--Apr. 1942 through Sept. 1982: 04/10/69--Stage = 16.34 ft; Discharge = 9,200 ft^3/s. (U.S. Geological Survey, 1959A-82). 05051522--Red River of the North at Hickson Continuous-record gaging station. Period of record--Oct. 1975 through Sept. 1982: 04/18/79--Stage = 33.03 ft; Discharge = 9,600 ft^3/s. (U.S. Geological Survey, 1959A-82). 05054000--Red River of the North at Fargo Continuous-record gaging station. Apr. 7, 1897: Stage = 39.1 ft; Discharge = 25,000 ft^3/s. Period of record--May 1901 through Sept. 1982: 04/15/69--Stage = 37.34 ft; Discharge = 25,300 ft^3/s. (U.S. Geological Survey, 1959A-82).	Changes in flood response of the Red River (Miller and Frink, 1982). Flood damage reduction (Souris-Red-Rainy River Basins Commission, 1972). 1969 flood report (U.S. Army Corps of Engineers, 1969). 1979 flood report (U.S. Army Corps of Engineers, 1979).	Frequency analysis for Red River, Cass County (Federal Emergency Management Agency, 1980C). Log-Pearson type III frequency analysis for gaging station 05051500; 100-year recurrence interval--Discharge = 11,000 ft^3/s (Souris-Red-Rainy River Basins Commission, 1972). Log-Pearson type III frequency analysis for gaging station 05054000; 100-year recurrence interval--Discharge = 29,500 ft^3/s (Souris-Red-Rainy River Basins Commission, 1972). Log-Pearson type III frequency analysis for Red River (North Dakota State Water Commission and Minnesota Department of Natural Resources Division of Waters, Soils, and Minerals, 1971). Log-Pearson type III frequency analysis for Red River at Fargo (Miller and Frink, 1982).	Gaging stations 05051500--Approximately 4,010 mi^2. 05051522--Approximately 4,300 mi^2. 05054000--Approximately 6,800 mi^2.	Gaging stations 05051500 05051522 05054000	

FLOOD HAZARD AREA: Abercrombie--Continued

COUNTY: Richland

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
Profiles for Red River (U.S. Army Corps of Engineers). Profiles for Red River, Cass County (Federal Emergency Management Agency, 1980C). Systematically derived profiles for Red River (North Dakota State Water Commission and Minnesota Department of Natural Resources Division of Waters, Soils, and Minerals, 1971).	Bridge Red River 39-127-13 Gaging stations 05051500 05051522 05054000 Red River (U.S. Army Corps of Engineers).	Gaging stations 05051500 05051522 05054000	Bridge Red River 39-127-13 Red River (U.S. Army Corps of Engineers).	Gaging stations 05051500 05051522 05054000 High water elevation for Red River (U.S. Army Corps of Engineers).	Additional information: Street and gutter elevations (Houston Engineering, Inc.). Flood Hazard Boundary Map (1:9,600): City of Abercrombie (U.S. Department of Housing and Urban Development, 1976A). Soil survey map: Richland County (U.S. Department of Agriculture, 1975B). Topographic map (1:24,000): Abercrombie (U.S. Geological Survey).	1:7,920--1979 flood and other dates (KBM, Inc.). 1:7,920 (Local Agriculture Stabilization and Conservation Service). Several sets, 1950's and 1970's; 1:24,000--1979 (U.S. Army Corps of Engineers).

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

FLOOD HAZARD AREA: Antelope Township

COUNTY: Richland

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05052500--Antelope Creek at Dwight Crest-stage gaging station. Period of record--Mar. 1944 through Sept. 1973: 04/10/69--Stage = 17.82 ft; Discharge = 9,000 ft^3/s. (U.S. Geological Survey, 1959A-82).	Drains 15, 32 1975 flood damages: Six roads had gravel washed off (Federal Highway Administration).	Log-Pearson type III frequency analysis for gaging station 05052500; 100-year recurrence interval--Discharge = 12,625 ft^3/s (Moore Engineering, Inc., 1982C).	Gaging station 05052500--Approximately 294 mi^2 of which about 16 mi^2 is noncontributing.	Gaging station 05052500	HEC-1 analysis for Antelope Creek basin (Moore Engineering, Inc., 1982C).

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
	Antelope Creek (U.S. Army Corps of Engineers). Bridges Antelope Creek 39-116-18 39-117-21 39-116-19 39-117-22 39-116-20 39-118-22 39-117-20 39-118-23 Unnamed creeks 39-112-19 39-114-21 39-113-19 39-115-20 39-114-19 39-116-21 39-114-20 39-117-21.1 Drains 15, 32 Gaging station 05052500	Gaging station 05052500	Antelope Creek (U.S. Army Corps of Engineers). Bridges Antelope Creek 39-116-18 39-117-21 39-116-19 39-117-22 39-116-20 39-118-22 39-117-20 39-118-23 Unnamed creeks 39-112-19 39-114-21 39-113-19 39-115-20 39-114-19 39-116-21 39-114-20 39-117-21.1 Drains 15, 32	Gaging station 05052500	Flood Hazard Boundary Map (1:24,000): Richland County (Federal Emergency Management Agency, 1981D). Soil survey map: Richland County (U.S. Oepartment of Agriculture, 1975B). Topographic maps (1:24,000): Mooreton West and Wyndmere SE (U.S. Geological Survey).	1:7,920--1979 flood and other dates (KBM, Inc.). 1:7,920 (Local Agriculture Stabilization and Conservation Service). Several sets, 1960's and 1970's (U.S. Army Corps of Engineers).

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

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05059000--Sheyenne River near Kindred Continuous-record gaging station. Spring flood of 1947 or 1948: Stage = 22.1 ft; Discharge ≅ 3,600 ft^3/s. Period of record--July 1949 through Sept. 1982: 04/15/69--Stage = 21.03 ft; Discharge = 4,690 ft^3/s. (U.S. Geological Survey, 1959A-82).	Drains 1, 14 Flood control: Sheyenne River (U.S. Army Corps of Engineers, 1982C and 1982D). Flood control surveys, 1940's and 1970's (U.S. Army Corps of Engineers). Flood damage reduction (Souris-Red-Rainy River Basins Commission, 1972). Levee system maps (1:4,800): Sheyenne River (U.S. Army Corps of Engineers). 1979 flood damages: Three roads had gravel washed off (Federal Highway Administration).	Log-Pearson type III frequency analysis for gaging station 05059000; 100-year recurrence interval--Discharge = 8,700 ft^3/s (Souris-Red-Rainy River Basins Commission, 1972). Log-Pearson type III frequency analysis for Sheyenne River above Kindred; 100-year recurrence interval--Discharge = 13,500 ft^3/s (U.S. Army Corps of Engineers, 1982B).	Gaging station 05059000--Approximately 8,800 mi^2 of which about 5,780 mi^2 is noncontributing.	Discharge data for Sheyenne River (U.S. Army Corps of Engineers). Gaging station 05059000	

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 Sheyenne River (U.S. Army Corps of Engineers).	Bridges Sheyenne River 39-108-5 39-110-4 39-108-6 39-111-2 39-108-6.1 39-112-2 39-108-6.2 0018-045.621 Unnamed creeks 39-107-3 39-110-3 39-108-4 39-111-5 39-109-5.1 39-111-6 Drains 1, 14 Gaging station 05059000 Sheyenne River (U.S. Army Corps of Engineers).	Gaging station 05059000	Bridges Sheyenne River 39-108-5 39-110-4 39-108-6 39-111-2 39-108-6.1 39-112-2 39-108-6.2 0018-045.621 Unnamed creeks 39-107-3 39-110-3 39-108-4 39-111-5 39-109-5.1 39-111-6 Drains 1, 14 Sheyenne River (U.S. Army Corps of Engineers).	Gaging station 05059000 High water elevation for Sheyenne River (U.S. Army Corps of Engineers).	Flood Hazard Boundary Map (1:24,000): Richland County (Federal Emergency Management Agency, 1981D). Levee system maps (1:4,800): Sheyenne River (U.S. Army Corps of Engineers). Soil survey map: Richland County (U.S. Department of Agriculture, 1975B). Topographic maps (1:24,000): Barrie and Power (U.S. Geological Survey).	1:7,920--1979 flood and other dates (KBM, Inc.). 1:7,920 (Local Agriculture Stabilization and Conservation Service). Several sets, 1950's and 1970's; 1:24,000--1979 (U.S. Army Corps of Engineers).

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

FLOOD HAZARD AREA: Belford Township

COUNTY: Richland

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05052000--Wild Rice River near Mantador Crest-stage gaging station. Period of record--Mar. 1944 through Sept. 1973: 04/13/69--Stage = 10.88 ft; Discharge = 2,360 ft^3/s. (U.S. Geological Survey, 1959A-82).	Flood damage reduction (Souris-Red-Rainy River Basins Commission, 1972). 1979 flood damages: Two roads had gravel washed off (Federal Highway Administration).	Log-Pearson type III frequency analysis for gaging station 05052000; 100-year recurrence interval--Discharge = 1,880 ft^3/s (Moore Engineering, Inc., 1982C).	Gaging station 05052000--1,360 mi^2 of which about 550 mi^2 is noncontributing.	Gaging station 05052000	HEC-1 analysis for Wild Rice River basin (Moore Engineering, Inc., 1982C).

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 39-116-34 39-119-35 39-118-32 Wild Rice River 39-113-32 39-116-34.1 39-114-32 39-117-34 39-114-32.1 39-118-35 39-115-33 39-119-35.1 Gaging station 05052000 Wild Rice River (Moore Engineering, Inc., 1982C). Wild Rice River (U.S. Army Corps of Engineers).	Gaging station 05052000	Bridges Unnamed creeks 39-116-34 39-119-35 39-118-32 Wild Rice River 39-113-32 39-116-34.1 39-114-32 39-117-34 39-114-32.1 39-118-35 39-115-33 39-119-35.1 Wild Rice River (U.S. Army Corps of Engineers).	Gaging station 05052000	Flood Hazard Boundary Map (1:24,000): Richland County (Federal Emergency Management Agency, 1981D). Soil survey map: Richland County (U.S. Department of Agriculture, 1975B). Topographic maps (1:24,000): Hankinson, Mantador, Moselle, and Swan Lake (U.S. Geological Survey).	1:7,920--1979 flood and other dates (KBM, Inc.). 1:7,920 (Local Agriculture Stabilization and Conservation Service). Several sets, 1960's and 1970's (U.S. Army Corps of Engineers).

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

FLOOD HAZARD AREA: Brandenburg Township

COUNTY: Richland

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05052000--Wild Rice River near Mantador Crest-stage gaging station. Period of record--Mar. 1944 through Sept. 1973: 04/13/69--Stage = 10.88 ft; Discharge = 2,360 ft^3/s. (U.S. Geological Survey, 1959A-82). 05052100--Richland County drain 65 near Great Bend Continuous-record gaging station. Period of record--Oct. 1980 through Sept. 1982: 06/25/81--Stage = 1.83 ft; Discharge = 3.5 ft^3/s. (U.S. Geological Survey, 1959A-82).	Drains 65, 66A Flood damage reduction (Souris-Red-Rainy River Basins Commission, 1972). Flood retention for Wild Rice River basin (Moore Engineering, Inc., 1982C). 1979 flood damages: One road had gravel washed off (Federal Highway Administration).	Log-Pearson type III frequency analysis for gaging station 05052000; 100-year recurrence interval--Discharge = 1,880 ft^3/s (Moore Engineering, Inc., 1982C).	Gaging stations 05052000--1,360 mi^2 of which about 550 mi^2 is noncontributing. 05052100--38 mi^2.	Gaging stations 05052000 05052100	HEC-1 analysis for Wild Rice River basin (Moore Engineering, Inc., 1982C).

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 39-123-34 39-124-35 39-123-34.1 39-124-36 39-124-34 Wild Rice River 39-119-35.1 39-123-34.2 39-120-35 39-125-32 39-121-35 39-125-33 39-122-34 0029-014.580L 0029-014.580R Drains 65, 66A Gaging stations 05052000 05052100 Wild Rice River (Moore Engineering, Inc., 1982C). Wild Rice River (U.S. Army Corps of Engineers).	Gaging stations 05052000 05052100	Bridges Unnamed creeks 39-123-34 39-124-35 39-123-34.1 39-124-36 39-124-34 Wild Rice River 39-119-35.1 39-123-34.2 39-120-35 39-125-32 39-121-35 39-125-33 39-122-34 0029-014.580L 0029-014.580R Drains 65, 66A Wild Rice River (U.S. Army Corps of Engineers).	Gaging stations 05052000 05052100	Flood Hazard Boundary Map (1:24,000): Township of Brandenburg (Federal Emergency Management Agency, 1983B). Flood Hazard Boundary Map (1:9,600): City of Great Bend (U.S. Department of Housing and Urban Development, 1976B). Soil survey map: Richland County (U.S. Department of Agriculture, 1975B). Topographic maps (1:24,000): Great Bend, Hankinson, Hankinson SE, and Mantador (U.S. Geological Survey).	1:7,920--1979 flood and other dates (KBM, Inc.). 1:7,920 (Local Agriculture Stabilization and Conservation Service). Several sets, 1960's and 1970's (U.S. Army Corps of Engineers).

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

FLOOD HAZARD AREA: Brightwood Township

COUNTY: Richland

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

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 39-117-41 39-119-38 39-118-38 Drain Unnamed.		Bridges Unnamed creeks 39-117-41 39-119-38 39-118-38 Drain Unnamed.		Flood Hazard Boundary Map (1:24,000): Richland County (Federal Emergency Management Agency, 1981D). Soil survey map: Richland County (U.S. Department of Agriculture, 1975B). Topographic maps (1:24,000): Hankinson and Swan Lake (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.

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05051500--Red River of the North at Wahpeton Continuous-record gaging station. Spring flood of 1897: Stage = 17 ft; Discharge = 10,500 ft^3/s. Period of record--Apr. 1942 through Sept. 1982: 04/10/69--Stage = 16.34 ft; Discharge = 9,200 ft^3/s. (U.S. Geological Survey, 1959A-82). 05052000--Wild Rice River near Mantador Crest-stage gaging station. Period of record--Mar. 1944 through Sept. 1973: 04/13/69--Stage = 10.88 ft; Discharge = 2,360 ft^3/s. (U.S. Geological Survey, 1959A-82). 05053000--Wild Rice River near Abercrombie Continuous-record gaging station. Spring flood of 1897: Stage = 27.5 ft. Period of record--Apr. 1932 through Sept. 1982: 04/11/69--Stage = 24.58 ft; Discharge = 9,540 ft^3/s. (U.S. Geological Survey, 1959A-82).	Drains 18, 41 Lateral C. Flood damage reduction (Souris-Red-Rainy River Basins Commission, 1972). Flood retention for Wild Rice River basin (Moore Engineering, Inc., 1982C). Levee elevations (City of Wahpeton). Levee system (U.S. Army Corps of Engineers, 1983A). 1979 flood damages: One road had gravel washed off (Federal Highway Administration). 1969 flood report (U.S. Army Corps of Engineers, 1969). 1979 flood report (U.S. Army Corps of Engineers, 1979).	Log-Pearson type III frequency analysis for gaging station 05051500; 100-year recurrence interval--Discharge = 11,000 ft^3/s (North Dakota State Water Commission and Minnesota Department of Natural Resources Division of Waters, Soils, and Minerals, 1971). Log-Pearson type III frequency analysis for gaging station 05051500; 100-year recurrence interval--Discharge = 11,000 ft^3/s (Souris-Red-Rainy River Basins Commission, 1972). Log-Pearson type III frequency analysis for gaging station 05052000; 100-year recurrence interval--Discharge = 1,880 ft^3/s (Moore Engineering, Inc., 1982C). Log-Pearson type III frequency analysis for gaging station 05053000; 100-year recurrence interval--Discharge = 10,225 ft^3/s (Moore Engineering, Inc., 1982C). Log-Pearson type III frequency analysis for gaging station 05053000; 100-year recurrence interval--Discharge = 10,000 ft^3/s (Souris-Red-Rainy River Basins Commission, 1972).	Gaging stations 05051500--Approximately 4,010 mi^2. 05052000--1,360 mi^2 of which about 550 mi^2 is noncontributing. 05053000--2,080 mi^2 of which about 590 mi^2 is noncontributing.	Gaging stations 05051500 05052000 05053000	HEC-1 analysis for Wild Rice River basin (Moore Engineering, Inc., 1982C).

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
Profiles for Red River (U.S. Army Corps of Engineers). Systematically derived profiles for Red River (North Dakota State Water Commission and Minnesota Department of Natural Resources Division of Waters, Soils, and Minerals, 1971).	Bridges Bois de Sioux River 39-133-26 Unnamed creeks 39-126-26 39-130-26 39-129-25 39-130-26.1 39-129-26 39-130-29 39-129-27 39-131-26 39-129-27.1 39-132-27 39-129-28 39-132-28 39-129-29 39-136-31.1 0013-387.782R 0013-387.788L Wild Rice River 39-126-29 39-127-28 39-126-29.1 39-128-27 39-126-30 39-128-27.1 0013-386.299L 0013-386.306R Gaging stations 05051500 05052000 05053000 Wild Rice River (Moore Engineering, Inc., 1982C). Wild Rice River (U.S. Army Corps of Engineers).	Gaging stations 05051500 05052000 05053000	Bridges Bois de Sioux River 39-133-26 Unnamed creeks 39-126-26 39-130-26 39-129-25 39-130-26.1 39-129-26 39-130-29 39-129-27 39-131-26 39-129-27.1 39-132-27 39-129-28 39-132-28 39-129-29 39-136-31.1 0013-387.782R 0013-387.788L Wild Rice River 39-126-29 39-127-28 39-126-29.1 39-128-27 39-126-30 39-128-27.1 0013-386.299L 0013-386.306R Wild Rice River (U.S. Army Corps of Engineers).	Gaging stations 05051500 05052000 05053000	Additional information: Plot of Standy and Wolf subdivisions (Center Township Board). Flood Hazard Boundary Map (1:12,000): City of Wahpeton (Federal Emergency Management Agency, 1981B). Flood Hazard Boundary Map (1:24,000): Richland County (Federal Emergency Management Agency, 1981D). Soil survey map: Richland County (U.S. Department of Agriculture, 1975B). Topographic maps (1:24,000): Dwight, Fairmount NW, Great Bend, and Mooreton East (U.S. Geological Survey).	1:7,920--1979 flood and other dates (KBM, Inc.). 1:7,920 (Local Agriculture Stabilization and Conservation Service). 1:4,800--04/ /69--Stage = 959.4 ft; 11/ /81 (North Dakota State Highway Department). Several sets, 1960's and 1970's (U.S. Army Corps of Engineers).

ADEQUACY	There should be adequate data to prepare appropriate technical information for flood plain management of the Wild Rice River. If additional hydraulic data are obtained for the Bois de Sioux River, then there should be adequate data to prepare appropriate technical information for flood plain management.

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05051500--Red River of the North at Wahpeton Continuous-record gaging station. Spring flood of 1897: Stage = 17 ft; Discharge = 10,500 ft^3/s. Period of record--Apr. 1942 through Sept. 1982: 04/10/69--Stage = 16.34 ft; Discharge = 9,200 ft^3/s. (U.S. Geological Survey, 1959A-82). 05052500--Antelope Creek at Dwight Crest-stage gaging station. Period of record--Mar. 1944 through Sept. 1973: 04/10/69--Stage = 17.82 ft; Discharge = 9,000 ft^3/s. (U.S. Geological Survey, 1959A-82). 05053000--Wild Rice River near Abercrombie Continuous-record gaging station. Spring flood of 1897: Stage = 27.5 ft. Period of record--Apr. 1932 through Sept. 1982: 04/11/69--Stage = 24.58 ft; Discharge = 9,540 ft^3/s. (U.S. Geological Survey, 1959A-82).	Drain 68 Flood damage reduction (Souris-Red-Rainy River Basins Commission, 1972). 1979 flood damages: Two roads had gravel washed off and one bridge was damaged (Federal Highway Administration). 1969 flood report (U.S. Army Corps of Engineers, 1969). 1979 flood report (U.S. Army Corps of Engineers, 1979).	Log-Pearson type III frequency analysis for gaging station 05051500; 100-year recurrence interval--Discharge = 11,000 ft^3/s (North Dakota State Water Commission and Minnesota Department of Natural Resources Division of Waters, Soils, and Minerals, 1971). Log-Pearson type III frequency analysis for gaging station 05051500; 100-year recurrence interval--Discharge = 11,000 ft^3/s (Souris-Red-Rainy River Basins Commission, 1972). Log-Pearson type III frequency analysis for gaging station 05052500; 100-year recurrence interval--Discharge = 12,625 ft^3/s (Moore Engineering, Inc., 1982C). Log-Pearson type III frequency analysis for gaging station 05053000; 100-year recurrence interval--Discharge = 10,225 ft^3/s (Moore Engineering, Inc., 1982C). Log-Pearson type III frequency analysis for gaging station 05053000; 100-year recurrence interval--Discharge = 10,000 ft^3/s (Souris-Red-Rainy River Basins Commission, 1972).	Gaging stations 05051500--Approximately 4,010 mi^2. 05052500--Approximately 294 mi^2 of which about 16 mi^2 is noncontributing. 05053000--2,080 mi^2 of which about 590 mi^2 is noncontributing.	Gaging stations 05051500 05052500 05053000	HEC-1 analysis for Wild Rice River basin (Moore Engineering, Inc., 1982C).

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
Profiles for Red River (U.S. Army Corps of Engineers). Systematically derived profiles for Red River (North Dakota State Water Commission and Minnesota Department of Natural Resources Division of Waters, Soils, and Minerals, 1971).	Antelope Creek (Moore Engineering, Inc., 1982C). Antelope Creek (U.S. Army Corps of Engineers). Bridges Antelope Creek 39-125-24 39-126-21 39-126-18.1 39-126-23 39-126-19 39-126-23.1 39-126-20 39-127-22 Red River 39-130-18 0210-002.937 Unnamed creeks 39-127-23 39-127-23.1 Wild Rice River 39-126-18 39-128-24.1 39-126-19.1 39-129-21 39-127-19 39-129-22 39-127-20 39-129-23 39-128-20 39-129-24 39-128-21 39-129-24.1 39-128-24 Drain 68 Gaging stations 05051500 05052500 05053000	Gaging stations 05051500 05052500 05053000	Antelope Creek (U.S. Army Corps of Engineers). Bridges Antelope Creek 39-125-24 39-126-21 39-126-18.1 39-126-23 39-126-19 39-126-23.1 39-126-20 39-127-22 Red River 39-130-18 0210-002.937 Unnamed creeks 39-127-23 39-127-23.1 Wild Rice River 39-126-18 39-128-24.1 39-126-19.1 39-129-21 39-127-19 39-129-22 39-127-20 39-129-23 39-128-20 39-129-24 39-128-21 39-129-24.1 39-128-24 Drain 68 Red River (U.S. Army Corps of Engineers). Wild Rice River (U.S. Army Corps of Engineers).	Gaging stations 05051500 05052500 05053000 High water elevation for Red River (U.S. Army Corps of Engineers).	Flood Hazard Boundary Map (1:24,000): Richland County (Federal Emergency Management Agency, 1981D). Soil survey map: Richland County (U.S. Department of Agriculture, 1975B). Topographic maps (1:24,000): Dwight and Mooreton East (U.S. Geological Survey).	1:7,920--1979 flood and other dates (KBM, Inc.). 1:7,920 (Local Agriculture Stabilization and Conservation Service). Several sets, 1960's and 1970's (U.S. Army Corps of Engineers).

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
	Red River (U.S. Army Corps of Engineers). Wild Rice River (Moore Engineering, Inc., 1982C). Wild Rice River (U.S. Army Corps of Engineers).					

ADEQUACY	There should be adequate data to prepare appropriate technical information for flood plain management of the Antelope Creek, Red River, and Wild Rice River.

FLOOD HAZARD AREA: Fairmount Township

COUNTY: Richland

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05050000--Bois de Sioux River near White Rock Continuous-record gaging station. Period of record--Oct. 1941 through Sept. 1982: 04/19/69-04/21/69--Stage = 15.07 ft; Discharge = 3,770 ft^3/s. (U.S. Geological Survey, 1959A-82).	Drains 3, 26, 34, 35, 39, 58 Flood damage reduction (Souris-Red-Rainy River Basins Commission, 1972). Flood damage and watershed protection (U.S. Department of Agriculture, 1960B). 1979 flood damages: Five roads had gravel washed off (Federal Highway Administration).	Log-Pearson type III frequency analysis for gaging station 05050000; 100-year recurrence interval--Discharge = 3,590 ft^3/s (Souris-Red-Rainy River Basins Commission, 1972).	Gaging station 05050000--Approximately 1,160 mi^2.	Gaging station 05050000	

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 Bois de Sioux River 39-135-38 0011-182.459 Unnamed creeks 39-131-43 39-133-45.1 39-131-46 39-133-46 39-132-43 39-134-36 39-133-40 39-134-40 39-133-41 39-134-45 39-133-43 39-135-47 39-133-45 West tributary of Bois de Sioux River (U.S. Department of Agriculture, 1960B).	Gaging station 05050000	Bridges Bois de Sioux River 39-135-38 0011-182.459 Unnamed creeks 39-131-43 39-133-45.1 39-131-46 39-133-46 39-132-43 39-134-36 39-133-40 39-134-40 39-133-41 39-134-45 39-133-43 39-135-47 39-133-45 West tributary of Bois de Sioux River (U.S. Department of Agriculture, 1960B).	Gaging station 05050000	Flood Hazard Boundary Map (1:24,000): Richland County (Federal Emergency Management Agency, 1981D). Soil survey map: Richland County (U.S. Department of Agriculture, 1975B). Topographic maps (1:24,000): Fairmount and Sonora (U.S. Geological Survey).	1:7,920 (Local Agriculture Stabilization and Conservation Service).

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

FLOOD HAZARD AREA: Great Bend

COUNTY: Richland

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05052000--Wild Rice River near Mantador Crest-stage gaging station. Period of record--Mar. 1944 through Sept. 1973: 04/13/69--Stage = 10.88 ft; Discharge = 2,360 ft^3/s. (U.S. Geological Survey, 1959A-82).	Flood damage reduction (Souris-Red-Rainy River Basins Commission, 1972). Flood retention for Wild Rice River basin (Moore Engineering, Inc., 1982C).	Log-Pearson type III frequency analysis for gaging station 05052000; 100-year recurrence interval--Discharge = 1,880 ft^3/s (Moore Engineering, Inc., 1982C).	Gaging station 05052000--1,360 mi^2 of which about 550 mi^2 is noncontributing.	Gaging station 05052000	HEC-1 analysis for Wild Rice River basin (Moore Engineering, Inc., 1982C).

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 Wild Rice River 39-121-35 39-125-32 39-122-34 39-125-33 39-123-34.2 0029-014.58OL 0029-014.58OR Gaging station 05052000 Wild Rice River (Moore Engineering, Inc., 1982C). Wild Rice River (U.S. Army Corps of Engineers).	Gaging station 05052000	Bridges Wild Rice River 39-121-35 39-125-32 39-122-34 39-125-33 39-123-34.2 0029-014.58DL 0029-014.58OR Wild Rice River (U.S. Army Corps of Engineers).	Gaging station 05052000	Flood Hazard Boundary Map (1:9,600): City of Great Bend (U.S. Department of Housing and Urban Development, 1976B). Soil survey map: Richland County (U.S. Department of Agriculture, 1975B). Topographic map (1:24,000): Great Bend (U.S. Geological Survey).	1:7,920--1979 flood and other dates (KBM, Inc.). 1:7,920 (Local Agriculture Stabilization and Conservation Service). Several sets, 1960's and 1970's (U.S. Army Corps of Engineers).

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

FLOOD HAZARD AREA: Greendale Township

COUNTY: Richland

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
	Flood damage reduction (Souris-Red-Rainy River Basins Commission, 1972). Flood damage and watershed protection (U.S. Department of Agriculture, 1960B). 1979 flood damages: Two roads had gravel washed off (Federal Highway Administration).				

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 39-124-47 39-124-47.1 West tributary of Bois de Sioux River (U.S. Department of Agriculture, 1960B).		Bridges Unnamed creeks 39-124-47 39-124-47.1 West tributary of Bois de Sioux River (U.S. Department of Agriculture, 1960B).		Flood Hazard Boundary Map (1:24,000): Richland County (Federal Emergency Management Agency, 1981D). Soil survey map: Richland County (U.S. Department of Agriculture, 1975B). Topographic maps (1:24,000): Hankinson, Hankinson SE, New Effington NE, and New Effington NW (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: Ibsen Township

COUNTY: Richland

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05052500--Antelope Creek at Dwight Crest-stage gaging station. Period of record--Mar. 1944 through Sept. 1973: 04/10/69--Stage = 17.82 ft; Discharge = 9,000 ft^3/s. (U.S. Geological Survey, 1959A-82).	Drains 28, 32, 33 Flood damage reduction (Souris-Red-Rainy River Basins Commission, 1972). 1979 flood damages: One road had gravel washed off and one bridge was damaged (Federal Highway Administration).	Log-Pearson type III frequency analysis for gaging station 05052500; 100-year recurrence interval--Discharge = 12,625 ft^3/s (Moore Engineering, Inc., 1982C).	Gaging station 05052500--Approximately 294 mi^2 of which about 16 mi^2 is noncontributing.	Gaging station 05052500	HEC-1 analysis for Antelope Creek basin (Moore Engineering, Inc., 1982C).

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
	Antelope Creek (Moore Engineering, Inc., 1982C). Antelope Creek (U.S. Army Corps of Engineers). Bridges Antelope Creek 39-118-23 39-123-24.1 39-119-23 39-123-24.2 39-119-24 39-123-24.3 39-123-24 Unnamed creeks 39-119-19 39-122-19 39-119-20 39-122-20 39-119-24.1 39-123-19 39-120-20 39-124-18 39-121-19 39-124-24 39-121-20 0029-028.069 0029-030.029 Drains 28, 32, 33 Gaging station 05052500	Gaging station 05052500	Antelope Creek (U.S. Army Corps of Engineers). Bridges Antelope Creek 39-118-23 39-123-24.1 39-119-23 39-123-24.2 39-119-24 39-123-24.3 39-123-24 Unnamed creeks 39-119-19 39-122-19 39-119-20 39-122-20 39-119-24.1 39-123-19 39-120-20 39-124-18 39-121-19 39-124-24 39-121-20 0029-028.069 0029-030.029 Drains 28, 32, 33	Gaging station 05052500	Flood Hazard Boundary Map (1:24,000): Richland County (Federal Emergency Management Agency, 1981D). Soil survey map: Richland County (U.S. Department of Agriculture, 1975B). Topographic maps (1:24,000): Mooreton East and Mooreton West (U.S. Geological Survey).	1:7,920--1979 flood and other dates (KBM, Inc.). 1:7,920 (Local Agriculture Stabilization and Conservation Service). Several sets, 1960's and 1970's (U.S. Army Corps of Engineers).

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

FLOOD HAZARD AREA: La Mars Township

COUNTY: Richland

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
	Drain 3 Flood damage reduction (Souris-Red-Rainy River Basins Commission, 1972). Flood damage and watershed protection (U.S. Department of Agriculture, 1960).				

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 39-126-46, 39-126-46.1, 39-126-47, 39-127-45, 39-127-45.1, 39-127-47, 39-128-43, 39-128-43.2, 39-128-43.3, 39-128-44, 39-128-46, 39-129-43, 39-129-47, 39-130-43, 39-130-45, 39-130-45.1, 39-130-46, 39-131-43, 39-131-44 Drain 3 West tributary of Bois de Sioux River (U.S. Department of Agriculture, 1960B).		Bridges Unnamed creeks 39-126-46, 39-126-46.1, 39-126-47, 39-127-45, 39-127-45.1, 39-127-47, 39-128-43, 39-128-43.2, 39-128-43.3, 39-128-44, 39-128-46, 39-129-43, 39-129-47, 39-130-43, 39-130-45, 39-130-45.1, 39-130-46, 39-131-43, 39-131-44 Drain 3 West tributary of Bois de Sioux River (U.S. Department of Agriculture, 1960B).		Flood Hazard Boundary Map (1:24,000): Richland County (Federal Emergency Management Agency, 1981D). Soil survey map: Richland County (U.S. Department of Agriculture, 1975B). Topographic maps (1:24,000): Hankinson SE, La Mars, New Effington NE, and Sonora (U.S. Geological Survey).	1:7,920 (Local Agriculture Stabilization and Conservation Service).

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

FLOOD HAZARD AREA: Liberty Grove Township

COUNTY: Richland

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05051900--Wild Rice River tributary near Mantador Crest-stage gaging station. Period of record--Nov. 1957 through Sept. 1973: 04/10/69--Stage = 4.87 ft; Discharge = 210 ft^3/s. (U.S. Geological Survey, 1959A-82). 05052000--Wild Rice River near Mantador Crest-stage gaging station. Period of record--Mar. 1944 through Sept. 1973: 04/13/69--Stage = 10.88 ft; Discharge = 2,360 ft^3/s. (U.S. Geological Survey, 1959A-82).	Flood damage reduction (Souris-Red-Rainy River Basins Commission, 1972). 1979 flood damages: Four roads had gravel washed off (Federal Highway Administration).	Log-Pearson type III frequency analysis for gaging station 05051900; 100-year recurrence interval--Discharge = 380 ft^3/s (Moore Engineering, Inc., 1982C). Log-Pearson type III frequency analysis for gaging station 05052000; 100-year recurrence interval--Discharge = 1,880 ft^3/s (Moore Engineering, Inc., 1982C).	Gaging stations 05051900--15.7 mi^2 of which about 11.4 mi^2 is noncontributing. 05052000--1,360 mi^2 of which about 550 mi^2 is noncontributing.	Gaging stations 05051900 05052000	HEC-1 analysis for Wild Rice River basin (Moore Engineering, Inc., 1982C).

FLOOD HAZARD AREA: Liberty Grove Township--Continued

COUNTY: Richland

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 39-110-32.1 39-112-32 Wild Rice River 39-110-30 39-113-32 39-110-31 39-113-32.1 39-111-31 39-114-32.1 39-112-32.1 Gaging stations 05051900 05052000 Wild Rice River (Moore Engineering, Inc., 1982C). Wild Rice River (U.S. Army Corps of Engineers).	Gaging stations 05051900 05052000	Bridges Unnamed creeks 39-110-32.1 39-112-32 Wild Rice River 39-110-30 39-113-32 39-110-31 39-113-32.1 39-111-31 39-114-32.1 39-112-32.1 Wild Rice River (U.S. Army Corps of Engineers).	Gaging stations 05051900 05052000	Flood Hazard Boundary Map (1:24,000): Richland County (Federal Emergency Management Agency, 1981D). Soil survey map: Richland County (U.S. Department of Agriculture, 1975B). Topographic maps (1:24,000): Kreiser Lake, Lidgerwood, Moselle, and Swan Lake (U.S. Geological Survey).	1:7,920--1979 flood and other dates (KBM, Inc.). 1:7,920 (Local Agriculture Stabilization and Conservation Service). Several sets, 1960's and 1970's (U.S. Army Corps of Engineers).

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

FLOOD HAZARD AREA: Lidgerwood

COUNTY: Richland

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
					Additional information: Street and gutter elevations (City of Lidgerwood). Flood Hazard Boundary Map (1:9,600): City of Lidgerwood (U.S. Department of Housing and Urban Development, 1974C). Soil survey map: Richland County (U.S. Department of Agriculture, 1975B). Topographic maps (1:24,000): Lidgerwood and Swan Lake (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: Mooreton Township

COUNTY: Richland

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05052500--Antelope Creek at Dwight Crest-stage gaging station. Period of record--Mar. 1944 through Sept. 1973: 04/10/69--Stage = 17.82 ft; Discharge = 9,000 ft^3/s. (U.S. Geological Survey, 1959A-82).	Drains 44, 64A Flood damage reduction (Souris-Red-Rainy River Basins Commission, 1972). 1969 flood damages: Three roads had gravel washed off (Federal Highway Administration).	Log-Pearson type III frequency analysis for gaging station 05052500; 100-year recurrence interval--Discharge = 12,625 ft^3/s (Moore Engineering, Inc., 1982C).	Gaging station 05052500--Approximately 294 mi^2 of which about 16 mi^2 is noncontributing.	Gaging station 05052500	HEC-1 analysis for Antelope Creek basin (Moore Engineering, Inc., 1982C).

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
	Antelope Creek (Moore Engineering, Inc., 1982C). Antelope Creek (U.S. Army Corps of Engineers). Bridges Antelope Creek 39-120-25 39-121-25 39-120-25.1 39-122-25 0029-023.510L 0029-023.510R South Branch Antelope Creek 39-120-28 39-122-27.1 39-121-28 39-123-26 0013-382.203 Unnamed creeks 39-119-28.1 39-124-28 39-122-29 39-124-28.1 39-123-28 39-126-26 39-124-27 0013-382.576 Drains 44, 64A Gaging station 05052500	Gaging station 05052500	Antelope Creek (U.S. Army Corps of Engineers). Bridges Antelope Creek 39-120-25 39-121-25 39-120-25.1 39-122-25 0029-023.510L 0029-023.510R South Branch Antelope Creek 39-120-28 39-122-27.1 39-121-28 39-123-26 0013-382.203 Unnamed creeks 39-119-28.1 39-124-28 39-122-29 39-124-28.1 39-123-28 39-126-26 39-124-27 0013-3B2.576 Drains 44, 64A	Gaging station 05052500	Flood Hazard Boundary Map (1:24,000): Richland County (Federal Emergency Management Agency, 1981D). Soil survey map: Richland County (U.S. Department of Agriculture, 1975B). Topographic maps (1:24,000): Great Bend, Mantador, Mooreton East, and Mooreton West (U.S. Geological Survey).	1:7,920--1979 flood and other dates (KBM, Inc.). 1:7,920 (Local Agriculture Stabilization and Conservation Service). Several sets, 1960's and 1970's (U.S. Army Corps of Engineers).

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

FLOOD HAZARD AREA: Moran Township

COUNTY: Richland

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
					Flood Hazard Boundary Map (1:24,000): Richland County (Federal Emergency Management Agency, 1981D). Soil survey map: Richland County (U.S. Department of Agriculture, 1975B). Topographic maps (1:24,000): Lidgerwood and Swan Lake (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.

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05052500--Antelope Creek at Dwight Crest-stage gaging station. Period of record--Mar. 1944 through Sept. 1973: 04/10/69--Stage = 17.82 ft; Discharge = 9,000 ft^3/s. (U.S. Geological Survey, 1959A-82).	Drains 7, 12, 63 McDonald and Mideman. Flood damage reduction (Souris-Red-Rainy River Basins Commission, 1972). 1979 flood damages: One road had gravel washed off and one culvert was washed out (Federal Highway Administration).	Log-Pearson type III frequency analysis for gaging station 05052500; 100-year recurrence interval--Discharge = 12,625 ft^3/s (Moore Engineering, Inc., 1982C).	Gaging station 05052500--Approximately 294 mi^2 of which about 16 mi^2 is noncontributing.	Gaging station 05052500	HEC-1 analysis for Antelope Creek basin (Moore Engineering, Inc., 1982C).

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
	Antelope Creek (Moore Engineering, Inc., 1982C). Antelope Creek (U.S. Army Corps of Engineers). Bridges Antelope Creek 39-113-13 39-114-16.1 39-113-14 39-115-16 39-114-14 39-115-17 39-114-15 39-115-18 39-114-16 39-116-18 Unnamed creeks 39-112-13 39-117-14 39-117-12 Drains 7, 12, 63 McDonald and Mideman. Gaging station 05052500	Gaging station 05052500	Antelope Creek (U.S. Army Corps of Engineers). Bridges Antelope Creek 39-113-13 39-114-16.1 39-113-14 39-115-16 39-114-14 39-115-17 39-114-15 39-115-18 39-114-16 39-116-18 Unnamed creeks 39-112-13 39-117-14 39-117-12 Drains 7, 12, 63 McDonald and Mideman.	Gaging station 05052500	Flood Hazard Boundary Map (1:24,000): Richland County (Federal Emergency Management Agency, 1981D). Soil survey map: Richland County (U.S. Department of Agriculture, 1975B). Topographic maps (1:24,000): Mooreton NW, Mooreton West, Wyndmere NE, and Wyndmere SE (U.S. Geological Survey).	1:7,920--1979 flood and other dates (KBM, Inc.). 1:7,920 (Local Agriculture Stabilization and Conservation Service). Several sets, 1960's and 1970's (U.S. Army Corps of Engineers).

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

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
	Drains 1, 2, 4, 10, 11, 17, 19, 38, 62 1979 flood damages: 40 roads had gravel washed off, 5 bridges were damaged, and 9 culverts were washed out (Federal Highway Administration).				

FLOOD HAZARD AREA: Richland County--Continued

COUNTY: Richland

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 39-125-17.2 39-125-18 Red River 39-124-2 39-126-4 39-125-2 39-126-9 Wild Rice River 39-108-29 39-124-9 39-109-30 39-124-11 39-121-1 39-124-12 39-121-2 39-124-13 39-121-3 39-124-14 39-121-6.1 39-124-14.1 39-122-4 39-124-14.2 39-122-5 39-124-15 39-122-6 39-124-15.1 39-122-8 39-124-15.2 39-122-8.1 39-125-16 39-122-8.2 39-125-17.2 39-123-8 39-125-18 39-123-9 0046-119.459 Drains 1, 2, 4, 10, 11, 17, 19, 38, 62		Bridges Antelope Creek 39-125-17.2 39-125-18 Red River 39-124-2 39-126-4 39-125-2 39-126-9 Wild Rice River 39-108-29 39-124-9 39-109-30 39-124-11 39-121-1 39-124-12 39-121-2 39-124-13 39-121-3 39-124-14 39-121-6.1 39-124-14.1 39-122-4 39-124-14.2 39-122-5 39-124-15 39-122-6 39-124-15.1 39-122-8 39-124-15.2 39-122-8.1 39-125-16 39-122-8.2 39-125-17.2 39-123-8 39-125-18 39-123-9 0046-119.459 Drains 1, 2, 4, 10, 11, 17, 19, 38, 62		Topographic maps (1:24,000): Christine, Claire City NE, Claire City NW, Coburn, Galchutt, McLeod, Wolverton, and Wyndmere NW (U.S. Geological Survey).	

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

FLOOD HAZARD AREA: Richland County--Continued

Additional flood hazard information for Richland County is contained in table 1 under the following governmental units: Abercrombie, Antelope Township, Barrie Township, Belford Township, Brandenburg Township, Brightwood Township, Center Township, Dwight Township, Fairmount Township, Great Bend, Greendale Township, Ibsen Township, LaMars Township, Liberty Grove Township, Lidgerwood, Mooreton Township, Moran Township, Nansen Township, Summit Township, Wahpeton, Walcott, Walcott Township, and Wyndmere Township.

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 39-125-17.2 39-125-18 Red River 39-124-2 39-126-4 39-125-2 39-126-9 Wild Rice River 39-108-29 39-124-9 39-109-30 39-124-11 39-121-1 39-124-12 39-121-2 39-124-13 39-121-3 39-124-14 39-121-6.1 39-124-14.1 39-122-4 39-124-14.2 39-122-5 39-124-15 39-122-6 39-124-15.1 39-122-8 39-124-15.2 39-122-8.1 39-125-16 39-122-8.2 39-125-17.2 39-123-8 39-125-18 39-123-9 0046-119.459 Drains 1, 2, 4, 10, 11, 17, 19, 38, 62		Bridges Antelope Creek 39-125-17.2 39-125-18 Red River 39-124-2 39-126-4 39-125-2 39-126-9 Wild Rice River 39-108-29 39-124-9 39-109-30 39-124-11 39-121-1 39-124-12 39-121-2 39-124-13 39-121-3 39-124-14 39-121-6.1 39-124-14.1 39-122-4 39-124-14.2 39-122-5 39-124-15 39-122-6 39-124-15.1 39-122-8 39-124-15.2 39-122-8.1 39-125-16 39-122-8.2 39-125-17.2 39-123-8 39-125-18 39-123-9 0046-119.459 Drains 1, 2, 4, 10, 11, 17, 19, 38, 62		Topographic maps (1:24,000): Christine, Claire City NE, Claire City NW, Coburn, Galchutt, McLeod, Wolverton, and Wyndmere NW (U.S. Geological Survey).	

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

FLOOD HAZARD AREA: Richland County--Continued

Additional flood hazard information for Richland County is contained in table 1 under the following governmental units: Abercrombie, Antelope Township, Barrie Township, Belford Township, Brandenburg Township, Brightwood Township, Center Township, Dwight Township, Fairmount Township, Great Bend, Greendale Township, Ibsen Township, LaMars Township, Liberty Grove Township, Lidgerwood, Mooreton Township, Moran Township, Nansen Township, Summit Township, Wahpeton, Walcott, Walcott Township, and Wyndmere Township.

FLODD HAZARD AREA: Summit Township

COUNTY: Richland

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05052000--Wild Rice River near Mantador Crest-stage gaging station. Period of record--Mar. 1944 through Sept. 1973: 04/13/69--Stage = 10.88 ft; Discharge = 2,360 ft^3/s. (U.S. Geological Survey, 1959A-82). 05053000--Wild Rice River near Abercrombie Continuous-record gaging station. Spring flood of 1897: Stage = 27.5 ft. Period of record--Apr. 1932 through Sept. 1982: 04/11/69--Stage = 24.58 ft; Discharge = 9,540 ft^3/s. (U.S. Geological Survey, 1959A-82).	Drains 18, 21, 30, 41, 55C, 65 Flood damage reduction (Souris-Red-Rainy River Basins Commission, 1972). Flood retention for Wild Rice River basin (Moore Engineering, Inc., 1982C). 1979 flood damages: Two roads had gravel washed off and one bridge was damaged (Federal Highway Administration).	Log-Pearson type III frequency analysis for gaging station 05052000; 100-year recurrence interval--Discharge = 1,880 ft^3/s (Moore Engineering, Inc., 1982C). Log-Pearson type III frequency analysis for gaging station 05053000; 100-year recurrence interval--Discharge = 10,225 ft^3/s (Moore Engineering, Inc., 1982C). Log-Pearson type III frequency analysis for gaging station 05053000; 100-year recurrence interval--Discharge = 10,000 ft^3/s (Souris-Red-Rainy River Basins Commission, 1972).	Gaging stations 05052000--1,360 mi^2 of which about 550 mi^2 is noncontributing. 05053000--2,080 mi^2 of which about 590 mi^2 is noncontributing.	Gaging stations 05052000 05053000	HEC-1 analysis for Wild Rice River basin (Moore Engineering, Inc., 1982C).

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 Bois de Sioux River 39-134-33 39-135-35 39-135-34 Unnamed creeks 39-126-33 39-127-35.1 39-126-33.1 39-127-38.1 39-126-34 39-128-36 39-127-31 39-128-36.1 39-127-32 39-132-31 39-127-33 39-132-32 39-127-34 39-133-31 39-127-35 Wild Rice River 39-126-30 39-126-31.1 39-126-31 39-126-31.2 Gaging stations 05052000 05053000 Wild Rice River (Moore Engineering, Inc., 1982C). Wild Rice River (U.S. Army Corps of Engineers).	Gaging stations 05052000 05053000	Bridges Bois de Sioux River 39-134-33 39-135-35 39-135-34 Unnamed creeks 39-126-33 39-127-35.1 39-126-33.1 39-127-38.1 39-126-34 39-128-36 39-127-31 39-128-36.1 39-127-32 39-132-31 39-127-33 39-132-32 39-127-34 39-133-31 39-127-35 Wild Rice River 39-126-30 39-126-31.1 39-126-31 39-126-31.2 Wild Rice River (U.S. Army Corps of Engineers).	Gaging stations 05052000 05053000	Flood Hazard Boundary Map (1:24,000): Richland County (Federal Emergency Management Agency, 1981D). Soil survey map: Richland County (U.S. Department of Agriculture, 1975B). Topographic maps (1:24,000): Fairmount NW, Great Bend, Hankinson SE, and Sonora (U.S. Geological Survey).	1:7,920--1979 flood and other dates (KBM, Inc.). 1:7,920 (Local Agriculture Stabilization and Conservation Service). Several sets, 1960's and 1970's (U.S. Army Corps of Engineers).

ADEQUACY	There should be adequate data to prepare appropriate technical information for flood plain management of the Wild Rice River. If additional hydraulic data are obtained, then there should be adequate data to prepare appropriate technical information for flood plain management of the Bois de Sioux River.

FLOOD HAZARD AREA: Wahpeton

COUNTY: Richland

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05051500--Red River of the North at Wahpeton Continuous-record gaging station. Spring flood of 1897: Stage = 17 ft; Discharge = 10,500 ft^3/s. Period of record--Apr. 1942 through Sept. 1982: 04/10/69--Stage = 16.34 ft; Discharge = 9,200 ft^3/s. (U.S. Geological Survey, 1959A-82).	Flood damage reduction (Souris-Red-Rainy River Basins Commission, 1972). Levee elevations (City of Wahpeton). Levee system (U.S. Army Corps of Engineers, 1983A). 1969 flood report (U.S. Army Corps of Engineers, 1969). 1979 flood report (U.S. Army Corps of Engineers, 1979).	Log-Pearson type III frequency analysis for gaging station 05051500; 100-year recurrence interval--Discharge = 11,000 ft^3/s (North Dakota State Water Commission and Minnesota Department of Natural Resources Division of Waters, Soils, and Minerals, 1971). Log-Pearson type III frequency analysis for gaging station 05051500; 100-year recurrence interval--Discharge = 11,000 ft^3/s (Souris-Red-Rainy River Basins Commission, 1972).	Gaging station 05051500--Approximately 4,010 mi^2.	Gaging station 05051500	

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
Profiles for Red River (U.S. Army Corps of Engineers). Systematically derived profiles for Red River (North Dakota State Water Commission and Minnesota Department of Natural Resources Division of Waters, Soils, and Minerals, 1971).	Bridges 8ois de Sioux River 39-133-26 0013-391.615 Red River 0210-002.937 Unnamed creeks 39-130-26 39-132-27 39-131-26 0013-389.096 Gaging station 05051500 Red River (U.S. Army Corps of Engineers).	Gaging station 05051500	Bridges Bois de Sioux River 39-133-26 0013-391.615 Red River 0210-002.937 Unnamed creeks 39-130-26 39-132-27 39-131-26 0013-389.096 Red River (U.S. Army Corps of Engineers).	Gaging station 05051500 High water elevation for Red River (U.S. Army Corps of Engineers).	Additional information: Street and gutter elevations (City of Wahpeton). Flood Hazard Boundary Map (1:12,000): City of Wahpeton (Federal Emergency Management Agency, 1981B). Levee system maps (City of Wahpeton). Soil survey map: Richland County (U.S. Department of Agriculture, 1975B). Topographic maps (1:24,000): Dwight and Wahpeton (U.S. Geological Survey).	1:7,920--1979 flood and other dates (KBM, Inc.). 1:7,920 (Local Agriculture Stabilization and Conservation Service). 1:4,800--04/ /69--Stage = 959.4 ft; 11/ /81 (North Dakota State Highway Department). Several sets, 1950's and 1970's; 1:24,000--1979 (U.S. Army Corps of Engineers).

ADEQUACY	If additional hydraulic data are obtained for the Bois de Sioux River, then there should be adequate data to prepare appropriate technical information for flood plain management. There should be adequate data to prepare appropriate technical information for flood plain management of the Red River.

FLOOD HAZARD AREA: Walcott

COUNTY: Richland

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
	Drains 5, 56				

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
	Bridge Unnamed creek 39-117-6 Drains 5, 56		Bridge Unnamed creek 39-117-6 Drains 5, 56		Flood Hazard Boundary Map (1:4,800): City of Walcott (Federal Emergency Management Agency, 1980A). Soil survey map: Richland County (U.S. Department of Agriculture, 1975B). Topographic map (1:24,000): Walcott (U.S. Geological Survey).	1:7,920 (Local Agriculture Stabilization and Conservation Service).

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

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05053000--Wild Rice River near Abercrombie Continuous-record gaging station. Spring flood of 1897: Stage = 27.5 ft. Period of record--Apr. 1932 through Sept. 1982: 04/11/69--Stage = 24.58 ft; Discharge = 9,540 ft^3/s. (U.S. Geological Survey, 1959A-82). 05059000--Sheyenne River near Kindred Continuous-record gaging station. Spring flood of 1947 or 1948: Stage = 22.1 ft; Discharge $\cong$ 3,600 ft^3/s. Period of record--July 1949 through Sept. 1982: 04/15/69--Stage = 21.03 ft; Discharge = 4,690 ft^3/s. (U.S. Geological Survey, 1959A-82).	Drains 5, 27, 37, 56, 57, 64 Lateral 37 and Lateral 57. Flood control: Sheyenne River (U.S. Army Corps of Engineers, 1982C and 1982D). Flood control surveys, 1940's and 1970's (U.S. Army Corps of Engineers). Flood damage reduction (Souris-Red-Rainy River Basins Commission, 1972). Levee system maps (1:4,800): Sheyenne River (U.S. Army Corps of Engineers).	Log-Pearson type III frequency analysis for gaging station 05053000; 100-year recurrence interval--Discharge = 10,225 ft^3/s (Moore Engineering, Inc., 1982C). Log-Pearson type III frequency analysis for gaging station 05053000; 100-year recurrence interval--Discharge = 10,000 ft^3/s (Souris-Red-Rainy River Basins Commission, 1972). Log-Pearson type III frequency analysis for gaging station 05059000; 100-year recurrence interval--Discharge = 8,700 ft^3/s (Souris-Red-Rainy River Basins Commission, 1972). Log-Pearson type III frequency analysis for Sheyenne River above Kindred; 100-year recurrence interval--Discharge = 13,500 ft^3/s (U.S. Army Corps of Engineers, 1982B).	Gaging station 05053000--2,080 mi^2 of which about 590 mi^2 is noncontributing. 05059000--Approximately 8,800 mi^2 of which about 5,780 mi^2 is noncontributing.	Discharge data for Sheyenne River (U.S. Army Corps of Engineers). Gaging station 05053000 05059000	HEC-1 analysis for Wild Rice River basin (Moore Engineering, Inc., 1982C).

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 Sheyenne River (U.S. Army Corps of Engineers).	Bridges Sheyenne River 39-112-2 39-114-2.1 39-114-2 39-114-2.2 0046-112.266 Unnamed creeks 39-115-2 39-119-1 39-117-3 39-119-2 39-117-5 39-119-2.1 39-117-6 39-119-4 39-118-2.1 39-119-4.1 39-118-2.2 39-119-5 39-118-2.3 39-119-6 39-118-3 39-120-6 39-118-3.1 39-121-5 39-118-4.1 39-121-6.1 0046-117.315 0046-118.078 Wild Rice River 39-121-1 39-122-4 39-121-2 39-122-5 39-121-3 39-122-6 0046-119.459 Drains 5, 27, 37, 56, 57, 64 Lateral 37 and Lateral 57. Gaging stations 05053000 05059000	Gaging stations 05053000 05059000	Bridges Sheyenne River 39-112-2 39-114-2.1 39-114-2 39-114-2.2 0046-112.266 Unnamed creeks 39-115-2 39-119-1 39-117-3 39-119-2 39-117-5 39-119-2.1 39-117-6 39-119-4 39-118-2.1 39-119-4.1 39-118-2.2 39-119-5 39-118-2.3 39-119-6 39-118-3 39-120-6 39-118-3.1 39-121-5 39-118-4.1 39-121-6.1 0046-117.315 0046-118.078 Wild Rice River 39-121-1 39-122-4 39-121-2 39-122-5 39-121-3 39-122-6 0046-119.459 Drains 5, 27, 37, 56, 57, 64 Lateral 37 and Lateral 57. Sheyenne River (U.S. Army Corps of Engineers).	Gaging stations 05053000 05059000 High water elevation for Sheyenne River (U.S. Army Corps of Engineers).	Flood Hazard Boundary Map (1:12,000): Township of Walcott (Federal Emergency Management Agency, 1982B). Levee system maps (1:4,800): Sheyenne River (U.S. Army Corps of Engineers). Soil survey map: Richland County (U.S. Department of Agriculture, 1975B). Topographic maps (1:24,000): Barrie, Christine, Hickson, Kindred, Norman, and Walcott (U.S. Geological Survey).	1:7,920--1979 flood and other dates (KBM, Inc.). 1:7,920 (Local Agriculture Stabilization and Conservation Service). Several sets, 1950's and 1970's; 1:24,000--1979 (U.S. Army Corps of Engineers).

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
	Sheyenne River (U.S. Army Corps of Engineers). Wild Rice River (Moore Engineering, Inc., 1982C).					

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

FLOOD HAZARD AREA: Waldo Township

COUNTY: Richland

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05052100--Richland County drain 65 near Great Bend Continuous-record gaging station. Period of record--Oct. 1980 through Sept. 1982: 06/25/81--Stage = 1.83 ft; Discharge = 3.5 ft^3/s. (U.S. Geological Survey, 1959A-82).	Drain 65 1979 flood damages: One road had gravel washed off (Federal Highway Administration).		Gaging station 05052100--38 mi^2.	Gaging station 05052100	

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 39-119-38 39-124-38 39-120-37 39-124-39 39-122-41 39-124-41 39-123-41 39-125-38 39-124-36 39-125-39 39-124-37 39-125-40 0011-172.007 0029-007.092 Drain 65 Gaging station 05052100		Bridges Unnamed creeks 39-119-38 39-124-38 39-120-37 39-124-39 39-122-41 39-124-41 39-123-41 39-125-38 39-124-36 39-125-39 39-124-37 39-125-40 0011-172.007 0029-007.092 Drain 65		Flood Hazard Boundary Map (1:24,000): Richland County (Federal Emergency Management Agency, 1981D). Soil survey map: Richland County (U.S. Department of Agriculture, 1975B). Topographic maps (1:24,000): Hankinson and Hankinson 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.

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05051700--Wild Rice River near Cayuga Continuous-record gaging station. Period of record--May 1956 through Sept. 1969: 04/12/69--Stage = 9.32 ft; Discharge = 1,710 ft^3/s. (U.S. Geological Survey, 1959A-82). 05052000--Wild Rice River near Mantador Crest-stage gaging station. Period of record--Mar. 1944 through Sept. 1973: 04/13/69--Stage = 10.88 ft; Discharge = 2,360 ft^3/s. (U.S. Geological Survey, 1959A-82).	Drain Tri-County. Flood damage reduction (Souris-Red-Rainy River Basins Commission, 1972). Flood retention for Wild Rice River basin (Moore Engineering, Inc., 1982C). 1969 flood damages: Six bridges were washed out (Wyndmere Township Board).	Log-Pearson type III frequency analysis for gaging station 05051700; 100-year recurrence interval--Discharge = 2,275 ft^3/s (Moore Engineering, Inc., 1982C). Log-Pearson type III frequency analysis for gaging station 05052000; 100-year recurrence interval--Discharge = 1,880 ft^3/s (Moore Engineering, Inc., 1982C).	Gaging stations 05051700--955 mi^2 of which about 390 mi^2 is noncontributing. 05052000--1,360 mi^2 of which about 550 mi^2 is noncontributing.	Gaging stations 05051700 05052000	HEC-1 analysis for Wild Rice River basin (Moore Engineering, Inc., 1982C).

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 Elk Creek 39-104-25 39-107-27 39-105-26 39-107-28 39-106-27 0013-363.552 Wild Rice River 39-102-29 39-105-29 39-103-29 39-106-29 39-104-28 0018-022.014 Drain Tri-County. Gaging stations 05051700 05052000 Wild Rice River (Moore Engineering, Inc., 1982C). Wild Rice River (U.S. Army Corps of Engineers).	Gaging stations 05051700 05052000	Bridges Elk Creek 39-104-25 39-107-27 39-105-26 39-107-28 39-106-27 0013-363.552 Wild Rice River 39-102-29 39-105-29 39-103-29 39-106-29 39-104-28 0018-022.014 Drain Tri-County. Wild Rice River (U.S. Army Corps of Engineers).	Gaging stations 05051700 05052000	Flood Hazard Boundary Map (1:24,000): Richland County (Federal Emergency Management Agency, 1981D). Soil survey map: Richland County (U.S. Department of Agriculture, 1975B). Topographic maps (1:24,000): Kreiser Lake and Wyndmere (U.S. Geological Survey).	1:7,920--1979 flood and other dates (KBM, Inc.). 1:7,920 (Local Agriculture Stabilization and Conservation Service). Several sets, 1960's and 1970's (U.S. Army Corps of Engineers).

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

FLOOD HAZARD AREA: Cogswell

COUNTY: Sargent

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	*Drainage area*	*Discharge*	*Runoff model analysis*
	Flood damage and watershed protection (U.S. Department of Agriculture, 1957).	General frequency analysis (U.S. Department of Agriculture, 1957).			

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
					Flood Hazard Boundary Map (1:7,273): City of Cogswell (U.S. Department of Housing and Urban Development, 1975D). Soil survey map: Sargent County (U.S. Department of Agriculture, 1964). Topographic map (1:24,000): Cogswell (U.S. Geological Survey).	1:7,920 (Local Agriculture Stabilization and Conservation Service).

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

FLOOD HAZARD AREA: Forman

COUNTY: Sargent

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
					Flood Hazard Boundary Map (1:9,600): City of Forman (U.S. Department of Housing and Urban Development, 1975H). Soil survey map: Sargent County (U.S. Department of Agriculture, 1964). Topographic maps (1:24,000): Forman and Rutland (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: Milnor

COUNTY: Sargent

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
	Bridge Unnamed creek 0013-351.987		Bridge Unnamed creek 0013-351.987		Additional information: Street and gutter elevations (City of Milnor and Moore Engineering, Inc.). Flood Hazard Boundary Map (1:9,600): City of Milnor (U.S. Department of Housing and Urban Development, 1975N). Soil survey map: Sargent County (U.S. Department of Agriculture, 1964). Topographic maps (1:24,000): Cayuga NW and Milnor (U.S. Geological Survey).	1:7,920 (Local Agriculture Stabilization and Conservation Service).

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

FLOOD HAZARD AREA: Rutland

COUNTY: Sargent

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
Southwestern corner of town flooded during 1969 and 1975 floods.					

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: Street and gutter elevations (Veigel Engineering). Flood Hazard Boundary Map (1:9,600): City of Rutland (U.S. Department of Housing and Urban Development, 1975P). Soil survey map: Sargent County (U.S. Department of Agriculture, 1964). Topographic maps (1:24,000): Cayuga and Rutland (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: Goodrich

COUNTY: Sheridan

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
					Additional information: Street and gutter elevations (Toltz, King, Duvall, Anderson, and Associates, Inc.). Contour data for slough south of Goodrich (Soil Conservation Service, McClusky). Flood Hazard Boundary Map (1:7,273): City of Goodrich (U.S. Department of Housing and Urban Development, 1974B). Topographic maps (1:24,000): Goodrich East and Goodrich West (U.S. Geological Survey).	1:7,920 (Local Agriculture Stabilization and Conservation Service).

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

FLOOD HAZARD AREA: South Heart

COUNTY: Stark

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
06343000--Heart River near South Heart Continuous-record gaging station. Period of record--June 1946 through Sept. 1970 and Oct. 1977 through Sept. 1982: 05/09/70--Stage = 22.77 ft; Discharge = 8,080 ft^3/s. (U.S. Geological Survey, 1959A-82).			Gaging station 06343000--311 mi^2.	Gaging station 06343000	

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 Heart River 45-110-10 45-112-10 South Branch Heart River 45-111-10.2 Unnamed creek 45-111-10.1	Gaging station 06343000	Bridges Heart River 45-110-10 45-112-10 South Branch Heart River 45-111-10.2 Unnamed creek 45-111-10.1	Gaging station 06343000	Additional information: Street and gutter elevations (Veigel Engineering). Flood Hazard Boundary Map (1:2,400): City of South Heart (Federal Emergency Management Agency, 1981A). Soil survey map: Stark County (U.S. Department of Agriculture, 1968). Topographic maps (1:24,000): Belfield SE and South Heart (U.S. Geological Survey).	1:12,000--06/16/81 and 1:10,200--06/16/81 (Horizon, Inc.). 1:7,920 (Local Agriculture Stabilization and Conservation Service).

ADEQUACY	If hydrologic data are obtained for the South Branch Heart River, then there should be adequate data to prepare appropriate technical information for flood plain management. There should be adequate data to prepare appropriate technical information for flood plain management of the Heart River.

FLOOD HAZARD AREA: Hope

COUNTY: Steele

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
					Flood Hazard Boundary Map (1:12,000): City of Hope (U.S. Department of Housing and Urban Development, 1975K). Topographic map (1:24,000): Hope (U.S. Geological Survey).	1:7,920 (Local Agriculture Stabilization and Conservation Service).

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

FLOOD HAZARD AREA: Belmont Township

COUNTY: Traill

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
	Changes in flood response of the Red River (Miller and Frink, 1982). Drains Carson 10 and Rust 24. Flood damage reduction (Souris-Red-Rainy River Basins Commission, 1972). 1979 flood damages: Three bridges were washed out, three roads had gravel washed off, five roads were washed out, and one culvert was washed out (Federal Highway Administration).				

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
Profiles for Red River (U.S. Army Corps of Engineers). Systematically derived profiles for Red River (North Dakota State Water Commission and Minnesota Department of Natural Resources Division of Waters, Soils, and Minerals, 1971).	Bridges Buffalo Creek 49-124-4.1 49-126-1.1 49-125-4 49-126-2.1 49-126-1 49-126-3 Red River 49-129-5 Unnamed creeks 49-127-2 49-127-6 49-127-2.1 49-128-6 49-127-3 49-128-7 49-127-3.1 Drains Carson 10 and Rust 24. Red River (U.S. Army Corps of Engineers).		Bridges Buffalo Creek 49-124-4.1 49-126-1.1 49-125-4 49-126-2.1 49-126-1 49-126-3 Red River 49-129-5 Unnamed creeks 49-127-2 49-127-6 49-127-2.1 49-128-6 49-127-3 49-128-7 49-127-3.1 Drains Carson 10 and Rust 24. Red River (U.S. Army Corps of Engineers).	High water elevation for Red River (U.S. Army Corps of Engineers).	Flood Hazard Boundary Map (1:24,000): Traill County (U.S. Department of Housing and Urban Development, 1980B). Soil survey map: Traill County (U.S. Department of Agriculture, 1977B). Topographic maps (1:24,000): Climax, Climax NW, and Climax SW (U.S. Geological Survey).	1:7,920--1979 flood and other dates (KBM, Inc.). 1:7,920 (Local Agriculture Stabilization and Conservation Service). Several sets, 1960's and 1970's; 1:24,000--1979 (U.S. Army Corps of Engineers).

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

FLOOD HAZARD AREA: Bingham Township

COUNTY: Traill

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
	Changes in flood response of the Red River (Miller and Frink, 1982). Drains Brakke 30, Mickelson 13, Moen 27, Munter 6, and Rust 24. Flood damage reduction (Souris-Red-Rainy River Basins Commission, 1972). 1979 flood damages: Three farmsteads were damaged and two roads were washed out (Federal Highway Administration).				

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
Profiles for Red River (U.S. Army Corps of Engineers). Systematically derived profiles for Red River (North Dakota State Water Commission and Minnesota Department of Natural Resources Division of Waters, Soils, and Minerals, 1971).	Bridges Red River 49-129-10 Unnamed creeks 49-124-10, 49-125-10, 49-125-10.1, 49-125-11, 49-126-11, 49-127-8, 49-127-9, 49-127-9.1, 49-127-11, 49-127-11.1, 49-128-7, 49-128-8, 49-128-9, 49-128-9.1, 49-128-11, 49-128-11.1, 49-128-11.2, 49-128-13, 49-129-9, 49-129-11 Drains Brakke 30, Mickelson 13, Moen 27, Munter 6, and Rust 24. Red River (U.S. Army Corps of Engineers).		Bridges Red River 49-129-10 Unnamed creeks 49-124-10, 49-125-10, 49-125-10.1, 49-125-11, 49-126-11, 49-127-8, 49-127-9, 49-127-9.1, 49-127-11, 49-127-11.1, 49-128-7, 49-128-8, 49-128-9, 49-128-9.1, 49-128-11, 49-128-11.1, 49-128-11.2, 49-128-13, 49-129-9, 49-129-11 Drains Brakke 30, Mickelson 13, Moen 27, Munter 6, and Rust 24. Red River (U.S. Army Corps of Engineers).	High water elevation for Red River (U.S. Army Corps of Engineers).	Flood Hazard Boundary Map (1:24,000): Traill County (U.S. Department of Housing and Urban Development, 1980B). Soil survey map: Traill County (U.S. Department of Agriculture, 1977B). Topographic maps (1:24,000): Climax and Climax SW (U.S. Geological Survey).	1:7,920--1979 flood and other dates (KBM, Inc.). 1:7,920 (Local Agriculture Stabilization and Conservation Service). Several sets, 1960's and 1970's; 1:24,000--1979 (U.S. Army Corps of Engineers).

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

FLOOD HAZARD AREA: Caledonia Township

COUNTY: Traill

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05064500--Red River of the North at Halstad Continuous-record gaging station. Spring flood of 1897: Stage ≈ 38.5 ft. Period of record--Apr. 1936 through June 1937 (no winter records), Apr. 1942 through Sept. 1960 (spring and summer months only), and May 1961 through Sept. 1982: 04/22/79--Stage = 39 ft; Discharge = 42,000 ft^3/s. (U.S. Geological Survey, 1959A-82). 05066500--Goose River at Hillsboro Continuous-record gaging station. Period of record--Mar. 1931 through Sept. 1982 (no winter records from 1932 through 1934): 04/21/79--Stage = 16.76 ft; Discharge = 14,800 ft^3/s. (U.S. Geological Survey, 1959A-82).	Changes in flood response of the Red River (Miller and Frink, 1982). Drains Mickelson 13 and Kaufman 22. Flood damage reduction (Souris-Red-Rainy River Basins Commission, 1972). Flood retention for Goose River (Moore Engineering, Inc., 1982A). 1979 flood damages: Two bridges were washed out, one spillway was washed out, and seven roads had gravel washed off (Federal Highway Administration).	Log-Pearson type III frequency analysis for gaging station 05064500; 100-year recurrence interval--Discharge = 54,500 ft^3/s (Souris-Red-Rainy River Basins Commission, 1972). Log-Pearson type III frequency analysis for gaging station 05066500; 100-year recurrence interval--Discharge = 15,885 ft^3/s (Moore Engineering, Inc., 1982A). Log-Pearson type III frequency analysis for gaging station 05066500; 100-year recurrence interval--Discharge = 15,300 ft^3/s (Souris-Red-Rainy River Basins Commission, 1972).	Gaging stations 05064500--Approximately 21,800 mi^2 which includes 3,800 mi^2 of closed basins. 05066500--1,203 mi^2 of which about 110 mi^2 is noncontributing.	Gaging stations 05064500 05066500	HEC-1 analysis for Goose River (Moore Engineering, Inc., 1982A).

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 Hillsboro (U.S. Army Corps of Engineers). HEC-2 step-backwater derived profiles for Red River (U.S. Army Corps of Engineers). Systematically derived profiles for Red River (North Dakota State Water Commission and Minnesota Department of Natural Resources Division of Waters, Soils, and Minerals, 1971).	Bridges Goose River 49-124-17 49-128-15 49-125-17 49-128-15.1 49-126-16 Red River 49-130-15 Unnamed creeks 49-126-13 49-128-13.1 49-127-13 49-129-18 49-128-13 Drains Mickelson 13 and Kaufman 22. Gaging stations 05064500 05066500 Goose River (Moore Engineering, Inc., 1982A). Goose River (U.S. Army Corps of Engineers). Red River (U.S. Army Corps of Engineers).	Gaging stations 05064500 05066500	Bridges Goose River 49-124-17 49-128-15 49-125-17 49-128-15.1 49-126-16 Red River 49-130-15 Unnamed creeks 49-126-13 49-128-13.1 49-127-13 49-129-18 49-128-13 Drains Mickelson 13 and Kaufman 22. Goose River (U.S. Army Corps of Engineers). Red River (U.S. Army Corps of Engineers).	Gaging stations 05064500 05066500 High water elevation for Goose River (U.S. Army Corps of Engineers). High water elevation for Red River (U.S. Army Corps of Engineers).	Flood Hazard Boundary Map (1:24,000): Traill County (U.S. Department of Housing and Urban Development, 1980B). Soil survey map: Traill County (U.S. Department of Agriculture, 1977B). Topographic maps (1:24,000): Caledonia and Shelly (U.S. Geological Survey).	1:7,920--1979 flood and other dates (KBM, Inc.). 1:7,920 (Local Agriculture Stabilization and Conservation Service). Several sets, 1930's, 1950's, and 1970's; 1:24,000--1979 (U.S. Army Corps of Engineers).

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

FLOOD HAZARD AREA: Eldorado Township

COUNTY: Traill

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05066500--Goose River at Hillsboro Continuous-record gaging station. Period of record--Mar. 1931 through Sept. 1982 (no winter records from 1932 through 1934): 04/21/79--Stage = 16.76 ft; Discharge = 14,800 ft^3/s. (U.S. Geological Survey, 1959A-82).	Drains Hillsboro, Kaufman 22, Mergenthal 5, and Paulson 7. Flood damage reduction (Souris-Red-Rainy River Basins Commission, 1972). Flood retention for Goose River (Moore Engineering, Inc., 1982A). Hillsboro Dam (North Dakota State Water Commission). 1979 flood damages: Five roads had gravel washed off, two culverts were washed out, and one bridge was damaged (Federal Highway Administration).	Frequency analysis for Hillsboro; 100-year recurrence interval--Discharge = 15,000 ft^3/s (U.S. Department of Agriculture, 1973). Log-Pearson type III frequency analysis for gaging station 05066500; 100-year recurrence interval--Discharge = 15,885 ft^3/s (Moore Engineering, Inc., 1982A). Log-Pearson type III frequency analysis for gaging station 05066500; 100-year recurrence interval--Discharge = 15,300 ft^3/s (Souris-Red-Rainy River Basins Commission, 1972).	Gaging station 05066500--1,203 mi^2 of which about 110 mi^2 is noncontributing.	Gaging station 05066500	HEC-1 analysis for Goose River (Moore Engineering, Inc., 1982A).

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 Hillsboro (U.S. Army Corps of Engineers). Profiles for Hillsboro (U.S. Department of Agriculture, 1973).	Bridges Goose River 49-122-18 49-124-17 0029-104.576L 0029-104.576R 0200-402.070 Unnamed creeks 49-120-12 49-121-16.1 49-120-13 49-121-17 49-120-14 49-122-18.1 49-120-15.1 49-122-18.2 49-120-15.2 49-124-13 49-120-16 49-124-14 49-121-13 49-124-15 49-121-15 49-124-16 49-121-16 Drains Hillsboro, Kaufman 22, Mergenthal 5, and Paulson 7. Gaging station 05066500 Goose River (Moore Engineering, Inc., 1982A). Goose River (U.S. Army Corps of Engineers). Goose River at Hillsboro (U.S. Department of Agriculture, 1973).	Gaging station 05066500	Bridges Goose River 49-122-18 49-124-17 0029-104.576L 0029-104.576R 0200-402.070 Unnamed creeks 49-120-12 49-121-16.1 49-120-13 49-121-17 49-120-14 49-122-18.1 49-120-15.1 49-122-18.2 49-120-15.2 49-124-13 49-120-16 49-124-14 49-121-13 49-124-15 49-121-15 49-124-16 49-121-16 Drains Hillsboro, Kaufman 22, Mergenthal 5, and Paulson 7. Goose River (U.S. Army Corps of Engineers). Goose River at Hillsboro (U.S. Department of Agriculture, 1973).	Gaging station 05066500 High water elevation for Goose River (U.S. Army Corps of Engineers).	Flood Hazard Boundary Map (1:24,000): Traill County (U.S. Department of Housing and Urban Development, 1980B). Soil survey map: Traill County (U.S. Department of Agriculture, 1977B). Topographic maps (1:24,000): Caledonia and Hillsboro (U.S. Geological Survey).	1:7,920--1979 flood and other dates (KBM, Inc.). 1:7,920 (Local Agriculture Stabilization and Conservation Service). Several sets, 1930's, 1950's, and 1970's; 1:24,000--1979 (U.S. Army Corps of Engineers).

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

FLOOD HAZARD AREA: Elm River Township

COUNTY: Traill

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05064500--Red River of the North at Halstad Continuous-record gaging station. Spring flood of 1897: Stage $\simeq$ 38.5 ft. Period of record--Apr. 1936 through June 1937 (no winter records), Apr. 1942 through Sept. 1960 (spring and summer months only), and May 1961 through Sept. 1982: 04/22/79--Stage = 39 ft; Discharge = 42,000 ft^3/s. (U.S. Geological Survey, 1959A-82).	Changes in flood response of the Red River (Miller and Frink, 1982). Drains McCraide 4, McCoy 14, and Kelsay Floodway. Flood damage reduction (Souris-Red-Rainy River Basins Commission, 1972). 1979 flood damages: Four culverts were washed out, one road was washed out, and one road had gravel washed off (Federal Highway Administration).	Frequency analysis for Elm River at 144-049-17; 100-year recurrence interval--Discharge = 9,783 ft^3/s (Houston Engineering, Inc., 1982). Frequency analysis for Elm River at 144-049-26; 100-year recurrence interval--Discharge = 9,621 ft^3/s (Houston Engineering, Inc., 1982). Frequency analysis for North Branch Elm River at 144-049-08; 100-year recurrence interval--Discharge = 2,299 ft^3/s (Houston Engineering, Inc., 1982). Log-Pearson type III frequency analysis for gaging station 05064500; 100-year recurrence interval--Discharge = 54,500 ft^3/s (Souris-Red-Rainy River Basins Commission, 1972).	Gaging station 05064500--Approximately 21,800 mi^2 which includes 3,800 mi^2 of closed basins.	Gaging station 05064500	HEC-1 analysis for Elm River (Houston Engineering, Inc., 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
Profiles for Red River (U.S. Army Corps of Engineers). Systematically derived profiles for Red River (North Dakota State Water Commission and Minnesota Department of Natural Resources Division of Waters, Soils, and Minerals, 1971).	Bridges Elm River 49-126-27.1 49-130-29 49-128-27 49-130-29.1 49-129-28 North Branch Elm River 49-125-27 49-126-27 49-126-26 49-127-26.1 49-126-26.1 Red River 49-131-28 Unnamed creeks 49-125-28.2 49-127-25 49-126-24 49-127-29 49-126-29 49-128-29 49-127-24 Drains McCraide 4, McCoy 14, and Kelsay Floodway. Elm River (Houston Engineering, Inc., 1982). Elm River (U.S. Army Corps of Engineers). Gaging station 05064500 Red River (U.S. Army Corps of Engineers).	Gaging station 05064500	Bridges Elm River 49-126-27.1 49-130-29 49-128-27 49-130-29.1 49-129-28 North Branch Elm River 49-125-27 49-126-27 49-126-26 49-127-26.1 49-126-26.1 Red River 49-131-28 Unnamed creeks 49-125-28.2 49-127-25 49-126-24 49-127-29 49-126-29 49-128-29 49-127-24 Drains McCraide 4, McCoy 14, and Kelsay Floodway. Elm River (Houston Engineering, Inc., 1982). Elm River (U.S. Army Corps of Engineers). Red River (U.S. Army Corps of Engineers).	Gaging station 05064500	Flood Hazard Boundary Map (1:24,000): Traill County (U.S. Department of Housing and Urban Development, 1980B). Soil survey map: Traill County (U.S. Department of Agriculture, 1977B). Topographic maps (1:24,000): Halstad and Halstad SW (U.S. Geological Survey).	1:7,920--1979 flood and other dates (KBM, Inc.). 1:7,920 (Local Agriculture Stabilization and Conservation Service). Several sets, 1930's, 1950's, 1960's, and 1970's; 1:24,000--1979 (U.S. Army Corps of Engineers).

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

FLOOD HAZARD AREA: Greenfield Township

COUNTY: Traill

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05062200--Elm River near Kelso Continuous-record gaging station. Period of record--Oct. 1955 through Sept. 1973 and Oct. 1980 through Sept. 1982: 03/ /66--Stage = 12.48 ft; Discharge = 1,000 ft^3/s. (U.S. Geological Survey, 1959A-82). 144-051-23DCC--Elm River near Grandin Indirect measuring station. 04/16/50--Discharge = 1,810 ft^3/s. (U.S. Geological Survey).	Drain Preston Floodway. 1979 flood damages: 3 culverts were washed out, 10 roads had gravel washed off, and 3 roads were washed out (Federal Highway Administration).	Frequency analysis for Elm River (Houston Engineering, Inc., 1982).	Gaging station 05062200--193 mi^2.	Gaging stations 05062200 144-051-23DCC	HEC-1 analysis for Elm River (Houston Engineering, Inc., 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
	Bridge Unnamed creek 49-111-26 Drain Preston Floodway. Gaging stations 05062200 144-051-23DCC	Gaging station 05062200	Bridge Unnamed creek 49-111-26 Drain Preston Floodway.	Gaging station 05062200	Flood Hazard Boundary Map (1:24,000): Traill County (U.S. Department of Housing and Urban Development, 1980B). Soil survey map: Traill County (U.S. Department of Agriculture, 1977B). Topographic maps (1:24,000): Ayr NE, Blanchard, Galesburg SE, and Hunter (U.S. Geological Survey).	1:7,920--1979 flood and other dates (KBM, Inc.). 1:7,920 (Local Agriculture Stabilization and Conservation Service). Several sets, 1930's and 1950's; 1:24,000--1979 (U.S. Army Corps of Engineers).

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

FLOOD HAZARD AREA: Herberg Township COUNTY: Traill

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05064500--Red River of the North at Halstad Continuous-record gaging station. Spring flood of 1897: Stage ≃ 38.5 ft. Period of record--Apr. 1936 through June 1937 (no winter records), Apr. 1942 through Sept. 1960 (spring and summer months only), and May 1961 through Sept. 1982: 04/22/79--Stage = 39 ft; Discharge = 42,000 ft^3/s. (U.S. Geological Survey, 1959A-82).	Changes in flood response of the Red River (Miller and Frink, 1982). Drains Herberg 2, Leirness 34, Nelson 28, and Stenerson 20. Flood damage reduction (Souris-Red-Rainy River Basins Commission, 1972). 1979 flood damages: 1 bridge was damaged, 1 culvert was washed out, 8 roads were washed out, and 14 roads had gravel washed off (Federal Highway Administration).	Log-Pearson type III frequency analysis for gaging station 05064500; 100-year recurrence interval--Discharge = 54,500 ft^3/s (Souris-Red-Rainy River Basins Commission, 1972).	Gaging station 05064500--Approximately 21,800 mi^2 which includes 3,800 mi^2 of closed basins.	Gaging station 05064500	

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
Profiles for Red River (U.S. Army Corps of Engineers). Systematically derived profiles for Red River (North Dakota State Water Commission and Minnesota Oepartment of Natural Resources Oivision of Waters, Soils, and Minerals, 1971).	Bridges Red River 0200-415.724 Unnamed creeks 49-124-20 49-127-22 49-124-20.1 49-127-23 49-124-22 49-127-24 49-124-24 49-127-24.1 49-125-20 49-128-20 49-125-22 49-12C-22 49-125-24 49-128-24 49-125-24.1 49-129-18 49-126-20 49-129-19 49-126-22 49-129-20 49-126-24.1 49-129-20.1 49-127-20 0200-410.155 0200-411.162 0200-412.160 0200-412.649 Drains Herberg 2, Leirness 34, Nelson 28, and Stenerson 20. Gaging station 05064500 Red River (U.S. Army Corps of Engineers).	Gaging station 05064500	Bridges Red River 0200-415.724 Unnamed creeks 49-124-20 49-127-22 49-124-20.1 49-127-23 49-124-22 49-127-24 49-124-24 49-127-24.1 49-125-20 49-12B-20 49-125-22 49-128-22 49-125-24 49-128-24 49-125-24.1 49-129-18 49-126-20 49-129-19 49-126-22 49-129-20 49-126-24.1 49-129-20.1 49-127-20 0200-410.155 0200-411.162 0200-412.160 0200-412.649 Drains Herberg 2, Leirness 34, Nelson 28, and Stenerson 20. Red River (U.S. Army Corps of Engineers).	Gaging station 05D64500 High water elevation for Red River (U.S. Army Corps of Engineers).	Flood Hazard Boundary Map (1:24,000): Traill County (U.S. Department of Housing and Urban Development, 1980B). Soil survey map: Traill County (U.S. Department of Agriculture, 1977B). Topographic maps (1:24,000): Caledonia; Halstad, Halstad SW, and Shelly (U.S. Geological Survey).	1:7,920--1979 flood and other dates (KBM, Inc.). 1:7,920 (Local Agriculture Stabilization and Conservation Service). Several sets, 1930's, 1950's, and 1970's; 1:24,000--1979 (U.S. Army Corps of Engineers).

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

FLOOD HAZARD AREA: Kelso Township

COUNTY: Traill

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05062200--Elm River near Kelso Continuous-record gaging station. Period of record--Oct. 1955 through Sept. 1973 and Oct. 1980 through Sept. 1982: 03/ /66--Stage = 12.48 ft; Discharge = 1,000 ft^3/s. (U.S. Geological Survey, 1959A-82).	Drains Kelso Floodway and McCoy 14. Flood damage reduction (Souris-Red-Rainy River Basins Commission, 1972). 1979 flood damages: Two bridges were washed out, one bridge was damaged, two culverts were washed out, and one road had gravel washed off (Federal Highway Administration).	Frequency analysis for Elm River at 144-049-19; 100-year recurrence interval--Discharge = 7,722 ft^3/s (Houston Engineering, Inc., 1982). Frequency analysis for North Branch Elm River at 144-049-08; 100-year recurrence interval--Discharge = 2,299 ft^3/s (Houston Engineering, Inc., 1982).	Gaging station 05062200--193 mi^2.	Gaging station 05062200	HEC-1 analysis for Elm River (Houston Engineering, Inc., 1982).

FLOOD HAZARD AREA: Kelso Township--Continued

COUNTY: Traill

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 Elm River 49-119-29 49-124-29 49-121-29 49-125-28 49-123-30 North Branch Elm River 49-121-25 49-123-27 49-122-24 49-124-26 49-122-25 49-124-26.1 49-123-25 49-124-26.2 49-123-26 49-125-26 Unnamed creeks 49-124-26.3 49-125-28.2 Drains Kelso Floodway and McCoy 14. Elm River (Houston Engineering, Inc., 1982). Elm River (U.S. Army Corps of Engineers). Gaging station 05062200	Gaging station 05062200	Bridges Elm River 49-119-29 49-124-29 49-121-29 49-125-28 49-123-30 North Branch Elm River 49-121-25 49-123-27 49-122-24 49-124-26 49-122-25 49-124-26.1 49-123-25 49-124-26.2 49-123-26 49-125-26 Unnamed creeks 49-124-26.3 49-125-28.2 Drains Kelso Floodway and McCoy 14. Elm River (U.S. Army Corps of Engineers).	Gaging station 05062200	Flood Hazard Boundary Map (1:24,000): Traill County (U.S. Department of Housing and Urban Development, 1980B). Soil survey map: Traill County (U.S. Department of Agriculture, 1977B). Topographic maps (1:24,000): Gardner, Grandin, Halstad, and Kelso (U.S. Geological Survey).	1:7,920--1979 flood and other dates (KBM, Inc.). 1:7,920 (Local Agriculture Stabilization and Conservation Service). Several sets, 1930's and 1950's; 1:24,000--1979 (U.S. Army Corps of Engineers).

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

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05065500--Goose River near Portland Continuous-record gaging station. Period of record--Oct. 1939 through Sept. 1975 and Oct. 1980 through Sept. 1982: 05/09/50--Stage = 20.12 ft; Discharge = 8,530 ft^3/s. (U.S. Geological Survey, 1959A-82). 05066500--Goose River at Hillsboro Continuous-record gaging station. Period of record--Mar. 1931 through Sept. 1982 (no winter records from 1932 through 1934): 04/21/79--Stage = 16.76 ft; Discharge = 14,800 ft^3/s. (U.S. Geological Survey, 1959A-82).	Drains 44 Mayville 8 and Mayville 36. Flood damage reduction (Souris-Red-Rainy River Basins Commission, 1972). Flood retention for Goose River (Moore Engineering, Inc., 1982A). Mayville Dam (North Dakota State Water Commission). Portland Dam (North Dakota State Water Commission). 1979 flood damages: Four bridges were damaged, eight culverts were washed out, and nine roads had gravel washed off (Federal Highway Administration).	Log-Pearson type III frequency analysis for gaging station 05065500; 100-year recurrence interval--Discharge = 7,450 ft^3/s (Federal Emergency Management Agency, 1982G and 1982H). Log-Pearson type III frequency analysis for gaging station 05065500; 100-year recurrence interval--Discharge = 8,630 ft^3/s (Moore Engineering, Inc., 1982A). Log-Pearson type III frequency analysis for gaging station 05065500; 100-year recurrence interval--Discharge = 11,400 ft^3/s (Souris-Red-Rainy River Basins Commission, 1972). Log-Pearson type III frequency analysis for gaging station 05066500; 100-year recurrence interval--Discharge = 13,000 ft^3/s (Federal Emergency Management Agency, 1982G and 1982H). Log-Pearson type III frequency analysis for gaging station 05066500; 100-year recurrence interval--Discharge = 15,885 ft^3/s (Moore Engineering, Inc., 1982A). Log-Pearson type III frequency analysis for gaging station 05066500; 100-year recurrence interval--Discharge = 15,300 ft^3/s (Souris-Red-Rainy River Basins Commission, 1972).	Gaging stations 05065500--517 mi^2 of which about 110 mi^2 is noncontributing. 05066500--1,203 mi^2 of which about 110 mi^2 is noncontributing.	Gaging stations 05065500 05066500	HEC-1 analysis for Goose River (Moore Engineering, Inc., 1982A).

FLOOD HAZARD AREA: Lindaas Township--Continued

COUNTY: Traill

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
		Log-Pearson type III frequency analysis for vicinity of Mayville (U.S. Department of Agriculture, 1978). Log-Pearson type III frequency analysis for vicinity of Portland (U.S. Department of Agriculture, 1978).			

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
Modified step-backwater derived profiles for vicinity of Mayville (Federal Emergency Management Agency, 1982G and 1982H). Modified step-backwater derived profiles for vicinity of Portland (Federal Emergency Management Agency, 1982G and 1982H). Step-backwater derived profiles for vicinity of Mayville (U.S. Department of Agriculture, 1978). Step-backwater derived profiles for vicinity of Portland (U.S. Department of Agriculture, 1978).	Bridges Goose River 0018-122.478 North Branch Goose River 49-106-8 49-108-11 49-107-8 49-109-11 49-107-9 49-110-11 49-108-9 49-110-12 0018-121.131 0200-388.375 Unnamed creeks 49-109-6 49-111-9 49-109-7 49-111-10 49-109-7.1 49-111-10.1 49-110-7 49-112-8 49-110-7.1 49-112-10 49-110-8 49-112-12 49-110-9 Drains 44 Mayville 8 and Mayville 36. Gaging stations 05065500 05066500 Goose River (Moore Engineering, Inc., 1982A). Goose River (U.S. Army Corps of Engineers).	Gaging stations 05065500 05066500	Bridges Goose River 0018-122.478 North Branch Goose River 49-106-8 49-108-11 49-107-8 49-109-11 49-107-9 49-110-11 49-108-9 49-110-12 0018-121.131 0200-388.375 Unnamed creeks 49-109-6 49-111-9 49-109-7 49-111-10 49-109-7.1 49-111-10.1 49-110-7 49-112-8 49-110-7.1 49-112-10 49-110-8 49-112-12 49-110-9 Drains 44 Mayville 8 and Mayville 36. Goose River (U.S. Army Corps of Engineers). Goose River in vicinity of Mayville (U.S. Department of Agriculture, 1978). Goose River in vicinity of Portland (U.S. Department of Agriculture, 1978).	Gaging stations 05065500 05066500 High water elevation for Goose River (U.S. Army Corps of Engineers).	Flood Hazard Boundary Map (1:24,000): Traill County (U.S. Department of Housing and Urban Development, 1980B). Flood Insurance Rate Map (1:4,800): City of Mayville (Federal Emergency Management Agency, 1982D). Floodway Flood Boundary and Floodway Map (1:4,800): City of Mayville (Federal Emergency Management Agency, 1982J). Soil survey map: Traill County (U.S. Department of Agriculture, 1977B). Topographic maps (1:24,000): Buxton SW, Hillsboro NW, Mayville North, and Mayville South (U.S. Geological Survey).	1:7,920--1979 flood and other dates (KBM, Inc.). 1:7,920 (Local Agriculture Stabilization and Conservation Service). Several sets, 1930's, 1950's, and 1970's; 1:24,000--1979 (U.S. Army Corps of Engineers).

FLOOD HAZARD AREA: Lindaas Township--Continued COUNTY: Traill

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
	Goose River in vicinity of Mayville (U.S. Department of Agriculture, 1978). Goose River in vicinity of Portland (U.S. Department of Agriculture, 1978).					

ADEQUACY	There should be adequate data to prepare appropriate technical information for flood plain management of the Goose River. If additional hydrologic data are obtained, then there should be adequate data to prepare appropriate technical information for flood plain management of the North Branch Goose River.

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05065500--Goose River near Portland Continuous-record gaging station. Period of record--Oct. 1939 through Sept. 1975 and Oct. 1980 through Sept. 1982: 05/09/50--Stage = 20.12 ft; Discharge = 8,530 ft^3/s. (U.S. Geological Survey, 1959A-82). 05066500--Goose River at Hillsboro Continuous-record gaging station. Period of record--Mar. 1931 through Sept. 1982 (no winter records from 1932 through 1934): 04/21/79--Stage = 16.76 ft; Discharge = 14,800 ft^3/s. (U.S. Geological Survey, 1959A-82).	Drains 39A, 39B Hansen 18, Mayville 9, Miller 29, and Murray 17. Flood damage reduction (Souris-Red-Rainy River Basins Commission, 1972). Flood retention for Goose River (Moore Engineering, Inc., 1982A). Mayville Dam (North Dakota State Water Commission). Portland Dam (North Dakota State Water Commission). 1979 flood damages: Three roads were washed out, one culvert was washed out, and four roads had gravel washed off (Federal Highway Administration).	Log-Pearson type III frequency analysis for gaging station 05065500; 100-year recurrence interval--Discharge = 7,450 ft^3/s (Federal Emergency Management Agency, 1982G and 1982H). Log-Pearson type III frequency analysis for gaging station 05065500; 100-year recurrence interval--Discharge = 8,630 ft^3/s (Moore Engineering, Inc., 1982A). Log-Pearson type III frequency analysis for gaging station 05065500; 100-year recurrence interval--Discharge = 11,400 ft^3/s (Souris-Red-Rainy River Basins Commission, 1972). Log-Pearson type III frequency analysis for gaging station 05066500; 100-year recurrence interval--Discharge = 13,000 ft^3/s (Federal Emergency Management Agency, 1982G and 1982H). Log-Pearson type III frequency analysis for gaging station 05066500; 100-year recurrence interval--Discharge = 15,885 ft^3/s (Moore Engineering, Inc., 1982A). Log-Pearson type III frequency analysis for gaging station 05066500; 100-year recurrence interval--Discharge = 15,300 ft^3/s (Souris-Red-Rainy River Basins Commission, 1972).	Gaging stations 05065500--517 mi^2 of which about 110 mi^2 is noncontributing. 05066500--1,203 mi^2 of which about 110 mi^2 is noncontributing.	Gaging stations 05065500 05066500	HEC-1 analysis for Goose River (Moore Engineering, Inc., 1982A).

FLOOD HAZARD AREA: Mayville Township--Continued

COUNTY: Traill

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
		Log-Pearson type III frequency analysis for vicinity of Mayville (U.S. Department of Agriculture, 1978). Log-Pearson type III frequency analysis for vicinity of Portland (U.S. Department of Agriculture, 1978).			

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
Modified step-backwater derived profiles for vicinity of Mayville (Federal Emergency Management Agency, 1982G and 1982H). Modified step-backwater derived profiles for vicinity of Portland (Federal Emergency Management Agency, 1982G and 1982H). Step-backwater derived profiles for vicinity of Mayville (U.S. Department of Agriculture, 1978). Step-backwater derived profiles for vicinity of Portland (U.S. Department of Agriculture, 1978).	8ridges Goose River 49-109-13 49-111-15.1 49-110-13 49-112-14 49-111-14 0018-121.131 0018-122.478 North Branch Goose River 49-112-13 49-112-14.1 0200-388.375 Unnamed creeks 49-106-16 49-110-17.2 49-107-14 49-111-15 49-108-16 49-111-16 49-108-17 49-111-16.1 49-109-16 49-111-17 49-109-16.1 49-112-15 49-109-17 49-112-15.1 49-109-17.1 49-112-16 49-110-15 49-112-16.1 49-110-16 49-112-16.2 49-110-16.1 49-112-17 49-110-17 49-112-17.1 49-110-17.1 0018-116.770 0018-118.266 0018-119.769N 0018-120.271N Drains 39A, 39B Hanson 18, Mayville 9, Miller 29, and Murray 17.	Gaging stations 05065500 05066500	Bridges Goose River 49-109-13 49-111-15.1 49-110-13 49-112-14 49-111-14 0018-121.131 0018-122.478 North Branch Goose River 49-112-13 49-112-14.1 0200-388.375 Unnamed creeks 49-106-16 49-110-17.2 49-107-14 49-111-15 49-108-16 49-111-16 49-108-17 49-111-16.1 49-109-16 49-111-17 49-109-16.1 49-112-15 49-109-17 49-112-15.1 49-109-17.1 49-112-16 49-110-15 49-112-16.1 49-110-16 49-112-16.2 49-110-16.1 49-112-17 49-110-17 49-112-17.1 49-110-17.1 0018-116.770 0018-118.266 0018-119.769N 0018-120.271N Drains 39A, 39B Hanson 18, Mayville 9, Miller 29, and Murray 17.	Gaging stations 05065500 05066500 High water elevation for Goose River (U.S. Army Corps of Engineers).	Flood Hazard Boundary Map (1:24,000): Traill County (U.S. Department of Housing and Urban Development, 19808). Flood Insurance Rate Map (1:4,800): City of Mayville (Federal Emergency Management Agency, 1982D). Floodway Flood 8oundary and Floodway Map (1:4,800): City of Mayville (Federal Emergency Management Agency, 1982J). Soil survey map: Traill County (U.S. Department of Agriculture, 1977B). Topographic maps (1:4,800): Goose River in the vicinity of Mayville and Portland (U.S. Department of Agriculture, Soil Conservation Service). Topographic maps (1:24,000): Hillsboro NW and Mayville South (U.S. Geological Survey).	1:7,920--1979 flood and other dates (KBM, Inc.). 1:7,920 (Local Agriculture Stabilization and Conservation Service). Several sets, 1930's, 1950's, and 1970's; 1:24,000--1979 (U.S. Army Corps of Engineers).

FLOOD HAZARD AREA: Mayville Township--Continued

COUNTY: Traill

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
	Gaging stations 05065500 05066500 Goose River (Moore Engineering, Inc., 1982A). Goose River (U.S. Army Corps of Engineers). Goose River in vicinity of Mayville (U.S. Department of Agriculture, 1978). Goose River in vicinity of Portland (U.S. Department of Agriculture, 1978).		Goose River (U.S. Army Corps of Engineers). Goose River in vicinity of Mayville (U.S. Department of Agriculture, 1978). Goose River in vicinity of Portland (U.S. Department of Agriculture, 1978).			

ADEQUACY	There should be adequate data to prepare appropriate technical information for flood plain management of the Goose River. If additional hydrologic data are obtained, then there should be adequate data to prepare appropriate technical information for flood plain management of the North Branch Goose River.

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05065500--Goose River near Portland Continuous-record gaging station. Period of record--Oct. 1939 through Sept. 1975 and Oct. 1980 through Sept. 1982: 05/09/50--Stage = 20.12 ft; Discharge = 8,530 ft^3/s. (U.S. Geological Survey, 1959A-82). 05066500--Goose River at Hillsboro Continuous-record gaging station. Period of record--Mar. 1931 through Sept. 1982 (no winter records from 1932 through 1934): 04/21/79--Stage = 16.76 ft; Discharge = 14,800 ft^3/s. (U.S. Geological Survey, 1959A-82).	Drains 39B Hanson 18, Miller 29, Murray 17, and Norway 38. Flood damage reduction (Souris-Red-Rainy River Basins Commission, 1972). Flood retention for Goose River (Moore Engineering, Inc., 1982A). 1979 flood damages: Six bridges were damaged and three roads had gravel washed off (Federal Highway Administration).	Frequency analysis for Hillsboro; 100-year recurrence interval--Discharge = 15,000 ft^3/s (U.S. Department of Agriculture, 1973). Log-Pearson type III frequency analysis for gaging station 05065500; 100-year recurrence interval--Discharge = 8,630 ft^3/s (Moore Engineering, Inc., 1982A). Log-Pearson type III frequency analysis for gaging station 05065500; 100-year recurrence interval--Discharge = 11,400 ft^3/s (Souris-Red-Rainy River Basins Commission, 1972). Log-Pearson type III frequency analysis for gaging station 05066500; 100-year recurrence interval--Discharge = 15,885 ft^3/s (Moore Engineering, Inc., 1982A). Log-Pearson type III frequency analysis for gaging station 05066500; 100-year recurrence interval--Discharge = 15,300 ft^3/s (Souris-Red-Rainy River Basins Commission, 1972). Log-Pearson type III frequency analysis for vicinity of Mayville (U.S. Department of Agriculture, 1978). Log-Pearson type III frequency analysis for vicinity of Portland (U.S. Department of Agriculture, 1978).	Gaging stations 05065500--517 mi^2 of which about 110 mi^2 is noncontributing. 05066500--1,203 mi^2 of which about 110 mi^2 is noncontributing.	Gaging stations 05065500 05066500	HEC-1 analysis for Goose River (Moore Engineering, Inc., 1982A).

FLOOD HAZARD AREA: Norway Township--Continued

COUNTY: Traill

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 Hillsboro (U.S. Army Corps of Engineers). Profiles for Hillsboro (U.S. Department of Agriculture, 1973). Step-backwater derived profiles for vicinity of Mayville (U.S. Department of Agriculture, 1978). Step-backwater derived profiles for vicinity of Portland (U.S. Department of Agriculture, 1978).	Bridges Goose River 49-112-15.1 49-115-17 49-113-15.1 49-117-18 49-114-16 North Branch Goose River 49-112-14.1 49-113-15 49-113-14 Unnamed creeks 49-112-16.1 49-113-17.1 49-113-13 49-113-18 49-113-15.1 49-113-18.1 49-113-16 49-114-18 49-113-16.1 49-116-16 49-113-17 49-117-17 0200-399.035 Drains 39B Hanson 18, Miller 29, Murray 17, and Norway 38. Gaging stations 05065500 05066500 Goose River (Moore Engineering, Inc., 1982A). Goose River at Hillsboro (U.S. Department of Agriculture, 1973).	Gaging stations 05065500 05066500	Bridges Goose River 49-112-15.1 49-115-17 49-113-15.1 49-117-18 49-114-16 North Branch Goose River 49-112-14.1 49-113-15 49-113-14 Unnamed creeks 49-112-16.1 49-113-17.1 49-113-13 49-113-18 49-113-15.1 49-113-18.1 49-113-16 49-114-18 49-113-16.1 49-116-16 49-113-17 49-117-17 0200-399.035 Drains 39B Hanson 18, Miller 29, Murray 17, and Norway 38. Goose River at Hillsboro (U.S. Department of Agriculture, 1973). Goose River in vicinity of Mayville (U.S. Department of Agriculture, 1978). Goose River in vicinity of Portland (U.S. Department of Agriculture, 1978).	Gaging stations 05065500 05066500 High water elevation for Goose River (U.S. Army Corps of Engineers).	Flood Hazard Boundary Map (1:24,000): Traill County (U.S. Department of Housing and Urban Development, 1980B). Soil survey map: Traill County (U.S. Department of Agriculture, 1977B). Topographic maps (1:24,000): Hillsboro and Hillsboro NW (U.S. Geological Survey).	1:7,920--1979 flood and other dates (KBM, Inc.). 1:7,920 (Local Agriculture Stabilization and Conservation Service). Several sets, 1930's, 1950's, and 1970's; 1:24,000--1979 (U.S. Army Corps of Engineers).

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
	Goose River in vicinity of Mayville (U.S. Department of Agriculture, 1978). Goose River in vicinity of Portland (U.S. Department of Agriculture, 1978).					

ADEQUACY	There should be adequate data to prepare appropriate technical information for flood plain management of the Goose River. If additional hydrologic data are obtained, then there should be adequate data to prepare appropriate technical information for flood plain management of the North Branch Goose River.

FLOOD HAZARD AREA: Roseville Township

COUNTY: Traill

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
	Drains Miller 29 and Roseville 19. Flood damage reduction (Souris-Red-Rainy River Basins Commission, 1972). Flood retention for Goose River (Moore Engineering, Inc., 1982A). 1979 flood damages: Five roads had gravel washed off (Federal Highway Administration).	Log-Pearson type III frequency analysis for Goose River (Moore Engineering, Inc., 1982A).			HEC-1 analysis for Goose River (Moore Engineering, Inc., 1982A).

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 vicinity of Mayville (U.S. Department of Agriculture, 1978). Step-backwater derived profiles for vicinity of Portland (U.S. Department of Agriculture, 1978).	Bridges South Branch Goose River 49-101-12.1 49-105-12.2 49-102-12 49-105-12.3 49-103-12 0018-125.691 Unnamed creeks 49-102-12.1 49-104-15 49-103-13 49-104-16 49-104-13 49-1D6-15 49-104-14 49-106-16 Drains Miller 29 and Roseville 19. Goose River (Moore Engineering, Inc., 1982A). Goose River (U.S. Army Corps of Engineers). Goose River in vicinity of Mayville (U.S. Department of Agriculture, 1978). Goose River in vicinity of Portland (U.S. Department of Agriculture, 1978).		Bridges South Branch Goose River 49-101-12.1 49-105-12.2 49-102-12 49-105-12.3 49-103-12 0018-125.691 Unnamed creeks 49-102-12.1 49-104-15 49-103-13 49-104-16 49-104-13 49-106-15 49-104-14 49-106-16 Drains Miller 29 and Roseville 19. Goose River (U.S. Army Corps of Engineers). Goose River in vicinity of Mayville (U.S. Department of Agriculture, 1978). Goose River in vicinity of Portland (U.S. Department of Agriculture, 1978).	High water elevation for Goose River (U.S. Army Corps of Engineers).	Flood Hazard Boundary Map (1:24,000): Traill County (U.S. Department of Housing and Urban Development, 1980B). Soil survey map: Traill County (U.S. Department of Agriculture, 1977B). Topographic maps (1:24,000): Galesburg NW and Mayville South (U.S. Geological Survey).	1:7,920--1979 flood and other dates (KBM, Inc.). 1:7,920 (Local Agriculture Stabilization and Conservation Service). Several sets, 1930's, 1950's, and 1970's; 1:24,000--1979 (U.S. Army Corps of Engineers).

ADEQUACY	If additional hydrologic data are obtained, then there should be adequate data to prepare appropriate technical information for flood plain management of the South Branch Goose River.

FLOOD HAZARD AREA: Stavanger Township COUNTY: Traill

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
	Drain Carson 10. 1979 flood damages: One bridge was damaged, three culverts were washed out, six roads were washed out, and six roads had gravel washed off (Federal Highway Administration).				

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 49-122-6, 49-122-6.1, 49-123-5, 49-123-5.1, 49-124-4, 49-124-4.1, 49-124-4.2 Unnamed creeks 49-118-3, 49-119-3, 49-120-3, 49-120-3.1, 49-121-2, 49-121-2.1, 49-122-2 Drain Carson 10.		Bridges Buffalo Creek 49-122-6, 49-122-6.1, 49-123-5, 49-123-5.1, 49-124-4, 49-124-4.1, 49-124-4.2 Unnamed creeks 49-118-3, 49-119-3, 49-120-3, 49-120-3.1, 49-121-2, 49-121-2.1, 49-122-2 Drain Carson 10.		Flood Hazard Boundary Map (1:24,000): Traill County (U.S. Department of Housing and Urban Development, 1980B). Soil survey map: Traill County (U.S. Department of Agriculture, 1977B). Topographic maps (1:24,000): Buxton, Climax NW, CLimax SW, and Reynolds (U.S. Geological Survey).	1:7,920 (Local Agriculture Stabilization and Conservation Service).

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

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
	Drains Blanchard 23, Bloomfield 46, Burke 15, Burke 16, Christopherson 50, Elm River Diversion, Garfield 32, Hatton 43, Hatton 45, Lateral A, and Norman 40. Elm River Dam (North Dakota State Water Commission). 1979 flood damages: 19 bridges were damaged, 27 roads were washed out, 72 roads had gravel washed off, and 32 culverts were washed out (Federal Highway Administration).				

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 Elm Creek 49-102-25 49-106-28 49-103-26 49-107-23 49-103-27 49-107-23.1 49-103-28 49-107-24 49-104-28 49-107-24.1 49-104-29 49-108-23 49-105-29 49-109-23 49-106-24 49-110-23 49-106-25 49-112-23 49-106-26 49-112-23.4 49-106-27 49-113-24 0018-106.082 North Branch Goose River 49-102-1 49-104-3 49-102-1.1 49-104-4 49-103-1 49-105-4 49-103-2 49-105-5 49-104-2 Drains Blanchard 23, Bloomfield 46, Burke 15, Burke 16, Christopherson 50, Elm River Diversion, Garfield 32, Hatton 43, Hatton 45, Lateral A, and Norman 40.		Bridges Elm Creek 49-102-25 49-106-28 49-103-26 49-107-23 49-103-27 49-107-23.1 49-103-28 49-107-24 49-104-28 49-107-24.1 49-104-29 49-108-23 49-105-29 49-109-23 49-106-24 49-110-23 49-106-25 49-112-23 49-106-26 49-112-23.4 49-106-27 49-113-24 0018-106.082 North Branch Goose River 49-102-1 49-104-3 49-102-1.1 49-104-4 49-103-1 49-105-4 49-103-2 49-105-5 49-104-2 Drains Blanchard 23, Bloomfield 46, Burke 15, Burke 16, Christopherson 50, Elm River Diversion, Garfield 32, Hatton 43, Hatton 45, Lateral A, and Norman 40.		Topographic maps (1:24,000): Buxton NW, Buxton SW, Galesburg, Galesburg SE, Hatton, and Holmes (U.S. Geological Survey).	

ADEQUACY	There should be adequate data to prepare appropriate technical information for flood plain management of the Elm River, Goose River, and Red River. If additional hydrologic data are obtained for the North Branch Goose River and South Branch Goose River, then there should be adequate data to prepare appropriate technical information for flood plain management.

FLOOD HAZARD AREA: Traill County--Continued

Additional flood hazard information for Traill County is contained in table 1 under the following governmental units: Belmont Township, Bingham Township, Caledonia Township, Eldorado Township, Elm River Township, Greenfield Township, Herberg Township, Kelso Township, Lindaas Township, Mayville Township, Norway Township, Roseville Township, Stavanger Township, and Viking Township.

FLOOD HAZARD AREA: Viking Township

COUNTY: Traill

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05065500--Goose River near Portland Continuous-record gaging station. Period of record--Oct. 1939 through Sept. 1975 and Oct. 1980 through Sept. 1982: 05/09/50--Stage = 20.12 ft; Discharge = 8,530 ft^3/s. (U.S. Geological Survey, 1959A-82). 05066500--Goose River at Hillsboro Continuous-record gaging station. Period of record--Mar. 1931 through Sept. 1982 (no winter record from 1932 through 1934): 04/21/79--Stage = 16.76 ft; Discharge = 14,800 ft^3/s. (U.S. Geological Survey, 1959A-82).	Drain 44 Flood damage reduction (Souris-Red-Rainy River Basins Commission, 1972). Flood retention for Goose River (Moore Engineering, Inc., 1982A). Portland Dam (North Dakota State Water Commission). 1979 flood damages: 11 bridges were damaged, 5 roads were washed out, 5 culverts were washed out, and 10 roads had gravel washed off (Federal Highway Administration).	Log-Pearson type III frequency analysis for gaging station 05065500; 100-year recurrence interval--Discharge = 8,630 ft^3/s (Moore Engineering, Inc., 1982A). Log-Pearson type III frequency analysis for gaging station 05065500; 100-year recurrence interval--Discharge = 11,400 ft^3/s (Souris-Red-Rainy River Basins Commission, 1972). Log-Pearson type III frequency analysis for gaging station 05066500; 100-year recurrence interval--Discharge = 15,885 ft^3/s (Moore Engineering, Inc., 1982A). Log-Pearson type III frequency analysis for gaging station 05066500; 100-year recurrence interval--Discharge = 15,300 ft^3/s (Souris-Red-Rainy River Basins Commission, 1972). Log-Pearson type III frequency analysis for Goose River at Portland; 100-year recurrence interval--Discharge = 13,000 ft^3/s (Federal Emergency Management Agency, 1982H). Log-Pearson type III frequency analysis for vicinity of Mayville (U.S. Department of Agriculture, 1978). Log-Pearson type III frequency analysis for vicinity of Portland (U.S. Department of Agriculture, 1978).	Gaging stations 05065500--517 mi^2 of which about 110 mi^2 is noncontributing. 05066500--1,203 mi^2 of which about 110 mi^2 is noncontributing.	Gaging stations 05065500 05066500	HEC-1 analysis for Goose River (Moore Engineering, Inc., 1982A).

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
Modified step-backwater derived profiles for Portland (Federal Emergency Management Agency, 1982H). Step-backwater derived profiles for vicinity of Mayville (U.S. Department of Agriculture, 1978). Step-backwater derived profiles for vicinity of Portland (U.S. Department of Agriculture, 1978).	Bridges Goose River 49-101-9 49-104-11 49-103-11 0018-129.843 North Branch Goose River 49-105-6 49-106-8 49-105-7 49-107-8 49-106-7 South Branch Goose River 49-101-12.1 49-105-12.2 49-102-12 49-105-12.3 49-103-12 0018-125.691 Unnamed creeks 49-101-7 49-101-11.1 49-101-8 49-102-12.1 49-101-11 Drain 44 Goose River (Moore Engineering, Inc., 1982A). Goose River (U.S. Army Corps of Engineers). Goose River in vicinity of Mayville (U.S. Department of Agriculture, 1978).	Gaging stations 05065500 05066500	Bridges Goose River 49-101-9 49-104-11 49-103-11 0018-129.843 North Branch Goose River 49-105-6 49-106-8 49-105-7 49-107-8 49-106-7 South Branch Goose River 49-101-12.1 49-105-12.2 49-102-12 49-105-12.3 49-103-12 0018-125.691 Unnamed creeks 49-101-7 49-101-11.1 49-101-8 49-102-12.1 49-101-11 Drain 44 Goose River (U.S. Army Corps of Engineers). Goose River in vicinity of Mayville (U.S. Department of Agriculture, 1978). Goose River in vicinity of Portland (U.S. Department of Agriculture, 1978).	Gaging stations 05065500 05066500 High water elevation for Goose River (U.S. Army Corps of Engineers).	Flood Hazard Boundary Map (1:24,000): Traill County (U.S. Department of Housing and Urban Development, 1980B). Flood Insurance Rate Map (1:4,800): City of Portland (Federal Emergency Management Agency, 1982E). Soil survey map: Traill County (U.S. Department of Agriculture, 1977B). Topographic maps (1:24,000): Hatton SW and Mayville North (U.S. Geological Survey).	1:7,920--1979 flood and other dates (KBM, Inc.). 1:7,920 (Local Agriculture Stabilization and Conservation Service). Several sets, 1930's, 1950's, and 1970's; 1:24,000--1979 (U.S. Army Corps of Engineers).

FLOOD HAZARD AREA: Viking Township--Continued

COUNTY: Traill

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
	Goose River in vicinity of Portland (U.S. Department of Agriculture, 1978).					

ADEQUACY	There should be adequate data to prepare appropriate technical information for flood plain management of the Goose River. If additional hydrologic data are obtained, then there should be adequate data to prepare appropriate technical information for flood plain management of the South Branch Goose River.

FLOOD HAZARD AREA: Fordville

COUNTY: Walsh

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05084000--Forest River near Fordville Continuous-record gaging station. Period of record--Apr. 1940 through Sept. 1982: 04/18/50--Stage = 14.48 ft; Discharge = 16,400 ft^3/s. (U.S. Geological Survey, 1959A-82).	Flood damage reduction (Souris-Red-Rainy River Basins Commission, 1972).	Log-Pearson type III frequency analysis for gaging station 05084000; 100-year recurrence interval--Discharge = 20,600 ft^3/s (Souris-Red-Rainy River Basins Commission, 1972).	Gaging station 05084000--456 mi^2 of which about 120 mi^2 is noncontributing.	Gaging station 05084000	

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 Forest River 50-124-24 North Branch Forest River 50-122-21 50-124-23 Gaging station 05084000	Gaging station 05084000	Bridges Forest River 50-124-24 North Branch Forest River 50-122-21 50-124-23	Gaging station 05084000	Additional information: Street and gutter elevations (KBM, Inc.). Flood Hazard Boundary Map (1:7,200): City of Fordville (U.S. Department of Housing and Urban Development, 1978C). Soil survey map: Walsh County (U.S. Department of Agriculture, 1972). Topographic map (1:24,000): Fordville (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: Hoople

COUNTY: Walsh

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05089200--North Branch Park River at Gardar Crest-stage gaging station. Flood of 1909: Stage = 11 ft. Period of record--Oct. 1954 through Sept. 1973: 04/ /69--Stage = 5.53 ft; Discharge = 1,200 ft^3/s. (U.S. Geological Survey, 1959A-82).	Watershed changes for North Branch Park River (U.S. Department of Agriculture, Soil Conservation Service).	Log-Pearson type III frequency analysis for gaging station 05089200; 50-year recurrence interval--Discharge = 2,020 ft^3/s (Crosby, 1975).	Gaging station 05089200--34.7 mi^2.	Gaging station 05089200	

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 North Branch Park River 50-131-1.1 50-131-1.2 0018-207.051 Unnamed creeks 50-131-1 50-131-1.3 Gaging station 05089200	Gaging station 05089200	Bridges North Branch Park River 50-131-1.1 50-131-1.2 0018-207.051 Unnamed creeks 50-131-1 50-131-1.3	Gaging station 05089200	Additional information: Street and gutter elevations (Richmond Engineering, Inc. and Webster, Foster, and Weston). Flood Hazard Boundary Map (1:2,400): City of Hoople (U.S. Department of Housing and Urban Development, 1978D). Soil survey map: Walsh County (U.S. Department of Agriculture, 1972). Topographic map (1:24,000): Crystal (U.S. Geological Survey).	1:7,920 (Local Agriculture Stabilization and Conservation Service).

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

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05083600--Middle Branch Forest River near Whitman Continuous-record gaging station. Period of record--Oct. 1960 through Sept. 1982: 05/19/74--Stage = 7.11 ft; Discharge = 984 ft^3/s. (U.S. Geological Survey, 1959A-82). 05084000--Forest River near Fordville Continuous-record gaging station. Period of record--Apr. 1940 through Sept. 1982: 04/18/50--Stage = 14.48 ft; Discharge = 16,400 ft^3/s. (U.S. Geological Survey, 1959A-82). 05084500--Forest River near Minto Nonrecording gaging station. Period of record--Apr. 1932 through Sept. 1944 (no record available for some winter months): 04/05/42--Stage = 14.87 ft; Discharge = 1,610 ft^3/s. (U.S. Geological Survey, 1959A-82). 05085000--Forest River at Minto Continuous-record gaging station. Period of record--Apr. 1944 through Sept. 1982: 04/18/50--Stage = 11.8 ft; Discharge = 16,600 ft^3/s. (U.S. Geological Survey, 1959A-82).	Drains 4, 5, 6, 7, 25, 26, 27, 28, 29, 30, 67A Ops 1 and Prairie Center 1. Flood control: Forest River (U.S. Army Corps of Engineers, 1975). Flood control: Park River at Grafton (U.S. Army Corps of Engineers, 1982A). Flood damage reduction for Forest River (Souris-Red-Rainy River Basins Commission, 1972). Flood damage reduction for Park River (Souris-Red-Rainy River Basins Commission, 1972). Flood damage reduction for Red River (Souris-Red-Rainy River Basins Commission, 1972). Homme Dam (U.S. Army Corps of Engineers). Watershed changes for Forest River (U.S. Department of Agriculture, Soil Conservation Service). Watershed changes for Park River (U.S. Department of Agriculture, Soil Conservation Service).	Frequency analysis for gaging station 05088000; 100-year recurrence interval--Discharge = 14,400 ft^3/s (Federal Emergency Management Agency, 1979C). Frequency analysis for Park River (U.S. Army Corps of Engineers, 1982A). Frequency analysis for Red River (U.S. Army Corps of Engineers). Frequency relationship analysis for Forest River at Forest River; 100-year recurrence interval--Discharge = 12,500 ft^3/s (Federal Emergency Management Agency, 1979B). Log-Pearson type III frequency analysis for gaging station 05083600; 25-year recurrence interval--Discharge = 652 ft^3/s (Crosby, 1975). Log-Pearson type III frequency analysis for gaging station 05084000; 100-year recurrence interval--Discharge = 20,600 ft^3/s (Souris-Red-Rainy River Basins Commission, 1972). Log-Pearson type III frequency analysis for gaging station 05085000; 100-year recurrence interval--Discharge = 10,800 ft^3/s (Federal Emergency Management Agency, 1980G).	Gaging stations 05083600--47.7 mi^2 of which about 8.8 mi^2 is noncontributing. 05084000--456 mi^2 of which about 120 mi^2 is noncontributing. 05084500--Approximately 578 mi^2 of which about 136 mi^2 is noncontributing. 05085000--740 mi^2 of which about 120 mi^2 is noncontributing. 05088000--Approximately 214 mi^2. 05088500--226 mi^2. 05089000--226 mi^2. 05090000--Approximately 695 mi^2. 05092000--Approximately 34,800 mi^2 which includes 3,800 mi^2 of closed basins.	Gaging stations 05083600 05084000 05084500 05085000 05088000 05088500 05089000 05090000 05092000	HEC-1 model analysis for Park River at Grafton (U.S. Army Corps of Engineers, 1982A).

FLOOD HAZARD AREA: Walsh County--Continued

COUNTY: Walsh

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05088000--South Branch Park River near Park River Nonrecording gaging station. Period of record--Oct. 1939 through Sept. 1950: 04/18/48--Stage = 11.8 ft; Discharge = 11,000 ft^3/s. (U.S. Geological Survey, 1959A-82). 05088500--Homme Reservoir near Park River Continuous-record gaging station. Period of record--Sept. 1949 through Sept. 1982: 04/20/79--Stage = 1,084.58 ft; Contents = 4,710 acre-ft. (U.S. Geological Survey, 1959A-82). 05089000--South Branch Park River below Homme Dam Continuous-record gaging station. Period of record--Oct. 1949 through Sept. 1982: 04/24/50--Stage = 37.52 ft; Discharge = 13,000 ft^3/s. (U.S. Geological Survey, 1959A-82). 05089100--Middle Branch Park River near Union Continuous-record gaging station. Period of record--Oct. 1965 through Sept. 1982: 04/20/79--Stage = 6.16 ft; Discharge = 960 ft^3/s. (U.S. Geological Survey, 1959A-82).		Log-Pearson type III frequency analysis for gaging station 05085000; 100-year recurrence interval--Discharge = 29,000 ft^3/s (Souris-Red-Rainy River Basins Commission, 1972). Log-Pearson type III frequency analysis for gaging station 05089000; 100-year recurrence interval--Discharge = 14,300 ft^3/s (Souris-Red-Rainy River Basins Commission, 1972). Log-Pearson type III frequency analysis for gaging station 05089100; 25-year recurrence interval--Discharge = 922 ft^3/s (Crosby, 1975). Log-Pearson type III frequency analysis for gaging station 05090000; 100-year recurrence interval--Discharge = 15,800 ft^3/s (Federal Emergency Management Agency, 1980F). Log-Pearson type III frequency analysis for gaging station 05090000; 100-year recurrence interval--Discharge = 22,000 ft^3/s (Souris-Red-Rainy River Basins Commission, 1972). Log-Pearson type III frequency analysis for gaging station 05092000; 100-year recurrence interval--Discharge = 99,000 ft^3/s (Federal Emergency Management Agency, 1980E).			

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDRDLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05090000--Park River at Grafton Continuous-record gaging station. Period of record--Apr. 1931 through Sept. 1982: 04/19/50--Stage = 20.13 ft; Discharge = 12,600 ft^3/s. (U.S. Geological Survey, 1959A-82). 05092000--Red River of the North at Drayton Continuous-record gaging station. Spring flood of 1897: Stage $\approx$ 41 ft; Period of record--Apr. 1936 through June 1937 and Apr. 1941 through Sept. 1982: 04/28/79--Stage = 43.66 ft; Discharge = 92,900 ft^3/s. (U.S. Geological Survey, 1959A-82).		Log-Pearson type III frequency analysis for gaging station 05092000; 100-year recurrence interval--Discharge = 115,000 ft^3/s (Souris-Red-Rainy River Basins Commission, 1972).			

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 Forest River at Forest River (Federal Emergency Management Agency, 1979B). HEC-2 step-backwater derived profiles for Forest River at Minto (Federal Emergency Management Agency, 1980G). HEC-2 step-backwater derived profiles for Park River at Grafton (Federal Emergency Management Agency, 1980F). HEC-2 step-backwater derived profiles for Park River at Grafton (U.S. Army Corps of Engineers, 1982A). HEC-2 step-backwater derived profiles for Red River at Drayton (Federal Emergency Management Agency, 1980E). HEC-2 step-backwater derived profiles for South Branch Park River at Park River (Federal Emergency Management Agency, 1979C). Profiles for Red River (U.S. Army Corps of Engineers).	Bridges Forest River 50-126-24 50-143-19 50-127-24 50-144-18.2 50-137-24 50-144-18.4 50-138-23 50-146-18 50-139-22 50-146-19.1 50-139-22.1 50-147-18 50-139-23 50-149-19 50-140-22.1 50-150-19 50-141-21 50-151-18 50-141-21.2 50-151-18.1 50-142-19 50-152-17 50-142-20 50-152-17.1 50-143-18 50-154-13 50-143-18.1 50-154-15 50-143-18.2 0029-168.629L 0029-168.629R 0081-181.354 Park River 50-140-8.1 50-148-7 50-142-9 50-148-8 50-143-9 50-149-7 50-144-8 50-150-8.1 50-145-7 50-153-7 50-146-8 50-154-5.1 50-146-8.1 0029-179.087L 0029-179.123M 0029-179.147R 0081-191.790 Red River 0017-140.372 0054-009.958	Gaging stations 05083600 05084000 05084500 05085000 05088000 05088500 05089000 05090000 05092000	Bridges Forest River 50-126-24 50-143-19 50-127-24 50-144-18.2 50-137-24 50-144-18.4 50-138-23 50-146-18 50-139-22 50-146-19.1 50-139-22.1 50-147-18 50-139-23 50-149-19 50-140-22.1 50-150-19 50-141-21 50-151-18 50-141-21.2 50-151-18.1 50-142-19 50-152-17 50-142-20 50-152-17.1 50-143-18 50-154-13 50-143-18.1 50-154-15 50-143-18.2 0029-168.629L 0029-168.629R 0081-181.354 Park River 50-140-8.1 50-148-7 50-142-9 50-148-8 50-143-9 50-149-7 50-144-8 50-150-8.1 50-145-7 50-153-7 50-146-8 50-154-5.1 50-146-8.1 0029-179.087L 0029-179.123M 0029-179.147R 0081-191.790 Red River 0017-140.372 0054-009.958	Gaging stations 05083600 05084000 05084500 05085000 05088000 05088500 05089000 05090000 05092000	Additional information: Elevations of buildings near the Red River (U.S. Army Corps of Engineers). Flood Insurance Rate Map (1:4,800): City of Drayton (Federal Emergency Management Agency, 1981J). Flood Insurance Rate Map (1:6,000): City of Forest River (U.S. Department of Housing and Urban Development, 1980D). Flood Insurance Rate Map (1:6,000): City of Grafton (Federal Emergency Management Agency, 1981K). Flood Insurance Rate Map (1:6,000): City of Minto (Federal Emergency Management Agency, 1981L). Flood Insurance Rate Map (1:6,000): City of Park River (U.S. Department of Housing and Urban Development, 1980H). Topographic maps (1:24,000): Adams, Adams SE, Adams SW, Ardoch, Big Woods, Big Woods NE, Big Woods NW, Big Woods SW, Brockett, Crystal SE, Dahlen, Drayton, Edinburg, Edinburg NW, Edmore NW, Fairdale, Forest River, Gardar, Grafton, Inkster, Inkster NE, Lankin, Lawton, Minto, Nash, Nekoma, North Salt Lake, Oakwood, Oslo, Oslo NE, Osnabrock, Park River, Pelto, Pisek, Pleasant Valley, Saint Thomas, Union, Veseleyville, Voss, Waterloo Lake, and Whitman (U.S. Geological Survey).	1:7,920--1979 flood and other dates (KBM, Inc.). 1:7,920 (Local Agriculture Stabilization and Conservation Service). Several sets, 1960's and 1970's; 1:24,000--1979 (U.S. Army Corps of Engineers).

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
Systematically derived profiles for Red River (North Dakota State Water Commission and Minnesota Department of Natural Resources Division of Waters, Soils, and Minerals, 1971).	Forest River (U.S. Army Corps of Engineers). Gaging stations 05083600 05084000 05084500 05085000 05088000 05088500 05089000 05090000 05092000 Park River (U.S. Army Corps of Engineers). Red River (U.S. Army Corps of Engineers).		Forest River (U.S. Army Corps of Engineers). Park River (U.S. Army Corps of Engineers). Red River (U.S. Army Corps of Engineers).			

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

FLOOD HAZARD AREA: Walsh County--Continued

Additional flood hazard information for Walsh County is contained in table 1 under Fordville and Hoople.

FLOOD HAZARD AREA: Harvey

COUNTY: Wells

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
05054500--Sheyenne River above Harvey Continuous-record gaging station. Period of record--Sept. 1955 through Sept. 1982: 04/20/79--Stage = 9.45 ft; Discharge = 1,000 ft^3/s. (U.S. Geological Survey, 1959A-82). 05055000--Sheyenne River near Harvey Continuous-record gaging station. Period of record--Oct. 1945 through Sept. 1956: 04/18/50--Stage = 6.62 ft; Discharge = 1,430 ft^3/s. (U.S. Geological Survey, 1959A-82).	Harvey Dam (North Dakota State Water Commission).		Gaging stations 05054500--424 mi^2 of which about 270 mi^2 is noncontributing. 05055000--Approximately 534 mi^2 of which about 360 mi^2 is noncontributing.	Gaging stations 05054500 05055000	

FLOOD HAZARD AREA: Harvey--Continued

COUNTY: Wells

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 Sheyenne River 0052-167.767 0052-168.810 Gaging stations 05054500 05055000	Gaging stations 05054500 05055000	Bridges Sheyenne River 0052-167.767 0052-168.810	Gaging stations 05054500 05055000	Additional information: Street and gutter elevations (Wold Engineering, PC). Flood Hazard Boundary Map (1:12,000): City of Harvey (U.S. Department of Housing and Urban Development, 1976C). Soil survey map: Wells County (U.S. Department of Agriculture, 1960A). Topographic map (1:24,000): Harvey (U.S. Geological Survey).	1:7,920 (Local Agriculture Stabilization and Conservation Service). Some photographs (City of Harvey).

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

FLOOD HAZARD AREA: Tioga

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
06331900--White Earth River tributary near Tioga Crest-stage gaging station. Period of record--Sept. 1959 through Sept. 1973: 06/11/62--Stage = 13.7 ft; Discharge = 1,120 ft^3/s. (U.S. Geological Survey, 1959A-82).	Drain system which flows through town (North Dakota State Water Commission). Tioga Dam (North Dakota State Water Commission).	Log-Pearson type III frequency analysis for gaging station 06331900; 50-year recurrence interval--Discharge = 1,440 ft^3/s (Crosby, 1975).	Gaging station 06331900--9.55 mi^2. 10 mi^2 for drain (North Dakota State Water Commission).	Gaging station 06331900	TR-20 model for drain (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 53-153-17 53-154-18 0040-002.861 0040-004.426	Gaging station 06331900	Bridges Unnamed creeks 53-153-17 53-154-18 0040-002.861 0040-004.426	Gaging station 06331900	Topographic map (1:24,000): Tioga (U.S. Geological Survey).	1:7,920--05/19/81 (Horizon, 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: Williston

COUNTY: Williams

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
06330000--Missouri River near Williston Continuous-record gaging station. Period of record for stage/discharge--Oct. 1897 through July 1965. Period of record for gage height only--Apr. 1966 through Sept. 1982: 04/04/30--Stage = 18.6 ft; Discharge = 231,000 ft^3/s. (U.S. Geological Survey, 1959A-82). 06330100--Sand Creek at Williston Partial-record gaging station. Period of record--Nov. 1954 through 1973: 03/ /60--Stage = 9 ft; Discharge = 1,600 ft^3/s. (U.S. Geological Survey, 1959A-82). 06331000--Little Muddy River below Cow Creek near Williston Continuous-record gaging station. Period of record--May 1954 through Sept. 1982: 04/18/79--Stage = 12.77 ft; Discharge = 9,180 ft^3/s. (U.S. Geological Survey, 1959A-82).	Levee system on Little Muddy River (U.S. Army Corps of Engineers, 1983A). Levee system on Missouri River (U.S. Army Corps of Engineers, 1983A). Some regulation of Little Muddy River by Lake Zahl (U.S. Fish and Wildlife Service). Stage of Missouri River is regulated by upstream reservoirs and by backwater from Garrison Dam (U.S. Army Corps of Engineers).	Log-Pearson type III frequency analysis for gaging station 06330100; 50-year recurrence interval--Discharge = 2,320 ft^3/s (Crosby, 1975).	Gaging stations 06330000--Approximately 164,500 mi^2. 06330100--38.2 mi^2. 06331000--Approximately 875 mi^2 of which about 100 mi^2 is noncontributing. 06331500--875 mi^2 of which about 100 mi^2 is noncontributing.	Gaging stations 06330000 06330100 06331000 06331500	

DESCRIPTION	WATERSHED CHANGES AND SPECIAL PROBLEMS	HYDROLOGIC DATA			
		Frequency analysis	Drainage area	Discharge	Runoff model analysis
06331500--Little Muddy Creek near Williston Continuous-record gaging station. Period of record--May 1904 through Apr. 1909, July 1932 through July 1933, and Apr. 1946 through Sept. 1954: 06/24/53--Stage = 13 ft; Discharge = 2,820 ft^3/s. (U.S. Geological Survey, 1959A-82).					

FLOOD HAZARD AREA: Williston--Continued

COUNTY: Williams

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 Chinaman Coulee 53-121-31 0085-202.901 Little Muddy Creek 53-122-30 Sand Creek 53-117-32 53-119-34 53-119-33 0002-018.346L 0002-018.351R Unnamed creek 53-121-30 Cross-section data for Chinaman Coulee (City of Williston). Cross-section data for Sand Creek (City of Williston). Gaging station 06330100--Bridge opening.	Gaging stations 06330000 06330100 06331000 06331500	Bridges Chinaman Coulee 53-121-31 0085-202.901 Little Muddy Creek 53-122-30 Sand Creek 53-117-32 53-119-34 53-119-33 0002-018.346L 0002-018.351R Unnamed creek 53-121-30 Cross-section data for Chinaman Coulee (City of Williston). Cross-section data for Sand Creek (City of Williston).	Gaging stations 06330000 06330100 06331000 06331500	Flood prone map (1:24,000): Williston East (U.S. Geological Survey). Flood prone map (1:24,000): Williston West (U.S. Geological Survey). Topographic maps (1:24,000): Williston East and Williston West (U.S. Geological Survey).	1:28,800--05/19/81 and 1:10,200--03/12/81 (Horizon, Inc.). 1:7,920 (Local Agriculture Stabilization and Conservation Service). Contact and high level (City of Williston).

ADEQUACY	If additional hydraulic data are obtained for the Missouri River and Little Muddy River, then there should be adequate data to prepare appropriate technical information for flood plain management of these flood plains. If hydrologic data are obtained for Chinaman Coulee, then there should be adequate data to prepare appropriate technical information for flood plain management. There should be adequate data to prepare appropriate technical information for flood plain management of Sand Creek.

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

---

Barnes County Highway Department
County Engineer
115 10th Avenue NW
Valley City, ND 58072
(701) 845-1861

Center Township Board
Robert Buck
Rural Route 2, Box 158
Wahpeton, ND 58075
(701) 642-8105

City of Aneta
John Hillesland, Sr., Mayor
Aneta, ND 58212
(701) 326-4505

City of Harvey
Harvey City Hall
120 West 8th Street
Harvey, ND 58341
(701) 324-2000

City of Lidgerwood
Robert Fust, Mayor
Box 404
Lidgerwood, ND 58053
(701) 538-4933

City of Milnor
Harold L. Johnson, Mayor
Milnor City Hall
312 5th Avenue
Milnor, ND 58060
(701) 427-5261

City of Wahpeton
City Engineer
Wahpeton City Hall
Wahpeton, ND 58075
(701) 642-6565

City of Williston
Phillip G. Epping, City Engineer
Williston City Hall
P.O. Box 1306
Williston, ND 58801
(701) 572-8161

Devils Lake City Engineer
423 6th Street
Devils Lake, ND 58301
(701) 662-4098

Edmore City Auditor
Joan Viger
Edmore, ND 58330
(701) 644-2473

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

Houston Engineering, Inc.
2505 North University Drive
Fargo, ND 58102
(701) 237-5065

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

Richmond Engineering, Inc.
919 North 6th
Grand Forks, ND 58201
(701) 775-3978

Southeast Cass County Drain Board
Howard Emerson, Chairman
American Healthcare Center
1315 South University Drive
Fargo, ND 58102
(701) 235-6578

Toltz, King, Duvall, Anderson,
and Associates, Inc.
1200 Missouri Avenue
Bismarck, ND 58501
(701) 258-7077

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. 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

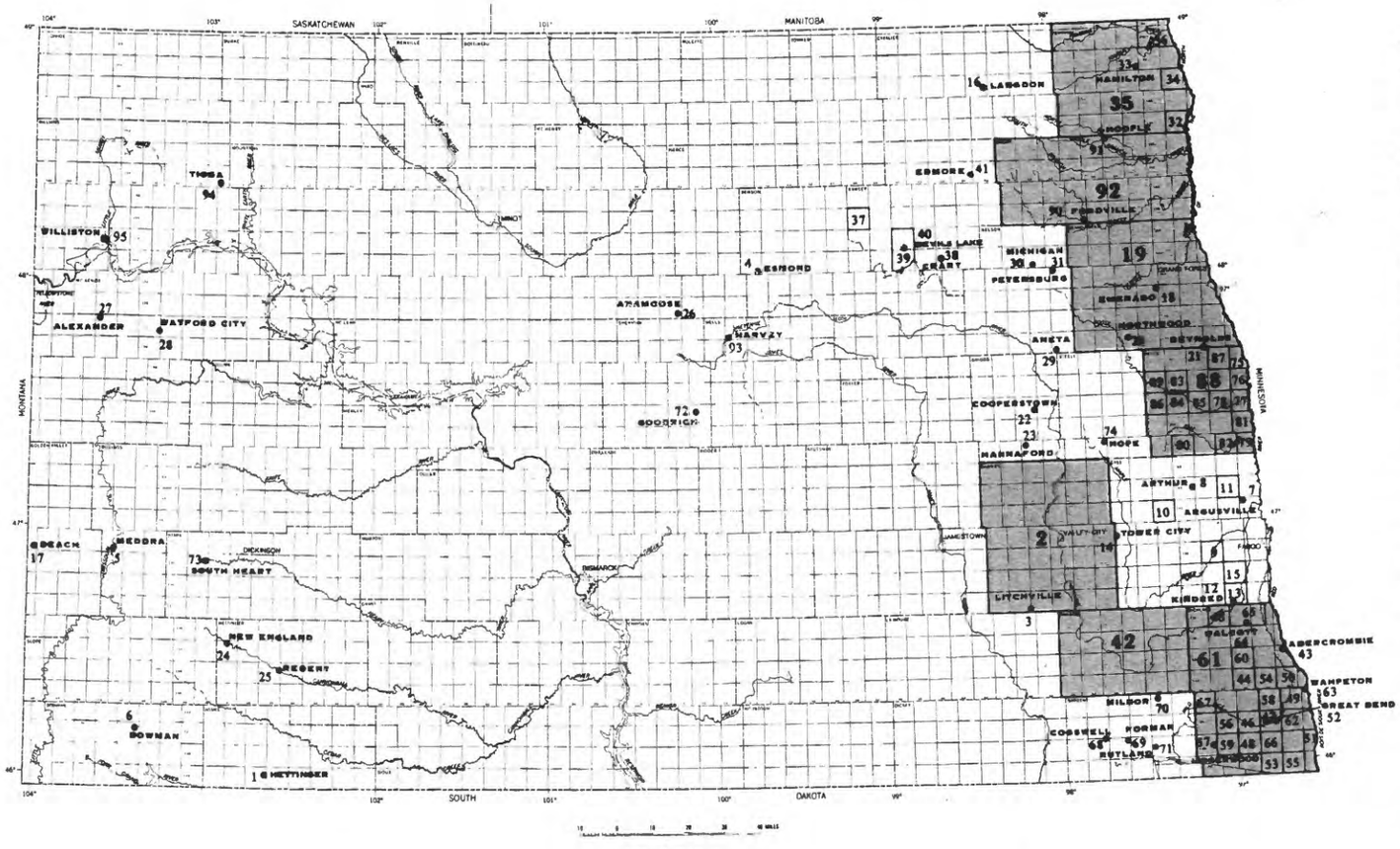
Veigel Engineering
Highway 10 East
Dickinson, ND 58601
(701) 227-1284

Webster, Foster, and Weston
1616 State Mill Road
Grand Forks, ND 58201
(701) 775-8118

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

Wyndmere Township Board
William Krause
Wyndmere, ND 58081
(701) 439-2936

84-53



GOVERNMENTAL UNITS

ADAMS COUNTY
1. HETTINGER

BARNES COUNTY
2. BARNES COUNTY
3. LITCHVILLE

BENSON COUNTY
4. ESMOND

BILLINGS COUNTY
5. MEDORA

BOWMAN COUNTY
6 BOWMAN

CASS COUNTY
7. ARGUSVILLE
8. ARTHUR
9. DURBIN TOWNSHIP
10. EMPIRE TOWNSHIP
11. GARDNER TOWNSHIP
12. KINDRED
13. NORMANNA TOWNSHIP
14. TOWER CITY
15. WARREN TOWNSHIP

CAVALIER COUNTY
16. LANGDON

GOLDEN VALLEY COUNTY
17. BEACH

GRAND FORKS COUNTY
18. EMERADO
19. GRAND FORKS COUNTY
20. NORTHWOOD
21. REYNOLDS

GRIGGS COUNTY
22. COOPERSTOWN
23. HANNAFORD

HETTINGER COUNTY
24. NEW ENGLAND
25. REGENT

McHENRY COUNTY
26. ANAMOOSE

McKENZIE COUNTY
27. ALEXANDER
28. WATFORD CITY

NELSON COUNTY
29. ANETA
30. MICHIGAN
31. PETERSBURG

PEMBINA COUNTY
32. DRAYTON TOWNSHIP
33. HAMILTON
34. JOLIETTE TOWNSHIP
35. PEMBINA COUNTY
36. PEMBINA TOWNSHIP

RAMSEY COUNTY
37. COULEE TOWNSHIP
38. CRARY
39. CREEL TOWNSHIP
40. DEVILS LAKE
41. EDMORE

RANSOM COUNTY
42. RANSOM COUNTY

RICHLAND COUNTY
43. ABERCROMBIE
44. ANTELOPE TOWNSHIP
45. BARRIE TOWNSHIP
46. BELFORD TOWNSHIP
47. BRANDENBURG TOWNSHIP
48. BRIGHTWOOD TOWNSHIP
49. CENTER TOWNSHIP
50. DWIGHT TOWNSHIP
51. FAIRMOUNT TOWNSHIP
52. GREAT BEND
53. GREENDALE TOWNSHIP
54. IBSEN TOWNSHIP
55. LaMARS TOWNSHIP
56. LIBERTY GROVE TOWNSHIP
57. LIDGERWOOD
58. MOORETON TOWNSHIP
59. MORAN TOWNSHIP
60. NANSEN TOWNSHIP
61. RICHLAND COUNTY
62 SUMMIT TOWNSHIP
63. WAHPETON
64. WALCOTT
65. WALCOTT TOWNSHIP
66. WALDO TOWNSHIP
67. WYNDMERE TOWNSHIP

SARGENT COUNTY
68. COGSWELL
69. FORMAN
70. MILNOR
71. RUTLAND

SHERIDAN COUNTY
72. GOODRICH

STARK COUNTY
73. SOUTH HEART

STEELE COUNTY
74. HOPE

TRAILL COUNTY
75. BELMONT TOWNSHIP
76. BINGHAM TOWNSHIP
77. CALEDONIA TOWNSHIP
78. ELDORADO TOWNSHIP
79. ELM RIVER TOWNSHIP
80 GREENFIELD TOWNSHIP
81. HERBURG TOWNSHIP
82. KELSO TOWNSHIP
83. LINDAAS TOWNSHIP
84. MAYVILLE TOWNSHIP
85. NORWAY TOWNSHIP
86. ROSEVILLE TOWNSHIP
87. STAVANGER TOWNSHIP
88. TRAILL COUNTY
89. VIKING TOWNSHIP

WALSH COUNTY
90 FORDVILLE
91. HOOPLE
92. WALSH COUNTY

WELLS COUNTY
93. HARVEY

WILLIAMS COUNTY
94. TIOGA
95. WILLISTON

FIGURE 1.—Locations of governmental units surveyed for flood hazard information.