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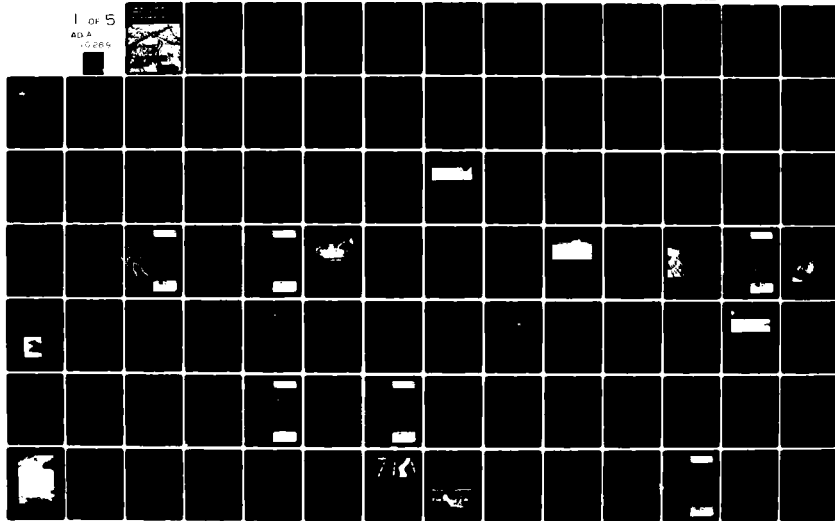
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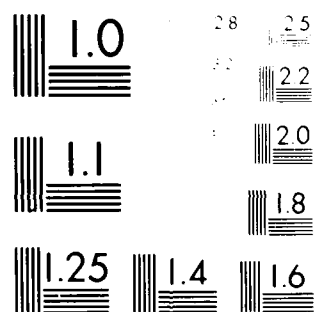
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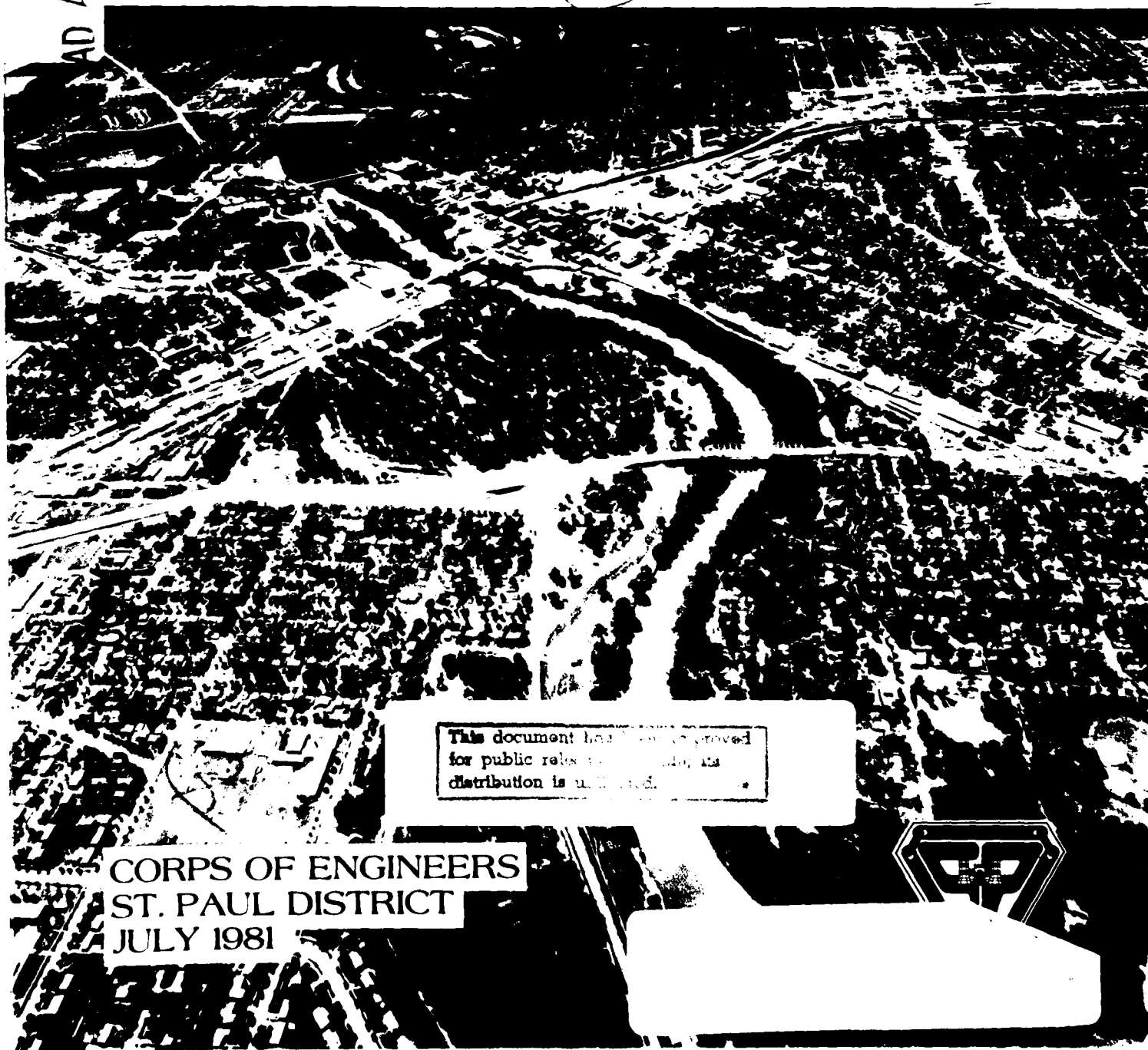
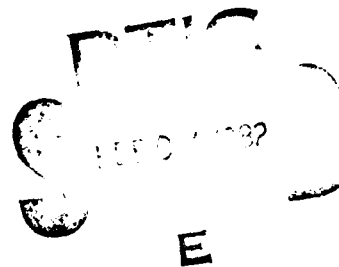
GRAND FORKS - EAST GRAND FORKS
URBAN WATER RESOURCES STUDY

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BACKGROUND INFORMATION APPENDIX

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JULY 1981



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for the urban study. Major topics include the study process and organization; specific water resource-related concerns, issues, needs, and objectives and the study area's physiography, ecology and cultural elements. This background information was used by planners, engineers and biologists to aid in the formulation, impact assessment, and evaluation of alternative solutions to the study area's water resource problems.

This document is one of ten constituting the Grand Forks-East Grand Forks urban study report:

- Summary report
- Background Information Appendix
- Plan Formulation Appendix
- Water Supply Appendix
- Wastewater Management Appendix
- Flood Control and Urban Drainage Appendix
- Flood Emergency Plan for East Grand Forks, North Dakota
- City of East Grand Forks, Minnesota, Civil Defense Flood Fight Plan
- Energy Conservation and Recreation Appendix/ Public Involvement Appendix
- Comments Appendix

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PREFACE

The Corps of Engineers' Urban Study Program is aimed at providing planning assistance to local interests in a variety of water resource and related land resource areas, including water supply, wastewater management, flood control, navigation, shoreline erosion, and recreation. In areas of traditional Corps responsibility (such as flood control), the Corps may implement and construct projects shown feasible in the urban study. In other areas (such as wastewater management), Corps involvement carries only through the planning stage; findings are turned over to local interests for incorporation into their broad urban comprehensive planning effort. Implementation is at the discretion of local interests in conjunction with appropriate State and Federal agencies.

The St. Paul District, Corps of Engineers, conducted the Grand Forks-East Grand Forks (GF/EGF) Urban Water Resources Study, which was a cooperative effort between local, State, and Federal agencies. The GF/EGF urban study spanned a time of transition in the Corps' urban study program. In mid-1978, directives were issued deleting the third and last stage of urban studies. At that time, the second stage of the GF/EGF urban study was nearing completion, but commitments for stage 3 studies had been made to local interests and involved State and Federal agencies. Therefore, the GF/EGF urban study was allowed to proceed to stage 3.

During the first stage, the 14-township study area was selected, broad topical problems to be addressed (water supply, wastewater management, and flood control) were identified, and a "plan of study" was developed. The plan of study outlined the general approach the study would follow. During stage 2, the topical problems were broken down into explicit problem areas. Investigators formulated a broad array of alternatives to solve the study area's problems. The alternatives were evaluated to eliminate those which were not suitable or cost effective. The stage 3 study examined in detail those alternatives that passed the stage 2 screening. Alternatives were reassessed to determine their respective cost effectiveness and environmental/social impacts.

This particular document is 1 of 11 constituting the GF/EGF urban study report:

Summary Report

Background Information Appendix

Plan Formulation Appendix

Water Supply Appendix

Wastewater Management Appendix

Flood Control and Urban Drainage Appendix

Flood Emergency Plan for Grand Forks, North Dakota

City of East Grand Forks, Minnesota, Civil Defense Flood Fight Plan

Energy Conservation and Recreation Appendix

Public Involvement Appendix

Comments Appendix

The Background Information Appendix describes the framework and basis for the urban study. Major topics include the study process and organization; specific water resource-related concerns, issues, needs, and objectives; and the study area's physiography, ecology, and cultural elements. The bulk of the material was presented in the Stage 2 Background Information Appendix; this document updates the stage 2 material.

This background information was used by planners, engineers, biologists, and other study participants to aid in the formulation, impact assessment, and evaluation of alternative solutions to the study area's water resource-related problems. This appendix and the other documents that constitute the urban study's final report will continue to be a valuable source of data.

BACKGROUND INFORMATION APPENDIX

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PURPOSE AND AUTHORITY

The Grand Forks-East Grand Forks Urban Water Resources Study was an interim study - part of the overall Red River of the North Basin Study. The study was based on the needs of local officials for early solutions to flood control, water supply, and wastewater problems. The study was authorized by a resolution of the Committee on Public Works, United States Senate, 93d Congress, 2d Session, adopted on 30 September 1974 at the request of Senator Quentin N. Burdick of North Dakota. The resolution reads as follows:

"RESOLVED BY THE COMMITTEE ON PUBLIC WORKS OF THE UNITED STATES SENATE, That the Board of Engineers for Rivers and Harbors be, and is hereby, requested to review reports on the Red River of the North Drainage Basin, Minnesota, South Dakota, and North Dakota, submitted in House Document Numbered 185, 81st Congress, 1st Session, and prior reports, with a view to determining if the recommendations contained therein should be modified at this time, with particular reference to flood control, water supply, waste water management and allied purposes."

SCOPE OF STUDY

The study area encompassed Grand Forks, North Dakota, and East Grand Forks, Minnesota, and included the Grand Forks Air Force Base 15 miles west of Grand Forks (see the following figure). The boundaries for the study area were established by a combination of climatic, physical, biological, and socioeconomic characteristics which distinguish the area from the surrounding region. In particular, the 14 townships within the study area are united by common water resource management problems and goals.

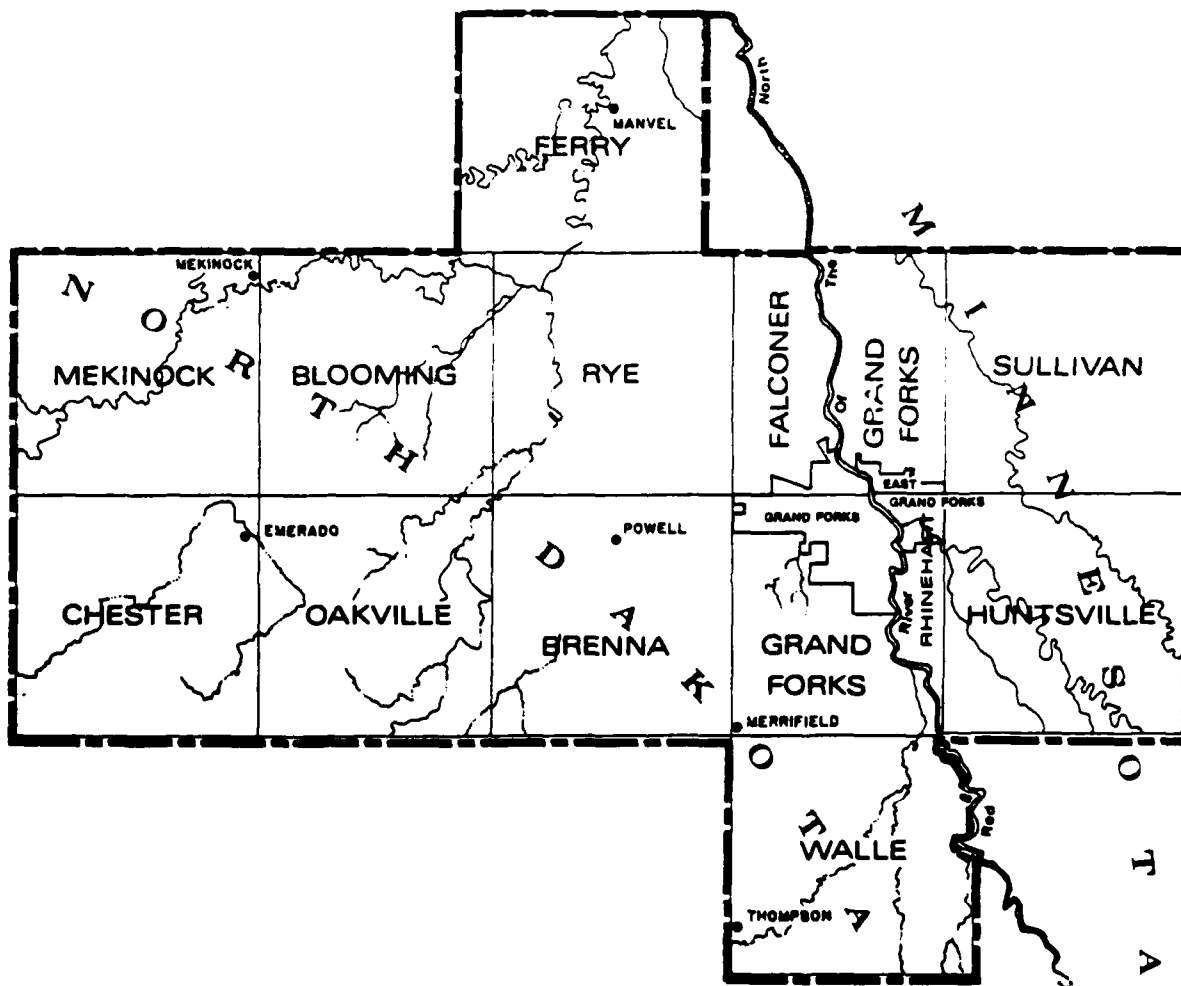
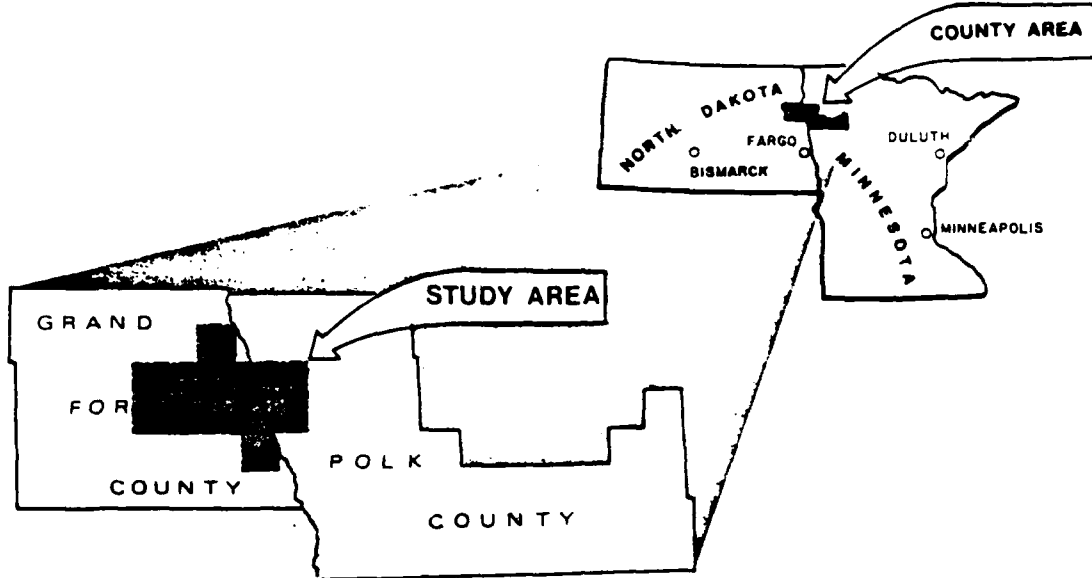


FIGURE 1 - Study Area

The goal of the study was to develop plans which offer a realistic prospect for solving specific urban water resource problems and serve as a catalyst for solving other related urban problems. The plans were developed with public input and were consistent with the national objectives of national economic development (NED) and environmental quality (EQ).

To achieve the national objectives, the urban study's water resource plans:

1. Addressed the specific water resource problems, issues, and concerns of the region.
2. Are flexible to accommodate changing economic, social, and environmental patterns and new technologies.
3. Were integrated with other urban development and management programs.
4. Were coordinated with affected agencies at all levels.
5. Were developed through an orderly, structured, and open planning process.
6. Are implementable with respect to financial and institutional capabilities and public acceptance.
7. Are acceptable to affected States, local governmental entities, and appropriate Federal agencies.

STUDY PARTICIPANTS AND COORDINATION

The agencies and groups participating in the Grand Forks-East Grand Forks Urban Water Resources Study represented a broad spectrum of public involvement. Details of the public involvement process are presented in the Public Involvement Appendix.

The study participants were organized into three specific units - the executive group, the study work group, and the citizens committee, as shown on the following figure. All members of these groups, both former and current, are listed to give credit to everyone who has contributed to the success of the urban study through participation in the study process.

EXECUTIVE GROUP

The executive group was chaired by the St. Paul District Engineer who had the final responsibility for the administration and management of the study. The executive group was responsible for making policy decisions and directing the general course of the study.

STUDY WORK GROUP

The study work group, chaired by the Corps study manager, was composed of the Corps of Engineers study team and the agency committee. The agency committee included staff level members of agencies in the executive group and other agencies involved in the study.

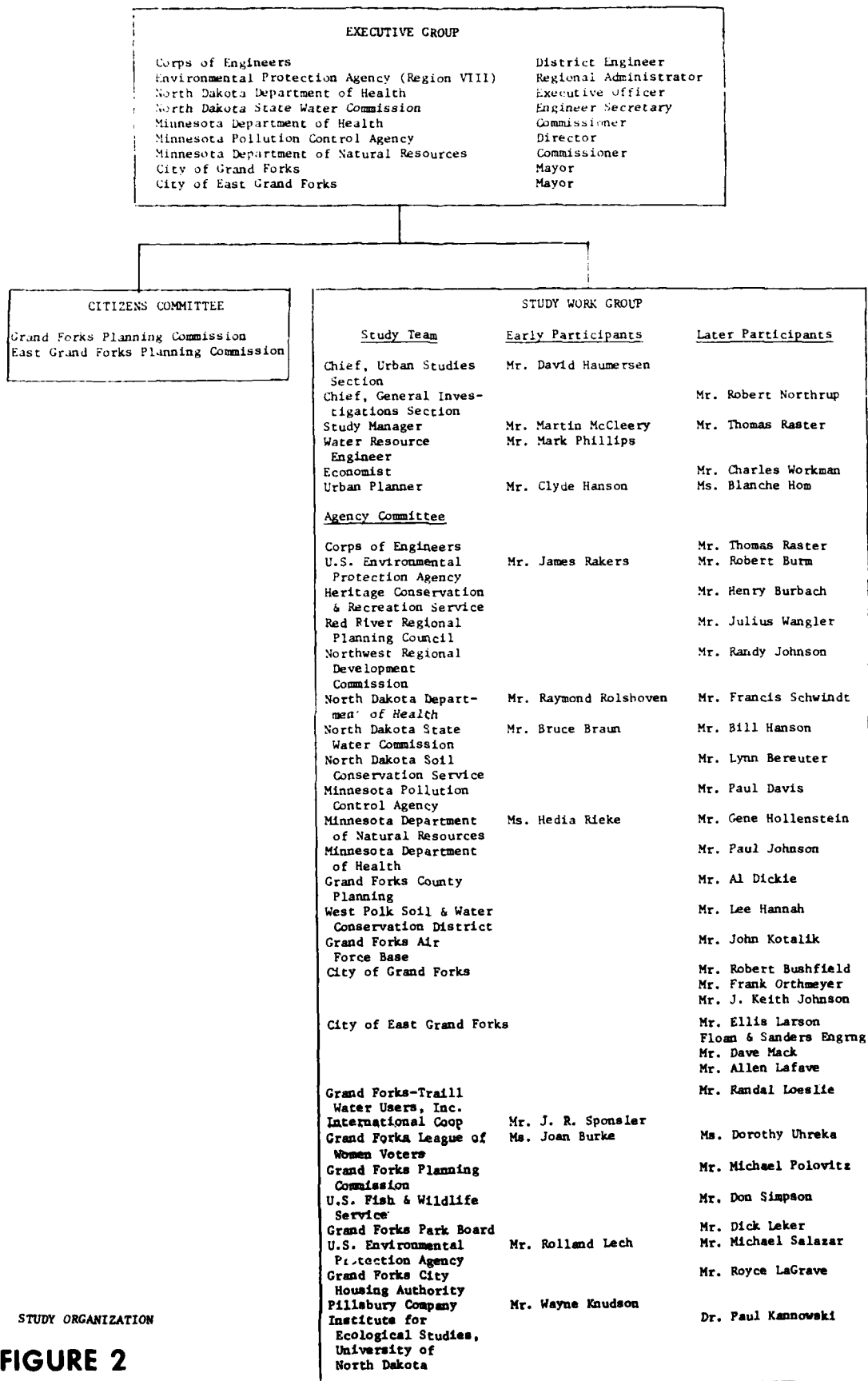
Study Team

The St. Paul District had an interdisciplinary urban studies team which included the following individuals either full time or on an "as required" basis: study manager, water resource planner, sanitary engineer, hydrologist, hydraulic engineer, economist, environmental planner, and design engineer. The study team was responsible for conducting the study.

Agency Committee

The agency committee:

1. Maintained liaison with each member's agency or special interest group to ensure that study activities were conducted in accordance with agency policies and that no duplication of effort took place.



STUDY ORGANIZATION

FIGURE 2

2. Designated task group members for the water supply, wastewater, and flood control investigations. The task groups reviewed scopes of work and contractor draft reports, monitored study progress, and offered suggestions regarding alternative plans and implementation strategies.

3. Participated in public meetings, workshops, seminars, and other activities of the public involvement program.

CITIZENS COMMITTEE

The two planning commissions from Grand Forks and East Grand Forks were appointed by their respective mayors to represent their communities on the citizens committee. The purpose of this committee was to assist the study work group in developing public understanding of the investigation processes and advise the study work group of study area desires concerning water resource development.

THE STUDY PROCESS AND REPORTS

The general planning process included the following steps: (1) gather available data from ongoing studies related to water resources, (2) assess existing water problems, (3) project water resource needs, (4) develop a program to meet those needs, and (5) provide alternative plans and programs needed by local governments to manage the water resources in the study area.

The study process was divided into three stages, each of which included four iterative planning tasks. The size of each planning box shown on the following figure represents the relative amount of study effort allotted to each task.

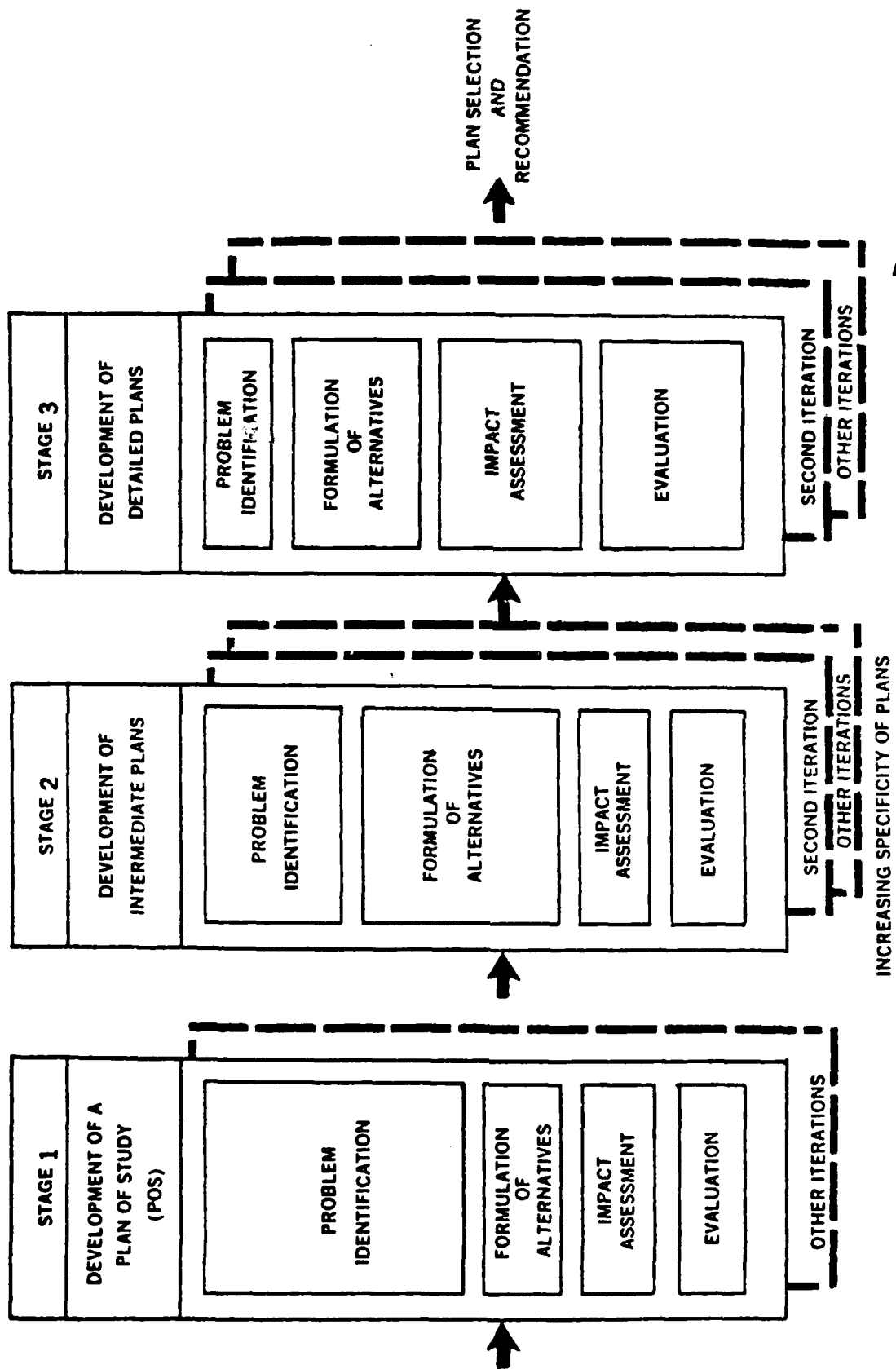


FIGURE 3 General Relationship of Plan Development Stages and Functional Planning Tasks.

The product of stage 1 was a plan of study which delineated the scope and objectives of the study. Specific constraints, procedures for subsequent planning, and identification of water resource problems were contained in this report.

Stage 2 concentrated on a more thorough analysis of the identified problems and development of a preliminary range of alternative solutions. The results of stage 2 included the draft technical appendixes and the draft Background Information Appendix.

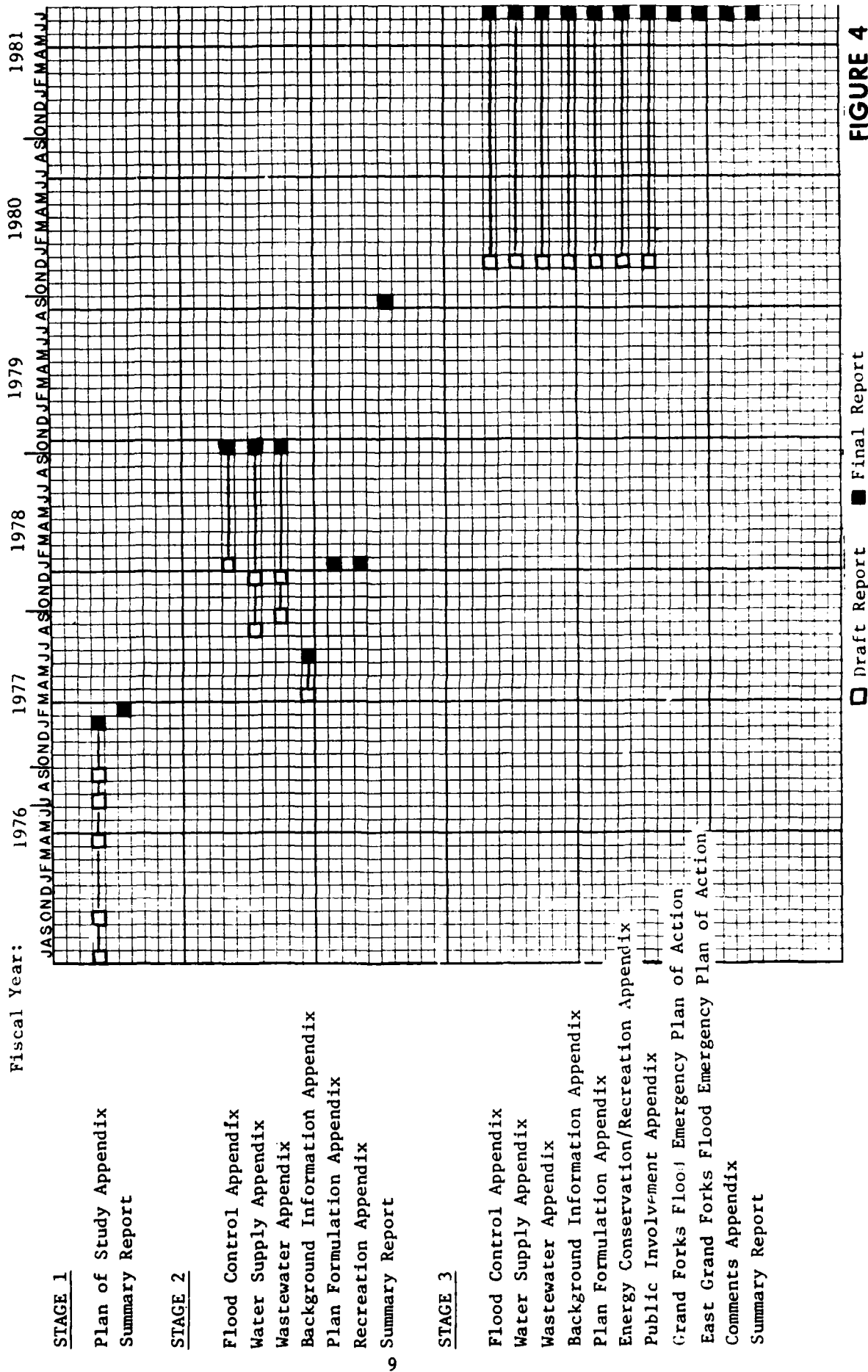
This appendix discusses the study area's water resource problems, issues, needs, and concerns; desired future conditions; and the physiographic, biological, cultural, and economic characteristics. This information was provided to assist planners in (1) defining social and environmental problems on both a regional and local basis, (2) creating alternative water and related land resource development plans, (3) analyzing environmental and social impacts of alternative plans, (4) preparing environmental impact statements, (5) identifying deficiencies in data where further investigation was needed, and (6) identifying credible sources of information.

Stage 3 of the study process concentrated on developing an increasing level of detail on a decreasing number of alternative plans. The end product of stage 3 was the final report offering viable plans for solving water resource and related urban problems.

The following figure shows the timetable of document submission during each stage of the study.

Figure 4 - GRAND FORKS - EAST GRAND FORKS URBAN WATER RESOURCES STUDY

SCHEDULE OF DOCUMENTS



IDENTIFICATION OF SPECIFIC PROBLEMS, NEEDS, AND CONCERNS

The following assessment of the study area's problems, needs, issues, concerns, and desired future conditions was prepared early in the study and, therefore, represents the original viewpoint of study participants. Conditions have changed, but it is reprinted here to provide the reader with an understanding of the purposes and goals that originally motivated the study.

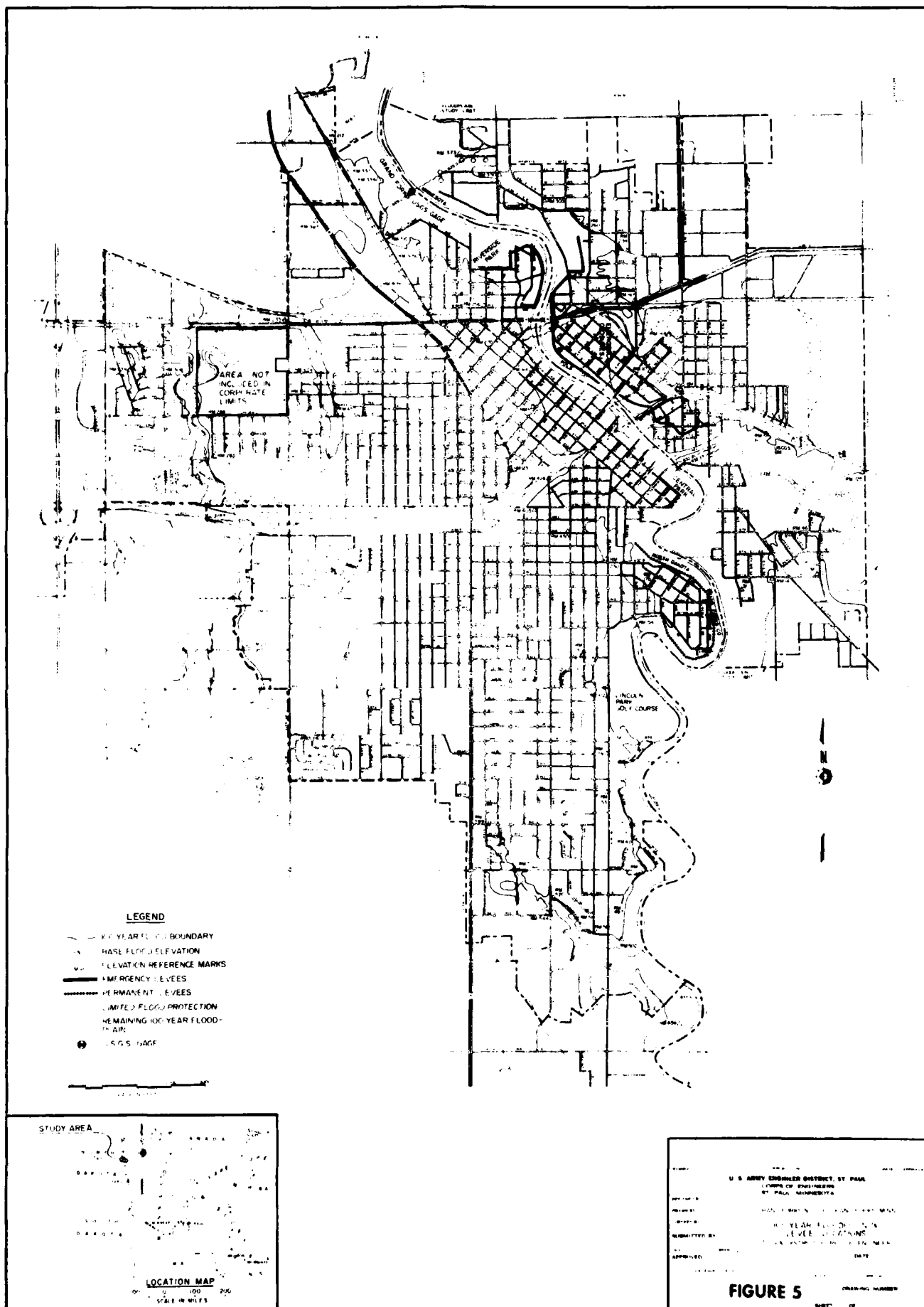
PROBLEMS AND NEEDS

Flood Control and Floodplain Management

Grand Forks and East Grand Forks are located along the Red River of the North approximately 298 miles (480 km) above the river mouth. The Red Lake River joins the Red River of the North at East Grand Forks. Another drainage source - English Coulee - flows into the Red River of the North and adjoins Grand Forks on the northwest corner of the city. The floodplains of these three major drainage sources experience frequent and coincidental flooding in the study area. Flooding along the lower reaches of English Coulee has frequently caused damages to urban and rural property. Floodplain areas in the study area, but outside the Grand Forks-East Grand Forks city limits, are subject to agricultural flooding.

Much residential property in both cities has been inundated by past floods. Nearly all downtown commercial areas have experienced severe basement and some first-floor flooding problems. Both cities have authorized Federal levee projects. The authorized levee for East Grand Forks lacked local financial cooperation and was never constructed. The Lincoln Park levee in Grand Forks protects against a flood having a 1-percent chance of being exceeded during any given year.

Both cities have emergency levees that were constructed by the Corps of Engineers. The levees (shown in the following figure) were built in 1969, 1971, and 1975 with Public Law 99 funds. The emergency levees in East Grand Forks were generally constructed along the proposed 1953 Definite Project Report alignment. The levee designs are considered



inadequate, and the levees were not constructed with properly compacted material. The emergency levees, owned and maintained by the cities, experience considerable slippage and cracking and are difficult to maintain. The existing project and emergency levees would be overtopped by the standard project and intermediate regional (1-percent chance) floods.

The most frequently flooded area in Grand Forks is a residential area near Central Park. The city is trying to improve this area through zoning and relocation. Over 2,600 residential, commercial, and public buildings are subject to direct flooding from the administratively agreed-upon intermediate regional flood (the 1-percent chance flood). In East Grand Forks, 977 buildings are subject to direct flooding from the 1-percent flood. Indirect flooding (sewer backup and basement flooding) from the 1-percent flood would affect over 2,600 additional buildings in Grand Forks and nearly 600 buildings in East Grand Forks. The downtown area is most frequently affected by indirect flooding.

Wastewater Management

The existing Grand Forks wastewater treatment facility meets State and Federal effluent regulations but is considered inadequate from a hydraulic standpoint. Based on a present-day flow, storage of 110 days is available between the 2- and 5-foot levels. Depths are often increased to 6 feet or more to maintain adequate treatment.

The Grand Forks sewage collection system consists of approximately 110 miles of sanitary sewer. The system appears to be in good condition; however, infiltration and inflow do occur. Approximately 35 percent of the Grand Forks system is served by combined sewers designed for capacities of only two to five times the average dry weather flow. Overflows occur nearly every time it rains, discharging sewage solids, bacteria, viruses, and other pollutants into the Red River of the North. Appreciable amounts of stormwater also enter the sewage treatment lagoon, putting an

additional burden on pumping stations and lagoon capacities. Lack of capacity in the collection system results in basement flooding in certain areas. During severe spring flooding, combined sewers are surcharged in wide areas which can cause basement flooding and/or structural damage to basements as well as the collection system.

The newer sections of Grand Forks are served by separate storm and sanitary sewer systems. The storm sewers empty into the Red River of the North and English Coulee. Storm drainage is not treated and significant concentrations of dirt, sand, salt, urban fertilizers, and other pollutants are dumped into these waterways. No areawide stormwater drainage plan exists for the fringe area of Grand Forks.

Grand Forks is an expanding community and its sewage facilities are becoming overloaded. The results of discharging insufficiently treated sewage are considered detrimental to the city from an ecological and public health standpoint. To avert potential problems, Grand Forks has recently completed a U.S. Environmental Protection Agency Section 201 facilities plan under a sewage treatment facility grant of \$45,000 (75 percent of estimated eligible project costs). The scope of the Section 201 facilities plan provides basic guidelines for immediate and short-range development of the city's sewage collection, transportation, treatment, and disposal systems with provisions to expand the facilities to meet U.S. Environmental Protection Agency requirements.

The city will implement one of the alternative facilities plans in the immediate future. The selected plan will include addition of a lagoon area, industrial monitoring stations, modifications to the existing collection system, repairs and additions to the existing outfall system, and a recommendation for combined sewer separation. However, the facilities plan does not consider the concept of an areawide plan. An areawide wastewater management plan should be developed as a potential alternative for consideration by Grand Forks in upcoming wastewater management decisions.

East Grand Forks has experienced significant industrial, commercial, institutional, and residential growth over the past 4 years. American Crystal Sugar Company is currently involved in a plant expansion program

that will double its production capabilities in East Grand Forks. Other commercial and institutional developments include new motels, proposed annexation to the city, and expansion of nursing home and vocational-technical institute facilities. Residential growth from January 1975 through October 1976 included permits for 121 single-family homes, 9 duplexes, and 9 apartment buildings averaging 8 units each.

American Crystal Sugar Company is the major industry in East Grand Forks and contributes approximately 40,000 gpd (gallons per day) sanitary and cooling water to the municipal lagoon system. Nine potato washing plants, four of which are currently in operation, also discharge into this system. Biochemical oxygen demands of these four facilities range from 60 to 900 ppm (parts per million). Suspended solids range from 500 to 8,000 ppm with a combined effluent loading at 420,000 gpd. Approximately 90 tons per week of settleable solids from the potato washing plants are disposed of in the Grand Forks sanitary landfill or hauled out by private individuals to farms where the solids are separated and used for stock feed.

East Grand Forks has experienced increased use of existing wastewater facilities at peak demand periods during the summer and the facilities have approached design flow. This increased demand on existing facilities is primarily a result of industrial growth in the city. A reevaluation of existing facilities is necessary to provide East Grand Forks with a facilities plan. East Grand Forks is interested in developing a facilities plan as part of the wastewater planning for the urban area.

The Grand Forks Air Force Base anticipates very little expansion of existing wastewater facilities. Some additional control structures and equipment for metering and sampling are planned. An evaluation of existing facilities is necessary to ensure compliance with Environmental Protection Agency requirements and development goals of the area.

Water Supply

Grand Forks and East Grand Forks draw their municipal water supply from the Red River of the North and Red Lake River. Increasing urban population and expansion of agricultural processing industries will significantly increase demands on the current water supply. The projected population growth and industrial expansion projected for the Grand Forks-East Grand Forks area indicate a potential water supply shortage within the foreseeable future. The water supply potentials of the Red River of the North and Red Lake River with additional tributary storage or adjacent basin diversion alternatives need to be studied. Water supply alternatives such as groundwater supply, brackish groundwater desalination, stormwater use, and municipal or industrial water recycling should also be investigated.

ISSUES AND CONCERNS

A further clarification of these general water resource problems has been obtained through efforts by the study team and interested citizens to identify specific local issues and concerns. These issues and concerns are listed below according to problem areas.

Flood Control

- The severity and frequency of floods appear to be increasing.
- Are agricultural levees downstream increasing the flood crests in Grand Forks and East Grand Forks?
- Have the speed and intensity of runoff increased as a result of construction of drainage ditches, tiling of fields, and draining of wetlands by farmers upstream?
- Has silting of the river channel lowered the channel's capacity to carry large volumes of water without flooding?
- Park facilities and plant life have been damaged by flooding.

- Temporary levees constructed in parks have ruined their recreational value.
- Downtown areas of both communities are threatened by flooding.
- Indirect flooding (basement and sewer backup) is a problem in commercial and residential areas.
- Urban runoff floods areas behind city-owned levees.
- Better intergovernmental cooperation to control drainage and manage the floodplain is needed.

Wastewater Management

- Will the capacity of wastewater treatment facilities limit residential and industrial growth?
- Can present wastewater treatment facilities meet future water quality goals?
- Can the dumping of combined sewage into the Red River of the North be stopped?
- Does areawide wastewater management have any advantages?
- Sewage and stormwater backup into homes are serious problems.
- Are present plans to separate storm and sanitary sewers cost effective?
- Is stormwater runoff causing pollution in the Red River of the North?
- Can the existing sewers handle the runoff from developing areas?

Water Supply

- Can the present treatment facilities produce water that meets Federal drinking water standards?
- Will present sources and facilities be adequate with increasing urban population and expansion of agricultural processing industries?

- Will sufficient water be available for domestic and industrial use during periods of low river flows?
- Will the return flows from irrigation projects increase water treatment costs?
- Is a regional system more economical and feasible than individual community systems?
- Will agricultural irrigation affect the availability of local water?
- Can oxbows, drainage ditches, and the Grand Marais Coulee be used to store water during high-flow periods for use during low-flow periods?

DESIRED FUTURE CONDITIONS

Urban studies look closely at water problems in the study area. Major problems are summarized and a wide range of possible alternatives is offered for consideration and discussion by all interested groups. The wise use of water resources is the responsibility of the people in the region and, ultimately, their needs and desires are given primary consideration.

STUDY OBJECTIVES

The objectives of the Grand Forks-East Grand Forks Urban Water Resources Study are to:

1. Provide reduction of stream-related flood damages.
2. Develop a water supply alternative capable of meeting projected future demand and maintaining Federal water quality standards.
3. Develop an adequate wastewater management plan.
4. Provide separation of combined sanitary and stormwater sewers in Grand Forks.
5. Develop urban drainage plans for the Grand Forks metropolitan area.
6. Enhance water-related recreation.
7. Enhance conservation of fish and wildlife resources.

STUDY ELEMENTS

To accomplish these objectives, the following major and supporting studies were part of the urban study. Alternative plans and programs were evaluated to determine which of them offered the best solutions to present and anticipated water resource problems.

Flood Control and Floodplain Management

A comprehensive study was made of the study area flood control needs involving the Red River of the North, Red Lake River, and English Coulee. In stage 2, the feasibility of the authorized flood control project at East Grand Forks was reaffirmed; further studies are being done under the Corps' Phase 1 General Design Memorandum program. Stage 2 and 3 studies considered the feasibility of upgrading the existing Corps-constructed levee/floodwall project at Grand Forks, assessed the feasibility of flood control measures for additional areas, and developed an urban drainage plan for Grand Forks.

Flood control alternatives included nonstructural and structural measures, such as floodwater diversion, impoundments, flood proofing, and evacuation. The urban drainage plan developed for Grand Forks' developing fringe provides guidelines for a drainage system to serve new development areas. Alternative plans included temporary runoff storage to attenuate peak flows and surface drainage changes to reduce the quantity of runoff reaching English Coulee.

Wastewater Management

A comprehensive study was made of the study area's wastewater management needs, particularly those of Grand Forks and East Grand Forks. The studies included review and documentation of information on existing and projected point and nonpoint sources of pollution; existing wastewater treatment facilities and their performance and effluent criteria; areas served by

combined sewers, sanitary sewers, and storm sewers; impact of rainfall events on the sewerage systems of Grand Forks and East Grand Forks; impacts of separate and combined storm sewers, combined sewer overflow, and nonpoint sources as a result of rainfall runoff; impacts of wastewater discharges; projected wastewater flow and load for each treatment facility; and needs for upgrading or expansion.

Additional investigations included:

- Analysis of alternative ways to meet zero-discharge criteria.
- Analysis of potential economic and managerial benefits of regional treatment for Grand Forks and East Grand Forks.
- Sampling and simulation of urban runoff to better define flow and loads from stormwater runoff.
- Analysis of alternative ways to reduce urban runoff loads on surface waters.
- Analysis of alternative methods and growth management options to provide adequate wastewater facilities for urban fringe areas around Grand Forks and East Grand Forks.
- Analysis of the social and environmental impact of continuing the lagoon method of treatment.
- Analysis of the potential use of wastewater as a water supply source to meet urban water supply needs.
- Analysis of ways to reduce odor emissions from lagoons.

Water Supply

A comprehensive study was made of the study area's water supply needs, particularly those of Grand Forks and East Grand Forks. The studies included identification of existing sources of water supply and their capacity, quality, and factors affecting their dependability; projection of future water supply demands; and identification of water supply and treatment needs.

Studies also addressed water supply problems, such as adequacy of water supply sources to satisfy existing and future needs; influence of rural water users association service areas on urban growth; economic and managerial advantages of operating the entire urban water system as one utility; cost to develop alternative supply sources for the study area from wastewater reuse, off-channel storage, or aquifers; timing of construction and cost for optional additions to the present system to meet needs through the year 2030; and development of information on water conservation measures that could be applied in the study area. In addition, a drought emergency plan of action was developed to help communities in the urban study area prepare for a severe water shortage.

Supporting Studies

The following supporting studies were conducted: demographic, institutional, recreation, sewer discharge, and low-flow studies.

The demographic study identified the most probable future for each community in the study area, drawing upon existing information. Population projections were developed on a 10-year basis for the study period 1980-2030. The most probable future (population projections) established the basis for subsequent study and analysis of alternative plans.

An institutional analysis was conducted to gather basic information on existing institutions. The study investigated local, State, and Federal institutions which are directly involved in and have significant authority for carrying out flood control, water supply, and wastewater alternatives. For regional or subregional alternatives, the analysis identified procedures for instituting a bi-State agreement between Minnesota and North Dakota.

The recreation study reviewed available information on land and water recreation facilities and use categories. The product of the study is an inventory of site and area location, size, kinds of recreation activities, and projected recreation demands and needs based on the population projections for the study area.

At the request of the North Dakota State Health Department and the city of Grand Forks, a water quality and quantity survey was conducted on 26 June 1978. The North Dakota State Health Department and the city of Grand Forks provided the personnel and lab services to obtain and analyze field survey samples. The objective of the survey was to evaluate the effects of the combined sewer overflows and stormwater discharges in the urban area.

In coordination with the Red River of the North Basin Study, a low-flow analysis of the Red River of the North main stem and tributaries was initiated early in 1977. Drought frequency and severity for the Grand Forks-East Grand Forks area were determined to assess the capabilities of the Red River of the North, Red Lake River, upstream reservoirs, and existing in-channel storage in the urban area to meet the water needs of the cities during water shortages.

STUDY AREA PROFILE

INTRODUCTION

This study area profile is designed to aid the project planning and assessment by providing an inventory of base-line data on a comprehensive list of social and environmental factors. Included is a compendium of facts and figures about the physiographic, biological, and cultural elements within the Grand Forks-East Grand Forks area.

This background information was developed early in the urban study (1976-1977). Conditions have changed since then, but these base-line data are reprinted here because they represent the background conditions prevailing when the urban study's scope was established.

The base-line data were compiled from field reconnaissances, published sources, work soon to be published, and from interviews with knowledgeable individuals. The collection of new data was not part of the project.

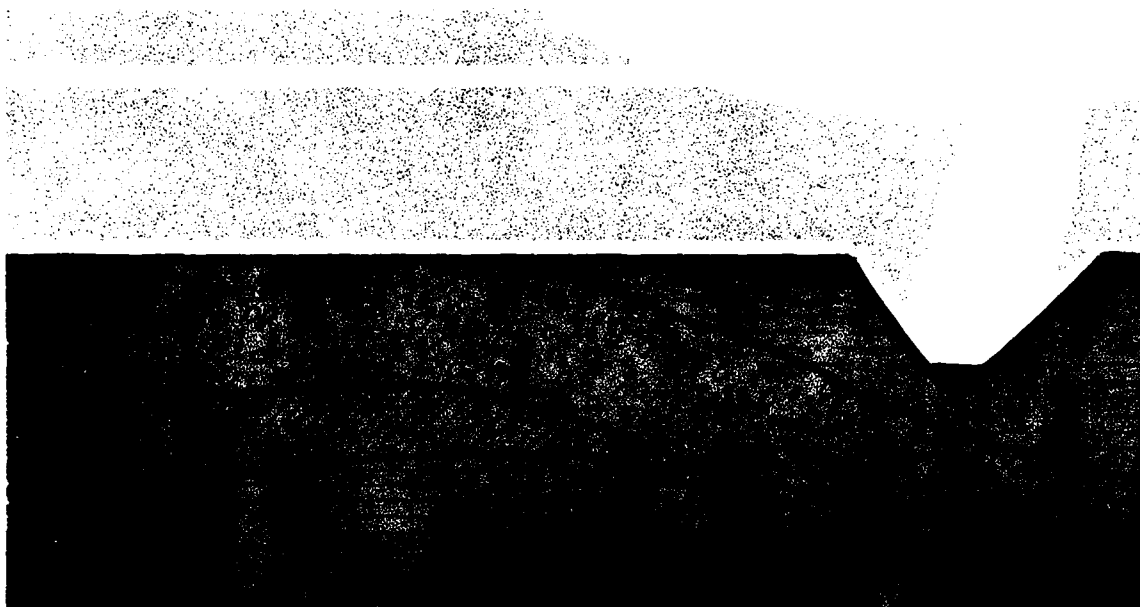
To maximize the usefulness of the profile, most of the base data are contained in displays rather than in general text. Where appropriate, information has been mapped for quick spatial reference. Tables and lists of key published references augment mapped information.

The information was not selected to be of specific interest to the specialists within a discipline; it can only be considered as first-cut or very basic data. An effort was made to make the depth of information on each element consistent throughout the report and to indicate sources of more explicit information for those requiring more detailed data.

The study area profile is divided into three sections. The first deals with the physiography or physical geography of the region. The interactions of geology, soils, mineral resources, water resources, and climate form a base upon which the human activity and natural ecosystems of the region are built. Knowledge of these factors is important for understanding basic problems associated with natural and human environments. Data such as geologic structure, types of soils, existence of mineral resources, and availability of water are important in developing the framework for project planning and assessment and have been included in this report.

The second general category deals with the natural environment. This section includes the definition of the region's basic ecosystems, a list of various wildlife species, enumeration of important and unique environmental areas, and a list of threatened or endangered species.

The final section deals with human cultural elements and is further divided into two subsections: (1) historical elements such as archaeology and the history of the areas and (2) the society of the region, including demographic characteristics, the general location of transport modes, type and location of community facilities, recreational facilities, and industrial and commercial activity. Socioeconomic data include general demographic characteristics, government operations, and "political" or citizen organizations. The demographic data include age, income, population density, and education levels taken from 1970 census data. Information on school districts, general tax levies, and citizen-neighborhood groups has been included to complete the picture of the cultural base.



PHYSIOGRAPHIC ELEMENTS

Geology

Mineral Resources

Soils

Water Resources

Climate

Introduction

**PHYSIOGRAPHIC MAP OF GRAND FORKS - EAST GRAND FORKS
AREA SHOWING SUBSURFACE STRATIGRAPHY**

SOURCE: REFERENCE NO. 1

This preglacial landscape changed extensively with the invasion of the continental ice sheets almost 1 million years ago. Of most significance to the area were the glacial actions during the early and late Wisconsin period, between 70,000 and about 10 to 12,000 years ago. The moraines, outwash plains (Elk Valley), and other deposits in western Grand Forks County, North Dakota, and west-central Polk County, Minnesota, provide visual evidence of these glacial movements.

The last glacier receded from the area about 10 to 12,000 years ago, followed by formation of glacial Lake Agassiz and associated land forms. At its maximum elevation, this glacial lake covered large portions of eastern North Dakota, northwestern Minnesota, and the Canadian Province of Manitoba. Evidence of this ancient lake is seen in the distinct former beach ridges extending in a north-south direction west of Emerado in Grand Forks County, and in a similar direction in west-central Polk County. The pattern of five major beach ridges in Grand Forks County represents successive lake elevations as the lake reached its maximum level, covering about 7,000 square miles in the two-State area (figure 7), then dropped as an outlet was found to the Minnesota River Valley, rose again, and finally drained altogether from the area. What was the former lake bottom is now the very flat, agriculturally productive Red River Valley.

The topography, location, and geologic structure of the Grand Forks-Polk County region place the area in the Central Lowland Province and Western Young Drift Section. Within these regionwide classifications, the study area lies within the Agassiz Lake Plain District, which is further subdivided in Grand Forks County into the Marvel Lowland, Arvilla Slope, and Elk Valley Outwash Areas.

Topographic relief in the lake plain area usually does not exceed 5 feet, with almost imperceptible land slopes toward the Red River in both counties. The terrain in Grand Forks County slopes generally northeastward from about 1060 to 1070 feet above sea level in the western sector to about 800 feet in the northeastern part of the county. Drainage in the area is generally poor. Intermittent streams from the higher plain, together with numerous ditches constructed over the years, extend this drainage to the Red River.

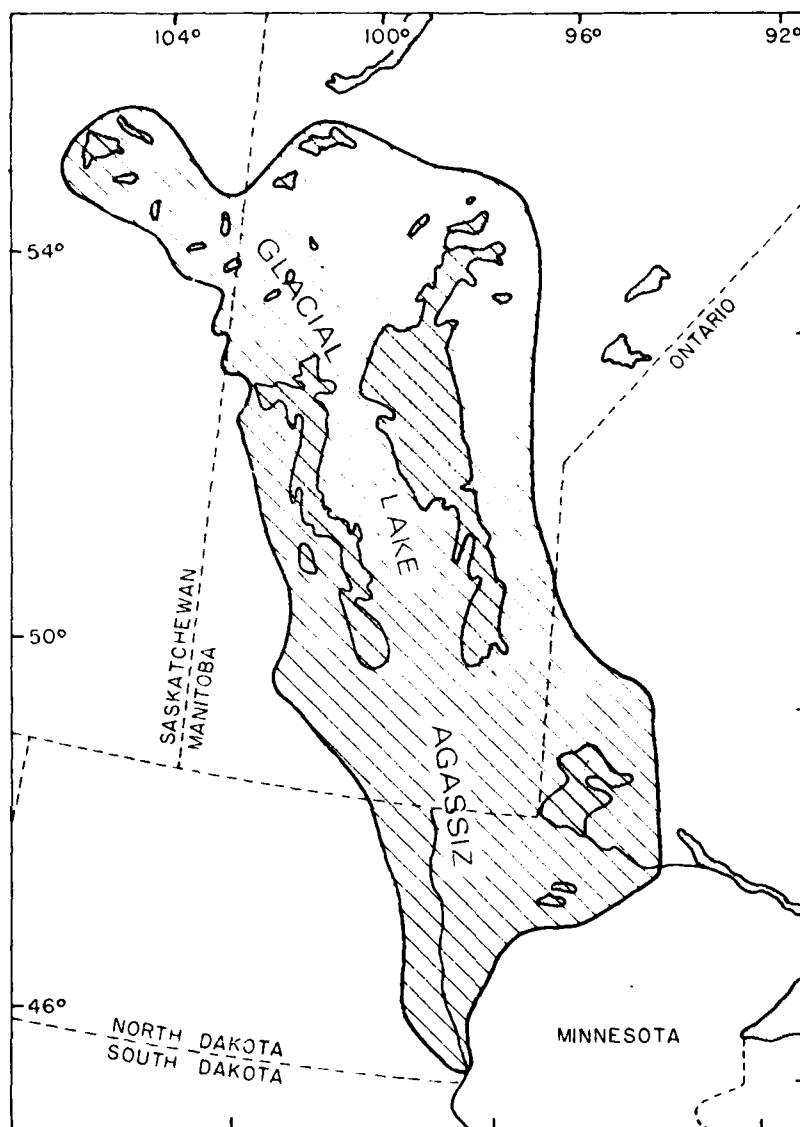


FIGURE 7

**GLACIAL LAKE AGASSIZ
ITS EXTENT AT HIGHEST WATER STAGE**

SOURCE: REFERENCE NO. 5

The Red River of the North, Red Lake River, and underground beach ridge aquifers are the most important water sources in the area. Natural lakes are nonexistent. Although of beneficial use as an area water supply source, the Red and Red Lake Rivers have periodically been the scene of damaging floods. Man has partially succeeded in measures to reduce the adverse effects of flooding in localized areas, but vast areas of productive farmland and some developed areas remain subject to extensive flooding.

The floodplain of the Red River at Grand Forks-East Grand Forks is about 0.6 mile wide; the Red Lake River floodplain is approximately 0.5 mile wide. Floodplains of the lesser streams range from about 0.5 mile wide along the Turtle River at Manvel, North Dakota, to about 1,000 to 2,000 feet wide for English Coulee at Grand Forks.

Geology

During the Pleistocene epoch, periodic glacial actions over a period of about 70,000 years established what would eventually become one of the most productive agricultural areas in the world - the Red River basin. At least three and possibly four glaciers moved southward over the area. Each advance and recession eroded the higher areas and filled the lower areas with glacial drift. Thickness of the glacial drift varies from about 300 feet in western Polk County to a maximum of about 450 feet in Grand Forks County.

About 12,000 years ago, the last glacier melted and receded northward. Starting out as a smaller lake between the final and terminal moraine and the melting edge of the glacier, Lake Agassiz eventually covered a large area (see figure 7). Its depth at what is now the Grand Forks-East Grand Forks area was 330 feet. The maximum elevation, and subsequent lower lake elevations as the lake later drained to the south through the Minnesota River Valley can be seen in the remaining beach ridges in the Grand Forks study area (see figure 6) and western Polk County. These beach ridges constitute the principal unique geologic feature of the study area. Maximum depth of Lake Agassiz sediments (clay and silt) is about 155 feet.

The subsurface formations underlying the study area are composed primarily of igneous and metamorphic rocks of the Precambrian age of several hundred million years ago (see figure 8). Surface elevations of the bedrock vary from about 550 feet and 400 feet, respectively, in the eastern and western portions of the study area. Overlying these rocks are the sedimentary rocks of the Paleozoic and Mesozoic eras including the Ordovician (principally shales and limestones), Jurassic (siltstones and sandstones), Cretaceous (claystones and siltstones interbedded with sandstones), and Quaternary or glacial drift deposits. Depths of the Ordovician and Cretaceous systems under the study area in Grand Forks County vary from around 800 feet to less than 20 feet from west to east. Figure 9 identifies the systems and their depths for a general stratigraphic column of Grand Forks County. Information on specific depths of these systems on the Minnesota side of the river is not available, but depths of 20 to 50 feet are considered reasonable. The location and extent of nonglacial land forms are shown on plate 1. A topographic map showing the flat former lake bed bordered by the north-south beach ridges is shown on plate 2.

The United States Geological Survey indicates that no geological hazards exist in the study area.

Key References

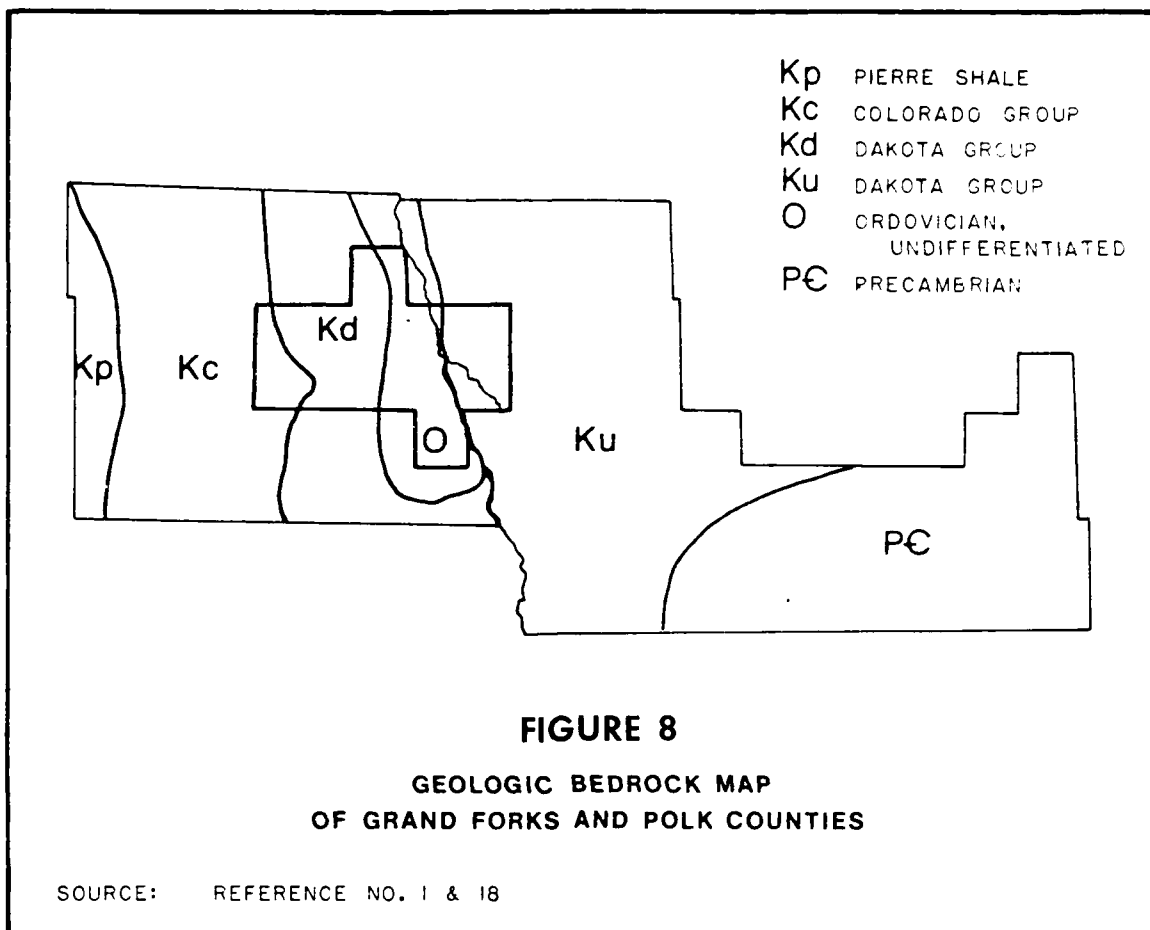
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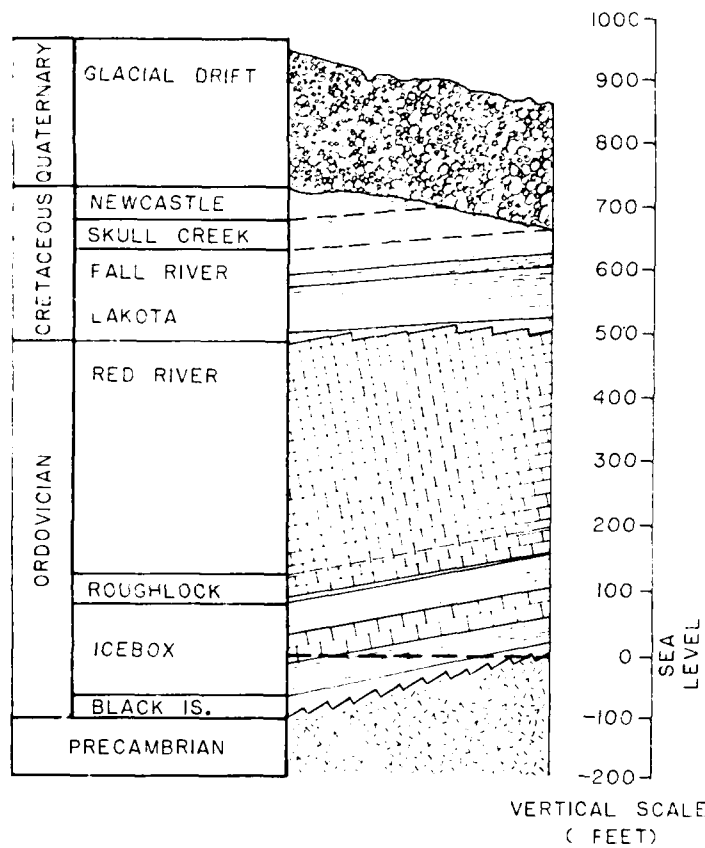
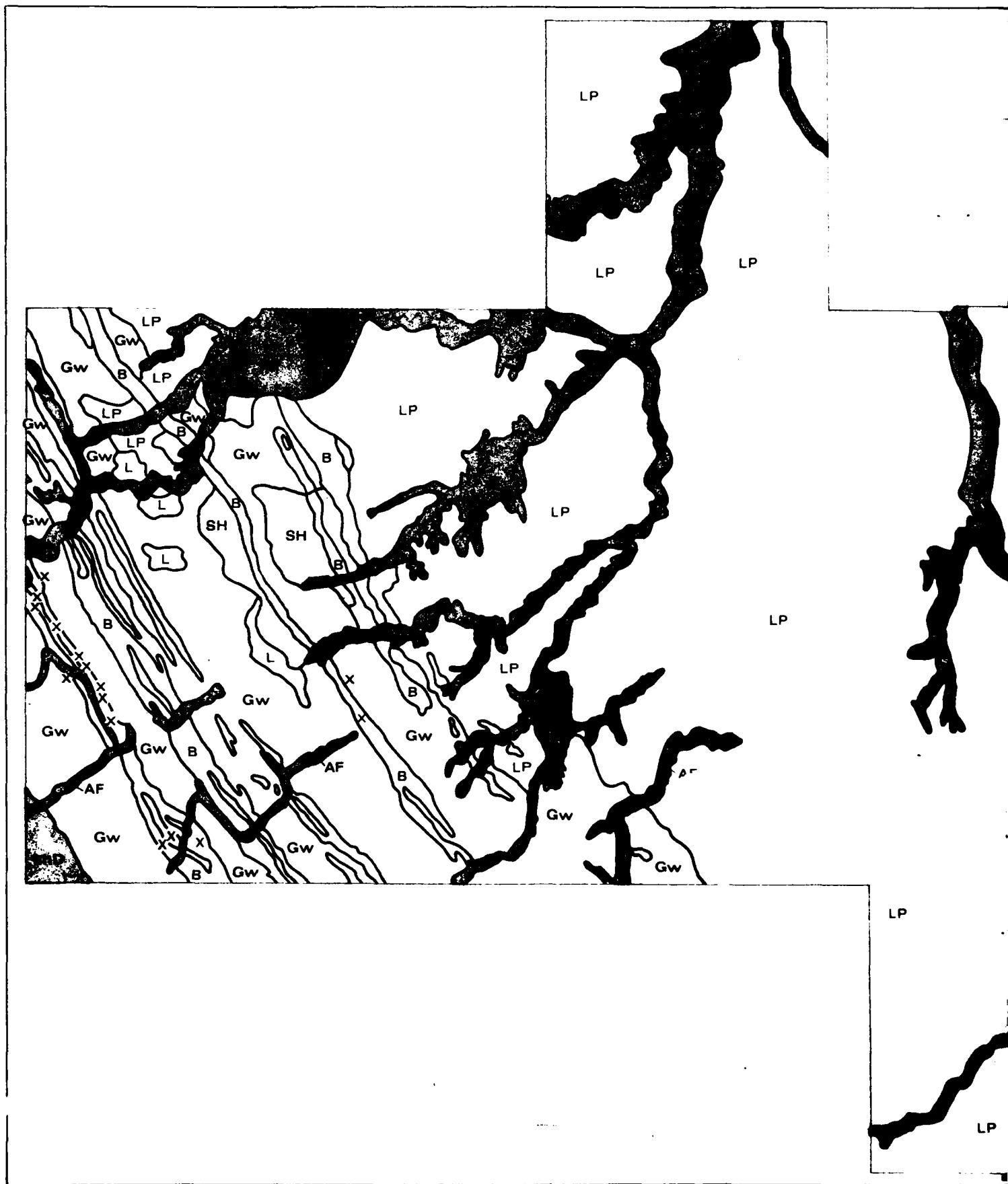


FIGURE 9
GENERAL STRATIGRAPHIC COLUMN
OF GRAND FORKS COUNTY

SOURCE: REFERENCE NO. 1



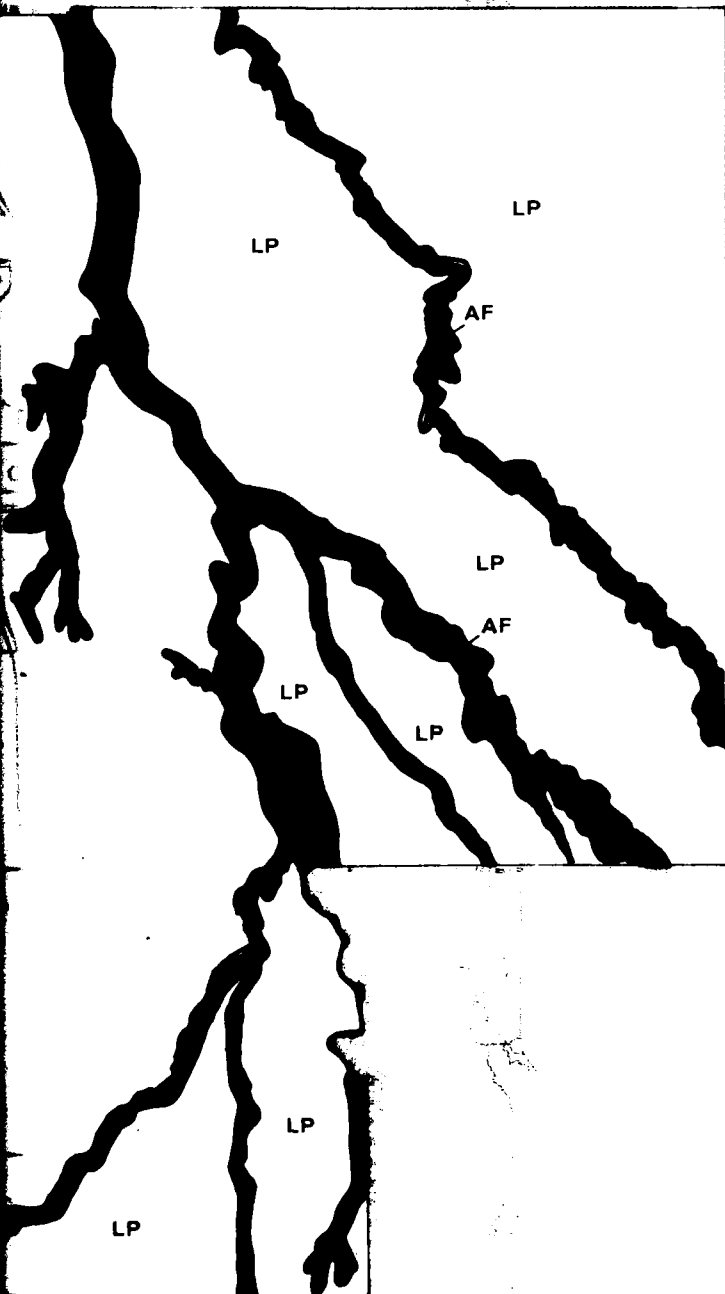
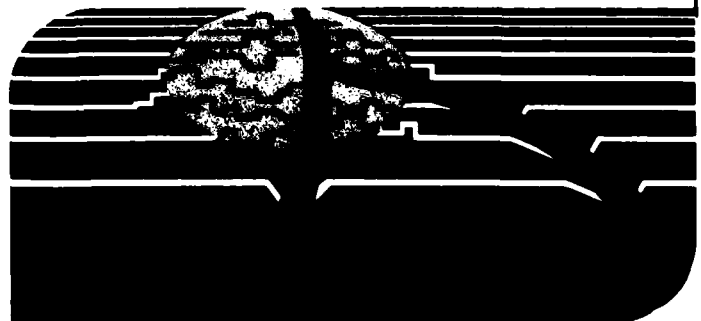
Grand Forks / East Grand Forks URBAN WATER RESOURCES STUDY

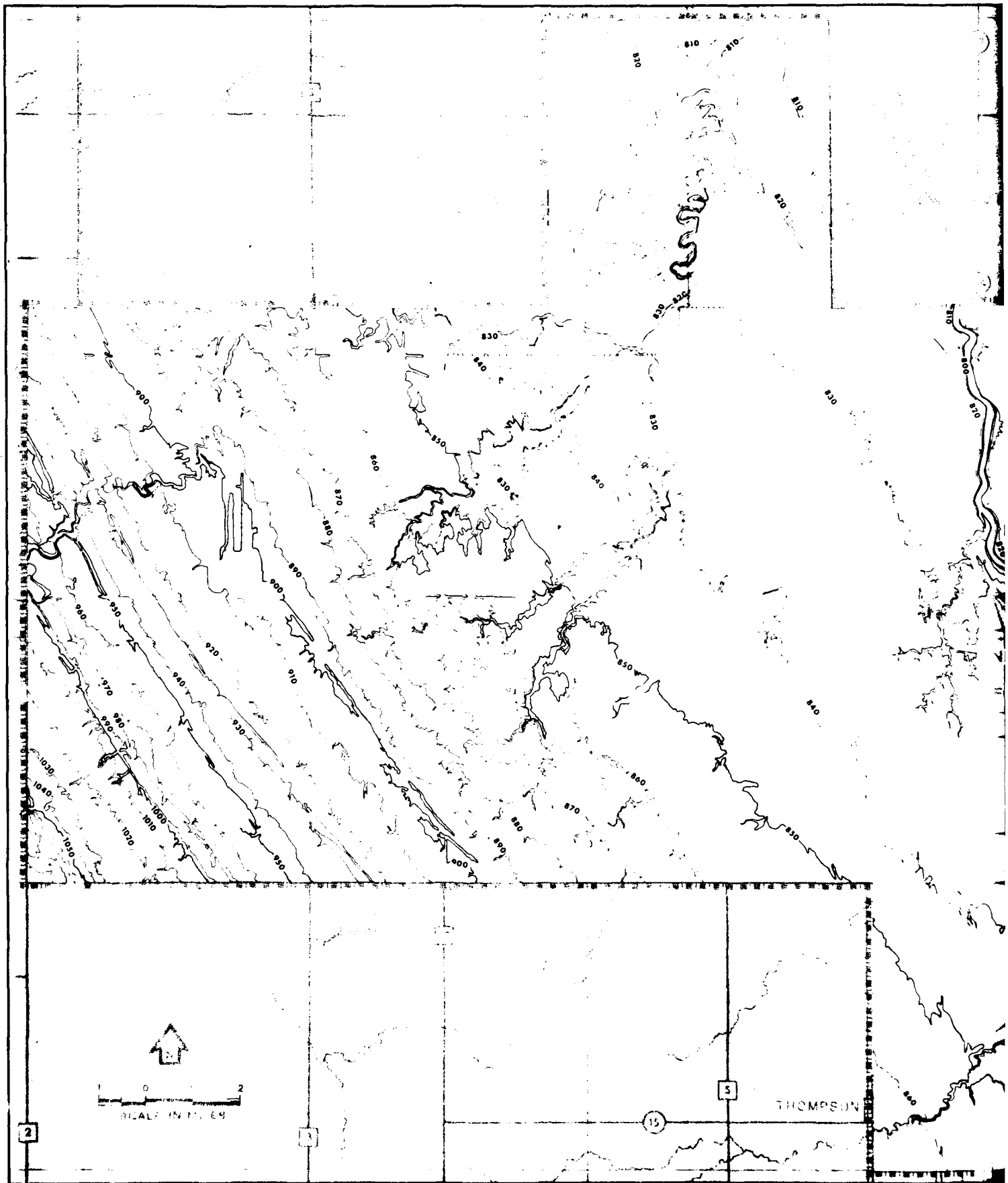
NON-GLACIAL LANDFORMS

-  ALLUVIUM (FLOODPLAIN)
-  SHORE DEPOSITS
-  DELTAIC DEPOSITS
-  SWAMP DEPOSITS
-  BEACH DEPOSITS
-  LAKE DEPOSITS (PLAIN)
-  LAKE DEPOSITS
-  GROUND MORaine, WATERWORN
-  SAND AND GRAVEL PIT

SOURCE: REFERENCES 1,4,15,18,46.

PLATE I



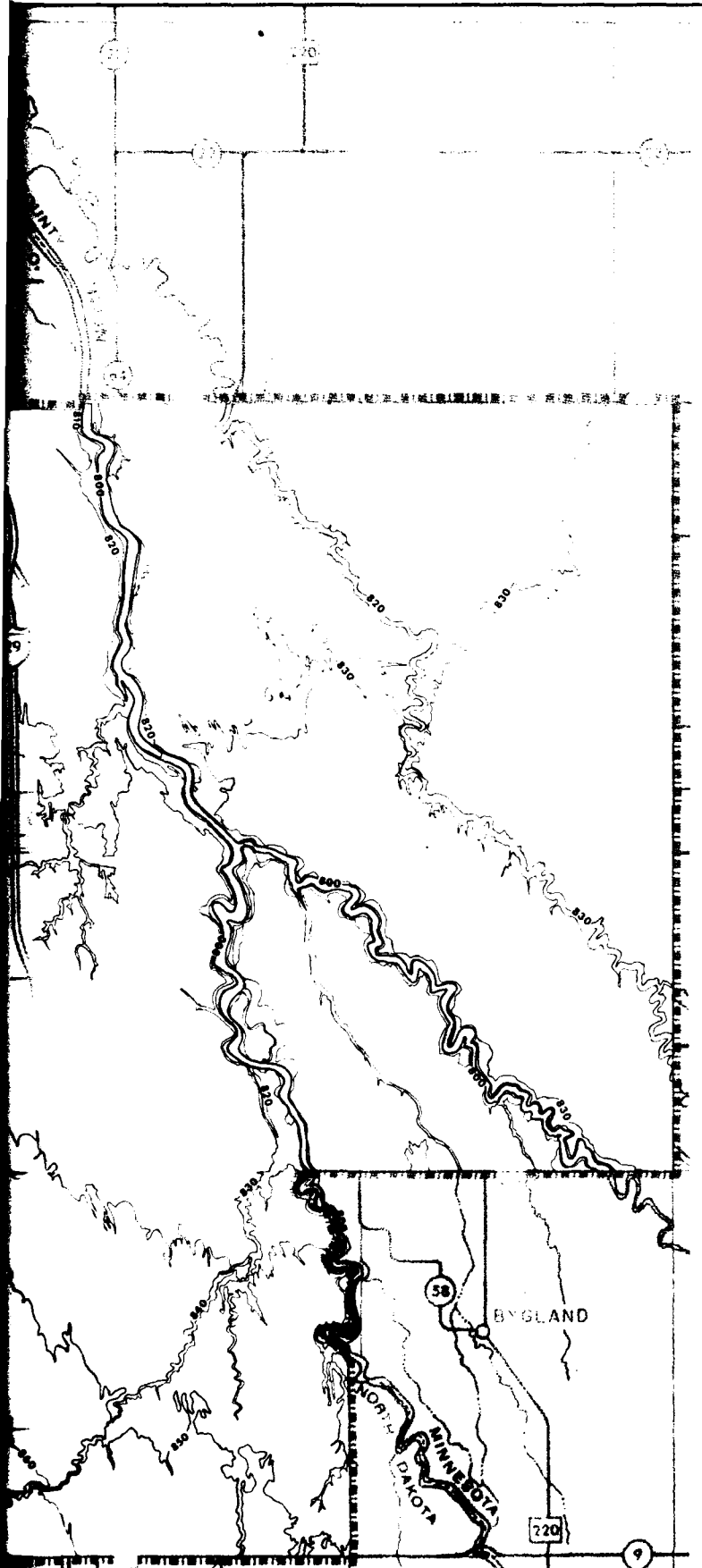


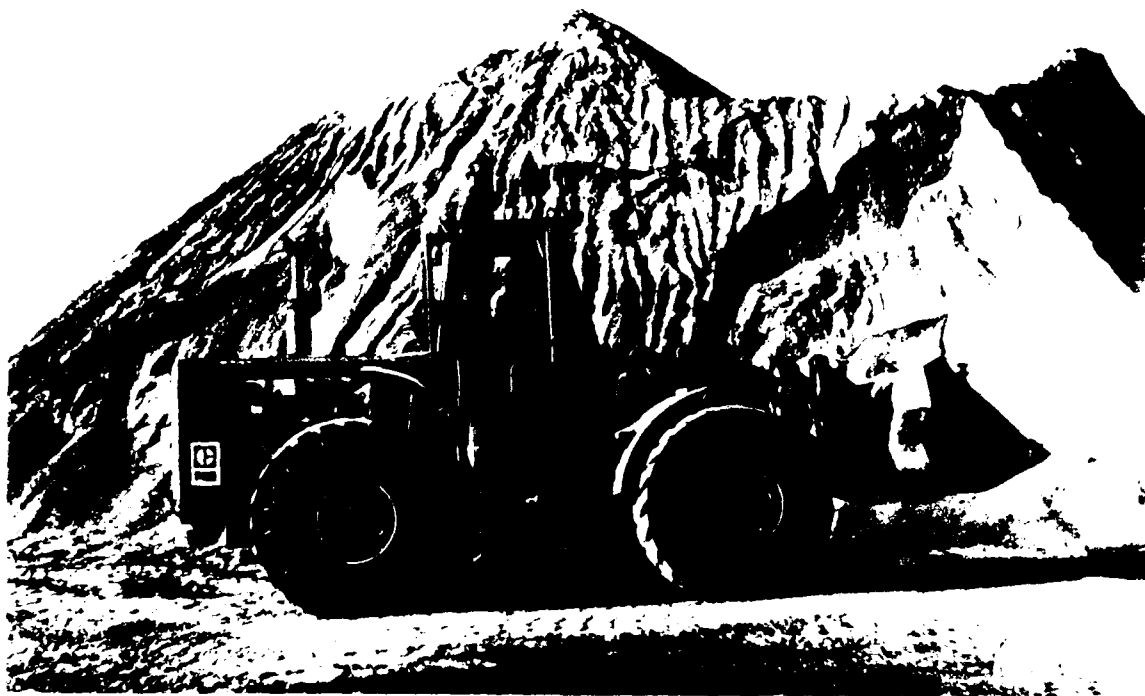
**Grand Forks / East Grand Forks
URBAN WATER RESOURCES STUDY**

CONTOUR INTERVAL EQUALS 10 FEET

SOURCE: U.S. GEOLOGICAL SURVEY

PLATE 2





Mineral Resources

Sand and gravel are the only mineral resources in Grand Forks and Polk Counties. Little is shipped out of the area, and production is geared to the amount of construction occurring in the area.

The sand and gravel is of glacial origin. Glaciofluvial sand and gravel occur in stream channels, glacial meltwater trenches, and glacial outwash plains. Glacio-lacustrine sand and gravel occur in deltas and various Lake Agassiz shore deposits, which include beaches and bars. Table 1 provides a list of sand and gravel production values in each county for the years 1967-1972. Locations of sand and gravel pits within the study region are shown on plate 1. Investigations and explorations have been made, primarily in Grand Forks County, to develop additional mineral resources. Seven exploratory oil wells were drilled but no oil shows were reported. In western Grand Forks County, outcrops of bentonite clay

beds occur in some road cuts and ravines. This clay is of a calcium and magnesium type better known as "fuller's earth," a natural bleaching powder. The clay is used for bleaching mineral, vegetable, and animal oil and as a binder for taconite pelletizing. However, the bentonite clays of Grand Forks County are not mined in significant quantities.

TABLE 1

**SAND AND GRAVEL PRODUCTION
GRAND FORKS AND POLK COUNTIES**

<u>Year</u>	<u>POLK COUNTY</u>		<u>GRAND FORKS COUNTY</u>	
	<u>Quantity</u> ¹	<u>Value</u> ²	<u>Quantity</u> ¹	<u>Value</u> ²
1972	813	771	W	114
1971	881	832	W	334
1970	1088	933	W	568
1969	989	W	W	451
1968	1248	W	W	494
1967	637	W	W	444

1 - Thousands of short tons

2 - Thousands of dollars

W - Withheld to avoid disclosing individual company confidential data

Key References

Sims, Paul K., "Directory of Minnesota Mineral Producers 1962," Information Circular Number 1, University of Minnesota, 1964

U.S. Department of the Interior, Bureau of Mines, Minerals Yearbook, Government Printing Office, Washington, D.C., 1969-1974

Soils

The soils of the study area represent its most valuable natural resource. The most notable characteristic of area soils is the high fertility.

The study area soils are derived almost entirely from glacial till and sediment from glacial Lake Agassiz. Most common in the Grand Forks and adjacent Grand Forks County study area are the medium and moderately fine-textured lake sediments. Soils in the beach areas west of Emerado are loams and sandy loams underlain by gravel and coarse sand at depths of less than 2 feet. Along the western edge of the lake plain, water-worked till overlies undisturbed glacial till. Elk River delta, created by a glacial stream during the glaciation period, overlies part of the westernmost study area and generally consists of fine sandy loam to loam.

Soils on the Minnesota side of the Red River of the North are similar to those on the western side and generally consist of fine-textured prairie soils or deep black soil formed on glacial lake clay and rich silt. East of the lake plain and outside the study area is a belt of fine sandy soils. Along the east edge of this belt, and at times intermixed, are the sand and gravel beach ridges.

Principal soil associations (see plate 3) include the Fargo-Hegne, Bearden-Glyndon, Bearden-Saline, Glyndon-Bearden, and Cashel-Fairdale-Zell. The Cashell-Fairdale-Zell association, composed of silty clays and sand, is of alluvial origin and is generally restricted to the stream corridors. Floodplain forest and open marsh are the typical vegetation found on these areas. The Fargo-Hegne soils, found principally on the Minnesota side of the river, form a pattern of low interconnecting ridges and intervening low areas that pond surface runoff. Both soils of this group are fine-textured and somewhat poorly drained. The Fargo soils are found in the low areas, and the Hegne soils on the intervening ridges. Other soil characteristics for this and other study area soil associations are given in table 2.

TABLE 2

STUDY AREA SOILS AND RELATED CHARACTERISTICS

Soil Association	Texture	Drainage	Typical Slopes	Water Holding Capacity	Principal Vegetation	Principal Use(s)	Limitations on Use
Bearden-Clyndon	Moderately fine (Bearden) to medium (Clyndon) textures; Black layer overlying a layer of lime accumulation	Somewhat poorly drained	From nearly level (Bearden) to more than 2 percent (Clyndon)	High, moderate permeability (Clyndon), seasonal water table	Tall grass prairie	Cropland; hay and pasture on poorly drained areas	Early spring wetness and seasonal water table; surface drainage required
Fargo-Magne	Fine-textured	Somewhat poorly drained to poorly drained (Magne soils)	From nearly level to generally less than 2 percent	High, frequent high water table in spring (Magne soils), slow permeability (Fargo series)	Prairie grasses, forests along streambanks	Cropland; small grains	Poor surface drainage; early spring wetness limits range of agricultural uses; much tillage can be accomplished
Cashell-Fairdale-Zell	Loam to silty clay	Moderately well drained	Steep river bank slopes, flat bottomlands		Floodplain forest, oak woods on higher elevations	Cropland on higher areas; recreational and wildlife management uses along floodplain areas	Periodic flooding of low areas
Clyndon-Bearden (Moderately saline)	See Bearden-Clyndon	See Bearden-Clyndon	See Bearden-Clyndon	High water table	Prairie grasses	Cropland; small grains; sugar beets and potatoes	Sufficient salt accumulations may affect plant growth
Strongly Saline Soils	See Bearden-Clyndon	See Bearden-Clyndon		High water table	Prairie grasses	Cropland; pasture	Salt accumulations can stunt plant growth
Blue-Zell-Fairdale	Loamy to clay loam	Generally rapid runoff	6 to 30 percent	Low due to rapid surface runoff	Prairie grasses	Pasture	Steep slopes, high susceptibility to erosion when cultivated or overgrazed
Saltz-Opel-Antler	Calcareous loam to silty clay loam, stone accumulations	Moderate to rapid runoff	Nearly level to steep slopes	Fair, poor on steep slopes	Prairie grasses and upland forest	Pasture, sand and gravel mining	Relatively low fertility; susceptibility to water-induced erosion
Ulen-Embsen-Hecto	Moderately coarse textured outwash and glacial lake deposits; Hecto - coarse grained	Moderately well to somewhat poorly drained	Range from level to very hilly areas	Good to fair water retention capacity	Prairie grasses, limited forest cover	Cropland; pasture on hilly areas	High susceptibility to wind erosion and early seasonal wetness



The Bearden-Saline soils (area 5 on plate 3) also occur on the nearly level lake plain, with a pattern of intersecting and interconnecting rises or ridges that form polygonal patterns. These soils are moderately fine-textured, somewhat poorly drained, and show a black surface layer underlain by a layer of lime accumulation. The Bearden soils are found on the ridges and higher areas. Both soils are moderately to strongly saline. These soils are used for cropland but are affected by spring wetness.

The Glyndon-Bearden soils group, along the western edge of the lake plain, consists of a top layer of medium-textured lake sediments overlying glacial till at depths of 1 to 5 feet. These soils occur mostly on the level areas, with cropland being the principal use.

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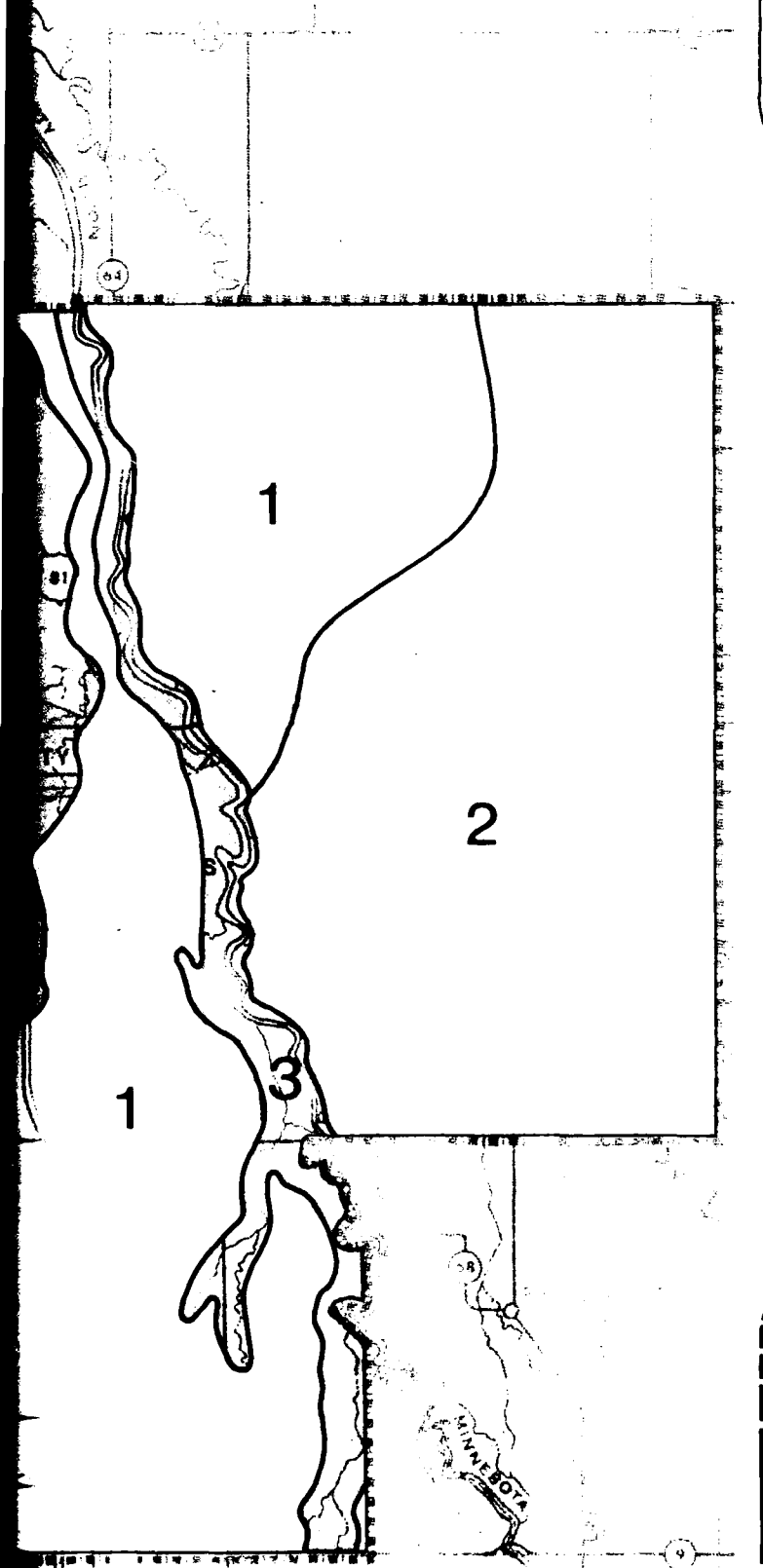
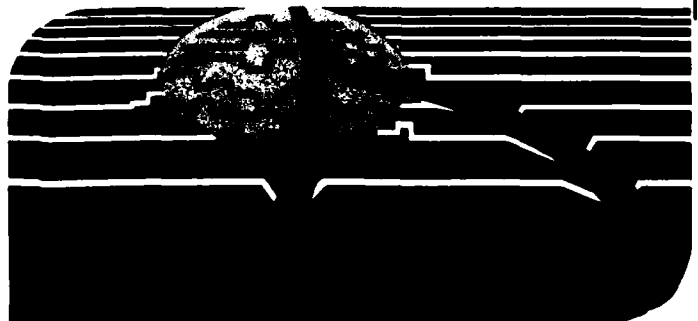
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SOIL ASSOCIATIONS

1	BEARDEN-GLYNDON ASSOCIATION
2	FARGO-HEGNE ASSOCIATION
3	CASHEL-FAIRDALE-ZELL ASSOC.
4	GLYNDON-BEARDEN ASSOCIATION (MODERATELY SALINE)
5	STRONGLY SALINE SOILS
6	BUSE-ZELL-FAIRDALE ASSOC.
	SELZ-OPS-ANTLER ASSOCIATION
	ULEN-EMBDEN-HECLA ASSOCIATION
---	GLACIAL LAKE BEACHES WITH DEEP SANDY THIN GRAVELLY SOILS.

SOURCE: REFERENCES 9,15,18.

PLATE 3



Water Resources

Surface Waters - Surface waters within the study area consist of the two major rivers, smaller streams, a network of drainage ditches, one man-made lake, and several sewage lagoons. The Red River of the North and the Red Lake River are, respectively, the first and second most significant in the area. The two major communities are located at the confluence of these rivers, as their names clearly imply. Lesser but locally significant streams include the Turtle River, which joins the Red River near Manvel; English Coulee, which joins the Red River just north of Grand Forks; Kellys Slough and Salt Water Coulee, tributaries of the Turtle River; and the Grand Marais River, which crosses the eastern part of the study area and enters the Red River downstream of East Grand Forks.



*Red River of the North
at Grand Forks - East
Grand Forks*

No natural lakes exist in the study area. The most significant open water body is the 180-acre lake created by a riprap dam at the Kellys Slough National Wildlife Refuge. Other open-water bodies include the sewage treatment lagoons operated by the communities, U.S. Air Force Base, and American Crystal Sugar Company in East Grand Forks. These lagoons serve as a food source and resting area for wildlife. Plate 4 shows the location and extent of the major rivers, smaller streams, and other surface waters in the study area.

As shown on the water resources plate, stream meanders (loops) are common on all study area streams. These meanders are due to the flat slopes of the streams situated on flat valley land created by former glacial Lake Agassiz. About 2 miles downstream of Grand Forks, the slope of the Red River of the North is only about 0.4 foot per mile. At Grand Forks, the Red River is about 200 feet wide and 8 to 10 feet deep during normal summer flows (figure 12).



Kelly's Slough

The drainage area of the Red River of the North at the U.S. Geological Survey stream gage located on the north edge of Grand Forks, 2.3 miles downstream of the Red Lake River, is 30,100 square miles, including the 3,800-square-mile Devils Lake subbasin. Included in the Red River drainage area is the Red Lake River subbasin which drains about 5,700 square miles in Minnesota. The Turtle River subbasin drains about 613 square miles of mostly agricultural land in east-central Grand Forks County.

The average flow of the Red River of the North at Grand Forks is approximately 2,500 cfs (cubic feet per second). Based on the 93-year record at the U.S. Geological Survey gaging station, the average, maximum, and minimum river flows have been about 2,524, 80,000, and 2.4 cfs, respectively. Mean annual flow of the Red Lake River at Crookston is about 1,121 cfs, with recorded minimum and maximum flows of 0 cfs (July 1960) and 28,400 cfs (April 1969), respectively.

Thus, of average Red River of the North flows at Grand Forks, approximately 45 percent is contributed by the Red Lake River. Average Turtle River flows over a 21-year period of record were approximately 48 cfs, with recorded minimum and maximum flows of 0 and 28,000 cfs (1950), respectively.

Frequent and coincidental flooding along the Red Lake River, the Red River of the North, and English Coulee is a major problem in the urbanized study area. Floodplain areas outside the Grand Forks-East Grand Forks area are subject to general agricultural flooding but this type of flooding is not considered a major problem in the study area. Flooding in the urban area frequently causes damages to residential, commercial, and public park and recreation area property. The most frequently flooded area in Grand Forks is a residential area near Central Park. A total of 2,893 residential, commercial, and public buildings is subject to direct flooding from the the 100-year flood (1-percent chance of occurring in any given year) at Grand Forks. The downtown area of East Grand Forks is most frequently affected by indirect flooding (sewer backup and basement flooding); almost 1,000 structures are subject to direct flooding from the 100-year flood.

Water quality of the Red River of the North and Red Lake River is directly affected by riverbank and other erosion, agricultural practices, and disposal of wastewater effluents from upstream communities. Localized water quality problems are caused in part by municipal and industrial waste discharges. Feedlot runoff and fertilizers are also contributing factors. Nonpoint sources contribute a majority of the nutrient loading in these rivers and a substantial portion of other pollutants. Principal industrial contributors include the sugar beet and potato plants at Crookston and East Grand Forks, Minnesota, and in the Fargo-Moorhead area. Total dissolved solids for both the Red River of the North and the Red Lake River are generally less than 500 mg/l (milligrams per liter). Hardness in the Red River of the North generally exceeds 180 mg/l but is generally less than 180 mg/l in the Red Lake River. At low Red Lake River flows, a critical buildup of wastes occurs, with total dissolved solids and hardness greatly exceeding the above values. Purification and treatment of water from both rivers are required for municipal, industrial, and rural domestic uses.

The stream classification and water quality and purity standards for the Red Lake River from Crookston to the mouth (East Grand Forks) were established by the Minnesota Pollution Control Agency in July 1966 and are outlined in Minnesota Regulation WPC 10, Chapters 115 and 116, State Statutes. Under these regulations, the Red Lake River from the mouth to Crookston has been classified as a Class IC, 2B, 3B stream. Standards of surface water quality for the Red River of the North and other streams in North Dakota are documented in Regulation 61-28-05.2, I through VIII. Under this regulation, the Red River of the North and Turtle River have been classified as Class I and II rivers, respectively. A comparison of State water quality standards for selected substances as established by both States is given in table 3. Also shown are State standards for the same substances as established for the Red Lake River.

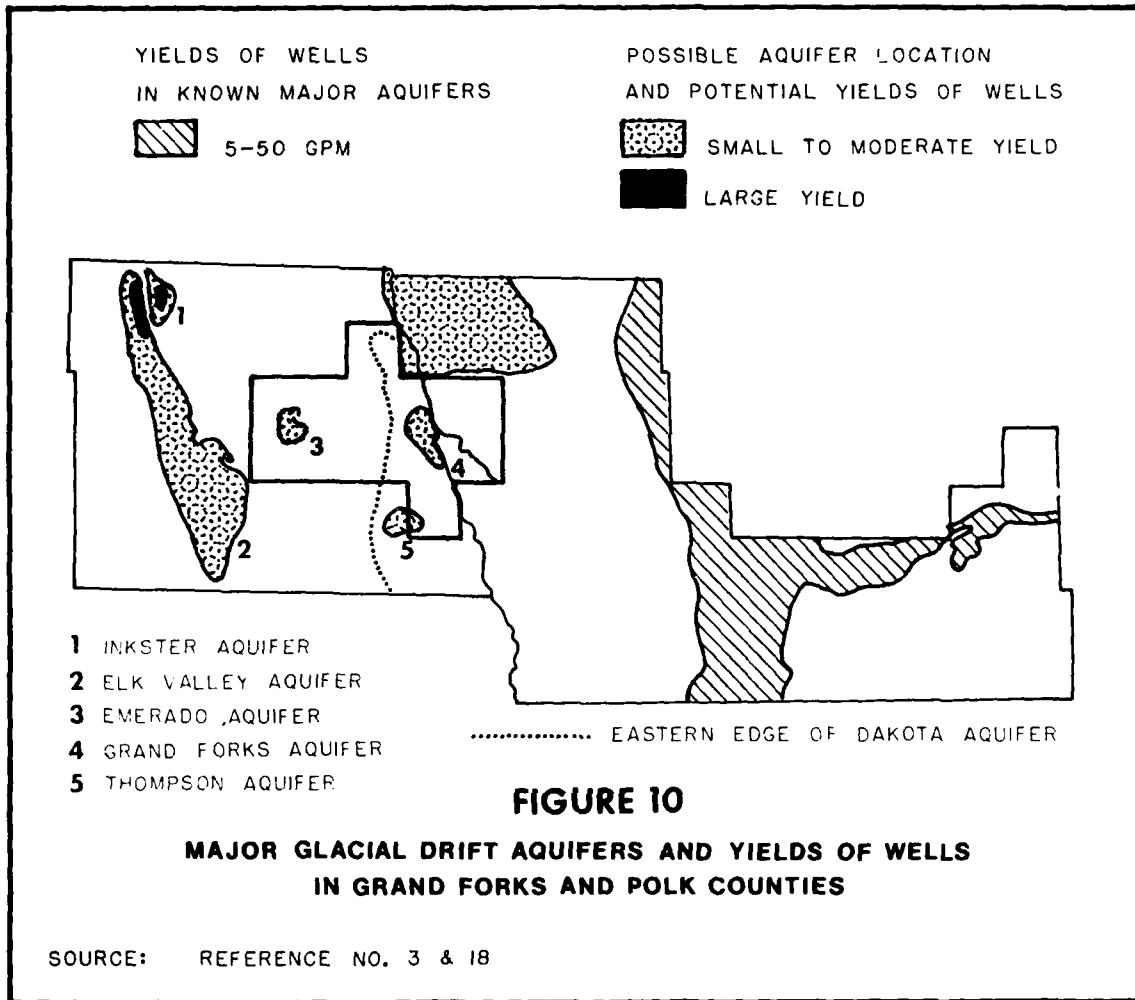
TABLE 3

**WATER QUALITY STANDARDS - SELECTED SUBSTANCES
(MINNESOTA AND NORTH DAKOTA)**

Substance	<u>Red River of the North</u>		<u>Red Lake River</u>
	Minnesota	North Dakota	Minnesota
Turbidity (FTU or JTU)	25 FTU	10 JTU	25
Dissolved Oxygen (mg/l)	5	5	5
Ammonia (mg/l)	1.5	.02	1.0
Hardness (mg/l)	250	---	200
Fecal Coliforms (MPN/100 ml.)	250	200	200

Source: Minnesota and North Dakota Water Quality Standards, References 26 and 27

Groundwater - Groundwater is a significant resource of the Grand Forks-East Grand Forks region; much of the rural population depends on groundwater for domestic and livestock needs. Two types of aquifers supply groundwater to the study region. They are glacial drift aquifers, which include the Elk Valley, Inkster, Thompson, Emerado, and Grand Forks aquifers, and aquifers of the preglacial rock (Late Cretaceous) in which the Dakota aquifer is located. For locations of these aquifers and their average yields, see figure 10.



Of these aquifers, the Dakota is by far the largest in terms of both amount of water contained and areal extent. It has been described as extending as far south as New Mexico and as far west as Montana. However, water from the Dakota aquifer is very saline and generally unsatisfactory for domestic uses without treatment. It is generally highly toxic to vegetation and too mineralized for livestock purposes. The Elk Valley aquifer served as one of the earliest sources of municipal water supplies and is the current source of supply for the Grand Forks-Traill Rural Water System. Five wells drilled to 60- to 100-foot depths in this 30- to 35-foot thick aquifer provide a combined maximum sustained yield of 700 gpm (gallons per minute) to the system.

Groundwater quality varies substantially over the study area, but is generally characterized by moderate to extreme hardness. Waters of the Dakota sandstone aquifer underlying the Grand Forks area are very saline; have an average dissolved solids content of 4,400 ppm; have excessive amounts of chloride, iron, and sulfates; and are highly toxic to most domestic plants. Waters of the Grand Forks aquifer underlying the city at lesser depths are very hard, with a dissolved solids content in excess of 7,500 ppm, and would be highly injurious to plants and soils. Groundwater in the localized Thompson aquifer is also very hard, highly mineralized, and very saline. Water quality parameters obtained from readings of selected wells in the principal Grand Forks County aquifers are given in table 4.

As evidenced by their use as area water supplies, the beach ridge aquifers are substantially lower in hardness and mineral content than the lake plain aquifers. Groundwater in the Elk Valley aquifer, hard by national standards, is soft in comparison to other area aquifers, with a total dissolved solids content averaging 630 ppm. By irrigation standards, the groundwater has medium to high salinity and low sodium content. The Inkster aquifer, of medium salinity, is of excellent quality except for hardness (dissolved solids content of 350 ppm). Groundwater on the Minnesota side is highly mineralized and very hard, with hardness values of 600 to 1,000 mg/l at East Grand Forks.

TABLE 4

CHEMICAL ANALYSES OF SELECTED WATER SAMPLES
GRAND FORKS COUNTY, NORTH DAKOTA

(Analytical Results in Parts Per Million Except as Indicated)

Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Nitrate (NO ₃)	Barium (Ba)	Sum	Dissolved Solids Residue on Evaporation at 100 Degrees F	Hardness as CaCO ₃		Aquifer	Depth	Source*	Date of Collection	Temperature (degrees F)	Silica (SiO ₂)	Total Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Carbonate (CO ₃)
							Calcium	Non-carbonate													
984	1,960	.8	1.9	2	4,720	4,840	1,280	1,120	Thompson	275	Qd	9-21-66	50	24	.52	328	112	1,190	24	191	0
285	206	.2	547	0.00	1,670	1,750	870	619	Dakota	400	Kd(?)	10-12-66	50	20	.46	152	119	158	25	307	0
1,530	1,170	2.8	2.0	3.1	4,320	4,230	900	694	Dakota	108	Kd	8-12-65	47	19	1.10	226	82	1,120	34	252	0
1,460	1,990	2.0	.4	3.5	5,560	---	1,090	860	Dakota	100(?)	Kd	9-7-65	48	17	1.70	270	101	1,550	40	278	0
733	368	.3	5.4	.97	1,850	1,890	835	619	Emerado	90	Qd	9-13-66	54	27	.22	205	79	289	11	264	0
1,350	1,930	.9	50	2.8	5,260	---	1,280	1,110	Grand Forks	210	Qd	9-10-65	--	12	.00	306	126	1,360	27	204	0
1,010	1,590	.5	1.4	2.0	4,260	4,310	1,070	855	Kelly Slough	75	Qd	8-18-66	48	26	.92	272	95	1,100	28	263	0
1.9	15	.3	7	.08	554	645	466	129	Elk Valley	14	Qev	7-15-65	48	14	.04	119	36	23	6.4	387	0

* Kd - Dakota Group of Cretaceous age
Qd - Glacial drift of Quaternary age
Qev - Elk Valley delta deposits of Quaternary age

Source: Bulletin 53, Part II, North Dakota Geological Survey

Remarks: Analyzed by North Dakota State Laboratory Department

Water Management Activities - Water management activities in the study area are accomplished by several Federal, State, and local agencies and, in a few cases, by groups representing several of the agencies. On a basinwide basis, the Souris-Red-Rainy Regional Office of the Upper Mississippi River Basin Commission located at Fargo, North Dakota, is charged with the orderly planning and development of the basin's water and related land resources. Working with this office at the Federal level on a continuing basis are the U.S. Geological Survey, U.S. Army Corps of Engineers, and U.S. Soil Conservation Service. Principal State agencies involved in area water management include the North Dakota State Water Commission and Minnesota Department of Natural Resources. On the regional level, interested agencies include the Red River Development Council in North Dakota, the Northwest Regional Development Commission in Minnesota, and the Red River Water Management Board. Representing county-level activities are the West Polk County Soil and Water Conservation District, Red Lake Watershed District, and Grand Forks County Water Management Board.

Numerous studies and projects for flood control in the study area have been completed. Studies and investigations include the Souris-Red-Rainy River Comprehensive Framework Plan (Appendixes D, G, and H) by the regional Commission office; survey studies completed by the Corps of Engineers at Grand Forks-East Grand Forks and along the Red Lake River; various basic water resource investigations by the U.S. Geological Survey; Type 15 and 19 flood insurance studies at Grand Forks by the Soil Conservation Service in 1972 and 1973, respectively; and a Grand Forks floodplain information report completed by the Corps of Engineers in 1971.

Completed major flood control projects affecting the study area include reservoir or lake storage on the Sheyenne River and upper Red Lake River. Other completed projects include stream channelization projects in the Red Lake River watershed, local flood barriers at Grand Forks, extensive drainage and land reclamation projects in Grand Forks and Polk Counties, permanent federally constructed levees at Lincoln Park in Grand Forks, and emergency levee works left in place after recent major floods at East Grand Forks (see figure 11).

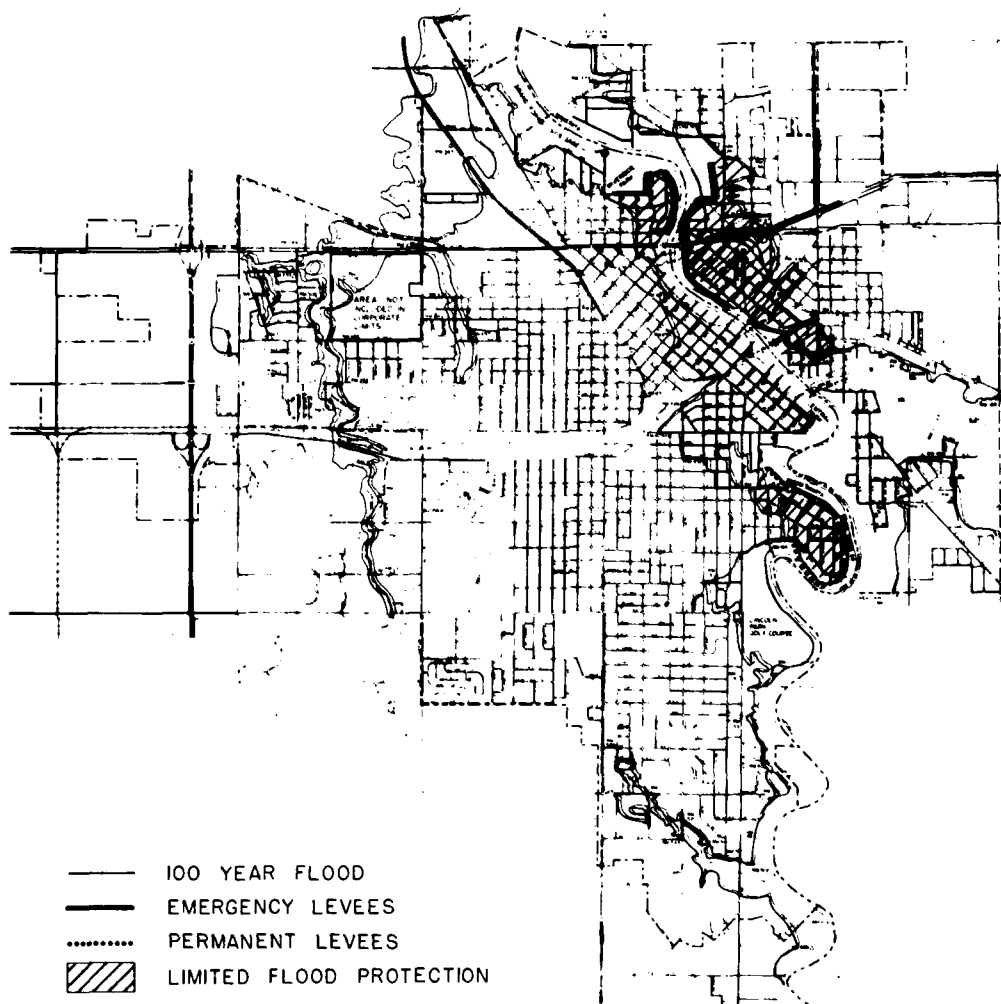


FIGURE 11

**EXISTING FLOOD CONTROL FACILITIES
IN THE GRAND FORKS - EAST GRAND FORKS URBAN AREA**

SOURCE: REFERENCE NO. 32

Grand Forks has adopted zoning regulations for floodplain areas. East Grand Forks has floodway zoning regulations and is developing floodplain regulations. Proposed zoning regulations incorporating floodplain zoning provisions for Grand Forks County are being reviewed.

Current activities for flood damage reduction and drainage in the study area include the authorized Corps of Engineers Red River of the North Basin Study, the continuing Red Lake River study, and the flood control improvements by the Soil Conservation Service at the confluence of Belmont Coulee and the Red River of the North at Grand Forks. A recent proposal to realign a portion of English Coulee in the far western and northwestern portion of Grand Forks is pending. An authorized Corps of Engineers flood control project at East Grand Forks would provide for levees, floodwalls, and related drainage works to protect against the 50-year flood level with 2 feet of freeboard (distance from design floodwater level to top of levee).

Wastewater Treatment - Grand Forks disposes of its sanitary and industrial wastes in a 640-acre lagoon system located approximately 4.3 miles northwest of the city, as shown on plate 5. The system, constructed in 1970 under an Environmental Protection Agency research and development grant, is designed to serve a population equivalent to 150,000 persons. It consists of an 8-acre pretreatment facility and two primary and two secondary cells (lagoon divisions). Sewage is delivered through a 30-inch force main to the pretreatment facility where it undergoes aerobic decomposition before proceeding to the main lagoon area for retention until Red River of the North water quality standards are met. The lagoon system is designed for a 5.4-mgd (million gallons per day) sewage flow and a 180-day detention or storage period. Recent (1976) average observed flows have reached 6.0 mgd. The sewage is stored over the winter and released to the Red River of the North during the spring and summer. Present expansion plans are to add 320 acres of lagoon and expand the collection system to new areas as they are annexed into the city.

The U.S. Environmental Protection Agency has provided a Section 201 (see Public Law 92-500, Water Pollution Control Act Amendments) facilities grant to Grand Forks for a study of its sewage treatment system. A Section 201 facilities plan has been developed, but is awaiting industry cost-sharing approval.

Wastewater from the Grand Forks Air Force Base is disposed of in a 160-acre lagoon located about 2 miles east of the base (see plate 5). The system can handle an estimated maximum 1.2-mgd sewage flow. The actual estimated peak flow rate, based on a recent 9-month period, was between 0.7 and 0.9 mgd. Recorded effluent quality values have been well below permit requirements as indicated by maximum BOD (biochemical oxygen demand) (5-day) and suspended solids values of 14.2 mg/l (standard weekly = 45 mg/l maximum) and 20.0 mg/l (standard weekly = 45 mg/l maximum), respectively. Effluents from the lagoon are released into the Turtle River via a small tributary during the spring and summer and eventually flow into the Red River of the North.

East Grand Forks disposes of its sanitary wastes into a lagoon. The disposal system includes a two-cell, 336-acre lagoon approximately 1.5 miles north of the city, as shown on plate 5. It serves both residential and industrial users and, in 1971, had 2,400 paying accounts of which 270 were commercial users. The system, fed by a 30-inch force main, is designed for a 1.4-mgd flow rate and 180-day storage time. Effluent from the lagoon is released into the Red River of the North at a point north of the city during the spring and fall. The estimated 1976 flow was 1.0 mgd. The city lagoon system meets all Federal and State standards. No differences exist between the present State standards (reference Water Pollution Control Standards WPC-1 through WPC-34, Chapters 115 and 116, State Statutes) and the 1977 or 1983 Federal requirements (reference 1972 Water Pollution Control Act Amendments, Public Law 92-500).

The city of Thompson, North Dakota, is served by a two-cell lagoon system totaling about 4.3 acres and located about one-half mile southeast of the city (see plate 5). Effluent from the lagoons is discharged into Elm Coulee,

which drains into the Red River of the North east of Thompson. The system was designed for a 27,000 gpd (gallons per day) flow and a 180-day storage time. No discharge was reported during the period of 1 January 1975 to 31 December 1976. However, the rapid increase in population in recent years has resulted in an estimated storage requirement of about 30 percent above the design capacity. The two cells (ponds) do not operate properly because of ground seepage and percolation. New and larger ponds have been proposed at a site south of the city limits. A Section 201 facilities plan for the city has been approved by the North Dakota Department of Health and is being reviewed by the Environmental Protection Agency.

Manvel is served by a two-cell (pond) lagoon system totaling 11 acres and located one-half mile west of the city as shown on plate 5. The system, 3 to 4 years old, is designed to serve a population of 600 (1970 population of 265) and discharge into the Turtle River. However, no discharges have occurred to date.

Emerado discharges its sewage into a 5-acre lagoon system located east of the city. The system is designed for a flow of 25,000 gpd and a storage time of 6 months. Effluents from the lagoon are discharged into Salt Water Coulee, which eventually discharges into the Red River of the North downstream of Grand Forks via the Turtle River. No discharges were reported between 1 January 1975 and 1 January 1977. A submitted interim compliance schedule to meet secondary treatment limitations is contingent upon future availability of funds. Other rural wastewater needs, mostly individual farm sites and small clusters of homes such as Merrifield, Powell, and Mekinock, North Dakota, are met by private septic systems.



Typical Sewage Lagoon

Water Supply - The greater part of Grand Forks is served by a municipally owned and operated water distribution system (see plate 5). The treatment plant has a capacity of 9.0 mgd; the Red River of the North and Red Lake River are the raw water sources with the Red Lake River being the best source. The treatment plant uses chlorine, fluoride, and other chemicals in the treatment process which provides taste and odor control and reduction of hardness. The city system also supplies water to the Grand Forks Air Force Base to a maximum of 2.5 mgd, in accordance with a present contract with the United States Government. Total average consumption increased from 4.5 mgd in 1968 to 7.1 mgd in 1972, with a maximum 1972 daily demand of 10.5 million gallons. To meet a projected maximum demand of 21.8 mgd by 1983, a new 7-million-gallon ground storage reservoir and a 7-mgd pumping station were recommended in a 1973 study. The pumping system has recently been completed. Increasing industrial demands, principally from the potato processing industry and the Grand Forks Air Force Base, resulted in a 1974 recommendation for expansion of the water treatment plant capacity. A summary of 1972 municipal and industrial water demands in Grand Forks and East Grand Forks is given in table 5.

TABLE 5

**WATER SUPPLY DEMAND
GRAND FORKS - EAST GRAND FORKS**

<u>Community</u>	<u>1972 Demand (mgd)</u>
Grand Forks Area	
Grand Forks	4.50
Air Force Base	0.75
Thermal Power (2 plants)	18.54
Pillsbury	0.65
Frito-Lay	0.04
Rogers Bros. Potato Co.	0.10
Associated Potato Growers, Inc.	0.01
Western Potato	0.75
East Grand Forks	
East Grand Forks	0.55
American Crystal Sugar	1.0
King of Spud	0.4
Old Dutch Foods	0.06

Source: References 33 and 48

In addition to the municipal distribution system, smaller portions of the city that have previously been served by the Grand Forks-Traill Rural Water System (see plate 5) retained this service after annexation to the city. A number of residential users, primarily in the southeastern portion of the city, are served by individual cisterns periodically filled by commercial water haulers.

East Grand Forks water supplies are furnished by the municipal water and light authority. The system (plate 5) draws raw water from the Red Lake River and consists of a 4-mgd pumping plant, a lime soda ash process treatment plant, and a citywide distribution system. Average demand is less than 2 mgd; maximum demand exceeds 2 mgd. Present storage capacity is 1,600,000 gallons. Additional facilities under construction include a 500,000-gallon elevated reservoir and a 2-million-gallon underground reservoir.

Thompson has been served by the Grand Forks-Traill Water Users Corporation since October 1972. Water for the system is obtained from wells near Inkster, North Dakota. Average consumption per user member (160 members on 19 August 1976) is approximately 6,000 gallons per month.

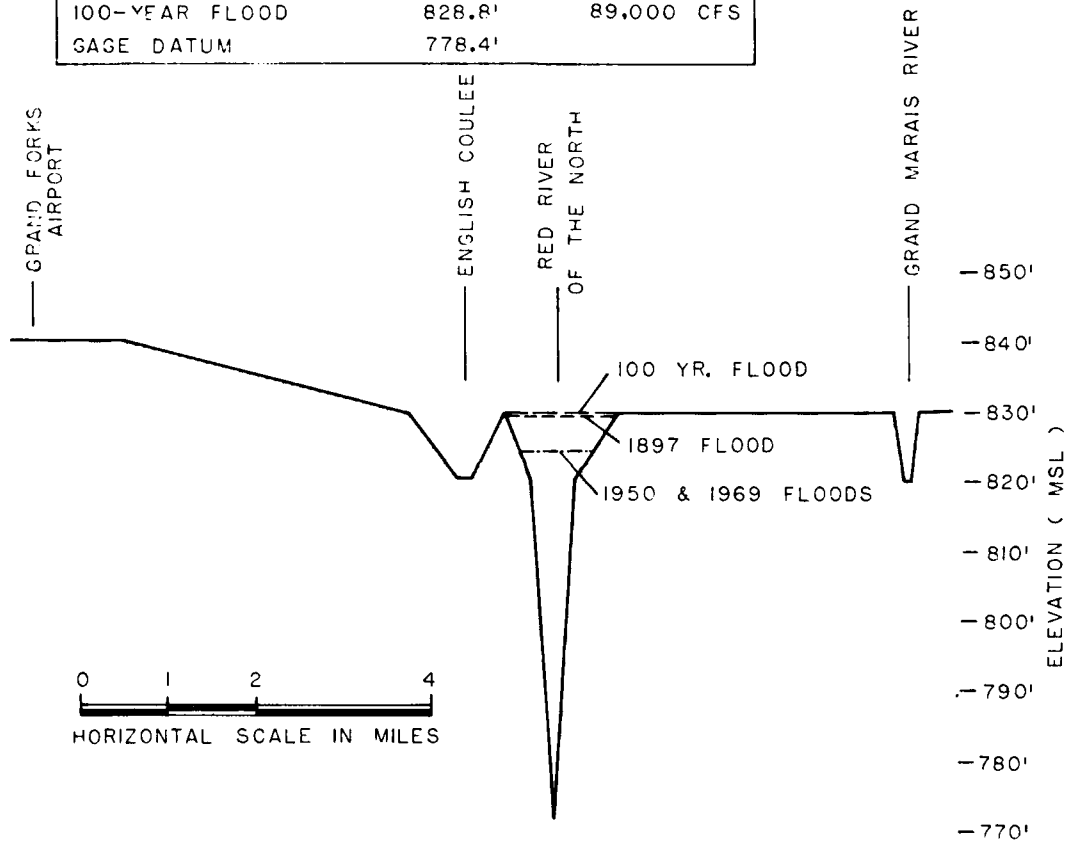
Emerado is served by its own municipal water system using a five-well source (four wells are operational at the present time) located 4 miles southwest of Arvilla, North Dakota, in the Elk Valley aquifer. Arvilla and a few individual customers are also served by the system. The water supply is considered sufficient to meet projected growth.

Manvel is provided water by the Agassiz Rural Water System (see plate 5 for service area). This system also draws its source from wells in the Elk Valley beach ridge deposits. The water quality is excellent and the supply is considered adequate to meet projected city growth.

Private farmsteads and other consumers in the rural Grand Forks County area are served either by private wells or by the two rural water systems. Rural residences in the Polk County study area are served by the Marshall-Polk Rural Water System or by private wells.

MAJOR FLOOD DATA

	ELEVATION	DISCHARGE
FLOOD OF 1897	827.7'	80,000 CFS
FLOOD OF 1950	823.8'	54,000 CFS
FLOOD OF 1969	824.0'	53,500 CFS
100-YEAR FLOOD	828.8'	89,000 CFS
GAGE DATUM	778.4'	



CROSS SECTION TAKEN AT USGS GAGE
(2.3 MILES DOWNSTREAM OF RED LAKE RIVER)

FIGURE 12

TYPICAL CROSS SECTION OF THE RED RIVER OF THE NORTH VALLEY

SOURCE: REFERENCE NO. 1 & 15.

Key References

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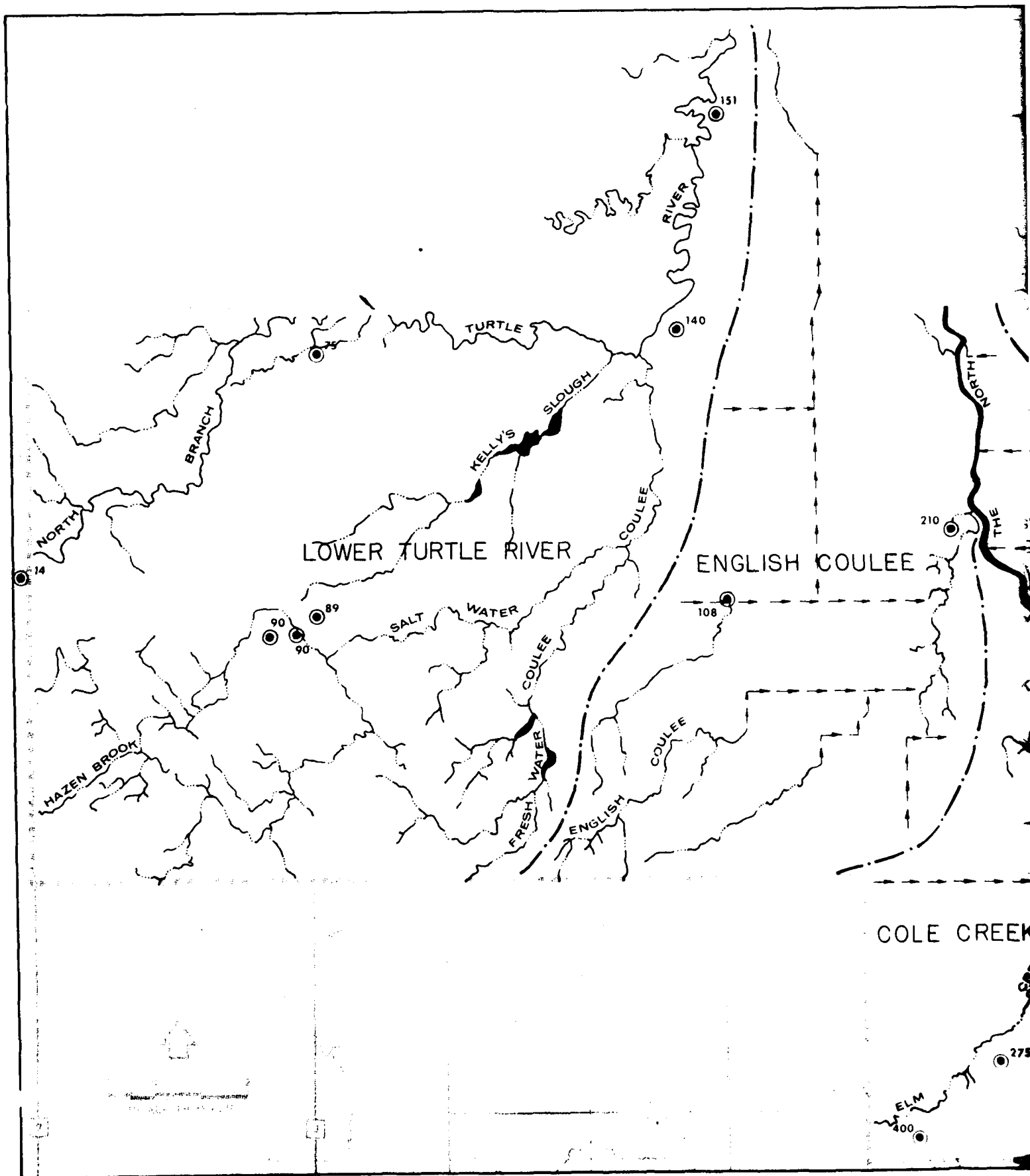
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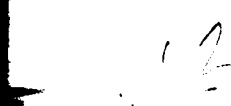
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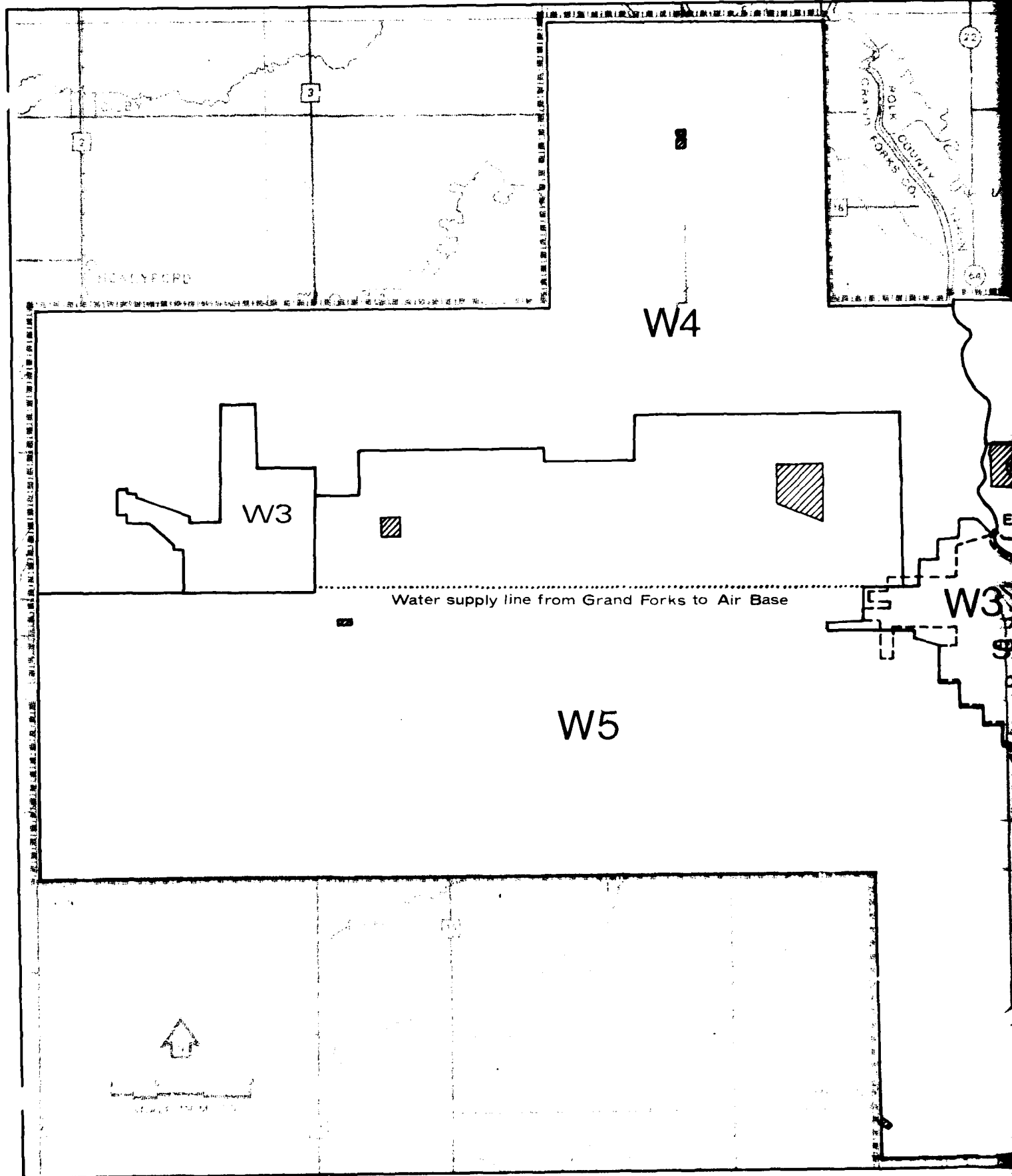


**Grand Forks / East Grand Forks
URBAN WATER RESOURCES STUDY**



-  LAKES AND PONDS
 MAJOR RIVER SYSTEMS
 SECONDARY
OR INTERMITTENT STREAMS
 DRAINAGE DITCHES
 DRAINAGE AREAS
 210
GROUNDWATER QUALITY WELL
AND DEPTH IN FEET
(SEE TABLE 4)

SOURCE: REFERENCES 14,15,18.



Grand Forks / East Grand Forks URBAN WATER RESOURCES STUDY

SEWAGE SERVICE AREAS

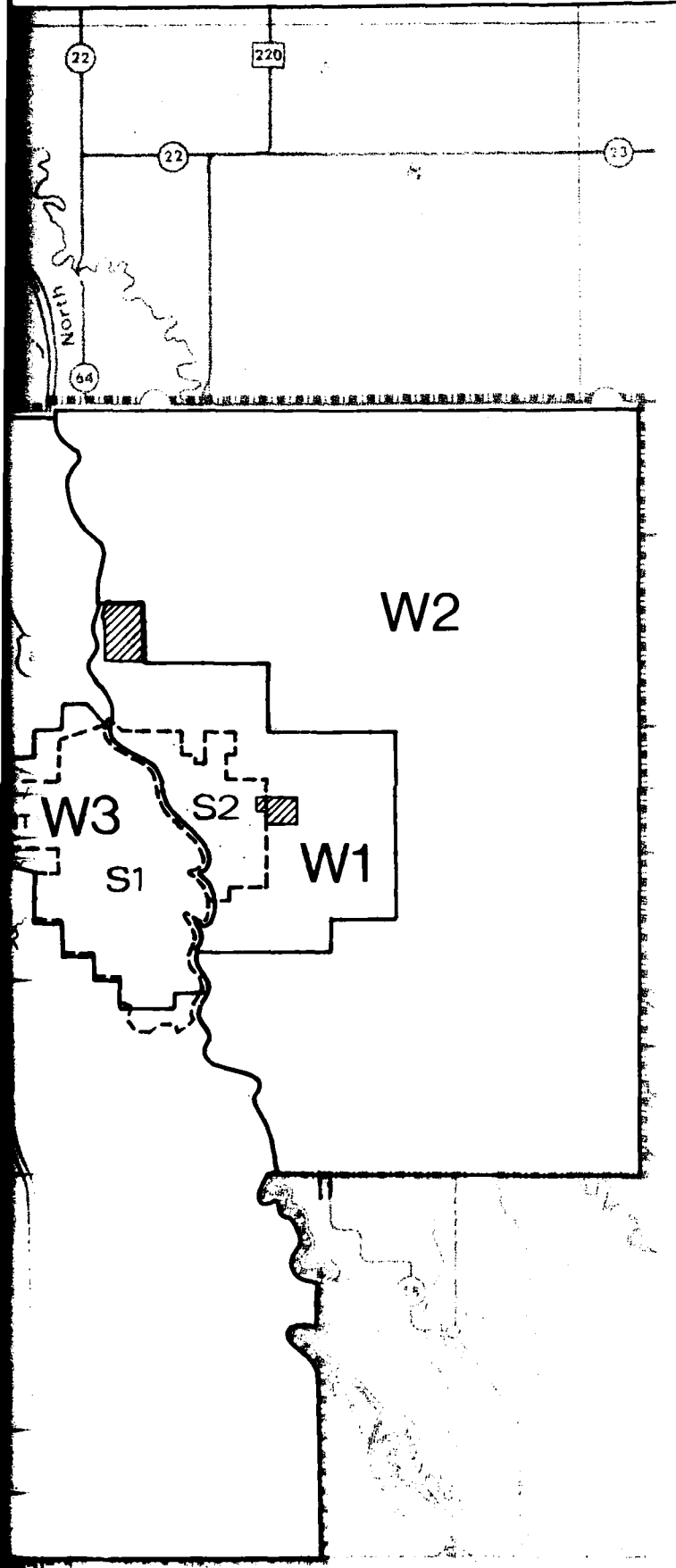
- S1 CITY OF GRAND FORKS
- S2 CITY OF EAST GRAND FORKS
- SEWAGE LAGOONS

WATER SUPPLY SERVICE AREAS

- W1 CITY OF EAST GRAND FORKS
- W2 MARSHALL AND POLK
RURAL WATER SYSTEM
- W3 CITY OF GRAND FORKS
- W4 AGASSIZ WATER USERS INC.
- W5 GRAND FORKS-TRAILL SYSTEM

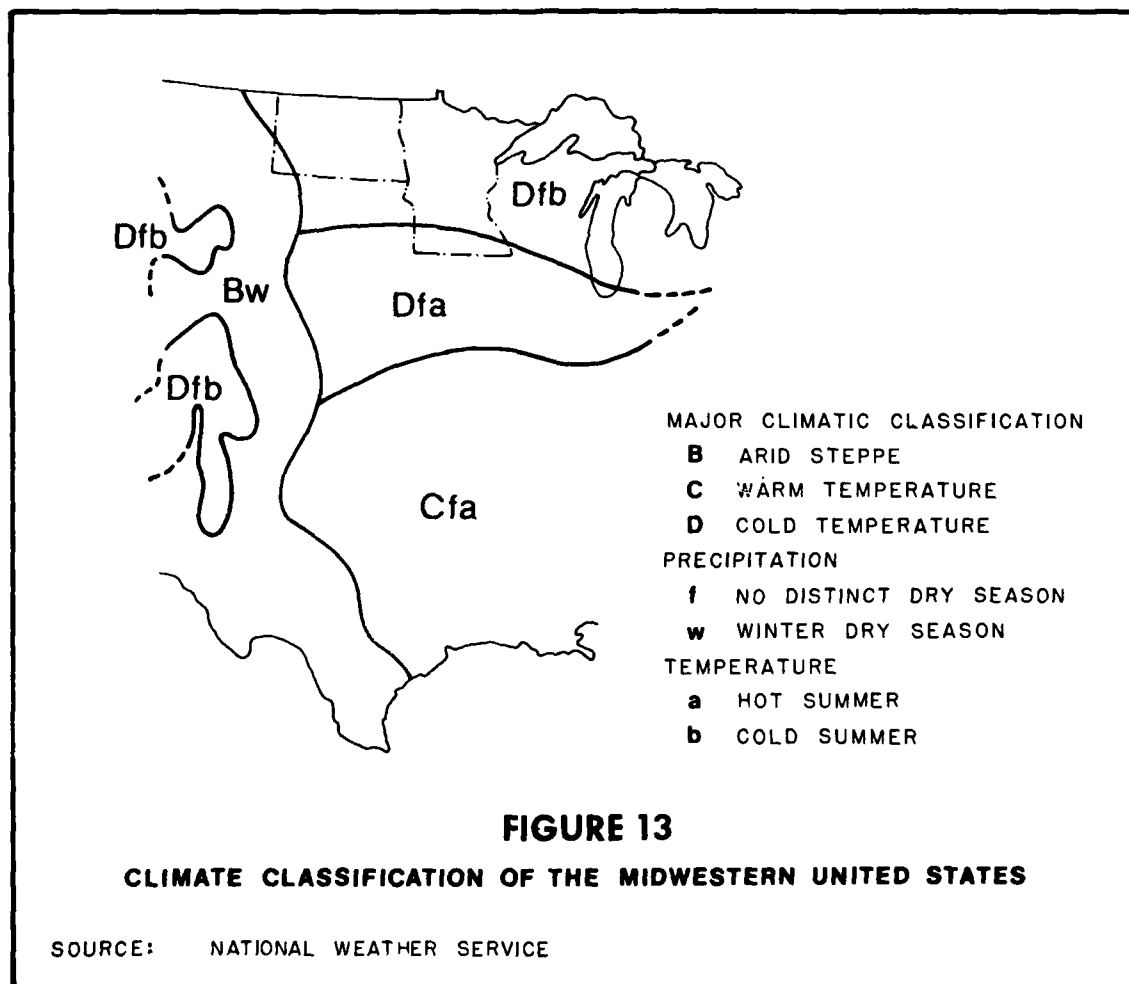
SOURCE: REFERENCE 172 THRU 175

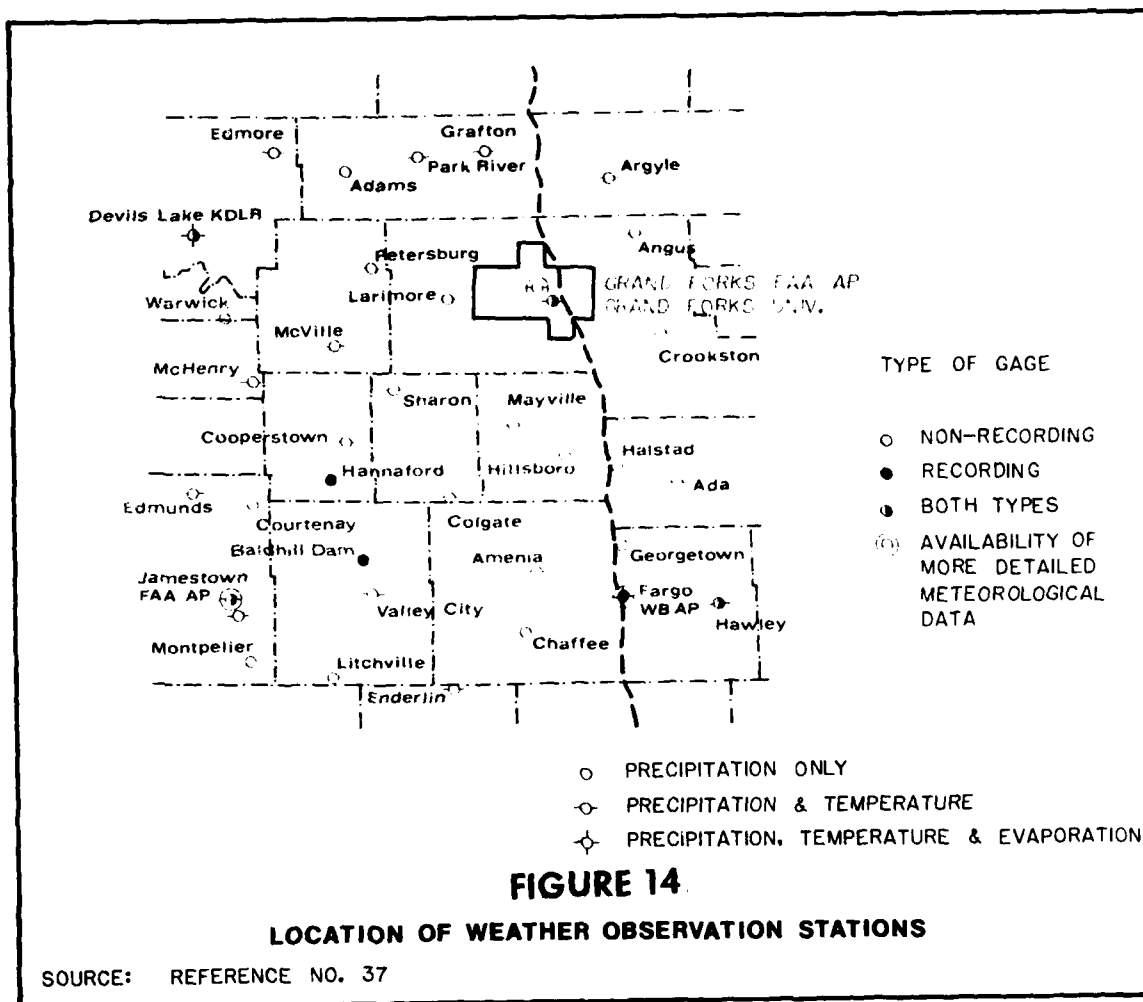
PLATE 5



Climate

The Grand Forks-East Grand Forks area has a continental climate characterized by wide variations in temperature, light to moderate precipitation, plentiful sunshine, and nearly continuous air movement. Weather patterns consisting of cold, dry air from polar regions and warm, moist air from tropical regions often move quickly into the area, resulting in the characteristic temperature variations. The climatic classification of the area as related to the midwestern region of the United States is shown on figure 13. The locations and types of weather observation stations are shown on figure 14. Weather records have been observed at Grand Forks (University of North Dakota) since January 1898; data given below are from these observations.





In the winter, movement of polar air into the area often results in bitter cold temperatures. Temperatures drop to 0° F (-18° C) or below on an average of 60 days each year. The coldest month on record, February 1936, had an average temperature of -13° F, 21° F below the normal temperature of 8° F. Monthly maximum and minimum temperatures recorded at Grand Forks for the years 1898-1966 are shown in tables 6 and 7, respectively. A summary of mean and extreme temperatures is given in table 8. The average precipitation during January, February, and March is 1.87 inches and the average yearly snowfall is 34.9 inches. Total monthly and annual precipitation figures for the years of record 1898-1966 are given in table 9. A summary of monthly and annual seasonal snowfall at Grand Forks for the years 1898-1966 is given in table 10.

TABLE 6

MAXIMUM TEMPERATURE
(Degrees F)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avail
1898	38	48	56	74	82	85	87	86	85	72	59	40	87
1899	46	46	30	79	75		89	85	85	72	58	44	
1900	50	33	60	85	95	98	93	92	89	73	55	58	98
1901	38	59	49	79	90	90	94	90	88	88	54	48	94
1902	46	50	59	74	84	87	88	83	82	73	56	39	88
1903	48	44	49	72	85	84	94	93	80	68	71	38	94
1904	37	37	48	72	82	84	87	84	83	69	65	45	87
1905	36	54	64	77	83	83	90	94	89	83	64	38	94
1906	37	37	58	80	95	85	91	96	99	84	58	29	99
1907	32	37	48	64	76	87	85	91	79	76	34	44	91
1908	49	37	45	90	81	91	96	94	93	80	64	36	94
1909	39	32	45	69	86	92	90	93	84	84	63	40	93
1910	38	37	83	83	87	99	96	94	83	85	44	34	99
1911	24	34	55	85	89	93	91	92	82	74	46	37	93
1912	25	39	47	80	85	98	88	87	92	79	57	46	98
1913	34	37	51	84	92	97	91	97	91	75	62	52	97
1914	45	46	55	70	85	86	95	93	92	88	43	37	95
1915	31	39	47	82	81	82	86	92	92	72	57	37	92
1916	29	38	48	68	84	81	93	95	89	70	44	51	95
1917	40	37	54	57	89	90	104	98	87	71	57	38	106
1918	31	48	74	72	94	93	95	98	79	73	65	44	98
1919	38	33	43	72	92	90	91	95	91	80	40	42	95
1920	32	32	56	57	80	88	93	99	88	88	54	34	99
1921	38	43	56	73	87	100	99	92	92	75	59	42	100
1922	35	25	53	78	83	92	92	96	94	95	56	39	94
1923	47	38	46	80	88	94	90	87	78	64	38	94	
1924	58	44	47	68	79	88	88	90	82	75	54	40	90
1925	39	50	61	82	93	85	92	96	85	57	58	43	94
1926	43	50	66	86	96	89	95	94	88	69	54	34	96
1927	40	40	59	70	75	90	92	93	80	52	34	93	
1928	44	42	64	76	95	84	87	94	84	83	57	47	95
1929	23	33	63	71	89	93	102	101	95	76	52	40	102
1930	31	47	54	76	92	89	99	98	87	79	61	40	99
1931	41	46	47	82	92	99	103	102	100	84	69	38	103
1932	35	51	45	73	92	90	101	94	87	73	50	45	101
1933	40	43	57	78	88	105	99	97	86	82	54	45	105
1934	38	42	53	90	105	90	105	98	88	86	63	38	105
1935	35	41	57	69	80	84	94	98	85	75	38	94	
1936	23	23	42	79	91	97	109	100	94	85	58	43	109
1937	26	35	45	63	89	92	95	96	93	87	45	37	96
1938	37	40	67	77	75	93	94	95	94	85	63	37	95
1939	29	40	61	83	100	93	102	96	94	70	64	58	102
1940	40	39	36	67	88	93	98	90	90	74	47	37	98
1941	40	34	48	79	90	92	103	93	92	71	58	52	103
1942	51	33	56	81	85	85	90	95	84	85	55	31	95
1943	37	40	50	75	79	93	94	93	84	81	50	46	94
1944	49	37	48	69	90	85	94	91	77	83	58	38	94
1945	35	40	69	64	80	90	97	101	97	80	55	46	101
1946	27	37	82	84	86	90	96	102	83	76	58	38	102
1947	40	36	52	84	81	83	93	101	98	86	51	32	101
1948	35	33	43	72	95	97	97	94	94	75	52	38	97
1949	39	32	42	84	83	93	94	101	83	77	67	29	101
1950	22	34	43	60	83	97	91	89	89	77	63	37	97
1951	40	38	48	72	89	85	97	93	81	79	47	38	97
1952	42	38	52	95	91	94	94	100	96	79	60	37	100
1953	39	39	53	71	88	92	89	97	88	86	65	40	97
1954	33	41	47	76	82	91	95	88	85	73	62	38	95
1955	25	36	51	78	93	88	97	98	90	82	51	35	98
1956	32	37	43	63	85	96	86	95	84	83	59	47	94
1957	33	39	58	85	83	87	96	93	80	80	49	44	96
1958	47	65	57	79	90	89	93	102	88	78	45	41	102
1959	34	35	56	78	91	97	96	96	97	71	63	41	97
1960	35	40	46	71	88	88	96	93	93	83	50	34	94
1961	40	40	64	69	90	94	95	99	89	84	58	31	99
1962	38	44	40	79	79	89	85	94	85	81	52	52	94
1963	40	46	80	77	86	91	95	92	88	85	60	38	95
1964	41	44	52	72	100	93	97	97	86	78	64	30	100
1965	31	41	42	79	86	87	90	101	71	75	67	45	101
1966	18	36	54	65	87	94	90	92	89	83	42	37	92

TABLE 7

MINIMUM TEMPERATURE
(Degrees F)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Ann'l
898	-15	-27	-6	15	25	36	39	40	29	22	-8	-31	-31
899	-28	-39	-14	25	38		44	40	22	22	15	-20	-39
900	-24	-28	-12	20	17	35	45	44	32	26	-12	-17	-28
901	-20	-18	-10	21	30	30		41	25	22	0	-33	-33
902	-33	-19	-13	15	30	40	45	42	25	20	2	-27	-33
903	-27	-32	0	18	26	34	38	40	27	20	-11	-25	-32
904	-27	-26	-14	10	32	40	40	40	25	21	1	-16	-37
905	-26	-30	-15	16	30	35	41	45	32	5	-35	-26	-35
906	-29	-36	-17	20	21	40	44	35	30	5	-14	-31	-36
907	-37	-39	-12	10	14	30	42	32	21	13	-1	-23	-39
908	-36	-29	-29	3	18	32	36	34	28	17	0	-22	-36
909	-38	-24	-6	7	18	33	45	37	32	10	-8	-27	-38
910	-28	-25	9	16	21	28	43	33	28	16	-4	-25	-28
911	-34	-27	16	8	18	40	38	37	27	12	-24	-23	-34
912	-43	-25	15	21	30	37	38	39	24	17	15	-16	-43
913	-37	-28	-23	23	25	35	41	47	22	5	6	-15	-37
914	-21	-40	-10	13	25	38	45	39	32	19	-11	-28	-40
915	-38	-9	-8	18	27	31	40	35	35	22	3	-19	-38
916	-40	-36	-26	8	25	35	48	34	28	9	-2	-34	-40
917	-36	-35	-33	20	25	28	40	36	22	2	10	-35	-36
918	-35	-28	-3	13	19	38	43	44	23	24	10	-30	-35
919	-36	-27	-20	19	26	39	47	38	29	-9	-24	-28	-36
920	-32	-30	-22	-9	22	36	40	35	25	15	6	-24	-32
921	-18	-20	-6	12	20	32	52	38	36	26	-23	-25	-25
922	-36	-27	-14	22	40	45	44	40	33	14	4	-22	-36
923	-26	-31	-20	14	20	39	49	34	24	12	7	-25	-31
924	-33	-20	3	14	24	34	41	38	32	30	5	-29	-33
925	-23	-32	-17	24	22	34	42	42	33	5	-2	-16	-32
926	-26	-5	-10	13	17	37	39	42	24	19	-12	-25	-26
927	-28	-15	2	20	33	37	44	37	22	28	-7	-21	-28
928	-22	-13	-9	7	27	31	48	38	24	13	9	-17	-22
929	-32	-28	-6	19	20	37	44	39	18	23	-15	-27	-32
930	-33	-23	-3	20	28	36	44	41	21	12	-8	-17	-33
931	-14	-14	0	16	22	32	47	36	35	27	-4	-15	-15
932	-24	-20	-13	6	26	47	44	38	33	17	-13	-18	-24
933	-14	-33	-7	18	28	40	46	39	32	11	-5	-37	-37
934	-29	-18	-7	19	24	41	42	36	24	21	7	-29	-29
935	-35	-9	3	15	29	31	53	32	27	6	-16	-23	-35
936	-39	-42	-22	-5	29	37	44	41	26	1	-11	-23	-42
937	-36	-29	-5	17	28	35	48	44	28	16	-11	-27	-36
938	-29	-23	-2	9	30	34	51	42	25	15	-15	-28	-29
939	-28	-38	-19	6	22	38	42	44	24	19	7	-10	-38
940	-25	-16	-15	4	26	32	41	44	27	25	-8	-21	-25
941	-26	-31	-16	18	25	34	43	34	30	12	-3	-17	-31
942	-26	-24	9	15	29	39	42	35	18	9	-7	-28	-28
943	-36	-27	-18	17	25	35	50	40	27	15	4	-15	-36
944	-12	-23	-16	3	25	39	39	40	33	20	2	-13	-23
945	-26	-15	-10	16	20	49	43	41	24	15	-1	-29	-29
946	-27	-29	-4	24	22	34	44	45	34	24	-8	-24	-29
947	-22	-19	-5	22	24	39	41	43	24	26	-16	-23	-23
948	-35	-31	-36	1	30	40	49	47	37	16	-4	-25	-36
949	-29	-27	-15	16	30	36	45	42	24	18	1	-19	-29
950	-33	-29	-24	-3	28	37	40	37	37	24	-10	-22	-33
951	-34	-26	-11	22	28	39	43	45	28	10	-16	-29	-34
952	-33	-15	-18	20	28	39	43	42	33	11	-1	-3	-33
953	-19	-16	-10	12	27	32	47	46	33	26	14	-22	-22
954	-32	-9	-2	-1	26	38	39	41	31	21	3	-10	-32
955	-21	-28	-23	29	23	44	45	42	11	14	-15	-30	-30
956	-22	-28	-23	14	29	35	47	41	25	18	-1	-23	-28
957	-30	-17	-8	9	29	37	49	41	24	15	-1	-18	-30
958	-16	-26	5	10	18	34	47	42	32	25	-22	-20	-26
959	-26	-30	-3	22	29	42	46	48	28	14	-4	5	-30
960	-22	-21	-18	14	27	40	42	49	32	21	-6	-22	-22
961	-27	-20	11	10	22	40	46	45	26	19	-2	-18	-27
962	-31	-32	-28	7	28	39	46	46	31	18	10	-16	-32
963	-28	-22	-5	17	25	43	49	44	37	29	4	-27	-28
964	-23	-18	-12	11	31	29	49	37	29	23	-19	-25	-25
965	-30	-21	-12	27	30	43	43	34	23	27	-1	-13	-30
966	-33	-34	-9	21	25	37	50	45	31	18	-2	-21	-34

TABLE 8

MEANS AND EXTREMES FOR PERIOD 1898 - 1966

Month	Temperature (°F)								Mean degree days	Precipitation Totals (Inches)								Mean number of days						Month
	Means				Extremes					Mean	Greatest daily	Year	Snow, Sleet				Precip. 10 inch or more	Temperatures						
	Daily maximum	Daily minimum	Monthly	Record highest	Year	Record lowest	Year	Mean					Maximum monthly	Year	Greatest daily	Year		Max above 32°	Min. below 32°	Below 0°	Below 0°			
(3)	69	69	69	74	1942	-43	1912	1876	5.51	64	1941	6.2	19.3	1950	5.0	1946	6.0	0	27	31	21	69	J	
J	14.1	-5.5	4.2	71	1938	-44	1893	1576	5.54	67	1911	5.7	19.6	1943	11.0	1943	2.2	0	23	28	16	69	F	
F	12.4	-11.8	3.4	73	1926	-56	1842	1314	5.50	1770	1937	5.9	19.0	1966	11.5	1966	2.2	0	15	26	6	69	M	
M	10.1	-10.7	41.5	63	1952	-56	1920	717	1.56	3.48	1937	3.0	16.7	1950	6.5	1904	4	2	18	*	*	69	A	
A	9.1	-11.8	54.7	105	1934	-14	1907	341	2.47	2.44	1922	0.4	6.7	1924	4.1	1938	5	1	0	6	0	69	M	
M	75.6	51.9	63.8	105	1933	25	1917	105	3.47	3.40	1908	T	T	1952*	T	1952*	7	2	0	*	0	69	J	
J	-1.3	-36.3	69.2	109	1936	36	1908	31	2.39	2.93	1960						6	4	0	0	0	69	J	
J	29.7	54.2	67.3	102	1938	32	1915	43	2.81	3.85	1951						5	4	0	*	0	69	A	
A	68.8	43.6	56.7	100	1931	11	1935	252	2.08	3.63	1957	T	2.0	1912	2.0	1912	4	1	0	3	0	69	S	
S	36.1	17.6	14.9	8	1922	-9	1919	609	1.29	2.73	1934	1.1	4.2	1926	7.5	1926	3	0	1	14	*	69	O	
O	35.6	17.0	20.7	71	1903	-35	1935	1167	.86	1.45	1944	5.9	24.1	1961	12.0	1958	2	0	17	28	3	69	N	
N	20.2	1.9	11.1	57	1932	-27	1911	1649	.62	.62	1938	6.1	27.6	1918	6.6	1942*	2	0	25	31	14	69	D	
Year	50.1	20.3	39.3	104	1936	-44	1893	9676	20.02	3.85	1951	34.9	27.6	1918	12.0	1958	44	12	105	146	60	69	Year	

(a) Average length of record, years.

T Trace, an amount too small to measure.

** Base 65°F

* Also on earlier dates, months, or years.

* Less than one half.

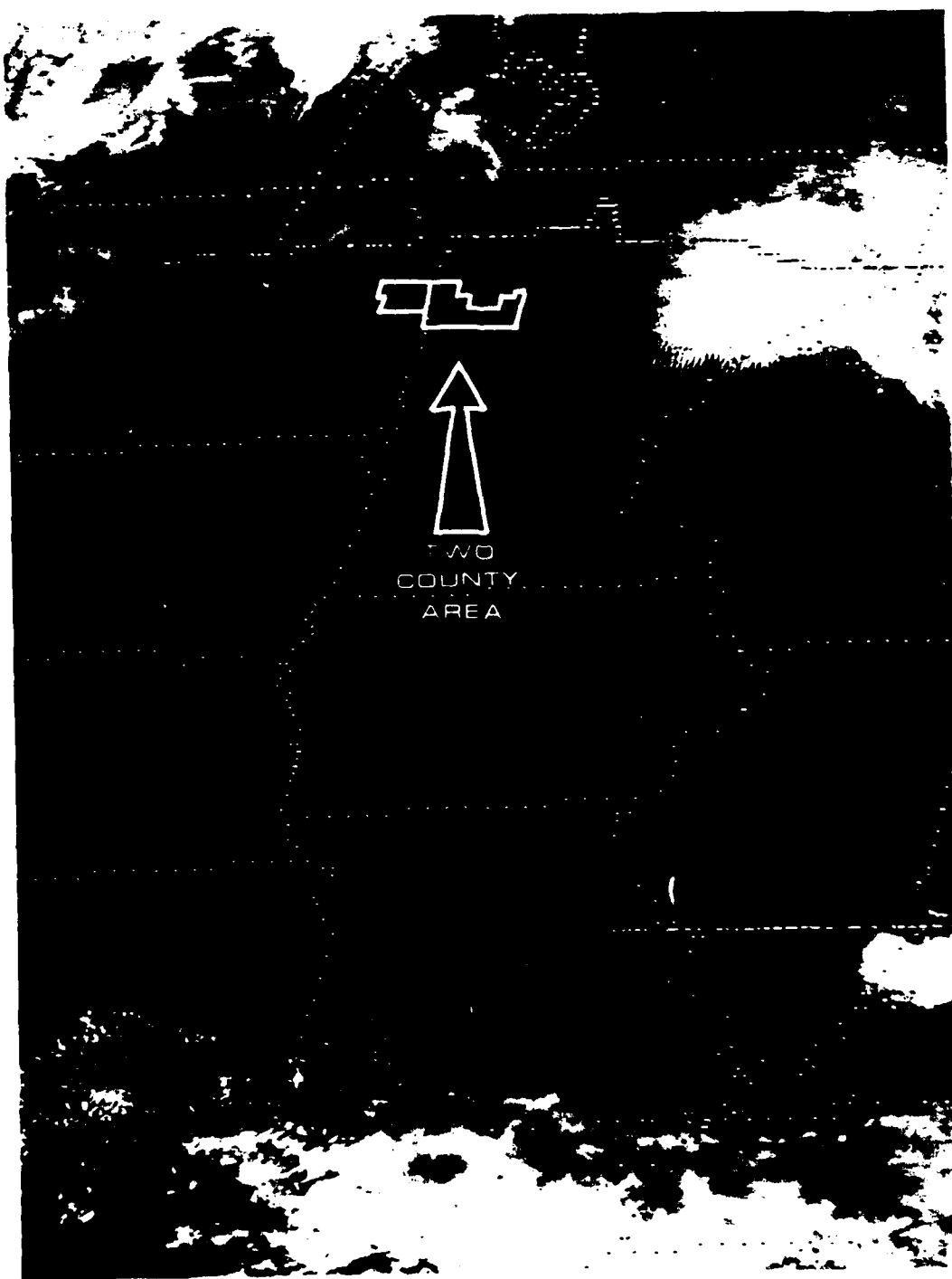
TABLE 9

Total Precipitation (Inches)												
Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1887	15	16	14	13	12	11	10	9	8	7	6	5
1888	14	13	12	11	10	9	8	7	6	5	4	3
1889	13	12	11	10	9	8	7	6	5	4	3	2
1890	12	11	10	9	8	7	6	5	4	3	2	1
1891	11	10	9	8	7	6	5	4	3	2	1	0
1892	10	9	8	7	6	5	4	3	2	1	0	-1
1893	9	8	7	6	5	4	3	2	1	0	-1	-2
1894	8	7	6	5	4	3	2	1	0	-1	-2	-3
1895	7	6	5	4	3	2	1	0	-1	-2	-3	-4
1896	6	5	4	3	2	1	0	-1	-2	-3	-4	-5
1897	5	4	3	2	1	0	-1	-2	-3	-4	-5	-6
1898	4	3	2	1	0	-1	-2	-3	-4	-5	-6	-7
1899	3	2	1	0	-1	-2	-3	-4	-5	-6	-7	-8
1900	2	1	0	-1	-2	-3	-4	-5	-6	-7	-8	-9
1901	1	0	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10
1902	0	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	-11
1903	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	-11	-12
1904	-2	-3	-4	-5	-6	-7	-8	-9	-10	-11	-12	-13
1905	-3	-4	-5	-6	-7	-8	-9	-10	-11	-12	-13	-14
1906	-4	-5	-6	-7	-8	-9	-10	-11	-12	-13	-14	-15
1907	-5	-6	-7	-8	-9	-10	-11	-12	-13	-14	-15	-16
1908	-6	-7	-8	-9	-10	-11	-12	-13	-14	-15	-16	-17
1909	-7	-8	-9	-10	-11	-12	-13	-14	-15	-16	-17	-18
1910	-8	-9	-10	-11	-12	-13	-14	-15	-16	-17	-18	-19
1911	-9	-10	-11	-12	-13	-14	-15	-16	-17	-18	-19	-20
1912	-10	-11	-12	-13	-14	-15	-16	-17	-18	-19	-20	-21
1913	-11	-12	-13	-14	-15	-16	-17	-18	-19	-20	-21	-22
1914	-12	-13	-14	-15	-16	-17	-18	-19	-20	-21	-22	-23
1915	-13	-14	-15	-16	-17	-18	-19	-20	-21	-22	-23	-24
1916	-14	-15	-16	-17	-18	-19	-20	-21	-22	-23	-24	-25
1917	-15	-16	-17	-18	-19	-20	-21	-22	-23	-24	-25	-26
1918	-16	-17	-18	-19	-20	-21	-22	-23	-24	-25	-26	-27
1919	-17	-18	-19	-20	-21	-22	-23	-24	-25	-26	-27	-28
1920	-18	-19	-20	-21	-22	-23	-24	-25	-26	-27	-28	-29
1921	-19	-20	-21	-22	-23	-24	-25	-26	-27	-28	-29	-30
1922	-20	-21	-22	-23	-24	-25	-26	-27	-28	-29	-30	-31

TABLE 10

MONTHLY AND SEASONAL SNOWFALL

Season	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Total	Season	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Total
1898 - 1899	0	T	T	5.0	6.0	1.0	6.0	0	0	0	18.0	1930 - 1931	C	0.4	8.2	6.4	1.4	1.0	3.4	T	0.8	0	23.6
1899 - 1900	0	T	1.5	5.0	1.1	2.7	3.5	0	0	0	13.8	1931 - 1932	0	0	10.9	2.3	5.4	10.3	6.7	1.8	0	0	37.4
1900 - 1901	0	0	8.0	2.0	N	2.0	6.5	1.5	T	0	M	1932 - 1933	0	5.4	6.5	0.8	11.6	1.5	2.2	11.4	0	0	39.8
1901 - 1902	0	0	2.4	7.1	3.1	3.9	4.5	6.0	1.5	0	28.5	1933 - 1934	C	4.4	16.8	14.4	1.3	1.2	2.6	8.2	0	0	49.1
1902 - 1903	0	0	1.3	4.6	7.0	1.0	5.0	0	0	0	18.9	1934 - 1935	T	T	2.2	5.7	6.3	0.1	4.6	3.8	T	T	22.7
1903 - 1904	0	0	5.0	10.5	3.0	11.0	7.8	7.3	0	0	44.6	1935 - 1936	0	1.5	11.7	7.7	10.5	13.1	6.6	1.7	0	0	52.8
1904 - 1905	0	0	T	4.3	3.0	1.3	2.5	0	0	0	11.1	1936 - 1937	0	1.7	3.2	3.0	13.5	8.6	3.2	9.6	0	0	42.8
1905 - 1906	0	1.0	6.0	2.8	7.0	2.0	1.0	0	0.5	0	20.3	1937 - 1938	0	0	7.5	5.6	3.0	10.4	0.7	0.7	4.3	0	32.2
1906 - 1907	0	4.0	15.6	8.7	8.0	1.0	2.0	1.1	0	0	40.4	1938 - 1939	0	0	15.2	6.0	6.6	10.2	8.9	1.7	0	0	48.5
1907 - 1908	0	0	0	3.0	1.3	14.0	9.0	0.2	C	0	27.5	1939 - 1940	0.2	2.3	0.1	1.3	1.1	10.8	6.3	3.8	0	0	25.9
1908 - 1909	T	0	3.4	2.5	8.6	1.0	2.7	3.0	0	0	21.2	1940 - 1941	0	0	5.9	8.0	10.4	5.8	8.5	2.3	0	0	40.9
1909 - 1910	0	T	7.5	7.5	2.0	1.3	T	2.0	0	0	20.3	1941 - 1942	0.2	3.6	1.6	3.0	2.1	1.9	15.6	1.7	T	0	29.7
1910 - 1911	0	0	7.0	4.0	9.1	13.8	0.3	7.5	0	0	41.7	1942 - 1943	0	T	3.6	13.3	2.7	19.6	12.2	T	T	0	51.4
1911 - 1912	0	T	9.5	5.3	7.1	0.5	2.9	0	0	0	25.3	1943 - 1944	0	T	3.0	4.2	5.1	1.9	18.5	T	1.0	0	33.7
1912 - 1913	2.0	0.2	1.0	4.5	3.1	1.0	7.4	3.0	0	0	22.2	1944 - 1945	0	0	7.4	3.5	8.6	5.9	1.7	4.5	3.5	0	35.1
1913 - 1914	0	0.5	1.5	0.7	6.8	3.5	5.0	1.6	0	0	19.4	1945 - 1946	T	T	1.2	16.7	5.9	9.0	2.3	5.5	1.0	0	41.6
1914 - 1915	0	0	2.4	4.9	4.8	12.2	0.8	0	0.1	0	25.2	1946 - 1947	0	T	4.3	4.8	6.3	3.9	4.2	3.0	0.3	0	26.8
1915 - 1916	0	T	2.7	6.5	17.5	7.1	17.3	6.1	T	0	57.2	1947 - 1948	0	0	21.0	6.5	5.1	13.2	9.5	10.4	0.5	0	66.2
1916 - 1917	0	1.8	0.1	16.9	6.8	10.8	3.6	0.7	0.3	0	41.0	1948 - 1949	0	T	6.4	9.5	16.9	7.9	10.1	T	T	T	50.8
1917 - 1918	0	6.6	2.4	12.9	5.0	2.6	0	T	0	0	29.5	1949 - 1950	0	0.8	2.8	13.3	19.3	1.4	10.5	16.7	4.6	T	69.4
1918 - 1919	0	1.0	5.7	27.6	5.2	5.0	1.2	8.1	0	0	53.8	1950 - 1951	T	2.0	4.7	7.0	7.2	2.2	9.5	1.0	0	0	33.6
1919 - 1920	0	5.0	23.9	1.9	10.3	2.5	3.9	1.2	0	0	48.7	1951 - 1952	0	0.3	6.4	8.9	12.0	6.0	3.8	T	0	T	38.4
1920 - 1921	0	T	1.3	3.5	3.7	7.5	7.3	1.2	T	0	24.5	1952 - 1953	0	T	1.5	4.9	6.5	4.7	3.5	1.7	T	0	22.8
1921 - 1922	0	3.0	3.6	3.5	5.2	19.6	7.6	0.8	0	0	43.3	1953 - 1954	0	0	7.0	6.9	11.4	0.9	4.6	T	2.5	0	33.2
1922 - 1923	0	0.8	7.1	10.1	2.8	7.6	6.5	9.1	0.1	0	44.1	1954 - 1955	0	0.5	3.1	1.5	4.7	11.3	3.4	0.5	0	0	35.0
1923 - 1924	0	0.8	1.2	9.5	9.2	4.2	5.4	3.2	6.7	0	40.2	1955 - 1956	0	0.5	13.1	4.4	11.9	6.3	15.3	1.8	0	0	53.3
1924 - 1925	0	T	2.2	2.7	2.0	3.3	4.9	0	T	0	15.1	1956 - 1957	0	0	T	7.5	5.4	7.5	0.9	4.0	0	0	25.6
1925 - 1926	0	5.4	0.1	2.2	4.5	2.5	3.0	0.4	0	0	18.1	1957 - 1958	0	0.5	5.8	1.6	1.6	0.6	2.8	T	0	0	12.9
1926 - 1927	T	8.2	12.7	6.5	4.1	5.9	4.3	5.0	0	0	46.7	1958 - 1959	C	0	24.1	4.1	4.4	7.6	1.4	0.5	0	0	42.1
1927 - 1928	T	1.4	7.5	6.3	3.6	0.1	10.2	5.7	0	0	34.1	1959 - 1960	0	3.8	9.9	0.6	8.1	4.7	2.2	13.5	T	0	42.8
1928 - 1929	T	0	T	7.4	11.1	2.6	1.5	2.3	T	0	24.9	1960 - 1961	0	0	6.9	8.0	4.1	6.0	3.4	1.0	T	0	26.4
1929 - 1930	C	5.2	6.9	6.7	4.1	17.9	3.3	T	T	0	44.1	1961 - 1962	0	0	5.7	6.8	9.2	10.6	16.3	0.7	0	0	47.3
												1962 - 1963	0	T	6.2	7.1	1.0	5.5	5.4	2.0	T	0	27.2
												1963 - 1964	0	0	1.8	11.0	6.0	3.6	11.2	7.9	0	0	41.7
												1964 - 1965	0	0	7.0	10.2	2.8	1.1	4.3	5.0	T	0	30.4
												1965 - 1966	0	0	12.2	7.1	4.6	2.9	19.0	3.9	0	0	49.7
												1966 -	0	0	7.9	10.7							



A report dated its photo

Spring is a time of rapid and large changes in temperature and precipitation. During April, the most rapid warming occurs, with average monthly temperatures 18° F higher than those of March. The average date of last frost is May 19, but freezing temperatures have been recorded as late as June. Average precipitation during April, May, and June is 7.50 inches, more than four times that of the winter months.

The summer months are characterized by nearly continuous bathing of weather patterns from the arid south. The average precipitation during the summer is 7.88 inches, slightly more than that of the spring months. The summers are warm but not hot; maximum temperatures of 90° F or more occur on an average of only 12 days a year.

The first frost of fall, which usually occurs in mid-to-late September, signals the end of the growing season and indicates that about 2 months remain until winter. The percent probability of freeze occurrence in the spring and fall in the area is given in table 11. Average frost penetration at Grand Forks is 4.5 feet, with an extreme of about 7 feet. A large decrease in precipitation occurs during the transition from summer to fall; the average total precipitation for October, November, and December is 2.77 inches, almost one-third that of the average total summer precipitation.

The temperature changes which accompany the rapidly moving winter weather systems may be extreme and, when accompanied by blizzard conditions, may threaten the life and well-being of humans, farm animals, and wildlife. The lowest temperature of record at the Grand Forks weather station, -44° F, occurred on 1 February 1893, and the highest temperature of record, 109° F, was recorded on 12 July 1936. The mean annual precipitation for the period of record at Grand Forks is 20.02 inches (figure 15), making the city one of the "wetter" areas in North Dakota.

TABLE 11

PROBABILITY OF FREEZE OCCURRENCE IN SPRING

Percent probability of a freeze occurring after date shown

Temp. (Degrees F)	90%	75%	50%	25%	10%
32	May 5	May 12	May 19	May 26	June 2
28	Apr. 22	Apr. 29	May 6	May 13	May 20
24	Apr. 8	Apr. 16	Apr. 24	May 2	May 10
20	Mar. 28	Apr. 5	Apr. 13	Apr. 22	Apr. 29
16	Mar. 19	Mar. 27	Apr. 5	Apr. 14	Apr. 22

PROBABILITY OF FREEZE OCCURRENCE IN FALL

Percent probability of a freeze occurring before date shown

Temp. (Degrees F)	10%	25%	50%	75%	90%
32	Sep. 11	Sep. 17	Sep. 23	Sep. 29	Oct. 5
28	Sep. 16	Sep. 22	Sep. 29	Oct. 6	Oct. 12
24	Sep. 26	Oct. 4	Oct. 12	Oct. 20	Oct. 28
20	Oct. 8	Oct. 16	Oct. 25	Nov. 3	Nov. 11
16	Oct. 15	Oct. 23	Nov. 1	Nov. 10	Nov. 18

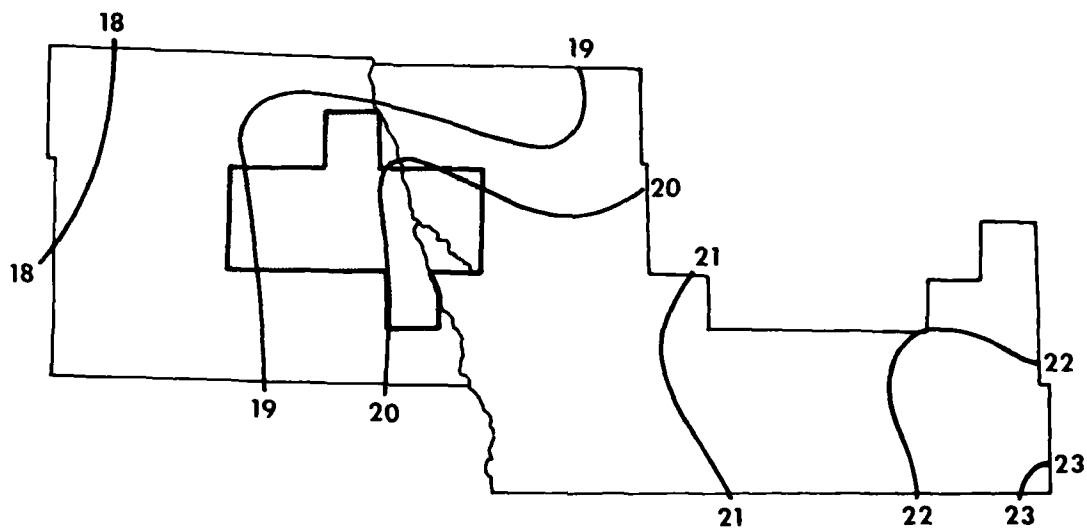
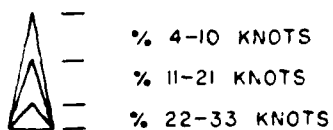
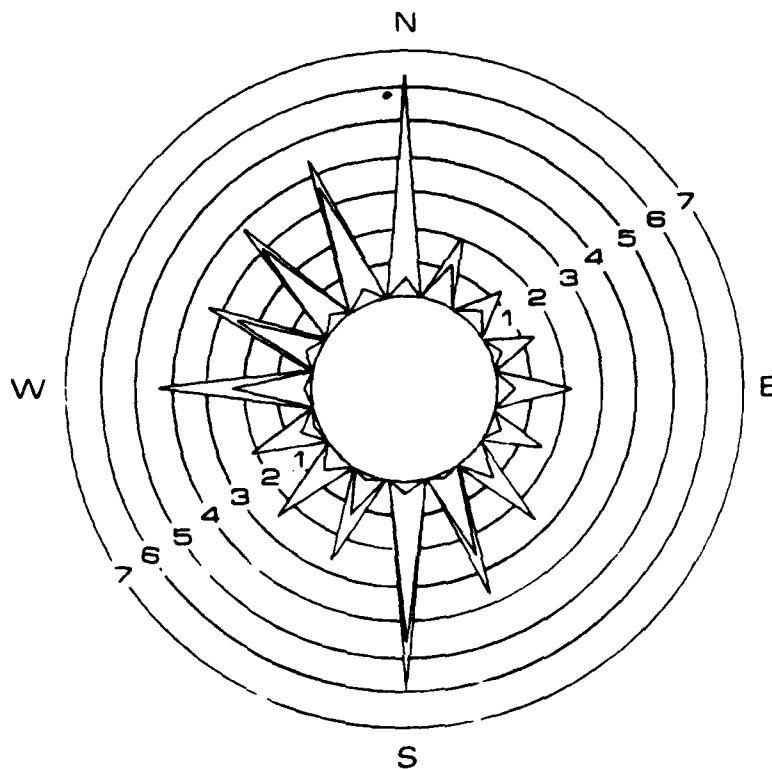


FIGURE 15
MEAN ANNUAL PRECIPITATION
IN GRAND FORKS AND POLK COUNTIES
(INCHES)

SOURCE: REFERENCE NO. 14 & 36

Average wind speeds in North Dakota are greatest in the winter and least in the summer. Average wind speeds in the Red River Valley range from 10 to 20 percent higher than in the adjacent plains area. As shown by the wind rose for the Grand Forks area (figure 16), the greatest frequency and magnitude of prevailing annual winds are from the north and south.



PERCENTAGE TIME WIND HAS INDICATED DIRECTION AND SPEED
 9.2% OF THE TIME WIND SPEED IS 3 KNOTS OR LESS

FIGURE 16
WIND ROSE
PERCENTAGE FREQUENCY OF WIND DIRECTION AND SPEED

SOURCE: REFERENCE NO. 38

Like other areas in the upper midwest and plains region, the Grand Forks-East Grand Forks area experiences tornadoes, windstorms, and blizzards. A damaging tornado occurred at Grand Forks in 1887. In 1954, a major windstorm caused extensive damage and power blackouts in the area. On the average, nearly 13 tornadoes occur in North Dakota during the year. The study area has experienced several severe blizzards over the years, the more memorable ones being the "Blizzard of 1896," those in 1940, the "Ides of March Blizzard" in 1941 when winds hit 85 miles per hour at Grand Forks, and the storm in 1950 when 70-mile-per-hour winds and heavy snow lashed the area.

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BIOLOGICAL ELEMENTS

Introduction

Ecosystems

Flora

Fauna

Threatened And Endangered Species

Ecosystem Trends

Susceptibility Of Fauna To Urbanization

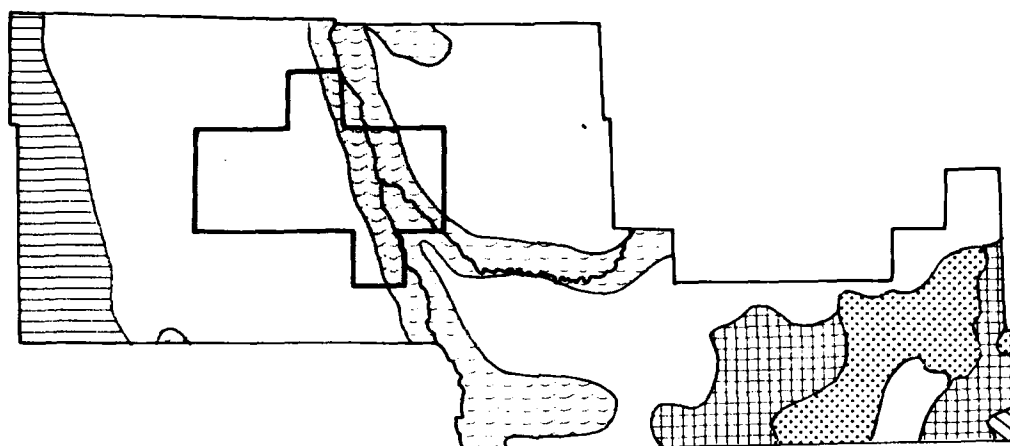
BIOLOGICAL ELEMENTS

Introduction

About 12,000 years ago, the Grand Forks-East Grand Forks area was covered by extensive forest growth. Drier conditions some 3,000 years later caused an increase in prairie vegetation. In about 500 years, prairie vegetation became dominant in the former lake plain area, with oak savanna forests in the eastern upland areas. Following another period of apparent re-forestation some 4,000 years ago, the prairie ecosystem again achieved dominance and remained relatively undisturbed until the influx of settlers in the mid-19th century.

Dominant grass species at the time of the early explorers included the tall and medium prairie grasses, such as big bluestem, wheatgrass, prairie June grass, and species of bluegrass, as well as switch grass and Indian grass. Flowering species included wild columbine, buttercups, violets, asters, and goldenrods. Reed grasses, sedges, cattails, and bulrushes were found in the wet meadows and marshes. Shrub communities such as berry shrubs and leadplant occurred throughout the prairie. Typical floral associations in the region are shown on figure 17.





	BLUESTEM PRAIRIE (ANDROPOGON-PANICUM-SORGHASTRUM)
	OAK SAVANNA (QUERCUS-ANDROPOGON)
	WHEATGRASS-BLUESTEM-NEEDLEGRASS (AGROPYRON-ANDROPOGON-STIPA)
	NORTHERN FLOODPLAIN FOREST (POPULUS-SALIX-ULMUS)
	OAK-MAPLE-BASSWOOD FOREST (QUERCUS-ACER-TILIA)
	GREAT LAKES SPRUCE-FIR FOREST (PICEA-ABIES)

FIGURE 17
FLORA ASSOCIATIONS OF
GRAND FORKS AND POLK COUNTIES

SOURCE: REFERENCE NO. 53

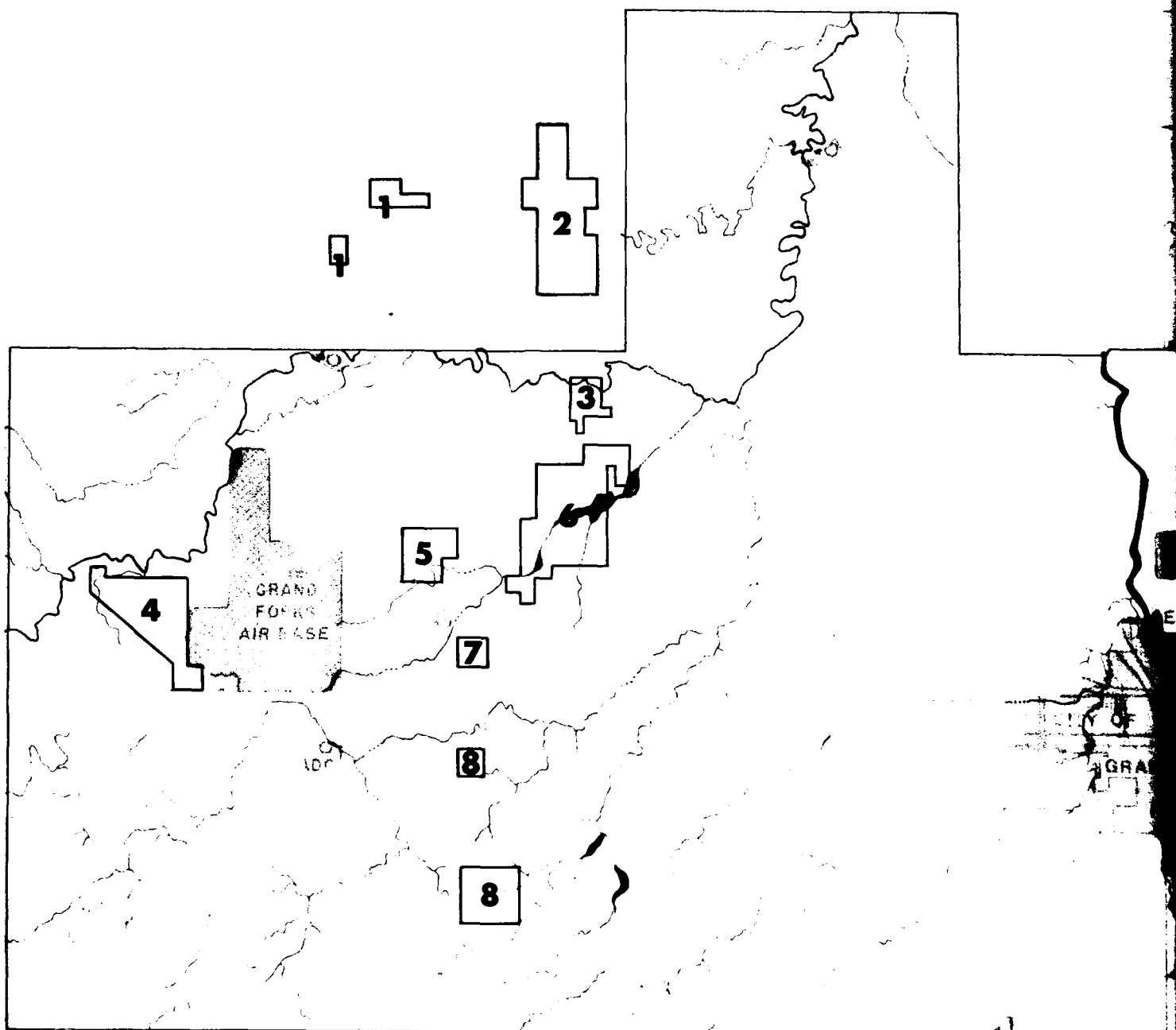
Buffalo (bison) roamed the area during early periods and were a principal food source for the Indians. To aid in hunting buffalo, the Indians burned the prairie. These fires and natural fires started by lightning burned the dry grasses, improving soil fertility and pasture for the buffalo. Fires, along with the dry conditions and dense prairie ground cover, prevented the encroachment of the forest. The first white settlers found woodlands only along the major watercourses. These floodplain forests included bur oak, hackberry, American elm, basswood, and green ash.

The rich prairie grasslands in the Lake Agassiz region supported a variety of wildlife. Buffalo and elk were common. Other species included the coyote and prairie grouse. Migrating waterfowl frequented wetlands in the area.

The boundary or transition between the floodplain forest and treeless prairie communities is defined as an ecotone. Species common to each community or ecosystem overlap at this boundary, with the boundary area containing more and different species than either ecosystem. Species from the native prairie ecosystem whose distribution ended at or near the prairie-forest ecotone included the Hungarian partridge, prairie chicken, and sharp-tailed grouse. Species in the forest community included the cottontail rabbit, deer, squirrel, and wood duck.

The influx of settlers into the area during the early and mid-1800's drastically and permanently altered the characteristics of the prairie biome. Cultivation of the fertile prairie soils signaled the end of most native prairie grasses and eliminated or threatened the traditional residents. By 1870, the buffalo were gone as a result of the hunters or loss of supporting native pasture. Former residents, such as the black bear, badger, antelope, and elk, are either gone from the area or near extinction. The drainage of wetlands and potholes in the poorly drained lake plain area has resulted in a substantial loss of waterfowl and other semiaquatic inhabitants.

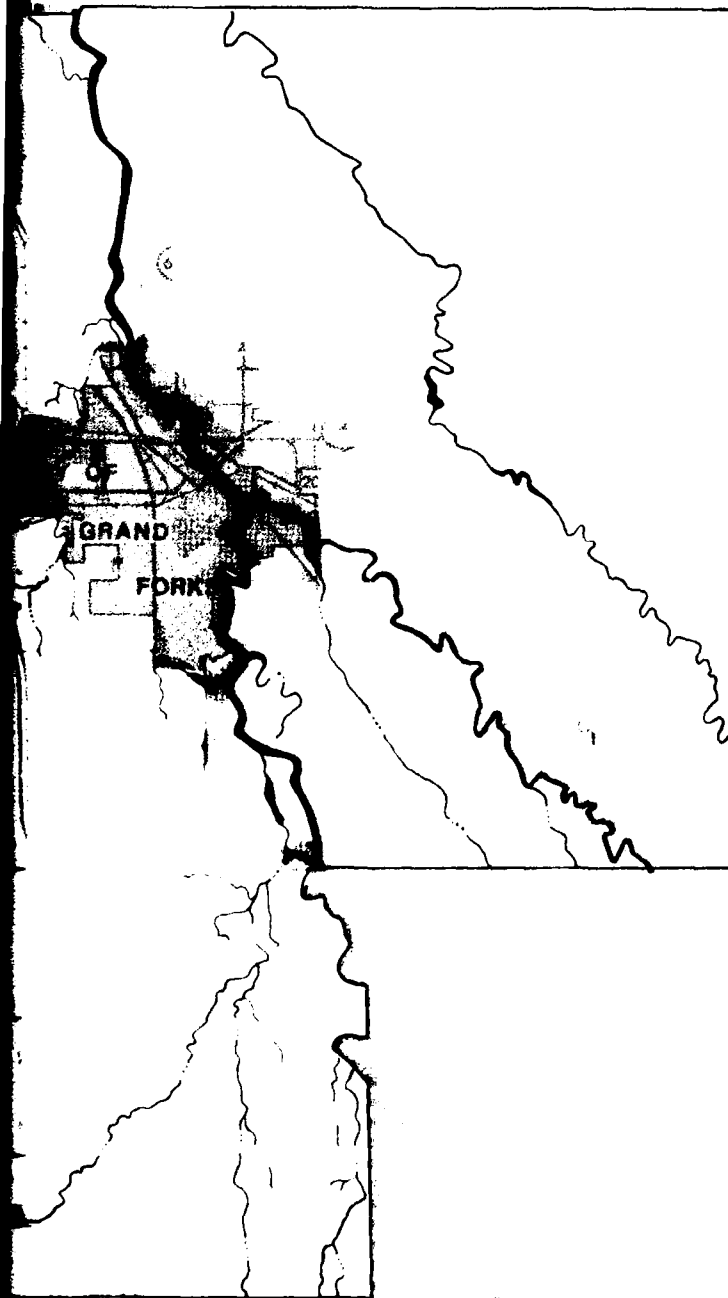
Much of the original bluestem prairie has disappeared with only remnant surviving tracts (see plate 6). Shelterbelts of both native and exotic tree and shrub species crisscross the former prairie to provide protection from the wind. The visual landscape is also markedly altered by numerous utility transmission lines. In contrast to the marked prairie changes, the floodplain forest species do not appear to have been significantly altered. Past lumbering activity took the larger, mature trees but in turn provided regrowth valuable to resident wildlife. Cultural development such as city park areas has eliminated the natural understory and ground cover in some areas.



**WILDLIFE, REFUGE
AND MANAGEMENT AREAS**

- 1 PRAIRIE CHICKEN MGT. AREA
- 2 STEWART LAKE
- 3 TURTLE RIVER WATERFOWL PRODUCTION AREA
- 4 AIR FORCE BIOLOGY AREA (UND)
- 5 MEKINOCK WATERFOWL PRODUCTION AREA
- 6 KELLY'S SLOUGH NATIONAL WILDLIFE REFUGE
- 7 PENDEN WATERFOWL PRODUCTION AREA
- 8 OAKVILLE PRAIRIE (UND)

Grand Forks / East Grand Forks URBAN WATER RESOURCES STUDY

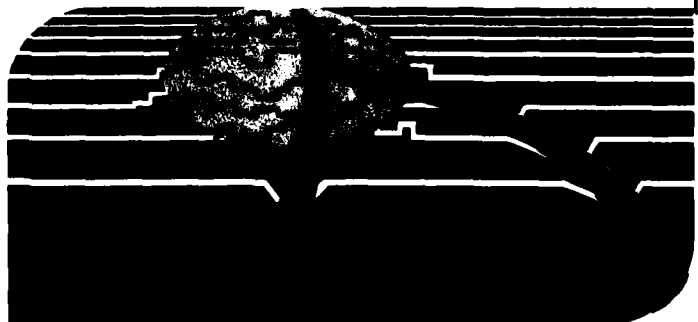


-  URBANIZED AREAS
-  WOODLANDS
-  FLOOD PLAINS
-  OPENLANDS AND CROPLANDS
-  LAKES AND PONDS
-  MAJOR RIVER SYSTEM
-  SECONDARY OR INTERMITTENT STREAMS
-  WILDLIFE, REFUGE OR MANAGEMENT AREAS

NOTE: SEE TABLES 16-20 FOR
DISCRIPTION OF FLORA AND
FAUNA IN EACH AREA.

SOURCE: REFERENCES 48,60,73,76.

PLATE 6



Ecosystems

During the formation of Lake Agassiz about 12,000 years ago, the area was covered by forests consisting largely of spruce, larch, poplar, ash, and, later, paper birch. Between 10,000 and 11,000 years ago, the climate - which had been cool and moist - warmed, and birch, elm, pine, and oak migrated into the region. Beginning about 9,000 years ago, this expansion of pine and deciduous forests was interrupted by an increase in prairie, suggesting drier conditions. By 8,500 years ago, the prairie was dominant on the lowlands around the lake, with oak savanna in the eastern uplands. Lake Agassiz disappeared in a very dry period (7,000 to 8,000 years ago) which coincides with the appearance of ambrosia. Climatic conditions 4,000 years ago were favorable for the deciduous forests of birch, elm, poplar, ash, ironwood, basswood, and sugar maple. As Lake Agassiz drained, the prairie dominated the lowlands, while oak savanna and, later, deciduous and coniferous forests developed in the eastern uplands. The continuum for the Prairie Couteau, within which the study area is located, is presented in table 12.

TABLE 12

ECOSYSTEM CHANGES - PRAIRIE COUTEAU

Thousands of Years
Before Present

0	-	Prairie with local developing deciduous forest (<u>Tilia</u> , <u>Fraxinus</u> , <u>Quercus</u> , <u>Ulmus</u> , <u>Populus</u> , <u>Salix</u>)
1		
2		
3		
4		
5	-	Prairie (<u>Gramineae</u> , <u>Artemisia</u> , <u>Petalostemum</u> , <u>Amorpha</u>)
6		
7		
8		
9		Prairie expanding
10		Deciduous forest (<u>Ulmus</u> , <u>Betula</u> , <u>Quercus</u> , <u>Acer</u> , <u>Pteridium</u>)
11		
12	-	Spruce forest

Source: Reference 79

The fluctuations of glacial Lake Agassiz left the Red River Valley underlain by alluvial clays, modified drift, sand, and gravel. The result was a strong subsoil which provided a foundation for the deep, rich topsoil and prairie grasses.

Before the arrival of European settlers, the area was virgin prairie, with the exception of timbered portions adjacent to the Red River of the North and Red Lake River. The presettlement prairie was composed of tall and medium grasses, including big bluestem, slender wheatgrass, western wheatgrass, prairie June grass, and species of bluegrass as listed in table 13.

TABLE 13

PRESETTLEMENT GRASS DISTRIBUTION

<u>Distribution</u>	<u>Grasses</u>
Slight depressions	Fowl bluegrass and eastern grasses
Wet areas (sloughs and ditches)	Cordgrass, American slough grass, sprangletop, manna grass, giant reed grass, reed canary grass, northern reed grass and sedges
Dry ridges and knolls	Blue grama, needle and thread, western wheatgrass, prairie June grass, little bluestem and dryland sedges
Rough land and broken hillsides	Little bluestem, plains muhly, blue grama grass, side oats grama, needle and thread, prairie June grass and bluebunch wheatgrass

Source: Reference 51

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GRAND FORKS - EAST GRAND FORKS URBAN WATER RESOURCES STUDY. BAC--ETC(U)

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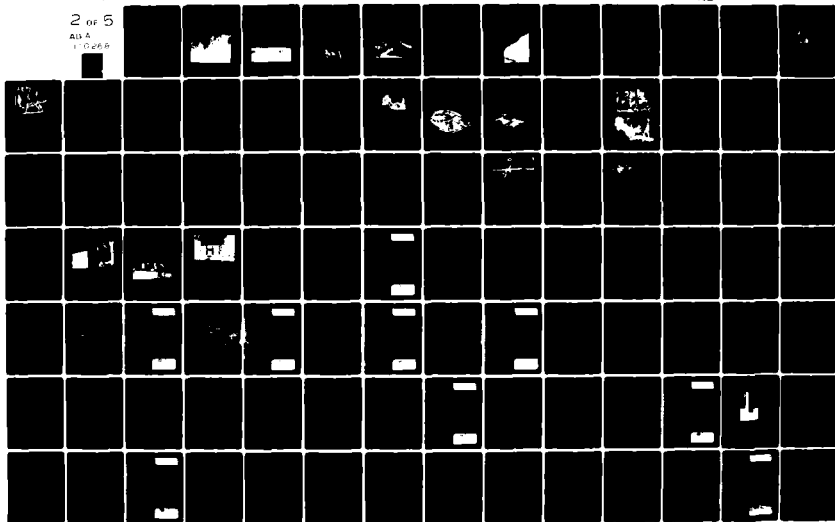
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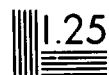
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From early spring to late autumn, prairie flowers bloomed. Earliest came the pasque flower, followed by the wild columbine, buttercups, violets, spiderwort, bear-tongue, ragwort, asters, and goldenrods. Prairie clover, a perennial herb, also occurred throughout the prairie. Wet meadows and marshes contained reed grass, arrowhead, cattail, sedges, and bulrushes. Species of the aster, bean, rose, and lily families added to the flora.

Shrub communities were scattered throughout the prairie in a variety of habitats. Low shrubs such as leadplant occurred throughout the prairie. Colonies of silverberry and wolfberry were prevalent on dry prairie slopes and knolls. Berry shrubs such as chokecherry and pin cherry occurred along the prairie-woodland fringe areas.

Currently there are two major ecosystems in the Grand Forks-East Grand Forks region: bluestem prairie and northern floodplain forests (see figure 17). Much of the original prairie has been plowed and is utilized for crop production, resulting in several agricultural communities. Wetlands, waters, and urban areas constitute other ecosystems.

Prairie - Though much of the bluestem prairie is gone, native grasses survive on tracts owned by the University of North Dakota, in game management areas, and along roadsides (plate 6). Tall bluestem, switch grass, Indian grass, and wild rye are common in such communities where rainfall is abundant and are often found in moist lowlands and deep ravines. Midgrasses - little bluestem, needlegrass, and June grass - are found in some areas. Silverberry and other small prairie shrubs also exist. Wildlife species include a variety of mammals and prairie birds, such as Hungarian partridge, prairie chickens, and sharp-tailed grouse.

Northern Floodplain Forest - This rich woodland community occurs on the floodplain of the Red River and tributary streams in the study area. The mature forest stands are dominated by a variety of trees such as bur oak, hackberry, American elm, basswood, and green ash. Ordinarily, a well-developed understory is composed of small trees and tall shrubs, including hop hornbeam and prickly ash.

This ecosystem provides a diverse habitat for cottontail rabbits, deer, squirrels, wood ducks, and associated species. The habitat is extremely valuable to wildlife because of the proximity of cover and water to food sources which are usually plentiful along field-forest borders.

Agricultural Communities - The study region is now a patchwork of agricultural croplands. Extensive acreage is devoted to growing sugar beets, potatoes, soybeans, small grains, and sunflowers. Cropland constitutes 81 percent of the total area of the Agassiz Lake Plain region. These acreages are practically devoid of wildlife. However, small grains and soybeans are important food sources to small mammals and birds which frequent adjacent communities.



*Northern Flood Plain Forest
Understory Removed*

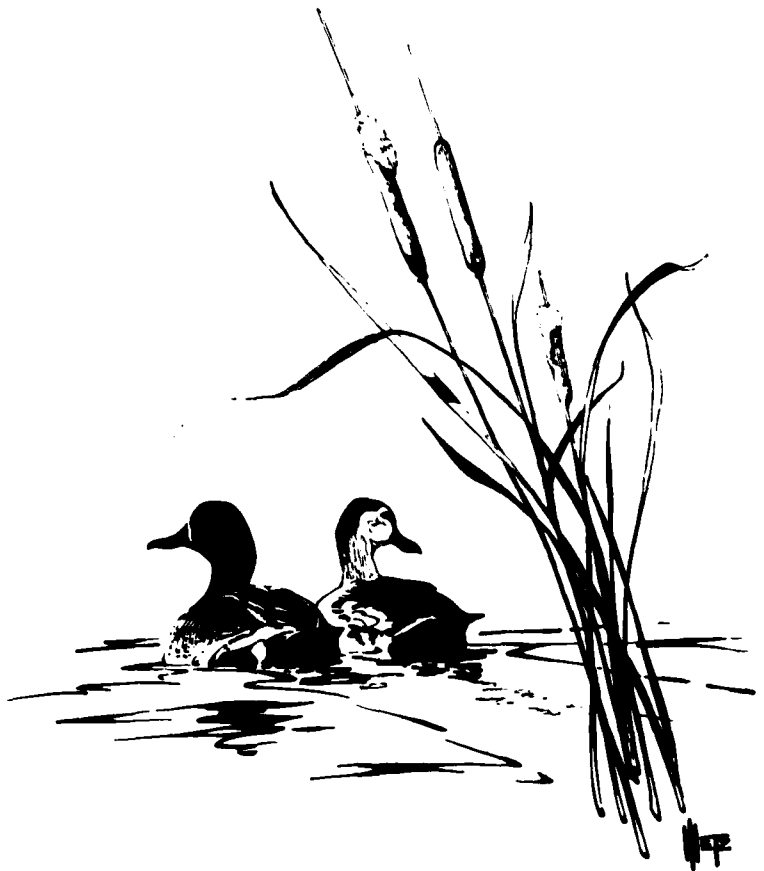
On many farms in the study area, trees and shrubs are planted in long narrow strips called shelterbelts to protect farmsteads from severe winter winds and impede drifting snow. Multiple row shelterbelts are preferred as habitat because their density allows for overwintering by small mammals and birds. The cover which they provide has great importance to wildlife which feeds on resources of the shelterbelts and neighboring croplands.

In agricultural areas, narrow strips of disturbed habitat border fencerows, roadsides, and drainage ditches. Vegetation on these areas is often composed of native prairie grasses and herbs in combination with many introduced weeds characteristic of disturbed soils. Occasional native trees or shrubs also are present. Diverse seed sources and grasses encourage birds and small burrowing mammals in addition to raptors which prey on them. However, many of these uncultivated areas are burned annually and have little wildlife value.



Typical Roadside Vegetation

Wetlands - Wetlands have nearly disappeared. Since 1870, when early settler-historians reported numerous waterfowl in the area, most of the wetlands have been drained for agriculture, while those near urban areas were filled. The original wetlands, located between the successive beaches of glacial Lake Agassiz, have given way to oxbow marshes, scattered wetlands, and waterfowl refuge/production areas. Generally, wetlands are recognized by their standing water and emergent vegetation, such as sedges, arrowhead, cattail, bladder pods, pond lilies, flattop asters, and violets. Stewarts Slough and Kellys Slough National Wildlife Refuge are important wetland areas in or near the study region. A large number of waterfowl pass through these areas during spring and fall migrations.



Open Waters - Aquatic ecosystems vary from saltwater to freshwater farm ponds to rivers. Most important are the Red River of the North and Red Lake River, but most common are tributary streams and drainage ditches. Because most waters are near croplands, bank vegetation is often absent and erosion is advanced, with resultant sedimentation of the stream channel. Rough fish species can optimize these conditions and thus appear in greater numbers than sport fish.

Urban Areas - The urban environment has little vegetative diversity, coupled with meager cover and food resources. Rabbits, squirrels, and birds are inhabitants of an ecosystem dominated by landscaped lawns, ornamental trees and shrubs, graveled driveways, and streets. Many species of songbirds appear to thrive in the urban community. White-tailed deer, red fox, raccoon, and skunk occasionally stray from shelterbelts and the Red River forest corridor into urban areas. Typical habitat niches are buildings, lawns, parks and golf courses, garden plots, and streets.



Flora

The flora of the area falls into three categories: trees, shrubs, and herbs. Trees dominate the Red River floodplain forest and shelterbelts. Shrubs thrive as understory in the floodplain forest, shelterbelts, and the urban environments. Herbs are found on the forest floor and in grasslands and wet areas.

Trees - Good stands of cottonwood, elm, ash, and box elder thrive in the moist, alluvial soils of the Red River of the North and Red Lake River bottomlands where adequate moisture promotes good form, quality, and size of timber stands. Common tree species in the floodplains include basswood, elm, box elder, and ash. Basswood flourishes farther from the river; box elder thrives nearer to the river. Waterleaf, wood nettle, bedstraw, and columbine typify the floodplain ground cover. Buckbrush, hawthorn, and gooseberry typify the understory.

The forest resources of the study area, meager in any prairie biome, have been reduced by land clearing for agricultural and urban development. Of a total land area of 920,000 acres in Grand Forks County, only 19,500 acres or 2.1 percent were commercial forest in 1956 (reference 64). A similar Federal survey of Polk County forest lands in 1962 revealed that, of the total county land area of 1,287,700 acres, 74,500 acres or 5.8 percent were commercial forest.

Most forestry activities in North Dakota are focused on planting trees in groves and strips. State and Federal agencies have encouraged planting programs directed toward establishing shelterbelts and windbreaks. Protection of homes, livestock, soil, roads, pastures, crops, and wildlife is the major function of these plantings, though incidental wood production is a valuable by-product. Planted species are listed in table 14.

TABLE 14

SHELTERBELT TREES

Green ash
Cottonwood
Box elder
Hackberry
American elm
Scotch pine

Colorado blue spruce
Rocky Mountain juniper
Siberian (Chinese) elm
Dropmore (Manchu) elm
Bur oak
Russian olive

Basswood
Willow
Black Hills spruce
Ponderosa pine
Eastern red cedar

Source: Reference 50



Typical Shelterbelt

Shrubs - Shrubs are found in the forest understory, shelterbelts, and urban environment. Species of the floodplain forest and those adjacent to water-courses are adapted to moist soils. The following berry shrubs are common in the Red River Valley and tributary streams: chokecherry, Juneberry, gooseberry, buckbrush, pin cherry, buffalo berry, and hawthorn.

Shelterbelt species planted in the agricultural areas tend to be drought-resistant because they are not greatly affected by the drying influence of winds. Typical shelterbelt shrubs are listed in table 15.

TABLE 15

SHELTERBELT SHRUBS

Aromatic sumac	Juneberry	Lilac
Sandcherry	Siberian crabapple	Nankin (Chinese) cherry
Wild plum	Dogwood	Willow
Chokecherry	Caragana	Cotoneaster
Honeysuckle	Buffalo berry	Potentilla
Russian olive	Golden currant	Highbush cranberry

Source: Reference 50

Urban shrubs provide little cover for wildlife and are valued primarily as ornamentation and food sources for birds and small mammals. The species vary from lilac to evergreen, but lists of species are lacking.

Herbs - The Red River Valley lies within the prairie biome, and herbaceous plants are representative of those that grow in grasslands with light to moderate rainfall. Exceptions occur along wooded streams and lowlands.

Annual rainfall, evaporation, and soil moisture determine plant occurrence. On prairie remnants, water from rain and snow quickly drains away, but as rain flows down small channels in the hillsides and valleys, more is absorbed. Flora in low areas is very sensitive to moisture fluctuations and occurs only where precipitation is adequate throughout the growing season. The water in saltwater coulees is too saline for most plants. Roadsides and tracts maintained as prairie provide the "classic" wildflower habitat. Sedges and coarse grasses are found on wet meadows without an outlet for surface water. On gentle slopes at higher elevations a great variety of flowering plants occurs. A list of common herbaceous plants, by ecosystem, is given in table 16. A list of uncommon herbaceous plants (rare in the study area) is given in table 20.

TABLE 16

COMMON HERBACEOUS PLANTS

Flood Plain Forest

Nodding fescue
Virginia wild rye
Nodding muhly
Charming sedge
Sprengel's sedge
Jack-in-the-pulpit
Wild leek
Large bellwort
False Solomon's seal
Solomon's seal
Nodding trillium
Carrian flower
Blue cohosh
Arrow-leaved aster

Wood nettle
Wild ginger
Columbine
Kidneyleaf buttercup
Tall meadowrue
Bloodroot
Yellow wood violet
Pink wood violet
Wild sarsaparilla
Honeywort
Waterleaf
Broad-leaved goldenrod
White snakeroot

Low Areas

Arrowhead
Bladderpod
Pond lilies
Violets
Asters

Salt Water Coulees

Saltgrass
Wild barley
Saltbrush
Red goosefoot
Pale goosefoot

Higher Elevations - Gentle Slopes

Lilies
Spiderwort
Camass
Star grass
Blue violet

Grass of parnassus
Canada anemone
Closed gentian
Hawksbeard
False dandelion

Rolling, Well-Drained Prairie

Pasque flower
Torch flower
Wild parsley
Prairie violet
Puccoon
Tipsin
Lead plant
Tooth-leaved primrose

Gaura
Gaillardia
False mallow
Western wallflower
Milk vetch
Prairie clover

Source: References 55, 59, 80, 81

Fauna

Fauna of the Red River Valley can be divided into inhabitants of the grasslands and those of the woodlands (see table 17). Many former animals of the grass prairie have vanished along with the loss of native prairies and now are found only in remnant prairies, roadside areas, and shelterbelts. Woodland animals are common to the basswood-ash-elm forests bordering the Red, Red Lake, and Turtle Rivers.

Mammals - White-tailed deer frequent the Red River bottoms, shelterbelts, and brushy areas in stream valleys. They are no longer abundant because much habitat has been cleared and devoted to intensive agriculture. Surveys made in 1965 indicate that deer population densities in the area range from 15 to 20 animals per square mile. Moose infrequently migrate through the study region, but are not native to the area.

Mice, shrews, and squirrels constitute most of the gnawing animals in the study area. Herbivorous species common to the timbered areas of the Red River are red squirrel, grey chipmunk, Franklin ground squirrel, groundhog, deer mouse, eastern meadow mouse, and muskrat. Common grass species are prairie deer mouse, grasshopper mouse, and meadow vole. All are important food sources for the red fox and hawks. The arctic shrew has been collected in marshy areas near Grand Forks, while the masked shrew and meadow jumping mouse are common to all habitats. The brown rat and house mouse are pests associated with urban areas. A former resident, the Canada beaver, occurs in greatly reduced numbers in the Red River and tributaries in the vicinity of Grand Forks.

Wooded portions of the Red River are the preferred habitat of cottontail and showshoe rabbits. Both are important prey of hawks, coyotes, and red fox. The white-tailed jackrabbit is rarely seen in the study area, preferring open prairies. The Grand Marais marshes, Kellys Slough, and other wetland areas support furbearers, including muskrat, mink, and beaver.

TABLE 17

LIST OF MAMMALS

<u>Common Name</u>	<u>Abundant</u>	<u>Common</u>	<u>Infrequent or Occasional</u>
Eastern chipmunk		X	
White-tailed deer		X	
Moose			X
Red squirrel	X		
Grey chipmunk		X	
Franklin ground squirrel		X	
Groundhog		X	
Deer mouse		X	
Eastern meadow mouse		X	
Muskrat		X	
Beaver		X	
Prairie deer mouse		X	
Grasshopper mouse		X	
Meadow vole		X	
Red fox	X		
Arctic shrew			X
Masked shrew	X		
Meadow jumping mouse	X		
Brown rat		X	
House mouse		X	
Striped skunk	X		
Raccoon	X		
Short tailed shrew		X	
Hoary bat		X	
Large brown bat		X	
Little brown bat		X	
Red-backed vole		X	

Source: Reference No.

The red fox, raccoon, and striped skunk are abundant in the area because they can adapt to man's activities and manipulations of habitat. Shelterbelts and wooded areas are common haunts which provide food sources. Declining prairie chicken populations are further threatened by these predators. Shelterbelts also provide habitat for the Hayden masked shrew and the short-tailed shrew.



The badger, coyote, black bear, and other carnivores have not survived as well in the area. An early biological survey of the area in 1926 (reference 55) noted several carnivores which then were rare, and probably are absent today as a result of habitat changes. The Canada lynx has disappeared, and the kit fox is rarely seen. Bounties and poisoned bait in recent years have greatly reduced the number of coyotes in the area.

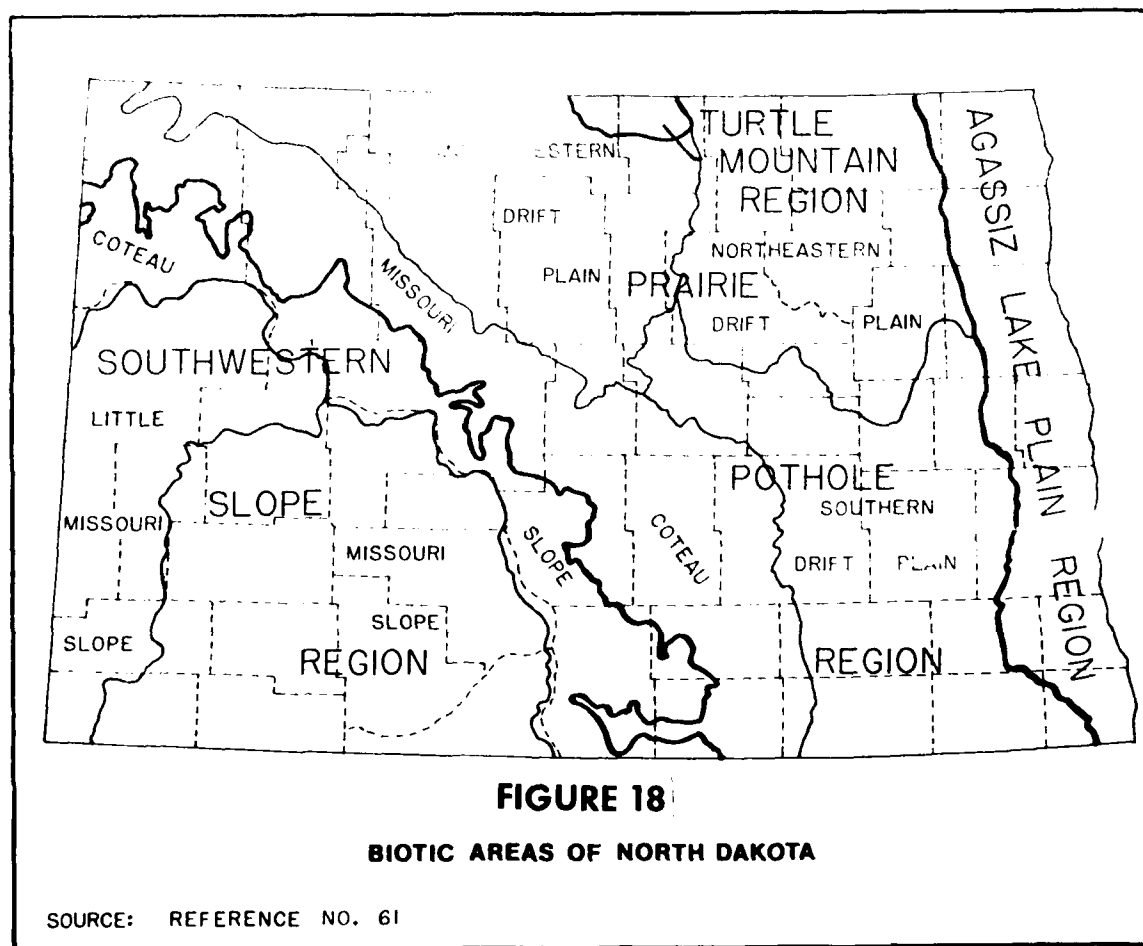


The hoary bat is found in heavy forest foliage. The large brown bat is common to all forested areas of North Dakota, whereas the little brown bat prefers to forage for insects near rivers. All are important as insectivores.

Fish - Information is limited on the fish species of the area because there have been few fish surveys. In aquatic environments characterized by channelization, populations are dominated by the "hardy" species. Minnows and carp are the most widely distributed fish in the Red River tributaries of North Dakota, while redhorse, black bullhead, burbot, and freshwater drum are the hardy species of the Red River. Rock bass and crappie are the principal sport fish. Walleye and northern are limited in the Red River because spawning habitat is lacking.

The Turtle River, during periods of adequate flow, supports populations of carp, catfish, walleye, sauger, northern, and minnows. Walleye, carp, and redhorse sucker are common species in the upper reaches of the Red Lake River, famous for its spring sucker fishery.

Birds - Because soils of the Agassiz Lake Plain (figure 18) are fertile, agricultural development has modified most of the arable acreage within the study region. The destruction of large tracts of natural habitat and their replacement with croplands and other man-made landscapes have left the Agassiz Lake Plain impoverished in its variety of birds (47 species); the least diverse of any region (reference 61).



Seven different types of bird habitat are found in the study area: croplands, wetlands, tallgrass prairie, fencerows and roadsides, shelterbelts, floodplain forest, and urban areas. The habitats and common species found in each are described in the following paragraphs. A list of common and secondary bird species by principal habitat type and frequency of occurrence is given in table 18.

Typical cropland habitat within the Agassiz Lake Plain region encompasses sugar beet, potato, soybean, and sunflower producing areas. Farming practices include the tradition of summer fallowing every second or third year. Cover may include bare fallow fields, fields of sprout growth, fields of mature grain, and stubble fields. Cropland species feed on weed seeds, insects, grasses, and grains. The most common bird species is the horned lark. Others, including members of the plover family and longspurs, are listed in table 18.

Wetland habitat is concentrated in Kellys Slough, Stewarts Slough, oxbows, and lowlands. Cattails, bur reeds, arrowhead, rushes, and grasses are the principal emergent vegetation, while pondweed, water lilies, and duckweed are common aquatic plants. Kellys and Stewarts Sloughs are of major importance to waterfowl production in the intensively farmed Red River Valley. Land acquisition and management in Grand Forks County by the U.S. Fish and Wildlife Service provide nesting habitat for duck species and upland nesters. The most common wetland birds include migratory ducks and geese, the marsh hawk, and the marsh wren (see table 18).

The remaining native prairie grassland occupies less than 1 percent of the Agassiz Lake Plain. Dominant vegetation which provides cover and a food source for birds is composed of big bluestem, switch grass, Indian grass, and prairie dropseed. Midgrasses are common and include Kentucky bluegrass, little bluestem, slender wheatgrass, porcupine grass, mat muhly, fescue sedge, and meadow sedge. Common and secondary bird species of the tallgrass prairie, including the plovers, western meadowlark, cowbird, and bobolink, are listed in table 18.

TABLE 18

COMMON AND SECONDARY BIRD SPECIES IN STUDY AREA

Species	Habitat Type and Frequency															
	Croplands		Wetlands			Tall Grass Prairie		Fencerows & Roadsides		Shelterbelts		Floodplain Forest		Urbanized Areas		
	Common	Secondary	Summer	Migrant	Occasional	Common	Secondary	Common	Secondary	Common	Secondary	Common	Secondary	Common	Secondary	
Horned lark	X															
Killdeer		X					X									
Upland plover		X				X										
Bobolink		X				X										
Western meadowlark		X				X		X								
Brown-headed cowbird		X					X	X		X		X			X	
Lark bunting		X						X								
Savannah sparrow		X				X			X							
McCowan's longspur		X							X							
Chestnut-collared longspur		X														
Mallard			X													
Godwall			X													
Pintail			X													
Green-winged teal			X													
Blue-Winged teal			X													
American widgeon			X													
Shoveler			X													
Wood duck			X													
Redhead			X													
Canvasback			X													
Ruddy duck			X													
Ring-Necked duck				X												
Lesser scaup				X												
Common goldeneye				X												
Bufflehead				X												
Blue goose				X												
Snow goose				X												
Canada goose				X												
Black duck					X											
Cinnamon teal					X											
Marsh hawk			X				X									
Greater prairie chicken							X									
Sharp-tailed grouse							X									
Short-eared owl							X									
Short-billed marsh wren			X				X									
Common yellow throat							X	X		X		X				
Red-winged blackbird							X	X								
Grasshopper sparrow							X									
LeConte's sparrow							X									
Vesper sparrow							X	X								
Clay-colored sparrow							X	X	X							
Gray partridge								X								
Eastern kingbird									X						X	
Ring-necked pheasant								X								
Western kingbird								X	X					X		
Logger-Head shrike								X		X						
Dickcissel								X								
American goldfinch								X	X			X		X		
Song sparrow								X	X			X		X		
Swainson's hawk									X							
Red-tailed hawk									X		X					
Mourning dove									X			X	X			

TABLE 18 CON'T

COMMON AND SECONDARY BIRD SPECIES IN STUDY AREA

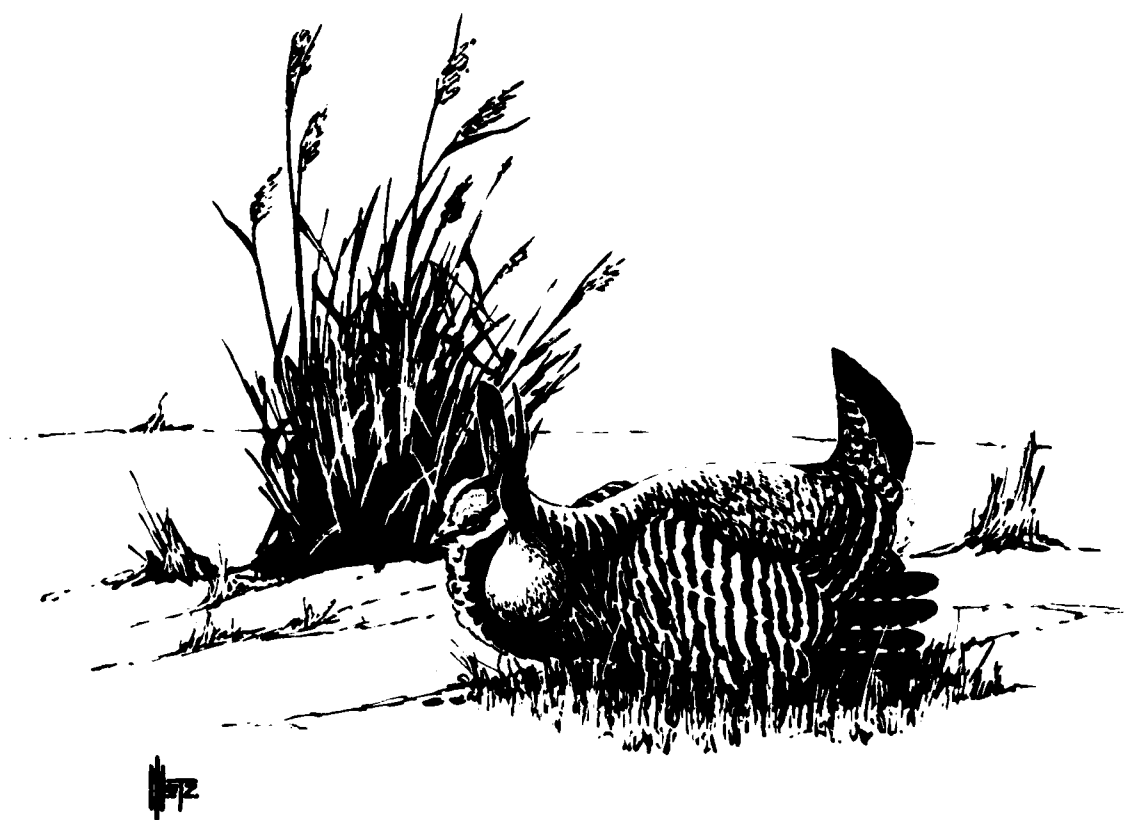
Species	Habitat Type and Frequency														
	Croplands		Wetlands		Occasional	Tall Grass Prairie		Fencerows & Roadsides		Shelterbelts		Floodplain Forest		Urbanized Areas	
	Common	Secondary	Summer	Migrant		Common	Secondary	Common	Secondary	Common	Secondary	Common	Secondary	Common	Secondary
Great horned owl									X			X			
Willow flycatcher									X				X		
Common crow									X			X			
House wren									X				X	X	
Brown thrasher									X				X	X	
American robin									X			X		X	
Yellow warbler									X						
Common grackle									X					X	
American kestrel										X					
Black-billed cuckoo											X				
Long-eared owl											X				
Red-headed woodpecker											X				
Yellow-shafted flicker											X	X			X
Least fly catcher											X	X			
Blue jay (local)											X	X			X
Black-billed magpie											X				
Eastern bluebird											X		X		X
Cedar waxwing											X		X		X
Starling											X			X	
Warbling vireo											X	X			X
Brewer's blackbird											X				
Baltimore oriole											X	X			X
Orchard oriole											X				X
Chipping sparrow											X			X	
Copper's hawk										X				X	
Downy woodpecker												X			
Hairy woodpecker												X			
Yellow-bellied sapsucker												X			
Great crested flycatcher												X			
Eastern wood pevee												X			
Black-capped chickadee												X			
White-breasted nuthatch												X			
Yellow-throated vireo												X			
Red-eyed vireo												X			
Yellow warbler												X			X
American redstart												X			
Scarlet tanager												X			
Rose-breasted grosbeak												X			
Indigo bunting												X			
Sharp-shinned hawk													X		
Screech owl													X		
Barred owl													X		
Chimney swift													X		X
Ruby-throated humming bird													X		
Gray catbird													X		X
Veery													X		
Ovenbird													X		
Purple martin (local)														X	
House sparrow														X	
Common nighthawk															X
Rock dove															X

In the agricultural areas, narrow strips of uncultivated habitat occur along fencerows, section lines, roads, and railroads. Vegetation at these locations is often composed of native prairie grasses and herbs, in combination with introduced weeds. Occasional native trees or shrubs are also present. Birds frequenting this type of habitat, such as the western meadowlark, lark bunting, and sparrows, are listed in table 18.

The long narrow strips of shelterbelt trees and shrubs designed to protect farms from severe winter winds and improve soil moisture conditions also support the second widest variety of bird life. A variety of native and exotic trees and shrubs is characteristic of these plantings and provides adequate food supply and shelter. The diverse fauna, including various songbirds, as well as hawks and owls which prey on an abundance of small mammals in this habitat, are listed in table 18.

The floodplain forest community along the Red River, Red Lake River, and other smaller tributaries supports the widest diversity of bird populations in the area. Mature trees and a usually well-developed understory composed of small trees and tall shrubs provide cover and ample food supply. The herbaceous vegetation of the forest floor is especially luxuriant and is composed of a great variety of seed species supportive of bird life. The most common birds found in these areas, including numerous songbirds, the great-horned owl, and woodpeckers, are also listed in table 18.

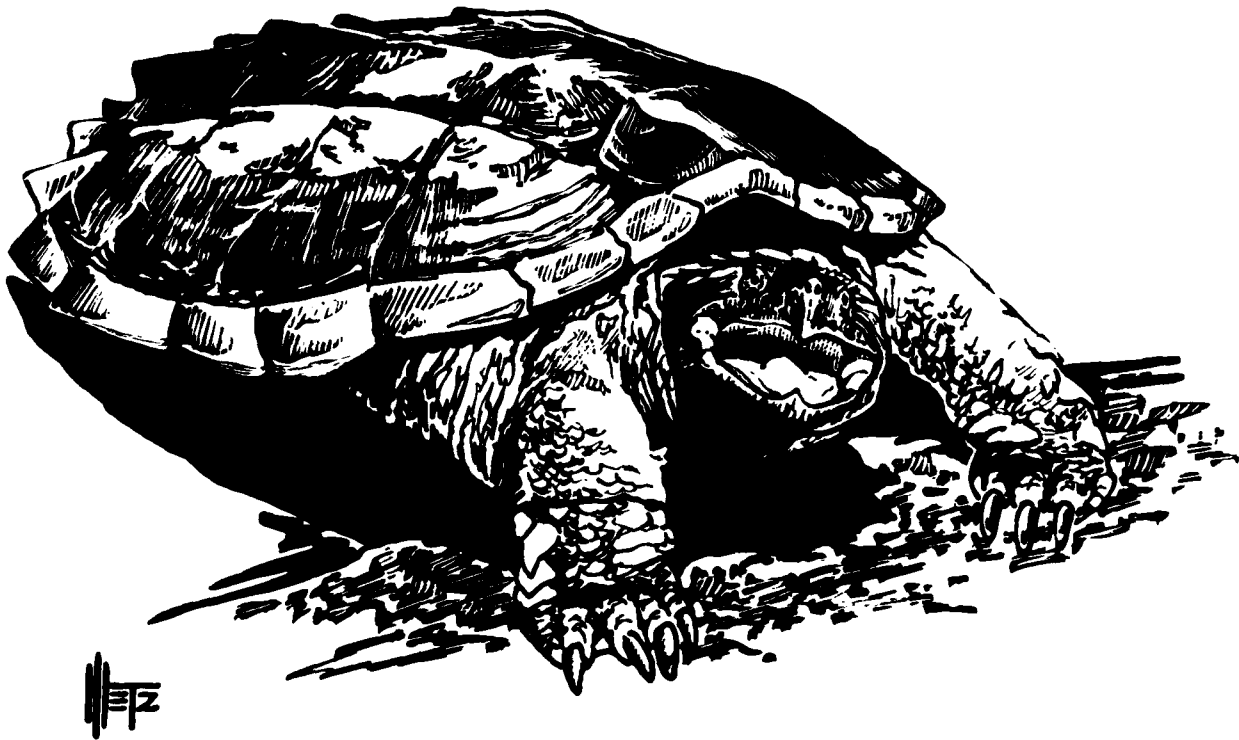
Bird species in urban areas are somewhat less diverse than those of the shelterbelts and floodplain forest. These species have adapted to man's activities and find habitat niches in office buildings, stores, and other commercial buildings; homes; apartment buildings; garages; sheds; lawns; parks and golf courses with ornamental trees and shrubs; garden plots; streets; and driveways. Common and secondary species found in these areas are listed in table 18.



Reptiles - Three reptiles are common in the Grand Forks area: the snapping turtle, painted turtle, and western plains garter snake.

The snapping turtle is common throughout North Dakota and is found in sluggish streams, ponds, and lakes - most notably in oxbows of the Red River. The western painted turtle is common to the study area and prefers warm shallow water areas with some plant growth.

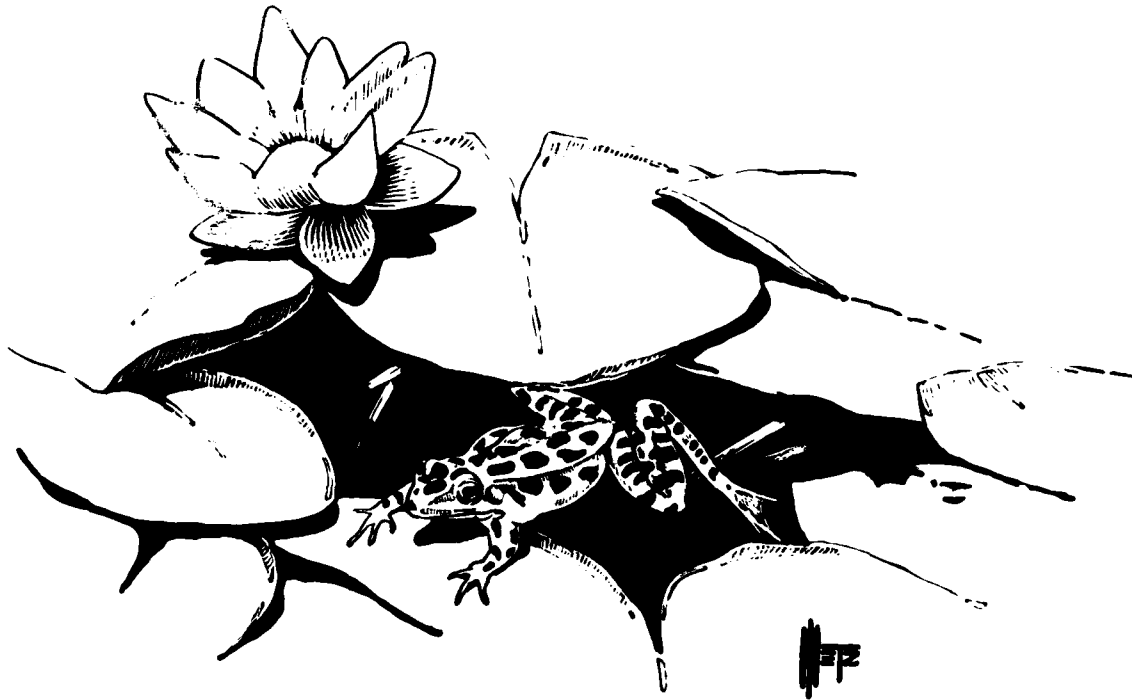
A frequent discovery in stream margins, sloughs, and lakes is the plains garter snake. This reptile is also common in open lots and parks in the urban area.



Amphibians - Amphibians found in the study area include salamanders, toads, and frogs. Tiger salamanders and mud puppies are present in the study area, usually near water.

Toad habitat includes grassland near streams and drainage ditches. The American toad is rare in Grand Forks County, most often being found in southeastern North Dakota. The great plains toad and the Dakota toad are common throughout the State.

The leopard frog, common in the study area, resides in or near almost every still or flowing body of water. Also found in the area are chorus and wood frogs.



Threatened or Endangered Species

Several species of fauna known to have inhabited the area have disappeared. These species include the bison, elk, grizzly bear, pronghorn antelope, trumpeter swan, and passenger pigeon. Although considerable research is continuing, the status of many species is either uncertain or unknown at this time. A list of mammal species considered threatened, endangered, or otherwise of special interest is given in table 19. The special interest species classification is recognized by local and State researchers in cases of restricted distribution, numbers, aesthetic appeal, or past history of near extinction.

The only bird considered endangered nationally which may infrequently visit the study area is the American peregrine falcon. However, no information on any sightings in the study area was found. The greater prairie chicken is considered threatened in the region because of loss of permanent grasslands for nesting and loss of food supply resulting from intensive agriculture. The western burrowing owl and ferruginous hawk, both common in other parts of North Dakota, are rarely sighted in the Lake Agassiz region. A list of birds considered threatened or of special interest because of unusual or unique values or vulnerability of habitat is also given in table 19.

Only two species of amphibians, the mud puppy and gray tree frog, are of concern because of their limited numbers. One fish species, the banded killifish, is found only in Kellys Slough in Grand Forks County and is listed as being of special interest because of limited distribution.

A list of endangered flora in the study area is given in table 20.



TABLE 19

LIST OF THREATENED OR ENDANGERED FAUNA

<u>Common Name</u>	<u>Scientific Name</u>	<u>Category</u>	<u>Distribution</u>
Mammals			
Fisher	<u>Martes pennanti</u>	Status Undetermined	Streams and woodlands in northeastern North Dakota
Water shrew	<u>Sorex palustris</u>	Special Interest	Eastern Red River Valley
Eastern mole	<u>Scalopus aquaticus</u>	Special Interest	Possibly in Red River Valley One known record.
Bobcat	<u>Lynx rufus</u>	Special Interest	Generally in the Badlands and along the Canadian border and lower Red River; however, sightings have been reported along most river systems.
Birds			
Greater prairie chicken	<u>Tympanuchus cupido pinnatus</u>	Threatened	Prairie Chicken Management Area in Grand Forks County
Western burrowing owl	<u>Athene cunicularia</u>	Status Undetermined	Rare in Lake Agassiz Region
Ferruginous hawk	<u>Buteo regalis</u>	Status Undetermined	Rare in study area
Bald eagle	<u>Haliaeetus Leucocephalus</u>	Special Interest	Formerly found along the Red River, Missouri River and Devils Lake
Common Goldeneye	<u>Bucephala clangula</u>	Special Interest	Breeds only in Turtle Mountains; migrates over rest of state
Pileated woodpecker	<u>Dryocopus pilcatus</u>	Special Interest	Along the Red River and its tributaries
Amphibians and Reptiles			
Mud puppy	<u>Nocturus maculosus</u>	Special Interest	One record - at Grand Forks
Gray tree frog	<u>Hyla versicolor</u>	Special Interest	Red River Valley
Fish			
Banded killifish	<u>Fundulus diaphanus</u>	Special Interest	Kellys Slough in Grand Forks County
Source: References 49, 76, 78			

TABLE 20
THREATENED OR ENDANGERED FLORA

<u>Common Name</u>	<u>Scientific Name</u>	<u>Category</u>	<u>Distribution</u>
Sedge	<u>Carex prarisa</u> Dewey	Unique	Wet meadows and boggy areas
Dwarf spikeseed	<u>Eleocharis parvula</u> (R. & S.) Link	Rare in Grand Forks County	Wet sands along lakes
Yellow monkeyflower	<u>Mimulus guttatus</u> D.C.	Rare in study area	Moist soil along streams and lakes

Source: (Barker, Larson & Williams, NDSU, 1976)

Ecosystem Trends

The original tallgrass prairie is essentially gone from the area. Remaining stands of native bluestem, switch grass, Indian grass, and wild rye are confined to purchased prairie remnants, fencerows, roadsides, and shelterbelts. Prairie wildflowers exist solely within these habitats. Elk and buffalo were eliminated by hunting pressure and stand in small protected herds as relics of the past. Prairie chickens exist as threatened species in protected areas (U.S. Fish and Wildlife Service 1973 "Redbook" designation; not on Federal threatened or endangered species list).

Major ecosystem changes began in the 1800's with the arrival of European settlers. Clearing, cultivating, and pasturing altered the native flora and fauna. The high fertility of the soils, attributable

to the accretion of tallgrass debris, has led to modification of nearly all arable acreage. Principal crops now grown are small grains, corn, potatoes, sugar beets, soybeans, and sunflowers. These crops provide sterile monotypic habitats which have greatly reduced the former diversity of prairie fauna and flora, as illustrated by the relatively small variety of birds in the Agassiz Lake Plain region.

The breaking of the prairie sod had other "ripple effects." Lack of surface vegetation promoted loss of soil moisture. Early farming practices accelerated soil erosion, culminating in the Dust Bowl of the 1930's. Over the years, soil erosion has contributed to the sedimentation of the Red River and its tributaries. Shelterbelts were planted after the Dust Bowl period to protect farmsteads from wind and promote snow accumulation, both functions formerly served by the original 6-foot big bluestem.

With fencing and shelterbelts, species are now associated with the habitat of the "edges," where two or more habitats are in proximity. Some of the original creatures of the open prairie have disappeared. The red fox, striped skunk, coyote, hawks, small mammals, and birds capable of foraging in different habitats now dominate shelterbelts and fencerows.

Forested areas in the study region have never been widespread and are located on the Red River floodplain and adjacent to tributaries. Floodplain forest is especially important because of its small acreage and mature native stands of bur oak, hackberry, American elm, basswood, and green ash. Many wildlife species, especially white-tailed deer, reside in the heavy cover of these forest corridors. Thus, although timber acreage in shelterbelts and windbreaks is increasing as a result of State and Federal planting programs, native timber is decreasing because of agricultural clearing operations and urban growth. Native tree species are important because of their longevity and now relatively infrequent occurrence.

Aquatic ecosystems have undergone many changes. Wetlands which harbored great numbers of waterfowl in the 1800's have been reduced to oxbows, farm ponds, and remnants owned by State and Federal game management agencies. Wetlands were ill-suited to cropping and thus were drained. Temporary wetlands were drained first and, as farming costs and agricultural commodity prices increased, permanent wetlands followed. These areas have great value for waterfowl breeding, spawning, ground-water recharge, and nutrient inactivation. Current threats to wetlands come from sedimentation, channelization, and land use changes.

The Red River of the North and tributary streams have heavy silt loads resulting from intensive cultivation and bank erosion. Elevated turbidities and sedimentation dictate species tolerant of such conditions: fathead minnows, common white sucker, black bullhead, and carp. Industrial pollution is generally not a serious factor in species distribution in Red River tributaries. However, potato and sugar beet processing plants which release effluents into the lower portions of the streams during part of the year affect aquatic habitat. Minimally treated sewage discharges from small towns along tributary streams are of more consequence (reference 56) than the processing plant discharges.

Saline ecosystems provide habitat for the banded killifish, which prefers clear, saline water with abundant vegetation. This species is localized specifically in Kellys Slough. Other unique ecosystems occur in the saltwater coulees where salt grass, wild barley, saltbush, and red and pale goosefoot may be present.

The original vegetation and topography of the urban portion of the study area have been replaced by buildings, landscaped lawns, parks and golf courses, ornamental trees and shrubs, streets, and driveways. Native plant and wildlife species have retreated to rural areas and the Red River floodplain forest. Greatest threats are posed by clearing trees and shrubs from the floodplain forest for urban development. Air pollution, water pollution, and solid waste disposal are problems common to any metropolitan area. However, a serious problem in the

urban study area is the increasing development of "marginal areas" which foster wildlife and include native stands of timber. Because of the dominance of agriculture in the study region, what little native forest there is remains adjacent to the Red River corridor in Grand Forks-East Grand Forks.

Intensive agriculture will continue in the fertile soils of the study region to keep pace with an increasing demand for agricultural food products. There are continuing demands for clearing forested areas and draining remaining wetlands for crop production. High commodity prices render such undertakings more economically feasible now than in the past.

With changing land use, native prairie tracts and sensitive species are subject to development forces. Habitat changes are largely irreversible. Buffalo and elk will probably never return. The Prairie Chicken Management Area flock is precariously unstable, possibly declining. Such species have unique niche requirements and cannot adapt; species which can adapt - skunk, raccoon, fox, and coyote - maintain stable populations in the area.

Public Law 92-500, the Federal Water Pollution Control Act Amendments, is directed at abating point sources of pollution. Funds are available to municipalities for upgrading their sewage treatment plants, and industries are required to meet stringent effluent requirements by 1977. Thus, the threat of municipal and industrial water pollution should diminish. Non-point sources of pollution - sediment, nutrients, and pesticides - will continue to affect the Red River and its tributaries, at least for the near future.

Susceptibility of Fauna to Urbanization

The river forest corridor is the natural system most susceptible to urbanization because it has been changed the least. Most of the larger fauna in the region are associated exclusively with this system or on an edge basis with the other systems. Extensive alteration of the river woodland system would seriously affect the total natural environment of the region.

The aquatic system is nearly as sensitive as the forests to human activity and urbanization. It is the only natural system which, because of periodic flooding, causes large scale damage to the human environment and, therefore, invites control and modification. This same dynamic character has made the rivers, streams, and lakes of the aquatic system the depository of urban wastes. These factors combine to make the aquatic system the natural system subject to the greatest degree of human concern.

Open land generally is the natural system least susceptible to change because it has already been changed by extensive farming practices.

The following paragraphs discuss the susceptibility and sensitivity of a selected list of species to the modification of their habitat by urbanization.

Carp (Cyprinus carpio) - The carp, considered a rough fish in the United States, was introduced from Europe by settlers who planned to culture it in ponds. In the Red River, the carp is one of the most abundant fish. It survives in water of poor quality and would be affected only by intense urbanization and severe water quality problems.

Black Bullhead (Ictalurus melas) - The black bullhead is considered a rough fish in the region. It is most common in the pools of streams with mud bottoms and in lakes and ponds. This species is tolerant of high turbidity and would not be as vulnerable to urbanization as other catfish.

Red Fox (Vulpes fluva) - The red fox subsists primarily on rabbits and mice and lives along the forest borderlands and open fields. Damage to woodlands and woodland-open land edges would harm the habitat of this species.

Coyote (Canis latrans) - Studies have shown that the coyote maintains relatively stable populations in the study area. The coyote generally prefers brushy country along the edge of timber in open farmlands where rabbit and small rodent populations are highest. Rabbits constitute from one-half to two-thirds of the coyote's diet, with the remainder made up

of mice, carrion, and small amounts of other foods. The coyote has generally adapted to agricultural activities. It can adapt to very low density urban activity. As urbanization becomes more intense, the population drops quickly.

Short-tailed shrew (*Blarina brevicauda*) - The short-tailed shrew is found throughout the study area in woody, brushy areas and, less frequently, in a grassland habitat. Populations may range from 1 to 4 per acre, with frequent fluctuations causing peaks as high as 25 per acre. The short-tailed shrew is basically insectivorous in its food habits. Clearing windbreaks, woodlands, and other brushy areas for increased cultivation or construction eliminates the habitat of this species. It is, therefore, harmed by both urbanization and more intense agricultural practices.

Tiger salamander (*Ambystoma tigrinum*) - The tiger salamander adults live under debris near water and in burrows of crayfish and mammals. They breed in ponds and temporary water. The larvae are strictly aquatic and eat small aquatic organisms. Trash and other debris from urbanization may increase the habitat of this species. Only with the most dense development would it be adversely affected.

Eastern gray tree frog (*Hyla versicolor*) - The common tree frog is restricted to streams, ponds, and swamps in wooded areas. Except during the breeding season, it lives in trees. Urban development which removes or alters riparian habitat would adversely affect this species.

Bullfrog (*Rana catesbeiana*) - The bullfrog occurs in very limited numbers in most tributaries, ponds, and lakes of the region. It is restricted to permanent water. Urbanization which would degrade water quality or eliminate water edge vegetation would harm the bullfrog.

Common snapping turtle (*Chelydra serpentina*) - The common snapping turtle is well adapted to permanent water. It is a bottom dweller and a poor swimmer and may grow to a weight of 50 pounds. Urbanization which eliminates ponds or pollutes streams would adversely affect this species.

Great blue heron (Ardea herodias) - The great blue heron is common in the marshes, rivers, and streams of the study area. Human activity disturbs this bird. Urban development can, therefore, harm this species by removing its habitat and increasing human activity around its habitat.

Great horned owl (Bubo virginianus) - The great horned owl is a common resident of the woods and woodland-open land edges of the Red River and Red Lake River corridors. Urbanization can harm this bird by removing or altering the forest habitat.

Nighthawk (Chordeiles minor) - The nighthawk often nests on rooftops and feeds in developed areas where insects are attracted to lights. In urbanized areas which allow nesting, this bird seems to adapt well. Urbanization, therefore, may not be of particular harm to this species and may actually provide it with a habitat.

Franklin ground squirrel (Citellus franklinii) - The Franklin ground squirrel prefers a prairie type habitat bordered by woods. Insects comprise a major portion of its diet, with grasshoppers and beetles the main types. The Franklin ground squirrel is listed as common in the wooded Red River corridor. The woodland border habitat of the squirrel is susceptible to agricultural pressure and urbanization.

Woodchuck (Marmota monax) - Woodchucks are found in greatest numbers along gullies and creek banks in the study area. The primary foods of the woodchuck are wild lettuce, white clover, red clover, and grasses. Woodchuck densities range from one per 11.5 acres to one per 36 acres. The woodchuck is listed as common in the wooded areas. Urban development of any density which replaces the cropland-woodland edge would eliminate the woodchuck's habitat.

White-tailed deer (Odocoileus virginianus) - The white-tailed deer inhabits river bottoms, brushland, and grassland areas. It feeds primarily on grasses; domestic crops; and browse such as leaves, twigs, and the fruits of trees and shrubs. It has adapted well to agricultural activity. However, it is sensitive to human activity and would be disturbed by even low density urbanization.

Eastern cottontail rabbit (*Sylvilagus floridanus*) - The cottontail rabbit is highly adaptable to almost all types of cover, but prefers brushy areas and briar patches. It is a prolific species, having a wide distribution but restricted in its home range. Five to ten acres is the general size of a cottontail's home range; however, some may range up to 22.5 acres during breeding periods. The cottontail is a complete vegetarian; herbaceous plants make up the bulk of its diet in summer and fall, and woody plants are eaten during snow cover. The cottontail can adapt well to low density urban development where suitable habitat is left or where ornamental vegetation is established. Intense urban development would eliminate its habitat and displace the species from the developed area.

Mink (*Mustela vison*) - One basic requirement for mink habitat is permanent water, preferably with a nearby stand of timber. The mink's diet includes crayfish, fish, mice, rats, birds, and rabbits. Human activity within the region's riparian forest would reduce the mink's habitat. Overgrazing of the stream edge by livestock would also harm this species.

Striped skunk (*Mephitis mephitis*) - The striped skunk favors open prairie regions with brush field borders and fencerows. The species is omnivorous with animal matter predominating; e.g., insects, mice, small reptiles, frogs, salamanders, and bird eggs. Population density of the striped skunk is approximately two per 100 acres. The habitat of this species is reduced when windbreaks or other brushy edges are removed.

Beaver (*Castor canadensis*) - The beaver inhabits streams, rivers, marshes, and small lakes throughout North Dakota and Minnesota. Principal foods include the bark of poplars, cottonwoods, and willows. In areas where it is available, corn is readily taken as food and also as building material for its dams. The beaver is considered to be increasing in areas where appropriate habitat is available. However, urbanization and agricultural practices which eliminate woodlands along streams would harm this species.

Muskrat (Ondatra zibethicus) - The muskrat is fairly common along rivers in both North Dakota and Minnesota. It inhabits ponds, lakes, and streams in areas where the water is either still or slowly flowing. A pair of muskrats has one litter per year with an average litter size of six. The maximum breeding concentration for muskrats is about two pairs per acre. Removal of aquatic habitat would reduce numbers of this species.

Raccoon (Procyon lotor) - The raccoon is common through forest bottomlands in the area. Proximity to water seems to be a major factor in the selection of a homesite for the species. Raccoons eat both plant and animal matter; e.g., cherries, corn, nuts, crayfish, grubs, frogs, and even bats. Population estimates range from approximately one per acre in an excellent habitat to one per 2 acres in a good habitat. It can adapt to low density urbanization if adequate habitat is retained.

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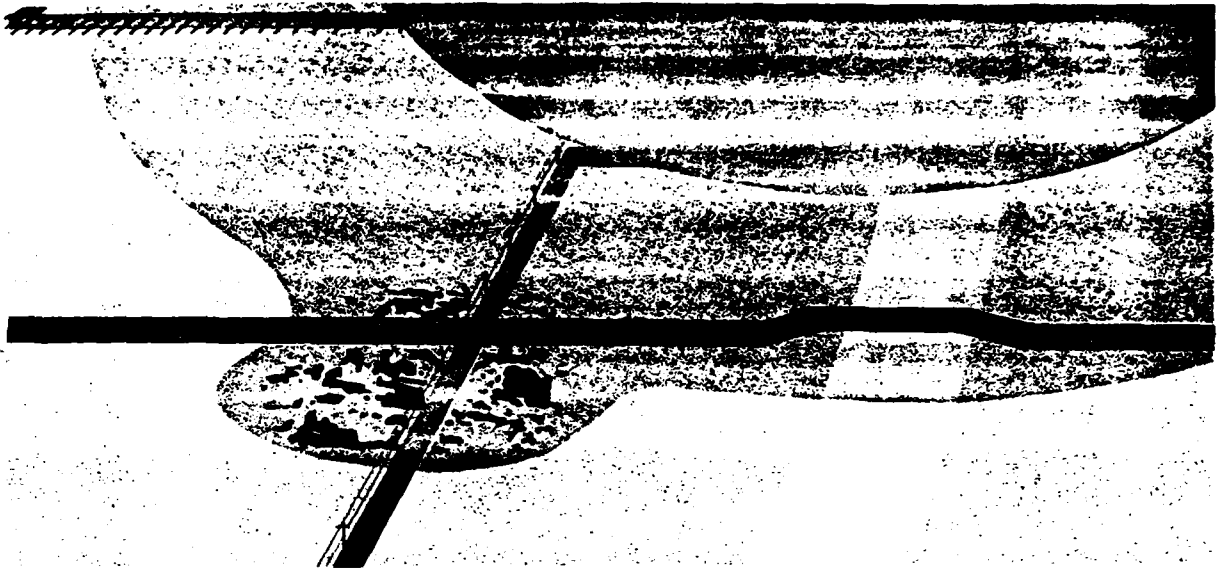
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CULTURAL ELEMENTS

Introduction

The social and cultural characteristics of the study area include the material, behavioral, and organizational attributes of past and present human inhabitants. These characteristics are divided into two components: those related to past occupations by prehistoric American Indians and historic groups of Indians, traders, and settlers and those related to the populations which currently reside in the area.

The information on archaeology and history is presented first. That section is followed by one on social organization which discusses the major institutional sectors of contemporary society with an indication of their functions and resource bases. The characteristics of the present population are presented as components of the functioning system of human interaction in the study area. Taken together, the historical and contemporary materials make up a dynamic progression of the past and present, combining the experiences and characteristics of the many groups of people who have lived in the area we now know as Grand Forks-East Grand Forks.



Archaeological and Historical Resources

Introduction - Archaeological sites and historical structures are among the cultural resources of the study area. The archaeological sites of prehistoric occupations contain all the information we will ever have about human life during those times. Archaeological sites and historical structures are scarce and irreplaceable and have intrinsic, individual value. When the locations of significant sites and structures are known, their worth can be evaluated and taken into account when various development alternatives are being considered.

Though the available information is limited, we know the general dimensions of prehistoric and historic life in the study area. The following sections provide a glimpse of the history of the area and a sense of what remains to be learned. With this awareness, those making decisions about the future of the area should be better able to protect and enhance the cultural resources of the past.



Prehistoric - The archaeological data in the area are very incomplete, but there is sufficient information to establish that early man inhabited the area about 8,000 years ago. Human occupation of the Red River Valley dates back to the "Early Man" period and extends through several definite time periods, as evidenced by changes in weapons and hunting and farming practices.

The earliest valley inhabitants occupied the area from about 8000 to 5500 B.C. These people were small roving bands of bison hunters who used spears or the atlatl (throwing stick) and dart. One known site of this early occupation exists in the valley, but none are known in the study area.

Immediately following this early occupation was a period of about 2,500 years during which the early hunters left the valley. It has been surmised that a severe drought occurred and deserts formed. Following the drought came the middle prehistoric period of 3000 to 1200 B.C. During this period, the people, also bison hunters, probably followed the reforestation onto the now dry glacial lake bed. There is also reason to believe that the "Old Copper Culture" from the upper Michigan and northern Wisconsin regions was introduced in the area during this period.

Following the second period of occupation is a 700-year period from 1200 to 500 B.C. for which no archaeological evidence of human occupancy exists. This does not suggest a total evacuation of early inhabitants, but is more probably due to a lack of field research in the area.

Archaeological evidence of human activity in the Red River Valley is again limited during the period 500 B.C. to 500 A.D. During this period, the people were also bison hunters. However, signs of increased diversification in ways of making a living, such as primitive forms of agriculture, are evident. During a later phase of this prehistoric occupation of the valley (200 to 1600 A.D.), a rapid increase in the development of technology occurred: primitive tools and implements, increased use of the bow and arrow in hunting and warfare, and greater reliance on agriculture.

One known archaeological mound site indicating evidence of prehistoric occupation is present in Huntsville Township, Polk County, Minnesota. This site has not been excavated to date. Other known mounds or mound groupings are present at six locations in the Grand Forks County study area.. These mounds are also unexcavated, primarily because of a lack of funds for needed surveys. Any future federally supported water resource programs would include provisions for surveys of known or presently unknown historic and archaeological resources that may be affected by proposed projects.

Historic - The early 17th century saw the first emergence in the area of European explorers and traders as evidenced by metal arrowheads, flints, and other artifacts. Closely following these early explorers came an influx of European fur traders to the Red River and tributaries. Known Indian groups in the area during early historic times were the Bungi, Hidatsa, and Dakota. Later groups included the Dakota Sioux and Assiniboiné in the forested portion of the Red River Valley in Minnesota and the Algonquian tribes in the western portions of the valley.

The first European explorer in the area was probably the French explorer Verendrye, in about 1738, followed somewhat later by the geographer David Thompson. France initially claimed the area in 1671, with subsequent competing claims by England for all the Hudson Bay Company lands draining to Hudson Bay. The United States gained possession of the area in 1803 as part of the Louisiana Purchase from France.

The Grand Forks-East Grand Forks area was a Red River base for early French settlers who established a trading post at the junction or fork of the Red and Red Lake Rivers and called it "Le Grande Fourche" from which Grand Forks is derived. From this time on, a steady influx of traders, trappers, and adventurers moved into the area. A large influx of colonists known as "Lord Selkirk's Colonists" moved into the area in the early 1800's.

Three principal oxcart or travel routes were used in the area during this early period of European settlement. One Pembina and Fort Garry to St. Paul trail probably began in the early 1840's and traversed the east bank area of the river valley. The old Georgetown trail opened in about 1859 and traversed the western part of the present Grand Forks County. The Goose River trail from Caledonia to St. Joseph and Fort Garry passed through the central part of the county. The "Lone Tree" in Section 21 of Blooming Township served as a landmark to early travelers on this trail.

Early permanent settlement of Grand Forks began in 1868, when Nicholas Hoffman and August Logan built a log house and stage station on the west bank of the river at what is now the city. The first Red River steamboat was built at Grand Forks in the period 1868-1870, although Red River steamboating had been going on since 1859. A post office was first established in 1870. In 1873, the Hudson Bay Company built its headquarters at Grand Forks for the company's upper Red River Valley operations.

North Dakota was admitted to the United States on 2 November 1889. Grand Forks County was created by the 10th session of the territorial legislature in 1873. Organization of the county government was completed the following year. The plat of the original townsite was filed in 1875 by Captain Alexander Griggs on 90 acres of his homestead. The village was organized in 1878, followed by incorporation as a city in 1881.

The first area newspaper, the Plainealer, was established in 1875. The Herald, predecessor of the city's present newspaper, was established in 1879. The Great Northern Railroad reached Grand Forks in 1880, giving a sudden additional impetus to agricultural and other growth in the area. The first bridge across the Red River at Grand Forks was a pontoon bridge in 1878, followed by two steel bridges in 1889. From a population of about 33 in 1871, the city's population grew to between 12,000 and 13,000 in 1909.



Polk County and the East Grand Forks area were similarly occupied by the early traders, trappers, and subsequent settlers. Mr. William C. Nash was the first settler in East Grand Forks in 1868. Polk County was created on 27 July 1858, from the old territorial county of Pembina, just shortly after Minnesota was admitted as a State on 11 May 1858. The county was subsequently divided four times before attaining its present size. The first division occurred in 1862, when a strip of land along the south boundary was allotted to Clay County. The county was divided again in 1866, when all lands along the eastern portion between Ranges 38 and 39 became part of Beltrami County. The fourth and last partitioning occurred when an irregular portion of Central and Northwest Townships was formed as Red Lake County.

The National Register of Historic Places lists two historic sites in Grand Forks and none in the Minnesota portion of the study area. The North Dakota sites include the Oxford House at the University of North Dakota and the U.S. Post Office and Court House in the city. The North Dakota State Historical Society lists numerous historic sites, principally historic buildings and townsites, in the Grand Forks study area, as listed in table 21 and shown on plate 7. Other literature indicates two additional sites, the Northwest Company building (descendant of Hudson Bay Company) and the AFC Grand Forks, 1830-1832. Other locally important historic sites include the restored Campbell House and the old post office at the Pioneer Women's Museum in Grand Forks and the old Great Northern Railroad Depot in Grand Forks.



Campbell House



Oxford House
Oxford House

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TABLE 21

HISTORIC SITES IN THE GRAND FORKS AREA

STATE County (Map Ref. No.)	Bldg. or Site Name	Location	National Register
HISTORIC SITES			
NORTH DAKOTA Grand Forks County			
1	Historic, rural church (1884)	SW $\frac{1}{4}$, NW $\frac{1}{4}$, NW $\frac{1}{4}$, Sec. 27 Mekinock Twn.	
2	Historic, rural school (1884)	SW $\frac{1}{4}$, SE $\frac{1}{4}$, Sec. 2, Chester Twn.	
3	Historic, Ojata Townsite (1884)	Ctr. of line between Sections 2 and 11, Oakville Twn.	
4	Historic, Marvel Townsite (1884)	NE $\frac{1}{4}$, Sec. 15, Ferry Twn.	
5	Historic, rural school (1884)	NE $\frac{1}{4}$, NE $\frac{1}{4}$, Sec. 19, Brenna Twn.	
6	Historic, rural school (1884)	SW $\frac{1}{4}$, NE $\frac{1}{4}$, Sec. 4, Brenna Twn.	
7	Historic, rural school (1884)	NE $\frac{1}{4}$, NE $\frac{1}{4}$, Sec. 23, Brenna Twn.	
8	Historic, rural school (1884)	NE $\frac{1}{4}$, NW $\frac{1}{4}$, Sec. 8, Falconer Twn.	
9	Historic, rural school (1884)	SW $\frac{1}{4}$, SW $\frac{1}{4}$, Sec. 16, Falconer Twn.	
10	Historic, rural school (1884)	NW $\frac{1}{4}$, SE $\frac{1}{4}$, SE $\frac{1}{4}$, Sec. 32, Falconer Twn.	
11	Oxford House	University of North Dakota, Grand Forks	*
12	U. S. Post Office and Court House	102 North 4th Street, Grand Forks	*
13	Campell House		
14	Historic, rural school (1884)	Ctr., NW $\frac{1}{4}$, Sec. 12, Walle Twn.	
15	Historic, rural school (1884)	SW $\frac{1}{4}$, SE $\frac{1}{4}$, Sec. 23, Walle Twn.	
16	Historic, rural school (1884)	Ctr., NE $\frac{1}{4}$, Sec. 30, Walle Twn.	
17	Historic, rural school (1884)	NE $\frac{1}{4}$, NW $\frac{1}{4}$, Sec. 25, Walle Twn.	
18	Historic, rural church (1884)	SW $\frac{1}{4}$, NW $\frac{1}{4}$, Sec. 26, Walle Twn.	
19	Historic, Thompson Townsite (1884)	W $\frac{1}{2}$, SW $\frac{1}{4}$, Sec. 30, Walle Twn.	
20	Historic, Walle Post Office (1884)	NE $\frac{1}{4}$, SE $\frac{1}{4}$, Sec. 25, Walle Twn.	
MINNESOTA Polk County			
	None		
PREHISTORIC-ARCHEOLOGICAL SITES			
NORTH DAKOTA Grand Forks County			
1	Prehistoric, Burial mound (?)	Sec. 22, Mekinock Twn.	
2	Prehistoric, Site (?)	Sec. 22, Mekinock Twn.	
3	Prehistoric, Burial area (?)	Sec. 31, Mekinock Twn.	
4	Prehistoric, Burial mound (?)	Sec. 31, Mekinock Twn.	
5	Prehistoric, Burial mound (?)	Sec. 31, Mekinock Twn.	
6	Prehistoric, Site (?)	Sec. 28, Falconer Twn.	
MINNESOTA Polk County			
7	Prehistoric, Mound	Huntsville Twn.	

4
FERRY

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MEKINOCK

BLOOMING

RYE

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FALCONER 9
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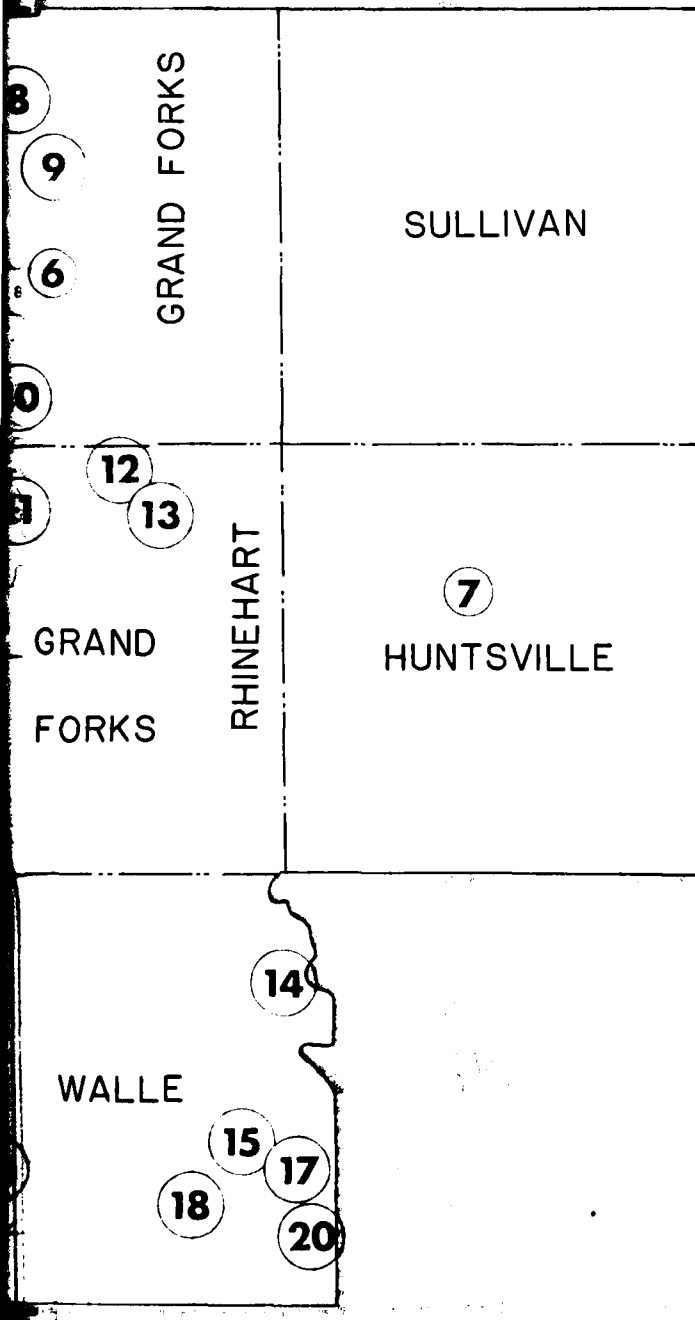
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GRAND
FORKS

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16
19

**Grand Forks / East Grand Forks
URBAN WATER RESOURCES STUDY**



- ⑦ ARCHEOLOGICAL SITE NUMBER
- ②① HISTORICAL SITE NUMBER

NOTE: SEE TABLE 21 FOR NUMBER LISTING OF ARCHEOLOGICAL AND HISTORICAL SITES.

SOURCE: REFERENCES 98,99,100,101.

PLATE 7

Social Organization

Introduction - A social system includes the characteristics of individuals constituting the system and the organizational forms they have adopted to meet both basic human needs and the cultural values that have evolved. The content of a social system, as it is presented here, can be divided into three categories: (1) the distribution of individual characteristics among the members of the population, (2) the manner in which behavior is organized to meet needs and values, and (3) the resources and services used to support fundamental activities.

The identification of population characteristics is important in the planning process. Such factors as population density, distribution by age, land use, and property values are essential aids to the planner in assessing quantity and geographic location of need, future projections of needs, and areas and groups that will be affected by decisions made during the study.

The social organization of behavior in a community is also a primary consideration in a planning study. Governmental organization, economic base, occupational structure, and education define the needs and constraints of a community and establish the practical parameters for levels of local participation in the planning process. Information about organized social structure provides understanding of how contemplated changes in any structural attribute may have indirect effects on other attributes and the overall organization of the community.

Social support services are important concerns in the identification of the needs and desires of a community. Community facilities, recreation, transportation, and utilities express the community's perceptions of vital services, recreational needs, and other demands that might be affected by possible changes in local use of resources.

Demography -

1. Population Density

Population densities vary greatly over the study area, with various smaller areas showing contrasting changes between 1960 and 1970. Whereas Grand Forks County increased in density from 33.8 to 42.5 persons per square mile, the city of Grand Forks decreased in density from 6,065 to about 4,200 persons per square mile mainly because of annexation of lower density suburban areas. In contrast, East Grand Forks increased in population density from about 2,670 to 2,900 persons per square mile, while Polk County decreased about 5 percent from 18 to 17.1 persons per square mile. Population densities per square mile for census enumeration districts within the study area are listed in table 22 and shown graphically on plates 8 and 9.

Of the smaller communities, Emerado and Thompson have shown marked density increases, with a 38-percent increase in Thompson between 1960 and 1970. Population density doubled at the Air Force Base, decreased 15 percent at Marvel, and declined sharply at Mekinock. Table 22 and plates 8 and 9 show a sudden decrease in population density from urbanized to rural areas.

TABLE 22

POPULATION DENSITY

Grand Forks Area

<u>Enumeration District</u>	<u>Population Per Square Mile</u>	<u>Enumeration District</u>	<u>Population Per Square Mile</u>
32	4,541	59	3,992
33	No Data	60	3,400
34	3,135	61	6,619
35	8,175	62A	7,450
36	5,305	62B	6,300
37	7,672	63A	9,736
38A	3,306	63B	8,642
38B	10,300	64	6,752
39	No Data	65	7,626
39 (Airport)	No Data	66A	2,425
40	242	66B	2,830
41A	No Data	66C	5,865
41B	12,344	67	7,078
42	3,565	68	7,450
43	6,829	69	36
44	5,340	70A	50
45	10,144	70B	181
46	8,233	11A	1,074
47	6,100	12	No Data
48	4,950	13	3,040
49	4,850	14	6
50	7,667	01	984
51	11,080	02	No Data
52	6,107	03	4
53	7,082	04	4
54	893	05	6
55	4,057	27	2,342
56	10,720	28	No Data
57	9,256	29	6
58	5,414	30	4

TABLE 22 CON'T

POPULATION DENSITY

East Grand Forks Area

<u>Enumeration District</u>	<u>Population Per Square Mile</u>
16	1,580
17	5,033
18	1,969
19	3,444
20	5,014
21	4,926
22	3,483
23	No Data
24	1,327
25	5,234
26	3,849
27	6,388
15	24
29	14
28	97
14	54

2. Population Distribution by Age

Age characteristics of the study area population vary, but show a slightly higher-aged rural population in Grand Forks County and a significantly older rural population in Polk County in terms of median age. Median ages for Grand Forks and Grand Forks County were 23.1 and 23.2, respectively, in 1970, while median East Grand Forks and Polk County ages were 24.4 and 30.5 years, respectively. The spatial distribution of the 0-17, 19-64, and 65 and older age groups for the urban and rural areas is shown by census enumeration district on plates 10 and 11 and tabulated in table 23.

Of significant interest is the effect of the declining birth rate, property values, and other factors on the population age distribution in the area. In Polk County, for example, the under-5 age group declined 33 percent between 1960 and 1970. In contrast, the 15-24 age group increased about 32 percent, while the over-65 group increased about 18 percent over 1960 levels. To illustrate an aging Polk County population, the 65 and older group increased from a 9.2-percent share in 1950 to a 14.4-percent share in 1970.

Another notable contrast is the marked difference in the median age of Polk County study area townships in contrast to that of the entire county. Of the four Polk County townships adjacent to East Grand Forks (see plate 10), Grand Forks Township had the highest median age of 20.6 compared to 30.6 for Polk County.

In Thompson, the population increased 83 percent, from 291 in 1970 to 532 in 1975. Of this increase, the 25-34 age group represented 31 percent of this growth, closely followed by the under-5 and 5-15 age groups at 26 and 25 percent, respectively. This growth is attributed to the large number of younger couples buying or building homes in the city and commuting to work in the Grand Forks area. Only the over-65 age group showed a decline over the 5-year period. From a disproportionately large number of elders in the city in 1970, the recent influx of younger persons has evened the distribution so that nearly 70 percent of the population is under 34 years compared to only 55 percent in 1970.

TABLE 23

POPULATION DISTRIBUTION BY AGE GROUPS

East Grand Forks Area

Enumeration District	AGE GROUPS					
	0 - 17		18 - 64		65+	
	#	%	#	%	#	%
16	141	44.6	175	55.4	0	0.0
17	301	28.5	627	59.3	129	12.2
18	512	46.5	562	51.0	27	2.5
19	16	51.6	15	48.4	0	0.0
20	454	43.1	518	49.2	81	7.7
21	64	13.7	276	59.0	128	27.3
22	213	34.7	321	52.4	79	12.9
24	23	16.8	13	9.5	101	73.7
25	304	40.0	449	59.2	6	0.8
26	334	45.2	385	52.1	20	2.7
27	452	37.7	596	49.6	153	12.7
15 (Grand Forks Twn)	204	54.6	155	41.4	15	4.0
29	264	52.4	230	45.6	10	2.0
28	153	44.9	159	46.6	29	8.5
14	75	38.3	76	38.8	45	22.9

TABLE 23 CON'T

POPULATION DISTRIBUTION BY AGE GROUPS

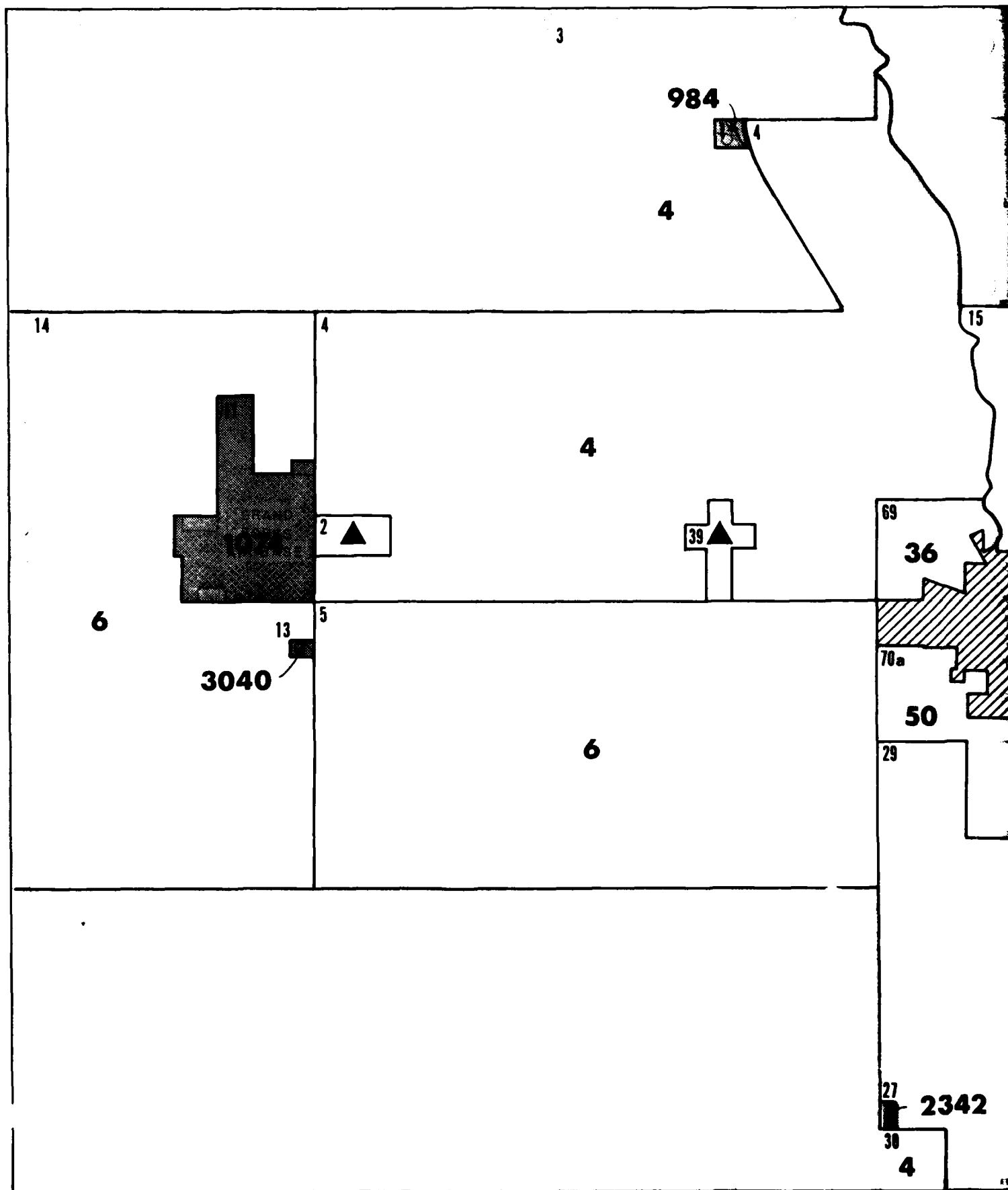
Grand Forks Area

Enumeration District	AGE GROUPS					
	0 - 17		18 - 64		65+	
	#	%	#	%	#	%
32	451	37	642	54	113	9
34	265	50	264	49	4	1
35	352	36	518	54	95	10
36	300	33	501	56	101	11
37	249	29	394	47	201	24
38A	307	32	620	65	32	3
38B	308	43	385	54	23	3
40	85	43	114	57	0	0
41A	345	27	918	73	0	0
41B	294	7	3,642	92	14	1
42	66	10	560	86	27	4
43	515	32	1,044	64	70	4
44	100	19	315	59	119	22
45	286	30	502	56	125	14
46	216	29	473	64	52	7
47	186	23	536	68	71	9
48	111	16	538	74	76	10
49	56	9	388	67	138	24
50	145	21	428	62	117	17
51	152	27	288	52	114	21
52	648	40	813	49	188	11
53	347	29	610	50	247	21
54	125	33	210	56	40	11
55	149	52	135	48	0	0
56	327	31	658	61	87	8
57	222	26	455	55	156	19
58	402	35	617	54	113	11

TABLE 23 CON'T
POPULATION DISTRIBUTION BY AGE GROUPS

Grand Forks Area

Enumeration District	AGE GROUPS					
	0 - 17		18 - 64		65+	
	#	%	#	%	#	%
59	502	45	573	51	43	4
60	186	55	154	45	0	0
61	401	37	537	51	123	12
62A	124	42	170	57	4	1
62B	134	35	238	63	6	2
63A	509	51	479	47	23	2
63B	412	49	371	43	70	8
64	501	38	650	50	152	12
65	609	42	768	53	72	5
66A	321	44	334	56	0	0
66B	163	29	295	52	108	19
66C	339	44	480	54	14	2
67	719	5	11,391	94	58	1
68	559	47	614	51	19	2
69	102	66	48	31	4	3
70A	99	27	247	68	18	5
70B	244	44	291	52	20	4
11	4,220	40	6,304	60	19	0
13	170	37	273	60	13	3
14	289	36	408	51	107	13
01	49	20	132	54	65	26
03	244	44	263	47	48	9
04	138	37	214	56	28	7
05	144	37	228	60	11	3
27	100	35	123	44	58	21
29	211	34	331	54	71	12
30	183	38	245	50	60	12



Grand Forks / East Grand Forks URBAN WATER RESOURCES STUDY

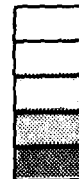
POPULATION DENSITY
OF RURAL AREAS OUTSIDE THE
GRAND FORKS - EAST GRAND FORKS
URBAN AREA

PERSONS PER SQUARE MILE
GIVEN FOR EACH ENUMERATION DISTRICT



NUMBER AND DISTRICT BOUNDARY

PERSONS PER SQUARE MILE



0-25
26-50
51-100
101-1000
1000+



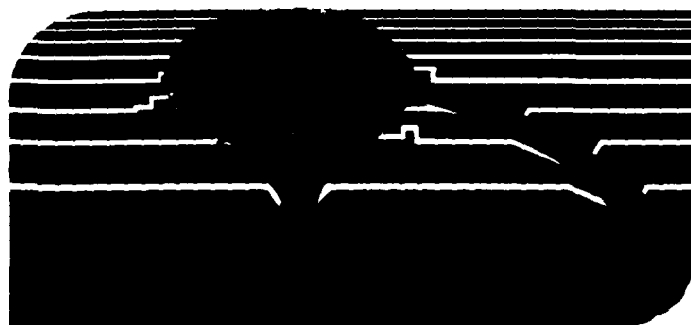
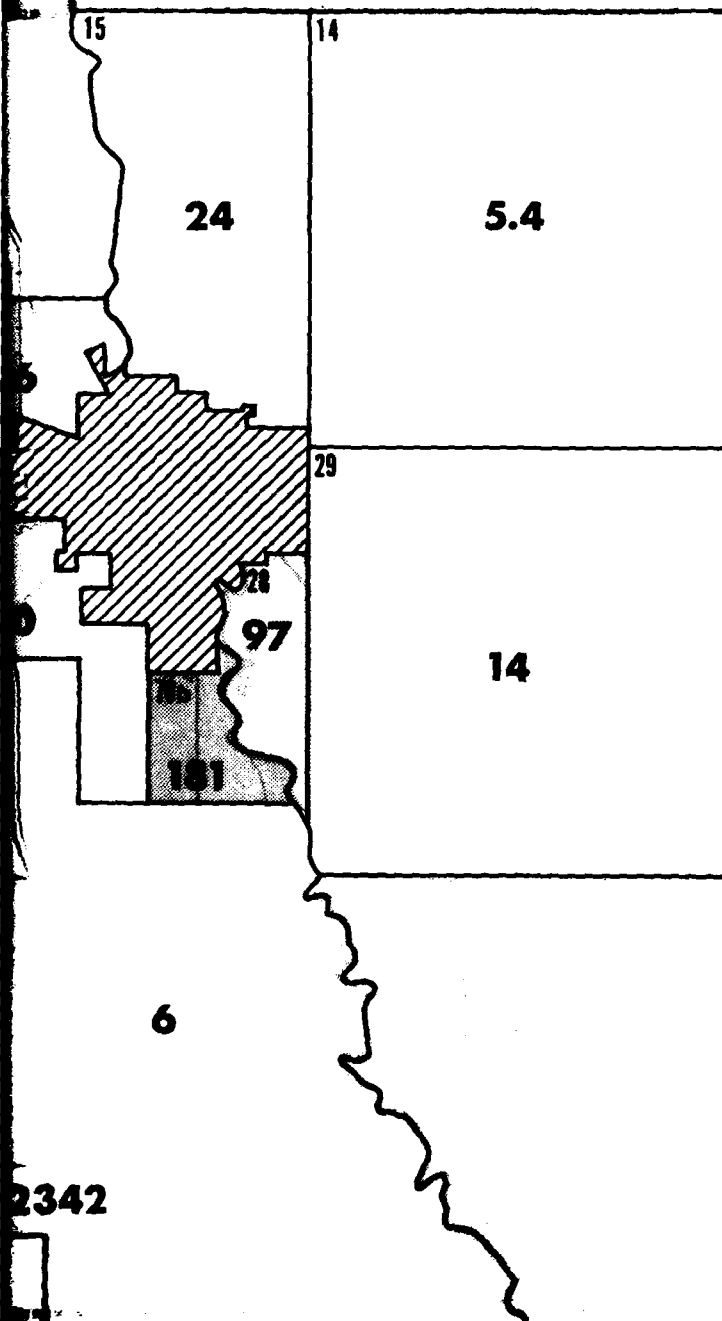
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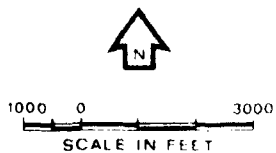
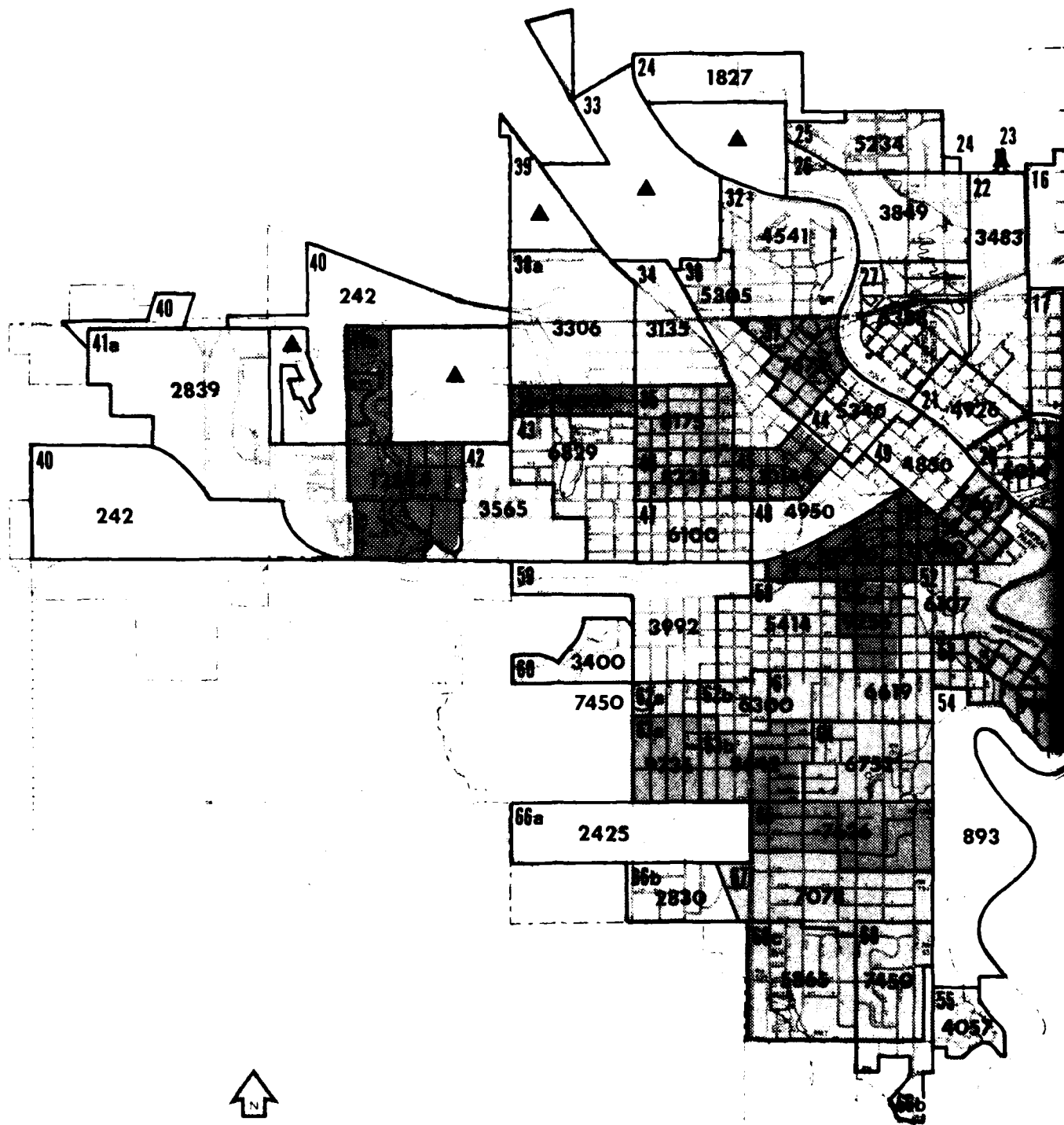


POPULATION DENSITY FOR THE
GRAND FORKS - EAST GRAND FORKS
URBAN AREA PRESENTED
ON PLATE 9

SOURCE: REFERENCE 156.

PLATE 8





Grand Forks / East Grand Forks URBAN WATER RESOURCES STUDY

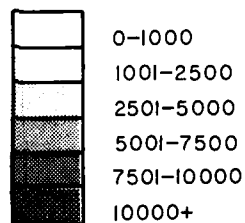
POPULATION DENSITY OF THE
GRAND FORKS - EAST GRAND FORKS
URBAN AREA

PERSONS PER SQUARE MILE
GIVEN FOR EACH ENUMERATION DISTRICT



NUMBER AND DISTRICT BOUNDARY

PERSONS PER SQUARE MILE

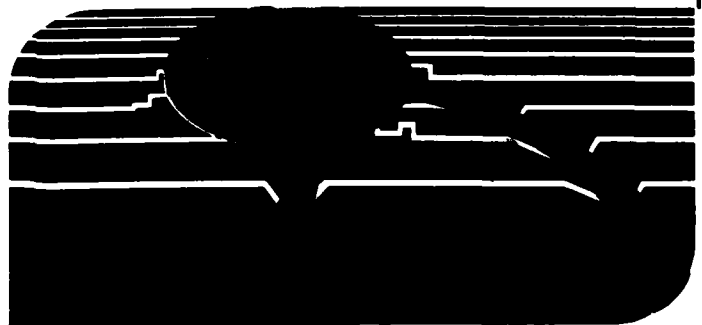
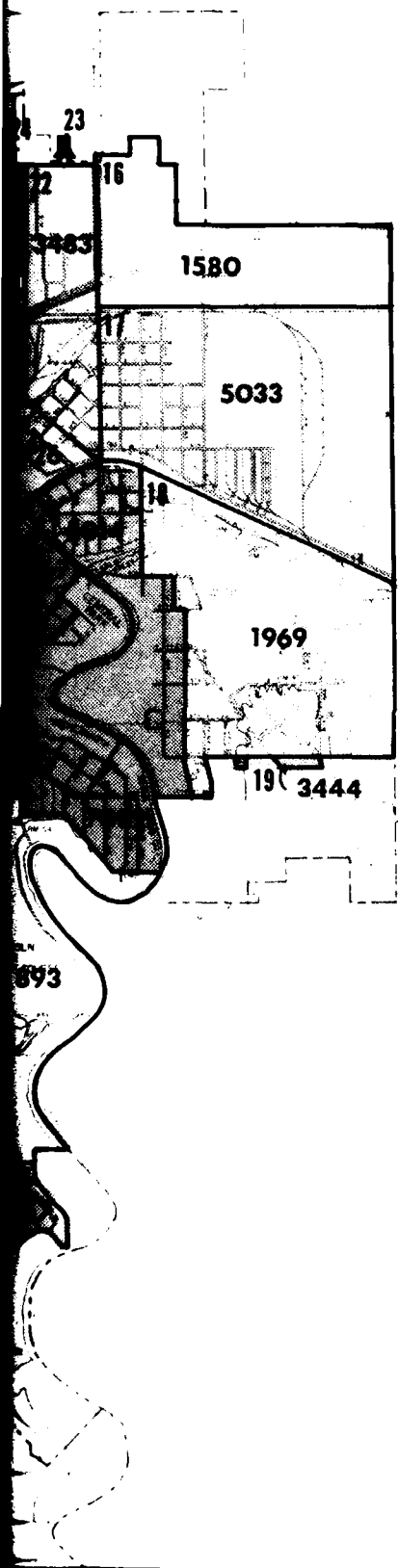


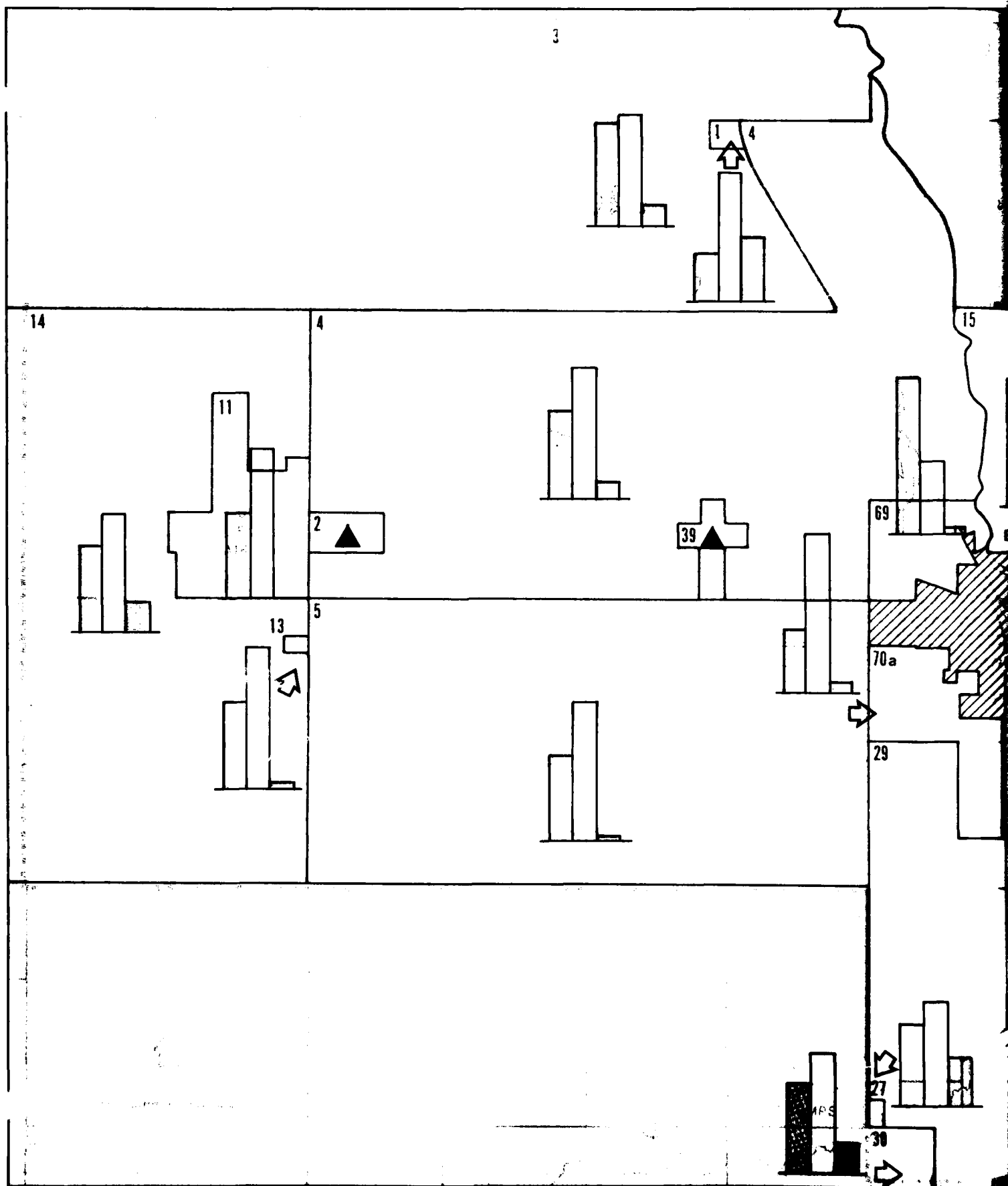
▲ DATA NOT AVAILABLE

POPULATION DENSITY FOR RURAL AREAS
OUTSIDE GRAND FORKS - EAST GRAND FORKS
PRESENTED ON PLATE 8

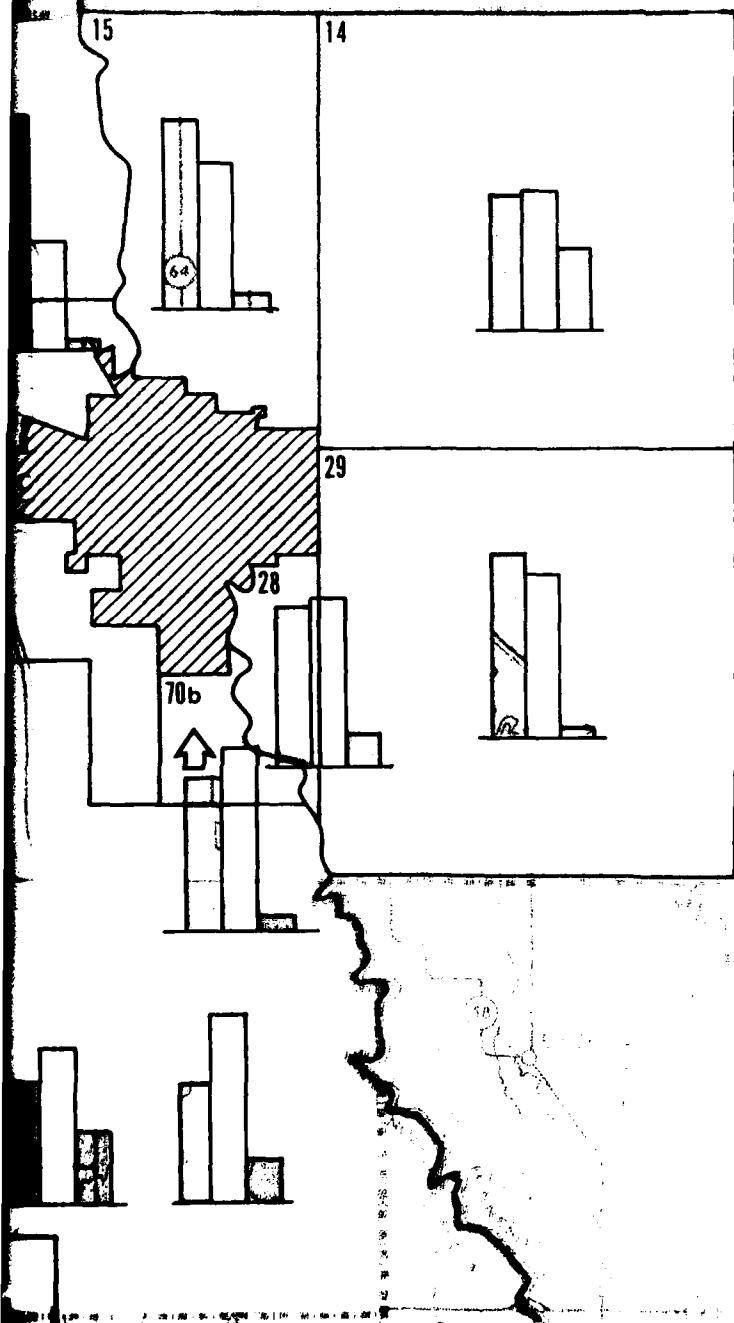
SOURCE: REFERENCE 156.

PLATE 9

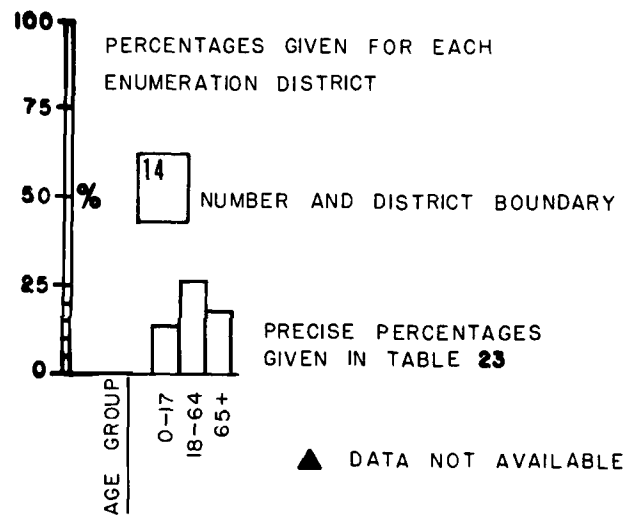




Grand Forks / East Grand Forks URBAN WATER RESOURCES STUDY



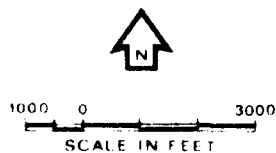
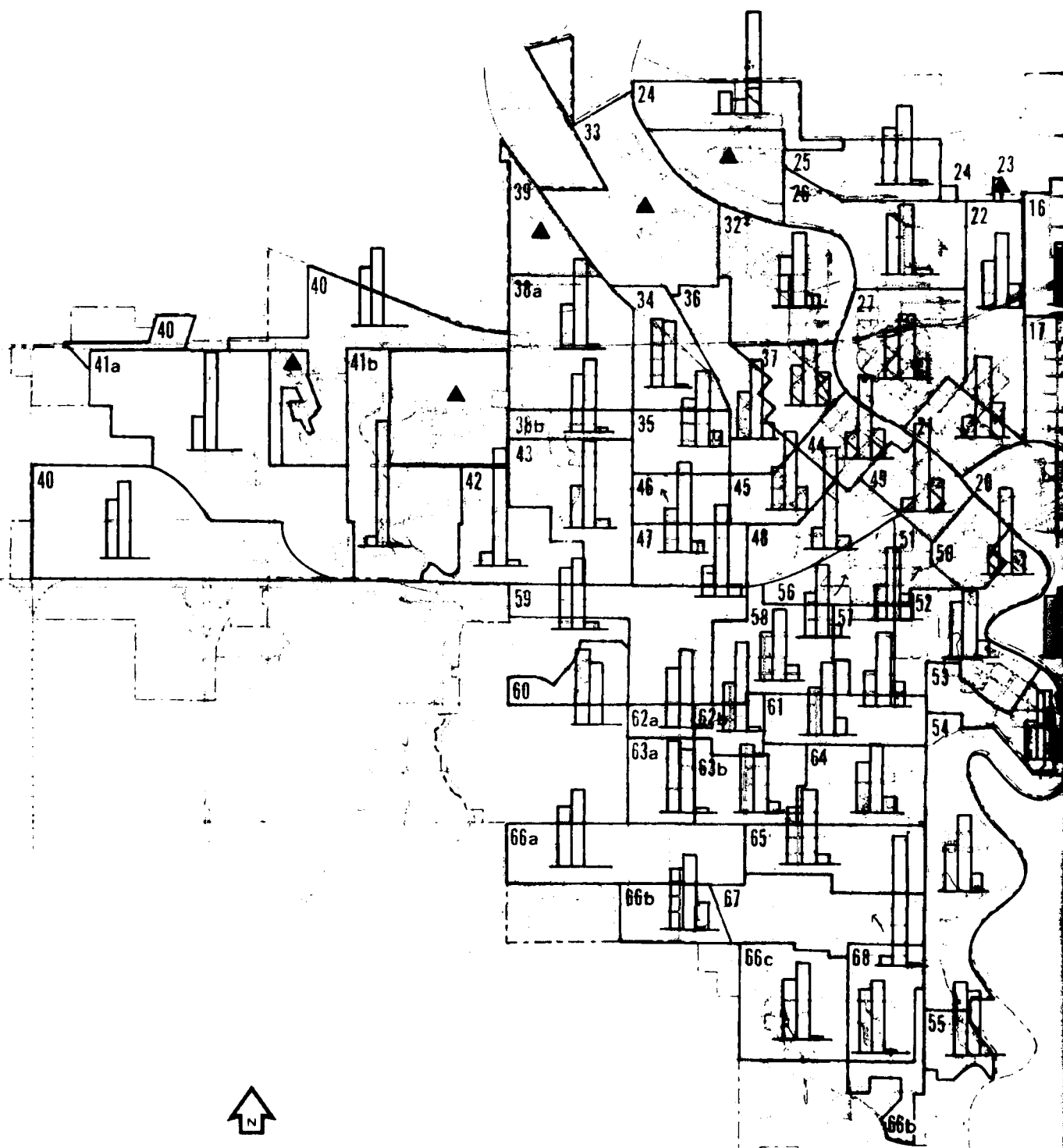
POPULATION DISTRIBUTION
BY AGE GROUP FOR RURAL AREAS



POPULATION DISTRIBUTION BY
AGE GROUP FOR THE GRAND FORKS-
EAST GRAND FORKS URBAN AREA
PRESENTED ON PLATE II

SOURCE: REFERENCE 156.

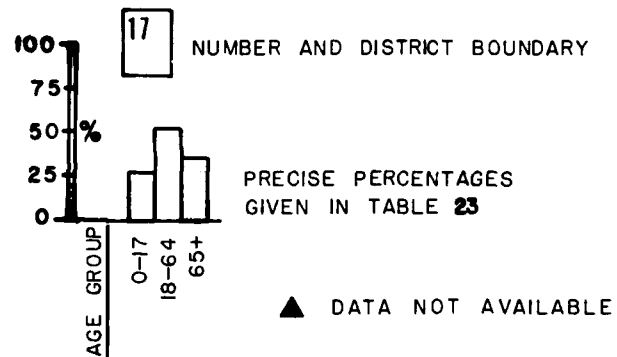
PLATE 10



Grand Forks / East Grand Forks URBAN WATER RESOURCES STUDY

POPULATION DISTRIBUTION BY AGE GROUP
FOR THE GRAND FORKS - EAST GRAND FORKS
URBAN AREA

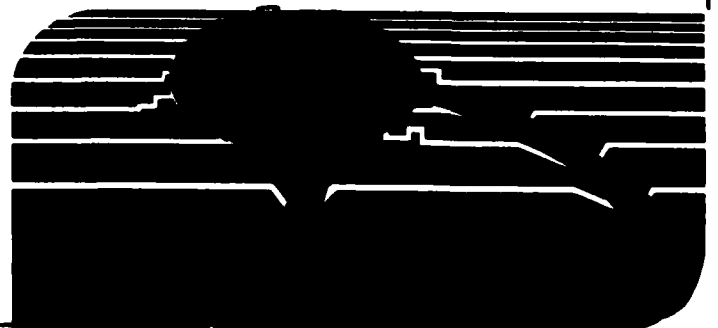
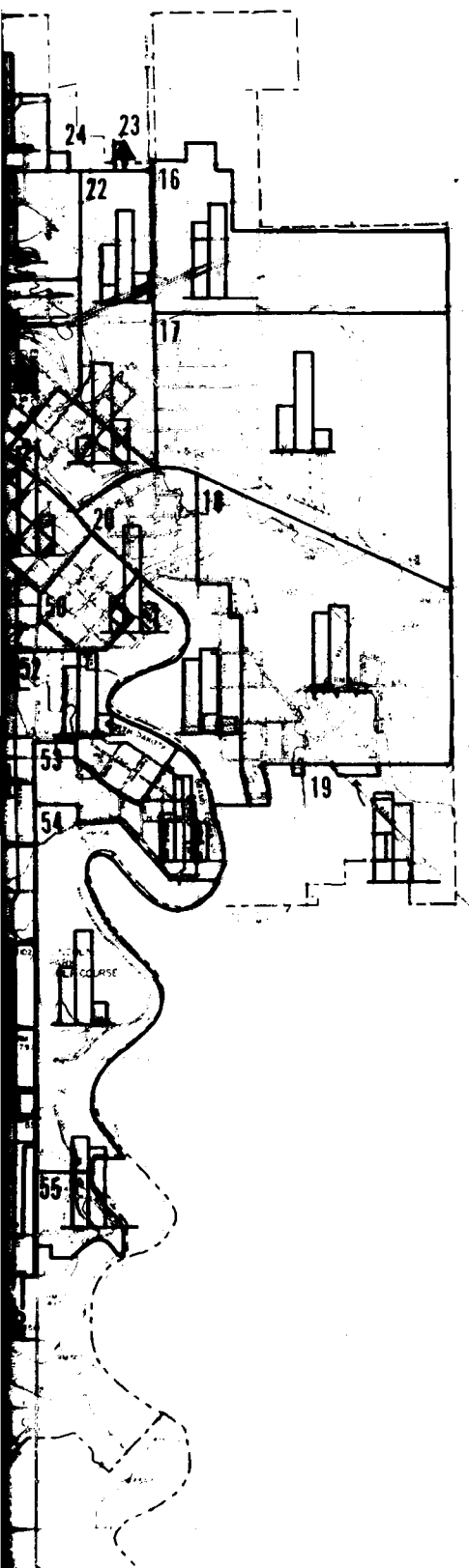
PERCENTAGES GIVEN FOR EACH
ENUMERATION DISTRICT



POPULATION DISTRIBUTION BY AGE GROUP
FOR THE RURAL AREAS OUTSIDE GRAND FORKS -
EAST GRAND FORKS PRESENTED ON PLATE 10

SOURCE: REFERENCE 156.

PLATE II



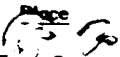
3. Urban-Rural Distribution

Before 1970, population trends indicated a shift from rural to urbanized areas, as farms grew larger and the number of farms decreased. With fewer employment opportunities, many displaced rural residents sought employment in the urbanized area. Very recent but incomplete data show some reversal of this trend, as some former urbanites are leaving for the amenities of a quieter rural or small community atmosphere. Indications of this trend may be seen in the rapid growth of Thompson and Emerald in Grand Forks County during the period 1970-76 compared to the slower growth rate between 1960 and 1970.

In Grand Forks County during 1960, the urban and rural areas (including rural communities) contained 70.8 and 29.2 percent of the population, respectively. By 1970, the urbanized and rural areas accounted for 81 and 19 percent, respectively, of the county population. Polk County urban-rural distributions present a marked contrast for both years, with a much higher percentage of rural population. In 1960, the urban and rural populations represented 43 and 57 percent, respectively, of total population. By 1970, the urban sector had grown slightly to 46 percent, while the rural sector decreased to 54 percent of the county population. In contrast to overall county patterns, the townships adjacent to densely urbanized areas will probably grow faster because of more commuting residents. This trend may be affected by future and uncertain energy considerations. A summary of study area population and percent change between 1960 and 1970 by county, city, rural community, and township is given in tables 24 and 25.

TABLE 24

POPULATION GRAND FORKS COUNTY, NORTH DAKOTA STUDY AREA

 Place	<u>1960</u>	<u>1970</u>	<u>1975</u>	<u>% Change 1960-1970</u>
Grand Forks County	48,677	61,102	DNA	+25.5
Grand Forks	34,451	39,008	41,601*	+13.2
Grand Forks Air Base	5,192	10,474	DNA	+101.7
Thompson	211	291	532	+37.9
Emerado	328	515	864	+57.0
Arvilla	138	DNA	DNA	---
Manvel	313	265	DNA	-15.3
Mekinock	111	DNA	DNA	---
Grand Forks Township**	92	1,083	DNA	+56.5
Walle Township	293	262	DNA	-10.6
Brenna Township	212	189	DNA	-10.8
Oakville Township	168	215	DNA	+5.6
Chester Township	168	215	DNA	+28.0
Mekinock Township	1,774	10,678	DNA	+501.9
Blooming Township	201	180	DNA	-10.4
Rye Township	137	161	DNA	+17.5
Falconer Township	308	159	DNA	-48.4
Ferry Township	296	222	DNA	-25.0

DNA - Data not available

* 1973

** Township populations exclude communities

TABLE 25

POPULATION
POLK COUNTY, MINNESOTA
STUDY AREA

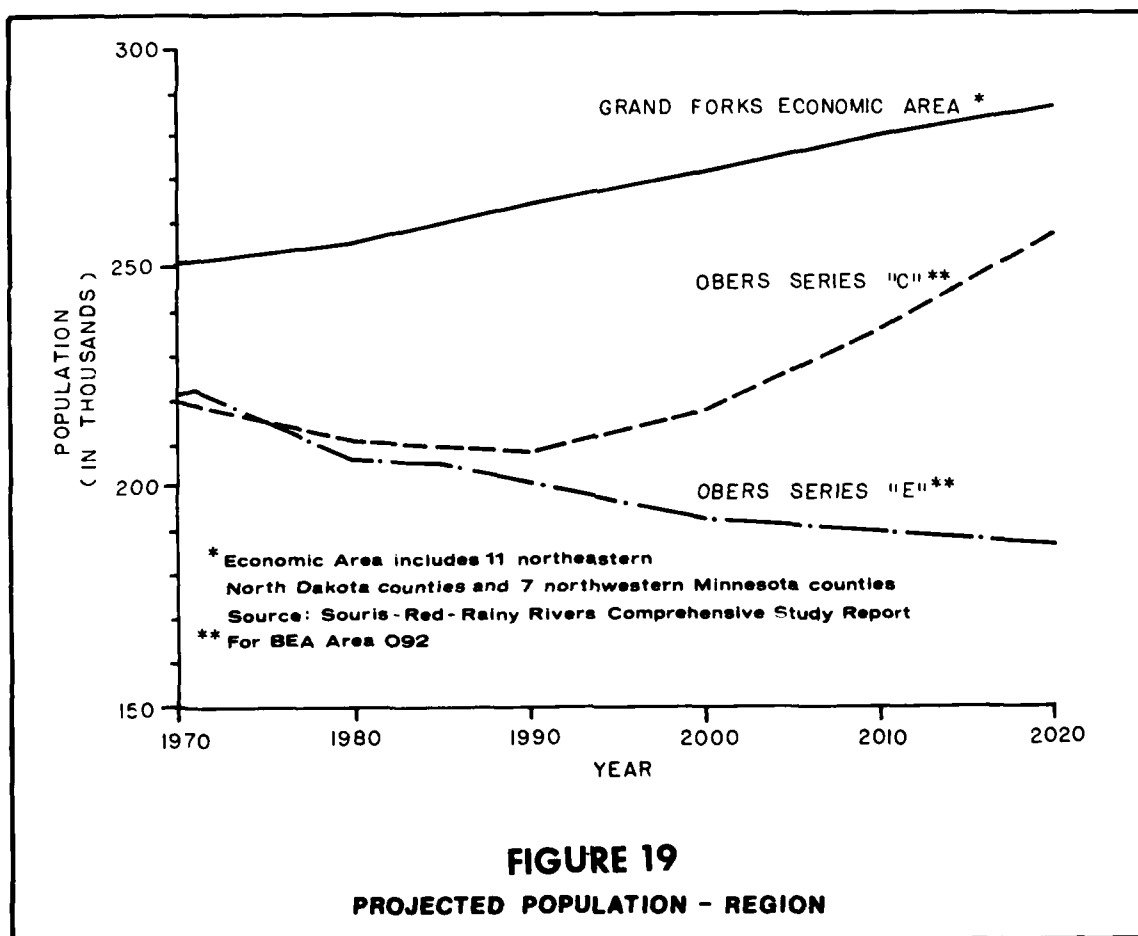
<u>Place</u>	<u>1960</u>	<u>1970</u>	<u>1975</u>	<u>% Change 1960-1970</u>
Polk County	36,182	34,435	DNA	-4.8
East Grand Forks	6,998	7,607	8,397	+8.7
Huntsville Township**	457	461	DNA	+0.9
Sullivan Township	207	213	DNA	+2.9
Grand Forks Township	259	357	DNA	+37.8
Rinehart Township	220	416	DNA	+89.1

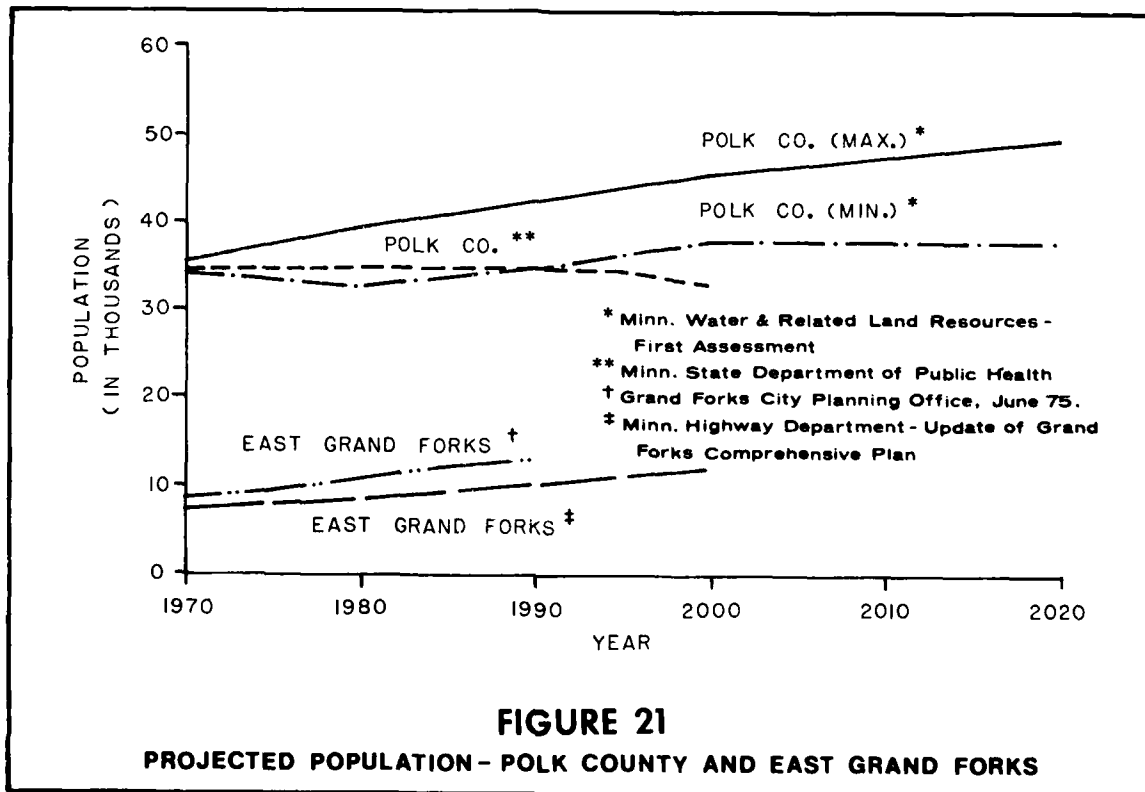
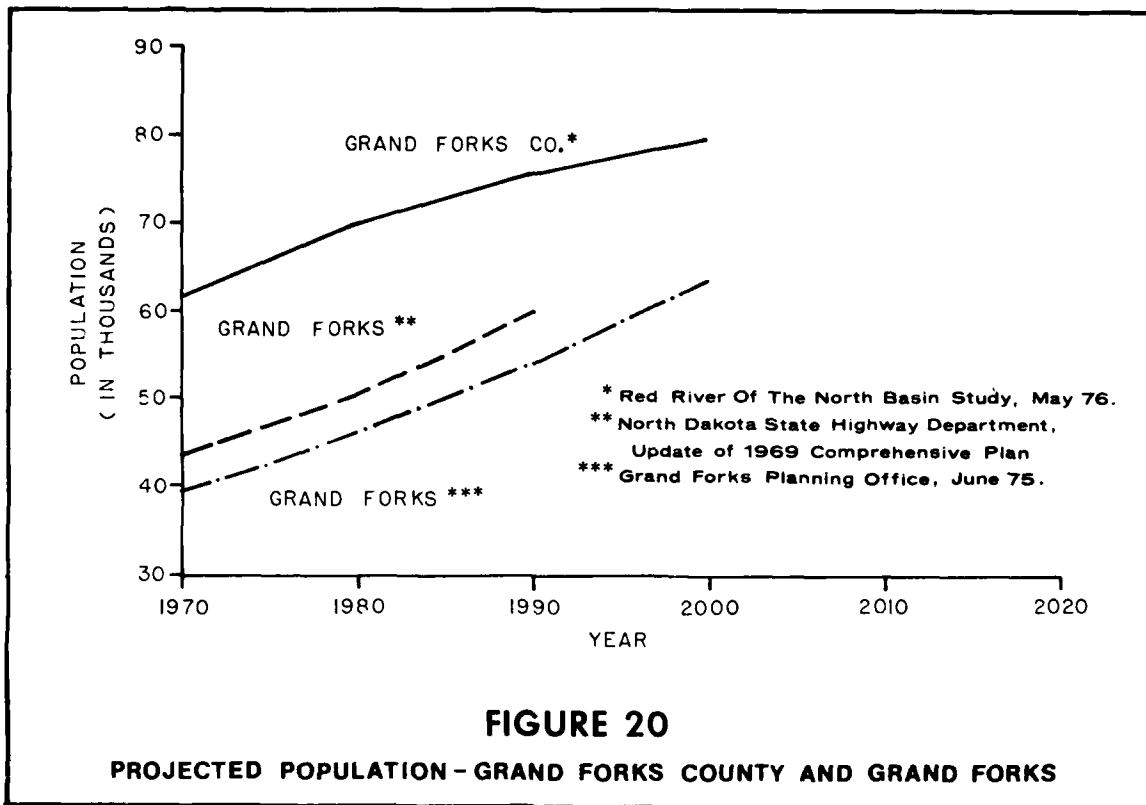
DNA - Data not available

Source: U.S. Census Bureau

4. Population Projections

Population projections for the study area have been made in recent years by Federal, State, and local units of government. Population projections for Bureau of Economic Analysis (BEA) Area 092, within which the study area is located, are shown in figure 19. Projections for Grand Forks County and Grand Forks are shown in figure 20, projections for Polk County and East Grand Forks are given in figure 21, and projections for the study area are given in figure 22. Table 26 is a breakdown of the study area projections into age and sex categories. Tables 27 and 28 show population projections for incorporated places within the study area.





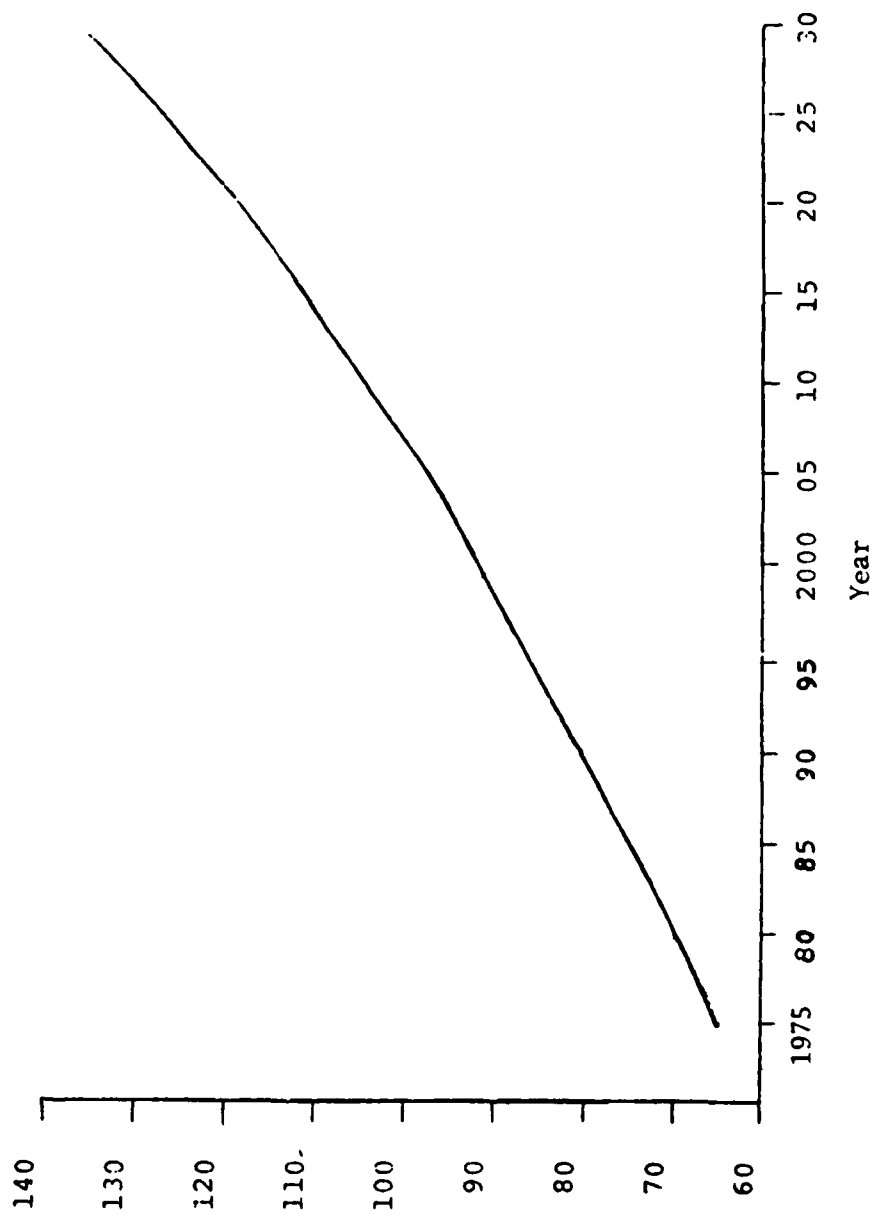


FIGURE 22 Study Area Growth Pattern (in 1,000s)

STUDY AREA
ADJUSTED COMPOSITE PROJECTION

91,098

TABLE 27

INCORPORATED PLACES
COMPOSITE PROJECTIONS

	<u>1975</u>	<u>1980</u>	<u>1990</u>	<u>2000</u>
Grand Forks	41,986	45,409	53,545	62,128
Thompson	532	689	889	1,149
Manvel	263	263	263	263
Emerado	864	903	993	1,052
East Grand Forks	8,397	9,279	10,737	12,376
Rural	2,312	2,433	3,012	3,430
Air Base	<u>10,700</u>	<u>10,700</u>	<u>10,700</u>	<u>10,700</u>
Total	65,054	69,676	80,139	91,098
University of North Dakota*	8,632	9,169	NA	NA

* Included in above figures.

TABLE 28
STUDY AREA AND SUBDIVISION
EXTRAPOLATED PROJECTIONS: 2000-2030

Study area	<u>2010</u>	<u>2020</u>	<u>2030</u>
	104,310	119,435	136,753
Grand Forks	72,296	83,976	97,351
Thompson	1,431	1,881	2,369
Manvel	263	263	263
Emerado	1,479	1,718	1,992
East Grand Forks	14,463	16,800	19,475
Rural	3,678	4,097	4,603
Air Base	10,700	10,700	10,700

University of North Dakota (Not available specifically - included in above totals)

Key References

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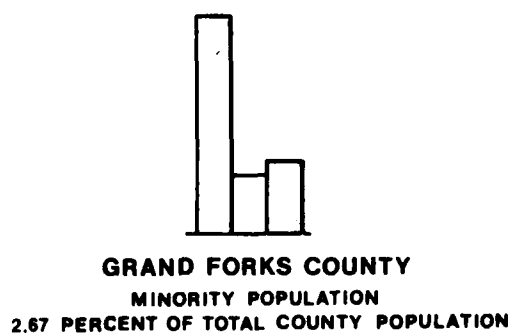
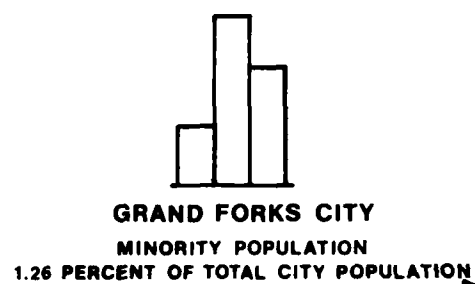
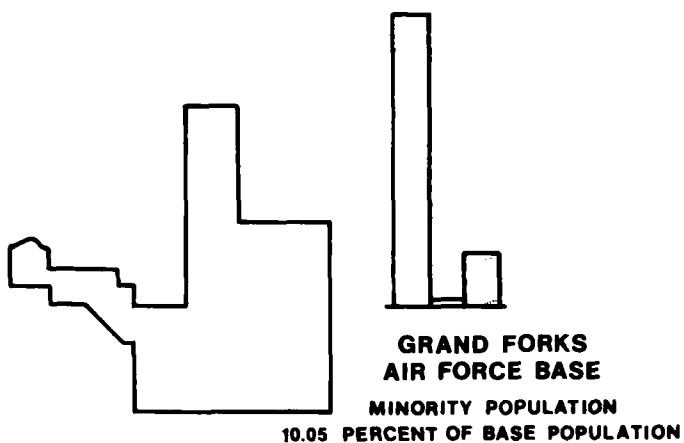
Racial Distribution - Racial minorities constitute only a small percentage of the study area population. Indians and Negroes represent the two largest groups, with 6.1 and 2.2 percent, respectively, of the Grand Forks population, and 4.2 and 1.1 percent, respectively of the East Grand Forks population. The largest concentrations of the Negro and Indian populations are at the U.S. Air Force Base and in Grand Forks, respectively. While the Negro population varies with the base population, the Grand Forks Indian population has shown a substantial increase in recent years, from 278 in 1970 to over 1,000 in 1976. A summary of minority group populations by county, principal city, and the Air Force Base is given in table 29 and displayed graphically on plate 12.

TABLE 29

MINORITY GROUP POPULATIONS - 1970

<u>Race Classification</u>	<u>Grand Forks County</u>		<u>Grand Forks</u>		<u>Grand Forks Air Force Base</u>		<u>Polk County</u>		<u>East Grand Forks</u>	
	<u>#</u>	<u>%</u>	<u>#</u>	<u>%</u>	<u>#</u>	<u>%</u>	<u>#</u>	<u>%</u>	<u>#</u>	<u>%</u>
Negro	1,004	50.4	86	4.3	879	44.1	15	0.8	8	0.4
Indian	278	42.6	238	36.5	16	2.5	88	13.5	32	4.9
Chinese	53	44.9	49	41.5	4	3.4	7	5.9	5	4.3
Japanese	77	48.1	19	11.9	52	32.5	11	6.9	1	0.6
Other	219	44.1	101	20.3	102	20.5	55	11.1	20	4.0

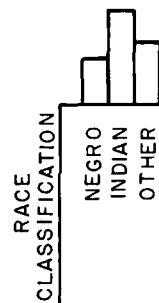
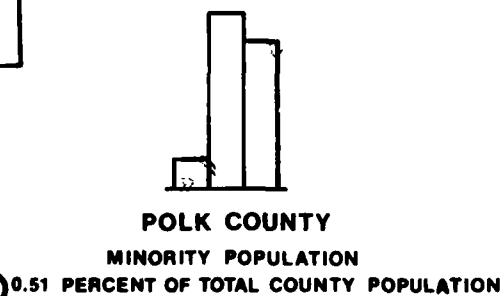
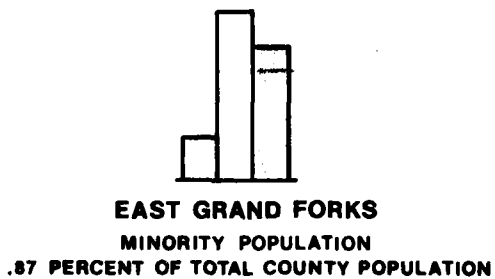
Source: U.S. Census



Grand Forks / East Grand Forks URBAN WATER RESOURCES STUDY

MINORITY GROUP POPULATIONS 1970

PERCENTAGE OF MINORITY POPULATIONS AND
RELATION TO TOTAL POPULATION



PRECISE PERCENTAGES
GIVEN IN TABLE 26

SOURCE: REFERENCES 162,163.

PLATE 12

Ethnic Groups - Unlike many other metropolitan areas, there are few easily distinguishable ethnic concentrations in the study area. Minority race persons represent only slightly over 1 percent of the Grand Forks population and are principally located in the near north side area of Grand Forks, the University, and the Air Force Base. Principal minority group concentrations include the native Americans on the near north side and the Negro population at the Air Force Base. Grand Forks is one of two North Dakota cities with the highest number of Indian residents, as evidenced by recent growth from 278 persons in 1970 to slightly over 1,000 in 1976. In East Grand Forks, minority races, predominantly native Americans, represent about one-half of 1 percent of the total city population and are dispersed citywide.

Neighborhood Groups - The formation of neighborhood groups and organizations in the larger urban areas provides opportunities for interested citizens to express their opinions and enter into the decision-making process. Only a small number of such groups is located in Grand Forks, with none in East Grand Forks and the rural study area, as shown in table 30. The general locations of identified groups and the planning district boundaries for the two major cities are shown on plate 13.

TABLE 30

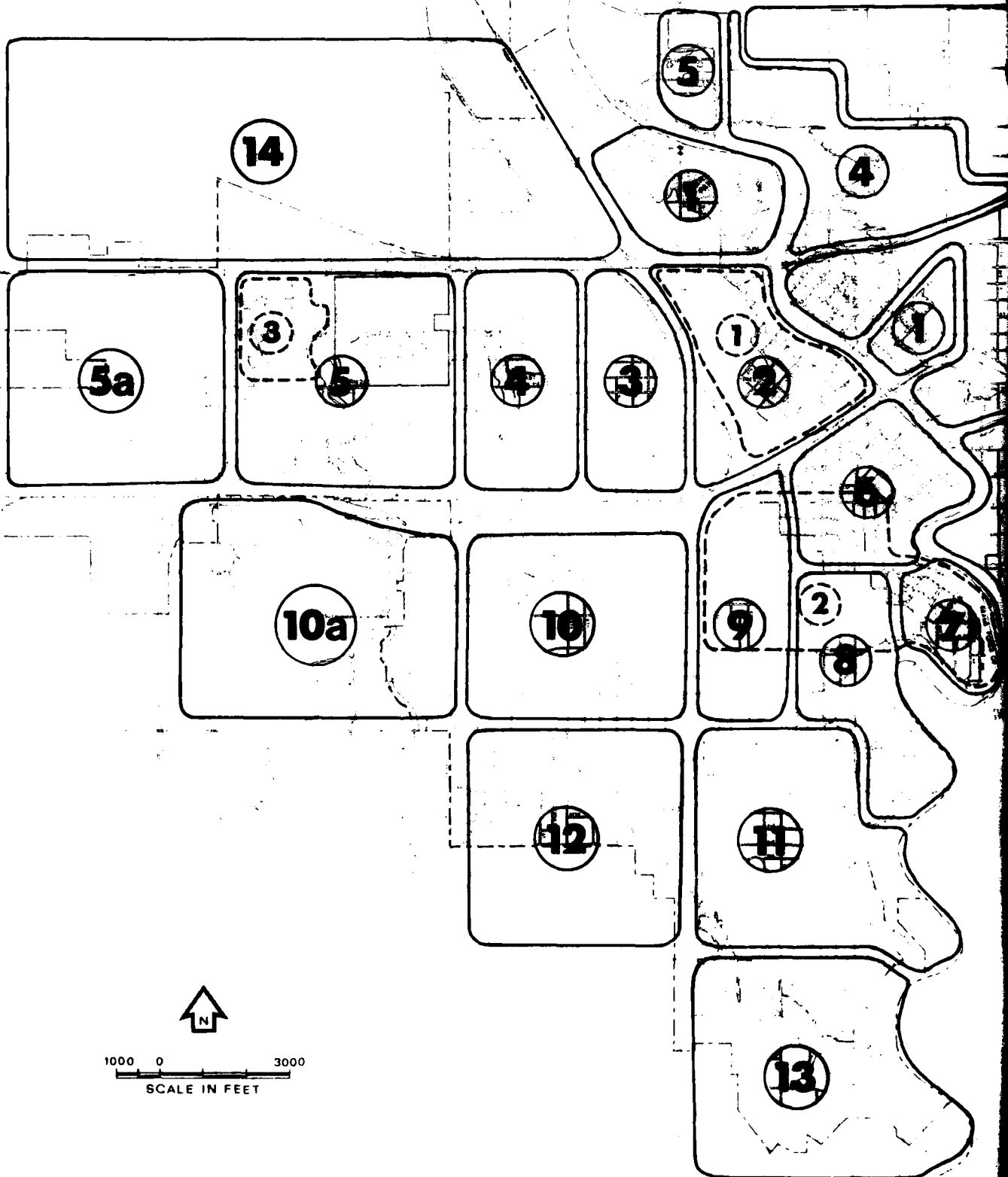
NEIGHBORHOOD GROUPS

Grand Forks

Near South Side Neighborhood Association
Near North Side Neighborhood Association
Lake Agassiz Homeowners Association

East Grand Forks

None



Grand Forks / East Grand Forks URBAN WATER RESOURCES STUDY

GRAND FORKS - EAST GRAND FORKS URBAN AREA



PLANNING DISTRICTS

GRAND FORKS

- ① RIVERSIDE PARK
- ② WASHINGTON
- ③ WINSHIP
- ④ WEST
- ⑤ AGASSIZ
- ⑥ WEST PARK
- ⑦ BELMONT
- ⑧ LINCOLN
- ⑨ ROOSEVELT
- ⑩ LEWIS & CLARK
- ⑪ BEN FRANKLIN
- ⑫ PARKSIDE
- ⑬ VIKING
- ⑭ VALLEY PARK
- ⑮ SOUTH TOWN
- ⑯ INDUSTRIAL AREA

EAST GRAND FORKS

- ① DOWNTOWN BUSINESS DISTRICT
- ② VALLEY
- ③ CRESTWOOD
- ④ RIVER HEIGHTS
- ⑤ FRINGE

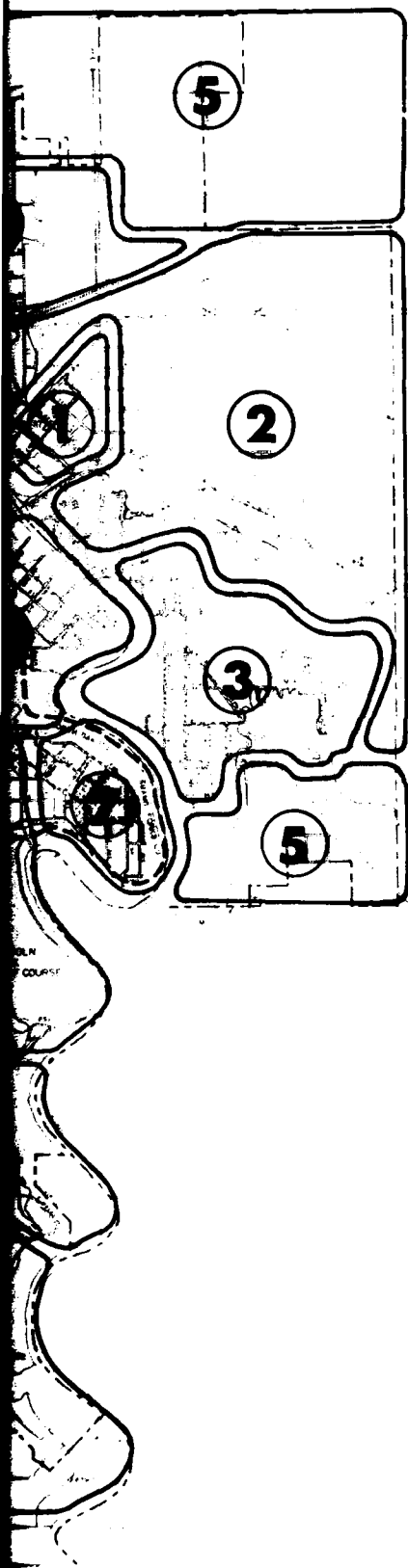


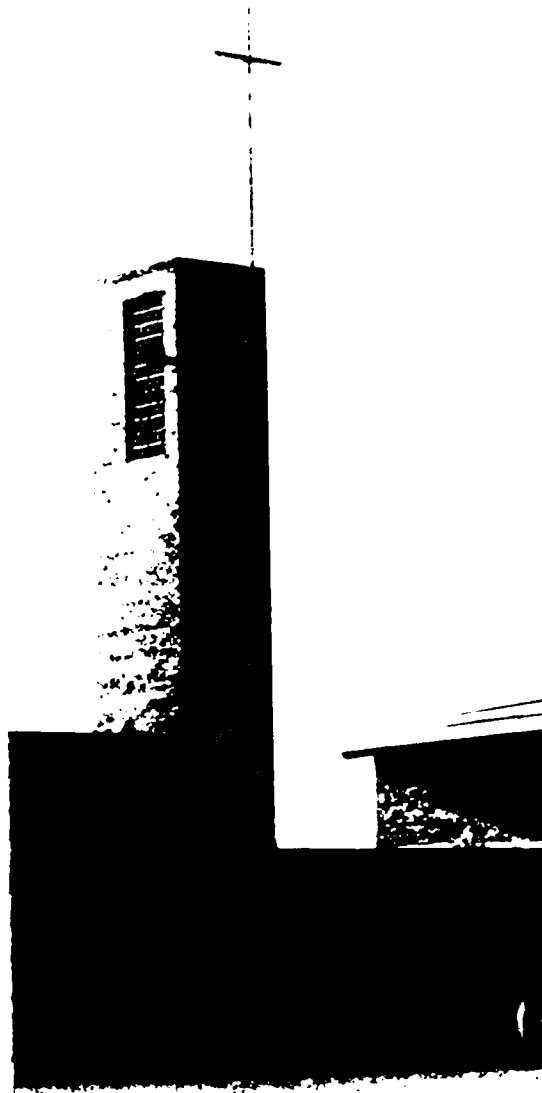
NEIGHBORHOOD GROUPS

- ① NEAR NORTH SIDE
- ② NEAR SOUTH SIDE
- ③ LAKE AGASSIZ HOME-OWNERS ASSOC.

SOURCE: REFERENCE 55.

PLATE 13





Religion - As in other pioneer communities, religion played an important role in the development and growth of the Grand Forks-East Grand Forks area. Early religious activity in the area centered around the Methodist Church and Catholic missionaries. Lutheran churches then followed with the influx of settlers in the later 1800's. Over 50 church congregations are located in the area and represent the various denominations shown in table 31. Of these, the principal faiths are Lutheran, Baptist, and Catholic, with the Lutheran faith dominant. Parochial education is provided by three elementary (Catholic) schools in Grand Forks, a Catholic elementary and high school in East Grand Forks, and the Bible Baptist Church.

TABLE 31

CHURCHES IN THE GRAND FORKS - EAST GRAND FORKS AREA

Lutheran	Federated Church
Baptist	Free Methodist
Catholic	Greek Orthodox
Methodist	Jehovah's Witness
Presbyterian	Jewish
Assembly of God	Nazarene
Church of God	Salvation Army
United Methodist	Seventh Day Adventist
Episcopal	United Church of Christ
Christian Reformed	United Pentecostal
Christian Science (Scientist)	Church of Jesus Christ of Latter
Church of Christ	Day Saints
Evangelical Free Church of America	Church of Jesus Christ of Latter Day Saints (Reorganized)

Crime - Probably partly because of its lower population and population densities, known criminal offenses per 100,000 population in North Dakota ranked lowest in the Nation from 1968 through 1972. In 1974, the rate of such offenses was 2,160 per 100,000 persons compared to the national average of 4,822. Recent major crime statistics for Grand Forks indicate a rate of about 40 crimes per 1,000 persons. Similar data indicate a rate of about 76 crimes per 1,000 persons for East Grand Forks.

Of the seven major crime categories shown in table 32, assaults and burglaries have shown the largest increase. Nonfirearm assaults in Grand Forks accounted for 84 percent of all city assaults and increased 42 percent over 1974. Assaults in East Grand Forks increased 69 percent during the same 1-year period. Burglaries in both urban centers increased dramatically, with 1-year increases of 102 and 111 percent, respectively, in Grand Forks and East Grand Forks. A graphic display of major crime incidence for Grand Forks and East Grand Forks is shown on plate 14.

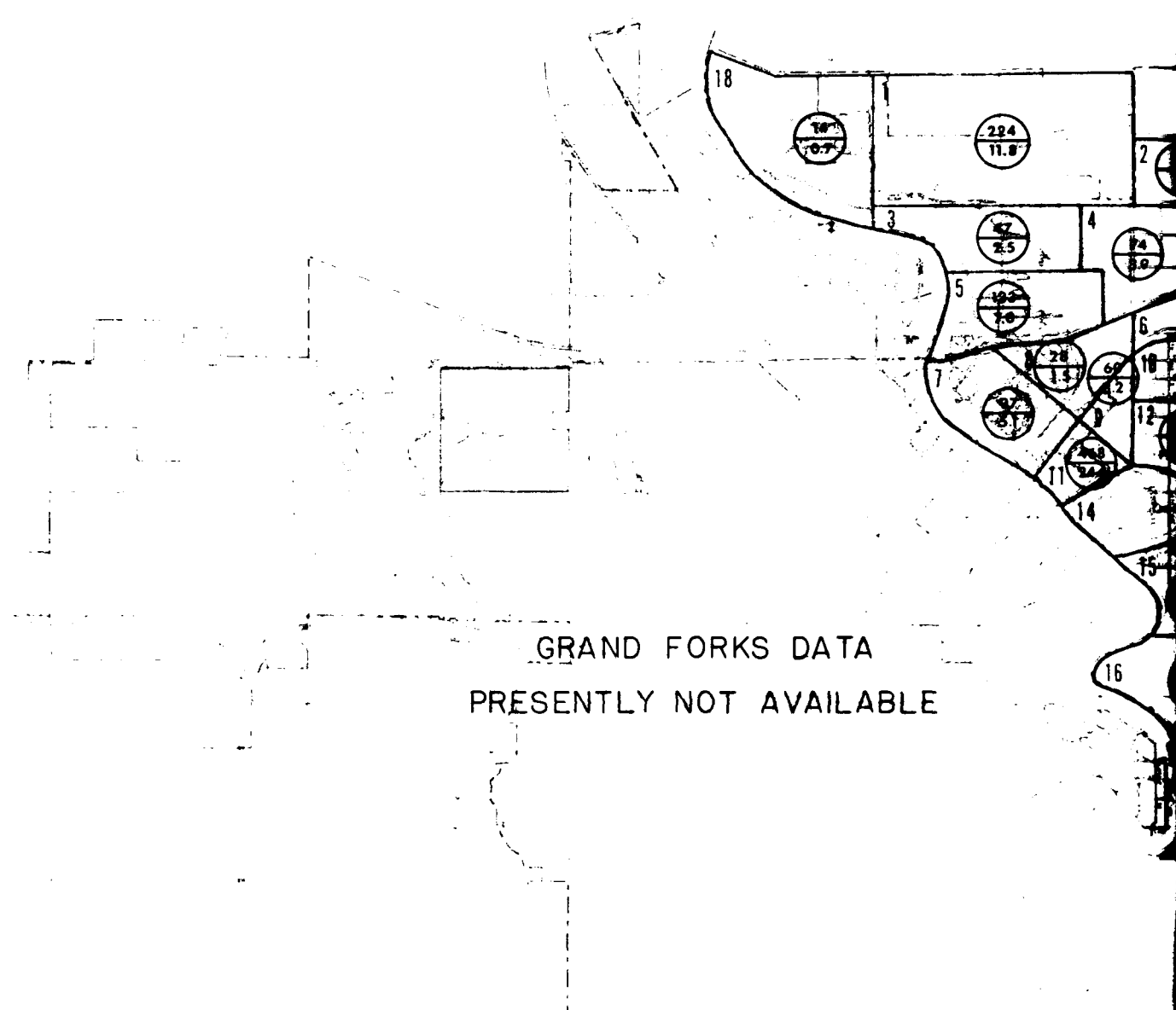
TABLE 32

MAJOR CRIMES

GRAND FORKS AND EAST GRAND FORKS

<u>Classification</u>	<u>Grand Forks</u>		<u>East Grand Forks</u>	
	<u>1974</u>	<u>1975</u>	<u>1974</u>	<u>1975</u>
Criminal Homicide	0	2	1	0
Forcible Rape	7	9	0	3
Assault	109	155	26	44
Robbery	10	14	2	1
Burglary	208	420	66	139
Auto Theft	112	111	32	32
Other Theft	1,676	1,642	402	421
	<u>2,122</u>	<u>2,353</u>	<u>529</u>	<u>640</u>

Sources: References 168, 169



GRAND FORKS DATA
PRESENTLY NOT AVAILABLE



Grand Forks / East Grand Forks URBAN WATER RESOURCES STUDY

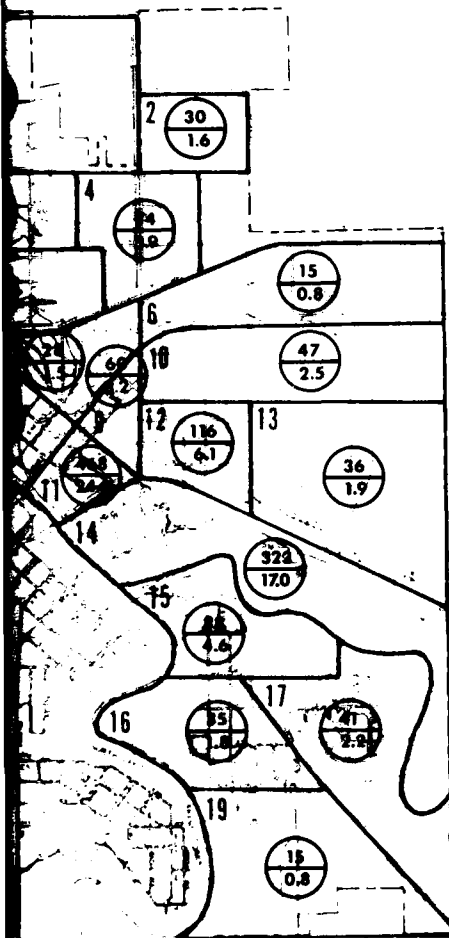
REPORTED CRIMES IN THE GRAND FORKS -
EAST GRAND FORKS URBAN AREA (1975)



EAST GRAND FORKS REPORTING AREAS



NUMBER OF COMPLAINTS PER AREA
PERCENTAGE OF TOTAL COMPLAINTS
IN EAST GRAND FORKS



SOURCE: REFERENCES 168,169.

PLATE 14

Geographic Distribution -

1. Housing and Property Value

As in other metropolitan areas of the Nation, housing growth in the study area is influenced by the available money supply, income, employment, and various other factors. The development and continued growth of the Grand Forks Air Force Base and the University have markedly influenced housing demands in the area. Much of the 57-percent population growth in Emerado between 1960 and 1970 is apparently due to the growth in Air Force Base population and results in increased demand for area housing. In-migration from surrounding rural areas between 1960 and 1970 resulted in further strains on housing capability in the urbanized portion of the study area. Annual residential building permits issued in Grand Forks increased from 58 in 1960 to 159 in 1975.

The total number of housing units in all portions of the study area except Polk County (excluding East Grand Forks) increased between 1960 and 1970. A noticeable trend in area housing is the shift from owner-occupied units to renter-occupied units. The principal reason for this trend is that housing costs are increasing faster than the home purchasing power of young adults who would normally be buying single-family homes. As an indication of this trend, renter-occupied units in Grand Forks accounted for about 40 percent of all occupied units in 1960, while in 1975, rental units accounted for 51 percent of all such units. Table 33 shows the 1960-1970 growth in housing by major community and county and the percent distribution of owner- and renter-occupied units.

Housing conditions in the area vary widely, generally according to age of the structure and relative location of the neighborhood. The major concentration of deteriorating and dilapidated housing is in the older neighborhoods, mostly of pre-World War II vintage. In Grand Forks, over 43 percent of the housing was constructed before 1940. For East Grand

TABLE 33

HOUSING GROWTH

	<u>Grand Forks</u>		<u>Grand Forks County</u>		<u>East Grand Forks</u>		<u>Polk County</u>	
	<u>1960</u>	<u>1970</u>	<u>1960</u>	<u>1970</u>	<u>1960</u>	<u>1970</u>	<u>1960</u>	<u>1970</u>
All Housing Units	9,891	11,907	14,185	18,074	2,038	2,282	12,159	11,456
Occupied Units - Year Round	9,369	11,344	12,990	16,975	1,915	2,200	10,335	10,502
Owner Occupied	5,323	6,017	7,759	8,656	1,300	1,468	7,706	7,989
Renter Occupied	4,046	5,327	5,231	8,319	615	732	2,629	2,513
Vacant	522	563	1,195	1,099	123	82	1,024	954

Source: U.S. Census of Housing, North Dakota and Minnesota

Forks, 37.5 percent of the housing units were built before 1940. The distribution of sound and deteriorating structures in the urbanized area suggests that development of the cities has followed a generally concentric pattern, expanding from the central core toward the outer fringe. In some areas, housing construction has occurred along arterial routes as a result of easier access to the central business districts. However, adverse environmental conditions, such as high noise levels, pollutants, and high frequency of traffic movement, have contributed toward deterioration of these structures. Results of the 1960 U.S. census and a 1967 local survey of housing conditions in Grand Forks are presented in table 34. The 1967 survey was only a "windshield" survey and did not include inspection of the building interiors. Housing values (1970 census) by enumeration (census) district are given in table 35 and shown on plates 15 and 16.

TABLE 34

HOUSING CONDITIONS - GRAND FORKS

	<u>1960 No.</u>	<u>%</u>	<u>1967 No.</u>	<u>%</u>
Total Units	9,891		9,250*	
Sound Units	8,334	84.2	6,520	70.5
Deteriorating Units	1,263	12.8	2,223	24.0
Delapidated Units	294	3.0	509	5.5

* 1967 Survey included no trailers or 1-room units

TABLE 35

HOUSING VALUE

East Grand Forks & Adjacent Areas

<u>Enumeration District</u>	<u>Under \$10,000</u>		<u>\$10,000-\$24,999</u>		<u>\$25,000 & Over</u>	
	<u>#</u>	<u>%</u>	<u>#</u>	<u>%</u>	<u>#</u>	<u>%</u>
16	96	100.0	0	0.0	0	0.0
17	79	42.0	109	58.0	0	0.0
18	5	2.9	158	93.5	6	3.6
19	5	100.0	0	0.0	0	0.0
20	67	41.1	82	50.3	14	8.6
21	16	27.6	38	65.5	4	6.9
22	14	13.5	86	82.7	4	3.8
24	14	100.0	0	0.0	0	0.0
25	0	0.0	114	81.4	26	18.6
26	0	0.0	127	73.0	47	27.0
27	54	27.8	119	61.3	21	10.9
15	0	0.0	14	45.2	17	54.8
29	11	28.2	28	71.8	0	0.0
28	9	12.2	65	87.8	0	0.0
14	70	100.0	0	0.0	0	0.0

TABLE 35 CON'T

HOUSING VALUE

Grand Forks Area

Enumeration District	<u>Under \$10,000</u>		<u>\$10,000-\$24,999</u>		<u>\$25,000 & Over</u>	
	<u>#</u>	<u>%</u>	<u>#</u>	<u>%</u>	<u>#</u>	<u>%</u>
32	0	0.0	201	88.2	27	11.8
34	10	14.3	60	85.7	0	0.0
35	62	40.8	86	56.6	4	2.6
36	89	60.5	58	39.5	0	0.0
37	79	76.7	24	23.3	0	0.0
38A	0	0.0	25	100.0	0	0.0
38B	5	4.1	94	77.7	22	18.2
40	0	0.0	9	23.7	29	76.3
41A	*					
41B	0	0.0	30	38.5	48	61.5
42	0	0.0	25	73.5	9	26.5
43	9	3.4	248	93.2	9	3.4
44	18	47.4	20	52.6	0	0.0
45	88	65.7	46	34.3	0	0.0
46	58	38.7	92	61.3	0	0.0
47	23	21.7	78	73.6	5	4.7
48	48	67.6	23	32.4	0	0.0
49	*					
50	11	16.2	47	69.1	10	14.7
51	16	39.0	20	48.8	5	12.2
52	38	16.3	150	64.4	45	19.3
53	10	5.6	149	83.2	20	11.2
54	4	4.2	37	38.1	56	57.7
55	0	0.0	0	0.0	62	100.0
56	65	61.9	40	38.1	0	0.0
57	44	28.8	109	71.2	0	0.0
58	41	31.3	90	68.7	0	0.0
59	20	14.6	117	85.4	0	0.0

TABLE 35 CON'T

HOUSING VALUE

Grand Forks Area

Enumeration District	Under \$10,000		\$10,000-\$24,999		\$25,000 & Over	
	#	%	#	%	#	%
60	0	0.0	41	73.2	15	26.8
61	24	14.1	137	80.6	9	5.3
62A	0	0.0	50	100.0	0	0.0
62B	0	0.0	26	100.0	0	0.0
63A	0	0.0	116	88.5	15	11.5
63B	5	2.9	156	90.7	11	6.4
64	20	6.7	216	72.2	63	21.1
65	0	0.0	166	67.5	80	32.5
66A	0	0.0	78	70.9	32	29.1
66B	0	0.0	0	0.0	31	100.0
66C	0	0.0	55	44.0	70	56.0
67	0	0.0	156	71.0	64	29.0
68	0	0.0	134	46.9	152	53.1
69	*					
70A	*					
70B	0	0.0	24	44.4	30	55.6
11	*					
12	30	66.7	10	33.3	0	0.0
13	*					
14	30	39.0	47	61.0	0	0.0
01	48	70.6	20	29.4	0	0.0
03	*					
04	*					
05	*					
27	37	53.6	32	46.4	0	0.0
29	*					
30	*					

Count of Owner Occupied Units by Value

Property values in Grand Forks have been steadily increasing in recent years as a result of upgrading, additions, and replacements of older structures. Assessed values in Grand Forks increased from about \$41.1 million in 1960 to \$66.5 million in 1975. The 1975 values would be higher except most personal property was exempted from taxation in 1970. Total 1975 market value of Grand Forks property was approximately \$369.7 million as shown in table 36.

TABLE 36

**ESTIMATED MARKET VALUE
GRAND FORKS**

<u>Year</u>	<u>Market Value</u>
1950	\$ 90,923,200
1960	152,412,300
1965	198,159,299
1970	206,476,100*
1971	223,273,300
1972	232,484,400
1973	261,520,009
1974	279,894,130
1975	369,699,000

* All personal property exempted from taxation beginning 1970

Source: Grand Forks Industrial Development Commission

East Grand Forks has experienced a corresponding increase in property values. Total taxable property value increased from \$3.4 million in 1970 to approximately \$15.8 million in 1975.

Land values have also increased significantly in the study area. Average 1976 Grand Forks city lot prices ranged from about \$5,500 for a 90- by 100-foot lot to around \$7,000 for a 150- by 200-foot lot. Agricultural land values in North Dakota have increased from an average of \$29 per acre in 1950 to \$243 per acre in 1976 as shown in table 37. Value per farm has also increased markedly during this same period as shown in table 38. In comparison, agricultural land values in the more fertile Grand Forks County area increased from \$124 per acre in 1964 to \$305 in 1974 as shown in table 37.

TABLE 37

AGRICULTURAL LAND VALUES

<u>Year</u>	<u>NORTH DAKOTA</u>		<u>MINNESOTA</u>	
	<u>State</u>	<u>Grand Forks County</u>	<u>Polk County</u>	<u>Red River Valley Minnesota</u>
1950	\$ 29	---	---	---
1960	53	---	\$ 112*	---
1964	64	\$ 124	139	---
1969	91	155	154	---
1974	151	305	291	\$ 359
1975	---	---	---	535
1976	243	---	---	---

* 1959

Source: References 24, 104, 105, 120, 149, 153

TABLE 38

AVERAGE FARM VALUE

<u>Year</u>	<u>NORTH DAKOTA</u>		<u>MINNESOTA</u>	
	<u>State</u>	<u>Grand Forks County</u>	<u>Polk County</u>	<u>State</u>
1959	\$ 38,800	\$ 58,059	\$ 47,357	\$ 33,000
1964	56,000	75,344	67,245	39,075
1969	83,800	105,816	72,785	58,714
1973	110,700	---	---	---
1974	152,700	225,409	153,987	117,353
1975	211,600	---	---	---

Source: References 104, 105

Key References

Bureau of the Census, General Housing Characteristics - Minnesota, 1970.

Bureau of the Census, General Housing Characteristics - North Dakota, 1970.

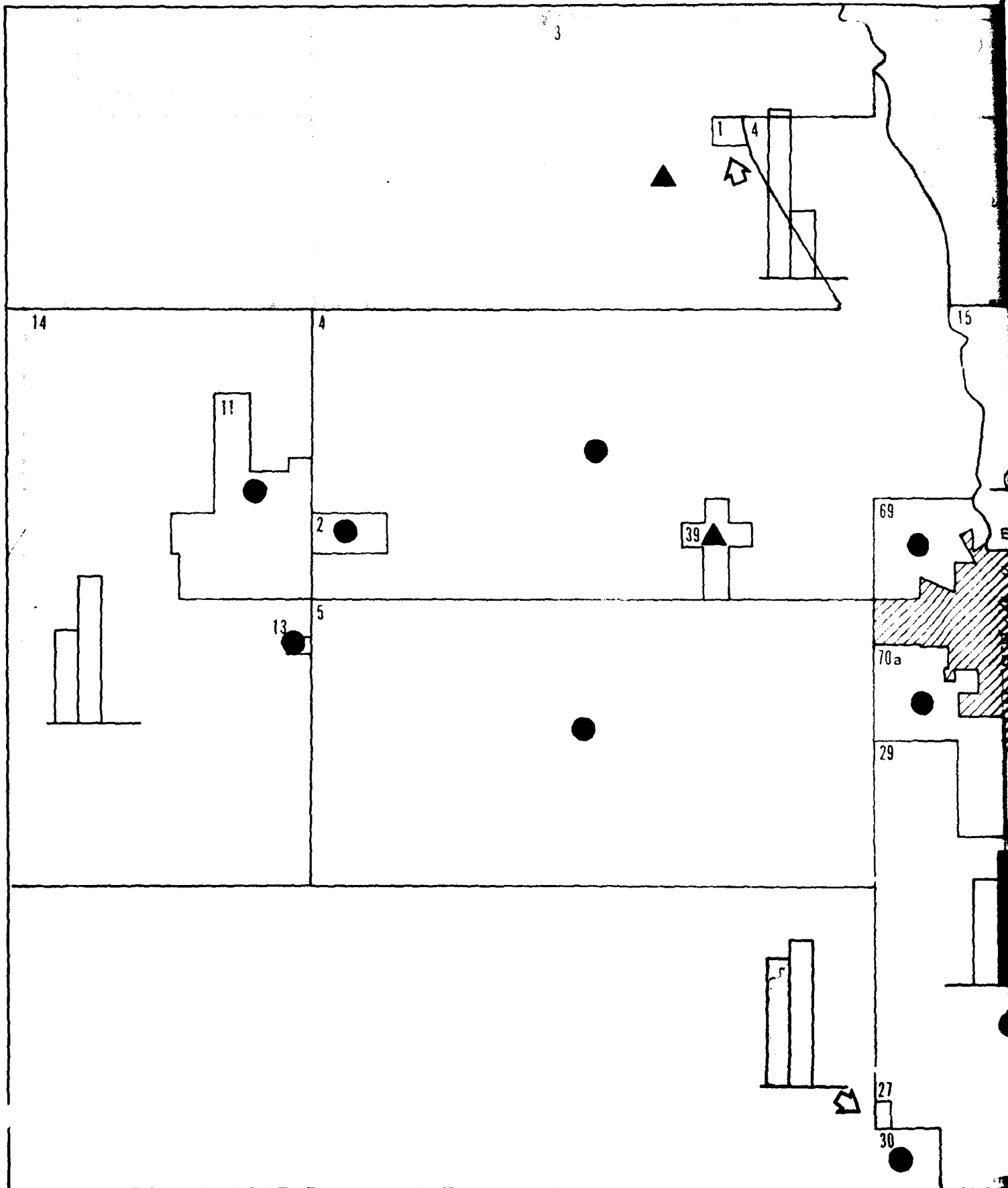
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Christianson, R., and P. M. Raup, "The Minnesota Rural Real Estate Market in 1975," Department of Agriculture and Applied Economics, University of Minnesota, January 1976.

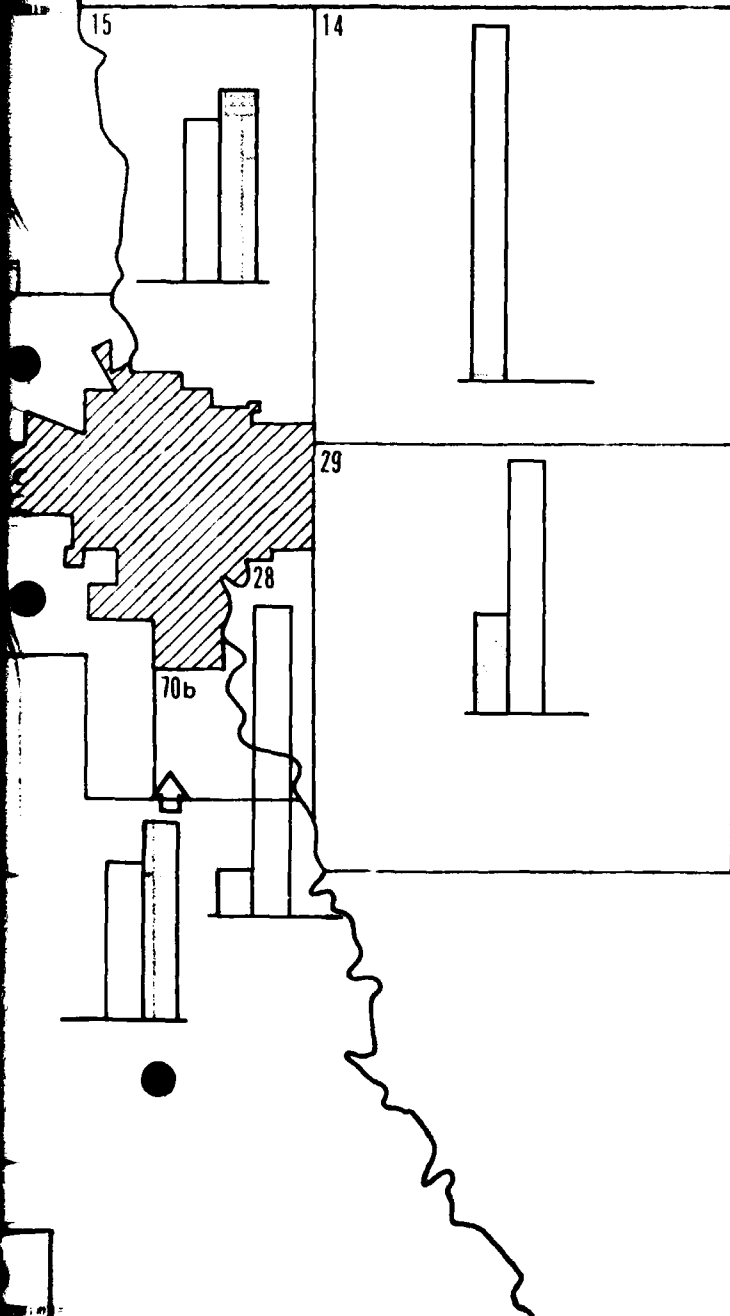
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Bureau of the Census, Detailed Housing Characteristics - Minnesota, 1970.

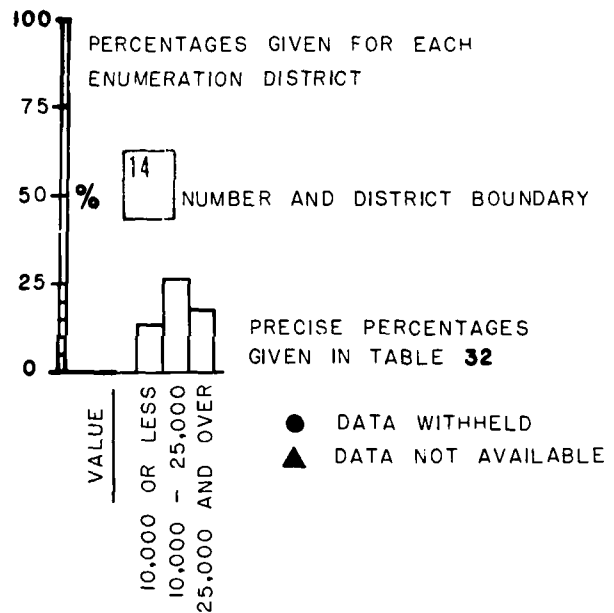
Bureau of the Census, Detailed Housing Characteristics - North Dakota, 1970.



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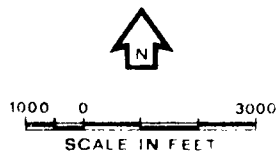
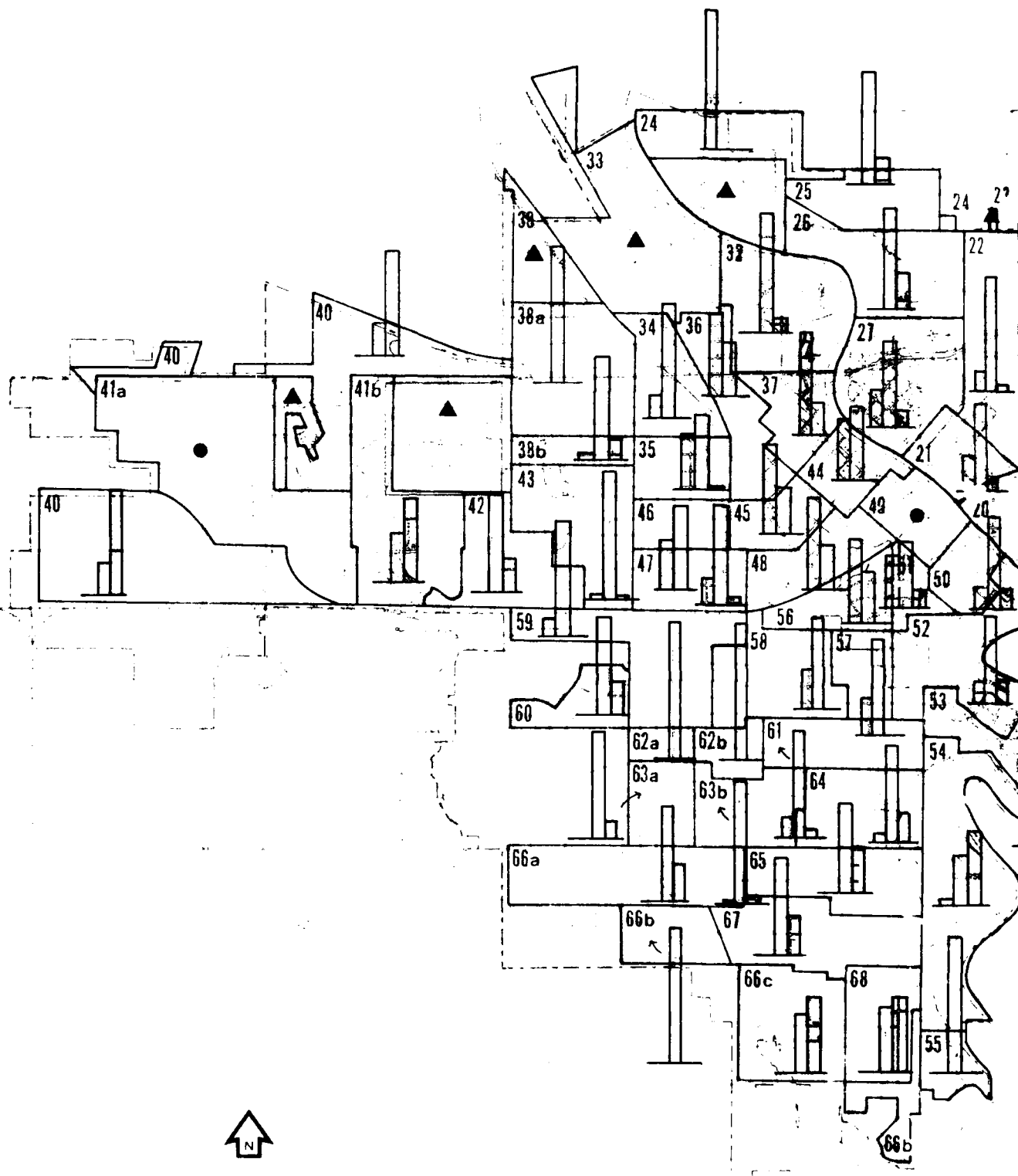


HOUSING VALUES FOR HOMES IN RURAL AREAS



SOURCE: REFERENCE 156.

PLATE 15



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GRAND FORKS - EAST GRAND FORKS URBAN WATER RESOURCES STUDY. BAC--ETC(U)
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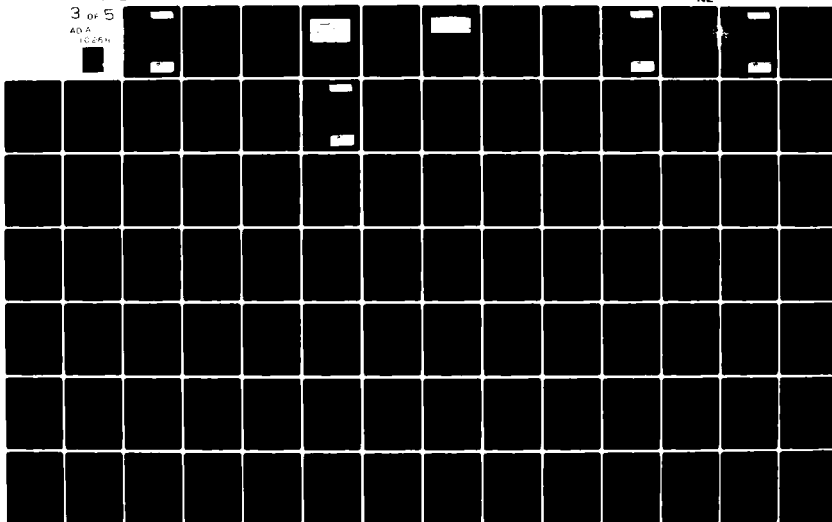
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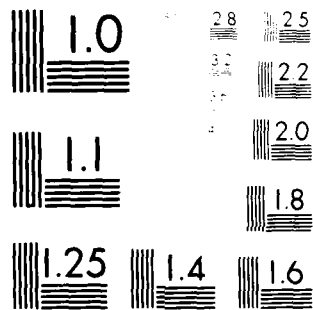
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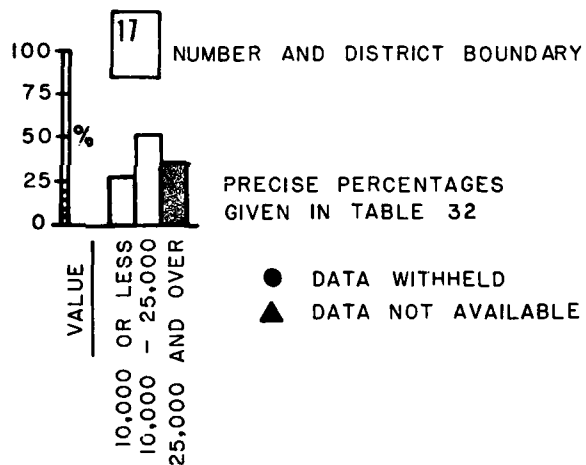


MICROSCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

Grand Forks / East Grand Forks URBAN WATER RESOURCES STUDY

HOUSING VALUES FOR HOMES IN THE GRAND FORKS - EAST GRAND FORKS URBAN AREA

PERCENTAGES GIVEN FOR EACH
ENUMERATION DISTRICT



HOUSING VALUE FOR RURAL AREAS OUTSIDE
GRAND FORKS - EAST GRAND FORKS
PRESENTED ON PLATE 15

SOURCE: REFERENCE 156.

PLATE 16

2. Land Use and Zoning

Land use in the urbanized area is quite varied but predominantly agricultural outside the two communities. Typical land uses in the urbanized area include residential, industrial, commercial, recreational, public buildings and grounds, and limited fringe forest areas along the Red River of the North and Red Lake River. An approximate indication of urban land use, expressed as percentages of total land use, is given in table 39. As shown on plate 17, the major urbanized areas are the cities of Grand Forks and East Grand Forks. Lesser areas of urban development include Manvel, Thompson, and Emerado, all of which are in Grand Forks County, as shown on plate 17. Land use information for Polk and Grand Forks Counties is given in table 40.

TABLE 39

LAND USE - GRAND FORKS AND EAST GRAND FORKS

<u>Category</u>	<u>Percent of Total</u>	
	<u>Grand Forks¹</u>	<u>East Grand Forks</u>
Residential	29.5	26.6
Commercial	5.2	1.8
Industrial	25.9	16.0
Public/Quasi-Public	12.2	11.8
Agricultural	0.0	0.0
Transportation & Utilities & Other	<u>27.2</u>	<u>43.8</u>
	100.0	100.0

1. Percent of developed city lands

Source: 1965 Grand Forks Urban Area Transportation Study and
1963 East Grand Forks Land Use Maps

TABLE 41

GRAND FORKS ANNEXATIONS - SQUARE MILES

<u>Year</u>	<u>Area Annexed</u>	<u>Total Area</u>
1938		3.67
1946-49	0.20	3.87
1951-59	1.81	5.68
1960-69	3.53	9.21
1970-73	1.05	10.26
1974-75	1.64	11.90
1976	0.30	12.20*

* Through 4/15/76

Source: Reference 24

Two principal areas of urban expansion outside Grand Forks are Emerado and Thompson. New housing developments are being constructed on former agricultural lands to meet Air Base and Grand Forks commuter needs. As an illustration of this growth, Thompson has increased in land area by almost 100 percent since 1970. About 44.5 percent of corporate lands (109 acres) in Thompson is in agricultural or vacant land use.

Urban land use in East Grand Forks is also expanding, primarily at the expense of agricultural and vacant lands. Continued residential development is concentrated primarily in the northwest and southeast sections of the community, as shown on plate 17. Commercial development has expanded from the central business district northward along Trunk Highway 220 and along the U.S. Highway 2 bypass. Industrial growth is occurring mostly in the eastern portion of the city.



Recreation land uses are very significant in the study area and are concentrated primarily in the urbanized area. Golf courses and the city park and recreation area systems are the predominant recreational land uses. They account for about 350 and 164 acres in Grand Forks and East Grand Forks, respectively. Recreational land use needs will grow with expanding residential land use. They are accommodated in Grand Forks by required recreational land area contributions to the city in all new areas of development brought into the city. East Grand Forks is expected to enact similar land development provisions in the near future. Recreational land use and related activities are further discussed in the section of this report on Recreation.

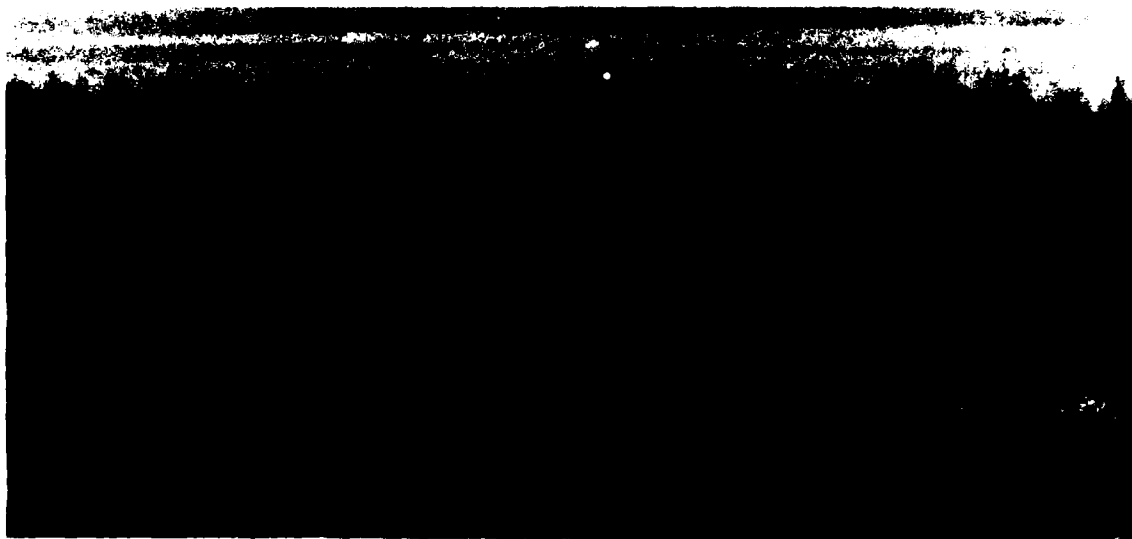
Public and quasi-public land uses are fairly well dispersed throughout the area. The principal urbanized area public and semipublic land uses include Federal, State, county, and local office buildings located primarily in the central business districts; the University of North Dakota complex; city park and recreation lands; the county fairgrounds in Grand Forks; golf courses; and school grounds. Other similar land uses include the North Dakota State Highway property in Grand Forks, the Pioneer Museum area, and several cemeteries. Rural public and semipublic land uses include the Grand Forks Air Force Base; University-owned land in Mekinock Township; the Kellys Slough National Wildlife Refuge; community sewage lagoons; State game management areas; and park, recreation, and school areas in the smaller communities. A summary of public land ownership in Grand Forks County is given in table 42.

TABLE 42

PUBLIC LAND OWNERSHIP AND EASEMENTS - GRAND FORKS COUNTY

<u>Agency</u>	<u>Acres</u>
North Dakota State Land Department	2,233.8
North Dakota Game and Fish Department	2,461.84
U.S. Fish and Wildlife Service	
Fee Title	4,408.92
Easements - Leases	867.0
U.S. Department of Defense	5,341.7
Grand Forks County	NA*
State Board of Higher Education	NA*

* Data not available



Principal environmental and natural land use areas in the study area include the 1,620-acre Kellys Slough National Wildlife Refuge, the University of North Dakota's 602-acre parcel of former Grand Forks Air Force Base property and approximately 800-acre Oakville Prairie unit, the 560-acre Mekinock waterfowl production area, the 336-acre Turtle River waterfowl production area, and the 160-acre Penden waterfowl production area. Other environmental use areas include English Coulee, the Red River of the North floodplain at Grand Forks, and natural areas within the Grand Forks and East Grand Forks park system.

Both of the University properties include field stations for wildlife habitat studies by the Biology Department. English Coulee has at times been used by the University's Biology Department for pollution, water level effect, and other environmental studies. Birding trips are carried out at the Kellys Slough Wildlife Refuge. The reach of the Red River of the North between the Sorlie and Kennedy Memorial Bridges is used by Central High School as a nature study area.

Zoning regulations are in effect for both Grand Forks and East Grand Forks. A zoning resolution for Grand Forks County is pending. A map of urban zoning for Grand Forks and East Grand Forks is shown on plate 18.

Key References

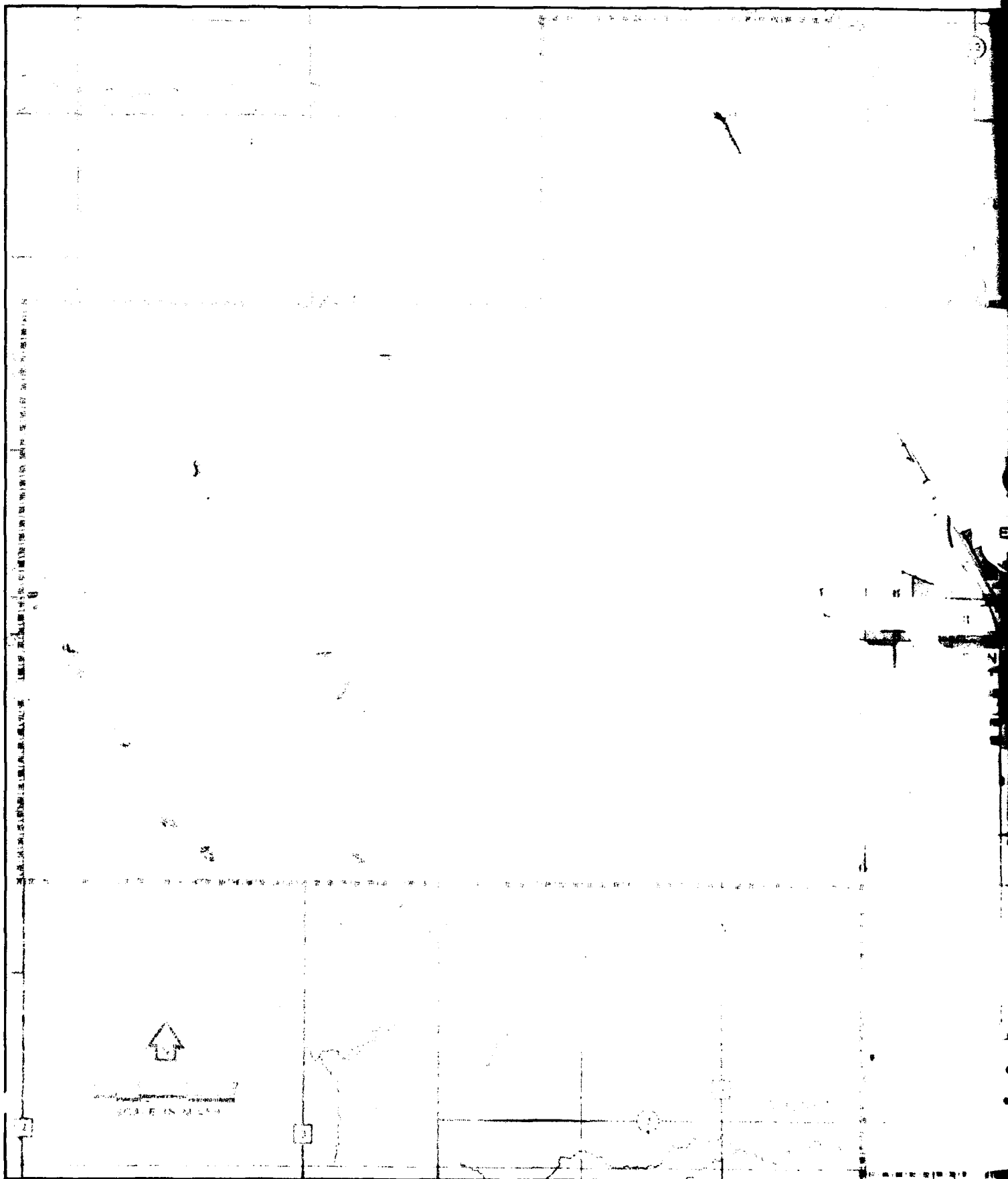
Community Planning and Design Associates, Inc., Comprehensive Guide Plan - East Grand Forks, Minneapolis, Minnesota, 1965

Wehrman, Chapman Associates, Inc., Plan for Future Growth, City of Grand Forks, North Dakota, Minneapolis, Minnesota, 1969

Wehrman, Chapman Associates, Inc., Polk County Land Use Plan, January 1970

Floan and Sanders, Inc., Official Zoning Districts - East Grand Forks, Map, Revised March 1975

Orthmeyer, F., Zoning Map, Parts I and II, City Engineers Office, Grand Forks, August 1975

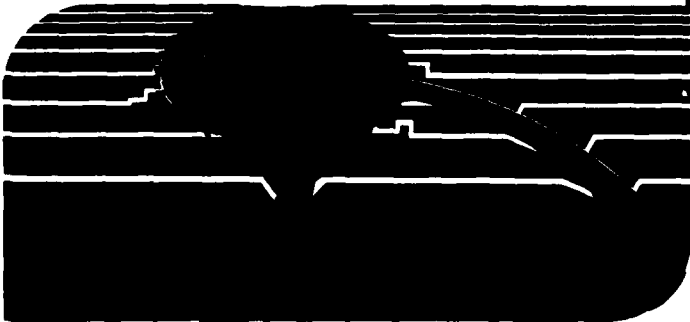


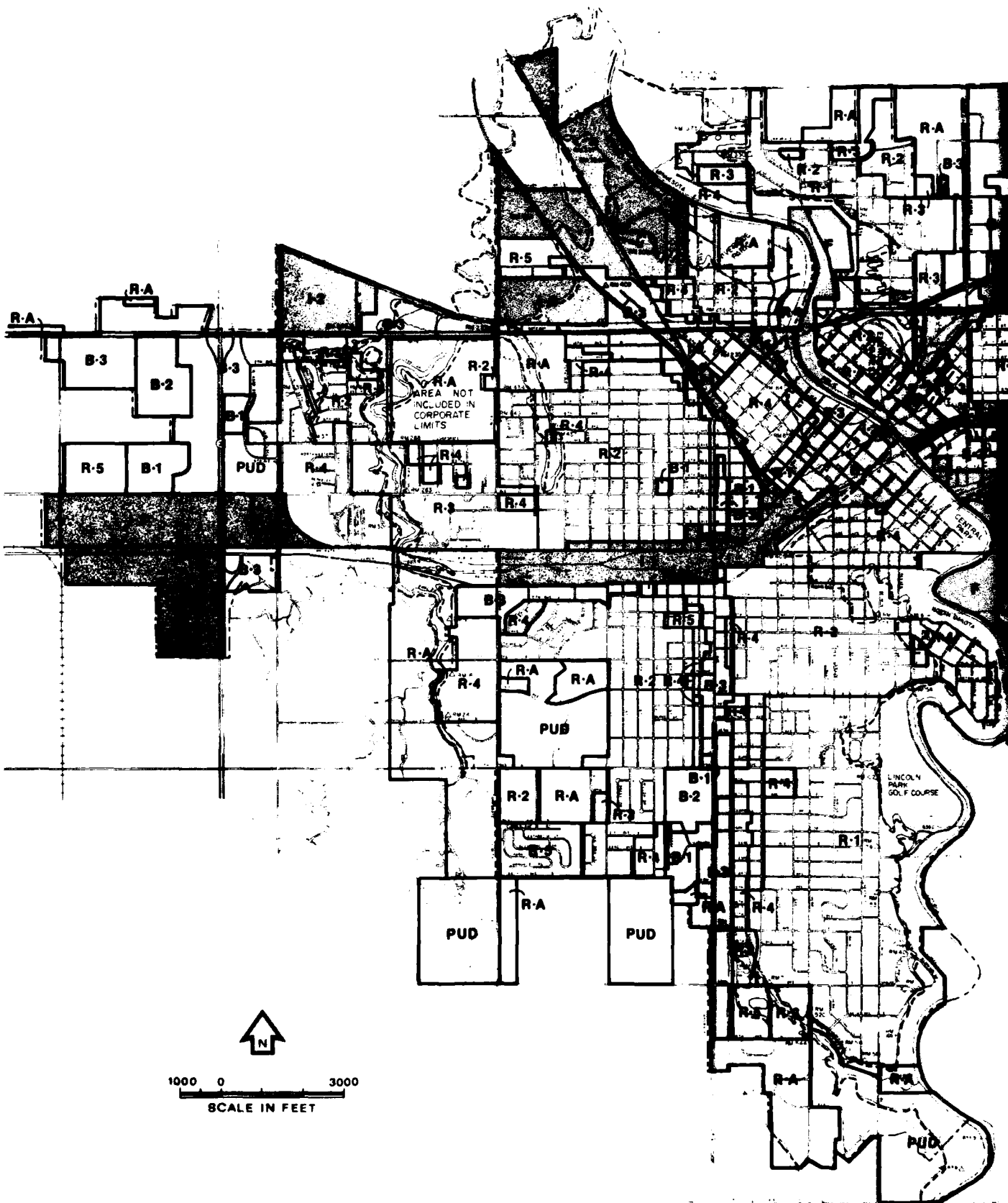
**Grand Forks / East Grand Forks
URBAN WATER RESOURCES STUDY**

-  RESIDENTIAL
-  RECREATIONAL
-  COMMERCIAL
-  PUBLIC, SEMI-PUBLIC
-  INDUSTRIAL
-  AGRICULTURAL OR OPEN LANDS

SOURCE: REFERENCES 40,48,III,III3.

PLATE 17





Grand Forks / East Grand Forks URBAN WATER RESOURCES STUDY

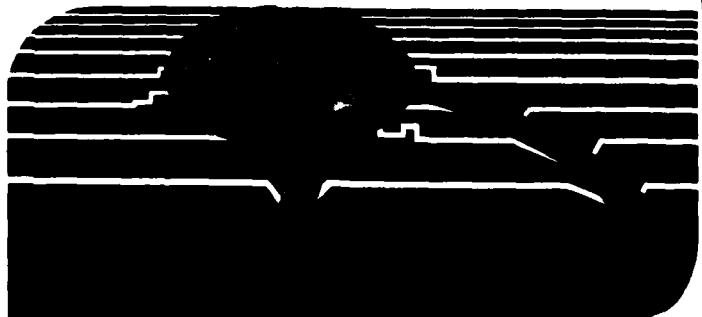
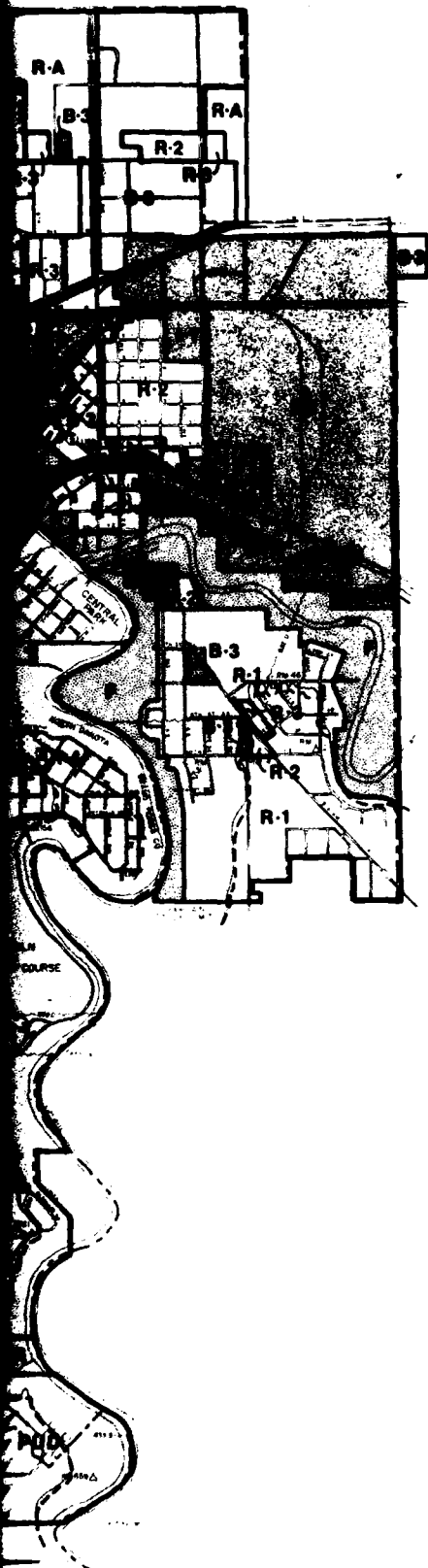
ZONING DISTRICTS

R-A	AGRICULTURAL RESIDENTIAL
R-1	SINGLE FAMILY RESIDENTIAL
R-2	ONE & TWO FAMILY RESIDENTIAL
R-3	ONE & TWO FAMILY AND MULTIPLE FAMILY RESIDENTIAL
R-4	MULTIPLE FAMILY RESIDENTIAL
R-5	MOBILE HOMES
B-1	LIMITED BUSINESS
B-2	SHOPPING CENTER BUSINESS
B-3	SERVICE BUSINESS
B-4	GENERAL BUSINESS
	LIMITED INDUSTRIAL
	GENERAL INDUSTRIAL
F	FLOODWAY
PUD	PLANNED UNIT DEVELOPMENT

----- 100-YEAR FLOOD PLAIN LINE

SOURCE: REFERENCES 116,117,118.

PLATE 18



Governmental Organization -

1. Political Structure

The study area is served by several levels of government, ranging from the national political structure down through State, regional, county, and local governing bodies. All of these forms of government have varied taxing authorities which occasionally overlap in terms of jurisdictional responsibilities and boundaries.

The Grand Forks County study area is represented on the national level by the State's U.S. Senators and the Representative from the First Congressional District. The Polk County study area is similarly represented in the U.S. Senate and by the Representative of the Seventh Minnesota Congressional District.

On the State level, the Grand Forks area is represented in the North Dakota Senate by Senate District 42 and House Districts 17, 18, and 43. The East Grand Forks area is represented in the Minnesota legislature by Senate District 2 and House District 2A.

Regional government in the North Dakota portion of the study area is provided by the Red River Council with offices in Grafton, North Dakota. The Northwest Regional Development Commission (Region 1) with offices in Crookston provides regional representation to the Polk County study area. The purpose of these commissions, consisting of representatives of county, township, and municipal governments, is to facilitate intergovernmental cooperation and coordinate planning and development on a regional basis. The commissions also serve as a clearinghouse for the review of local applications for Federal funds. These commissions have authorized taxing authorities to finance their activities. However, some commission activities are financed by grants from various Federal and State sources.

Grand Forks County was created by the 10th session of the territorial legislature in 1873 and organized the following year. County governmental duties are performed by an elected board of six county commissioners and other officials, including the county treasurer, sheriff, clerk of court, register of deeds, States attorney, county judge, superintendent of schools, auditor, superintendent of highways, county planner (part-time only), and county agricultural extension agent. Appointed boards and committees, such as the county water management board, are formed as required to resolve various issues. The Polk County political structure, similarly, consists of elected commissioners and both elected and appointed officials. Polk County was created in 1858 and was subsequently divided four times before reaching its present size.

The original plat of the Grand Forks townsite was filed in 1875. The village was organized in 1878, followed by incorporation in 1881. Municipal government is provided by a mayor and a 14-ward alderman council elected to 4-year terms of office. City administration is accomplished by various function-oriented departments; the most prominent include the departments of administration and public works, police and fire departments, health department, department of housing and community development, the municipal court, and the public school systems. City park and recreational planning and development are under the jurisdiction of the city park board. Community planning activities are accomplished by the city planner in concert with a 15-member planning commission. Sources of revenue for financing city government operations include the ad valorem tax, other miscellaneous taxes, and utility assessments and revenues, with an average 1976 per capita general obligation bond debt of \$12.85.

East Grand Forks is also served by an elected mayor-council form of government. Major governmental departments include administration, the municipal court, school systems, police and fire departments, and city recreation department. Required engineering services are provided by a consultant under contract to the city. Planning services are provided by the city planning commission with outside assistance as required. Primary sources of revenue for governmental operations include property taxes, various fees and miscellaneous taxes, Federal and State aid allotments, and utility assessments and revenues.

Local community governments, all located in Grand Forks County, consist of a mayor and council, together with the various township boards of supervisors. The smaller communities such as Thompson, Emerado, Arvilla, and Manvel provide their own administrative, police and fire protection, and sewerage services. Community planning and engineering services for the Grand Forks County communities are usually provided on a continuing or as-needed basis by the regional planning council or private consultants.

2. Taxes

Property taxes in the area generally correspond to the level of services provided and intensity of use. As in other metropolitan areas, taxing authorities by the various governing agencies and school districts overlap.

In North Dakota, the primary source of revenue for support of local government is the ad valorem property tax. Nearly all personal property is exempt from taxation. The property tax is used to support schools, parks, and city and county governmental operations, with one-half of 1 percent given to support the State Medical Center at Grand Forks.

Using the 1972-73 budget year as an example, local units of government in Grand Forks levied a total of about \$6.1 million in property taxes. Of this amount, schools accounted for about 44 percent, city government 26 percent, county government 21 percent, parks and recreation 6 percent, public library 2 percent, and water district 1 percent.

There is no general homestead exemption law in North Dakota. A limited exemption is available to those over 65 who have total incomes of less than \$3,000 per year. Special exemptions are granted to disabled veterans, the blind, and farmers. All farm buildings and improvements are exempt from taxation.

Although North Dakota State laws normally limit local taxing authorities, communities may, at their election, adjust or even remove such limits, as in Grand Forks, where local voters have approved a special mill levy (tax rate in one-tenth cents) for park board recreational purposes. The total consolidated tax rate for Grand Forks in 1973 was 226.6 mills, which, when applied against the ratio of 11.5 percent of market value, yields an effective tax of about 2.7 percent of the property value. The same tax rate applies to all property, including income-producing property. Taxable property valuations and tax rates in 1974 for Grand Forks and selected smaller communities are given in table 43. Tax levies by school district are shown on plate 19.

The real estate tax is also an important source of community revenue in Minnesota. The tax rate for East Grand Forks is based on an assessed value equal to 43 percent of the market value. The city's 1976 tax rate was 120.62 mills and supported local schools and local, county, and regional government in the following proportions:

Municipal	32.0 percent
School District	48.4 percent
County	19.1 percent
Red Lake River Watershed District	0.4 percent
Region 1 Development Commission	0.1 percent

Certain personal property (such as automobiles and boats) is subject to taxation. Of the total 1976 taxable property valuation of \$15,823,453 in East Grand Forks, taxable personal property was valued at \$1,206,983, or about 8 percent.

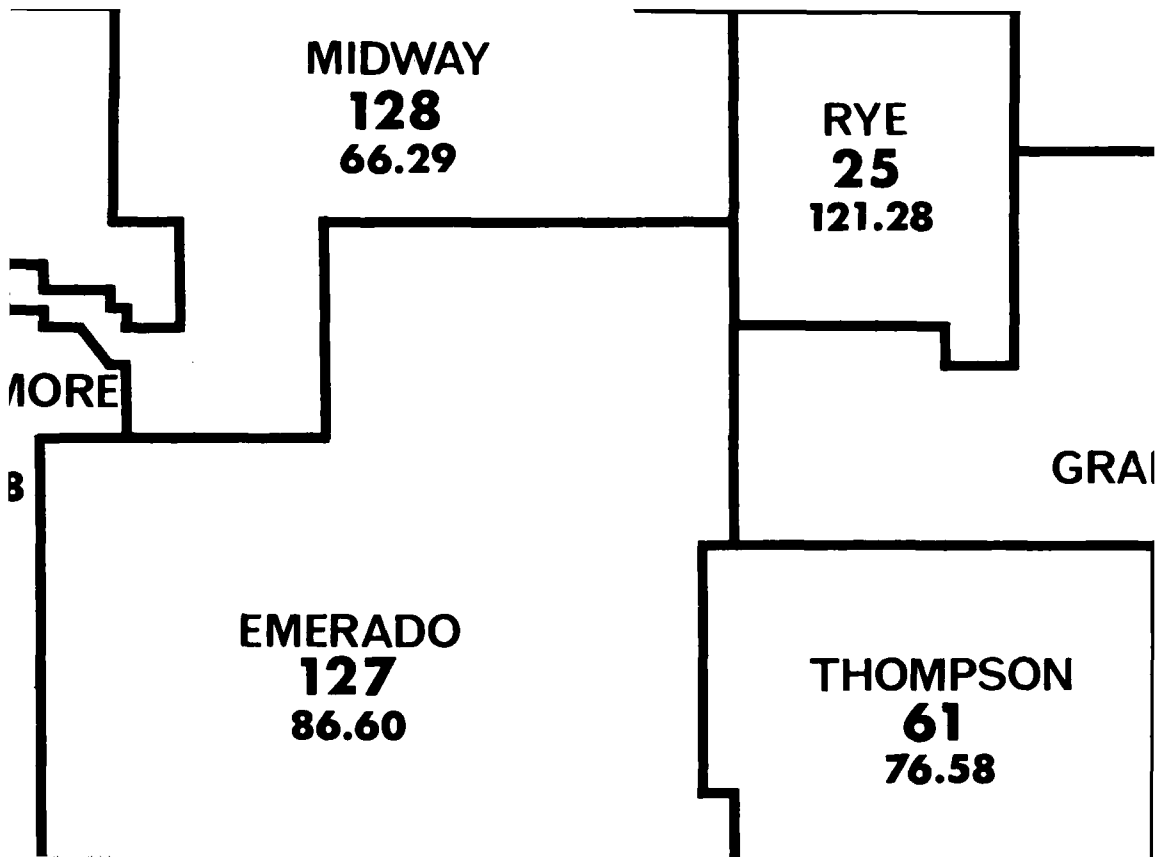
A homestead exemption up to a maximum of \$325 per residence is granted in Minnesota to owner-occupied households and property owners. Agricultural property is taxed, but any farm property with 10 or more acres of cropland is taxed at a lower rate.

TABLE 43

PROPERTY VALUATIONS AND TAX RATES - 1974

<u>City</u>	<u>1974 Taxable Valuation</u>	<u>1974 State & County Levy - Mills</u>	<u>County School Equalization</u>	<u>Total City Levy - Mills</u>	<u>Park District Levy - Mills</u>	<u>School District Levy - Mills</u>	<u>Total of all 1974 Levies - Mills</u>
Grand Forks	\$ 32,187,325	31.53	19.87	59.58	14.56	109.66	235.20
Emerado	128,367	31.53	19.87	71.36	1.17	86.60	210.53
Manvel	107,905	31.53	19.87	33.09	4.00	87.94	176.43
Thompson	207,417	31.53	19.87	52.01	---	76.58	179.99

Source: Special Bulletin No. 47, North Dakota League of Cities



**Grand Forks / East Grand Forks
URBAN WATER RESOURCES STUDY**

— SCHOOL DISTRICT BOUNDARY

MANVEL SCHOOL DISTRICT
125 DESIGNATION

87.94 1974 SCHOOL DISTRICT
LEVY (MILLS)

* SCHOOL LEVY ONLY

SOURCE: REFERENCE 156.

PLATE 19

Institutional Analysis - In February 1977, the St. Paul District contracted with the Institute for Ecological Studies at the University of North Dakota to conduct an institutional analysis.⁽¹⁾ The Institute investigated local, regional, State, and Federal institutions that are directly involved in and have significant authority over flood control, water supply, and wastewater management alternatives that may be considered as means of meeting the study objectives.

Basic information on existing institutions was gathered to outline significant authorities, spatial and functional responsibilities, and institutional relationships to establish a framework for subsequent study and analysis by the study work group and consultants. Eight institutional work elements were specified for inclusion in this study. The data presented here follow the pattern of items specified. Data on the following work elements were gathered for each agency:

1. Description of existing capability.
2. Basis of agency authority.
3. Types of functional authority.
4. Coordinating mechanisms present.
5. Present budget and financial resources.
6. Legal limitations.
7. Institutional relationships affecting water resource management program.
8. Manpower available for water resource program.

In addition, information on bi-State agreements for regional water supply and wastewater treatment facilities was gathered.

(1) The study was completed under the direction of Dr. Paul B. Kannowski, University of North Dakota.

The sources of information for this study include institutional publications; other publications of a comparable nature; Federal, State, and local statutes; and direct interview. Federal laws and agency missions were determined by reference to the Commission on Rural Water (1974), and United States Water Resources Council (1975a, 1975b, 1977). Sources of information for State, regional, and local agencies included Minnesota Statutes (1969), Minnesota Water Resources Board (1972), North Dakota Century Code (1970), Red Lake Watershed District (1976), Souris-Red-Rainy River Basin Commission (1972), and West Polk Soil and Water Conservation District (1976). References for the design and operation of the Grand Forks-East Grand Forks Urban Water Resources Study included Army Corps of Engineers (1976) and Wehrman, Chapman Associates (1977). Much information was gathered and checked by telephone; individuals who provided such assistance have been identified in the section on Acknowledgements. In addition, copies of the draft write-up of most of the agencies were submitted to officials in these agencies for their comments and criticisms; these officials are listed in the following section.

Some minor revisions in the original text have been made by the St. Paul District, Corps of Engineers, to reflect institutional changes since 1977.

ACKNOWLEDGEMENTS

I gratefully acknowledge the financial support of the St. Paul District, U.S. Army Corps of Engineers, which made this study possible. Mr. Martin McCleery of the Urban Studies section of the St. Paul District office was the liaison agent for the Corps and was most helpful to me. I was aided in obtaining information by Barbara Benner, Terry Brokke and David Willis, research assistants in the Institute for Ecological Studies. Mrs. Sheila King, Miss Virginia Steinhaus and Miss Shirley Schwartz typed the draft and final manuscripts.

The following individuals generously provided information about their agencies or organizations.

Federal Agencies: Bureau of Outdoor Recreation, H. Burbach, Jr., Lakewood, CO; Economic Development Administration, Stanley J. Pechaver, Washington, DC; Environmental Protection Agency, Frank Beaver, Bismarck, ND, John W. Helvig, Minneapolis, MN; Farmers Home Administration, Francis Koehmstedt, Grand Forks, ND, Leslie G. Matts, St. Paul, MN; Federal Highway Administration, George H. Seaworth, Bismarck, ND; Federal Housing Administration, James A. Nemzek, Fargo, ND; Federal Insurance Administration, Jerry Olson, Denver, CO, Robert Shaw, Denver, CO, James A. Nemzek, Fargo, ND, F.M. Crompton, Washington, DC; Fish and Wildlife Service, Dave Jangowski, Bemidji, MN, Norrel Wallace, Fergus Falls, MN, Harvey Willoughby, Denver, CO; Geological Survey, Oren Holmen, Grand Forks, ND, Quentin Paulson, Bismarck, ND; Soil Conservation Service, Martin Lund, Grand Forks, ND, Mel Brandt, Bismarck, ND, Allen L. Fisk, Bismarck, ND, Harry M. Major, St. Paul, MN, Lowell Neska, Crookston, MN, Gerry Young, Thief River Falls, MN; Upper Mississippi River Basin Commission, Floyd Fischer, Fargo, ND.

Minnesota State Agencies: Commissioner of Health, Gary Englund, Minneapolis, MN, Charles Moates, Minneapolis, MN, Richard L. Wade, Minneapolis, MN; Department of Natural Resources, Andy Brewer, St. Paul, MN; Pollution Control Agency, Sandra Gardebring, Roseville, MN; Planning Agency, Ed Fick, St. Paul, MN, Mary Louise Dudding, St. Paul, MN, Jim

Ramstrom, St. Paul, MN; Soil and Water Conservation Board, Ron Nargang, St. Paul, MN; Water Resources Board, Erling Weiberg, St. Paul, MN.

North Dakota State Agencies: Department of Health, Norman L. Peterson, Bismarck, ND; Game and Fish Department, Wilbur Boldt, Bismarck, ND; Parks and Recreation Department, Karen Thompson, Mandan, ND, Craig Wellin, Mandan, ND, Gary Leppart, Mandan, ND; Water Commission, Matt Emerson, Bismarck, ND, Vern Fahy, Bismarck, ND.

Local and Regional Agencies: Northwest Regional Development Commission, Gene Abbott, Crookston, MN, Randall L. Johnson, Crookston, MN; Red River Regional Council, Ron LeClair, Grafton, ND, Julius Wangler, Grafton, ND; Grand Forks County, Mrs. Helen Myers, Grand Forks, ND, A.B. Dickey, Grand Forks, ND; Grand Forks Township (MN), O. Howard Hoff, East Grand Forks, MN; Huntsville Township, Esther Danielson, East Grand Forks, MN; Rhinehart Township, Luvern Syrstad, East Grand Forks, MN; Sullivan Township, George Krejci, East Grand Forks, MN; Blooming Township (ND), Earl Clemetson, Grand Forks, ND; Brenna Township, Gary Lund, Grand Forks, ND; Chester Township, Rodney Martin, Emerado, ND; Falconer Township, Frank Matejeck, Grand Forks, ND; Ferry Township, Glenn Callahan, Manvel, ND; Grand Forks Township, Robert Fortin, Grand Forks, ND; Mekinock Township, Olaf Overland, Mekinock, ND; Oakville Township, Mrs. Ruby Sieg, Emerado, ND; Rye Township, Ole Lommen, Grand Forks, ND; Walle Township, Elner Kvasager, Thompson, ND; City of East Grand Forks, Edwin J. Osowski, Ellis L. Larson; City of Emerado, Henry Mazac; City of Grand Forks, Don Tingum, Frank Orthmeyer, Gordon Caldis; City of Manvel, Duane Bry; Grand Forks Air Force Base, Lt. Col. Eldon W. Zeller; Eastern Grand Forks County Soil and Water Conservation District, Burnett Grove, Reynolds, ND; Lower Red River Water Management Board, Olaf C. Soine, Crookston, MN; Red Lake Watershed District, Charles L. Anderson, Crookston, MN; West Polk Soil and Water Conservation District, Leslie Hannah, Crookston, MN; Agassiz Water Users Association, Clark Cronquist, Gilby, ND; Marshall-Polk Rural Water System, Larry L. Murphy, Warren, MN.

Local Public Interest Organizations: Near Northside Neighborhood Association and Citizens' League for Environment and Natural Resources, Eliot Glassheim; Belmont Neighborhood Association, Diana Deats; Grand Forks League of Women Voters, Joan Burke; National Audubon Society, Grand Forks Chapter, Barbara Benner; North Dakota Wildlife Federation and Ducks Unlimited, Grand Forks County Chapters, John Duerre; Lake Agassiz Neighborhood Association, Bill Bolonchuk.

EXISTING INSTITUTIONAL FRAMEWORK

FUNCTIONS

The functions covered in this analysis include: 1) flood prevention and control; 2) water supply and conservation; 3) water quality management; 4) fish and wildlife resources management; and 5) recreational water use. Each of these is described below.

1. Flood Prevention and Control

Flood prevention and control includes watershed protection, land treatment enhancing water retention, dam and reservoir construction, levee construction, drainage practices, channelization, etc.

2. Water Supply and Conservation

The construction of water storage reservoirs and ducts leading from aquifers, reservoirs or water courses, water treatment facilities, water distribution systems, irrigation, water use and water policy, etc. are included in this heading.

3. Water Quality Management

Identification, regulation and abatement of water pollution and the operation and maintenance of wastewater treatment facilities constitute the water quality management function.

4. Fish and Wildlife Resources Management

Fish and wildlife resources management includes acquisition of wetlands for fish and wildlife habitat, collection of data on habitat requirements, and improvement and maintenance of lakes, streams, and surrounding lands for fish and wildlife conservation. It includes the game and non-game animals living in and/or dependent on natural or artificial water bodies and the plants and microorganisms found in these same aquatic habitats.

5. Recreational Water Use

Management of natural and artificial water bodies for recreation involves acquisition of land and conservation of its

resources while providing recreational opportunities for the public. Water-related recreation includes fishing and hunting, swimming, boating, canoeing, sailing, water-skiing, scuba diving, ice skating, photography, sight-seeing, etc.

WATER RESOURCE AGENCIES

Federal Agencies

The following Federal agencies have been identified as having a role in water resources in the project area. A summary of their capabilities for urban water resources is given in Table 1.

Army Corps of Engineers

Department of Agriculture
Farmers Home Administration
Soil Conservation Service

Department of Commerce
Economic Development Administration

Department of Housing and Urban Development
Federal Housing Administration
Federal Emergency Management Agency

Department of the Interior
Heritage Conservation and Recreation Service
Fish and Wildlife Service
Geological Survey

Department of Transportation
Federal Highway Administration

Environmental Protection Agency

Upper Mississippi River Basin Commission
Souris-Red-Rainy Regional Committee

State Agencies

The following State agencies are primarily concerned with water resource problems in the two states. Water resource planning in Minnesota was formerly in the province of the State Planning Agency but is now handled by the Department of Natural Resources. In addition to the North Dakota agencies listed, there is a North Dakota State Planning Division, but the Division does not have any functions related to water except A-95 review. The capabilities of these agencies for urban water resources are summarized in Table 2.

Minnesota

Commissioner of Health
Department of Natural Resources
Pollution Control Agency
Soil and Water Conservation Board
Water Resources Board

North Dakota

Department of Health
Game and Fish Department
Parks and Recreation Department
Water Commission

Sub-State Regional Agencies

Both Minnesota and North Dakota have developed regional governmental units especially for planning purposes. The regional agencies encompassing the study area are as follows:

Minnesota

Northwest Regional Development Commission

North Dakota

Red River Regional Council

Counties

The study area includes parts of the following counties:

Grand Forks County, ND

Polk County, MN

Townships

Four Minnesota townships and ten North Dakota townships are included in the project area. These are the following:

Minnesota

Grand Forks Township
Huntsville Township
Rhinehart Township
Sullivan Township

North Dakota

Blooming Township
Brenna Township
Chester Township
Falconer Township
Ferry Township
Grand Forks Township
Mekinock Township
Oakville Township
Rye Township
Walle Township

Cities

Five cities are located within the study area, one in Minnesota and four in North Dakota. They are:

Minnesota

East Grand Forks

North Dakota

Emerado
Grand Forks
Manvel
Thompson

Miscellaneous Agencies

Six publicly-supported agencies, not accounted for above, are located within the study area and have a concern with some aspects of water resource use. They are:

Minnesota

Lower Red River Water Management Board
Red Lake Watershed District
West Polk Soil and Water Conservation District

North Dakota

Eastern Grand Forks County Soil and Water Conservation District
Grand Forks Air Force Base Environmental Support
Grand Forks County Water Management District

Private Rural Water Systems

A relatively recent development in this area has been the organization of rural water delivery systems to service farms, rural communities and suburban areas. The local water systems are the following:

Minnesota

Marshall-Polk Rural Water System

North Dakota

Agassiz Water Users Association
Grand Forks-Traill Water Users Association

Each of these agencies and organizations is described in detail on the following pages.

TABLE 44 Summary of Authorities, Capabilities and Functional Concerns for Federal Water Resource Agencies.

AGENCY	CATEGORY	AUTHORITY	EXISTING CAPABILITIES							FUNCTIONAL CONCERNS
			Policies	Planning	Property Acquisition	Construction	Maintenance	Financial Assistance	Manpower Assistance	
Army Corps of Engineers	Flood Control	Flood Control Act of 1936	x	x	x	x	x	x	x	The Corps participates in flood control projects including dam and reservoir construction, levee construction and river channelization. It provides information for use by communities in planning floodplain land use.
		Flood Control Act of 1960	x	x				x	x	
		Water Resources Development Act of 1974	x	x				x	x	
Water Supply	Water Quality	Water Supply Act of 1958	x	x					x	Water supply storage may be provided in Corps-operated reservoirs.
		Federal Water Pollution Control Act Amendments of 1972	x	x				x	x	
Fish & Wildlife	Project Recreation Act of 1965	Federal Water Project Recreation Act of 1965	x	x	x	x	x			Fish and Wildlife uses may be incorporated into Corps-operated reservoir projects. Mitigation for fish and wildlife losses due to construction are incorporated into project plans.

TABLE 44 CON'T

Recreation	Flood Control Act of 1944	x	x	x	x	x	x	x	Recreational facilities may be incorporated into Corps-operated projects with cost-sharing between the Corps and local interests.
	Federal Water Project Re-creation Act of 1965	x	x	x	x	x	x	x	
Farmers Home Administration	Consolidated Farm and Rural Development Act of 1972								The FmHA provides assistance to facilitate planning, improvement or construction of rural water systems.
	Consolidated Farm and Rural Development Act of 1972								Assistance to facilitate planning, improvement or construction of rural waste disposal systems may be provided by the FmHA.
Soil Conservation Service	Flood Control and Flood Prevention Act	x	x	x	x	x	x	x	The SCS provides planning assistance to local agencies and works directly with farmers on construction of small impoundments for flood control.
	Soil Conservation Act of 1935								The Soil Conservation Service provides planning assistance to soil conservation districts, watershed management groups and local governmental units and works directly with farmers on water supply reservoirs.
Economic Development Administration	Watershed Protection and Flood Prevention Act	x	x	x	x	x	x	x	
	Public Works and Economic Development Act of 1965								The EDA provides loans and matching grants for water treatment facilities and water storage reservoirs to local communities.
Water Supply	Public Works and Economic Development Act of 1965								
	Public Works and Economic Development Act of 1965								The EDA provides loans and matching grants to local communities for sewage treatment facilities.

EXISTING CAPABILITIES

TABLE 44 CON'T

AGENCY	CATEGORY	AUTHORITY	FUNCTIONAL CONCERNS						
			Policies	Planning	Property Acquisition	Construction	Maintenance	Financial Assistance	Manpower Assistance
Department of Housing and Urban Development	Water Supply	Housing Act of 1954	x					x	x
	Water Quality	Housing Act of 1954	x					x	x
Federal Housing Administration	Flood Control (indirectly)	National Housing Act of 1934	x						
		Housing and Urban Development Act of 1965							
Federal Insurance Administration	Flood Control (indirectly)	Housing and Urban Development Act of 1968	x						
		Flood Disaster Protection Act of 1973							
Bureau of Outdoor Recreation	Recreation	Bureau of Outdoor Recreation "Organic Act"	x						
		Land and Water Conservation Fund Act of 1965	x						
		Federal Water Project Recreation Act	x						

HUD makes grants to supplement State and local funds for water supply and sewage projects that are part of a comprehensive community plan

The Federal Housing Administration provides mortgage insurance to lenders to finance housing for low and moderate income persons, makes payments to owners of rental housing to supplement payments of low-income tenants, and makes grants to local agencies for low-income housing.

In communities participating in the National Flood Insurance program property owners can purchase flood insurance at subsidized rates.

The Bureau of Outdoor Recreation conducts studies and reviews plans for water resources programs of other Federal agencies, and of private interests which require a Federal permit, to determine the impact upon outdoor recreation. It provides assistance to the states in developing statewide recreation plans and financing to the states for planning, acquisition and development of recreation area.

Fish & Wildlife Service	Fish & Wildlife Act of 1956	x	x	x	x	The Fish and Wildlife Service may acquire lands for fish and wildlife habitat; investigate impacts of land and water projects on fish and wildlife; and assist State and other agencies in the development, protection, rearing and stocking of fish & wildlife resources.
Geological Survey	Water Supply Geological Survey "Organic" Act of 1879	x	x	x	x	The Geological Survey investigates floods & droughts, existing and potential water problems, hydrology and related sciences and provides technical assistance to Federal, State and local agencies.
Federal Highway Administration	Flood Control (indirectly) Federal-Aid Highway Act of 1950 ff.	x	x	x	x	The Federal Highway Administration administers highway construction grants to the States for highway projects. Financial assistance is also provided for repair work following natural disasters.
Environmental Protection Agency	Water Quality Federal Water Pollution Control Act (1948) FWPCA of 1965 FWPCA Amendments of 1972	x	x	x	x	EPA administers the National Pollutant Discharge Elimination System, develops guidelines regulating State, regional and local planning, provides funds for state planning, approves basin-level plans submitted by States, makes grants for construction of public wastewater treatment facilities and for areawide treatment management plans, establishes operations criteria for public waste treatment facilities, conducts surveys of the quality of operations performance in local plants, and enforces Federal water quality regulations if a State is unwilling or unable to enforce the law.
Upper Mississippi River Basin Commission (Southeastern Regional Committee)	Water Supply Water Resources Planning Act of 1965 Clean Water Restoration Act Water Quality Improvement Act	x	x	x	x	The Committee develops plans and region-wide priorities for conservation, development and utilization of water and related land resources within the Souris, Red and Rainy River basins.

TABLE 45 Summary of Authorities, Capabilities and Functional Concerns for State Water Resource Agencies,

EXISTING CAPABILITIES										
AGENCY	CATEGORY	AUTHORITY	Policies	Planning	Property Acquisition	Construction	Maintenance	Financial Assistance	Manpower Assistance	FUNCTIONAL CONCERNS
Minnesota Commissioner of Health	Water Supply	Minnesota Statutes 144.05; 144.12; 144.381-.388; and 115.71-.82.	x						x	The Commissioner examines plans for public water supplies, sets standards for water supply systems and water wells, advises on water supply development and water treatment and conducts analysis on water.
	Water Quality	Minnesota Statutes 144.05; 144.12; 144.381-.388; and 115.71-.82.	x	x					x	The Department's Section of Analytic and Environmental Health Services analyzes sewage and wastes.
Minnesota Department of Natural Resources	Water Supply	Minnesota Statutes Section 84	x	x	x	x			x	The DNR issues permits for water use, for lake and stream bed use, and for bridges crossings; conducts hydrologic data and water resources studies, operates State-owned dams, develops water resources conservation programs and prepares reports on water management problems.
	Fish & Wildlife	Minnesota Statutes Section 84	x	x	x	x	x		x	The DNR is responsible for the protection and management of fish and wildlife including land acquisition, lake and stream improvement, research on aquatic weed control and pollution, watershed planning and surveys of lakes and streams.
Recreation		Minnesota Statutes Section 84	x	x	x	x			x	The DNR manages land in the State Park Systems.

TABLE 45 CON'T

Minnesota Pollution Control Agency	Water Quality	Minnesota Statutes Section 116.02	x	x	x	The MPCA administers and enforces laws relating to pollution of the waters of Minnesota. It conducts investigations, holds hearings, issues orders for water pollution abatement and for construction of waste disposal systems. It establishes pollution standards for waters of the State, may order cessation of discharges and sets standards for the quality of effluents and for the performance of waste treatment and disposal systems. It issues permits for the discharge of sewage, industrial and other wastes and for the installation and operation of disposal systems, and may revoke or modify any permit if necessary to prevent or abate pollution. The Agency is responsible for the training and certification of waste treatment plant operators.
Minnesota Soil and Water Conservation Board	Flood Control	Minnesota Statutes 40.03	x	x	x	The Board assists the local soil and water conservation districts in carrying out their programs; it administers the allocation of State funds to districts and administers the State cost-sharing program for the installation of soil and water conservation practices.
Minnesota Water Resources Board	Water Supply Water Quality	Minnesota Statutes 105.71	x	x	x	The Board has the authority to decide questions of water policy where use, disposal, pollution or conservation of water are involved. The Board also has jurisdiction over the establishment of watershed districts.
North Dakota Department of Health	Water Supply	North Dakota Statute 61-28.04.	x	x	x	The Dept. of Health reviews plans of local communities to assure proper construction and safe operation of drinking water facilities.
	Water Quality	North Dakota Statute 61-28.04.	x	x	x	The Dept. conducts research on water pollution, sets standards for discharge of wastes into water and reviews plans and inspects construction of waste disposal systems. It also administers Federal grants to local communities for construction of waste treatment facilities.

TABLE 45 CON'T

EXISTING CAPABILITIES

AGENCY	CATEGORY	AUTHORITY	FUNCTIONAL CONCERNS						
			Policies	Planning	Property Acquisition	Construction	Maintenance	Financial Assistance	Manpower Assistance
North Dakota Game & Fish Department	Fish & Wildlife	North Dakota Statutes 20.1	x	x	x	x	x	x	x
			The Game & Fish Dept. is responsible for the construction and operation of all State fish hatcheries, State game farms, game refuges and reserves; for the breeding, propagation and distribution of fish, game birds and game animals; for the enforcement of State laws involving fish, game birds, game animals and harmless birds and animals; research on fish and wildlife of the State; and programs and regulations on threatened or endangered species of wildlife.						
North Dakota Parks and Recreation Department	Recreation	North Dakota Statutes 55-08-01	x	x	x	x	x	x	x
			The Parks and Recreation Dept. may acquire and manage land for State parks and recreation areas. It plans and develops such areas for outdoor recreation and regulates visitor use.						
North Dakota Water Commission	Flood Control	North Dakota Statutes 61-02	x	x	x	x	x	x	x
			The Water Commission may improve stream channels and construct and maintain dams, reservoirs, diversion and drainage canals.						
	Water Supply	North Dakota Statutes 61-02	x	x	x	x	x	x	x
			The Water Commission has jurisdiction over all water resource projects in the State; it may regulate water flow, impound water for municipal, industrial and rural water supplies, provide water for irrigation, power generation, etc.; improve stream channels, and construct and maintain dams and reservoirs. The Commission may also establish rules and regulations for sale of water and water rights, for control of water supplies and for financing projects.						

TABLE 46 - Summary of authorities, capabilities and functional concerns for regional and local agencies and organizations

Agency	Category	Authority	Existing capabilities						Financial Assistance	Manpower Assistance	Functional concerns
			Policies	Plan-ning	Property Acquisition	Construc-tion	Mainte-nance	Resource			
Northwest Regional Development Commission	Water Quality	Regional Development Act of 1969	X	X					X	X	The 208 Water Quality Committee of the NWDC reviews water resource management programs affecting the region and makes recommendations to planning agencies.
Red River Regional Planning Council	Water Quality	Senate Bill 2126	X	X					X	X	The Council cooperates with the North Dakota Water Commission on water quality studies.
Grand Forks County - North Dakota	Water Supply Water Quality	North Dakota Century Code, Sections 11-33, X and 11-28.2									The county has responsibility for water and sewer services in recreation service districts.
Polk County Minnesota	Flood Control Water Supply Water Quality	Minnesota Statute 106.021 Minnesota Statute 1162 Minnesota Statute 1162	X	X	X	X			X	X	The county Board of Commissioners has authority over water supply and sewer systems in rural areas. The Board may obtain land and arrange for construction of water facilities and flood control structures.
Minnesota Townships	Water Supply	Minnesota Statute 365.20	X	X							Townships may provide water services for their residents.
North Dakota Townships		North Dakota Century Code Sec. 58-03-11	X	X							North Dakota townships have authority only for rural zoning regulations.
East Grand Forks	Water Supply Water Quality	Minnesota Statute 412 Minnesota Statute 115.46	X X	X X	X X	X X	X X	X X	X X	X X	The city provides water supply and sewage disposal service to residents & businesses.
Emerado	Water Supply Water Quality	N.D. Century Code, Sec. 40-05-01	X X	X X	X X	X X	X X	X X	X X	X X	Emerado provides water and sewage treatment to its residents and businesses.
Grand Forks	Flood Control Water Supply Water Quality	N.D. Century Code Chapter 40-05.1	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	Grand Forks provides water supply and sewage disposal to city residents and businesses. It also supplies water to the Grand Forks Air Force Base. The city's zoning ordinance has floodway and floodplain regulations.
Manvel	Water Quality	N.D. Century Code Section 40-05-01	X	X	X	X	X	X	X	X	Manvel maintains sewage collection lines and a treatment lagoon.
Thompson	Water Quality	N.D. Century Code Section 40-05-01	X	X	X	X	X	X	X	X	Thompson provides sewage disposal to its residents.
Eastern Grand Forks County Soil and Water Conservation District	Water Resources	N.D. Century Code Chapter 4-22	X	X					X	X	The district's function is to participate in and coordinate programs related to soil and water resources being conducted by various government agencies.
Grand Forks Air Base Environmental Support	Water Supply Water Quality	U.S. Air Force	X X	X X	X X	X X	X X	X X	X X	X X	Environmental support provides water supply and waste disposal services to the air base.
Grand Forks County Water Management District	Flood Control Water Supply Water Quality	N.D. Century Code Section 61-16-11	X X X	X X X	X X X	X X X	X X X	X X X	X X X		The district is authorized to plan, locate, construct, modify, repair, maintain, and regulate water management facilities within the district. Flood control, water quality, and wastewater issues fall within its jurisdiction.
Lower Red River Watershed Management Board, Minnesota	Flood Control	1976 Act of the Minn. Legislature	X	X					X		The board evaluates water management programs of the 7 watershed districts in the lower Red River area of Minnesota.
Red Lake Watershed District, Minnesota	Flood Control Water Supply	Watershed Act, MN. Statute Chapter 112	X X	X X	X X	X X	X X	X X	X X	X X	The district regulates all water management projects within the Red Lake Watershed.
West Polk County Soil & Water Conservation District, Minnesota	Water Resources	Chapter 40 of Minnesota State Law	X	X						X	The district works with persons in the area on soil and water conservation matters.
Agassiz Water Users Association, North Dakota	Water Supply	Non-profit corporation			X	X	X				The association distributes water to rural areas and small towns within its service area.
Grand Forks-Trail Water Users Association, North Dakota	Water Supply	Non-profit corporation			X	X	X				The association distributes water to rural areas and small towns within its service area.
Marshall and Co. Rural Water System, Minnesota	Water Supply	Minnesota Statute Chapter 116 A			X	X	X				The system provides water to rural water users within its distribution area.

FEDERAL AGENCIES

ARMY CORPS OF ENGINEERS, Department of Defense

1) Existing Capability:

The Army Corps of Engineers' concerns include flood control, water supply and quality management, wastewater management, and recreational water use. The Corps may undertake investigations of water and related land resources projects under specific authorizations by Congress or, for smaller studies, under general continuing authorities.

2) Basis of Agency Authority:

The Flood Control Act of 1936 approved Federal participation in project improvements for flood control purposes on navigable waters or their tributaries if the benefits exceeded estimated costs and if the lives and social security of people are otherwise adversely affected. Sec. 206 of the Flood Control Act of 1960, as amended, authorized the Corps to provide technical planning assistance to non-Federal entities in identifying flood hazard areas and in planning wise use of floodplains. The Water Supply Act of 1958, as amended, authorized reservation of space in Corps-built reservoirs for municipal and industrial water supply, provided it was economically justified and represented the least costly alternative. Technical assistance to state and local interests in developing and operating an areawide waste treatment management process is authorized by Section 208(h) of the Federal Water Pollution Control Act Amendments of 1972. The Water Resources Development Act of 1974 authorized cooperation with states in preparation of comprehensive plans for development, utilization, and conservation of water and related resources of drainage basins located within the boundaries of a state. Recreation facilities may be constructed and operated as part of Corps projects under the authority of Section 4, the Flood Control Act of 1944, and of the Federal Water Project Recreation Act of 1965.

3) Types of Functional Authority:

a) Flood control:

The Corps participates in flood control projects which may include dam and reservoir construction, levee construction, and river channelization. It makes available information which can be used by communities in planning flood plain land use.

b) Water supply and quality management:

While local communities are primarily responsible for their water supplies, water supply storage in multiple-purpose reservoirs may be

authorized if guidelines are met. Storage to facilitate streamflow regulation for the improvement of water quality may also be a function of such reservoirs, though this may not be used as a substitute for local wastewater treatment. Wastewater planning is provided to State and local interests through the Urban Studies program.

c) Recreation:

Multiple-purpose reservoir projects may include provisions for recreational use, with the cost of recreational facilities being shared between Federal and non-Federal units, and maintenance costs being assumed by the Federal government. Cost-sharing arrangements for recreational facilities on other projects may be made if the local interests involved agree to provide operation and maintenance.

4) Coordinating Mechanisms Present:

Other Federal, State, and local agencies and the public are notified of the initiation of studies concerning specific proposed water projects and are given the opportunity to comment. Public hearings are held.

5) Present Budget and Financial Resources:

The Grand Forks-East Grand Forks Urban Water Resources Study is estimated to cost \$1,065,000 with \$945,000 coming from Federal (Corps) funds and \$120,000 from non-Federal sources.

6) Legal Limitations:

The amount of project assistance is limited unless Congress requests a study and appropriates funds. In compliance with the National Environmental Policy Act, an Environmental Impact Statement must be prepared. In order for project construction to proceed, benefits must exceed costs.

7) Institutional Relationships Affecting Water Management Program:

The Corps enters into cost-sharing arrangements with State and local units for development of local flood control projects and recreational facilities.

8) Manpower Available for Water Resource Program:

The St. Paul District has organized an interdisciplinary urban studies team under the leadership of the Chief, Urban and Special Studies Section, who reports directly to the Chief of Planning Branch. The team includes the following individuals, either full time or on an "as required" basis: study manager, water resource planner, sanitary engineer, hydrologist, hydraulic engineer, economist, environmental planner, and design engineer.

FARMERS HOME ADMINISTRATION, Department of Agriculture

1) Existing Capability:

The Farmers Home Administration (FmHA) provides assistance on the preparation of plans for the development of water systems, sewer systems, and other community related projects located in rural areas.

2) Basis of Agency Authority:

Title III of the Consolidated Farm and Rural Development Act of 1972 authorized the Farmers Home Administration to grant funds for rural community planning.

3) Types of Functional Authority:

The FmHA provides assistance to facilitate planning, improvement, or construction of rural water systems and waste disposal systems by applicants that lack funds for the task. It promotes efficient and orderly development of rural communities and the avoidance of overlapping, duplication, overdesign or underdesign of community water and sewer facilities in an area.

4) Coordinating Mechanisms Present:

Regulations require that consideration be given to all recommendations and services available from interested Federal, State, and local agencies.

5) Present Budget and Financial Resources:

The town of Manvel (ND) recently completed a sewer system with the aid of a \$97,000 grant and \$126,000 loan. In Minnesota, the Marshall-Polk Rural Water District received an \$800,000 grant and a \$2,350,000 loan for a water system. The cities of Climax and Oslo, adjacent to but outside of the project area, received grants and/or loans for water and/or sewer systems.

6) Legal Limitations:

Assistance is limited to areas which do not have a population over 10,000 and primarily serve rural residents. The FmHA provides grants and loans but does not conduct the plans or the project; it may review periodically to insure that the work is satisfactorily accomplished. All applicants must be reviewed for the ability to obtain credit through normal commercial sources at reasonable rates and terms.

7) Institutional Relationships Affecting Water Management Program:

The FmHA maintains an office in each county to facilitate contact with local communities.

8) Manpower Available for Water Resource Program:

On the state level, there is one engineer who inspects project work. A staff member in each county serves as liaison with the surrounding area.

SOIL CONSERVATION SERVICE, Department of Agriculture

1) Existing Capability:

The Soil Conservation Service (SCS) provides technical assistance to individuals, groups, organizations, cities and towns, and county and state governments in reducing the waste of land and water resources and in putting these national assets to good use. SCS's technical staff analyzes problems and suggests safe uses and treatment of such resources. The technical staff includes soil conservationists, soil scientists, economists, engineers, agronomists, biologists, foresters, plant materials specialists, landscape architects, and resource planning specialists.

2) Basis of Agency Authority:

The Soil Conservation Service is authorized by the Soil Conservation Act of April 27, 1935 (PL 74-46) as amended, and the Watershed Protection and Flood Prevention Act (PL 83-566) as amended, to respond to local requests for planning assistance in watersheds or subwatersheds of 250,000 acres or less for land treatment, structural and nonstructural improvements for flood prevention or the conservation, development, utilization and disposal of water.

Other special authorities have been provided by Congress.

3) Types of Functional Authority:

The SCS provides planning assistance to soil conservation districts, watershed management groups, and local governmental units. SCS personnel also work directly with farmers on projects such as shelterbelts, irrigation program management, and construction of small impoundments for supply reservoirs and flood control. The SCS provides the farmer with technical data and supervises construction.

4) Coordinating Mechanisms:

SCS personnel coordinate their efforts with concerned Federal agencies as well as appropriate State, regional and local governmental units.

5) Present Budget and Financial Resources:

SCS funds come from Congressional appropriations. The current fiscal year budget for the state of North Dakota is about \$10 million; for the eleven-county area including Grand Forks County, it is about

\$1.5 million. These figures include both soil and water programs. The current fiscal year budget for Minnesota is \$10,000,000. In Administrative Area I, a 13-county area including Polk County, the budget is \$1,250,000 including \$400,000 for emergency watershed measures to correct the damages of the 1975 flood.

6) Legal Limitations:

Projects that do not exceed \$250,000 and do not include a structure providing more than 2,500 acre-feet of total capacity are approved by the State Conservationist of the SCS and submitted to the Governor for review. Projects exceeding \$250,000 in cost or with a structure exceeding 2,500 acre-feet capacity must be approved by the Office of Management and Budget and by Congress. No structure can have over 25,000 acre-feet capacity. The watershed area included in a single plan must not exceed 250,000 acres.

7) Institutional Relationships Affecting Water Management Program:

The U.S. Forest Service has responsibility for the watershed program of PL 83-566 in National Forests. It works, however, very closely with the SCS. On the local level, the SCS provides technical assistance to soil conservation districts; SCS and district employees, where available, work on local conservation projects.

8) Manpower Available for Water Resource Program:

The Soil Conservation Service provides the Eastern and Western Grand Forks County SCD's with a district conservationist, a technician, and a conservation aide; their responsibilities include, but are not limited to, water resources. A student trainee is also employed during the summer. The SCS area office located in Grand Forks serves eleven North Dakota counties; it is staffed with an engineer, a soil scientist, and a technician who are available to assist local staffs. The Minnesota portion of the study area is served by a local office in Crookston which has a district conservationist, a soil conservation technician, and a soil conservation trainee; and an area office in Thief River Falls comparable to the Grand Forks area office.

ECONOMIC DEVELOPMENT ADMINISTRATION, Department of Commerce

1) Existing Capability:

The Economic Development Administration (EDA) assists communities in developing facilities to encourage industry to locate in the area. Water and sewage systems and flood protection are among the projects for which a community may receive funds. However, sewage treatment systems and flood control projects are limited only to those areas where industrial expansion or threats to potential or existing jobs are at stake.

2) Basis of Agency Authority:

The EDA was established September 1, 1965 by the Public Works and Economic Development Act of 1965. This act has been extended for three years by Congressional action in August of 1976.

3) Types of Functional Authority:

The EDA makes loans and matching grants to communities for public works such as sewage and water treatment facilities and water storage reservoirs. It also offers technical, planning, and research assistance. This authority relates solely to economic development.

4) Coordinating Mechanisms Present:

EDA coordinates with other federal agencies concerned with economic development and employment.

5) Present Budget and Financial Resources:

EDA budgets funds on a regional basis. Minnesota shares in the funding with the Midwestern Regional Office located in Chicago. The 1977 budget is generally about \$25 million for all types of public works projects relating to economic impact to be generated. There is no special allocation for water resource development. This is a part of the overall budget, and competes against all types of projects.

In June, 1976, a grant for \$736,000 was approved for East Grand Forks to construct a water tower, underground reservoir and pumping station, and to construct supply mains connecting East Grand Forks and Grand Forks.

6) Legal Limitations:

No residential-type funding is authorized. EDA is concerned primarily with the benefits of the project on economic development. It reviews grant proposals to assure that proposed projects meet statutory requirements, but does not monitor the functioning of facilities. However, it does monitor regulations covering adherence to non-relocation and civil rights.

7) Institutional Relationships Affecting Water Management Program:

EDA requires that qualified redevelopment areas (counties) have completed and accepted a county-wide Overall Economic Development Plan before they can become designated to be eligible for EDA financing.

8) Manpower Available for Water Resource Program:

EDA has field offices in each state. Economic Development representatives are located in St. Paul and Duluth, Minnesota, and Bismarck, North Dakota. EDA representatives meet with grant applicants to review proposals and set up a conference with regional personnel.

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

1) Existing Capability:

The Department assists in the planning of programs concerned with water and related land resources as they affect and are affected by community development, such as water supply, flood and runoff control, water quality management, and the quality of life involving water and related open space.

2) Basis of Agency Authority:

The Housing Act of 1954, Section 701, authorized the Urban Planning Assistance Program, which provides Federal grants for assistance in urban planning projects. The Department of Housing and Urban Development, created by an Act of Congress in 1965, now administers the UPAP.

3) Types of Functional Authority:

The Department makes grants to supplement state and local funds for water and sewer projects that are part of a comprehensive community plan. It may provide interest-free advances of funds to help finance plan preparation for specific projects, and long-term loans for construction of public works such as sewer or water facilities.

4) Coordinating Mechanisms Present:

Communities applying for grants must show that the proposed project fits into a comprehensive local plan. Since urban areas often extend over more than one political unit, area organizations of public officials may be formed which are eligible for grants.

5) Present Budget and Financial Resources:

Funds are available to local communities through Community Development Block Grants administered by the regional office in Denver, Colorado (for North Dakota) and that in Chicago, Illinois (for Minnesota).

6) Legal Limitations:

The Department provides funds to assist in planning and construction of projects but is not itself involved in planning or construction.

7) Institutional Relationships Affecting Water Management Program:

Planning and construction of water resources management facilities are carried out by the local community; the Department reviews and comments on plans presented by grant applicants, and makes decisions on supplementary funding.

8) Manpower Available for Water Resource Program:

State and regional staff members review grant proposals but do not participate in the actual planning or construction.

FEDERAL HOUSING ADMINISTRATION, Department of Housing and Urban Development

1) Existing Capability:

The Federal Housing Administration (HUD-FHA) assists private industry in making housing more available to low and moderate income families, handicapped, and elderly persons. While not directly concerned with water resources, its resources might be utilized if persons are displaced from their homes as a result of water management projects such as reservoirs.

2) Basis of Agency Authority:

The National Housing Act of 1934, as amended, and the Housing and Urban Development Act of 1965 authorize various HUD-FHA programs.

3) Types of Functional Authority:

HUD-FHA provides mortgage insurance to lenders who finance the purchase, construction, or improvement of housing for low and moderate income persons. It also makes payments to owners of rental housing to supplement partial rental payments of low-income tenants, and makes grants to local public agencies to assist them in providing low-income housing.

4) Coordinating Mechanisms Present:

HUD-FHA works with agencies established by local governments or non-profit groups and private enterprise concerned with providing housing for low and moderate income persons.

5) Present Budget and Financial Resources:

At present there are no HUD-FHA-supported programs concerned with relocation of persons displaced by water resource projects in the study area.

6) Legal Limitations:

Dollar amounts of mortgage insurance are limited depending on the type of housing and program involved. Rent supplement payments are also limited to 70% of market rental.

7) Institutional Relationships Affecting Water Management Program:

If a proposed water project would affect the community housing situation, interested mortgagors or agencies may apply to HUD-FHA for assistance to finance a purchase of, improvement to, or construction of a dwelling.

8) Manpower Available for Water Resource Program:

HUD-FHA's responsibility is in the areas of mortgage insurance; its personnel would not be directly involved with water resources programs.

FEDERAL INSURANCE ADMINISTRATION, Department of Housing and Urban Development

1) Existing Capability:

The Federal Insurance Administration (FIA) makes flood insurance available to property owners at affordable rates, and promotes wise land use practices in areas susceptible to flooding.

2) Basis of Agency Authority:

The Housing and Urban Development Act of 1968 provided for a National Flood Insurance Program. The Flood Disaster Protection Act of 1973, as amended, required that flood insurance be purchased as a condition for Federal assistance for construction or purchase of property in flood hazard areas.

3) Types of Functional Authority:

In communities participating in the National Flood Insurance program, property owners can purchase flood insurance at subsidized rates, providing that the property has not been built within an identified flood hazard area after a specified date. Actuarial insurance rates are charged for property built after that date.

4) Coordinating Mechanisms Present:

Communities having special flood hazard areas identified by FIA must participate in the National Flood Insurance Program in order for certain types of Federal assistance to be available to property owners for construction or acquisition of property in those areas. In order to participate in the program, communities must adopt land use and control measures consistent with the program's regulations.

5) Present Budget and Financial Resources:

Portions of both Grand Forks and East Grand Forks are designated as flood hazard areas, and the communities are participating in the National Flood Insurance Program.

Flood Insurance is available throughout the community as follows:

Type of dwelling	Limit of coverage	Subsidized rates (per \$100)
Single family residential	\$35,000	\$.25
Other residential	\$100,000	\$.25
Non-residential	\$100,000	\$.40
Contents: residential (per unit)	\$10,000	\$.35
Contents: Non-residential (per unit)	\$100,000	\$.75

6) Legal Limitations:

Properties built within identified special flood hazard areas after FIA establishes final flood elevations at a later date will be eligible for flood insurance only at actuarial rates.

7) Institutional Relationships Affecting Water Management Program:

Community applications to participate in the program are handled through the HUD central office in Washington, D.C. or the HUD regional offices in Denver, Colorado (North Dakota) and Chicago, Illinois (Minnesota). Information about the program is also available through FIA's toll free telephone number (800-424-8872).

8) Manpower Available for Water Resource Program:

The National Flood Insurance Program does not have personnel available for consultation on water resources management in general. Flood Insurance Specialists in the regional offices are available to assist communities in enacting flood plain management regulations to meet the requirements of the National Flood Insurance Program. FIA will perform a detailed flood insurance study, if necessary, to identify flood elevations so that the degree of risk for individual properties can be determined and actuarial rates established.

BUREAU OF OUTDOOR RECREATION, Department of the Interior

1) Existing Capability:

The Bureau of Outdoor Recreation, on behalf of the Secretary of the Interior, serves as the Federal focal point for coordinating, planning, and financing public recreation and encouraging and assisting all governmental and private interests to conserve, develop, and utilize outdoor recreation resources for the benefit and enjoyment of present and future generations.

2) Basis of Agency Authority:

The Bureau of Outdoor Recreation "Organic Act" (Public Law 88-29; 77 Stat. 49) established the Bureau and mandated the responsibility to develop a nationwide outdoor recreation plan every five years to serve as a guide for Federal, State, and local governments and the private sector in identifying and meeting future recreation needs of America. The Land and Water Conservation Fund Act of 1965 (Public Law 88-578; 78 Stat. 897) as amended was created to help finance Federal recreation land acquisition, State recreation planning, and State and local land acquisition and development. The 1976 amendment allows for study and analysis of recreation problems and needs in America's urban areas. Section 6(a) of the Federal Water Project Recreation Act (Public Law 89-72; 79 Stat. 213) requires the Bureau to participate in comprehensive water and related land resources planning, conduct studies of recreation aspects of proposed Federal water resources developments, and review project reports and environmental impact statements prepared by Federal agencies and private interests seeking a Federal license or permit.

Section 4(f), Department of Transportation Act of 1966 (Public Law 89-670; 80 Stat. 931), as amended, requires the Secretary of Transportation to work with the Departments of Interior, Housing and Urban Development, and Agriculture and the states in developing transportation plans and programs with measures to maintain or enhance the natural beauty of the affected lands. Within Interior, the Bureau coordinates and prepares comments on transportation projects and programs that could have major environmental consequences.

The Wild and Scenic Rivers Act (Public Law 90-542; 82 Stat. 906) as amended established a National Wild and Scenic Rivers System to protect free-flowing rivers for their "outstanding scenic, recreational, geologic, fish and wildlife, historic, and cultural values." The Bureau carries out the Interior Secretary's responsibility for studying those rivers assigned to the Department.

The National Trails System Act (Public Law 90-543; 82 Stat. 919) encourages establishment of trails to foster public enjoyment and appreciation on the "open air, outdoor areas of the Nation." The responsibility for studying these trails has been delegated to the Bureau.

The Sikes Act (Public Law 86-797; 74 Stat. 1053) as amended allows the Bureau to provide assistance to the Department of Defense and individual military departments in developing outdoor recreation plans, programs, and resources and general coordination and planning activities.

The National Environmental Policy Act (Public Law 91-190; 83 Stat. 852) requires that the Bureau review recreation-related environmental statements prepared by many Federal agencies, apart from water resource and transportation-related environmental impact statements.

Federal Lands for Parks and Recreation (Public Law 91-485; 84 Stat. 1084) provides for the transfer of surplus Federal real property to State and local governments for public park and recreation use. The program is administered by the Bureau in cooperation with the General Services Administration and the Federal Property Council.

3) Types of Functional Authority:

a) Planning

The Bureau conducts investigations and reviews of plans for water resource programs of other Federal agencies, and of private interests which require a Federal permit, to determine the impact on outdoor recreation. It also provides assistance to the states in developing statewide recreation plans. The Bureau also undertakes wild and scenic river planning and planning for the nationwide recreation plan national trails and urban studies.

b) Financing

The Land and Water Conservation Fund program provides money to the states for planning, acquisition, and development of recreation areas, and to Federal agencies for authorized acquisition of land and water for recreation.

The Bureau does not collect user fees at Federal recreation areas; the managing agency makes this collection, but these funds are no longer utilized for the Land and Water Conservation Fund Act projects. The sources of funds for the Land and Water Conservation Fund program are derived from the sale of Federal surplus real property, the Federal motorboat fuels tax, and outer continental shelf mineral receipts.

4) Coordinating Mechanisms Present:

The Bureau maintains a comprehensive nationwide recreation plan and encourages cooperation among Federal, regional, State and local units. A state must submit a comprehensive statewide outdoor recreation plan in order to be eligible for grants from the Bureau.

Coordination also occurs between the Bureau and other Federal, State and local agencies through its various program efforts of water resource planning, rivers and trails, grants-in-aid, Federal operations, private enterprise, planning assistance, and environmental affairs.

5) Present Budget and Financial Resources:

Congress provides funds to the Bureau of Outdoor Recreation projects through appropriations to the Land and Water Conservation fund. At present there are no water resource projects in the study area receiving Bureau funds. However, park and recreation projects in the Grand Forks area have received Land and Water Conservation Funds in excess of \$622,000.

6) Legal Limitations:

Use of money in the Land and Water Conservation Fund for purchase of lands by Federal, State and local entities must be authorized and funded by Congress. The Bureau is also limited in its coordinating role with some of the land managing agencies.

7) Institutional Relationships Affecting Water Management Program:

The Federal Water Project Recreation Act of 1965 establishes policies and procedures for State and local administration and cost-sharing involving Federal multipurpose water resource projects.

8) Manpower Available for Water Resource Program:

The Bureau is primarily a reviewing and funding agency; it works through State and local agencies and does not maintain an office in either North Dakota or Minnesota. The regional office for North Dakota is located in Denver, Colorado; that for Minnesota, in Ann Arbor, Michigan.

FISH AND WILDLIFE SERVICE, Department of the Interior

1) Existing Capability:

The Fish and Wildlife Service is the principal agency through which the Federal government carries out its responsibilities for conserving fish and wildlife.

2) Basis of Agency Authority:

In 1956 the Fish and Wildlife Act created the U.S. Fish and Wildlife Service, establishing two Bureaus within it: the Bureau of Commercial Fisheries and the Bureau of Sport Fisheries and Wildlife. In 1970 the Bureau of Commercial Fisheries was transferred to the Department of Commerce and renamed. The Bureau of Sport Fisheries and Wildlife remained in Interior and was renamed the U.S. Fish and Wildlife Service in 1974 by Act of Congress amending Section 3 of the Fish and Wildlife Act.

3) Types of Functional Authority:

The Fish and Wildlife Service is authorized to acquire lands for fish and wildlife and to conduct surveys of fish and wildlife resources. It investigates possible impacts of land and water projects on fish and wildlife and is responsible for recommending against those which would have unacceptable environmental effects on fish and wildlife. The Service assists State and other agencies in the development, protection, rearing, and stocking of fish and wildlife resources, through Federal grants and through extension and information services. It provides national leadership in preserving and restoring animal species and plant life threatened or endangered with extinction in the United States and throughout the world.

4) Coordinating Mechanisms Present:

Survey and management information regarding fish and wildlife resources is made available to other Federal agencies and to State and local units.

5) Present Budget and Financial Resources:

In 1976, the Fish and Wildlife Service acquired title to 594.52 (341 wetland) acres of land within the study area, all in the North Dakota portion, for a total of \$166,233.75.

6) Legal Limitations:

Funds from the Land and Water Conservation Fund may be used for land acquisition to protect threatened species of fish and wildlife, and for purchase of limited acreages adjacent to national refuges, hatcheries, and conservation areas, but these funds are available only through Congressional appropriation for specific projects.

7) Institutional Relationships Affecting Water Management Program:

Under the Federal Water Project Recreation Act of 1965, provisions are made for cost-sharing with State and local units for facilities to conserve and enhance fish and wildlife resources.

8) Manpower Available for Water Resource Program:

The Fish and Wildlife Service's Regional Office Environment staff located in Denver, Colorado oversees land and water resource planning in ten states, including North Dakota. The Wetlands Coordinator also works out of the Denver Regional Office. The Service maintains an area office in Bismarck, North Dakota. There, a professional staff of eleven considers projects impacting on fish and wildlife in the State. A Wetlands Acquisition Office at Devils Lake employs three professionals who handle small wetlands acquisitions for a wide area, including Grand Forks County. Five wildlife biologists in the Wetlands Management District Office in Devils Lake manage the wetland production areas in Grand Forks County as well as other Service projects in North Dakota.

In Minnesota the Regional Office is located in Minneapolis, with the area office at St. Paul. A Wetlands Acquisition Office and a Wetlands Management District Office in Fergus Falls handle purchase and management of Federal wildlife lands over the entire state. The Wetlands Coordinator for the region works out of Fergus Falls. In Bemidji a wildlife biologist serves as liaison with other Federal and State agencies in wildlife management.

GEOLOGICAL SURVEY, Department of the Interior

1) Existing Capability:

The Geological Survey, through its Water Resources Division, is responsible for the investigation and appraisal of the source, quantity, quality, distribution, movement, and availability of both surface and ground waters.

2) Basis of Agency Authority:

The Geological Survey was established by an Act of Congress in 1879. The Bureau of the Budget has charged the Survey with the collection and interpretation of water resource data on a national network basis.

3) Types of Functional Authority:

The Water Resources Division's responsibilities include investigations of floods and droughts, studies of existing and potential water problems, research in hydrology and related sciences, and scientific and technical assistance to other Federal agencies and to State and local units.

4) Coordinating Mechanisms Present:

The Water Resources Division coordinates water data acquisition by various Federal agencies. It shares with State and local agencies, such as the North Dakota Water Commission, North Dakota Health Department, North Dakota Geological Survey, Minnesota Department of Natural Resources, and Minnesota Pollution Control Agency, the responsibility for planning and financing water resources investigations.

5) Present Budget and Financial Resources:

At present the Geological Survey is not funding any projects in the study area. Funds for research come from Federal appropriations and from other Federal and State agencies with which the Survey cooperates. The Water Resources Division has a budget of approximately \$2 million for its activities in the state of North Dakota.

6) Legal Limitations:

The Survey is primarily a data collection and advisory agency; it has no authority to enforce regulations.

7) Institutional Relationships Affecting Water Management Program:

The Survey maintains district offices in each state to facilitate cooperation with agencies of the state and its subdivisions. Under the district office are several Field Headquarters, each covering a portion of the state. As mentioned above, it shares responsibility for data collection with various Federal, State, and local agencies.

8) Manpower Available for Water Resource Program:

The field headquarters located in Grand Forks, serving the eastern third of North Dakota, employs one hydrologist and six hydrologic technicians. The Minnesota portion of the study area is served by a field headquarters in Grand Rapids, Minnesota, which employs a surface water hydrologist, two ground water hydrologists, and twelve hydrologic technicians.

FEDERAL HIGHWAY ADMINISTRATION, Department of Transportation

1) Existing Capability:

The Federal Highway Administration (FHWA) administers the Federal-aid Highway Program and assists the states in highway construction, including culverts, ditches, and drainage through land utilized for roadways.

2) Basis of Agency Authority:

The FHWA administers the Federal-aid Highway Program and the Federal Highway Program under Title 23, U.S.C., as amended.

3) Types of Functional Authority:

The FHWA administers highway construction grants to the states, and directs Federal highway construction appropriations. Such construction must meet Federal regulations concerning water pollution control and susceptibility to flood losses to be eligible for Federal funds. Federal aid is available for repair work following natural disasters such as flooding. The FHWA engages in highway construction in nearly all types of Federal lands.

4) Coordinating Mechanisms Present:

An environmental impact statement must be prepared for all major proposed highway actions on which Federal funds will be utilized. Public hearings must be held when required in the state's Action Plan. Other Federal agencies must approve portions of a project which affect land or facilities under their jurisdiction. Conversely, a Federal agency planning a project which may have impact on a Federally-aided transportation facility must coordinate with FHWA. The FHWA is required to approve the state's plans, specifications and estimates, monitor construction and make a final inspection of each completed project except for those projects administered under an approved Secondary Road Plan or Certification Acceptance Plan (23 U.S.C. 117) where only the final inspection is made.

5) Present Budget and Financial Resources:

Funds for Federal aid to highway construction come from the Federal Highway Trust Fund and general fund. The fiscal year 1977 budget for North Dakota in Federal funds is approximately \$46,561,185. For Minnesota it is \$152,516,746. There are four FHWA-supported projects, either

current or planned, in the North Dakota portion of the study area; these are paving and grading projects not directly concerned with water resources. There are no known projects in the Minnesota portion of the area.

6) Legal Limitations:

Coordination with affected Federal agencies is required before authorization of a project.

7) Institutional Relationships Affecting Water Management Program:

As mentioned above, the FHWA coordinates with other Federal agencies and with State and local governing bodies.

8) Manpower Available for Water Resource Program:

A division office is maintained in each state: at Bismarck in North Dakota, and St. Paul in Minnesota. Their professional staffs include environmental coordinators. The staffs are available in a review capacity and on a limited basis for other functions.

ENVIRONMENTAL PROTECTION AGENCY

1) Existing Capability:

The Environmental Protection Agency (EPA) is an independent regulatory agency concerned with environmental quality management. It is responsible for the establishment and enforcement of performance standards in the various areas of environmental quality including water quality. These include stream and lake water quality standards and the setting of performance standards for sources of discharges of water pollutants by public and non-public facilities.

2) Basis of Agency Authority:

EPA was established on December 2, 1970 by Executive order. In the area of water resources, EPA was delegated responsibilities under the Federal Water Pollution Control Act of 1948, the Federal Water Pollution Control Act of 1965 and the Federal Water Pollution Control Act Amendments of 1972, as well as under the Water Resources Planning Act of 1965, the Clean Water Restoration Act and the Water Quality Improvement Act of 1970.

3) Types of Functional Authority:

a) Effluent limitation and discharge permits:

The Federal Water Pollution Control Act Amendments of 1972 established the National Pollutant Discharge Elimination System (NPDES). Under NPDES, permits are issued for all point source discharges into surface waters. The requirements of this act stipulate that by

July 1, 1977 industries use the "best practicable" treatment currently available to control water pollution, and that publicly-owned treatment plants provide a minimum of "secondary treatment"; by July 1, 1983 industries shall use the "best available" treatment economically achievable, and publicly-owned waste treatment facilities shall use the "best practicable" control technologies. The goal of this Act is to have zero discharge of pollutants by industries and public-owned facilities by July 1, 1985. Permits limit concentrations of parameters that may be discharged and set target dates for compliance with the applicable provisions of the law. A compliance schedule may be required as a part of the permit. The permit also requires dischargers to monitor their wastes and report the amount and type of parameters included in the discharge.

b) Planning

The Federal Water Pollution Control Act of 1972 also expanded planning aspects of water quality management by local, regional and State governmental units. Section 201 of the Act provides for local municipal facilities planning; section 208 provides for regional wastewater management and section 303(e) provides for basin-level facilities planning. These three levels are coordinated by requiring the local plans to be incorporated into the basic plans. Section 209 provides for basin-wide studies of water and related land resources (level B planning). EPA designates the planning agency and establishes criteria for the areawide planning agencies, develops guidelines regulating planning at all three levels, acts on requests for state planning grants, and approves basin-level plans submitted by the states.

c) Finance

EPA is authorized to make grants for the construction of public wastewater treatment facilities under Title II of the Federal Water Pollution Control Act Amendments of 1972. Facilities may serve all or portions of individual communities, metropolitan areas or regions. Treatment of industrial wastes is included but pretreatment of industrial wastes which would otherwise be detrimental to efficient operation and maintenance of the facility is required. User charges and cost sharing associated with the treatment of industrial wastes are also required.

Grants are also made to encourage and facilitate the development and implementation of areawide treatment management plans in areas designated by the Governor of a state (or Governors of adjoining states). These grants are authorized under section 208 of the Federal Water Pollution Control Act Amendments of 1972.

d) Monitoring

EPA establishes operations and maintenance criteria for public waste treatment facilities, sets conditions on Federal construction grants, and approves areawide waste management programs and state administration of NPDES. It has authority to conduct surveys to determine the quality of operations and maintenance performance in any municipal or non-municipal plant. Further, the states are required to establish and carry out satis-

factory self-monitoring practices as a condition for receiving state planning grants and for administering the NPDES permit system.

e) Enforcement

Enforcement of water quality regulations has been delegated to the states under the Federal Water Quality Control Act Amendments of 1972. If a state proves either unable or unwilling to enforce the law, EPA is authorized to carry out enforcement.

4) Coordinating Mechanisms Present:

EPA coordinates its activities primarily through designated State planning or regulatory agencies.

5) Present Budget and Financial Resources:

Grand Forks is presently completing reports on a \$1 million grant for water supply treatment facilities and a \$200,000 grant for interceptor sewerage; construction of both projects has been finished. A grant for \$60,000 has been made for assessment of needs in wastewater treatment facilities; the total cost of the project, including planning and construction, has been estimated at \$16 million.

Thompson has applied for a grant for the assessment phase of the Federal aid process.

6) Legal Limitations:

EPA personnel are not allowed to advise on what kind of a system should be built, but can give assistance on how to use the facility once it is operational.

7) Institutional Relationships Affecting Water Management Program:

EPA has formal arrangements with the designated State agencies for the permit program (Minnesota Pollution Control Agency; North Dakota State Health Department). It also has informal relationships with other Federal and State agencies for the exchange of information.

8) Manpower Available for Water Resource Program:

The EPA offices in each state have limited manpower but are available for review and assistance as appropriate. The North Dakota Office (Bismarck) has one scientist. The Minnesota-Wisconsin District Office (Minneapolis) has 12 permanent positions, mainly scientific and engineering.

UPPER MISSISSIPPI RIVER BASIN COMMISSION, Souris-Red-Rainy Regional Committee.

1) Existing capability:

The Souris-Red-Rainy Committee is a subdivision of the Upper Mississippi River Basin Commission. It is engaged in water and

related land resources planning activities which are comprehensive and involve coordination of Federal, State, and local resource decisions into a joint plan. The Committee's area of jurisdiction includes the 60,000 square miles of the Souris, Red, and Rainy River basins.

2) Basis of Agency Authority:

The 1965 Water Resources Planning Act (Public Law 89-90) authorized the President of the United States to establish regional river basin planning commissions involving both Federal and State agencies. The Souris-Red-Rainy River Basins Commission was created in 1967. In 1973, its authority was transferred to the Upper Mississippi River Basin Commission, within which the Souris-Red-Rainy Regional Committee was established.

3) Types of Functional Authority:

a) Comprehensive planning:

The Souris-Red-Rainy Regional Committee is responsible for the formation of framework plans and regionwide priorities which take into account the needs and desires of the region's residents for conservation, development, and utilization of water and related land resources within the Souris, Red, and Rainy River basins. The committee also contributes information to National Assessment programs concerning water resources, and sponsors Regional Assessment activities. It conducts Level B studies, which identify and recommend plans to be carried out by agencies at various governmental levels, on water resources within its jurisdiction. It initiates Special Staff Studies to assist in the formulation of a comprehensive, coordinated, joint water resources plan.

b) Coordination:

The committee facilitates information exchange and coordinated planning among various governmental units, including planning efforts which take place outside its area of jurisdiction but which may affect, or be affected by, water resource decisions in the Souris, Red, and Rainy River basins.

c) General support activities:

The committee handles administrative responsibilities pertaining to the coordination of water resource planning activities, and sponsors meetings, seminars, and regional conferences on water related issues and problems. Its public information program also includes publication of a monthly newsletter and of "Information Bulletins" covering the results of Special Staff Studies.

4) Coordinating Mechanisms Present:

The Committee consists of representatives from the states of Minnesota and North Dakota; U.S. Departments of Agriculture, Army, Interior, and the Environmental Protection Agency; and the chairmen of the North Dakota and Minnesota Citizen Advisory Councils, which are appointed by the governors of the respective states. Input from all governmental levels and from interested citizens is thus included in the planning process.

5) Present Budget and Financial Resources:

The Committee receives funds from the Federal government and from the states of Minnesota and North Dakota. Total funds available are \$111,600, of which Minnesota and North Dakota each contribute \$15,000 and the Federal government contributes \$81,600.

6) Legal Limitations:

The Committee and Commission are responsible for formulating region-wide plans and priorities for submittal to the President of the United States through the U.S. Water Resources Council. The governors of Minnesota and North Dakota, Congress, and the heads of such Federal, State, interstate and international agencies as the President and governors shall direct, also receive the Commission and Committee reports.

7) Institutional Relationships Affecting Water Management Program:

The Committee serves as the principal agency for the coordination of Federal, State, interstate, local and non-governmental plans for the development of water and related land resources in the Souris, Red, and Rainy River basins.

8) Manpower Available for Water Resources Program:

The Committee's staff includes 2 professionals and 1 secretary. Staff responsibilities are primarily those of managing committee programs and conducting special staff investigations. The staff responds to public requests for information and serves as a link between the public and appropriate Federal and State agencies.

STATE AGENCIES - Minnesota

COMMISSIONER OF HEALTH

1) Existing Capability:

The Commissioner of Health is charged with the improvement of public health. With regard to water resources, he or she is concerned with safety of drinking water supplies. The Commissioner also serves on the Water Resources Planning Board.

2) Basis of Agency Authority:

Minnesota statutes S. 144.05, 144.12, 144.381 through 144.388, 115.71 through 115.82, Cap. 156A, Laws 1977, Chap 446 set forth the powers and duties of the Commissioner of Health which concern the safety of water.

3) Types of Functional Authority:

The Commissioner examines plans for public water supplies, plumbing systems and swimming pools; examines and licenses plumbers; and inspects plumbing installations. He or she investigates and sets standards for water supply systems; approves the certification of water supply operators; regulates and licenses water well contractors; sets standards for and inspects water wells; reviews water supply reports from district personnel and advises on water supply development and water treatment. The Department's Section of Analytic and Environmental Health Services makes qualitative and quantitative analyses on water, sewage, and wastes as well as air, food, and other environmental components, and approves other laboratories in the state to perform bacteriological analyses of water.

4) Coordinating Mechanisms Present:

There are seven functional divisions under the Commissioner. The Division of Environmental Health has the major responsibility concerning water resources; it coordinates with the other divisions. Through his or her power to review plans and set standards, the Commissioner insures that local communities provide healthful water supplies.

5) Present Budget and Financial Resources:

The Commissioner receives both state and Federal funding; under the Federal Water Quality program and Safe Drinking Water Act of 1974 salaries of many members of the professional staff in the Division of Environmental Health will come from Federal funds.

6) Legal Limitations:

The Commissioner has the power to adopt and enforce standards concerning water supplies and sanitation practices. The Commissioner does not have the capacity to provide construction or funding of measures to protect water quality.

7) Institutional Relationships Affecting Water Management Program:

The Commissioner supervises district sanitation offices throughout the state. He or she surveys and approves laboratories in the state which perform bacteriological analyses on water.

8) Manpower Available for Water Resources Program:

The Division of Environmental Health employs nine engineers, three hydrologists, six and one-half sanitarians, an attorney and a training officer (sets up programs to train persons in the operation of water supply facilities). Additional engineers will be hired in the future through the Federal Water Quality Program and the Safe Drinking Water Act of 1974.

DEPARTMENT OF NATURAL RESOURCES

1) Existing Capability:

The DNR is charged with conservation and promotion of wise use of the natural resources of the state. It consists of six divisions: Forestry, Fish and Wildlife, Waters, Minerals, Parks and Recreation, and Enforcement. The Bureaus of Engineering Information and Education, Lands, Legal, Field Services, Licenses, Fiscal, and Planning serve the entire department. While water resources management is primarily the responsibility of the Division of Waters, several other divisions are also involved with water-related programs. A separate Office of Water Planning, directly responsible to the Commissioner of the DNR, is concerned with planning involving water resources.

2) Basis of Agency Authority:

Minnesota Statutes, Section 84, concerns the Department of Natural Resources and its predecessor, the Department of Conservation.

3) Types of Functional Authority:

a) Division of Waters

The Division of Waters has general administrative jurisdiction over public waters, both surface and underground. It issues permits for the use of water, for lake and stream bed work, and for bridges and crossings; collects hydrologic data and undertakes water resources studies; makes recommendations to the Water Resources Board concerning petitions for establishment of watershed districts; and maintains

state-owned dams. As the major agency concerned with Minnesota's water resources, it develops a general water resources conservation program, prepares reports on water management problems, and represents the state in water matters.

b) Division of Forestry

Watershed management through forest development is the primary function of this Division.

c) Division of Fish and Wildlife

This division is responsible for the protection and management of wildlife; its activities include land acquisition, lake and stream improvement, research on aquatic weed control and pollution, watershed planning, and surveys of lakes and streams. It maintains a summary of information on each body of water surveyed.

d) Division of Parks and Recreation

This division manages land in the state park system, including water resources on state park property.

e) Office of Water Planning

The responsibility for water resources planning, previously held by the DNR Bureau of Planning and subsequently the Division of Waters, was transferred during the past year to the Office of Water Planning. The Office of Water Planning will be studying water allocation policy and making recommendations to the legislature.

4) Coordinating Mechanisms Present:

Coordination with Federal and other state agencies in regard to water resources is accomplished primarily through the Division of Waters. In cooperation with the U.S. Geological Survey's Water Resources Division, it collects basic hydrologic data. It reviews proposals and plans of Federal agencies for flood control, navigation, and water conservation. The DNR has a representative on the Water Planning Board, which was created by the 1977 legislature to replace the Water Resources Council; the Board is charged with completion of the Statewide Water and Land Resources Plan.

5) Present Budget and Financial Resources:

The Department of Natural Resources has an annual budget of about \$50,000,000, mainly from state funds but also including Federal funds. The city of East Grand Forks has a DNR grant of \$97,500 for development of park facilities along the river in the southeast part of the city. EDA funds were used to purchase the land and construct water storage facilities; when construction is finished, park development will proceed on the site.

6) Legal Limitations:

The DNR is responsible for administrative and regulatory activities pertaining to the state's water resources, but the state auditor retains the power to disburse funds involved in water resources programs.

7) Institutional Relationships Affecting Water Management Program:

The several divisions of the DNR work with each other and with other state agencies, Federal agencies, and local agencies.

8) Manpower Available for Water Resource Program:

The DNR maintains a central office in St. Paul, Minnesota. Besides the staff of the various Divisions and Bureaus, there is a Director of Water Planning, and a Natural Resources Planning Director who reviews and coordinates long-range planning involving natural resources. The Division of Fish and Wildlife maintains a field office in Thief River Falls. Presently most water management concerns are handled through the central office, but new rules and regulations are being drafted which would transfer the granting of many water permits to the field offices.

POLLUTION CONTROL AGENCY

1) Existing Capability:

The Minnesota Pollution Control Agency is responsible for creating and administering regulations and standards concerning air and water quality, sewage and solid waste disposal, hazardous waste disposal, and noise levels.

2) Basis of Agency Authority:

The Minnesota Water Pollution Control Act of 1945 (Minnesota Statutes Annotated, Vol. 9, Sect. 115.01 through 115.09) created a state water pollution control commission. In 1967, the Minnesota Pollution Agency was created (MSA9:116.02); it absorbed the powers and duties of the Minnesota Water Pollution Control Commission, and the latter was abolished. The MPCA is the designated State agency for the administration of certain Federal water resources programs such as the NPDES permit and section 208 planning programs, and for certification of water resources projects for federal license or permit; these authorities derive from the Federal Water Pollution Control Act Amendments of 1972 (PL92-500).

3) Types of Functional Authority:

a) Administration and Enforcement:

The MPCA is responsible for administration and enforcement of all laws relating to the pollution of any of the waters of Minnesota. In carrying out these duties, it may conduct investigations and hold hearings (MSA9:115.03). It may issue orders for water pollution abatement and for construction of waste disposal systems.

b) Standards:

The MPCA establishes pollution standards for waters of the state, giving consideration to the various uses of those waters. It has authority to order the cessation of discharges which result in violation of these standards. It also sets standards for the quality of effluents discharged by a source, and for the performance of waste treatment and disposal systems. It also may set standards limiting the amounts of nutrients in cleaning agents and water conditioning agents (MSA9:115.03).

c) Permits and Certification:

The MPCA issues permits for the discharge of sewage, industrial, and other wastes and for the installation or operation of disposal systems. It may require plans for such disposal systems to be submitted for its approval, and may inspect a system to insure compliance with applicable regulations. It may revoke or modify any permit if necessary to prevent or abate pollution (MSA9:115.03). The agency is responsible for the training and certification of waste treatment plant operators.

4) Coordinating Mechanisms Present:

The Federal NPDES permit program is administered under an inter-agency agreement with the U.S. Environmental Protection Agency. The MPCA is represented on the Red River Water Pollution Board of the International Joint Commission. MSA116.05 authorizes the MPCA to enter into agreements with other agencies of the Federal government and of Minnesota, with other states, and with municipalities.

5) Present Budget and Financial Resources:

The total MPCA program budget for the fiscal year 1976 and 1977 biennium was \$11,758,000; for fiscal year 1978 and 1979 it is \$12,600,000, not including construction grants and similar funds. Federal (EPA) program grants may make up from 33% to 44% of the total. The Minnesota legislature also appropriates funds for MPCA operations. Municipal waste disposal system planning, design and construction grant funds are potentially available to applicants in the East Grand Forks area. A contract for non-point source 208 planning coordination activities has been awarded to the Region 1 Northwest Regional Development Commission (which includes the East Grand Forks area).

6) Legal Limitations:

The agency may examine records pertaining to any discharge system and may enter public or private property for the purposes of obtaining information or conducting investigations (MSA9:116.091). It may grant variances from its standards to avoid undue hardship, after holding a public hearing (MSA9:116.07). All hearings and records of the MPCA are open to the public, excepting specific categories of confidential information set forth in MSA9:116.075.

7) Institutional Relationships Affecting Water Management Program:

The Executive Director of the Agency by statute is designated a member of the Minnesota Environmental Quality Board, the Minnesota Water Planning Board and the Minnesota Soil and Water Conservation Board. Through such memberships, the Agency actively participates in development of water and related resource use policies and plans and the coordinating mechanisms for carrying them out. The Agency also has developed an integrated citizen and interagency advisory committee for the 208 planning process which includes representation from the regional development commissions and state and Federal agencies concerned with water and related land use planning.

8) Manpower Available for Water Resource Program:

The director and pollution control specialists (2) of the regional office in Fergus Falls are available for consultation on local resource projects. In addition, central office staff of the Division of Water Quality may be called upon as necessary to assist with particular kinds of projects. The Division has staff with background in many aspects of water resources programs, including water quality studies and management planning, environmental impact evaluation, and disposal facilities engineering, construction and operation.

SOIL AND WATER CONSERVATION BOARD

1) Existing Capability:

The Board provides administrative leadership and guidance to 92 local soil and water conservation districts.

2) Basis of Agency Authority:

The Board was established by Minnesota Statutes 40.03 and serves as an agency within the Department of Natural Resources.

3) Types of Functional Authority:

The Board assists the local soil and water conservation districts in carrying out their programs; it facilitates coordination of information and efforts among the local districts; it acts as a liaison between local districts and Federal and State agencies. It has the authority to subdivide and consolidate districts. It administers the allocation of state funds to districts and administers a state cost sharing program for the installation of enduring soil and water conservation practices.

4) Coordinating Mechanisms Present:

The Board administers the agricultural nonpoint source water pollution control program, part of the water quality management program required under Section 208 of the Federal Water Pollution Control Act of 1972; it has contracted with the U.S. Soil Conservation Service, the USDA Agricultural Research Service, and the University of Minnesota for the

research and technical application aspects of the program. The Board also administers Federal funds provided for the 208 program. The funding comes through the U.S. Environmental Protection Agency, which has contracted with the Minnesota Pollution Control Agency (MPCA) for allocation of these funds; the MPCA has delegated the responsibility to the Board.

5) Present Budget and Financial Resources:

The Board's biennial budget includes state funding of \$276,290 for operations and maintenance, \$850,000 for grants-in-aid to local conservation districts, \$500,000 for a sediment and erosion control demonstration program and a \$3 million program of cost-sharing with land occupiers for the installation of soil and water conservation practices. Additionally, the Board has a contract for \$325,000 to conduct agricultural non-point pollution planning required by Section 208 of PL 92-500.

6) Legal Limitations:

The Board exists as an agency within the Department of Natural Resources (DNR). The Commissioner of DNR is required to provide the Board with a separate budget, an administrative officer and such employees as the Board requires to carry out its responsibilities under Chapter 40. The Board determines the qualifications, duties and compensation of its employees.

7) Institutional Relationships Affecting Water Management Program:

The Board is an agency within the Department of Natural Resources and operates under the authorities established in Chapter 40, Minnesota Revised Statutes (MRS). Four of its members are ex-officio members as follows: the Director of the Agricultural Extension Service of the University of Minnesota; the Dean of the Institute of Agriculture of the University of Minnesota; the Director of the Pollution Control Agency; and the Commissioner of Agriculture. The State Conservationist of the U.S. Soil Conservation Service, Association of Minnesota Counties, League of Minnesota Cities and the Minnesota Association of Soil and Water Conservation Districts serve as advisory members to the Board.

8) Manpower Available for Water Resource Program:

The Board is the state administrative agency of the 92 Soil and Water Conservation Districts in Minnesota and maintains a central staff of six professionals in addition to providing a professional Board Representative in each of the six DNR regions.

WATER RESOURCES BOARD

1) Existing Capability:

The Board decides questions of state water policy where conflicting public interests are involved. Its purpose is to provide consistent, systematic administration of water law.

2) Basis of Agency Authority:

The Water Resources Board was created by the Minnesota Legislature in 1955. Its organization is covered in Minnesota Statutes S 105.71.

3) Types of Functional Authority:

a) Water Policy:

The Board has the authority to decide questions of water policy where use, disposal, pollution, or conservation of water is involved. It may resolve inconsistencies between statutes and determine the proper application of water policy to a case.

b) Watershed Districts:

The Board has jurisdiction over the establishment of watershed districts. Representatives of a proposed watershed district must file a petition with the Board. After a public hearing the Board issues an order establishing the watershed district. (Chapter 112, Minnesota Statutes)

4) Coordinating Mechanisms Present:

The Board, in making decisions on water policy, helps define the responsibilities of various agencies and contributes to coordination of their efforts.

5) Present Budget and Financial Resources:

The Board has an annual budget of \$76,000, provided by state funds, which includes salaries and expenses for hearings.

6) Legal Limitations:

The Board's decisions are legally binding unless successfully contested in the courts.

7) Institutional Relationships Affecting Water Management Program:

The governor, the heads of state departments and agencies, or a Federal agency involved in a question of water policy may petition to place the matter under the Board's jurisdiction.

8) Manpower Available for Water Resource Program:

The Board employs an engineer and an agronomist who provide professional advice; legal staff is provided by the Attorney General's office. It also employs a stenographer.

STATE AGENCIES - North Dakota

DEPARTMENT OF HEALTH

1) Existing Capability:

The Department of Health is concerned with the prevention, control and abatement of water pollution within the state, the quality of public water supplies and management of water quality.

2) Basis of Agency Authority:

North Dakota Statute 61-28 sets forth the powers and duties of the State Department of Health which involve water quality and supply. The 1977 Legislature enacted legislation giving the Department responsibilities comparable to the Federal Safe Drinking Water Act (93-523).

3) Types of Functional Authority:

The Department of Health conducts investigations and research on water pollution; sets standards for discharge of wastes into water; and reviews plans and inspects construction of waste disposal systems. It may issue orders for the cessation of waste discharges or the construction or modification of treatment systems to produce compliance with water pollution standards. As the designated state water pollution control agency, the Department acts to insure that the state meets State and Federal standards for water pollution control, and administers Federal grants to communities for construction of waste treatment facilities.

The Department also has responsibilities in water supply management and planning. No permits are required, but the Department reviews plans and may require changes to assure proper construction and safe operation of drinking water facilities. There are no grants for the water supply program.

4) Coordinating Mechanisms Present:

The Department is authorized by law to advise, consult, and cooperate with other State agencies, the Federal government, other states, interstate agencies, local governments, industries, and other affected groups. It is designated as the state water pollution control agency for purposes of the Federal Water Pollution Control Act and as the agency for implementation of programs under the Federal Safe Drinking Water Act.

5) Present Budget and Financial Resources:

The Division of Water Supply and Pollution Control has an annual budget (1977-78) of approximately \$756,000, of which about \$173,000 comes from State funds and the balance from Federal funding. This budget is allocated as follows:

	<u>State</u>	<u>Federal</u>	<u>Total</u>
Water Pollution Control	\$65,000	\$227,000	\$292,000
Water Supply	\$68,000	\$205,000	\$273,000
Water Quality Planning	\$40,000	\$151,000	\$191,000

6) Legal Limitations:

Adoption, amendment, or repeal of any regulations or water quality standards must be preceded by a public hearing held by the Department and the State Water Pollution Control Board. The water pollution control board advises the Department in the administration of laws relating to water pollution.

7) Institutional Relationships Affecting Water Management Program:

The head of the Department of Health (or a designated representative) serves on the State Water Pollution Control Board, which advises and directs the Department in its water pollution control responsibilities. The Department's state sanitary engineer serves as executive secretary to the board.

8) Manpower Available for Water Resources Program:

The Department employs a state sanitary engineer who is concerned with environmental aspects of water, air, and solid waste programs. The division of water supply and pollution control is staffed by a director and seventeen professional and technical employees.

GAME AND FISH DEPARTMENT

1) Existing Capability:

The Game and Fish Department is concerned with the propagation, management and protection of fish, game birds, game animals, and harmless birds and animals in the state; the construction and operation of state game refuges and state fish hatcheries; and the protection and management of endangered species of wildlife.

2) Basis of Agency Authority:

The duties of the State Game and Fish Commissioner are set forth in section 20.1-02-04 of the North Dakota Century Code, 1977 Supplement. The powers of the Commissioner are given in section 20.1-02-05 of the 1977 Supplement, North Dakota Century Code.

3) Types of Functional Authority:

a) Management of Fish and Game Habitat:

The Department is responsible for the construction and operation of all state fish hatcheries, state game farms, game refuges and reserves for the propagation and protection of fish, game birds and game animals. It also maintains a program of breeding, propagation and distribution of fish, game birds and game animals. For these purposes the Commissioner may purchase, lease, condemn or sell real estate in the name of the State, subject to the approval of the Governor.

b) Enforcement of Fish and Game Laws:

The Department is responsible for the enforcement of state laws involving fish, game birds, game animals and harmless birds and animals. The Commissioner recommends annually to the Governor the fishing and hunting regulations for the State. The Commissioner may order additional protection for any fish with an open season when he deems such protection is needed. The Commissioner may also promulgate rules and regulations and issue permits for the introduction of fish, game animals or furbearers.

c) Research and Education:

The Department collects data on fish and wildlife in the State and distributes this information for the conservation education of the public.

d) Protection of Endangered Species of Wildlife:

The Department may establish programs and regulations for the preservation and management of threatened or endangered species of wildlife.

4) Coordinating Mechanisms Present:

The Commissioner coordinates with the U.S. Fish and Wildlife Service and other similar agencies on the propagation and distribution of fish in the waters of the State; with the U.S. Bureau of Reclamation for the management of lands in the Heart Butte Reservoir area; and with the State Agriculture Commissioner, the U.S. Fish and Wildlife Service, and other agencies for the destruction of predatory or destructive wild animals.

5) Present Budget and Financial Resources:

The operating budget for the Department during 1977-78 has been set at \$6,374,572, of which approximately \$2,990,000 will come from Federal funds and approximately \$3,384,000 will come from license fees and other non-tax revenues.

6) Legal Limitations:

Hunting and fishing license fees shall be used only for departmental purposes. Land acquisitions by the Department must have the approval of the Board of County Commissioners in the county in which the land is located.

7) Institutional Relationships Affecting Water Management Program:

The Department receives funding from the U.S. Fish and Wildlife Service for fish and game habitat and propagation studies. It also cooperates with the State Commissioner of Agriculture and the U.S. Fish and Wildlife Service on the control of predatory animals and destructive birds. The State Game and Fish Commissioner serves as a member of the State Nature Preserves Advisory Board.

8) Manpower Available for Water Resources Program:

The Department consists of a Commissioner, a Deputy Commissioner, and a scientific and technical staff of approximately 33 individuals. The staff of the Fisheries Division, which would be most closely concerned with this water resources program, has 8 scientific and technical staff members.

PARKS AND RECREATION DEPARTMENT

1) Existing Capability:

The Department is responsible for conservation of natural areas in North Dakota through a system of state parks, and for development of opportunities for outdoor recreation through parks and recreation areas.

2) Basis of Agency Authority:

The Department was created by the 1977 North Dakota Legislature (North Dakota Century Code, 1977 Supplement, Section 55-08-01) which provided for the merging of two state agencies, the North Dakota State Park Service and the State Outdoor Recreation Agency, into the new department. The bill also created the Outdoor Recreation Interagency Council (NDCC, 1977 Supplement, Section 55-08-02.1) composed of the heads (or designated representatives) of all state departments and commissions whose concerns relate to outdoor recreation.

3) Types of Functional Authority:

The Department is authorized to acquire and manage land for state parks and recreation areas. It plans and develops such areas for outdoor recreation, and regulates visitor use.

4) Coordinating Mechanisms Present:

The Department works in coordination with the State Game and Fish Department and the State Water Commission in planning the use of state dams, reservoirs, and surrounding lands for recreational and wildlife purposes.

5) Present Budget and Financial Resources:

The budget for the biennium 1977-1979 is approximately \$11 million, or \$5.5 million per year, for all Department activities. Funds come from state appropriations and from the Federal government's Land and Water Conservation Fund. The Department presently has no projects in the study area and does not expect any in the near future.

6) Legal Limitations:

In its management of water resources the Department must meet regulations set up by the State Water Commission.

7) Institutional Relationships Affecting Water Management Program:

The Department receives Federal funding through the U.S. Bureau of Outdoor Recreation for the acquisition and management of parks and recreation areas.

8) Manpower Available for Water Resource Program:

The Department employs two recreation planners at the state level whose responsibilities include planning for recreational opportunities at all levels of government within North Dakota.

WATER COMMISSION

1) Existing Capability:

The Commission has general jurisdiction over the waters of the state.

2) Basis of Agency Authority:

North Dakota Statutes 61-02-01 through 61-02-46 authorize the State Water Commission and set forth its powers and duties.

3) Types of Functional Authority:

a) Water Resource Projects:

The Commission has jurisdiction over all water resource projects in the state, and may investigate and plan further projects in order to carry out its powers and duties. It may regulate water flow to minimize flood damage and stream pollution; impound water for municipal, industrial, and rural water supplies; provide for water for irrigation, livestock, power generation, and industrial purposes; improve channels of streams; and construct and maintain dams, reservoirs, diversion canals, and drainage channels.

b) Regulations:

The Commission may establish rules and regulations for sale of water and water rights, for control of water supplies, for control of water pollution, and for financing of water development projects.

c) Land Acquisition:

The Commission may acquire, own, and develop lands for irrigation, water conservation, and dams and reservoirs. It may acquire easements and rights-of-way for diversion and distributing systems.

4) Coordinating Mechanisms Present:

The Commission is authorized by Statute 61-02-24 to enter into agreements for investigation, planning, conservation, utilization, and development of water resources with the United States and any of its departments or agencies; with Minnesota, South Dakota, Montana, and Wyoming; and with Canada, its provinces, and departments and agencies of Canada or its provinces. Statute 61-02-24.1 authorizes cooperation, including financial assistance, with political subdivisions of the state. The Grand Forks County Water Management District is currently receiving funding assistance for several drain projects.

5) Present Budget and Financial Resources:

The biennial budget for the state of North Dakota is about \$5 million. The Commission has recently approved grants totaling \$130,000 for several drain projects in Grand Forks County, and assistance for a diking program north of Grand Forks is a future possibility.

6) Legal Limitations:

The previous limitation in Statute 61-02-15 that the Commission cannot declare waters to be polluted without such a finding by the State Department of Health and that it cannot limit the authority of the Department of Health to prevent water pollution was repealed by the 1977 Legislature.

7) Institutional Relationships Affecting Water Management Program:

Other state agencies and officers may make agreements concerning water conservation, flood control, irrigation, water pollution, and other water-related matters, but must first secure the approval of the State Water Commission.

8) Manpower Available for Water Resource Program:

The Commission does not maintain area offices; on the State level, twenty-two professional staff and twenty technicians are employed.

SUB-STATE REGIONAL AGENCIES - Minnesota

NORTHWEST REGIONAL DEVELOPMENT COMMISSION (Water Quality Management Advisory Committee), Crookston, MN

1) Existing Capability:

The Committee functions as a source of local advisory input; it evaluates data and formulates policy concerning water quality issues (primarily non-point sources). It also facilitates local citizen participation in decisions affecting water quality.

2) Basis of Agency Authority:

The Committee was established by the NWRDC on November 23, 1976 as part of Minnesota's water quality management planning process. Each state is required to implement such a plan in accordance with the Federal Water Pollution Control Act of 1972 (PL92-500), section 208.

3) Types of Functional Authority:

a) Analysis and Review

The Committee reviews and comments on the analyses of non-point source impacts drawn up by technical agencies (State and local level organizations, agencies and institutions).

b) Recommendations

When all available alternatives for management plans (to include an assessment of land management practices as well as the institutions which administer the practices) have been analyzed and data compiled, a representative from the Committee participates in the State Plan Development Task Force which makes recommendations as to the best management practices for reducing non-point pollution.

4) Coordinating Mechanisms Present:

The Minnesota Pollution Control Agency (MPCA) coordinates water quality management planning for the area of Minnesota outside the Twin Cities metropolitan area.

5) Present Budget and Financial Resources:

The Committee has a budget of \$12,000 for a two-year period; this includes no salaries.

6) Legal Limitations:

The Committee has no regulatory authority; it is advisory only.

7) Institutional Relationships Affecting Water Management Program:

Through the input and evaluation process set up by the MPCA, the Committee receives information from various agencies, organizations, and universities charged with carrying out the technical analysis work. The Committee's recommendations, based on the results of these analyses, go to the State Task Force, the MPCA Board, and the governor of Minnesota, who is responsible for adoption of a water quality management plan in final form.

8) Manpower Available For Water Resource Program:

The Committee has one resource planner concerned primarily with water quality and secondarily with land use.

SUB-STATE REGIONAL AGENCIES - North Dakota

RED RIVER REGIONAL PLANNING COUNCIL, GRAFTON, North Dakota

1) Existing Capability:

The Red River Regional Planning Council is concerned with land use planning in four counties in northeastern North Dakota.

2) Basis of Agency Authority:

The Council's existence was originally established through a proclamation of the governor of North Dakota. In 1977, Senate Bill 2126, which authorized the creation of regional planning councils, became law.

3) Types of Functional Authority:

The Council is involved in community and land use planning and provides technical assistance for writing Federal grant proposals.

4) Coordinating Mechanisms Present:

The Council initiates projects after requests from area communities. It attempts to coordinate planning on a regional basis.

5) Present Budget and Financial Resources:

The Council's activities are supported by grants from the U.S. Department of Housing and Urban Development, the Old West Regional Commission, and the North Dakota Law Enforcement Council. The present budget is \$95,000.

6) Legal Limitations:

The Council's role is advisory only; it has no authority for taxation or decision making.

7) Institutional Relationships Affecting Water Resource Program:

The Council cooperates with the North Dakota Water Commission on water quality studies.

8) Manpower Available For Water Resource Program:

As the Council is concerned primarily with land use, it has little input of manpower into water resource programs.

COUNTIES

GRAND FORKS COUNTY, North Dakota

1) Existing Capability:

The county has responsibility for zoning in rural areas and for the provision of water and sewer services in recreation service districts. Drainage and flood control are regulated by the county through the water management district. (This is a separate entity and is described in the section on Other Local Governmental Agencies.)

2) Basis of Agency Authority:

County zoning commissions are authorized by section 11-33 of the North Dakota Century Code. Recreation service districts are permitted by section 11-28.2 of the North Dakota Century Code.

3) Types of Functional Authority:

The county has authority over zoning except where governed by city or township zoning ordinance. Counties may authorize recreation service districts for the purposes (among others) of providing sewers and water to residences and establishments within its boundaries. Grand Forks County has a zoning commission but does not have a recreation service district.

4) Coordinating Mechanisms Present:

In matters of zoning the planning commission may cooperate with township, city, other county, State, regional or Federal agencies or officials.

5) Present Budget and Financial Resources:

The zoning commission is financed by a county-wide mill levy. The 1976-77 budget is \$6,809.85.

6) Legal Limitations:

Counties may not prevent townships from making zoning regulations, but townships may relinquish their zoning power to the county. The county zoning does not affect cities but cities may relinquish zoning power to the county. (North Dakota Century Code 11-33-30.)

7) Institutional Relationships Affecting Water Management Program:

Except as described under the Grand Forks County Water Management District and for zoning, the county has no direct relationship concerning water management programs.

8) Manpower Available for Water Resources Program:

None, directly.

POLK COUNTY, Minnesota

1) Existing Capability:

The county has authority over water supply and sewer systems in any area of the county not organized into cities. It has authority over public drainage and flood control and may extend drainage systems into or through a city in order to secure an outlet for drainage waters. Polk County has its own planning and zoning commission, but townships can supersede county authority.

2) Basis of Agency Authority:

Minnesota Statute 116Z gives a county's Board of Commissioners authority to establish public water and sewer systems. MS 106.021 authorizes a county to construct and maintain public drainage systems and flood structures.

3) Types of Functional Authority:

The Board of Commissioners may authorize the preparation of plans for facilities to obtain, store, treat, and distribute water for domestic, commercial, and industrial use, and to collect, treat, and dispose of sewage and wastewater. It may acquire land and easements for such facilities; contract for their construction; establish, collect, and revise user fees; make special assessments against benefitted property; issue bonds to finance construction; and require residents of the service area to connect to the system. The Board, through letting of contracts, may construct drainage ditches, channelize waterways, drain lakes, and construct flood control structures.

4) Coordinating Mechanisms Present:

Counties may participate in comprehensive planning efforts coordinated by State agencies or watershed districts. Eligibility for Federal grants for water facilities may require that the county prepare a long-range plan for the area involved.

5) Present Budget and Financial Resources:

The budget of Polk County is on a calendar year basis. For 1977 the budget is about \$6,250,000 of which approximately \$2,500,000 is from county taxes, the rest from State and Federal funds. There is no specific funding for water-related programs.

6) Legal Limitations:

Water supplies must meet health standards of the Minnesota Department of Health; discharges from sewage treatment must meet Minnesota Pollution Control Agency standards. Before authorizing ditch construction, lake drainage, or flood control improvements, the county must obtain from the Department of Natural Resources (DNR) an opinion that public waters are not involved; or, if public waters are involved, must obtain a permit from the DNR for the proposed work.

7) Institutional Relationships Affecting Water Management Program:

While the county may undertake water management projects within its boundaries, its activities where public waters are concerned are under the jurisdiction of the state. Thus the county acts under the authority of a more inclusive institution, the state government.

8) Manpower Available for Water Resources Program:

The county contracts with professional planners, engineers, and construction companies for designing and building water facilities, rather than maintaining a staff of its own.

TOWNSHIPS

MINNESOTA TOWNSHIPS

1) Existing Capability:

Townships have authority to provide water service to the residents of the township, and they may establish their own planning and zoning regulations which may supersede the county regulations.

2) Basis of Agency Authority:

Minnesota Statute 365.20 authorizes townships to "build and construct water mains, with all the necessary pipes, hydrants, and other appliances for the purpose of providing water for the inhabitants thereof...."

3) Types of Functional Authority:

Townships may provide water service to the residents of the township and establish their own zoning regulations.

4) Coordinating Mechanisms Present:

None of the townships in the project area provide water service to their residents.

Zoning regulations in the project area townships are as follows:

Grand Forks Township: Mainly follow the county regulations; no junkyards or refineries. The intent is to retain the land for farming and residential use.

Huntsville Township: Mainly follow the county regulations; an area along U.S. Highway 2 is zoned industrial; an area along Minnesota Trunk Highway 220 is zoned residential; requirements for large animals (horses, cattle) include more than 3 acres for one animal, more than 5 acres for 2, and more than 10 acres for 3 or more animals; residential areas require 1 acre for house and garage, no stock; special permits are required for junkyards, businesses, animal shelters, etc. Changes in regulations are now being considered.

Rhinehart Township: The township regulations permit only agriculture and residential use; the residential use is restricted to one single family residence per 5 acre lot.

Sullivan Township: The township regulation stipulates single family dwellings, no apartments; buildings must be located 100 feet from roadways.

5) Present Budget and Financial Resources:

The 1977-78 budgets for each of the Minnesota townships in the project area are given below.

<u>Township</u>	<u>Budget</u>
Grand Forks	\$3,500
Huntsville	\$13,000
Rhinehart	Not Available
Sullivan	Not Available

6) Legal Limitations:

Townships have authority only in areas specified by Minnesota Statutes.

7) Institutional Relationships Affecting Water Management Program:

No special arrangements are specified. The townships involved are interested in the project.

8) Manpower Available for Water Resources Program:

None available except on a volunteer basis.

The following Minnesota townships are included within the project area. The names of the chairperson of the Township Board of Supervisors and of the Township Clerk are also given.

<u>Township</u>	<u>Township Board</u>	
	<u>Chairperson</u>	<u>Clerk</u>
Grand Forks	Donald Peterson	Howard Hoff
Huntsville	Keith Driscoll	Esther Danielson
Rhinehart	Lawrence Donahue	Denise Cariveau
Sullivan	George Krejci	Joseph Bolstad

NORTH DAKOTA TOWNSHIPS

1) Existing Capability:

Townships have authority over zoning within the township, except for areas within two miles of cities which may be zoned by city planning and zoning commissions.

2) Basis of Agency Authority:

The North Dakota Century Code Section 58-03-11 authorizes the establishment of zoning districts.

3) Types of Functional Authority:

Townships may establish one or more zoning districts for the regulation of construction, alteration or use of buildings, the height and size of structures, lot size, population density, and the location and use of land and buildings. (North Dakota Century Code 58-03.11).

4) Coordinating Mechanisms Present:

Townships may jointly operate zoning commissions and may relinquish zoning responsibilities to the county.

In 1966, Brenna, Falconer, Grand Forks and Rye townships (the four townships surrounding the city of Grand Forks) released their zoning rights to Grand Forks County. The other 6 townships in the project area do not have special zoning ordinances nor have they relinquished their zoning rights to the county. They are responsible for their own zoning and all follow the county regulations.

When the Grand Forks Air Force Base was built north of Emerado in 1956, the county established zoning regulations to protect the land surrounding the Base. Land immediately adjacent to the Base was placed in Zone 1 which allows single family dwellings and agricultural buildings. Zone 2 surrounds Zone 1 and extends out approximately 50,000 feet from the center of the Base; it is zoned to permit certain types of businesses as well as residential and agricultural uses. The remainder of the county is in Zone 3, except the 4 townships listed above. Junkyards and slaughterhouses are not allowed in any zone without a special permit.

5) Present Budget and Financial Resources:

The 1977-78 budgets proposed for the North Dakota townships in the project area are given below.

<u>Township</u>	<u>Proposed 1977-78 Budget</u>
Blooming	\$7,000.00
Brenna	\$8,000.00
Chester	\$6,000.00
Falconer	\$7,000.00
Ferry	\$10,000.00
Grand Forks	\$20,000.00
Mekinock	\$4,500.00
Oakville	\$4,000.00
Rye	\$7,000.00
Walle	\$10,000.00

6) Legal Limitations:

"No townships shall possess or exercise any corporate powers except those enumerated in this chapter, those specifically given by law, or those necessary to the exercise of powers enumerated or granted."
(North Dakota Century Code 58-03-02).

Section 40-47-01.1 of the North Dakota Century Code permits cities to extend the application of city zoning regulations to unincorporated territory within $\frac{1}{2}$ mile of the city's limits for cities of less than 5,000 population, to within 1 mile for cities of more than 5,000 and less than 25,000 population, and to within 2 miles for cities of 25,000 or more population. The city of Grand Forks has extended its zoning regulations to the 2 mile limit in Brenna, Falconer, Grand Forks, and Rye townships.

7) Institutional Relationships Affecting Water Management Program:

No formal relationships exist except in the matter of relinquishing zoning to the county or of zoning in the two mile area surrounding the city of Grand Forks.

8) Manpower Available for Water Resources Program:

None available except on a volunteer basis.

The following North Dakota townships are included within the project area. The names of the chairperson of the Board of Township Supervisors and of the Township Clerk are also given.

<u>Township</u>	<u>Township Board</u>	
	<u>Chairperson</u>	<u>Clerk</u>
Blooming	Duaine Lund	Earl Clemetson
Brenna	Gary Lund	(vacant)
Chester	Rodney Martin	Robert Martin
Falconer	Richard Klava	John A. Campbell
Ferry	Glenn Callahan	Gerald Nagle
Grand Forks	Marvin Birkholz	Robert Fortin
Mekinock	Merlyn Skold	Ross Erickson
Oakville	Bernhard Knutson	Ralph Sauer
Rye	Henry T. Stromsodt	Daniel Dubuque
Walle	Elner Kvasager	William Mitchell

CITIES

EAST GRAND FORKS, Minnesota

1) Existing Capability:

The city of East Grand Forks provides water supply and sewage disposal services to residents and businesses within the city limits. The city regulates zoning within the city but does not at present extend its zoning rights to the two mile area surrounding the city.

2) Basis of Agency Authority:

Minnesota Statute 412 gives municipalities the power to establish and regulate water supply systems, sewer systems, and drainage systems within the city limits. MS 115.46 provides that municipalities may levy taxes and issue bonds to finance construction and operation of a sewage and wastewater disposal system; these sources of revenue are not subject to limitation.

3) Types of Functional Authority:

a) Water, Light, Power, and Building Commission

The East Grand Forks City Code gives the Water, Light, Power, and Building Commission jurisdiction over the city water supply system. The Commission has the authority to purchase water, set rates and adopt regulations for water service, contract for construction and improvement of water supply facilities, and employ personnel necessary to carry out its functions.

b) Sewage Department

The City Code gives the Sewage Department jurisdiction over sewers, wastewater treatment, and eventual discharge of treated water.

4) Coordinating Mechanisms Present:

City authorities cooperate with Federal and State agencies, which set standards the city operations must meet and which may provide financial and/or technical assistance for water supply or wastewater projects.

5) Present Budget and Financial Resources:

Funds are derived largely from taxes on property within the city limits; Federal or State funding is available for certain projects, as discussed in the sections on Federal and State agencies. The present (1976-77) water budget is approximately \$315,000; the sewage department budget is approximately \$105,000.

6) Legal Limitations:

The city's water supplies must meet Minnesota Department of Health standards. The Minnesota Pollution Control Agency (MPCA) certifies the operator of the sewage treatment plant. Discharges from the treatment plant must meet MPCA standards.

7) Institutional Relationships Affecting Water Management Program:

As in the case of counties, a city's jurisdiction over water management is subject to regulations of the state, since water-related activities of a city may clearly affect areas outside of the city.

8) Manpower Available for Water Resource Program:

The water plant employs a chief operator and five assistants; the sewage department has a treatment plant operator and two assistants.

EMERADO, North Dakota

1) Existing Capability:

The city of Emerado provides water and sewage treatment to its residents and business places.

2) Basis of Agency Authority:

The North Dakota Century Code Section 40-05-01 authorizes municipalities to operate a waterworks system (subsection #36), to construct and operate public works projects for municipal water supply, flood control, water conservation, prevention of stream pollution, and for sewage disposal (subsection #59), to prevent the pollution of any water supply belonging to the municipality within one mile of the limits of the municipality (subsection #61), and to construct and operate flood control projects within and adjacent to the municipality (subsection #68).

3) Types of Functional Authority:

Emerado maintains its own sewage system including secondary treatment lagoons northeast of the city. The water supply is obtained by wells from a nearby aquifer and transported to the city and distributed to residents and businesses.

4) Coordinating Mechanisms Present:

North Dakota municipalities are authorized to cooperate in water and wastewater treatment and may enter into contracts with governmental agencies and municipalities outside the state. (North Dakota Century Code 40-34-15.)

5) Present Budget and Financial Resources:

The 1976-77 budget was \$10,042.15 with an additional \$656.88 allocated for a park. Funds come from a mill levy and State and Federal funds.

6) Legal Limitations:

Municipalities have only those powers specifically granted to them by North Dakota statutes unless governed by the Home Rule Statute. Emerado is not a Home Rule City.

7) Institutional Relationships Affecting Water Management Program:

None.

8) Manpower Available for Water Resource Program:

The city does not have any manpower that can be used by this program except to be informed by the status of the project.

GRAND FORKS, North Dakota

1) Existing Capability:

The city of Grand Forks provides water supply and sewage disposal to residents and businesses within the city limits and provides water for the Grand Forks Air Base. The city regulates the zoning within the city and in the unincorporated area within two miles of the city limits.

2) Basis of Agency Authority:

Grand Forks operates under the provisions of a Home Rule Charter. Home Rule in cities is authorized by Chapter 40-05.1 of the North Dakota Century Code. The powers of Home Rule cities are listed in subsection 06. These powers are broad and non-specific. In general, Home Rule cities may exercise self-government to the maximum extent within the powers enumerated.

3) Types of Functional Authority:

The Water Department operates the water treatment facility, the water intake pumps and lines from the sources in the Red and Red Lake

Rivers, the sludge filter plant, the water storage facilities and the water distribution lines. Department personnel read and maintain the individual water meters and prepare billings according to rates set by the City Council.

The Sewer Department operates the system of storm and sanitary sewer lines in the city and the lagoon treatment facility northwest of the city. Except for two industries where pre-treatment plants are operated, all wastes from the city are transported untreated into the lagoon. The lagoons are monitored and discharges empty into the Red River.

4) Coordinating Mechanisms Present:

Subsection 15 of the Home Rule in Cities Chapter (40-05.1) of the North Dakota Century Code authorizes cities "to contract with and receive grants from any other governmental entity or agency, with respect to any local, State, or Federal program, project or works."

5) Present Budget and Financial Resources:

The 1976-77 city budget is \$16,089,151.67 and includes fees collected for services such as water and sewage, and funds collected from the 67.85 mills assessed against property in the city. Of this budget, \$788,369.03 is allocated to the operation of the Wastewater Department and \$1,638,543.98 is allocated to the operation of the Water Department. The funds for the Wastewater and Water Departments come entirely from fees charged property owners for these services. In addition, the Wastewater Department has included in its budget \$1,500,000 for expansion of the city's sewage lagoons. One-fourth of this cost will come from sewage revenues and 3/4 from an anticipated grant from the U.S. Environmental Protection Agency.

6) Legal Limitations:

As a Home Rule city, Grand Forks may act under the powers granted in the North Dakota Century Code (40-05.1-06). Generally, unless powers have been specifically reserved by the state, the city has authority to govern itself. Water quality and standards and water pollution regulations established by the state are applicable in the city.

7) Institutional Relationships Affecting Water Management Program:

The city cooperates with the State Health Department in the operation of the water and sewage treatment facilities. Grand Forks obtains a large part of its water supply from the Red Lake River in East Grand Forks, Minnesota. Grand Forks maintains the intake facility and the pipeline to the treatment plant. Grand Forks has obtained the rights to Red Lake River water from the state of Minnesota. Just recently, Grand Forks and East Grand Forks completed the interconnection of their processed water distribution lines.

8) Manpower Available for Water Resource Program:

The Water Department is directed by Mr. Al Forsman, who heads a staff of 26 employees. Mr. Keith Cornell directs the Wastewater Department which employs 11 individuals. Both men would be available for involvement in a water resources program.

MANVEL, North Dakota

1) Existing Capability:

Manvel provides sewage disposal to city residents. It does not provide water supply services; residents obtain water from the Agassiz Water Users Association.

2) Basis of Agency Authority:

The North Dakota Century Code Section 40-05-01 authorizes municipalities to operate a waterworks system (subsection #36), to construct and operate public works projects for municipal water supply, flood control, water conservation, prevention of stream pollution, and for sewage disposal (subsection #59), to prevent the pollution of any water supply belonging to the municipality within one mile of the limits of the municipality (subsection #61), and to construct and operate flood control projects within and adjacent to the municipality (subsection #68).

3) Types of Functional Authority:

The city maintains sewage collection lines and a lagoon. No water is discharged from the lagoon, as evaporation is sufficient to maintain the lagoon level.

4) Coordinating Mechanisms Present:

North Dakota municipalities are authorized to cooperate in water and wastewater treatment and may enter into contracts with governmental agencies and municipalities outside the state. (North Dakota Century Code 40-34-15).

5) Present Budget and Financial Resources:

The budget for sewage operations is approximately \$3,000 per year. Funds come from county property taxes and from user fees. Construction of the system was supported by a grant (\$97,000) and a loan (\$126,000) from the Farmers Home Administration.

6) Legal Limitations:

Municipalities have only those powers specifically granted to them by North Dakota Statute, unless governed by the Home Rule Statute. Manvel is not a Home Rule city.

7) Institutional Relationships Affecting Water Management Program:

None.

8) Manpower Available for Water Resources Program:

The city does not have any manpower that can be used in this program except to be informed of the status of the project.

THOMPSON, North Dakota

1) Existing Capability:

Thompson provides sewage disposal to its residents, but has nothing to do with water supply. Residents buy water directly from the Grand Forks-Traill Water Users Association.

2) Basis of Agency Authority:

The North Dakota Century Code Section 40-05-01 authorizes municipalities to operate a waterworks system (subsection #36), to construct and operate public works projects for municipal water supply, flood control, water conservation, prevention of stream pollution, and for sewage disposal (subsection #59), to prevent the pollution of any water supply belonging to the municipality within one mile of the limits of the municipality (subsection #61), and to construct and operate flood control projects within and adjacent to the municipality (subsection #68).

3) Types of Functional Authority:

Presently the city has a system of sewage collection lines and a lagoon, and is in the process of building a new lagoon. After treatment, waste is discharged into Elm Coulee. The city anticipates that future growth will make additional treatment facilities necessary, and has applied for an EPA grant to help finance assessment of its wastewater treatment needs.

4) Coordinating Mechanisms Present:

North Dakota municipalities are authorized to cooperate in water and wastewater treatment and may enter into contracts with governmental agencies and municipalities outside the state. (North Dakota Century Code 40-34-15).

5) Present Budget and Financial Resources:

The 1976-77 budget was \$14,714.08 and was generated by a local mill levy supplemented by State and Federal funds.

6) Legal Limitations:

Municipalities have only those powers specifically granted to them by North Dakota Statute, unless governed by the Home Rule Statute. Thompson is not a Home Rule city.

7) Institutional Relationships Affecting Water Management Program:

None.

8) Manpower Available for Water Resources Program:

The city does not have any water resource personnel. If the waste treatment system needs attention, a consulting engineer is consulted.

OTHER LOCAL GOVERNMENTAL AGENCIES

EASTERN GRAND FORKS COUNTY SOIL AND WATER CONSERVATION DISTRICT (North Dakota)

1) Existing Capability:

The district provides encouragement and technical assistance to residents, units of government and cities in the eastern portion of Grand Forks County in the proper uses of soil and water resources and related resource problems.

2) Basis of Agency Authority:

The county soil conservation districts are a political subdivision of the state, organized under Chapter 4-22 (North Dakota Century Code) of the Soil Conservation Districts Law. Each district in the county is governed by its own Board of Supervisors, elected at the general county election.

3) Types of Functional Authority:

A three-man Board of Supervisors, elected by the public, plus two appointed supervisors sets policies for the district. Utilizing personnel of Federal, State, and local agencies, the district organization works with people, government agencies and local units of government within the district area, especially farmers, on matters of soil and water conservation; shelterbelt plantings, irrigation management, and farm pond construction are examples.

4) Coordinating Mechanisms Present:

The Soil Conservation District's purpose is to plan and direct the program, obtain assistance, coordinate the help of government agencies, assign priority to resource development tasks, and serve as a community clearing house for information and services.

5) Present Budget and Financial Resources:

The Federal and State personnel who work in the district are paid by the respective agency. State and county funds are used for supervisors' expenses, clerical and part-time assistance. District funds (obtained through payment for services) are used for wages of conservation aides and for mileage reimbursement, supervisor expenses and conservation promotional activities. District funds are obtained from earnings of rental of heavy equipment, tree planting machinery and tree planting stock purchased by the District.

6) Legal Limitations:

A soil conservation district may exercise the public powers ordinarily exercised by a governmental subdivision of the state relating to soil and water resources. Projects undertaken by the district are primarily on private lands at the request of the owner. State regulations concerning alteration, diversion, or pollution of public waters must not be violated in carrying out the project.

7) Institutional Relationships Affecting Water Management Program:

The programs of the district are operated through a Memorandum of Understanding between the district organization and Federal and State government.

8) Manpower Available for Water Resource Program:

The district supervisors may request assistance from any Federal, State or local agency. Most of the technical services are furnished by the Soil Conservation Service of the U.S. Department of Agriculture, the only agency that receives Federal funds earmarked by Congress for direct technical assistance to conservation districts. Personnel provided are conservationists, engineers, soil scientists, biologists, range specialists, agronomists, and conservation aides.

GRAND FORKS AIR BASE ENVIRONMENTAL SUPPORT (North Dakota)

1) Existing Capability:

Environmental Support provides water supply and waste disposal services to the air base.

2) Basis of Agency Authority:

The facilities are maintained under the authority of the U.S. Air Force to provide housing and associated services to members of the Air Force and their dependents.

3) Types of Functional Authority:

The agency purchases water from the city of Grand Forks and maintains the water distribution systems on the base. It maintains its own sewage lagoons.

4) Coordinating Mechanisms Present:

The agency purchases water from the city of Grand Forks.

5) Present Budget and Financial Resources:

Funds are provided by the Federal government; no fees or taxes are assessed against users of the system.

6) Legal Limitations:

The agency is responsible only for service to facilities on the Grand Forks Air Force Base.

7) Institutional Relationships Affecting Water Management Program:

The Air Base Environmental Support will work with other agencies in projects relating to water supply and water treatment for the air base as permitted by Department of Defense regulations.

8) Manpower Available for Water Resource Program:

One supervisor and seventeen workers carry out the duties of the agency.

GRAND FORKS COUNTY WATER MANAGEMENT DISTRICT (North Dakota)

1) Existing Capability:

The district is concerned with the planning, construction and operation of water conservation structures; the maintenance of water levels and water flow from structures within the district; the regulation and control of flood waters within the district; the regulation of water use, pollution, etc., of waters within the district; and the planning, construction and operation of water supply and wastewater systems.

2) Basis of Agency Authority:

Section 61-16-02 of the North Dakota Century Code provides for the establishment of water conservation and flood control districts. Section 61-21-65 provides for the consolidation of drainage districts into water management districts. The powers and duties of water management districts are described in section 61-16-11.

3) Types of Functional Authority:

The district is authorized to plan, locate, construct, modify, repair, maintain and regulate water conservation devices, and to regulate reservoirs and other water storage devices within the district. It may also regulate the water levels and flow of water in streams modified by flood control and water conservation projects within the district. It may modify streams or other water courses within the district to prevent

or control flooding. It may regulate the pollution or contamination of the water resources, streams or bodies of water included in the district. It may construct, operate and maintain recreational facilities on or adjacent to water resource developments. It may undertake legal action to maintain water resources of the district in proper function. It may prevent the destruction of native woodland adjacent to riverbanks. And, it may plan, construct, operate and maintain water supply and sewer systems within the district.

4) Coordinating Mechanisms Present:

Coordination with Federal, State and local governmental agencies, with Canadian Federal, Provincial and local governmental agencies, and with individuals and corporations is authorized in section 61-16-19 of the North Dakota Century Code.

5) Present Budget and Financial Resources:

The current operating budget for 1976-77 is \$144,000. This money is provided from mill levy, not to exceed 3 mills on each dollar of taxable valuation in the district, established by Grand Forks County. In the construction of water management projects additional funds may be received from the State Water Commission, from Federal agencies and by assessment against benefitted property.

6) Legal Limitations:

The district is not authorized to construct structures capable of storing more than 12½ acre-feet of water. Proposed projects must be approved by the State Water Commission.

7) Institutional Relationships Affecting Water Management Program:

The water management boards are specifically encouraged to co-operate with local, State, Federal, and Canadian agencies and with individuals and corporations (North Dakota Century Code 61-16-19).

8) Manpower Available for Water Resource Program:

The Grand Forks County Water Management District does not have any fulltime employees. The members of the district board are area residents; the chairman generally serves as liaison with other agencies.

LOWER RED RIVER WATERSHED MANAGEMENT BOARD (Minnesota)

1) Existing Capability:

The Lower Red River Watershed Management Board is concerned with coordination of water management programs of seven watersheds in north-western Minnesota which drain into the lower Red River.

2) Basis of Agency Authority:

The Board was formed by an act of the Minnesota Legislature during the 1976 session. The Joint Powers Agreement among the seven local watershed districts sets forth the working agreements and procedures for the Board.

3) Types of Functional Authority:

The Board evaluates projects suggested by local watershed districts and decides which projects will receive funding.

4) Coordinating Mechanisms Present:

The formation of the Board provides a means of coordination among the participating local watershed districts.

5) Present Budget and Financial Resources:

The Board authorized the seven local watersheds to institute a 2-mill levy, of which half will go to the local districts and half to the Board. Estimated 1977 fiscal year budget is \$300,000. Approved projects may be fully or partially funded depending on available revenue and other sources of funds.

6) Legal Limitations:

Work is confined to flood control and water impoundment. The Board cooperates with the Department of Natural Resources and Army Corps of Engineers. The Joint Powers Agreement and Minnesota Watershed Act also govern activities of the Watershed Board.

7) Institutional Relationships Affecting Water Management Program:

The Board works with various public agencies including the Army Corps of Engineers, U.S. Soil Conservation Service, Minnesota Department of Natural Resources, and Souris-Red-Rainy River Basin Committee.

8) Manpower Available for Water Resource Program:

The seven-member board is available for evaluation and coordination purposes, but the local districts are primarily responsible for projects undertaken in their respective areas.

RED LAKE WATERSHED DISTRICT (Minnesota)

1) Existing Capability:

The Red Lake Watershed District includes those portions of ten counties in northwestern Minnesota which drain into the Red Lake River. Its concerns include water conservation and management, and flood protection.

2) Basis of Agency Authority:

Under the provisions of the Watershed Act (MS Chapter 112) the Minnesota Water Resources Board authorized the District's principal office at Thief River Falls, Minnesota, and directed which counties would appoint representatives to the Board of Managers.

3) Types of Functional Authority:

a) Works:

The Board of Managers has the authority to develop, initiate and construct projects. It may acquire, operate, construct and maintain dams, dikes, water supply systems and appurtenant works. It may construct, alter, repair or change the course of any natural or artificial waterway.

b) Regulation:

The Board of Managers have adopted, and may amend, rules and regulations to regulate, conserve and control the use of water within the district.

c) Permit Review:

The Board of Managers reviews applications received by the Minnesota Department of Natural Resources for permits to construct drainage ditches; to construct roads, bridges, and culverts which may affect water resources; and to appropriate water. It makes recommendations to the Minnesota Department of Natural Resources, which issues the permits.

d) Investigation and Monitoring:

The district engineers inspect dredged rivers for needed maintenance work. They monitor run-off characteristics in the watershed through a stream gauging program, which will provide valuable information for flood control and drainage planning. Investigation and development of potential impoundment sites is also a concern of the board.

e) Financing:

The Board is involved in financing of public construction projects which affect water resources, including flood control structures, drainage ditches, and river dredging.

4) Coordinating Mechanisms Present:

The Board of Managers and its engineering staff are involved in meetings sponsored by various federal, state, and local groups to consider water resource management problems.

5) Present Budget and Financial Resources:

Funds for administrative purposes are raised by mill levies; state law limits funds raised by mill levy to \$75,000. The approximate budget for 1977 is \$70,000. Funds for specific projects are assessed against the benefit area.

6) Legal Limitations:

Watershed projects are subject to the permit requirements of the Minnesota Department of Natural Resources and the U.S. Army Corps of Engineers.

7) Institutional Relationships Affecting Water Management Program:

The Board has a representative on the Lower Red River Watershed Management Board, an organization of seven watershed districts in northwestern Minnesota. The Board also cooperates with water resource agencies at all governmental levels and with wildlife agencies which are managing water resources for waterfowl production. Board members perform a liaison function with the county governments which appoint them.

8) Manpower Available for Water Resource Program:

The district employs two engineers who are available for consultation.

WEST POLK COUNTY SOIL AND WATER CONSERVATION DISTRICT (Minnesota)

1) Existing Capability:

The district organization encourages and assists county residents in wise use of soil and water resources.

2) Basis of Agency Authority:

The county conservation districts are locally organized groups which facilitate the work of the U.S. Soil Conservation Service. Each Soil Conservation Service unit corresponds to a local district unit, on the level of either a county or a portion of a county. The Districts are locally sponsored groups, organized as a governmental subdivision under Chapter 40 of Minnesota State Law, which facilitate the work of the U.S. Soil Conservation Service.

LOCAL PRIVATE RURAL WATER SYSTEMS

AGASSIZ WATER USERS ASSOCIATION (North Dakota)

1) Existing Capability:

The association is concerned with water supply and distribution in rural areas and small towns. Its service area includes north-eastern Grand Forks County (north of the city of Grand Forks) and south-eastern Walsh County, North Dakota. The city of Manvel is included in the service area.

2) Basis of Agency Authority:

The association was organized by area residents as a non-profit corporation.

3) Types of Functional Authority:

The association obtains water from the Inkster aquifer near Inkster, North Dakota. It constructs and maintains trunk lines distributing water to users, and determines user fees.

4) Coordinating Mechanisms Present:

The association cooperates with the North Dakota State Water Commission.

5) Present Budget and Financial Resources:

The present annual operating expenses, including interest on a Farmers Home Administration loan, are approximately \$192,000; depreciation is approximately \$64,000. Income from user fees is approximately \$229,000.

6) Legal Limitations:

The association's activities are regulated by the North Dakota Water Commission. It cannot compel an area resident to join, but can require membership as a prerequisite for services.

7) Institutional Relationships Affecting Water Management:

As a private, non-profit association, it has no established relationships with governmental agencies except those it serves and those regulating its activities.

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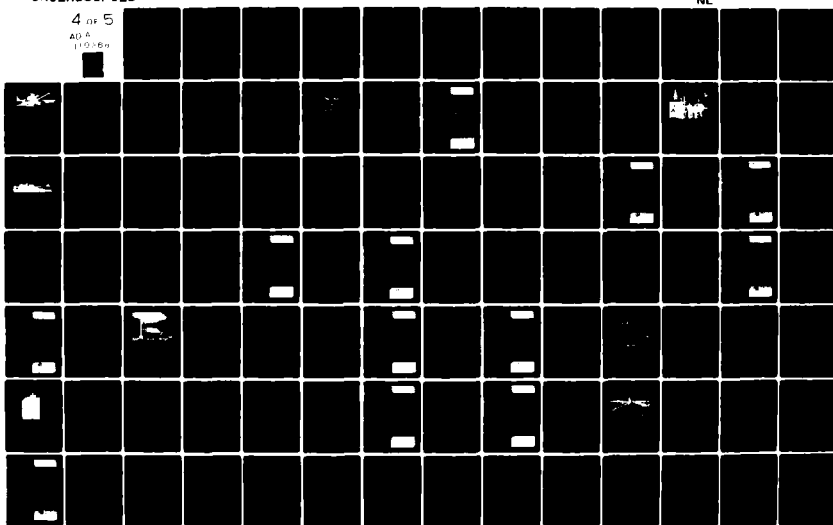
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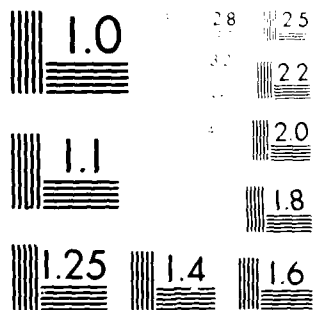
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8) Manpower Available for Water Resource Program:

The association does not employ its own professional staff; a consulting engineer is called in when necessary.

GRAND FORKS-TRAILL WATER USERS ASSOCIATION (North Dakota)

1) Existing Capability:

The association is concerned with water supply and distribution in rural areas and small towns. Its service area covers the southeastern part of Grand Forks County (south of the city of Grand Forks) and the northern portion of Traill County, North Dakota. The city of Thompson and Brenna, Chester, Grand Forks, Oakville and Walle townships are served by this association.

2) Basis of Agency Authority:

The association was organized by area residents as a non-profit corporation.

3) Types of Functional Authority:

The association obtains water from the Elk Valley aquifer near Northwood. It constructs and maintains trunk lines distributing water to users, and determines user fees.

4) Coordinating Mechanisms Present:

The association cooperates with the North Dakota State Water Commission.

5) Present Budget and Financial Resources:

The present annual budget is approximately \$400,000. Expenses include repayment of a Farmers Home Administration loan, water distribution, and maintenance. Income is derived from user fees.

6) Legal Limitations:

The association is a private corporation; its activities are regulated by the North Dakota Water Commission. It cannot compel an area resident to join, but can require membership as a prerequisite for services.

7) Institutional Relationships Affecting Water Management Program:

As a private, non-profit association, it has no established relationships with governmental agencies except those it serves and those regulating its activities.

8) Manpower Available for Water Resources Program:

Staff includes a supervisor and two maintenance technicians; their work is limited to facilities of the association.

MARSHALL AND POLK RURAL WATER SYSTEM (Minnesota)

1) Existing Capability:

The system's purpose is to assure sufficient quality and quantity of potable water for rural water users. The area of service is roughly western Marshall County and northwestern Polk County, Minnesota.

2) Basis of Agency Authority:

The system was organized by area residents and established under the provisions of Minnesota Statute Chapter 116 A, Public Water and Sewer Systems, as amended.

3) Types of Functional Authority:

The system provides water to rural users; its responsibilities include construction of a distribution system and maintenance of water lines.

4) Coordinating Mechanisms Present:

The system cooperates with State agencies such as the Minnesota Department of Natural Resources and Minnesota Department of Health.

5) Present Budget and Financial Resources:

The system has received a loan and a grant from the Farmers Home Administration; revenues from the sale of water are a source of income. The budget for operations and maintenance (excluding loan repayment) is approximately \$50,000 annually.

6) Legal Limitations:

The system is regulated by the DNR, which issues permits for water use, and by the State Department of Health, which sets standards for construction of water supply facilities and for safety of water supplies. It cannot compel area residents to join, but can require membership as a prerequisite for services.

7) Institutional Relationships Affecting Water Management Program:

The system was established, as required under Minnesota law, through the district court and is operated under the authority of the county commissioners of the counties involved.

8) Manpower Available for Water Resource Program:

The system employs a manager/operator and a secretary/bookkeeper. They work only within the area served by the system.

LOCAL PUBLIC INTEREST ORGANIZATIONS

A number of public interest organizations have an interest in water resource development in the Grand Forks-East Grand Forks area. The list presented below is of area organizations that are currently active and that might have an interest in the Urban Water Resources Study. Excluded from this list are chambers of commerce, labor unions, private clubs and lodges, service clubs, fraternal organizations, garden clubs, gun clubs, etc.

Minnesota

- Farm Bureau
- Farmers Union
- Red River Valley Potato Growers Association

North Dakota

- Belmont Neighborhood Association
- Citizens League for Environment and Natural Resources
- Ducks Unlimited
- Farm Bureau
- Farmers Union
- Lake Agassiz Neighborhood Association
- League of Women Voters
- National Audubon Society
- Near Northside Neighborhood Association
- North Dakota Wildlife Federation
- Quad County Community Action Agency

Each of these organizations is briefly described in the following pages.

Belmont Neighborhood Association, Grand Forks

No formal officers

Peggy Jensen - usually in charge
618 Belmont Rd.
Grand Forks, ND 58201

Purpose: To maintain quality of life in the neighborhood and combat influences which would disrupt it.

Citizens' League for Environment and Natural Resources (C.L.E.A.N.)

President: Jerry Waletzko

Secretary-Treasurer: Liz Kube

Mailing Address: Liz Kube
501 Seward
Grand Forks, ND 58201

Purpose: To increase awareness and promote action on land use, conservation, and environmental issues.

Ducks Unlimited, Grand Forks Chapter

Chairman: Dr. John Duerre

Secretary-Treasurer: George Newton

Mailing Address: Dr. John Duerre
918 N. 26th
Grand Forks, ND 58201

Purpose: To promote conservation of waterfowl habitat and wise waterfowl hunting practices.

Farm Bureau, Grand Forks County Chapter

President: Arnold Johnson

Vice-president: Boyd Haugen

County Secretary: Jean Hanson

Office secretary and treasurer: Marian LeClerc

Mailing Address: P.O. Box 847
Grand Forks, ND 58201

Purpose: To examine the problems faced by farmers and to formulate appropriate action, including efforts to influence legislation affecting the farmer.

Farm Bureau, Polk County Chapter

President: Charles Sylvester

Vice-president: Roger Beiswenger

Secretary-Treasurer: Earl Wagner

Mailing Address: Charles Sylvester
Fisher, MN 56723

Purpose: To examine the problems faced by farmers and to formulate appropriate action, including efforts to influence legislation affecting the farmer.

Farmers Union, Grand Forks County Chapter

President: Harry Hjelmstad

Vice-president: Art Larson

Secretary-Treasurer: Mrs. Clarence Urnsen

Mailing Address: Harry Hjelmstad
Reynolds, ND 58275

Purpose: To promote the family farm and work for better living conditions for farm families.

Farmers Union, Polk County Chapter

President: Loran Stortroen

Secretary: Arthur Smith

Mailing Address: Loran Stortroen
R.R.
Climax, MN 56523

Purpose: To promote the family farm and work for better living conditions for farm families.

Lake Agassiz Neighborhood Association, Grand Forks

President: Bill Bolonchuk

Vice-president: Dr. Arnie Selbyg

Secretary: vacant at present

Mailing Address: 1038 Boyd Dr.
Grand Forks, ND 58201

Purpose: To develop a community designed for safe, healthful, and harmonious living, to promote property and civic rights of neighborhood property owners and residents, to care for improvements and maintenance of the community, to counsel with the city government regarding any zoning which may affect neighborhood property, and in general to promote the welfare of neighborhood residents and property owners.

League of Women Voters, Grand Forks Chapter

President: Joan Burke

Vice-presidents: Marilyn Korbach, Candy Vigen

Secretary: Patsy Nies

Treasurer: Beverly Osnowitz

Mailing Address: Joan Burke
3003 Olson Drive
Grand Forks, ND 58201

Purpose: To encourage citizens to participate actively in government and politics.

National Audubon Society, Grand Forks Chapter

President: Dr. Alan Cvancara

Vice-president: Terry Brokke

Secretary: Barb Sorrie

Treasurer: Matt Dordal

Mailing Address: P.O. Box 23
Grand Forks, ND 58201

Purpose: To promote the conservation of wildlife and the natural environment.

Near Northside Neighborhood Association, Grand Forks

Co-chairpersons: Dr. Eliot Glassheim
Elsie Reinhart
Donna Jorgenson

Secretart-Treasurer: Donna Jorgenson

Mailing Address: Eliot Glassheim
619 N. 3rd
Grand Forks, ND 58201

Purpose: To enhance the quality of life in the neighborhood area, and to deal with city issues affecting the area.

North Dakota Wildlife Federation, Grand Forks County Chapter

President: Dr. John Duerre

Vice-president: Gordy Linell

Secretary-Treasurer: John Soli

Mailing Address: P.O. Box 375
Grand Forks, ND 58201

Purpose: To protect and maintain habitat for wildlife.

Quad County Community Action Agency

President: Eugene O'Keefe

Vice-president: Richard Zolondik

Executive Director: Mike Thorsteinsen

Secretary-Treasurer: Dr. Eliot Glassheim

Mailing Address: 31 S. 3rd Street
Grand Forks, ND 58201

Red River Valley Potato Growers Association

President: W.G. Dickson

Vice-president: George Mack

Secretary: Paul Driscoll

Treasurer: John Donnelly

Mailing Address: P.O. Box 301
East Grand Forks, MN 56721

Purpose: To promote the potato business in Area I of Minnesota
and the state of North Dakota.

EXISTING AND SUGGESTED PROCEDURES FOR BI-STATE AGREEMENTS ON REGIONAL WATER RESOURCES FACILITIES

EXISTING AGREEMENTS

There are no existing formal agreements between North Dakota and Minnesota or between local subdivisions in the two states on regional water resources facilities. The only formal agreements in existence are the mutual aid fire agreements involving the East Grand Forks, Grand Forks, Grand Forks Air Force Base and Crookston, Minnesota fire departments and the five year agreement on the use of the Grand Forks landfill by the city of East Grand Forks.

Grand Forks obtains the major portion of its water supply from the Red Lake River in East Grand Forks and transports it across the Red River into Grand Forks for treatment and distribution. The city of Grand Forks has obtained the rights to water in the Red Lake River from the state of Minnesota. Grand Forks owns its water intake facility in East Grand Forks and also its pipeline from that facility under the Red River to the Grand Forks Water Treatment plant. Just recently, a line interconnecting the processed water systems of Grand Forks and East Grand Forks has been completed. There is no written agreement covering this interconnection.

PROPOSED BI-STATE AGREEMENT

Because the two major municipalities involved are located in different states, cooperation in water resources management can be arranged more satisfactorily by formal agreement than by contract or by the formation of a district.

The proposed agreement should consist of the following sections:

1) Statement of Agreement:

A form such as the following is appropriate: "It is agreed between the signatory governmental units that the provisions of this agreement should apply to...."

2) Statement of Functions to be Served:

The following is suggested: "Under this agreement coordination in planning, construction, operation, maintenance, distribution, etc., of processed water, wastewater, and flood prevention and control facilities, and other relevant services shall be carried out jointly by the participating parties."

3) Statement of Territory to be Served:

Presumably all territory in an organized municipality would be included. Townships may be involved in whole or in part. If in part, the part to be involved should be specified. The counties may be parties to this agreement, but probably only as agents for the townships involved. The states and the Federal government would probably be involved only in an advisory capacity, so that territory definitions for those units would not be relevant.

4) Statement of Provision for the Addition of Other Political Subdivisions to This Agreement:

Provision should be made in the agreement for the future addition of other political subdivisions provided such association is for mutual benefit.

5) Statement of Restriction:

Because of the special nature of the laws of the two states and of the Federal government, a statement qualifying the provisions of the agreement regarding effects on State and Federal regulations should be provided. For example, "Nothing in this agreement shall be construed to repeal or prevent the enactment of legislation or prevent the enforcement of any requirement by a signatory party."

6) Statement of Coordinating Personnel:

The agreement should designate a coordinating committee and specify the number of members thereof. Members should be appointed by the Chief Executive Officer of each of the local governmental units involved. The number of meetings and the method of calling same should also be spelled out. The chairmanship of the coordinating committee should be rotated (elected) among the membership on the basis of equal representation by local units.

7) Statement of Termination:

The agreement shall be in force until dissolved by mutual consent.

REFERENCES

- Army Corps of Engineers, St. Paul District. 1976. Grand Forks-East Grand Forks Urban Water Resources Study. Plan of Study. St. Paul, MN. 192 pp.
- Commission on Rural Water. 1974. Guide to State and Federal Policies and Practices in Rural Water-Sewer Development. Chicago, IL. 223 pp.
- Department of the Army, Office of the Chief of Engineers. 1975. Digest of Water Resources Policies. Washington, DC. 220 pp.
- Minnesota Statutes Annotated. 1969 ff. and Pocket Parts. West Publishing Co., St. Paul, MN.
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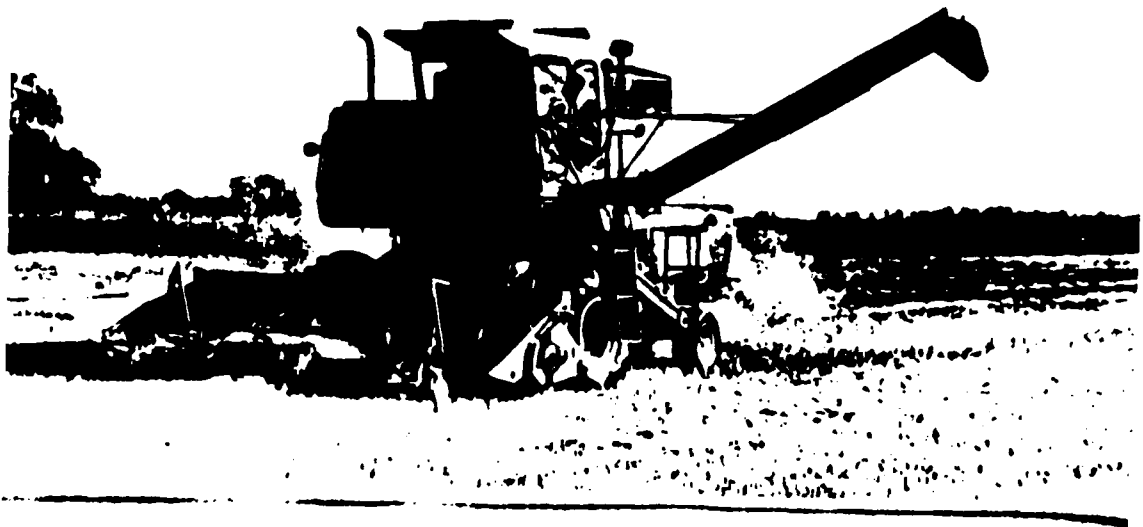
Economy -

1. Agriculture

From its early subsistence forms practiced by the Indians and early settlers, agriculture and its related activities are still the single most important sector of the regional economy. The early settlers, who first grew corn and other vegetable products for their family needs and then corn for livestock feed and marketing, soon found that the rich valley soils were ideal for spring wheat and other small grains. Completion of the railroads into the Grand Forks area in the early 1880's provided additional impetus for agricultural growth by creating a vastly wider market area (including the Minneapolis-St. Paul area) for local farm products.

The flat former glacial lake bed makes the Red River Valley one of the Nation's most productive small grain, potato, and sugar beet areas. The fertile topsoil was created by countless years of decaying original prairie vegetation. The very flat topography, with maximum relief changes of about 5 feet in the study area, enables the use of large equipment and a minimum of labor on the large farms. Natural drainage in the area is only poor to fair, requiring extensive drainage works in both counties. Because of the flat land and poor natural drainage, farmlands generally suffer extensive losses from direct flooding and prolonged inundation of immature crops. A description of agricultural resources of the study area is shown on plate 20.

As in most other areas of the Nation, the number of farms in the study area is continually declining, with a corresponding increase in farm size. During the 5-year period from 1969 to 1974, the number of farms in Grand Forks County decreased from 1,281 to 1,172 (-8.5 percent), with an increase in average farm size from 683 acres to 739 acres (+8.2 percent). Similar data for Polk County indicate a 10.9-percent decrease in the number of farms with an 11.8-percent increase in average farm acreage.



Total land area in farms is decreasing slightly, as indicated by a 5-year decrease of 1.1 percent in Grand Forks County and a 0.2-percent decrease in Polk County. For the present at least, continuing cropland losses as a result of urbanization are being nearly offset by use of more marginal lands and removal of windbreaks and other forest growth.

North Dakota is presently the Nation's leading producer of spring wheat, including durum wheat, rye, and flaxseed. Grand Forks County is the State's leading producer of barley, ranks second in wheat and potato production, and third in sunflower seeds. Similarly, Minnesota is one of the Nation's leading crop producers, ranking in the top 10 States for all principal crops grown in the region, except winter wheat. Within Minnesota, Polk County ranks as the leading producer of spring wheat, barley, potatoes, and sugar beets. It ranks in the top 10 counties for oats, sunflower seeds, milk production, stock sheep and lambs, and total hens and pullets. Agricultural production for crop year 1975 for Polk and Grand Forks Counties is presented in tables 47 and 48, respectively.

TABLE 47

AGRICULTURAL PRODUCTION BY COUNTY - 1975

Polk County

	<u>1975 Rank in State</u>	<u>Acres Harvested</u>	<u>Ave. Yield¹ per Acre</u>	<u>Total Production</u>	<u>1975 Dollar² Value</u>	<u>1971-75 5-yr. ave. prod.</u>
Corn-Grain	—	8,300	52.0 Bu.	431,600	1,035,800	356,400
Spring Wheat (No Durum)	1	383,500	40.9 Bu.	15,680,600	61,154,300	12,095,200
Durum Wheat	—	—	—	—	—	—
Oats	8	50,100	44.4 Bu.	2,222,600	3,222,600	4,939,700
Barley	1	164,800	47.5 Bu.	7,832,800	20,756,900	7,311,100
Rye	8	3,800	25.5 Bu.	96,800	232,300	100,500
All Hay	6	75,800	2.0 Tons	149,900	7,570,000	152,700
Flaxseed	11	5,500	12.0 Bu.	66,000	432,300	85,000
Potatoes	1	20,200	175 CWT	3,535,000	15,306,550	4,468,000
Sunflower Seed	6	11,800	1193 Lbs.	14,073,000	1,491,700	18,617,000
Sugar Beets	2	59,400	14.4 Tons	855,400	34,985,900 ³	794,200
Soybeans	—	1,800	16.1 Bu.	29,000	133,400	34,900

1. Based on production
2. Using statewide seasonal average price
3. Based on 1974 prices

Source: Reference 104, 107, 105, 108

TABLE 48

AGRICULTURAL PRODUCTION BY COUNTY - 1975

Grand Forks County

	<u>1975 Rank in State</u>	<u>Acres Harvested</u>	<u>Ave. Yield¹ per Acre</u>	<u>Total Production</u>	<u>1975 Dollar² Value</u>	<u>1971-75 5-yr. ave. prod.</u>
Corn-Grain	--	1,000	56.0 Bu.	56,000	134,400	--
Spring Wheat (No Durum)	2	302,000	34.7 Bu.	10,640,000	42,028,000	6,774,500
Durum Wheat	--	38,900	31.6 Bu.	1,229,200	5,592,900	474,800
Oats	--	28,900	52.2 Bu.	1,507,700	1,960,000	1,875,400
Barley	1	126,000	45.5 Bu.	5,731,600	18,111,900 ³	4,757,600
Rye	--	2,000	23.0 Bu.	45,900	105,570	41,100
All Hay	--	24,400	1.9 Tons	46,200	1,686,300	--
Flaxseed	--	14,000	9.6 Bu.	133,900	863,655	206,700
Potatoes	2	31,100	168 CWT	5,442,500	23,402,800	--
Sunflower Seed	3	58,800	1040 Lbs.	61,150,000	6,622,500	--
Sugar Beets	6	11,400	13.5 Tons	153,400	5,936,600 ³	--
Soybeans	--	0	--	--	--	--

1. Based on production

2. Using statewide seasonal average price

3. Based on 1974 prices

Source: References 105, 108

The average growing season of 127 days and average annual precipitation of about 20 inches make this area ideal for the production of small grains which can tolerate drought periods. Although spring wheat and barley remain the principal crops, in recent years the Red River Valley has emerged as an important potato, sugar beet, and sunflow seed producing area. In Polk County between 1971 and 1975, the production of spring wheat increased about 30 percent, and sugar beets over 40 percent. Oat and flax production experienced significant declines. Corn, hay, and potato production grew erratically during the period. Similar data for Grand Forks County indicate 1975 spring wheat production exceeded the preceding 5-year average by about 28 percent; barley production was some 20 percent above the 5-year average; oat and flaxseed production was substantially below the 5-year average and continuing an apparent downward trend. Typical yields for major crops in both counties for the years 1970-1975 are given in table 49.

TABLE 49

AVERAGE CROP YIELDS

<u>Crop</u>	<u>Grand Forks County</u>					<u>Polk County</u>				
	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>
Corn (Grain) (bu/ac)	53.0	36.0	30.0	30.0	56.0	60.0	60.0	55	40.9	52.0
All Wheat (bu/ac)	30.6	32.0	33.8	23.6	35.2	39.7	37.8	37.9	31.4	40.4
Spring Wheat ² (bu/ac)	31.0	32.5	32.5	23.6	35.8	40	38	38	31.6	40.9
Oats (bu/ac)	48.0	54.0	51.8*	33.8	52.2	61	53	47	35.8	44.4
Rye (bu/ac)	27.0	27.0	32.0	20.5	23.0	30	21	36	28.5	25.5
Barley (bu/ac)	40.0	41.0	39.0	35.0	45.5	50	49	42	40.4	47.5
Flax (bu/ac)	11.0	13.0	9.0	8.5	9.6	12	11	12	11.6	12.0
Sunflowers (lbs/ac)	--	850	950	780	1040	--	1000	950	600	1193
All Hay (ton)	1.69	1.52	1.60	1.88	1.89	1.8	2.2	1.8	2.1	2.0
Potatoes (cwt)	155	167	141	185	175	180	185	140	190	175
Sugar Beets (tons/ac)	10.9	12.5	14.2	10.1	13.5	?	14.4	16.6	12.5	14.4
Durum Wheat (bu/ac)	27.0	25.0	23.0	23.7	31.6	--	--	--	--	--

1. Based on harvested acres

2. Excluding Durum Wheat

Source: References 107 and 108

The study area includes a modern and efficient system for the harvesting, storage, and marketing of agricultural products. As an indication of modern mechanization, total agricultural employment in the two-county area declined from 5,977 in 1960 to 3,285 in 1970. Storage elevators are located on farms and in most small communities and are owned and managed by either private investors or farmer-owned cooperatives. The State-owned North Dakota Mill at Grand Forks provides area farmers an outlet for their milling products. An American Crystal Sugar Company sugar beet processing plant, with a capacity of approximately 8,000 tons per day, is located in East Grand Forks. Also located in East Grand Forks are 41 potato warehouses with a total storage of over 10 million bushels.

The marketing or movement of area agricultural products is handled by a truck-rail system. As an illustration of area grain movements of the commercially stored grain in Grand Forks County (1974-1975), about 58 percent of the spring wheat was shipped to national or foreign export markets via Duluth-Superior Harbor, 33 percent was sent to the Minneapolis-St. Paul area, and 9 percent was moved to west coast and other destinations. For barley shipments, about 22 percent went to Duluth-Superior, 75 percent went to Minneapolis-St. Paul, and only about 3 percent was shipped to west coast ports and other areas. The high concentration of barley shipments to the Minneapolis-St. Paul area is due to demand from malting firms in that area. Of the different movements from commercial storage in Grand Forks County, about one-half the hard red spring wheat is moved by rail, as is 88 percent of the barley and 23 percent of the flax.

Over 40 percent of all economic activity in the Grand Forks-East Grand Forks area is directly related to agriculture. Total 1974 income from cash crops, livestock production, forestry, and poultry production was \$76,890,000 for Grand Forks County and \$122,517,000 for Polk County. Approximately 2,000 persons were employed in Polk County agricultural activity in 1970, or 17 percent of total county employment. Similarly, 1,281 persons in Grand Forks County were engaged in agricultural related activities.



Key References

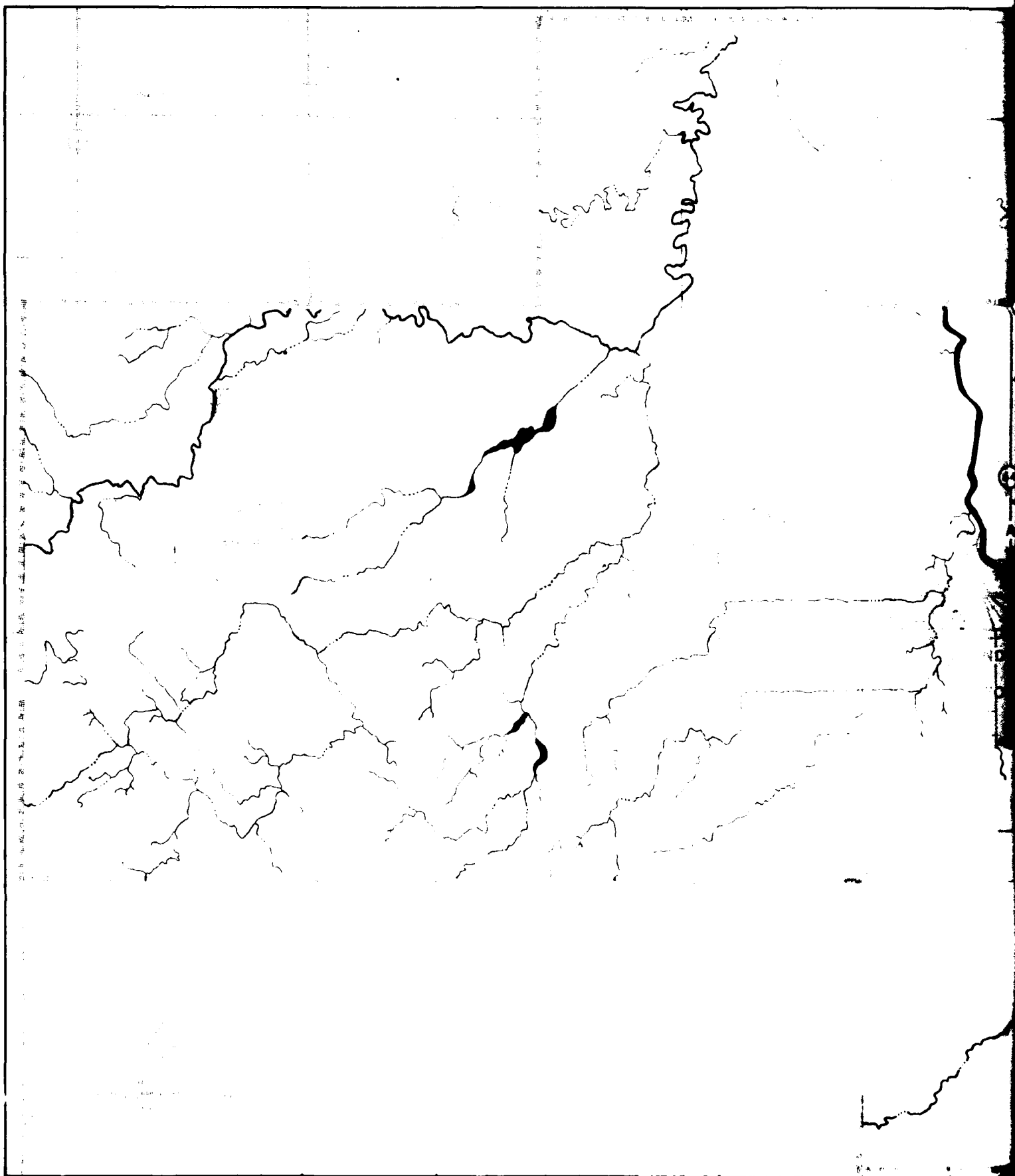
Bureau of the Census, 1974 Census of Agriculture - Minnesota, 1976

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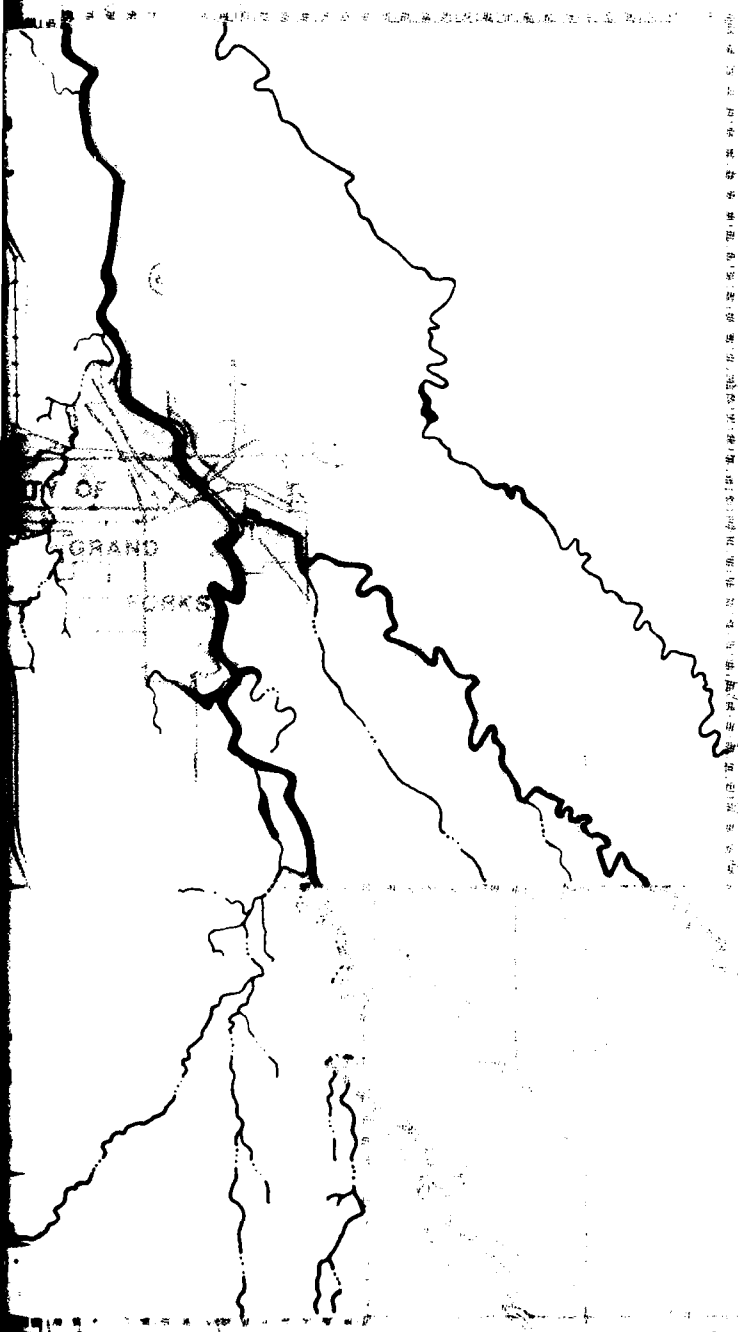
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**Grand Forks / East Grand Forks
URBAN WATER RESOURCES STUDY**



-  URBAN AREAS
-  WOODLANDS
-  CROPLANDS
-  GRASS AND OPEN LANDS
-  LAKES AND PONDS
-  MAJOR RIVER SYSTEMS
-  SECONDARY
OR INTERMITTENT STREAMS

SOURCE: REFERENCES 40,48,107,108.

PLATE 20

2. Commercial and Industrial Activity

The Grand Forks-East Grand Forks area has experienced continued change and growth to become the region's most important trade, service, and manufacturing center. In contrast to the earliest fur trapping, sawmill, boat building, and river navigation activities, present economic activity includes a wide variety of wholesale and retail trade, government and private services, and light and heavy industry. The growing economy is well illustrated by increasing sales and a more than threefold increase in building permit valuations as shown in table 50. Another major economic activity, the Grand Forks Air Force Base, contributes approximately \$11,700,000 annually to the area economy.

TABLE 50

TAXABLE SALES & BUILDING PERMITS - GRAND FORKS

<u>Year</u>	<u>Taxable Sales</u>	<u>Building Permits (Valuations)</u>
1950	\$ 46,424,000	\$ 6,833,718
1960	60,492,000	4,191,857
1970	105,030,497	10,800,715
1971	113,756,542	11,631,055
1972	127,000,000	20,183,066
1973	127,523,732	22,509,953
1974	139,315,249	11,778,416
1975	189,025,013	22,628,205

Source: Grand Forks Industrial Development Commission

Wholesale trade has significantly increased in the study area, both in terms of number of businesses and volume of sales. As shown in table 51, the growth in number of wholesale businesses in Grand Forks County was about twice that of Polk County from 1963 to 1972; however, the percentage growth in sales volume was about the same in both counties. Wholesale growth patterns in the two counties, excluding the two major communities, are quite different, as indicated by a slight decrease in business numbers in Grand Forks County outside of Grand Forks and a slower growth in sales volume. The proximity and size of Crookston and other Polk County communities have a significant influence on county business so that wholesale trade in Polk County outside of East Grand Forks is growing about as fast as that in East Grand Forks.

TABLE 51

WHOLESALE TRADE 1963-1972

<u>Location</u>	<u>Number of Establishments</u>			<u>Wholesale Sales</u>		
	<u>1963</u>	<u>1972</u>	<u>% Change 1963-1972</u>	<u>1963 x \$1000</u>	<u>1972 x \$1000</u>	<u>% Change 1963-1972</u>
Grand Forks	57	97	70.2	35,347	74,993	112.2
Grand Forks County	105	142	35.2	56,581	106,914	89.0
Remaining Grand Forks County	48	45	-6.2	21,234	31,921	50.3
East Grand Forks	21	28	33.3	12,952	27,859	115.1
Polk County	105	127	21.0	36,781	81,335	121.1
Remaining Polk County	84	99	17.9	23,829	53,476	124.4

Sources: 1963 and 1972 U.S. Census of Wholesale Trade, Minnesota and North Dakota

Retail trade activity has also experienced a significant increase in the urbanized study area. Grand Forks and Grand Forks County have both had modest increases in numbers of establishments and substantial increases in sales volume, as shown in table 52; however, excluding Grand Forks, the remainder of Grand Forks County had a decline in numbers of businesses, with a modest increase in total dollar volume. Retail trade in the Polk County and East Grand Forks areas showed modest increases in sales volume for both the city and county along with a slight decrease in business numbers for the county. Excluding East Grand Forks, the remaining area of the county experienced a slightly higher loss in numbers of businesses (4.6 percent vs. 2.0 percent) but a greater increase in sales volume because of retail trade activity in Crookston and other county communities.

TABLE 52

RETAIL TRADE 1963-1972

<u>Location</u>	<u>Number of Establishments</u>			<u>Wholesale Sales</u>		
	<u>1963</u>	<u>1972</u>	<u>% Change 1963-1972</u>	<u>1963 x \$1000</u>	<u>1972 x \$1000</u>	<u>% Change 1963-1972</u>
Grand Forks	293	394	34.5	58,268	139,042	138.6
Grand Forks County	440	510	15.9	68,556	152,869	123.0
Remaining Grand Forks County	147	116	-21.1	10,288	13,827	34.4
East Grand Forks	68	75	10.3	10,228	12,214	19.4
Polk County	395	387	-2.0	42,042	56,796	35.1
Remaining Polk County	327	312	-4.6	31,814	44,582	40.1

Sources: 1963 and 1972 U.S. Census of Wholesale Trade, Minnesota and North Dakota



Of the Grand Forks and Grand Forks County retail trade activities, general merchandising, food stores, and auto dealerships are the most significant, accounting for about one-half of the trade. In Polk County, food stores, auto dealers, and service stations dominate the trade, accounting for 52 percent of total county retail sales in 1972.

The urbanized study area is also an important government and private service center. Principal governmental activities include the University of North Dakota, the U.S. Potato Research Center, the U.S. Post Offices, the U.S. Energy Research Center, the North Dakota State Mill, and the U.S. Department of Agriculture's Human Nutrition Laboratory. Private services include two private testing laboratories, professional consultants, health care services (State Medical Center in Grand Forks, clinics, etc.), banking facilities, and other financial institutions. Area financial growth, as indicated by bank deposits, debits, and savings accounts, is shown in table 53.

TABLE 53

GRAND FORKS-EAST GRAND FORKS FINANCIAL GROWTH

	<u>Bank Deposits</u>	<u>Bank Debits</u>	<u>Savings and Loan Savings Accounts</u>
1950	\$ 33,729,430	\$ 265,051,000	\$ 4,566,315
1960	54,598,803	469,380,000	32,497,650
1970	80,159,100	700,028,000	58,615,200
1971	131,104,000	1,175,004,000	100,985,000
1972	144,710,346	1,293,876,000	132,920,004
1973	158,913,370	1,493,652,000	140,147,174
1974	167,723,533	1,710,179,000	160,034,000
1975	199,696,706	2,154,324,000	210,979,330

Source: Grand Forks Industrial Development Commission

Aside from convention activities, tourist trade in the immediate study area is not a significant activity in terms of sales volume and is probably hampered by the lack of variety of natural features such as open water bodies, forested areas, and hills in the immediate area. The bulk of tourist related trade in the area is most closely related to convention activities, the motel-hotel trade, and eating and drinking establishments. Polk County tourism during 1974 accounted for about 1.6 percent of gross retail sales compared to the 3.2-percent statewide county average. As would be expected in this area, lodging and food and drink sales accounted for the greatest share of county tourist revenue with 22 and 33 percent of total expenditures, respectively.

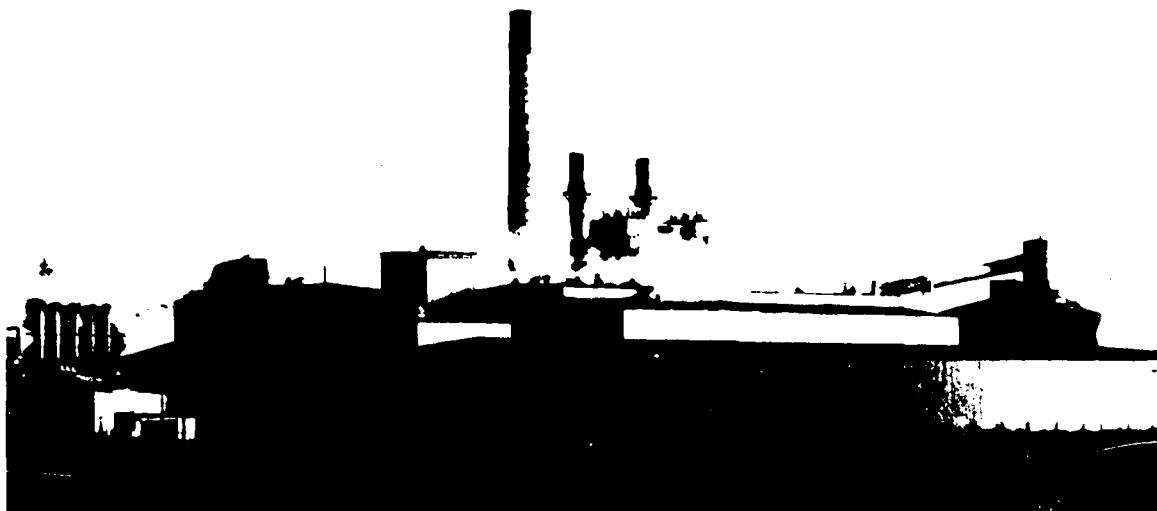
Beet sugar refining, potato processing, and related activities are the leading industrial activities in the area. Of the 10 major city employers in East Grand Forks in 1976, sugar refining and potato processing (including related activities) accounted for 57.8 and 19.8 percent of the industrial employment, respectively. Other major industrial activity, based on industry employment, includes processing of dairy products, grain milling and seed processing, production of chemicals and fertilizers, and soft drink bottling. Manufacturing activities, aside from chemicals and fertilizers, include concrete products, woodworking, farm equipment and other machinery, and tool and machine works. A breakdown of local industries by type and number is given in table 54.

TABLE 54

**LOCAL INDUSTRIES
GRAND FORKS-EAST GRAND FORKS**

<u>Industry Type</u>	<u>Number</u>
Construction Contractors	14
Fertilizer and Chemicals	8
Potato Processing	7
Concrete Products	4
Soft Drink Bottling	2
Potato Equipment	3
Farm Machinery	2
Tool & Machine Works	3
Dairy Products	3
Printing, Signs, Displays, etc.	7
Feed and Seeds	2
Sugar Beet Refining	1
Flour Products	2
Other	11

Source: Grand Forks Industrial Development
Commission



Industrial activity in the Grand Forks County study area outside of the urbanized area is generally limited to grain storage and transfer facilities and potato storage facilities in the smaller communities, gravel mining operations, and concrete products. There is no significant industrial or manufacturing activity other than agriculture in the rural Polk County study area.

Future industrial expansion in the area is facilitated by an 86-acre industrial park and other smaller sites in Grand Forks and three sites totaling nearly 200 acres in East Grand Forks. All necessary service facilities are available to these sites. Site development is coordinated by established industrial development groups in both communities.

Key References

Grand Forks Industrial Development Commission, Local Industries, Grand Forks, 1976

North Dakota State Department of Economic Development, Community Profile, Emerado, Bismarck, 1976

Bureau of the Census, 1972 Census of Retail Trade - Minnesota, 1974

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Bureau of the Census, 1967 County Business Patterns, Minnesota, 1969

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City Planning Office, Community Planning Data, City of Grand Forks, Grand Forks, 1975

North Dakota Business and Industrial Development Department, North Dakota Growth Indicators, Bismarck, Revised November 1976

Occupational Structure - The urban area has a fairly diversified employment base and continues to grow as an important regional trade, manufacturing, service, and educational center. Agricultural employment has experienced a marked decrease during the past two decades, with offsetting increases in manufacturing, education, and various services.

The metropolitan area draws its work force from a population of around 200,000 people located within 30 to 40 miles of the urban center. Enhancing this work force are graduates from the University, a local business college, and area post-high school training facilities. As indicators of area labor force growth, the Grand Forks County work force increased by 19.7 percent between 1972 and 1976 along with a 15.8-percent increase in Polk County during the period 1970-75. Of all persons 16 years of age or

older and capable of working, 58.6 and 54.4 percent, respectively, are included in the Grand Forks County and Polk County labor pools. While Grand Forks includes over 65 percent of the county work force, East Grand Forks has a lesser impact on the area with about 24 percent of the county work force as shown in table 55.

Unemployment in the area has fluctuated widely but has recently moderated as indicated by a 4.7-percent Polk County rate in 1975. U.S. Census data for 1970 show 4.6- and 4.3-percent unemployment rates, respectively, for Grand Forks and Grand Forks County. The 1970 female unemployment rate exceeded the male rate by about 4 percent in Grand Forks and by nearly three times in East Grand Forks. The high proportion of seasonal employment in East Grand Forks is a probable factor in the city's female unemployment rate.

The Grand Forks Air Force Base has a sizable impact on the Grand Forks County labor force, accounting for about 19 percent of the total force in 1970. Of the 1970 base work force, 88 percent was military. Of the non-military, women accounted for 78 percent of the labor force and a similar percentage of unemployed in 1970.

TABLE 55

LABOR FORCE - 1970

	<u>Grand Forks County</u>	<u>Grand Forks</u>	<u>Grand Forks Base</u>	<u>Polk County</u>	<u>East Grand Forks</u>
Total persons 16 years and older	42,277	27,818	6,529	23,417	5,023
Total labor force	24,798	16,152	4,660	12,732	3,041
Labor force -					
Male (%)	66.5	58.3	90.2	63.6	61.1
Female (%)	33.5	41.7	9.8	36.4	38.9
Civilian labor force	19,932	15,606	543	12,618	2,938
Employed	19,078	14,892	502	11,884	2,798
Unemployed	854	714	41	734	140
Percent Unemployed	4.3	4.6	7.5	5.8	4.8

Sources: References 157, 158

The largest employment group by occupational type in 1970 in Grand Forks County was clerical and kindred workers, accounting for about 21 percent of the total employment, closely followed by service workers with 20 percent. In Polk County, service workers accounted for about 31 percent of total employment, followed by clerical and kindred workers with 25 percent. The occupational group with the lowest percentage of workers in both counties was farm laborers, followed by other laborers. Other occupational group percentages and data for the two study area counties are shown in table 56. Study area employment (1970 census) by occupational category for each census district is shown in table 57 and displayed graphically on plates 21 and 22.

TABLE 56

OCCUPATION BY TYPE AND BY COUNTY - 1970

<u>Occupation</u>	<u>East Grand Forks</u>	<u>Polk County</u>	<u>Grand Forks</u>	<u>Grand Forks County</u>
Professional, technical and kindred workers	273	1,308	3,074	3,550
Managers and administrators, except farm	277	1,054	1,690	1,985
Sales workers	237	682	1,314	1,504
Clerical and kindred workers	375	1,411	2,488	3,029
Craftsmen, foremen and kindred workers	407	1,370	1,725	2,204
Operatives, including transport	420	1,508	1,243	1,599
Laborers, except farm	136	517	502	643
Farmers and farm managers	29	1,507	73	947
Farm laborers and farm foremen	29	438	65	283
Service workers, including private household	615	2,089	2,718	3,334
Totals: Employed, 16 years and over	2,798	11,884	14,892	19,078

Between 1950 and 1970, employment in agriculture in Polk and Grand Forks Counties declined 65 and 60 percent, respectively. Employment in the transportation industry decreased 31 and 47 percent, respectively, for the counties over the same period. In contrast, as shown in table 58, employment in manufacturing and education increased. From 1950 to 1970, manufacturing employment in Polk and Grand Forks Counties increased 114 and 28 percent, respectively. Education employment increased 82 and 126 percent, respectively, in the two counties between 1960 and 1970. With declining birth rates and lower elementary school enrollments, it is unlikely that future educational employment will show significant growth. Employment data for East Grand Forks and Grand Forks are shown in table 59.

TABLE 57

EAST GRAND FORKS OCCUPATIONS

<u>Enumeration District</u>	<u>Professional, etc.</u>		<u>Farm & Labor</u>		<u>Other</u>	
	<u>#</u>	<u>%</u>	<u>#</u>	<u>%</u>	<u>#</u>	<u>%</u>
16	22	16.4	8	6.0	104	77.6
17	34	8.5	44	11.0	323	80.5
18	91	23.6	10	2.6	285	73.8
19	0	0.0	0	0.0	10	100.0
20	47	12.1	33	8.5	310	79.4
21	52	29.4	26	14.7	99	55.9
22	38	17.5	16	7.4	163	75.1
24	5	33.3	0	0.0	10	66.7
25	96	29.4	8	2.4	223	68.2
26	90	34.0	10	3.8	165	62.2
27	75	15.8	39	8.2	362	76.0
15	17	13.5	50	39.7	59	46.8
29	25	15.7	32	20.1	102	64.2
28	18	14.6	6	4.1	100	81.3
14	5	10.2	5	10.2	39	79.6

TABLE 57 CON'T

GRAND FORKS OCCUPATIONS

<u>Enumeration District</u>	<u>Professional, etc.</u>		<u>Farm & Labor</u>		<u>Other</u>	
	<u>#</u>	<u>%</u>	<u>#</u>	<u>%</u>	<u>#</u>	<u>%</u>
32	193	40.9	0	0.0	279	59.1
34	5	2.5	36	17.8	161	79.7
35	29	7.3	25	6.3	342	86.4
36	33	9.9	27	8.1	274	82.0
37	72	26.8	20	7.4	177	65.8
38A	176	39.9	26	5.9	240	54.2
38B	87	26.4	15	4.5	228	69.1
40	37	43.5	0	0.0	48	56.5
41A	319	57.4	5	0.9	232	41.7
41B	466	39.2	59	5.0	663	55.8
42	110	35.0	0	0.0	204	65.0
43	284	41.6	31	4.5	368	53.9
44	64	31.4	12	5.9	128	62.7
45	17	5.3	17	5.3	284	89.4
46	77	26.2	17	5.8	200	68.0
47	100	28.3	8	2.3	245	69.4
48	50	15.4	54	16.6	220	68.0
49	47	13.9	10	3.0	280	83.1
50	55	15.8	10	2.8	284	81.4
51	35	17.6	6	3.0	158	79.4
52	212	35.5	22	3.7	363	60.8
53	93	25.3	31	8.5	243	66.2
54	74	49.3	10	6.7	66	44.0
55	67	81.7	0	0.0	15	18.3
56	62	17.9	24	6.9	260	75.2
57	50	14.0	21	5.8	287	80.2
58	72	15.3	23	4.9	376	79.8

TABLE 57 CON'T

GRAND FORKS OCCUPATIONS

Enumeration District	Professional, etc.		Farm & Labor		Other	
	#	%	#	%	#	%
59	47	11.9	30	7.6	318	80.5
60	39	32.3	5	4.1	77	63.6
61	105	25.5	4	1.0	302	73.5
62A	25	19.4	4	3.1	100	77.5
62B	20	14.1	0	0.0	122	85.9
63A	97	27.5	15	4.2	241	68.3
63B	145	26.6	11	2.0	389	71.4
64	203	43.2	19	4.0	248	52.8
65	242	44.5	27	5.0	274	50.5
66A	78	37.7	0	0.0	129	62.3
66B	147	67.7	0	0.0	70	32.3
66C	196	58.0	5	1.5	137	40.5
67	313	49.9	11	1.8	303	48.3
69	5	22.7	12	54.5	5	22.7
70A	38	24.7	17	11.0	99	64.3
70B	67	34.4	0	0.0	128	65.6
11A	93	18.5	14	2.8	395	78.7
13	10	11.1	0	0.0	80	88.9
14	42	17.9	87	37.2	105	44.9
01	20	22.8	9	10.2	59	67.0
03	16	10.4	66	42.8	72	46.8
04	5	3.7	68	50.4	62	45.9
05	3	1.8	63	38.7	97	59.5
27	14	12.3	23	20.4	76	67.3
29	29	15.6	81	43.5	76	40.9
30	9	6.7	100	73.5	27	19.8

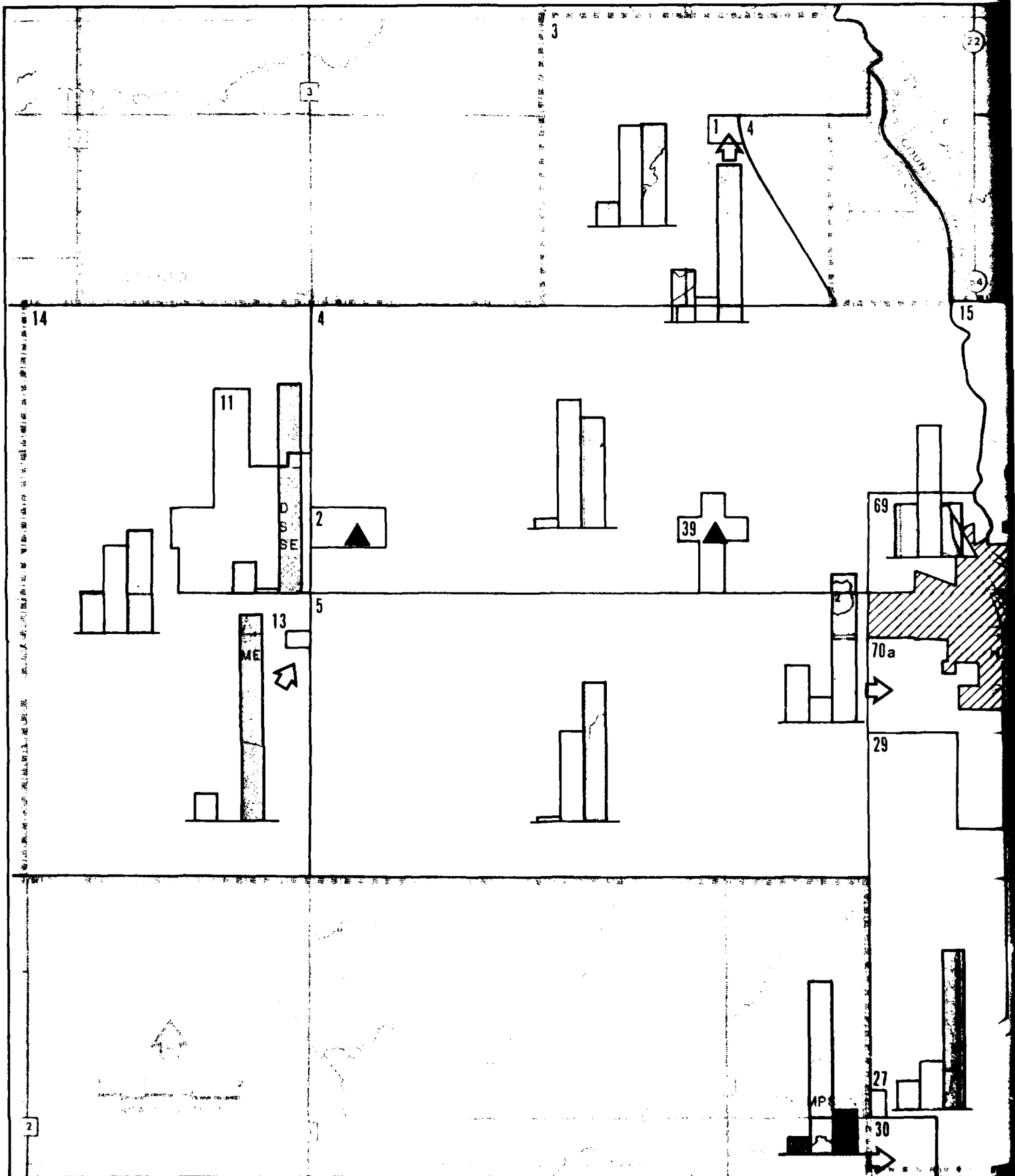
TABLE 58

EMPLOYMENT BY INDUSTRY

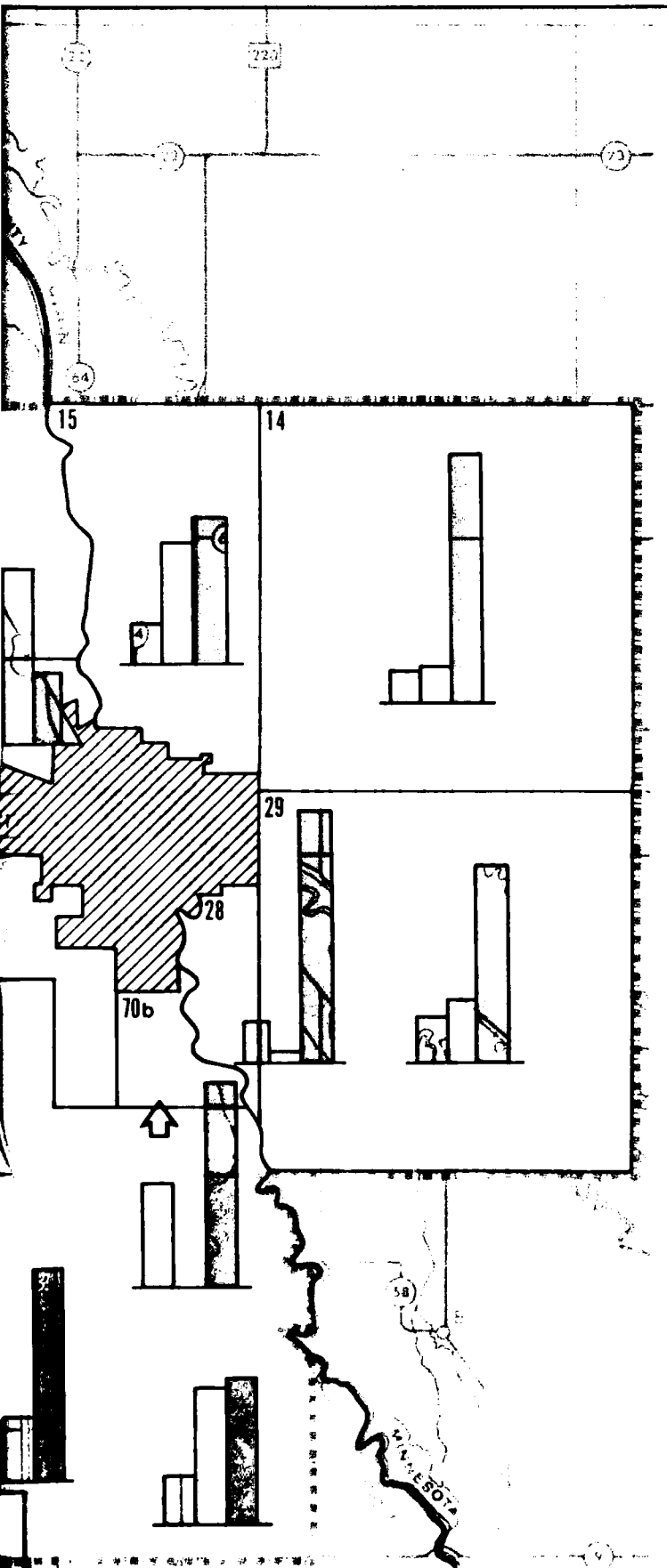
<u>Industry</u>	<u>POLK COUNTY</u>			<u>GRAND FORKS COUNTY</u>		
	<u>1950</u>	<u>1960</u>	<u>1970</u>	<u>1950</u>	<u>1960</u>	<u>1970</u>
Agriculture	5,748	3,915	2,004	3,255	2,116	1,281
Construction	638	727	612	870	1,206	960
Manufacturing	608	695	1,301	1,053	968	1,331
Transportation	835	630	575	1,401	1,003	965
Commun. & Utilities	285	281	451	455	563	638
Wholesale Trade	469	580	495	884	845	839
Retail Trade	1,824	2,177	2,203	2,635	3,408	3,846
Finance, Insurance	191	244	282	428	579	707
Service						
Business & Repair	374	198	249	347	307	374
Education	459	638	1,161	---	---	3,587
Other Service	939	1,371	1,793	2,690	4,385	2,965
Public Admin.	323	358	443	547	2,665	1,116
Other	202	612	315	324	447	469
Totals	12,895	12,426	11,884	14,889	18,492	19,078

TABLE 59**EMPLOYMENT BY INDUSTRY**

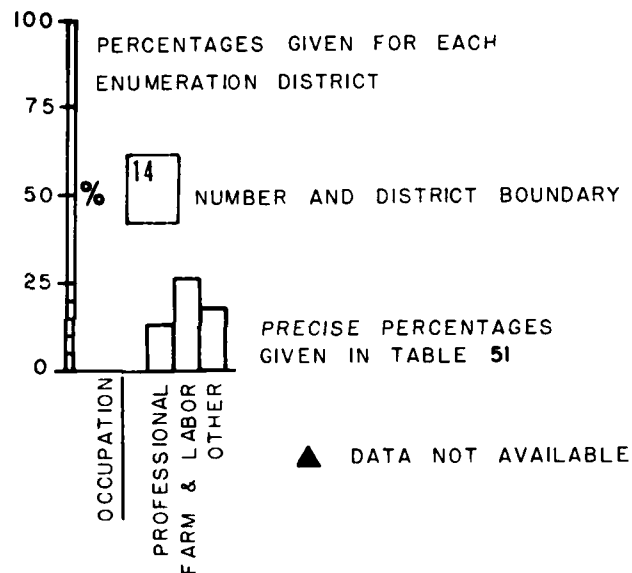
<u>Industry</u>	<u>East Grand Forks</u>	<u>Grand Forks</u>
Construction	158	748
Manufacturing	310	1,135
Transportation	230	763
Commun. & Utilities	81	587
Wholesale & Retail Trade	905	3,864
Finance, Insurance, Business and Repair Services	158	889
Professional and Related Services	302	369
Educational	283	3,116
Public Administration	155	724
Hospitals, Health Services	---	1,173
Other	216	1,524
Total Employed, 16 years and over	2,798	14,892



Grand Forks / East Grand Forks URBAN WATER RESOURCES STUDY



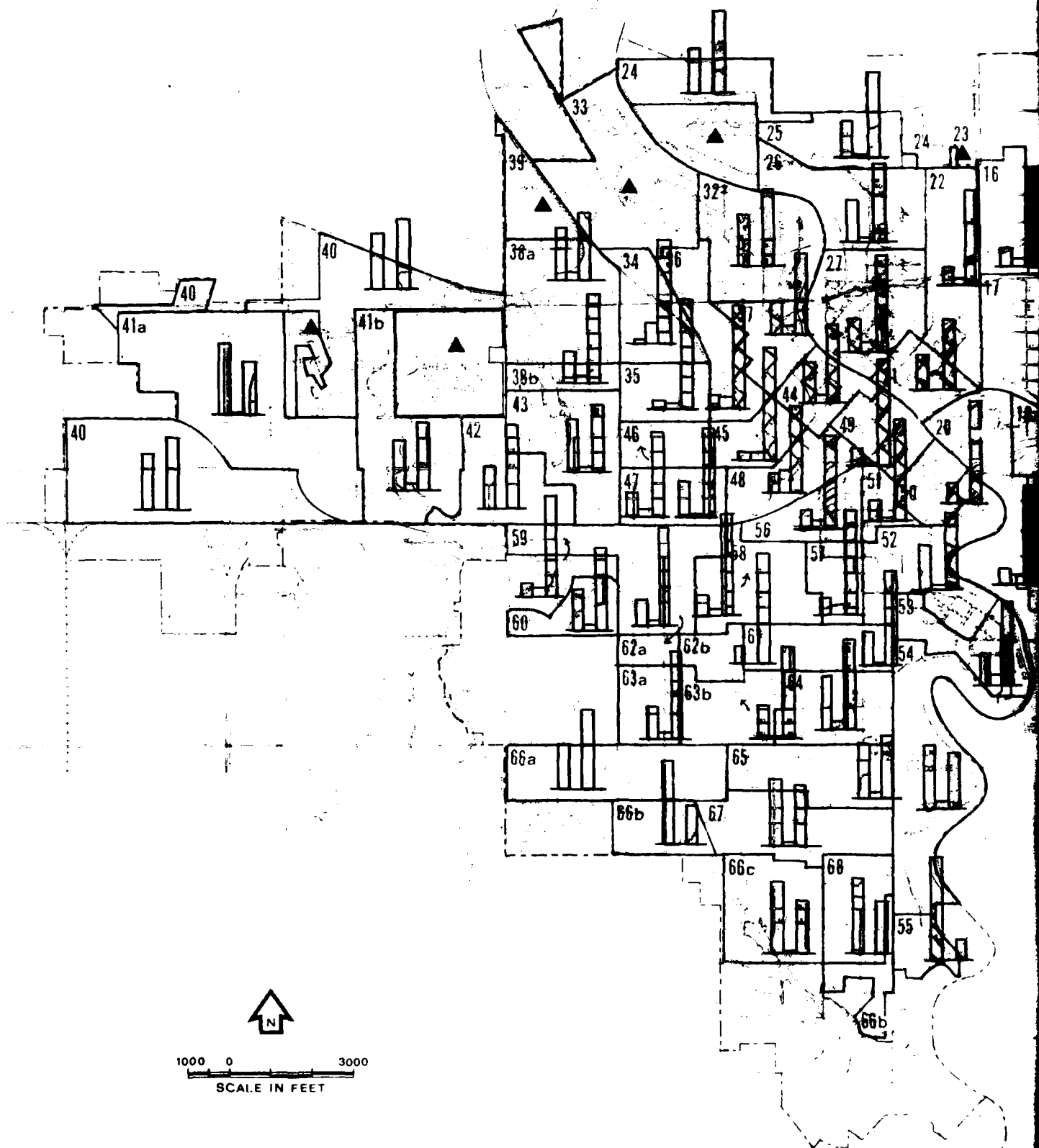
OCCUPATION GROUPING FOR RURAL AREAS

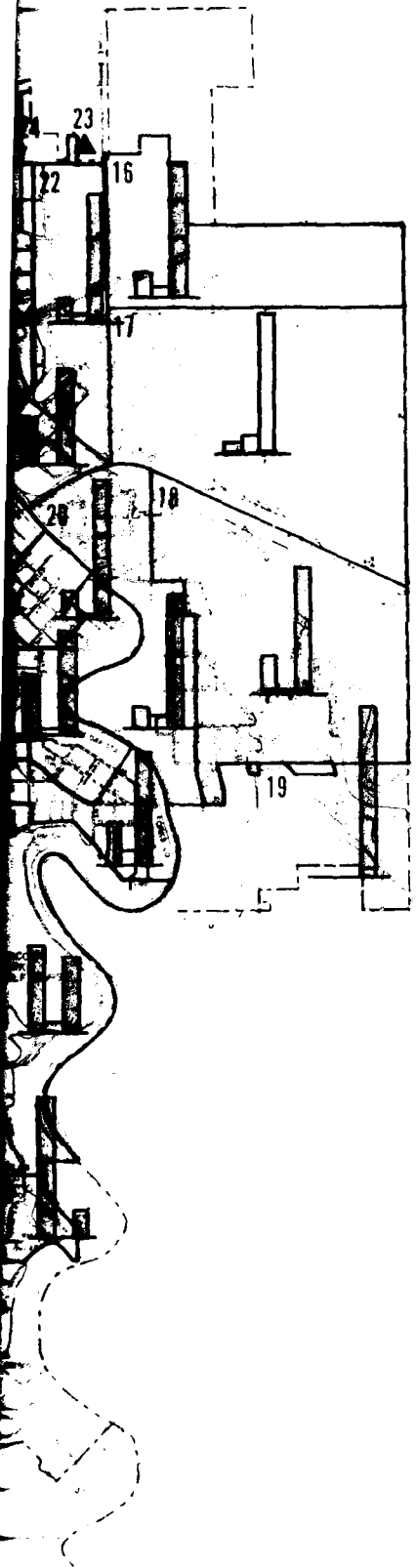


OCCUPATION GROUPINGS FOR THE
GRAND FORKS - EAST GRAND FORKS
URBAN AREA PRESENTED ON
PLATE 22

SOURCE: REFERENCE 156.

PLATE 21

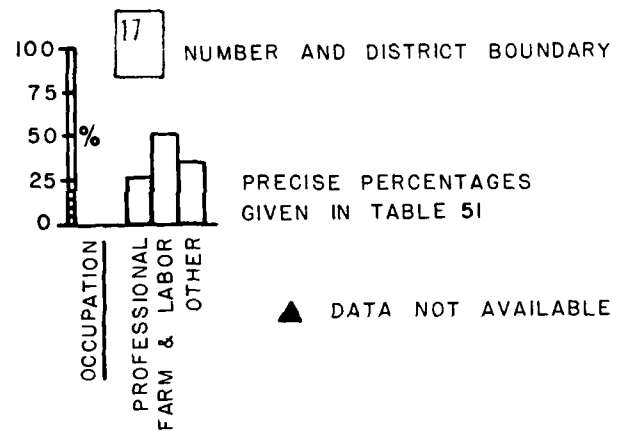




Grand Forks / East Grand Forks URBAN WATER RESOURCES STUDY

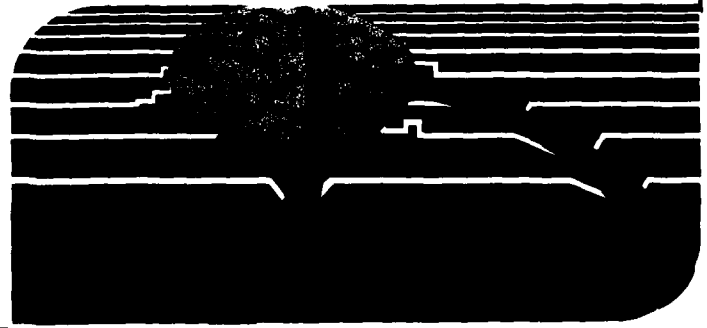
OCCUPATION GROUPING FOR THE
GRAND FORKS - EAST GRAND FORKS
URBAN AREA

PERCENTAGES GIVEN FOR EACH
ENUMERATION DISTRICT



OCCUPATION GROUPINGS FOR THE
RURAL AREAS OUTSIDE GRAND FORKS -
EAST GRAND FORKS PRESENTED ON PLATE 21

SOURCE: REFERENCE 156.



Income - Median family income in Polk County for 1969 was \$7,858 compared to the regional average of \$7,108, the statewide average of \$9,931, and East Grand Forks average family income of \$9,156. Similar data for Grand Forks and Grand Forks County show 1969 median family incomes of \$9,109 and \$8,458, respectively, compared to the State average of \$7,838.

Per capita income is fairly consistent throughout the study area, ranging from \$2,318 in Polk County to a 1970 high of \$2,709 in the city of Grand Forks. Per capita income has also experienced a general increase throughout the area, as evidenced by a 7.2-percent increase for BEA Economic Area 092 between 1962 and 1970. In 1974, per capita income in East Grand Forks was \$4,780 compared to the Polk County average of \$4,493 and a statewide average of \$4,675.

Disparities in family income by area become evident when various income brackets are compared. Table 60 shows that in 1969, more families in Polk County (35.6 percent) had an income of less than \$5,000 than in all other areas. Grand Forks had the fewest lower income families (18.5 percent) and the greatest percentage of families earning over \$15,000 (17.0 percent). The geographical distribution (by census enumeration district) of study area family income is shown in table 61 and on plates 23 and 24.

TABLE 60

INCOME DISTRIBUTION BY CITY AND COUNTY

	<u>Grand Forks County</u>	<u>Grand Forks</u>	<u>Polk County</u>	<u>East Grand Forks</u>
Per Capita Income	\$ 3,480	\$ 2,709	\$ 2,318	\$ 2,641
Median Family Income	8,458	9,109	7,858	9,156
Income (%)				
\$0-5,000	---	18.5	35.6	20.8
\$5-10,000	---	37.4	37.6	37.5
\$10-15,000	---	27.1	18.4	30.4
\$15,000 and over	14.7	17.0	8.4	11.3

Source: U.S. Census - 1970

TABLE 61

INCOME DISTRIBUTION

Grand Forks Area

Enumeration District	Under \$5,000		Family Income \$5-14,999		\$15,000 and Over	
	#	%	#	%	#	%
32	14	4.6	232	76.6	57	18.8
34	10	8.1	97	78.9	16	13.0
35	31	12.4	209	83.6	10	4.0
36	67	25.9	177	68.3	15	5.8
37	64	33.9	112	59.2	13	6.9
38A	29	13.7	147	69.3	36	17.0
38B	41	23.0	89	50.0	48	27.0
40	0	0.0	19	55.9	15	44.1
41A	181	42.3	237	55.4	10	2.3
41B	20	11.4	116	65.9	40	22.7
42	14	25.4	26	47.3	15	27.3
43	38	10.2	293	79.0	40	10.8
44	43	32.1	76	56.7	15	11.2
45	93	39.7	127	54.3	14	6.0
46	23	13.1	131	74.9	21	12.0
47	43	21.4	143	71.1	15	7.5
48	51	29.7	101	58.7	20	11.6
49	32	36.4	56	63.6	0	0.0
50	45	23.7	125	65.8	20	10.5
51	44	38.9	55	48.7	14	12.4
52	74	17.5	295	69.6	55	12.9
54	4	4.1	23	23.7	70	72.2
55	0	0.0	11	17.5	52	82.5
56	84	30.0	192	68.6	4	1.4
57	39	18.9	147	71.4	20	9.7
58	77	25.0	221	71.8	10	3.2
59	37	15.0	194	78.5	16	6.5
60	0	0.0	60	78.9	16	21.1
61	55	19.7	195	69.6	30	10.7
62A	0	0.0	60	85.7	10	14.3
62B	32	32.0	49	49.0	10	19.0
63A	17	7.4	180	77.9	34	14.7
63B	33	10.2	242	74.4	50	15.4
64	61	17.5	207	59.3	81	23.2
65	69	19.9	175	50.6	102	29.5
66A	5	3.8	85	64.4	42	31.8

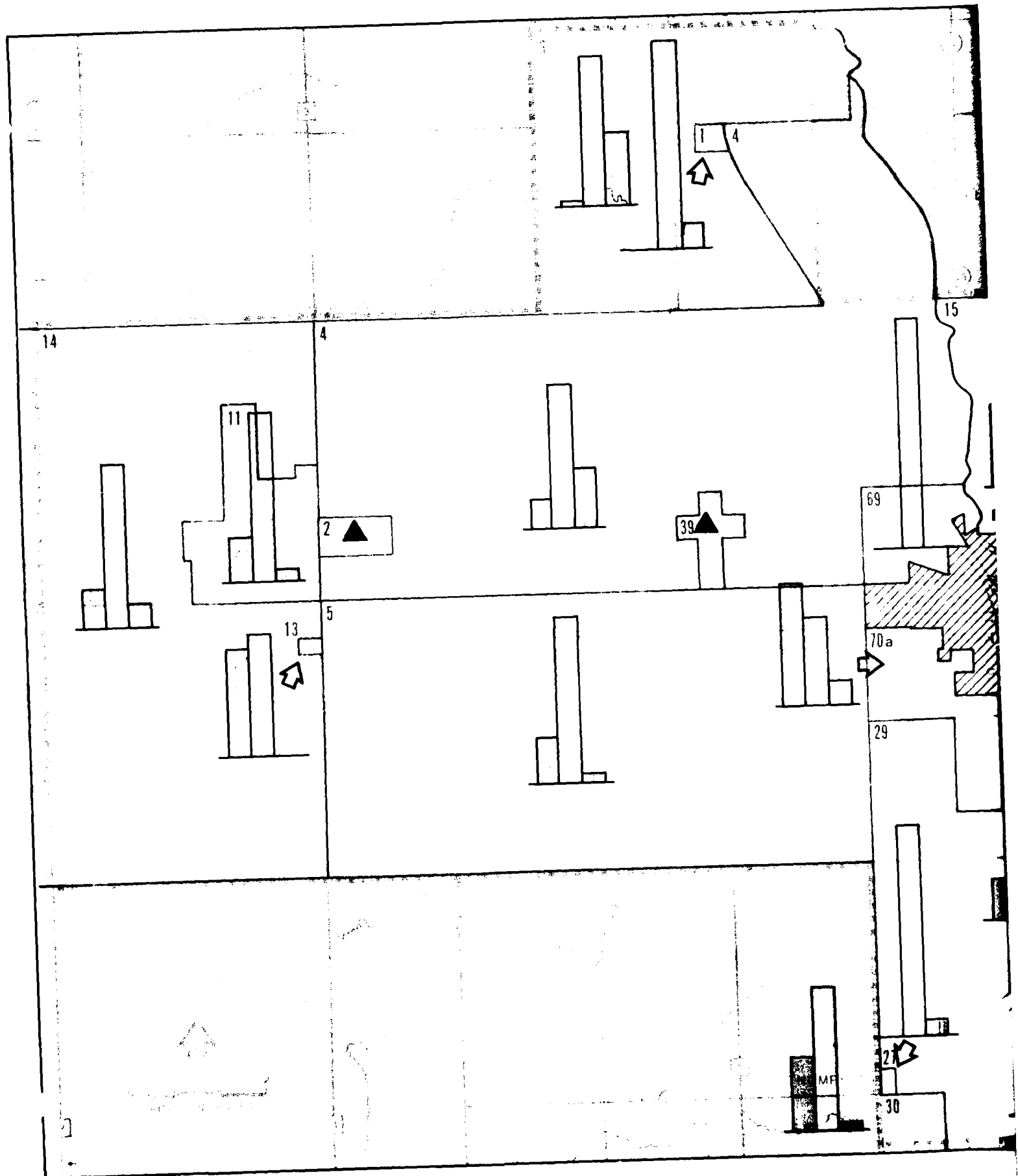
TABLE 61 CON'T

INCOME DISTRIBUTION

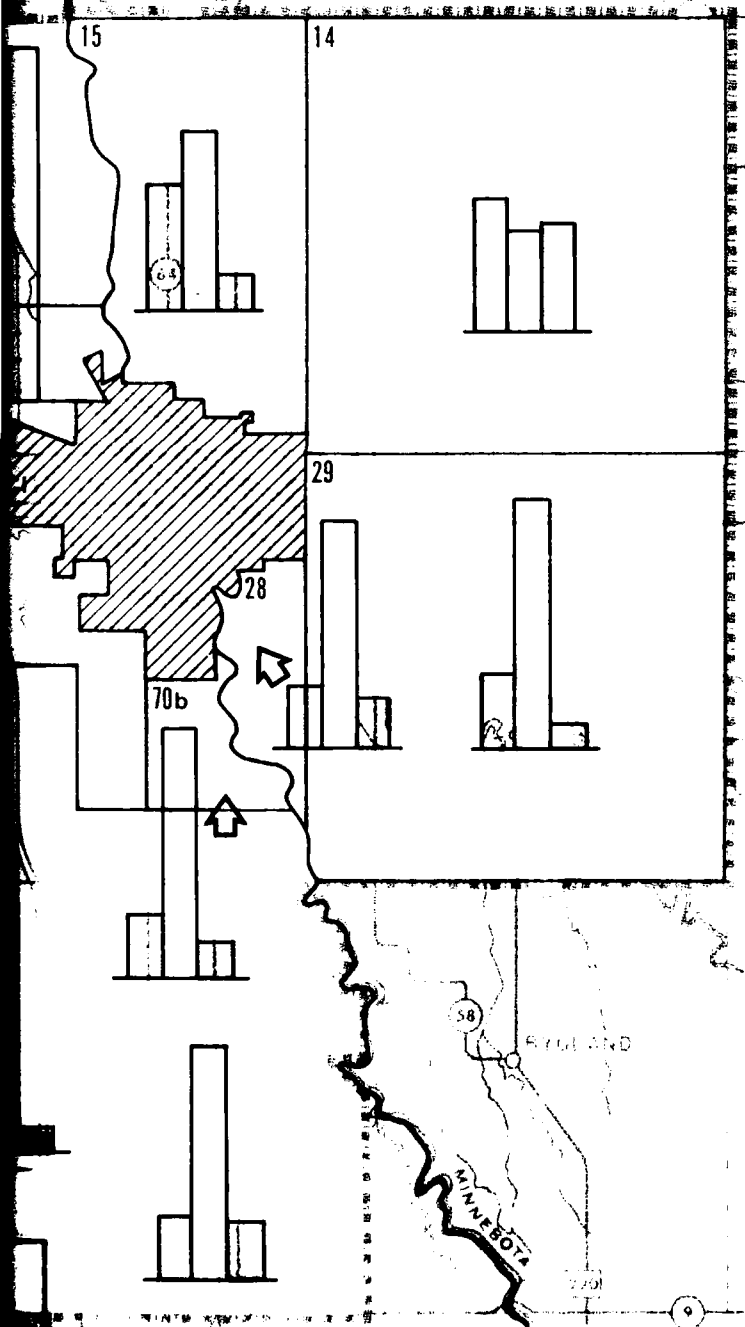
East Grand Forks Area

Enumeration District	Under \$5,000		Family Income \$5-14,999		\$15,000 and Over	
	#*	%	#*	%	#*	%
66B	28	18.5	94	62.3	29	19.2
66C	21	10.6	97	49.0	80	40.4
67	39	10.4	212	56.2	126	33.4
68	10	3.6	111	39.6	159	56.8
69	0	0.0	22	100.0	0	0.0
70A	62	50.4	48	39.0	13	10.6
70B	27	18.8	102	70.8	15	10.4
11	379	20.0	1,593	74.3	60	5.7
13	69	46.9	78	53.1	0	0.0
14	37	17.5	151	71.6	23	10.9
01	0	0.0	62	89.9	7	10.1
03	4	3.2	81	64.8	40	32.0
05	22	21.4	76	73.8	5	4.8
29	18	18.0	66	66.0	16	16.0
27	0	0.0	63	92.6	5	7.4
30	45	33.3	86	63.8	4	2.9
16	21	20.6	81	79.4	0	0.0
17	127	32.5	245	62.7	19	4.8
18	64	21.2	214	70.9	24	7.9
19	0	0.0	0	0.0	5	100.0
20	86	32.0	173	64.3	10	3.7
21	160	63.5	73	29.0	19	7.5
22	129	51.2	117	46.4	6	2.4
24	0	0.0	5	50.0	5	50.0
25	33	15.1	149	68.0	37	16.9
26	23	11.9	97	50.3	73	37.8
27	141	35.4	230	57.8	27	6.8
15 (Grand Forks Twn)	33	36.7	47	52.2	10	11.1
29 (Huntsville Twn)	25	21.9	80	70.2	9	7.9
28 (Rinehart Twn)	16	18.8	56	65.9	13	15.3
14 (Sullivan Twn)	20	39.2	15	29.4	16	31.4

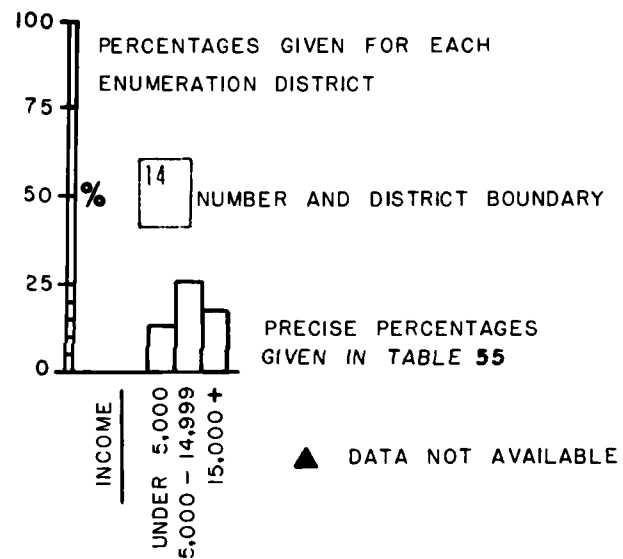
* Includes both families and unrelated individuals



Grand Forks / East Grand Forks URBAN WATER RESOURCES STUDY



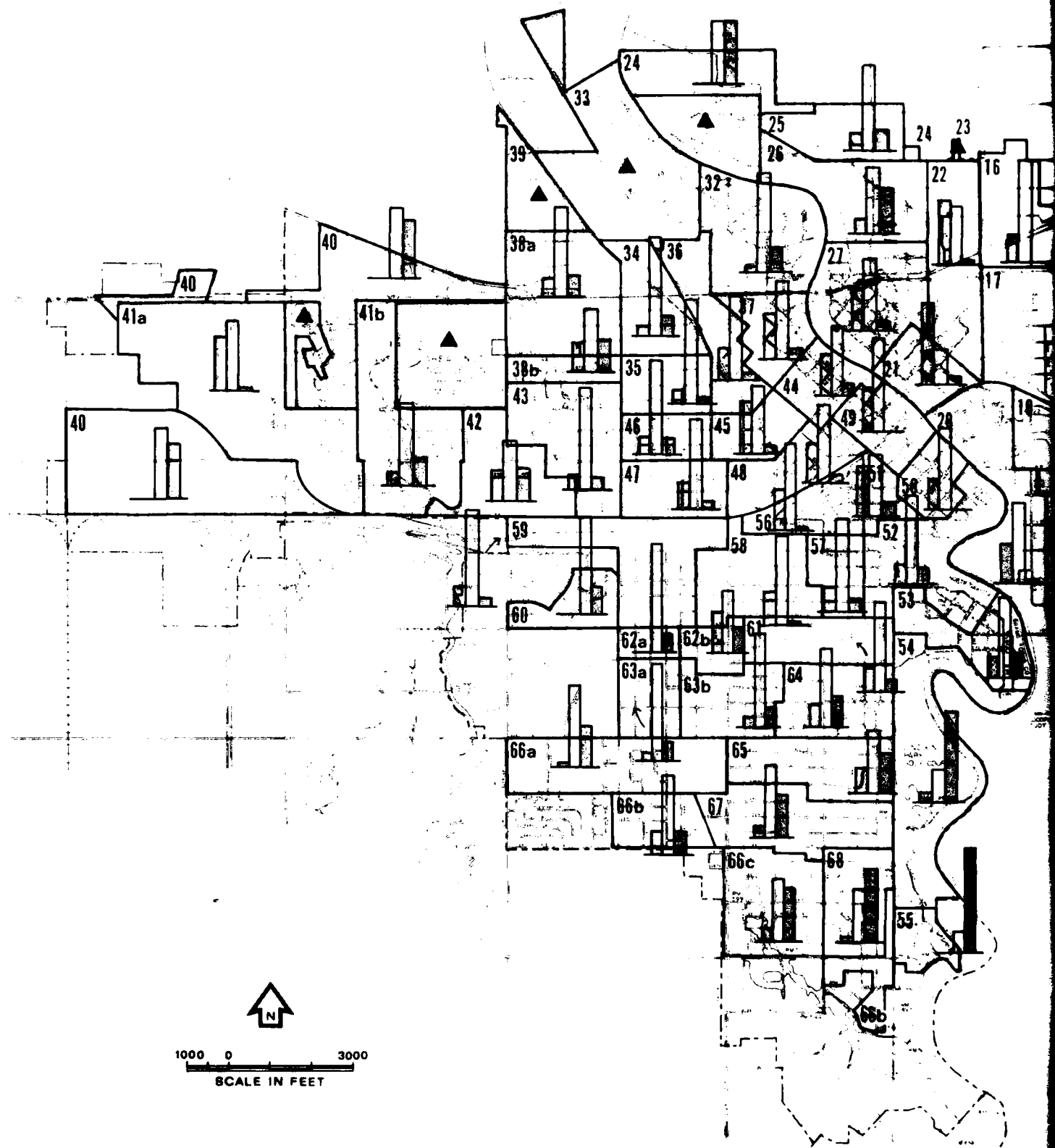
FAMILY INCOME FOR RURAL AREAS



FAMILY INCOME FOR THE
GRAND FORKS - EAST GRAND FORKS
URBAN AREA PRESENTED ON PLATE 24

SOURCE: REFERENCE 156.

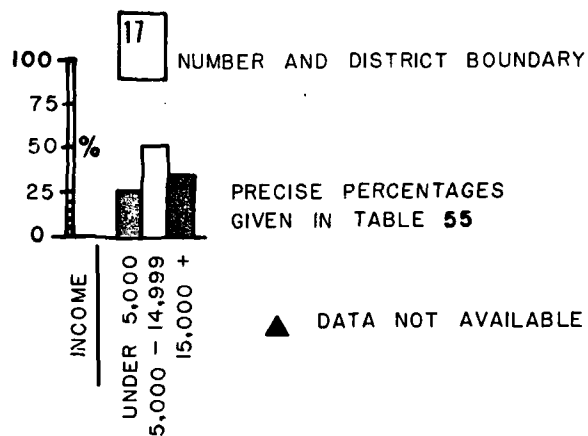
PLATE 23



Grand Forks / East Grand Forks URBAN WATER RESOURCES STUDY

FAMILY INCOME FOR THE GRAND FORKS -
EAST GRAND FORKS URBAN AREA

PERCENTAGES GIVEN FOR EACH
ENUMERATION DISTRICT



FAMILY INCOME FOR THE RURAL AREAS
OUTSIDE GRAND FORKS - EAST GRAND FORKS
PRESENTED ON PLATE 23

SOURCE: REFERENCE 156.

PLATE 24

Education - The area is fortunate in having a high quality, complete education system for its students. Grand Forks and the immediate adjacent area are served by 14 public elementary schools, 3 junior high schools, and 2 high schools. Public elementary and secondary education in the Grand Forks County study area outside the city is provided by five school districts, as shown on plate 19 in the report section on taxes. East Grand Forks and the adjacent Minnesota study area are organized as Independent School District No. 595 and are served by three public elementary schools, one junior high school, and one high school. Three parochial elementary schools are located in Grand Forks. One parochial elementary school and one parochial high school are located in East Grand Forks. A Bible Baptist Church school with an average enrollment of 60 to 80 students provides education from kindergarten through college. A vocational center and recently completed vocational-technical institute in East Grand Forks provide post-high school education to area residents in over 30 educational areas. College-level education is provided by the University of North Dakota at Grand Forks and a small business college. Enrollment at the University has increased from slightly over 3,000 in 1955 to over 8,000 in 1976. Established in 1883, the University of North Dakota has a faculty of about 700 and offers study in 12 disciplines. The University's Institute for Ecological Studies provides an important center for ecological research in the region. The North Dakota State School for the Blind at Grand Forks provides education for the visually handicapped.

Educational attainment in the region is quite high, with higher levels in the urbanized areas. Median school years completed for Grand Forks and Polk Counties are 12.4 and 9.2 years, respectively. Similar data for the Grand Forks and East Grand Forks communities are 12.5 and 12.1 years, respectively, as shown in table 62. As a comparison, median school years completed for North Dakota and Minnesota are 12.0 and 12.2 years, respectively. Study area educational levels are presented in table 63 and shown on plates 25 and 26 for each census enumeration district.

The impact of the University at Grand Forks is clearly shown in table 62. The advantage to North Dakota residents is evident, in that over twice as many students in Grand Forks County completed college than in Polk County. While the percentages of persons completing high school are comparable in the two counties, Polk County has a larger rural population which terminated its education after elementary school. Present educational requirements and the expected growth of the vocation-technical school should result in an increasing percentage of Polk County residents completing high school and post-high school studies.

TABLE 62

EDUCATIONAL CHARACTERISTICS

Years of School Completed as a Percent
of 25 years and over Population

Location	Total Population 25 years and over	Elementary 8 years	High School 4 years	College 1-3 years	College 4 years	Median School Years Completed
Grand Forks	8,148	18.3	25.8	15.5	22.8	12.5
Grand Forks County	13,544	19.4	29.5	13.3	19.5	12.4
East Grand Forks	3,710	21.8	32.9	11.7	8.8	12.1
Polk County	9,257	32.7	25.1	6.8	7.0	9.2

Source: U.S. Census, Minnesota and North Dakota, General Social and Economic Characteristics, 1970

TABLE 63**EDUCATION****Grand Forks Area**

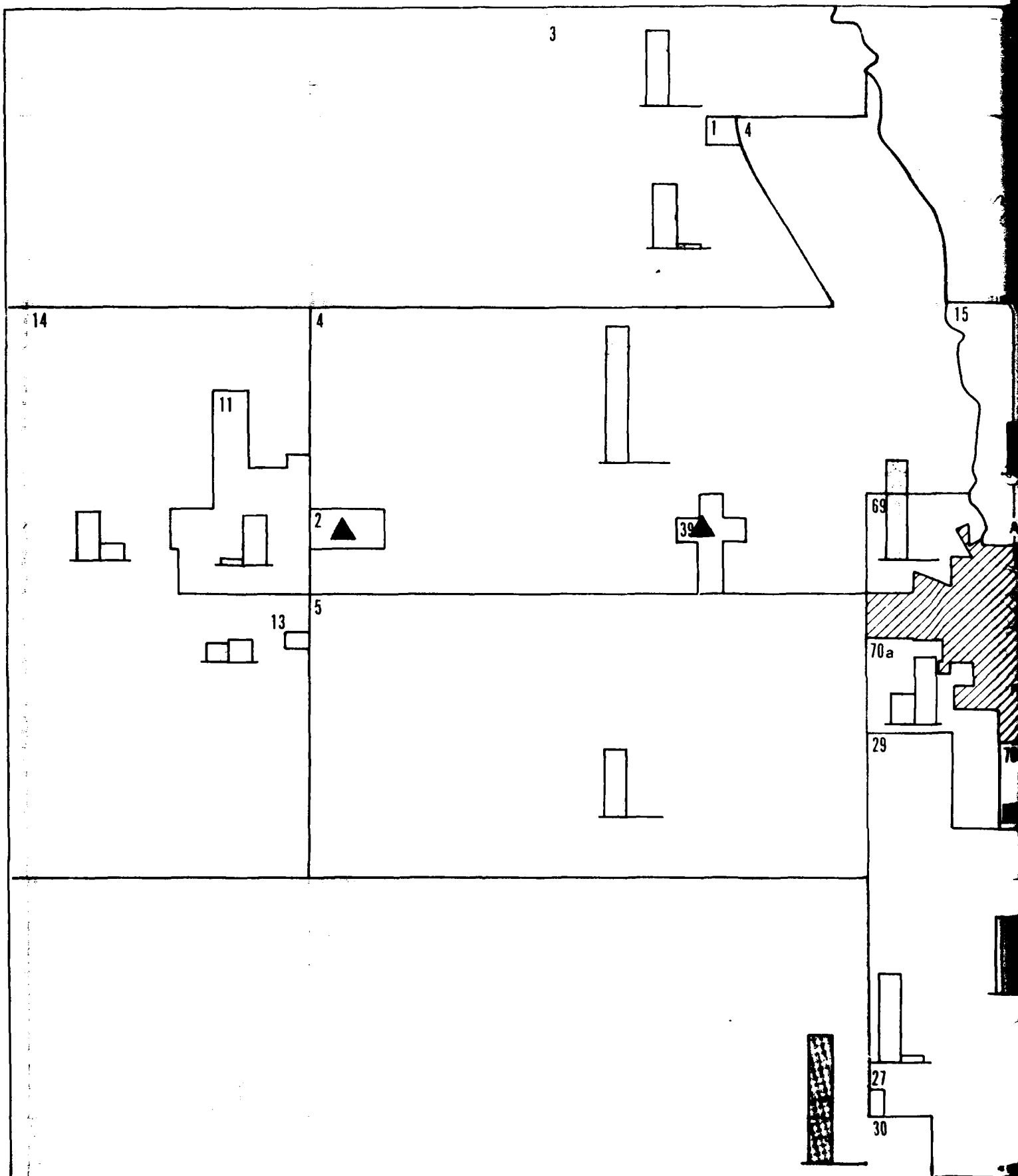
Enumeration District	Grade School Only		4 Years College Complete	
	#	%*	#	%*
50	107	28.0	61	16.0
51	97	32.1	21	7.0
52	155	19.0	155	19.0
53	123	18.1	91	13.4
54	5	2.4	61	28.9
55	0	0.0	63	52.5
56	203	38.4	43	8.1
57	165	35.9	34	7.4
58	175	36.9	27	5.7
59	108	23.1	0	0.0
60	19	12.8	15	10.1
61	102	20.0	37	7.2
62A	19	15.3	0	0.0
62B	22	17.9	0	0.0
63A	36	9.2	63	16.0
63B	72	13.2	54	9.9
64	100	14.2	182	25.8
65	71	10.4	176	25.9
66A	15	5.7	71	27.1
66B	74	22.1	87	26.0
66C	5	1.4	163	44.3
67	45	6.1	160	21.6
68	16	2.9	226	40.6
69	11	42.3	0	0.0
70A	19	14.0	39	28.7
70B	19	7.9	31	12.9
11	111	2.9	787	21.1
13	13	8.4	15	9.7
14	100	21.6	35	7.5
15	105	32.3	13	4.0
21	58	33.1	0	0.0
03	73	27.8	7	2.7
04	118	59.3	0	0.0
05	59	29.6	0	0.0
27	56	38.3	5	3.4
29	112	32.5	13	3.8
30	114	55.2	0	0.0

TABLE 63 CON'T

EDUCATION

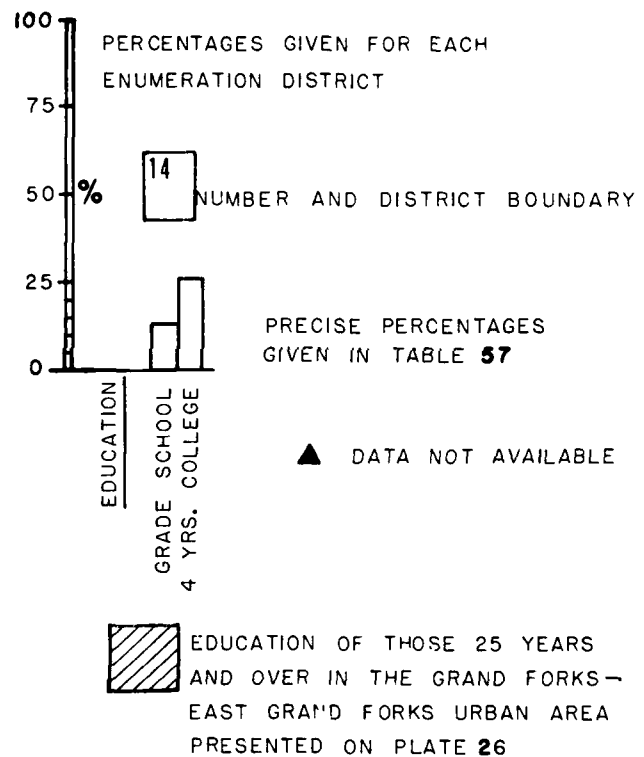
East Grand Forks

Enumeration District	Grade School Only		4 Years College Complete	
	#	%*	#	%*
16	13	11.6	5	4.5
17	157	27.6	29	5.1
18	125	24.1	39	7.5
19	5	33.3	0	0.0
20	107	23.2	19	4.1
21	95	31.8	24	8.0
22	81	26.5	5	1.6
24	31	27.2	5	4.4
25	53	16.2	59	18.0
26	37	10.1	105	28.6
27	107	17.2	35	5.6
15 (Grand Forks Twn)	32	21.8	0	0.0
29 (Huntsville Twn)	71	34.1	8	3.8
28 (Rinehart Twn)	36	20.8	14	8.1
14 (Sullivan Twn)	33	30.8	6	5.6
32	118	20.8	140	25.2
34	51	25.5	6	3.0
35	142	32.1	17	3.8
36	141	29.4	20	4.2
37	151	31.5	28	5.8
38A	57	12.8	99	22.2
38B	26	9.0	63	21.8
40	6	8.0	35	46.7
41A	0	0.0	230	59.7
41B	10	2.2	186	40.6
42	17	11.4	63	42.3
43	103	12.2	198	23.4
44	34	10.9	19	6.1
45	127	27.3	10	2.2
46	61	18.4	33	10.0
47	71	19.2	45	12.2
48	107	26.9	17	4.3
49	94	27.2	26	7.5



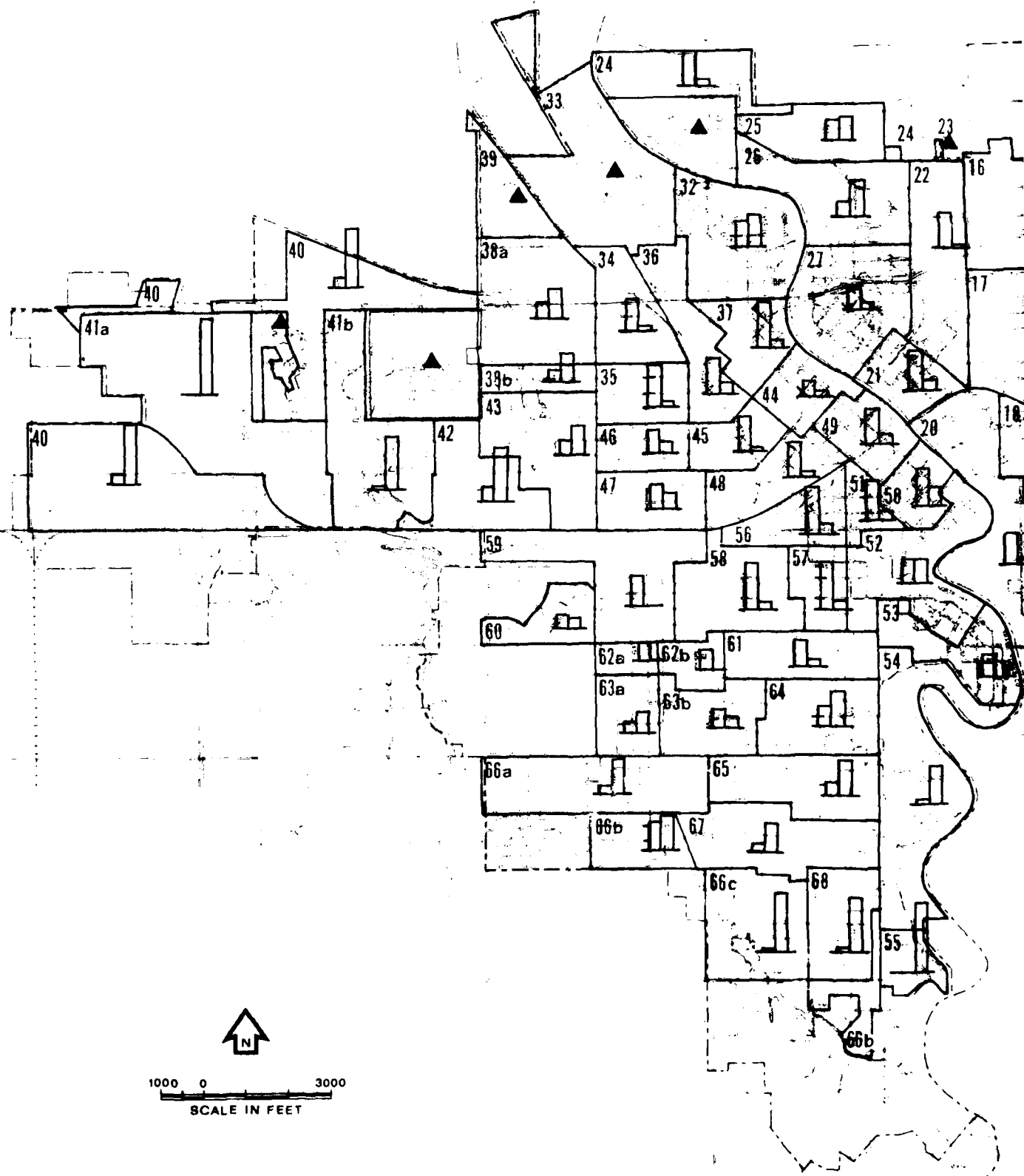
Grand Forks / East Grand Forks URBAN WATER RESOURCES STUDY

EDUCATION AS A PERCENTAGE
OF TOTAL POPULATION
25 YEARS AND OVER



SOURCE: REFERENCE 156.

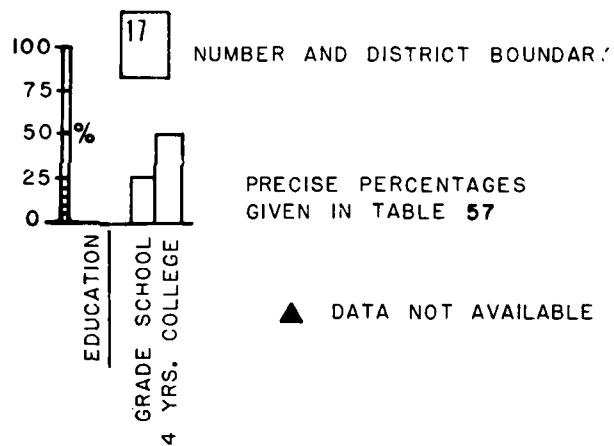
PLATE 25



Grand Forks / East Grand Forks URBAN WATER RESOURCES STUDY

EDUCATION AS A PERCENTAGE OF
TOTAL POPULATION 25 YEARS AND OVER

PERCENTAGES GIVEN FOR EACH
ENUMERATION DISTRICT



EDUCATION OF THOSE 25 YEARS AND OVER
IN RURAL AREAS OUTSIDE GRAND FORKS -
EAST GRAND FORKS PRESENTED ON PLATE 25

SOURCE: REFERENCE 156.

PLATE 26

Social Support Services -

1. Community Facilities

A wide variety of public and private social service facilities is available within the area, mostly within the metropolitan area. These facilities include schools, hospitals, churches, museums, cultural and convention facilities, police and fire protection facilities, and cemeteries. The most significant community facility in the area is probably the University of North Dakota. Established in 1883 by the Legislative Assembly of Dakota Territory, this institution provides the area with a constant source of entertainment and cultural enjoyment, ranging from various sporting events to musicals, stage plays, and concerts performed at the University's Chester Fritz Auditorium. Research facilities at the University include the publicly endowed Lignite Research Center and Deep Sea Laboratory and the Department of Agriculture's Human Nutrition Laboratory.

Also located at the University is the Chester Fritz Library, the largest in the State in terms of size and number of volumes. Other area libraries include the municipal public libraries and individual school libraries and learning centers.

Medical facilities in the metropolitan area serve a wide area and include the United Hospital complex, the UND Rehabilitation Hospital, and the Grand Forks Clinic. The Rehabilitation Hospital provides a comprehensive program of rehabilitation for the people of North Dakota and surrounding area and a clinical education setting for students from the University and other professional schools.



The public school system is divided into 7 school districts and includes 19 public schools in Grand Forks and 5 public schools in East Grand Forks. Augmenting these facilities are three parochial schools in Grand Forks, three parochial schools in East Grand Forks, the University, a private business college, a vocational-technical institute, and the North Dakota State School for the Blind.

Plates 27 and 28 show the locations of community facilities in the rural and urban study areas, respectively. Community facilities located within the study area are listed in tables 64 and 65. Schools, churches, cemeteries, and other facilities are number keyed to corresponding table numbers.

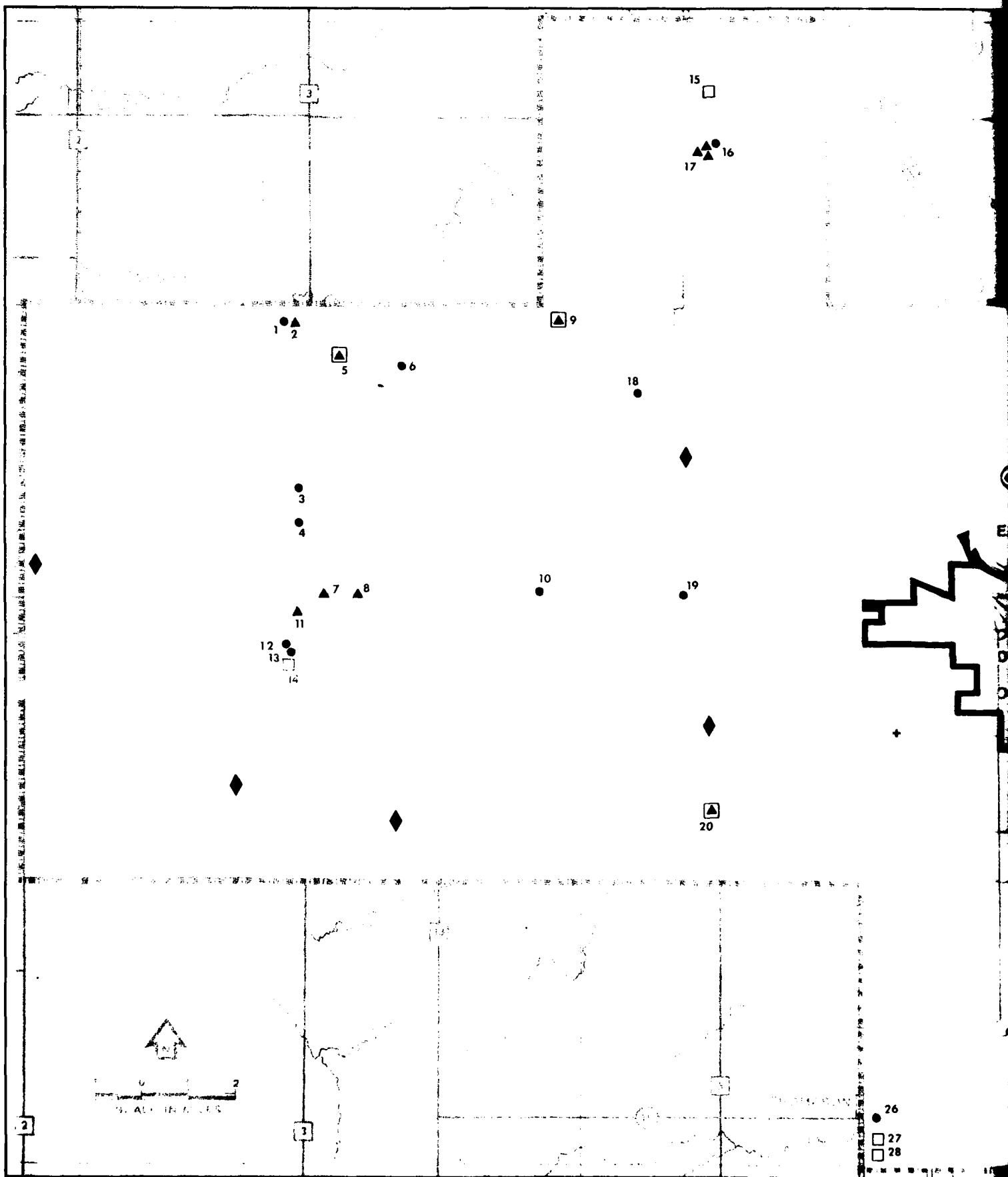
TABLE 64**COMMUNITY FACILITIES - RURAL AREA**

<u>Plate Number*</u>	<u>Name of Facility</u>
1	School (unknown name)
2	Church (unknown name)
3	Twining School
4	Eielson School
5	Ness Church and Cemetery
6	Mekinock School
7	Calvary Church
8	Baseview Church
9	Middle Grove Church and Cemetery
10	Oakville School
11	Ascension Church
12	Emerado Community Schools
13	Emerado Community Schools
14	Emerado Cemetery
15	St. Timothy Cemetery
16	Manvel City School
17	Manvel Community Churches (3)
18	School No. 25
19	School No. 30
20	Evanger Church and Cemetery
21	South Bethany Cemetery
22	Pleasant View School
23	Driscoll School
24	Resthaven Memorial Gardens
25	Nesbit Cemetery
26	Thompson Community School
27	Thompson Cemetery
28	St. James Cemetery
29	Walle Church and Cemetery

* See Plate 27 for Facility Locations

TABLE 65**COMMUNITY FACILITIES - URBAN AREA**

<u>Plate Number</u>	<u>Name of Facility</u>
1	Calvary Cemetery
2	Memorial Park Cemetery
3	Sunset Memorial Gardens
4	Westley College
5	University of North Dakota
6	Lake Agassiz School
7	School for the Blind
8	West School
9	Valley Junior High School
10	Winshin School
11	St. James High School
12	Benjamin Franklin School
13	Lewis and Clark School
14	Holy Family School
15	Immanual School
16	Viking School
17	Schroeder Junior High School
18	South Junior High School
19	Lincoln School
20	Roosevelt School
21	Belmont School
22	St. Mary's School
23	Central High School
24	St. Michael School
25	Washington School
26	Wilder School
27	River Heights School
28	River Heights High School
29	Central High School
30	Valley School
31	Sacred Heart School
32	Crestwood School
33	Grand Forks Public Library
34	Rehabilitation Hospital
35	United Hospitals



Grand Forks / East Grand Forks URBAN WATER RESOURCES STUDY

COMMUNITY FACILITIES FOR RURAL AREAS

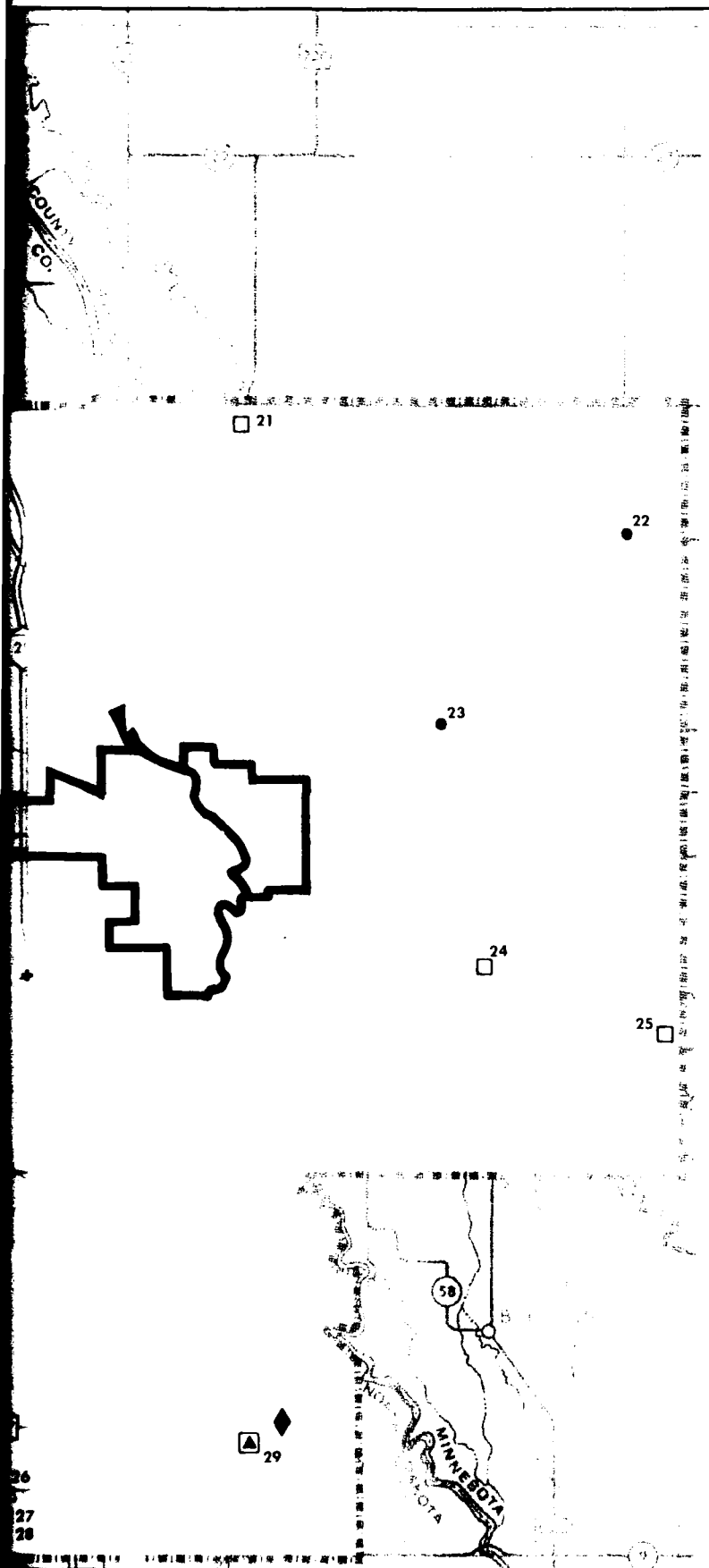
- ELEMENTARY, PAROCHIAL
OR HIGH SCHOOL
- ▲ CHURCH
- CEMETERY
- ▣ CHURCH WITH CEMETERY
- ◆ TOWN HALL
- + HOSPITAL

NOTE: SEE TABLE 58 FOR NUMBER
LISTING OF RURAL CHURCHES,
CEMETERIES AND SCHOOLS.

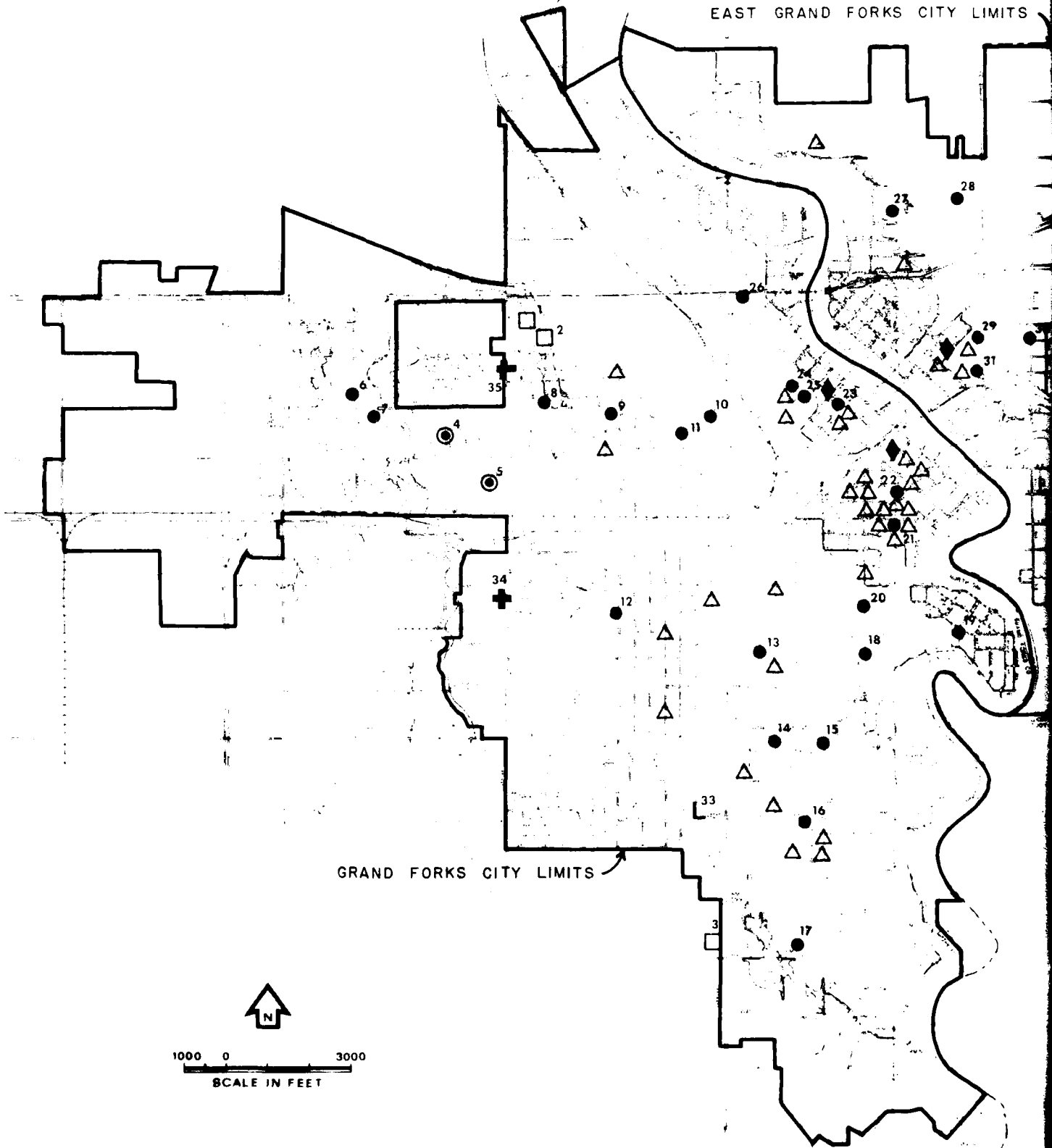
□ COMMUNITY FACILITIES FOR THE
GRAND FORKS - EAST GRAND
FORKS URBAN AREA PRESENTED
ON PLATE 28

SOURCE: REFERENCES 119 THRU 123.

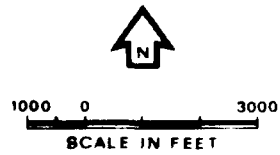
PLATE 27



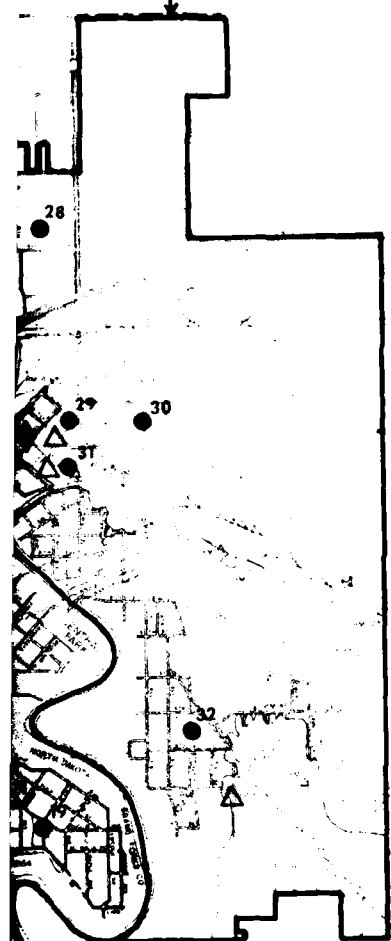
EAST GRAND FORKS CITY LIMITS



GRAND FORKS CITY LIMITS



Y LIMITS



Grand Forks / East Grand Forks URBAN WATER RESOURCES STUDY

COMMUNITY FACILITIES FOR THE GRAND FORKS - EAST GRAND FORKS URBAN AREA

- ⊙ COLLEGES
- ELEMENTARY, PAROCHIAL OR
HIGH SCHOOL
- △ CHURCH
- CEMETERY
- ◆ COURT HOUSE OR CITY HALL
- ⊕ HOSPITAL
- L LIBRARY

NOTE: SEE TABLE 58 FOR LISTING OF
GRAND FORKS - EAST GRAND FORKS
COMMUNITY FACILITIES AND SERVICES.

COMMUNITY FACILITIES IN RURAL AREAS
PRESENTED ON PLATE 27

SOURCE: REFERENCES 119 THRU 123.

PLATE 28

2. Recreation

The major focuses for metropolitan area recreational needs are the Red River of the North and Red Lake River floodplains and city park and recreation systems. Other areas and facilities include the Turtle River State Park near Arvilla, municipal parks at Thompson and Manvel, the county fairgrounds at Grand Forks, school playgrounds, semipublic country clubs in the urbanized area, and numerous privately owned and operated facilities dispersed throughout the area (plates 29 and 30). The lower 164 miles of the Red Lake River has been designated by the State of Minnesota as a canoe route. The Red River from the low-head dam at Grand Forks to Pembina (139 miles) is identified in the North Dakota State Comprehensive Outdoor Recreation Plan (SCORP) as a canoe route.

The Grand Forks park system commenced in the early 1900's with the acquisition of 150 acres of parkland at four locations (reference 90). There are presently 581.6 acres of parks, open space, and public recreation land in Grand Forks, 8.9 percent of the total land acreage within the existing city limits. Of this total, 496.1 acres are devoted to parks and public recreation, while 85.5 acres constitute open space, principally located along the Red River of the North. Each park or recreation area and its facilities are listed in table 66 (reference 242). These areas provide a wide variety of public summer and winter recreation facilities, as shown by category in table 66. A recent city park-use survey indicates that about 70 percent of the users originate in the city, about 20 percent are from within 25 miles, and 10 percent travel a distance of over 25 miles.

Complementing the recreational opportunities provided by the Grand Forks park system are the county fairgrounds used for fair activities, rodeos, and auto racing; three movie theaters; one drive-in movie; the Grand Forks arena; and the winter sports arena at the University of North Dakota. Numerous privately owned facilities (see table 67) further aid in meeting recreational needs in the area.



The East Grand Forks park and recreation system presently includes about 164 acres of public and semipublic lands (reference 128). Included are three neighborhood parks, two playground areas, 80 acres of mostly undeveloped floodway, and 30 acres of acquired but generally undeveloped property (see table 66). Facilities provided at each area are also shown by category in the table. Complementing these city facilities are the school playgrounds and the new civic arena which provides a variety of indoor recreation facilities. Private recreation facilities, including a country club, rod and gun club, and an archery club, are also located in the city (see table 67).

TABLE 66 ^{1/}

PUBLIC PARKS AND RECREATION AREAS

TABLE 66 ^{1/}
PUBLIC PARKS AND RECREATION AREAS

Location	Name	Area in Acres	Type of Facilities																						
			Archery Range	Baseball Diamond	Softball Diamond	Tennis Courts	Golf Course	Curling Area	Hockey Pen	Ice Rinks	Campgrounds	Picnic Grounds	Playground Equip.	Ski Lift	Swimming Area	Indoor Pool	Recreation Room	Warming House	Horseshoe Courts	Boat Landing	Amphitheater	Flower Gardens	Toilets	Football	Snowmobiling
Grand Forks	Belmont & 23rd Ave. So.	Lincoln Park	124.10	X		X	X					X	X	X					X	X			X		
	7th Ave. So.	Williamson Ball Field	15.85	X	X			X		X		X	X	X									X	X	
	Park Ave. & N. 1st. St.	Riverside Park	38.59		X	X			X	X	X	X	X	X	X		X	X	X				X	X	
	Elm Ave. & So. 4th St.	Central Park	19.01		X							X	X	X			X	X	X		X		X	X	
	17th Ave. So. & So. 25th St.	Appalo Park	27.00	X	X																				
	Univ. Ave. & No. 25th St.	University Park	18.20		X				X	X		X	X				X	X	X				X		
	13th Ave. So. & So. 10th St.	Elk's Park	10.00		X				X	X			X	X		X	X	X	X						
	11th Ave. So. & 20th St.	Franklin Park	10.00		X					X			X				X	X	X						
	6th Ave. N. & N. 39th St.	Lake Agassiz Park	7.20							X							X	X	X						
	Oak & 22nd Ave. So.	Cox Park	6.50		X				X	X			X				X	X	X						
	9th Ave. So. & So. 15th St.	Wilmar Park	5.50		X				X	X			X				X	X	X						
	Demers Ave.	Ray Richards																							
	Cherry St. & 42nd Ave.	Golf Course	70.00				X																		
		Sunbeam (In 2-3 yrs)	18.7									Undeveloped													
		Medview (In 2-3 yrs)	9-10									Undeveloped													
		Mini-park	0.62									Undeveloped													
East Grand Forks	Sherlock Park		20.5						X	X		X	X		X							X	X	U	
	Stauss Park		5.3						X	X		X	X										X	X	
	Folson Park		25.4	U					X	X		X	X				X		U	U			X	U	
	Harney Playground		1.12							X			X												
	Griggs Playground		2.0						X	X			X											X	
	O'leary Property		28.0									U	U											U	
	Lawonn Property		1.2																						
	Floodway		60.0																						
	DDT'L Floodway		20.0										U	U						U		X		U	U
Thompson	Heritage Park		10.0		X	X																			
Manvel	Recreation Area		5.0		X														X						
Arvilla	Ray Ronan Park		10.0		X				X			X							X						
	Turtle River State Park		486.0								X	X	X		X										

^{1/} Excluding school grounds and facilities

Sources: References G.F. Rec. Plan, EGF Rec. Plan, and N.D. SCORP

^{1/}

Excluding school grounds and facilities

Sources: References G.F. Rec. Plan, EGF Rec. Plan, and N.D. SCORP

TABLE 67

OTHER RECREATION FACILITIES

Map Number	Name or Type	Location	Map Number	Name or Type	Location
1	Playground, ball park	Emerado, N.D.	29	Valley Country Club	East Grand Forks, Minn.
2	Amusement Center	Emerado, N.D.	30	River Heights Park	East Grand Forks, Minn.
3	Nat'l waterfowl production area	Blooming Township, N.D.	31	East Grand Forks Rod & Gun Club	East Grand Forks, Minn.
4	Picnic grounds	Blooming Township, N.D.	32	River Heights Elementary School	East Grand Forks, Minn.
5	Kelly Slough Nat'l Wildlife Refuge	Blooming Township, N.D.	33	Red River Archers	East Grand Forks, Minn.
6	Manvel-Gilby Gun Club	Manvel, N.D.	34	Sherlock Park	East Grand Forks, Minn.
7	Manvel School & Stables	Manvel, N.D.	35	River Band Country Club	East Grand Forks, Minn.
8	Monterey School & Stables	Manvel, N.D.	36	Valley Elem. School Grounds	East Grand Forks, Minn.
9	Roy Ronan Park	Rye Township, N.D.	37	Folsom Park	East Grand Forks, Minn.
10	Amusement Center	Rye Township, N.D.	38	Crestwood Elem. School Grounds	East Grand Forks, Minn.
11	Westside Trailer Park and Campground	Rye Township, N.D.	39	Straus Park	East Grand Forks, Minn.
12	Amusement Center	Rye Township, N.D.	40	Harney Park	East Grand Forks, Minn.
13	Grand Forks Rod & Gun Club	Rye Township, N.D.	41	Griggs Park	East Grand Forks, Minn.
14	Drive-in movie	Grand Forks	42	Civic Recreation Center	East Grand Forks, Minn.
15	University Park	Grand Forks	43	Lincoln Park	East Grand Forks, Minn.
	University of North Dakota Field House	Grand Forks	44	Winston Register Stables	Grand Forks
	Memorial Stadium		45	George Eastburn Stables	Grand Forks
16	YMCA	Grand Forks	46	Grand Forks Country Club	Grand Forks Township
17	Roy Richards Golf Course	Grand Forks	47	Thompson Recreation Area	Thompson, N.D.
18	Riverside Park	Grand Forks	48	Heritage Park	Thompson, N.D.
19	County Fairgrounds	Grand Forks	49	Grand Forks Arena	Grand Forks
20	Hylden Field	Grand Forks	50	Williamson Ball Field	Grand Forks
21	Y-Family Center	Grand Forks	51	Franklin Park	Grand Forks
22	Apollo Park	Grand Forks	52	Lake Agassiz Park	Grand Forks
23	Elk's Park	Grand Forks	53	Wilmar Park	Grand Forks
24	KOA Campground	Grand Forks	54	Indoor Tennis Arena	Grand Forks
25	Drive-in movie	Grand Forks	55	Roller Rink	Grand Forks
26	Cox Park	Grand Forks	56	Wilder School Playground	Grand Forks
27	Central Park	Grand Forks	57	Roosevelt School Playground	Grand Forks
28		Grand Forks	58	Belmont School Playground	Grand Forks
			59	Lincoln School Playground	Grand Forks
			60	West School Playground	Grand Forks
			61	Mini-park Playground	Grand Forks

The principal regional park serving the study area is the 486-acre Turtle River State Park, located about 25 miles west of Grand Forks near Arvilla. The park provides camping, picnicking, playground, and swimming facilities plus attractive natural areas for use by regional residents. The nearest regional Minnesota facility is the 285-acre Old Mill State Park, located about 47 miles northeast of East Grand Forks. The park contains a historic mill site and provides facilities for camping, picnicking, swimming, and snowmobiling.

Municipal park and recreation areas outside the urbanized area include two parks totaling 15 acres at Thompson and a 10-acre park at Manvel. Facilities provided at these parks are also listed in table 66.

Even with the relatively large number of recreational facilities in the area, the Grand Forks and East Grand Forks Park Boards, statewide Comprehensive Outdoor Recreation Plans (SCORP's), and user surveys indicate needs for additional areas and facilities. These added facilities are needed to serve an expanding population with increased leisure time. To meet these needs, the 1974 Grand Forks Master Park and Open Space Plan recommends the addition of over 234 acres of parkland by 1990, development of a city bicycle-hiking trail system, collocation of neighborhood parks with existing or new elementary schools, and intensified management and use of existing facilities. The park-use survey made in support of the plan indicated the greatest need for tennis and bike path facilities. Grand Forks presently has a LAWCON (Land and Water Conservation) grant application pending for a recreational complex consisting of six tennis courts, four handball courts, two basketball courts, and attendant parking. The April 1976 East Grand Forks Recreation Facility Study recommends additional park areas both in the northern and southern sections



of the city, a safe crossing of U.S. Highway 2, traffic controls for safe access to the Civic Recreation Center, development of bike routes and walking trails, development of a former landfill for recreational use, and development of water-based recreation facilities for aesthetic reasons and greater utilization of floodplain areas. The two greatest user needs indicated by a recent survey are a north end park and a safe crossing over U.S. Highway 2. A LAWCON Grant for recreational development of O'Leary Park has recently been approved.

On a regional basis, both the Minnesota and North Dakota State Outdoor Recreation Plans(SCORP's)indicate a need for various recreation facilities. For Minnesota Region 1, the 7-county area including Polk County (see figure 23), the Minnesota SCORP indicates a 1980 need for all listed facilities except additional golf courses and canoe stream as shown in table 68. For the northeastern region (Region 4) of North Dakota, including Grand Forks County, the North Dakota SCORP indicates a future surplus or need for selected recreation facilities as shown in table 69.

For more information on the recreation needs and projections of the study area, refer to the Energy Conservation and Recreation Appendix.

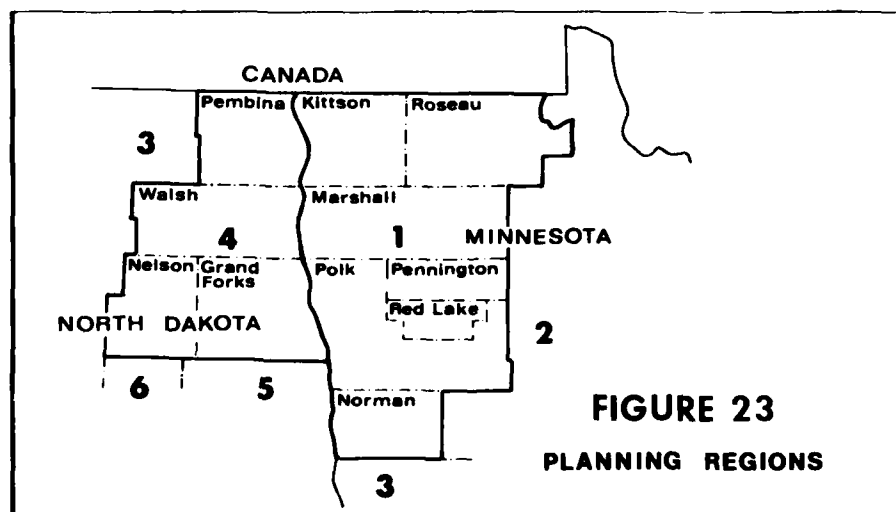


TABLE 68

RECREATION FACILITY REQUIREMENTS - REGION I, MINNESOTA

Facility	1972 Existing		Region I 1980 Required		Region I 1990 Required	
	Region I	Polk County	Quantity	Need or Surplus (+)	Quantity	Need or Surplus (+)
Athletic Fields (acres)	342	54	353	(-11)	363	(-21)
Tennis Courts	32	15	42	(-10)	36	(-4)
Golf Courses (holes)	135	36	66	(+69) ¹	---	---
Picnic Tables	701	211	887	(-186)	892	(-191)
Campsites	391	151	913	(-522)	1112	(-721)
Hiking Trails (miles)	27	5	91	(-64) ¹	---	---
Snowmobile Trails (miles)	82	5	464	(-382) ¹	26 miles per 1000 added vehicles	
Biking Trails (miles)	---	3	---	---	---	---
Swimming Area (1000 ft ²)	196	14.4	310	(-114)	336	(-140)
Canoe Stream (miles)	164	---	13	(+151)	18	(+146)

1. 1975 Requirements

Source: 1974 Minnesota SCORP

TABLE 69

RECREATION FACILITY REQUIREMENTS - REGION 4, NORTH DAKOTA

<u>Facility</u>	<u>Existing Region 4</u>	<u>Grand Forks County</u>	<u>Region 4 - 1980 Add'l Required</u>	<u>Region 4 - 1990 Add'l Required</u>
Baseball & Softball Diamonds	51	36	28	34
Tennis Courts	22	13	40	60
Golf Courses (9 hole courses)	15	7	8	14
Picnic Tables	726	385	442	525
Campsites	229*	310	61	108
Hiking Trails (miles)	---	53	---	---
Snowmobile Trails (miles)	0	0	---	---
Biking Trails (miles)	0	0	12	14
Swimming Area (pools)	14	6	2	2
Canoe Stream (miles)	Red River	Red River	Not Determined	Not Determined
Ice Skating Rinks	18	8	12	15
Horseshoe	44	30	Not Determined	Not Determined
Playgrounds	23	2	Not Determined	Not Determined

*

Source: Reference 124

Key References

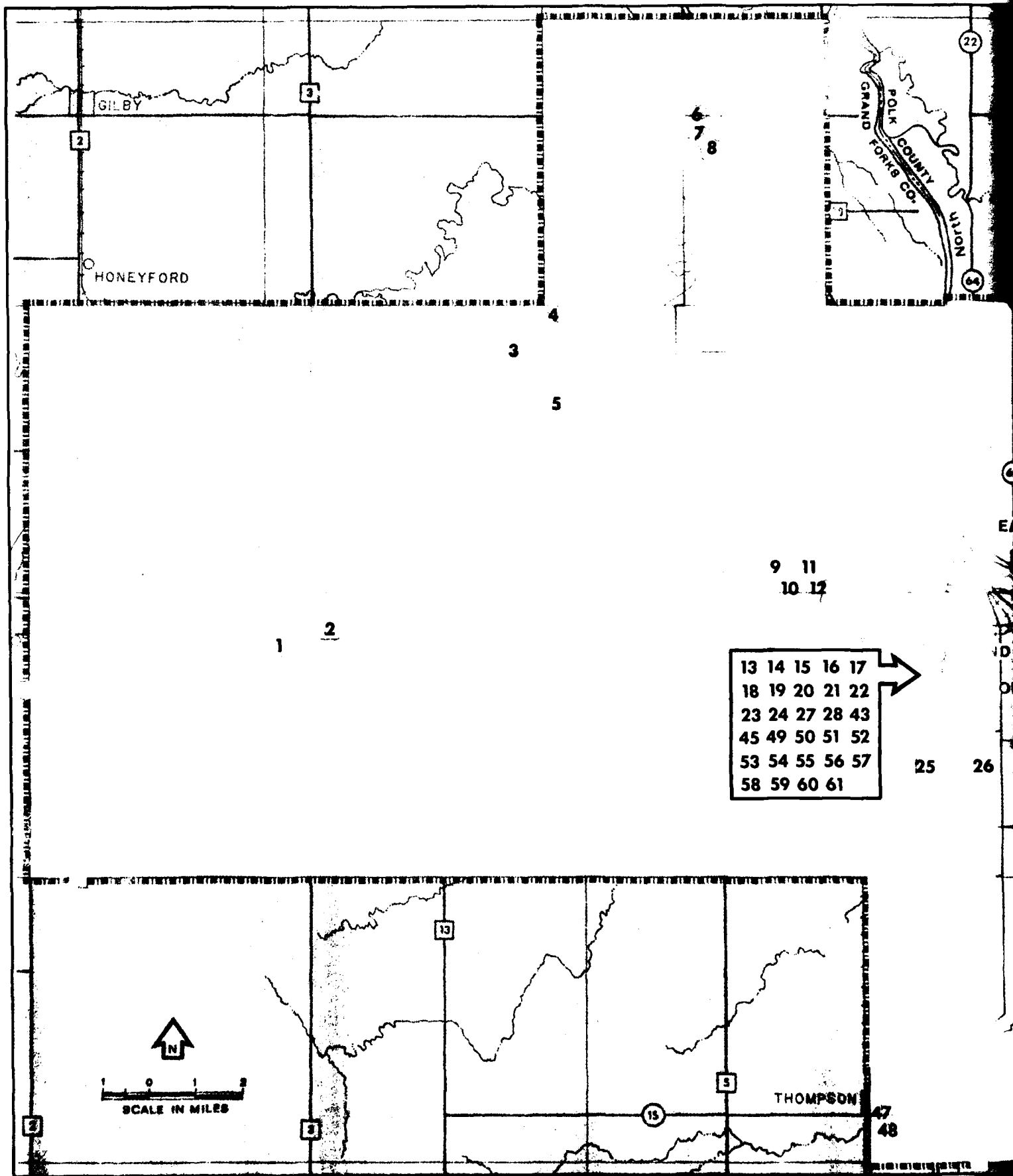
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Grand Forks / East Grand Forks URBAN WATER RESOURCES STUDY

RECREATION FACILITIES FOR RURAL AREAS

5 RECREATION FACILITY

LOCATION OF GRAND FORKS -
EAST GRAND FORKS RECREATION
FACILITIES SHOWN ON PLATE 30

NOTE: SEE TABLE 61 FOR NUMBER
LISTING OF RECREATION FACILITIES

SOURCE: REFERENCES 119 THRU 130

PLATE 29

30 32 33 34
35 36 37 38
39 40 41 42

31
29

25 26

44
46

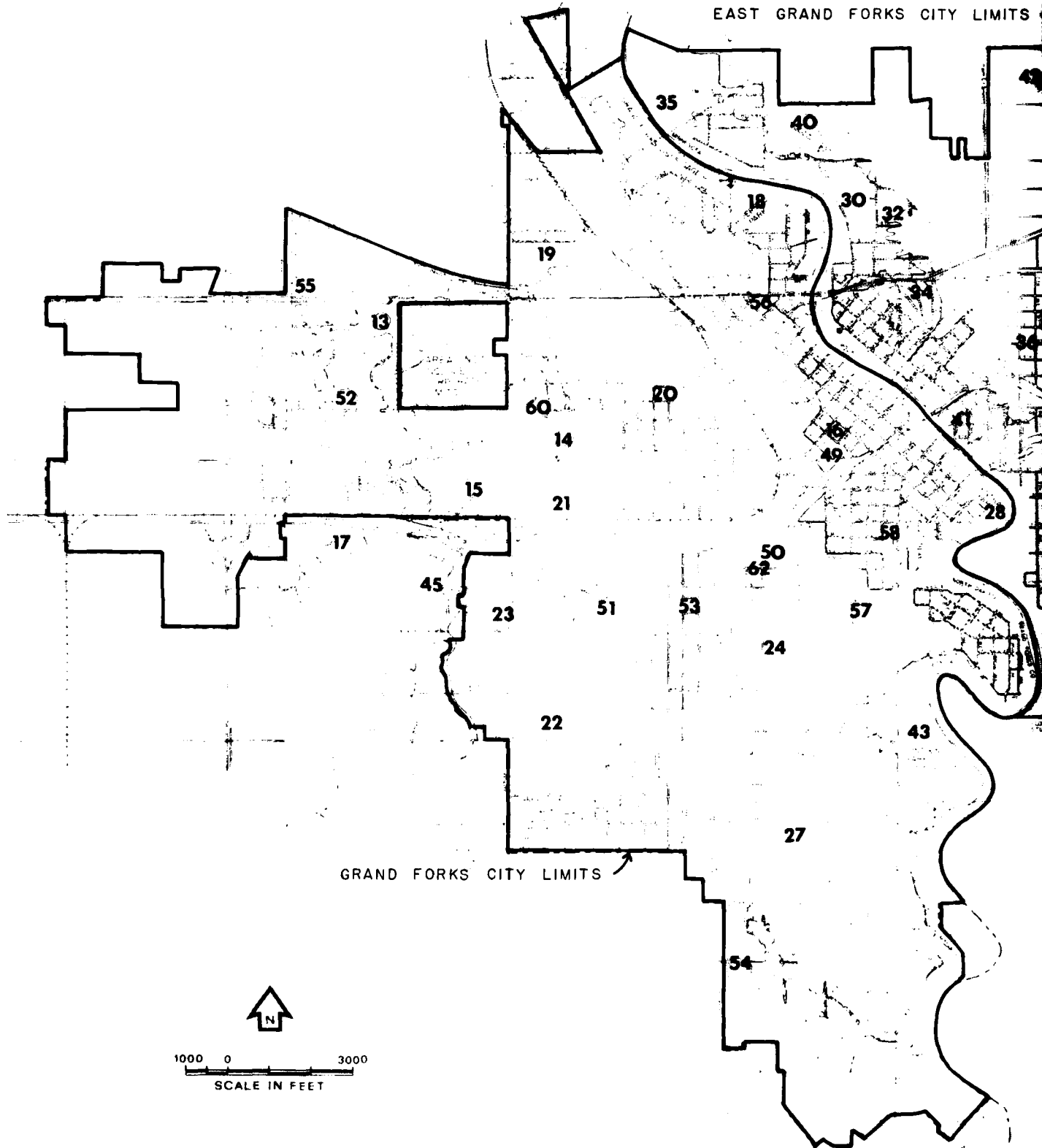
BYGLAND

NORTH
DAKOTA

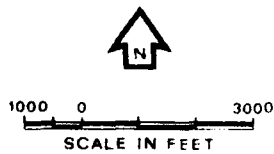
220

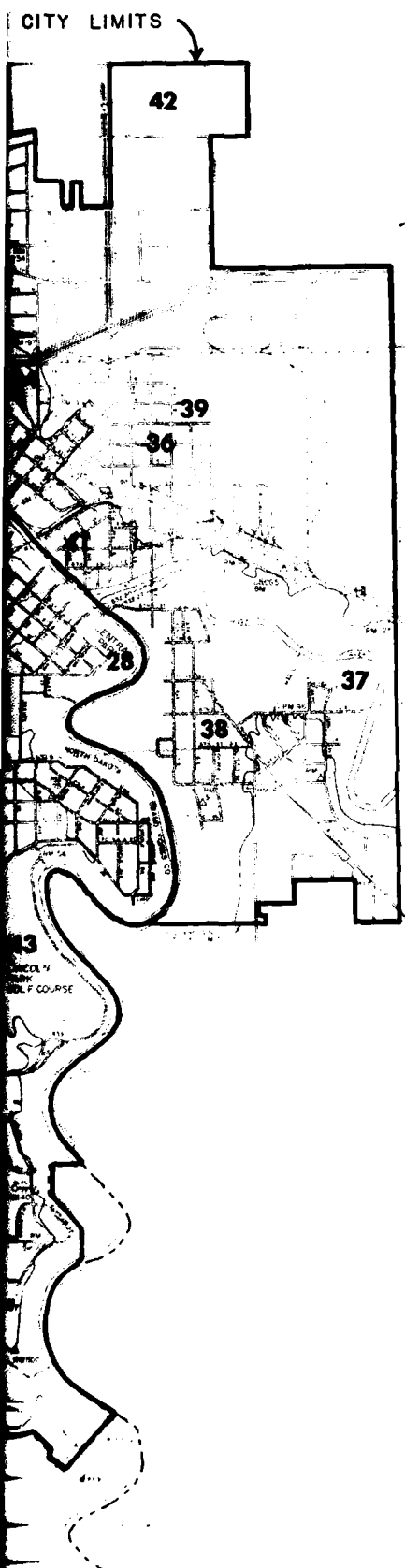
9

EAST GRAND FORKS CITY LIMITS



GRAND FORKS CITY LIMITS





Grand Forks / East Grand Forks URBAN WATER RESOURCES STUDY

RECREATION FACILITIES FOR THE
GRAND FORKS - EAST GRAND FORKS
URBAN AREA

36 RECREATION FACILITY

RECREATION FACILITIES IN RURAL
AREAS PRESENTED ON PLATE 29

NOTE: SEE TABLE 61 FOR NUMBER LISTING
OF RECREATION FACILITIES.

SOURCE: REFERENCES 119 THRU 130.

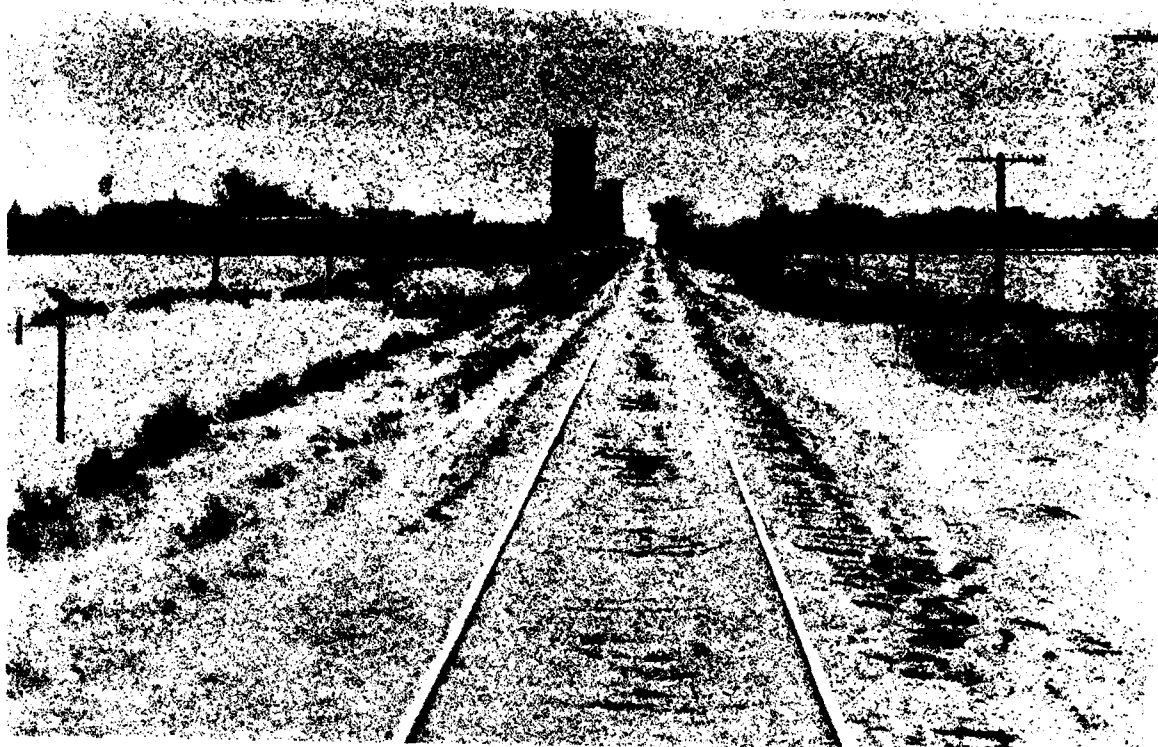
PLATE 30

Transportation and Utilities - An adequate transportation system is essential if a community is to prosper. The Grand Forks-East Grand Forks vicinity is fortunate in that transportation facilities were provided early in the community's history and have continued to develop. The following paragraphs describe the various modes of transportation available to study area residents.

Air transportation within the area is facilitated primarily by Grand Forks International Airport (Class A) located $4\frac{1}{2}$ miles from the city. Northwest Orient, Republic, and Frontier Airlines provide 32 flights a day to and from Grand Forks, of which 18 are fan-jet flights. Connections are readily available from Grand Forks International Airport to major Canadian and United States cities as well as to the North Dakota cities of Bismarck, Fargo, Jamestown, Minot, and Devils Lake. In addition to passenger service, cargo service is available via air freight or air express to Bismarck, Devils Lake, Dickinson, Fargo, Jamestown, Minot, and Williston. Other air facilities in the area include the Grand Forks Air Force Base and a small landing strip at Manvel. However, the Air Base is a military operation and is not normally considered a public transportation facility.

Both passenger and freight rail services are available to area residents. Daily freight shipments are handled by Burlington Northern and daily passenger service for the surrounding region, via the Empire Builder, is handled by the Amtrak terminal at Grand Forks. Various trucking services are provided to the area by local and national trucking companies.

Bus service to the area is provided by three bus lines. Greyhound Bus Lines operates between Grand Forks and the cities of Fargo and Winnipeg; the Highway 2 Express operates between Grand Forks and Minot; and Triangle Bus Lines operates between Grand Forks and Bemidji, Minnesota.



Grand Forks is located at the junction of U.S. Highways 81 and 2. Interstate Highway I-29 parallels U.S. Highway 81 and connects the study area to both the Canadian and Mexican borders. The major junction within East Grand Forks is U.S. Highway 2 and Minnesota State Highway 20. For relative locations of highway, rail, and air transportation facilities, see plate 31.

The major planned highway modification in the urban area is the proposed replacement of the State Highway 220 bridge over the Red Lake River in East Grand Forks. Unstable soil conditions are causing the north abutment to subside. Various alternatives are being considered jointly by the city and State Highway Department. Other proposed or planned improvements, all located in Grand Forks and/or Grand Forks County, include widening of U.S. Highway 2 west of the U.S. Air Force Base to four lanes, widening and other

improvements to Columbia Road, and a proposed extension of the city "Ring" Road north of Demers Avenue. The Grand Forks City Street and Highway Plan is being updated through a joint effort of the city and the North Dakota State Highway Department.

Electric power transmission line and generating plant locations are also indicated on plate 31. Within the study area, four electrical power agencies supply power to Grand Forks area residents. They are the United Power Association (UPA), Minnkota Power Cooperative (MPC), Water and Power Resources Service (WPRS), and Northern States Power Company (NSP). All major electrical systems are interconnected in a regional power grid. Future area electric power needs are being considered in current studies of additional regional system interconnections, added capacity at Garrison Dam and other main stem damsites, and plant expansions planned or under way by various regional utilities. Electric power for East Grand Forks residents is provided by the municipal East Grand Forks Water and Light Department.

A 16-inch pipeline transmits crude oil into the study area from the west and runs south of Grand Forks. Another general purpose petroleum products pipeline supplies natural gas to Grand Forks users. Northern States Power Company provides natural gas service to East Grand Forks area customers.

Telephone service to the area, including the Air Force Base, is provided by Northwestern Bell Telephone Company. Total capacity is over 26,000 instruments, with a reported excellent capability for expansion. A discussion of area wastewater and water supply systems was given in the water resources section of this report.

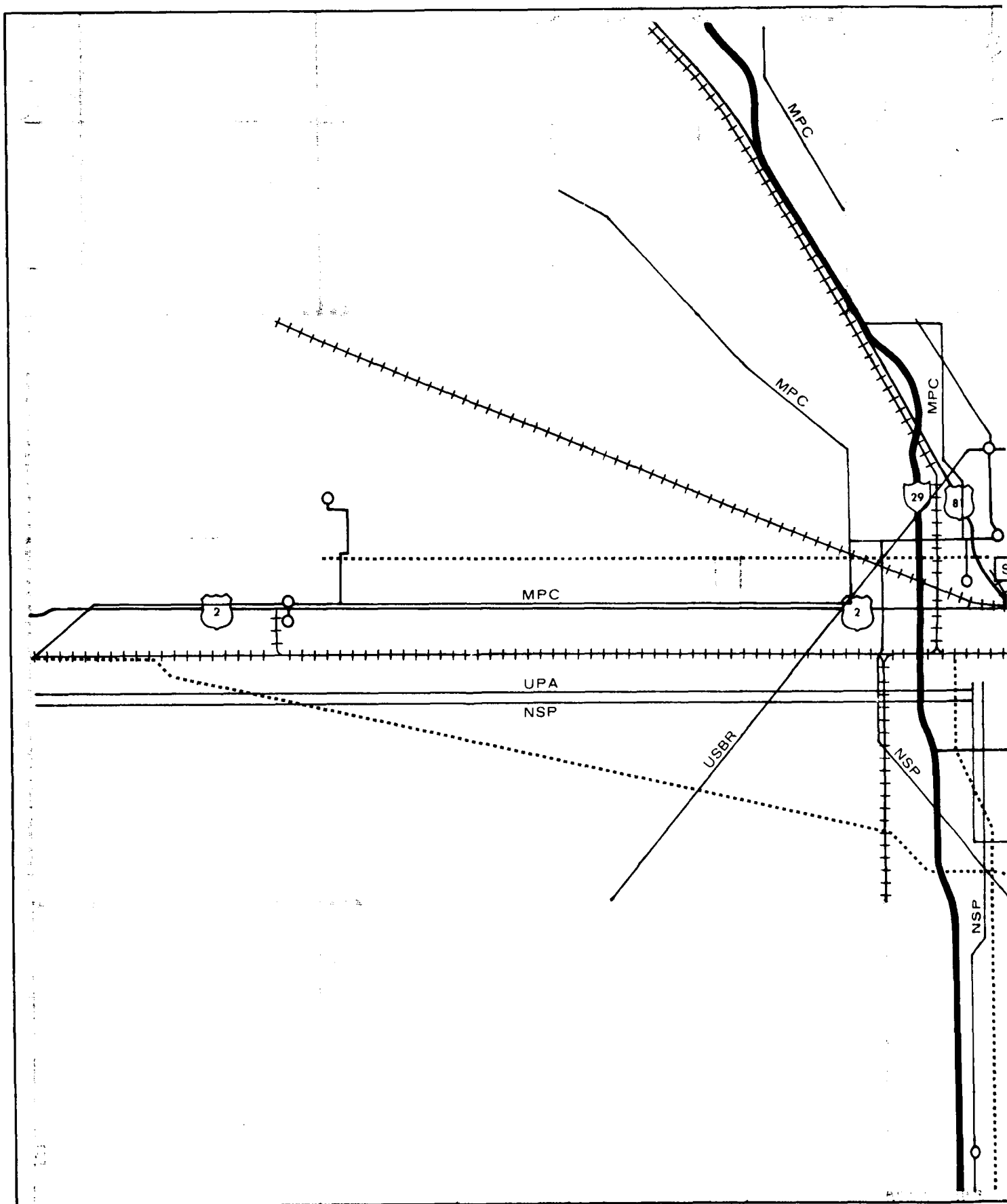
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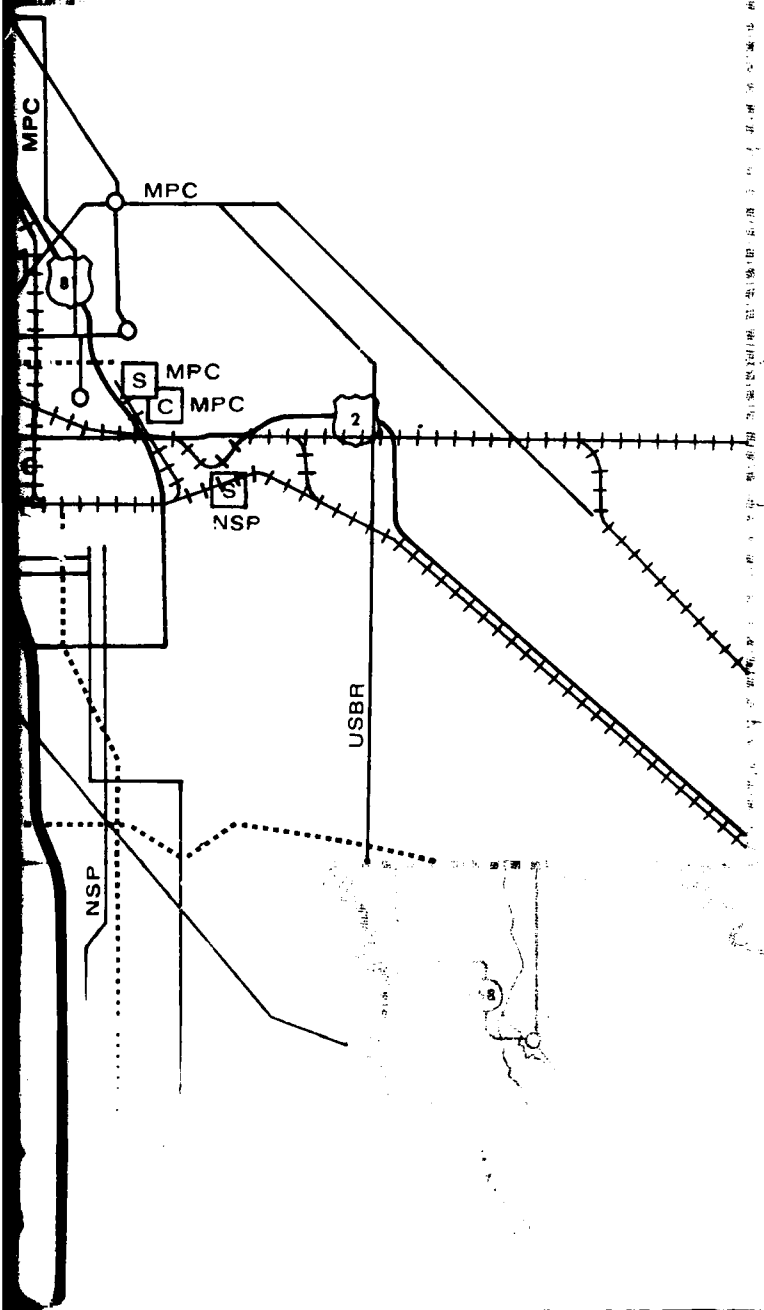
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NOTE:

NODAK RURAL ELECTRIC COOP.
DISTRIBUTES POWER TO INDIVIDUAL
RURAL CUSTOMERS. OTTERTAIL
POWER COMPANY SUPPLIES MOST
RURAL COMMUNITIES WITH POWER

**Grand Forks / East Grand Forks
URBAN WATER RESOURCES STUDY**



- INTERSTATE HIGHWAY
- U.S. HIGHWAY
- RAILWAYS
- MINOR AIRSTRIP
- MAJOR AIRPORT
- STEAM POWER PLANT
- INTERNAL COMBUSTION POWER PLANT
- OIL PIPELINE
- POWER SUBSTATION
- POWER TRANSMISSION LINE
- MPC MINNKOTA POWER COOP. INC.
- UPA UNITED POWER COOP.
- NSP NORTHERN STATES POWER
- USBR U.S. BUREAU OF RECLAMATION

SOURCE: REFERENCES 48,119,120,131.

IDENTIFICATION OF DATA DEFICIENCIES

The following discussion presents a summary of data gaps and/or insufficiencies identified during the social and environmental survey for the Grand Forks-East Grand Forks Urban Water Resources Study. The discussion follows the same outline as the draft Social and Environmental Inventory Report.

Physiographic Elements

- Geology - Available information on depths of subsurface formations in the Polk County study area is somewhat conjectural and incomplete.
- Minerals - Published sand and gravel production data for years subsequent to 1972 could not be found in U.S. Bureau of Mines reports and other researched sources.
- Soils - Current published reports available for Grand Forks County area. Data not nearly so complete for Polk County portion.
- Water Resources - Only limited data available regarding the physical characteristics of the tributary streams. Ongoing SCS Turtle River Special Flood Hazard Study will provide data on that stream. Little published water quality data for the smaller tributary streams. Data on physical and operating characteristics for the small community lagoon systems in Grand Forks County are locally available in files of a local consultant. Published information on nonpoint pollution sources affecting Red River water quality in the study area is very cursory at best.
- Climate - Information (tabulated data) is based on a special local study by the National Weather Service in 1966. Additional local climatological information is available in the Geography Department of the University of North Dakota at Grand Forks.

Biological Elements

- Flora - Data are generally adequate but conflicting opinions exist regarding the status of certain threatened or endangered flora.
- Fauna - A major gap exists in published information on study area mammals. Nothing comprehensive is available since Bailey's "A Biological Survey of North Dakota" in 1926 (draft report ref. 55).
- Discussions with knowledgeable local persons indicate that game and fish people have little interest in Red River Valley fish and wildlife prospects because of past and continuing intensive agricultural practices. Minnesota DNR field personnel indicated only a very minor interest in the study area fish and wildlife reserves.
- Reptiles and Amphibians - Current information on distribution and status is limited as a result of apparent lack of interest by fish and game management interests.
- Aquatic Species - Very limited information as a result of low priorities based on relative occurrence of fish and wildlife habitat in the study area.
- Threatened and Endangered Species - Other than species listed in the Federal Register, considerable differences seem to exist between reputable sources as to the status of selected species.

Cultural Elements

Archaeological- - Data are generally adequate except for the
Historical location of three old pioneer oxcart trails. A retired judge (Sylvester) in Crookston may have more information on the trails. Only limited field research has been undertaken concerning pre-historic and archaeological sites in the study area.

Agriculture - Limited comprehensive published data are available at the local level. Best data sources are the national agricultural census and State reporting service reports. Accuracy of 1974 U.S. farm census data is questioned by many of those in the trade.

Land Use - A serious lack of current land-use data exists for the study area. Available data contained in the 1963 and 1965 comprehensive plans for Grand Forks and East Grand Forks are grossly outdated. The city of Grand Forks has an unpublished map showing 1975 land use but has no numerical breakdown of land use by category. The city of East Grand Forks is expected to identify current land use in a revised comprehensive plan to be completed some time in 1977.

The Red River Regional Development Council (Region 4) is presently preparing a data inventory report which will give land use data for the small communities and townships. Preliminary data by Grand Forks County are complete except for Rye and Grand Forks Townships. Land use data for the small communities exist only for Thompson (ongoing comprehensive plan by Region 4). Grand Forks County land use maps are presently being prepared by the Red River Regional Council and will be available some time in 1977.

Recreation - Current data in the form of surveys and reports are available for Grand Forks and East Grand Forks (references 126 and 128). The city of Grand Forks has some reservations about the report (ref. 126) recommendations.

Other than SCORP and Chamber of Commerce data, no published recreational data were found for the small towns and rural areas.

Transportation and Utilities - No published information is available concerning aircraft activity at Grand Forks International Airport. Unpublished information is reportedly available for on-site review at two sources at the airport. Grand Forks city street and highway plan is being updated by the city and State Highway Department.

Industrial and Commercial Activity - Data for the smaller Grand Forks County communities are lacking. Community profiles, where available, provide only limited information. No published breakdowns of industrial land use for Grand Forks or East Grand Forks are available.

Housing and Property Value - No current housing condition data other than 1970 U.S. Census data are available. Typical property values for East Grand Forks are also not published. No published information is available for towns of less than 2,500 population. A new Grand Forks report - Housing Market Survey - has just been published but a copy could not be obtained. Rural housing data for Grand Forks County are being gathered by the Regional Development Council and should be available shortly.

- Occupations
and
Income - Very limited published data are available for the small communities. Best available data for the nonurbanized area are the 1970 U.S. Census data for Grand Forks and Polk Counties and data contained in the Region 1 data inventory report.
- Population
Distribution - Most current data are those of the 1970 U.S. Census as supplemented by more recent data for Grand Forks, East Grand Forks, and Thompson.
- Crime - A crime incidence map for Grand Forks is presently unavailable.
- Neighborhood
Groups - No published list or source of groups is available. Identified groups obtained through discussions with local government personnel.

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