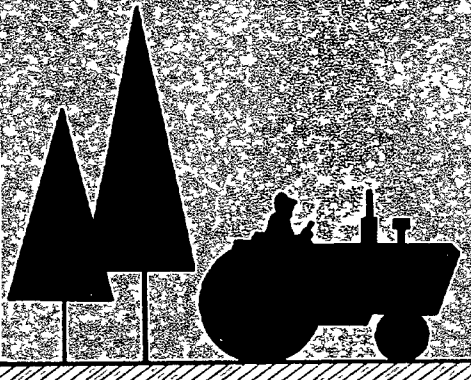
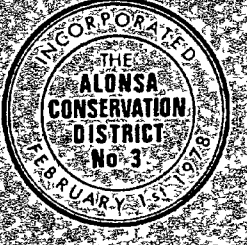
THE ALONSA CONSERVATION DISTRICT RESOURCE MANAGEMENT SCHEME





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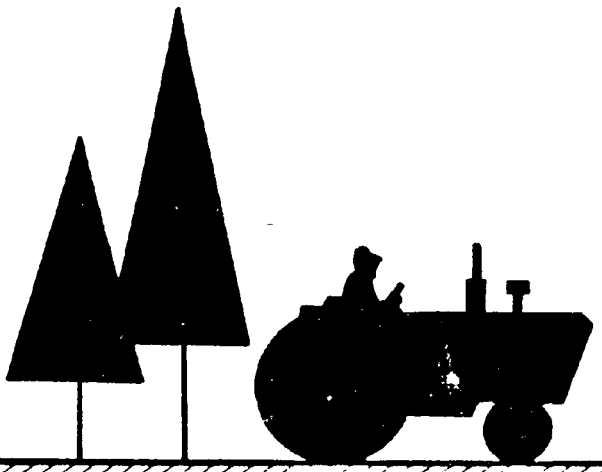

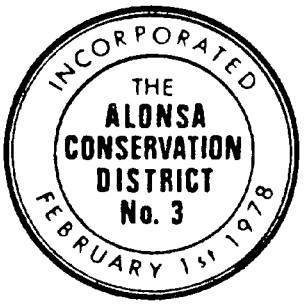

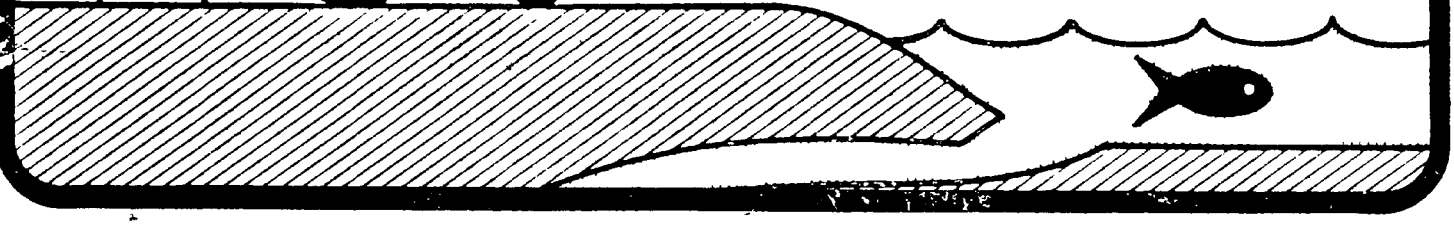

ALONSA CONSERVATION DISTRICT BOARD

RESOURCE MANAGEMENT SCHEME

INCORPORATED THE ALONSA CONSERVATION DISTRICT No 3 FEBRUARY 1st 1978

SUBMITTED BY

● BILL NAPIER
CHAIRMAN
ALONSA CONSERVATION DISTRICT

RECOMMENDED BY

● T E WEBER P ENG
CHAIRMAN
CONSERVATION DISTRICTS COMMISSION

APPROVED BY

● HONOURABLE A MACKLING
MINISTER
DEPARTMENT OF NATURAL RESOURCES

OCTOBER 1983

CONSERVATION DISTRICTS COMMISSION
1577 Dublin Avenue • Winnipeg • Manitoba R3E 3J5

March 7, 1984

Honourable Al Mackling,
Minister of Natural Resources,
215 Legislative Building,
WINNIPEG, Manitoba.

Dear Sir:

The Conservation Districts Commission has the honour to present the attached Alonsa Conservation District Resource Management Scheme for your approval. Upon reviewing the report, the Commission has found this Scheme to be consistent with the purposes and intent of the Conservation Districts Act, S.M. 1976, c.38.

The Commission recommends the Alonsa Conservation District Resource Management Scheme be approved for implementation.

Yours truly,

T. E. Weber,
Chairman,
Conservation Districts Commission.

ALONSA CONSERVATION DISTRICT BOARD

February 29, 1984

Conservation Districts Commission
1577 Dublin Avenue
Winnipeg, Manitoba
R3E 3J5

Gentlemen:

The Alonsa Conservation District Board has prepared a resource management scheme in accordance with Regulation 13 pursuant to Section 14 of the Conservation Districts Act, S.M. 1976, c. 38. The Board is pleased to submit the attached report and eight appendices to the Commission for Ministerial approval to implement the Scheme.

Yours sincerely,

Bill Napier
Chairman
Alonsa Conservation District

STUDY GROUP

D. J. Kozusko, P. Eng. (Study Coordinator)	-	Senior Planning Engineer Water Management Service Water Resources Branch Manitoba Department of Natural Resources
D. Davies	-	Regional Wildlife Specialist Wildlife Branch Manitoba Department of Natural Resources
H. W Graham, Agr.	-	Conservation Specialist Land and Water Management Section Land and Water Branch Manitoba Department of Agriculture
M. Rutulis, P Eng.	-	Groundwater Inventory Geologist Water Investigations Service Water Resources Branch Manitoba Department of Natural Resources
Dr. H. Schellenberg, Agr.	-	Agricultural Resource Economist Policy and Development Branch Policy and Economics Division Manitoba Department of Agriculture
H. Valiant	-	Regional Fisheries Biologist Fisheries Branch Manitoba Department of Natural Resources
A Warkentin	-	Hydrometeorologist Water Investigations Service Water Resources Branch Manitoba Department of Natural Resources

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APPENDICES

1. INTRODUCTION

As the world population grows, the pressure on the land to produce increases With this pressure comes advanced technology that pushes back old frontiers and allows man to use land that once lay dormant. Man has made mistakes in the past when opening new areas for agricultural production as can be witnessed in many areas of the world where agricultural production has been destroyed because of poor management. Man must learn from his experiences and change his approach to the land. He should apply new methods of utilizing the resources around him while at the same time protecting and leaving them for future generations. This approach to resource use and management is called conservation.

The pressure of society not only places demands on the agriculture industry to produce more to feed a hungry world, but also creates the need for more space for recreation and leisure activities. Society has more free time and has developed a growing interest in the outdoors as a place to spend this time. The land can provide all these things, food, a livelihood for those who work the land and use its resources and a place for leisure activities. But in order to maintain the capability of the land over the long term, it must be managed to conserve what is left and to replenish some of the resources that have been destroyed.

The Conservation Districts Act was implemented in 1976 as a vehicle for local residents to decide how the resources of their area should be managed The Act is the product of the amalgamation of two previous Acts of the legislature, The Watershed Conservation Districts Act

and The Resource Conservation Districts Act The earlier acts were restricted in their approach to total resource management and as a result there were limitations on what could be done under the Acts. The Conservation Districts Act provides the opportunity to address the entire spectrum of soil, water and related resource management.

The Act provides for the establishment of a board of local representatives for each conservation district whose responsibilities centre on the control, conservation and management of the resources within the boundaries of the district. To undertake these responsibilities, the board must develop a set of good, sound, overall resource management objectives. These objectives should describe the direction the board will take over the years ahead Once its objectives have been set, the board would then describe measures that would achieve each of the stated objectives in a resource management scheme. This scheme will act as a blueprint for any future programs and works conducted by the board and its agents Through implementation of the scheme, the overall goals of resource management for conservation will be met.

In order for a conservation district board to be able to implement its scheme effectively, it has been given a variety of powers by the Act. For example, the board assumes responsibility and authority for all conservation, reclamation and land rehabilitation works in the district, including land drainage works. The board may construct reservoirs for potable water and sell the water from them It may enter into an agreement with any landowner creating a protected area for the purpose of conserving and managing the resources. The board may issue permits for cutting trees

on these protected areas and permits for altering surface water courses. Where necessary, for the implementation of the scheme, the board may recommend to the Crown the purchase of land or may purchase the land itself.

1.1 The Alonsa Conservation District

The Alonsa Conservation District was established on February 1, 1978. The District includes all of the land within the Local Government District of Alonsa except for those portions already incorporated into the Whitemud Watershed and Turtle River Watershed Conservation Districts. The total area of the District is approximately 267,500 hectares (661,000 acres). The land is flat and contains many areas of marsh and bog. There are no major rivers and drainage is generally into Lake Manitoba. The most prominent geographical feature in the District is a height of land known as the Kinosota Ridge The ridge was probably important to prehistoric people as a travel route and camping site. If offered a dry piece of land with access to Lake Manitoba, as well as an easily travelled route during wet periods The ridge continues to act today as a north-south route for modern vehicles on P.T.H. No. 50

The first white people in the area probably came in the early 1800's. They were connected with the fur trade and built Manitoba House near the Narrows in 1828. This trading post was used intermittently until 1911. Although the Province of Manitoba was founded in 1870, it was known as the Postage Stamp Province with its northern border passing the district about six miles south of the present location of Amaranth. Until

1881, the Alonsa District was part of the Northwest Territories. In 1881, the Province was expanded and the Alonsa area became part of Manitoba Although there had been a settlement of Icelandic people along the shores of Lake Manitoba since 1894, settlement lagged behind that of the rest of southern Manitoba primarily because of the lack of an effective transportation route into the area. Also, the more easily tilled land in the south was being chosen first by settlers It wasn't until the coming of the railway in the early 1900's that settlement began in earnest. For example, the post office at Amaranth wasn't established until 1911.

When settlement finally did begin in the Alonsa area, settlers were faced with the task of having to clear and cultivate land others had found to be too wet and too difficult to farm. The area suffered from a lack of natural drainage, making much of the land unsuitable for growing cereal crops

In order to render the Alonsa area fit for occupation and cultivation, land owners submitted petitions to the Provincial Government asking for drainage assistance. On June 18th, 1909, Order-in-Council No. 14208 was passed authorizing the formation of Drainage District No. 8 and the construction of the ditches therein. This Order-in-Council directed that debentures for land drainage be issued for a sum not exceeding $577,000. On April 30th, 1912, Order-in-Council No. 18763 was passed increasing the area of Drainage District No. 8. The portion of Drainage District No. 8 which benefitted the Alonsa Conservation District included all land south of Township 21 for a total of about 48,200 hectares (119,040 acres) Once constructed, maintenance of the drains became a

municipal responsibility. Attempts to provide further artificial drainage have continued up to the present time.

Today, much of the land in the Alonsa Conservation District is still in its native state, although agriculture is well established in some areas particularly in the southern half of the District. The land is best suited for mixed farming Livestock and forage production provide a large part of the agriculture activity. The growth of technology and the pressure on farmers for increased productivity has manifested the need for implementing a number of land management programs and for designing and installing an improved drainage system to service the land. It is largely for this reason that the Council of the Local Government District of Alonsa decided to apply for the formation of a conservation district. The conservation district was deemed to be the most effective means of developing and delivering these programs In 1978, the Alonsa Conservation District was established in an effort to strengthen the economy of the area by providing drainage services to allow the development of more land for agriculture and to improve conditions for the existing farm community

1 2 Development Of The Resource Management Scheme

A Conservation District Board is governed by the Conservation Districts Act and its regulations Subject to compliance with The Water Rights Act, The Land Rehabilitation Act and the Planning Act, a Conservation District Board is responsible for developing their resource management scheme. The Board has requested the Conservation Districts Section of the Water Resources Branch to assist them in preparing a scheme The scheme is

intended to be a working document to assist the Board members in making day to day planning decisions on the direction of resource development.

This resource management scheme is a composite report of the recommendations from the resource discipline reports. Consistent with the purposes of the Conservation Districts Act, the scope and objectives of the resource management scheme have been established. The purposes of the resource management scheme are outlined in chapter two. Under the general direction of the objectives of the scheme, inventory reports of the agriculture, water, wildlife, fisheries and recreation resources of the District have been prepared. In preparing the background information for the discipline reports, technical experts worked with the Alonsa Conservation District Board. The Board had the opportunity to bring forth issues which could be addressed in the discipline reports. Each resource report forms an appendix of the scheme.

To achieve the purposes of the scheme, development policies have been prepared for the Board The development policies of the District are presented in chapter three of the scheme. The development policies are based on the recommendations of the discipline reports. These policies will help to guide the direction of Board decisions on resource management and development in the District.

Resource development projects and programs have been proposed to give the Board some direction in putting the policy objectives of the scheme into action. Chapter four of this scheme presents the resource development programs which are based on the studies and recommendations in the appendices.

Implementation of the Alonsa resource management scheme is addressed in chapter five. Once the completed scheme has received written approval of the Minister of Natural Resources, the Alonsa Conservation District Board is responsible for implementing its scheme. Implementation of the scheme requires detailed feasibility studies for the Board to decide whether or not to proceed with a project. Once a decision is made to proceed with a project, final project plans and designs can be prepared. These final plans and designs would properly prepare the project to be included in the budget of the annual works program for construction.

2. PURPOSES OF THE RESOURCE MANAGEMENT SCHEME

The purposes of the Alonsa Conservation District Resource Management Scheme are to achieve the following objectives consistent with the purposes of the Conservation Districts Act

(1) To define the Alonsa Board resource management policies so as to serve as a guide to the Board in exercising its powers under the Conservation Districts Act

(2) To provide policy guidelines and direction for cooperation with other planning processes initiated by municipalities, Provincial and Federal governments, private companies and/or public agencies.

(3) To provide a basic framework within which more detailed conservation planning can take place.

(4) To provide a framework for the orderly implementation of programs to achieve long term resource management goals which are in the best public interest This would ensure the best possible benefit to society from the land, water, wildlife, fisheries and recreational assets of the Alonsa Conservation District.

(5) To assist in the integration of Board action with that of other agencies to achieve the most beneficial conservation program for the Alonsa Conservation District.

3 DEVELOPMENT POLICIES

To achieve the purposes of the resource management scheme, the Board has formulated the following development policies.

3.1 General Policies

The general policies governing all developments in the Alonsa Conservation District shall be as follows

(1) Management of all existing natural resources shall be compatible with the needs and demands of the population and take into account the environmental constraints of the area.

(2) The Alonsa Conservation District Board shall co-ordinate its activities with Provincial departments such as the Department of Natural Resources and Department of Agriculture which are responsible for resource management

(3) The Alonsa Conservation District Board shall encourage the Local Government District of Alonsa and any planning boards to adopt land use regulations and shall endeavour to have policies which are consistent with the resource management objectives of the Board incorporated within these regulations.

(4) The Alonsa Conservation District Board shall consider multiple land use when undertaking resource development.

(5) The preservation of the natural environment including areas of natural, scenic, biological and historic interest shall be included in the Board's program of resource management

(6) The Board shall conduct an active educational program in order to communicate to residents, including the young people of the area, an understanding of the Board's goals, objectives, and technical and financial assistance programs. This program will involve meetings, publications, and displays showing the technical, financial, and integrative roles of the Board in maintaining and enhancing those natural resources which sustain a healthy environment within which to live, work and play.

(7) The Board shall encourage public participation in the inventory, planning, decision-making and implementation stages of all Board projects.

(8) In undertaking projects to conserve and manage the water, soil and related resources in the Alonsa Conservation District, the Board shall ensure that final designs are completed and available prior to any construction or reconstruction For example, a final design for construction of a drain could include a plan-profile (showing channel bottom grade line, base width, side slopes, dyking information and hydraulic information), a plan indicating the proposed limits of right-of-way and additional plans showing any structural detail (dam, drop structure)

3.2 Agricultural Development Policy

The Alonsa Conservation District Board is concerned with maximizing long term agricultural productivity in the District by developing

the land according to its agricultural capability The Department of Agriculture should provide suitable technical expertise consistent with recognized standards for agricultural practice. The Alonsa Conservation District Board, in conjunction with the Department of Agriculture shall pursue the following policies for the wise management of agricultural land resources.

(1) Agricultural lands in the District shall be developed in accordance with their agricultural capability as indicated in the report "Agricultural Land Use and Management", Appendix 1.

(2) Where technically and economically feasible, drainage shall be provided to improve the productivity of agricultural land with excess water problems

(3) Wind erosion shall be controlled on susceptible agricultural land by using appropriate land management practices

3.3 Water Resources Development Policy

The Alonsa Conservation District Board is concerned with improving productivity of soils with excess water problems and with proper groundwater resource management. The Department of Natural Resources should provide suitable technical expertise conforming to recognized standards of engineering practice. The Alonsa Conservation District Board, in conjunction with the Water Resources Branch shall pursue the following policies for the wise management of the surface and groundwater resources.

(1) Surface water resource development shall be conducted on a watershed basis.

(2) Three levels of drainage based on the capability of soil to sustain (1) an intensive agriculture, (2) a mixed farming and (3) a livestock production land use respectively shall govern drainage development in the District.

(3) The proposed water management guidelines for soils with excess water problems shall be adopted and implemented as required on the basis of the subwatersheds identified in the Surface Water Management Plan, Appendix 3.

(4) All water management works under the jurisdiction of the Board shall be maintained to ensure design performance

(5) Records describing and locating water resources related complaints and problems shall be permanently kept on file at the District's office to provide background for plan formulation to alleviate these problems.

(6) Water control works such as a dam, drain or road crossing sustaining significant flood damage shall have its capacity reviewed and adjusted if necessary.

(7) Studies and investigations shall be undertaken and documented to identify project benefits and costs and provide recommendations to form a basis of agreement for resource development prior to project implementation.

(8) Lands necessary for the construction of water management projects shall be acquired or otherwise controlled to prohibit additional developments that would interfere with

the eventual proper development of these water control projects

(9) Wells in flowing well areas shall be constructed in a manner that would facilitate control of discharge.

(10) Intensive development (subdivisions) and high capacity wells shall only be permitted in areas where they will not cause a reduction in water supply for existing users.

(11) Groundwater consumption shall not exceed the total sustained yield of an aquifer

(12) Activities that may cause pollution under normal operating conditions or by accident shall not be permitted in groundwater pollution hazard areas unless it can be proved by adequate field information that the proposed activities will not cause pollution of existing or potential groundwater supply in the area.

3.4 Wildlife Development Policy

The Alonsa Conservation District is concerned with the establishment and enhancement of wildlife habitat. The Department of Natural Resources should provide suitable technical expertise compatible with recognized standards of wildlife management practice. In conjunction with the Wildlife Branch, the Board shall pursue the following policies for the prudent management of the wildlife resource in the area.

(1) Wildlife management areas shall be established to protect major deer wintering areas.

(2) Game bird refuges shall be established and nesting cover on islands shall be protected to allow populations to increase

(3) Marsh developments for waterfowl and fur production shall be established.

3.5 Fisheries Development Policy

The Alonsa Conservation District Board is concerned with the establishment and maintenance of optimum fish conditions. The Department of Natural Resources should provide suitable technical expertise conforming to recognized standards for fisheries management practices In conjunction with the Fisheries Branch, the Board shall pursue the following policies for the prudent management of the fishery resource

(1) Major fish spawning areas shall be protected due to their importance to the Lake Manitoba fishery.

(2) Water retention areas shall be established to stabilize downstream flows to promote suitable downstream fish spawning conditions.

(3) Actions will be taken to ensure that any existing or proposed structures in a stream known to support a fish run shall not obstruct movement of desirable fish species

(4) Where technically and economically feasible, Pickerel rearing facilities shall be developed in suitable locations

3.6 Recreational Development Policy

The Alonsa Conservation District is concerned with safeguarding scarce recreational and scenic resources in the District. The Board shall pursue the following policies for the wise management of the outdoor recreation resource in the area.

(1) Lands suitable for outdoor recreation shall be developed under the advice of the Parks Branch, Department of Economic Development and Tourism and the Municipal Planning Branch.

(2) Lands classified 1, 2 or 3 having regard to outdoor recreation capability shall not be subdivided if the Board and Local Government District of Alonsa, through consultation with the Municipal Planning Branch, are satisfied that sufficient lands of similar capability are not available to satisfy local and regional recreation needs for the foreseeable future (i.e. 20 years).

(3) Carrying capacity studies shall be undertaken before recreational development takes place to minimize or eliminate degradation of recreation areas. Where such studies do not exist or are not feasible, recreation space standards may be used.

(4) The Board shall oppose intensive residential, industrial, agricultural or commercial development or subdivision adjacent to outdoor recreation areas which are potentially detrimental to the character of the recreation area or park.

(5) The Board shall promote outdoor recreation area development in harmony with the proposed Lake Winnipegosis-Lake Manitoba Recreational Waterways Project.

3.7 Land Use Development Policy

The Alonsa Conservation District is concerned with the wise use and orderly development of land resources and therefore shall adopt the following policies

(1) In the active pursuit of land use development the Board shall ensure recognition of hazard lands, recreational needs and environmental problems.

(2) Lands subject to hazards such as flooding and stream bank erosion shall be retained for open space, recreational or compatible agricultural use Generally, intensive development of land shall be considered where the hazard can be eliminated or where the use would be compatible with the risk.

4. CONSERVATION DISTRICT PROGRAMS

The Board will undertake programs to meet the policy objectives. Resource development programs will be established taking into consideration the studies and recommendations contained in the Appendices of this Scheme. The Board will consider the financial capabilities and limitations of the Alonsa Conservation District when undertaking resource development projects and programs.

The recommended development programs are intended for a multi-year program although development of the recommended projects are not necessarily restricted within a specific time frame The programs shall be adjusted from time to time as conditions warrant and a complete review shall be carried out after the first five years.

4 1 General Programs

The following actions are of importance in the overall management of the resources in the Alonsa Conservation District.

(1) The Board will hire a part-time or full-time manager to propose and expedite Board programs.

(2) The Board will establish a working partnership with the Local Government District of Alonsa to review the adequacy of present land-use planning regulations as they affect conservation policies and objectives and to provide assistance in formulating policies and land-use regulations consistent with the Board's policies.

(3) The Board will establish a permanent file in the District's

office on water, erosion, wildlife, fisheries and other development problems and complaints. The manager or the plan formulation group will be responsible for maintaining the records.

4.2 Agriculture Programs

Recommendations for management of the agricultural resources in the District have been based on the Agricultural Land Use and Management Report, Appendix 1, prepared by the Department of Agriculture. The Department of Agriculture will be involved on matters concerning agriculture and where agricultural technical assistance is required.

(1) To maximize long term agricultural productivity, the Board will technically assist individual farm operators and other land managers to develop their agricultural lands according to the potential agricultural land uses outlined in Appendix 1.

(2) To improve the productivity of soils with excess water problems, the Board works program will provide surface drainage where economically feasible. The level of drainage will correspond to the potential agricultural land uses and the type of crops grown.

(3) To maintain wind erosion at tolerable levels on susceptible soils, a Board program to provide information, technical and financial assistance on the various erosion control measures (such as minimizing tillage, reducing summer

fallow, establishing shelterbelts, growing forages and retaining crop residues, as stated in Appendix 1) will be established and maintained.

4.3 Water Resources Programs

Recommendations for management of the surface water resource in the District have been based on the Surface Water Management plan, Appendix 3. General knowledge of the groundwater resources and guidance with respect to the development of water supplies for residential use have been based on the Groundwater Resources Report, Appendix 4 These reports were prepared by the Water Resources Branch of the Department of Natural Resources. The Water Resources Branch and the Engineering and Construction Branch will be contacted on matters concerning surface water and where technical assistance is required for surface water management. More specific information regarding groundwater resource conditions, aquifer management, aquifer pollution prevention and well construction will be obtained from the Groundwater Section of the Water Resources Branch.

(1) Since a streamflow gauging network is necessary to provide a rational basis for planning and development of the District's water resources, the Board will establish hydrometric stations at the locations shown in Appendix 3

(2) The Board will establish a plan formulation group to work on surface water problems outside of the regular meetings This group will be involved in implementing the procedure for drainage management outlined in the Surface Water

Management Plan, Appendix 3. The plan formulation group will plan projects well in advance of construction to promote a better and more coordinated works program. Technical assistance could be provided by the Conservation Districts Section of the Water Resources Branch Examples of works that could be undertaken by this plan formulation group are

(a) reconstruction of drains to provide required higher drainage standard,

(b) replacement of bridges or crossings to provide required higher drainage standard,

(c) construction of any retention or detention dams, and

(d) continuous resloping and reshaping of drains for upgrading of required drainage standard.

(3) The formula allocation portion of the annual Alonsa Conservation District Program will reflect regular maintenance of water management works under the jurisdiction of the Board. Such a program will promote adequate performance of existing Board drains. Examples of these works which fall under maintenance are·

(a) brushing of drains,

(b) spraying of drains for vegetation control,

(c) drain bottom cleanouts or grading for the purpose of facilitating low flows in the drain,

(d) side sloping in areas where bank stability is a problem (not to be used for capacity increase),

(e) repair work on existing crossings including bridges over man made waterways, and

(f) replacement of existing crossings or bridges over man made waterways if the purpose of replacement is for structural reasons and not for capacity reasons.

(4) The Board will initiate a proposal to extend the northern boundary of the Alonsa Conservation District to Lake Manitoba This would include those portions of the Crane River and Crane Narrows subwatersheds currently outside the authority of the Board Any work done in these subwatersheds within the current District boundary could affect land and water courses beyond the authority of the Board.

(5) Due to the magnitude of the proposed Portia Complex project, the Board will initiate an investigation to identify benefits and effects of the proposed project to protect any agricultural, wildlife and fishery interests and ensure prudent use of funds.

(6) Due to the potential conflict between fisheries, wildlife and agriculture, the Board will initiate an investigation providing recommendations which would form a basis of agreement for a development plan of the Garrioch Creek subwatershed.

(7) Since groundwater is not evenly distributed throughout the District and is the principal source of water supply for domestic farm and other requirements, the Board will establish a program under the guidance of the Water Resources

Branch to ensure proper groundwater resource management and protection for existing users and for potential development Currently the total groundwater supply in the District is adequate for present requirements and for considerable future development

4 4 Wildlife Programs

Recommendations to manage, enhance or maintain wildlife habitat have been based on the Wildlife Report, Appendix 5. This report has been prepared by the Wildlife Branch of the Department of Natural Resources The Wildlife Branch will be consulted on matters concerning the wildlife resource and where technical assistance is required in this area.

(1) To protect major deer wintering areas the Board will establish the proposed Westlake Wildlife Management Area and the proposed North Cayer Wildlife Management Area.

(2) To protect important sharp-tailed grouse habitat the Board will request that the Province of Manitoba maintain the Alonsa Wildlife Management Area.

(3) To increase the Canada Goose population the Board will take measures to grant game bird refuge status to Pedro Lake and Jarvie Lake. In addition, to allow for some protection of goose nesting cover the Board will take action to restrict agricultural use on larger islands such as Bjarnason, Redwillow, Hay and Ducharme islands to hay use only

(4) To improve deer habitat on new wildlife management areas, small forage plots will be developed.

(5) To provide for public use of new wildlife management areas, a system of trails will be developed.

(6) To identify the locations of new wildlife management areas, boundaries will be cleared and posted.

(7) To improve waterfowl habitat, Lake Mary, Alonsa Community Pasture Marsh, Portia Complex, Primes Lake, Tamarack Marsh, and Guynemer Marsh will be developed as proposed by Ducks Unlimited.

4.5 Fisheries Programs

Recommendations to manage, enhance or maintain optimum fish conditions have been based on the Fisheries Report, Appendix 6 This report has been prepared by the Fisheries Branch of the Department of Natural Resources The Fisheries Branch will be consulted on matters concerning the fishery resource and where technical assistance is required in this area

(1) Pickerel rearing lakes will be developed to improve the Lake Manitoba fishery where technically and economically feasible Some rearing lakes will be developed through the cooperation of Ducks Unlimited at no cost to the Board, specifically Johnson Lake, the proposed Guynemer project, the proposed Portia lakes project, and the Lussier and Bluff Harbour projects on Reykjavik Point Ducks Unlimited has also offered to contribute $10,000 toward the cost of a screen structure on the Lonely Lake drain which would prevent access by rough fish and allow the use of Lonely Lake as a rearing lake If the proposed drain from Tamarack Lake

to Lonely Lake is built, then use of Tamarack Lake as a rearing lake will be considered.

(2) Where technically and economically feasible, water retention sites will be protected and improved, so as to stabilize flows and improve conditions for natural fish spawning downstream. Specifically, water storage in areas such as Primes Lake (Crane River) and Lake Mary (Garrioch Creek) will be maintained and increased if possible. In addition, the natural channels of important spawning streams, in particular the Crane River, will not be disturbed.

(3) In addition to the screen structure proposed for the Lonely Lake drain to allow use of Lonely Lake for Pickerel rearing, the Hatchery Section of the Fisheries Branch would like to establish a Pickerel spawn taking operation on the Lonely Lake drain on an annual basis minor modifications to the drain consisting of a small harbour cut into the bank of the drain near the mouth, stakes driven into the stream bed and a temporary dock for use with the pound net will be added.

4.6 Recreation Programs

Recommendations to manage, enhance or maintain outdoor recreation have been based on the Outdoor Recreation Report, Appendix 7. The Parks Branch, Municipal Planning Branch and the Departmentof Economic Development and Tourism will be consulted on matters concerning the outdoor recreation resource and where technical assistance is required in this area.

(1) The Board will request the Parks Branch to undertake an investigation for the development of the proposed Big Sandy Point recreation area.

(2) If the northern boundary of the District is adjusted northward, the Board will request the Parks Branch to undertake an investigation for the development of the proposed harbour/docking facilities at Crane River.

(3) The Board will request the Parks Branch to undertake an investigation for the development of the proposed Narrows recreation area.

(4) The Board will request the Provincial Department of Economic Development and Tourism to investigate the feasibility of upgrading and/or expanding existing tourism facilities and services in the Alonsa Conservation District

4.7 Public Relations And Conservation Education Programs

Demonstration is one of the most effective methods of education. The following are examples of demonstration projects combining research practicality and education to be undertaken by the Board in the Alonsa Conservation District

(1) A Soil Improvement Demonstration And Investigation

Farmer cooperators would be sought to participate in different tillage practices to determine the effect on physical and chemical properties of the soil.

(2) A Water Management Demonstration

A small watershed requiring drainage would be developed

using grassed pilot channels to effectively remove excess precipitation. Vegetation control techniques would be used to properly maintain the drains.

(3) A Habitat Management Demonstration

Additional nesting cover plots to that proposed adjacent to ponds and streams in the Portia area. Information would be gathered on the utilization of this habitat by waterfowl.

(4) A Waterfowl Management Demonstration

Giant Canada Geese would be transplanted from the Reykjavik refuge to the Portia area. Information would be gathered on whether transplanted Canada Geese would establish nesting in another area.

(5) A Fisheries Management Demonstration

Pickerel rearing ponds would be established as part of the Portia Complex project. Natural spawning habitat for Pickerel would be established in Reedy Creek.

Conservation education in soil, water, wildlife, fishery and forestry conservation is becoming recognized as a public right and responsibility. Along with an active role of solving problems that can have detrimental environmental effects, the Board will stress at least equally the passive role of simply imbibing knowledge about conservation.

The Alonsa Conservation District Board will encourage conservation education to be·

(1) an integral part of school outdoor education programs.

(2) a helpful aid to farmers who wish to maximize returns through such practices as erosion control and drain maintenance and construction.

(3) in general, a source of strength to those who wish to understand and contribute to maintenance of a superior environment for themselves, their contemporaries and future generations.

The Board will encourage school boards in the District to emphasize the following aspects in outdoor teaching

(1) interdependent relationships between man, plants and animals.

(2) life cycles of forests.

(3) hydrologic cycle.

(4) the natural environment of the Alonsa Conservation District.

(5) individual involvement and its resulting influence on values, attitudes and emotional responses toward the natural environment.

Other conservation education can be supported through use of

(1) pamphlets or brochures.

(2) films.

(3) technical assistance provided by specialists.

(4) displays.

(5) resource libraries
(Board can contribute suitable publications to local libraries.)

By taking the initiative in providing these services itself and arranging and encouraging additional support where its own abilities and resources are limited, the Alonsa Conservation District can be a catalyst in influencing young people, and their families and friends, to respect their natural environment and live harmoniously for mutual benefit.

5. IMPLEMENTATION

The Alonsa Conservation District will implement its Scheme in conjunction with the Local Government District of Alonsa, Province of Manitoba and private agencies whose activities affect resource conservation.

Specifically, this Scheme will be implemented through the following means

(1) The preparation of final project plans and designs conforming to this Scheme that outline in detail the specific projects to be undertaken by the District and cooperating agencies.

(2) The preparation of successive multi-year budgetary programs reflecting the current grant structures, the financial capabilities of the District and the current development policies

(3) A program of public relations and conservation education.

(4) The integration, wherever possible, of the policies and programs of this Scheme with existing and future municipal and regional official plans, zoning by-laws and development programs

(5) Cooperative action with private, public or government agencies such as Duck's Unlimited, the Manitoba Wildlife Federation, the Department of Agriculture, the Department of Natural Resources, Department of Highways and Transportation and the Department of Municipal Affairs.

APPENDIX 1
AGRICULTURAL LAND USE AND MANAGEMENT

PROVINCE OF MANITOBA

DEPARTMENT OF AGRICULTURE

AGRICULTURAL LAND USE AND MANAGEMENT IN THE ALONSA CONSERVATION DISTRICT

January, 1982

Revised
February, 1984

Prepared by

B Graham, Agr
Manitoba Department of Agriculture

H Schellenberg, Agr
Manitoba Department of Natural Resources

SYNOPSIS

This report on agricultural land use and management has been prepared for the Alonsa Conservation District To maximize long term agricultural productivity, lands in the District should be developed according to their agricultural capability On lands with excess water problems, surface drainage is recommended where technically and economically feasible Wind erosion on susceptible soils should be controlled using various land management practices Maps of the District are provided to indicate recommended land uses and specific areas subject to excess water, wind erosion and stoniness Additional management recommendations are provided regarding soil salinity, soil moisture and fertility

CONTENTS

LIST OF FIGURES

1 INTRODUCTION

Lands of the Alonsa Conservation District vary widely in their suitability for agriculture Soil management problems are diverse, including stoniness, excessive wetness, salinity, erosion, fertility, droughtiness and peat Localized natural drainage is extremely variable due to the ridge and swale topography

This report is divided into two sections The first section presents agricultural land uses recommended for the District The second section deals with the specific management problems of excessive moisture, wind erosion, stoniness, salinity, soil moisture retention and fertility The Alonsa Conservation District can assist in solving these problems by (1) providing information and technical and financial assistance to individual farm operators, and (2) entering into District programs such as the development of surface drainage systems beyond the scope of a single farmer

2 AGRICULTURAL LAND USE

Agricultural land uses recommended for the District are presented on Figure 1 The objective is to maximize long term agricultural productivity by utilizing land according to its capability The four major categories of agricultural land use and corresponding crops are as follows

Agricultural Land Use		Crops
Intensive Agriculture	-	Cereals, oilseeds, regionally suitable special crops, corn, forages
Mixed Farming	-	High percentage in forages, remainder in intensive agriculture
Livestock Production	-	Tame and native forages
Limited Agriculture	-	Native forages only

Lands were categorized for agricultural use on the basis of soil capability ratings Seven soil classes have been established, according to the degree of limitation to dryland agriculture These limitations (wetness, stoniness, poor fertility, etc) will necessitate implementation of a different management program for efficient agricultural use of the soils The limitations may seriously affect such farm practices as choice of crops, timing and ease of tillage and planting and harvesting

Lands mapped as Intensive Agriculture on Figure 1 comprise class 1, 2 and 3 soils which are suitable for a wide range of crops Lands mapped as Mixed Farming comprise class 4 soils, on which forages for hay or pasture

are likely the most profitable crop to be grown However, a wider range of crops, as in Intensive Agriculture, might also be grown to a minor extent if special management procedures are practised Class 5 soils comprise lands recommended for Livestock Production Only tame or native forages should be grown on these lands The majority of the land base in the Alonsa Conservation District is class 4 and 5 Class 6 soils have such severe limitations that they are only suitable for Limited Agriculture utilizing native vegetation Class 7 soils have no practical use for agriculture

A special problem exists for certain areas of the District with respect to "soil complexes" In such areas two or three different types of soils may occur in a complex landscape and as such are impossible to distinguish individually on a map In these cases, land uses were based upon the majority soil type It should therefore be recognized that the land uses recommended herein are general guidelines Within any particular area soils of different capability may well exist on a very localized basis

Soils information was obtained from several sources From the bottom of Township 23 to the northern limits of the District soil survey data from the Ste Rose and Grahamdale map sheet areas was utilized These areas have been mapped in considerable detail by Manitoba Soil Survey within the past decade Soil Survey data includes soil capability classifications for all identified soils including organic (peat) soils The agricultural use of organic soils takes into account the quality of the underlying mineral materials, to reflect the eventual loss of the organic layer over time

Lands south of Township 23 do not have the benefit of soil survey data to the same level of detail Accordingly, Canada Land Inventory maps

prepared in the late 1960's based upon the best soils information available at the time were utilized Canada Land Inventory did not group organic soils into agricultural capability classes Therefore, on Figure 1, organic soils in the southern portion of the District are simply labelled as Peat Note, however, that the majority of these organic soils can be considered to be of class 5 capability which is suitable for forage production

Because of the lack of detailed soils information south of township 23 land use recommendations are less precise in this portion of the District The problem is illustrated by the lack of a smooth transition in land use recommendations at the line between townships 22 and 23 Within the scope of this report, no solution exists to resolve any inconsistencies However, information is still sufficiently reliable for general planning purposes

2 1 Intensive Agriculture

Soil and climatic conditions suitable for Intensive Agriculture are located mostly in the southern portion of the District These lands are already mostly developed and intensively farmed Wheat and rapeseed appear to be the most profitable small grain crops on these lands at present but other small grains such as oats, barley and flax can also be grown profitably The area averages 2,300 corn heat units, therefore both grain and silage corn offer potential An important cash crop might also be forages for hay, especially where stoniness is a problem

2 2 Mixed Farming

The majority of the District is best suited for Mixed Farming A considerable area is still undeveloped Most of the developed class 4 soils

are located in the southern portion of the District

Grain and livestock production are often combined in mixed farming operations on the better agricultural soils, with dominantly cattle production taking place on mixed farms and small ranching operations scattered throughout the remainder of the area The largest area of the improved land is devoted to grasses and legumes followed by oats, wheat, barley and flax Although annual cropping is possible on these soils, the risk of failure is high, therefore, forages for hay and pasture should be the predominant crop Limitations on these soils include stoniness, droughtiness, low fertility, soil erosion, salinity, excessive moisture and restricted rooting zones Timing and ease of tillage, planting and harvesting are significantly affected by these limitations The cost of bush clearing, stone removal and other development costs can likely be justified by individual farm operations on class 4 soils throughout the District

2 3 Livestock Production

Soils that have very severe limitations that restrict their agricultural capability should be used entirely for livestock production These soils are scattered throughout the District. Because of their limitations only perennial tame and native forages should be grown Improvement practices such as bush clearing, cultivating, seeding, fertilizing and water control are generally feasible Although tame forages may be difficult to establish due to excessively wet or dry conditions and stoniness, their yield potential is substantially greater than native forages Direct sod seeding has been practised quite successfully

Soil limitations in class 5 lands include the adverse effects of severe climate, low water holding capacity, very poor drainage, excessive moisture, severe salinity permitting only salt tolerant forage plants to grow, stoniness or shallowness to bedrock that render annual cultivation impractical

In the southern portion of the District, inadequate soil drainage is the most common limitation for agricultural production

2 4 Limited Agriculture

Only a very small percentage of the District is placed in this category These lands are best left in native vegetation Improvement with farm machinery and by drainage or protection from flooding is not practical Aerial seeding or bush spraying may have some limited application to improve native pasture and hay conditions

In the District, these lands are typically characterized by limitations such as extreme salinity, frequent overflows, surface water for much of the year and excessive stoniness or shallowness to bedrock

2 5 No Agriculture

These lands are located mostly along shorelines A few scattered inland parcels of land having exposed bedrock or surface water are also found These soils have no usefulness for the growing of agricultural crops

2 6 Peat

This category applies to organic soils that occur south of Township 23 which have not been classified by Manitoba Soil Survey or Canada Land

Inventory into agricultural capability classes Some of these soils should be suitable for Livestock Production with the growing of tame and native forages for hay or pasture

The agricultural potential of these organic soils depends on the success of drainage and cultivation operations Most of the organic soils occur in poorly drained depressional areas and water tables are at or near the surface throughout most years Shallow peats are dominant, consisting of less than 1 3 m of moderately well decomposed fen peat overlying fine to medium textured lacustrine sediments

The dominant vegetation on these soils is sedges, reeds and meadow grasses with clumps of swamp birch and willow

3 SPECIFIC MANAGEMENT PROBLEMS

3 1 Drainage

Figure 2 indicates soils within the Alonsa Conservation District adversely affected by excess water on the soil surface or within the rooting zone of soil other than that brought about by inundation by streams or lakes These soils were identified from the Manitoba Soil Survey Reports and Canada Land Inventory maps Excess water is usually the result of poor internal soil drainage, high water tables, seepage or runoff from surrounding areas

Soil drainage is affected by several factors acting separately or in combination including texture, structure, gradient, length of slope water holding capacity, evaporation and evapotransporation The problem of inadequate soil drainage occurs when these factors restrict or impede the movement of water from the soil resulting in conditions of excess water on or within the soil

The objective of surface drainage is to enhance agricultural productivity by constructing works which are technically and economically feasible Drainage requirements vary according to whether the soils are of mineral or organic origin On mineral soils the purpose of artificial drainage is to remove excess water from the soil surface and within the rooting zone On coarse-textured soils that are affected by high groundwater levels, any drainage should ensure that the groundwater table is maintained within the rooting zone as groundwater provides much of the plant moisture requirements

Open surface ditching is the most feasible method of removing excess surface water in areas where local relief is insufficient to remove

the water naturally

Water table control is the main requirement for agricultural drainage development on organic soils Water table control is necessary for successful crop production and for the long-term maintenance of the soil itself If organic soils are allowed to dry out there will be increased subsidence (settling) and hazard from wind erosion and fire Optimum water table levels are usually 45 to 90 cm below the surface to maintain crop production and minimize subsidence

As with identifying recommended land uses, drainage problems were encountered with respect to "soil complexes" If the majority of the soil types in a complex had a wetness limitation, the area was identified as requiring drainage Again, drainage recommendations on Figure 2 should be considered as general guidelines Exceptions may exist on a localized basis

For each situation where drainage is proposed a comparison of project benefits and costs should be made to determine whether or not the improvements are economically justified Agrologists should be consulted in the detailed preparation and evaluation of drainage proposals Cereals and other small grains have a reduced tolerance to excess moisture relative to forages, and therefore a higher standard of drainage can be justified on soils in annual crops Excess water should be removed from soils in annual crops as rapidly as possible earlier spring seeding generally provides higher crop yields at harvest Ponding from summer rainstorms leads to reduced crop yields or to total drown-out Damages from lower yields can begin as soon as the crop is inundated In general, all surface water should be removed from a field within 36 hours after ponding begins Good on-farm drainage facilities are a key element in the effective functioning of an

entire drainage system

Damage to perennial forages from excess water varies according to the type of forage grown Drainage should correspond to the desired forage and its characteristics Alfalfa is the most productive forage but also the least tolerant of inundation Spring flooding after growth has started will begin to reduce alfalfa yields after one week of inundation with total destruction likely by the end of two weeks Summer flooding during active growth can lead to death of alfalfa within a few days

Native and other tame forages can generally tolerate extended inundation However, excess water requires removal to permit grazing and haying and to maintain yields Some native species require annual flooding to be productive Excessive inundation can lead to dominance of undesirable vegetation

3 2 Soil Erosion

(a) Figure 3 indicates areas in the Alonsa Conservation District with soils which are highly erodible by wind Most of these soils are located in the south-westerly portion of the District

Management practices recommended to maintain erosion at tolerable levels are

1 Crop lands continuously Do not summerfallow, initiate rotations involving cereals, row crops, and grass and legume mixtures

2 Return crop residue and maintain trash cover during non-growing periods of late fall and early spring Do not burn straw

3 Crop land in strips and orient fields across the direction of the prevailing winds

4 Plant field shelterbelts to reduce wind velocity

The most serious erosion occurs on cultivated soils Soil erosion whether by wind or water, acts first on the surface layer, hence, bare soil as is the case in summerfallow is particularly susceptible to erosion Coarse-textured soils such as sands, loamy sands and sandy loam have weak or no structure and erode readily In contrast, finer-textured soils such as clay loams and clays are generally strongly aggregated and more resistant to erosion

The damaging effects of erosion results in decreased productivity, difficulty in management and, if sufficiently severe, even abandonment of farm land

(b) No significant water erosion problems are identified in the District, other than some possible erosion along waterways Natural drains should be retained as grassed waterways

3 3 Stoniness

Stones can be a serious impediment to the agricultural utilization of soils Figure 4 indicates that stones are found throughout the District However, pockets of relatively stone free soils do exist, especially in the south-west corner of the District

In addition to surface stones, cobbley and gravelly lenses frequently occur immediately below the surfaces of some soils and may have an adverse effect on crop production Such concentration of layers of coarse

gravel and large stones within rooting zones will reduce the water holding storage capacity of the soil or interfere with internal drainage

Two farm implements which have been introduced to the area to deal with the stoniness problems are the roller seeder and the sod seeder

The roller seeder is used on soils that have been cleared of bush and large stones and are ready for seeding to forage crops The roller gives a firm seed bed and presses smaller stones into the ground where they do not interfere with machinery

The sod seeder is being successfully used to re-establish stands of grasses and legumes without having to work up the fields

3 4 Soil Salinity

Salinity is not a major problem in the District, however, certain pockets do exist, especially near waterbodies and lakeshores

The agricultural use of saline soils varies with the amounts of soluable salts present Extremely saline conditions (over 16 mS/cm electrical conductance) preclude the growth of most useful plants Soils with more moderate quantities of salts (5 to 16 mS/cm) have variable suitability for most field and forage crops Slightly saline soils (< 4mS/cm) affect non-tolerant or low tolerant crops like corn, sunflowers, peas and red clover The agricultural use of saline soils require crop rotations and management practices to keep saline problems in check, drainage if this is possible, use of crops that are tolerant to salts, the use of manure, peat or green manure and phosphate fertilizers together with a system of continuous cropping or permanent forage cover No summerfallow should occur on saline soils All tillage should be shallow

The following chart indicates the relative salt tolerance of various crops in Manitoba Salt tolerance increases as one proceeds down the list

	None to slight Salinity (0 to 4 mS/cm)	Moderately Saline (5 to 10 mS/cm)	Severely to very Severely Saline (11+ mS/cm)
Annual Field Crops	soybeans field beans fababeans peas corn	rapeseed flax mustard wheat fall rye oats 2-row barley sunflowers 6-row barley	Barley may produce some crop but this land is best suited to salt tolerant forages
Forage Crops	red clover alsike timothy	reed canary meadow fescue intermediate wheat grass brome grass crested wheat grass alfalfa sweet clover	altai wild rye grass russian wild rye grass slender wheat grass beardless wild rye grass salt meadow grass

3 5 Soil Moisture

Growing season precipitation is often insufficient to meet the needs of the crop Agricultural crops will show stress on most soils during

years of below normal precipitation On coarse-textured soils with low water holding capacity, plants may undergo moisture stress at various times during the growing season when soil water is used up and the distribution of rainfall is somewhat erratic Within the District, those soils subject to wind erosion are also most prone to moisture shortages

Management practices which will help to maintain soil moisture are

1 continuous cropping to maintain a good supply of organic matter
2 trash cover from stubble and straw to reduce loss of water
3 good plant nutrition

3 6 Fertility

Soil fertility means the ability of the soils to provide sufficient nutrients to support plant growth Soils in the District are generally deficient in only two nutrients namely nitrogen and phosphorous There are, however, isolated areas that are deficient in other nutrients including potassium, sulfur, manganese, iron, zinc and copper Organic (peat) soils are likely to be deficient in copper and potassium Sulfur is most likely to be deficient in the coarse-textured soils The type and amount of nutrients needed can be determined by the Manitoba Provincial Soil Testing Laboratory

More efficient use of available moisture is achieved and greater yields are obtained with a given moisture supply when adequate fertilizer is used The Soil Testing Laboratory is now considering moisture conditions when making its soil test recommendations

4 RECOMMENDATIONS

A AGRICULTURAL LANDS IN THE ALONSA CONSERVATION DISTRICT SHOULD BE DEVELOPED ACCORDING TO THE AGRICULTURAL LAND USE RECOMMENDATIONS SHOWN ON FIGURE 1

The intensity of agricultural land development should correspond to soil capability Figure 1 provides agricultural land use recommendations at four different levels of use These vary from intensive agriculture suitable for a wide range of crops to limited agriculture based on the use of native forages only

The majority of the Alonsa Conservation District is suitable for mixed farming, with a higher proportion of crops in tame forages for livestock enterprises than in annual cropping Because of various soil problems such as stoniness, low fertility and poor natural drainage, tame forages are more likely to provide higher farm returns than other crops Under good farm management, tame forages can support much higher livestock populations than native forages

The southern portion of the District contains soils suitable for intensive agriculture and capable of growing a wide range of crops Scattered throughout the District are soils that should be in forage production only, with some limited to only native forages Peat soils in the District should generally be used for the production of forages

B SURFACE DRAINAGE, WHERE TECHNICALLY AND ECONOMICALLY FEASIBLE, SHOULD BE PROVIDED TO IMPROVE PRODUCTIVITY OF SOILS WITH EXCESS WATER PROBLEMS

The provision of adequate drainage is of top priority in the development of agricultural land in the District Soils with an excess water problem are shown on Figure 2

The standard of drainage should vary according to the soil capability and the type of crop grown The practicality of specific drainage proposals should be based upon a comparison of project benefits and costs Drainage can be very expensive to develop due to the ridge and swale topography typical of the District and the lack of suitable natural streams to act as drainage outlets Peat soils require water table control in contrast to mineral soils which require surface water removal

C WIND EROSION SHOULD BE CONTROLLED ON SUSCEPTIBLE SOILS BY USING APPROPRIATE LAND MANAGEMENT PRACTICES

Coarse-textured soils are very susceptible to wind erosion Vulnerable soils in the District are shown on Figure 3 Various control measures such as minimizing tillage, reducing black summerfallow, establishing shelterbelts, growing forages and retaining crop residues can be implemented to maintain wind erosion at tolerable levels

D GOOD FARM MANAGEMENT PRACTICES SHOULD BE UTILIZED TO MINIMIZE OTHER LESSER PROBLEMS RELATING TO STONINESS, SALINITY, SOIL MOISTURE AND FERTILITY

The specific recommendations to deal with these diverse problems of less overall significance, but sill very important at local farm levels, are contained in the previous section

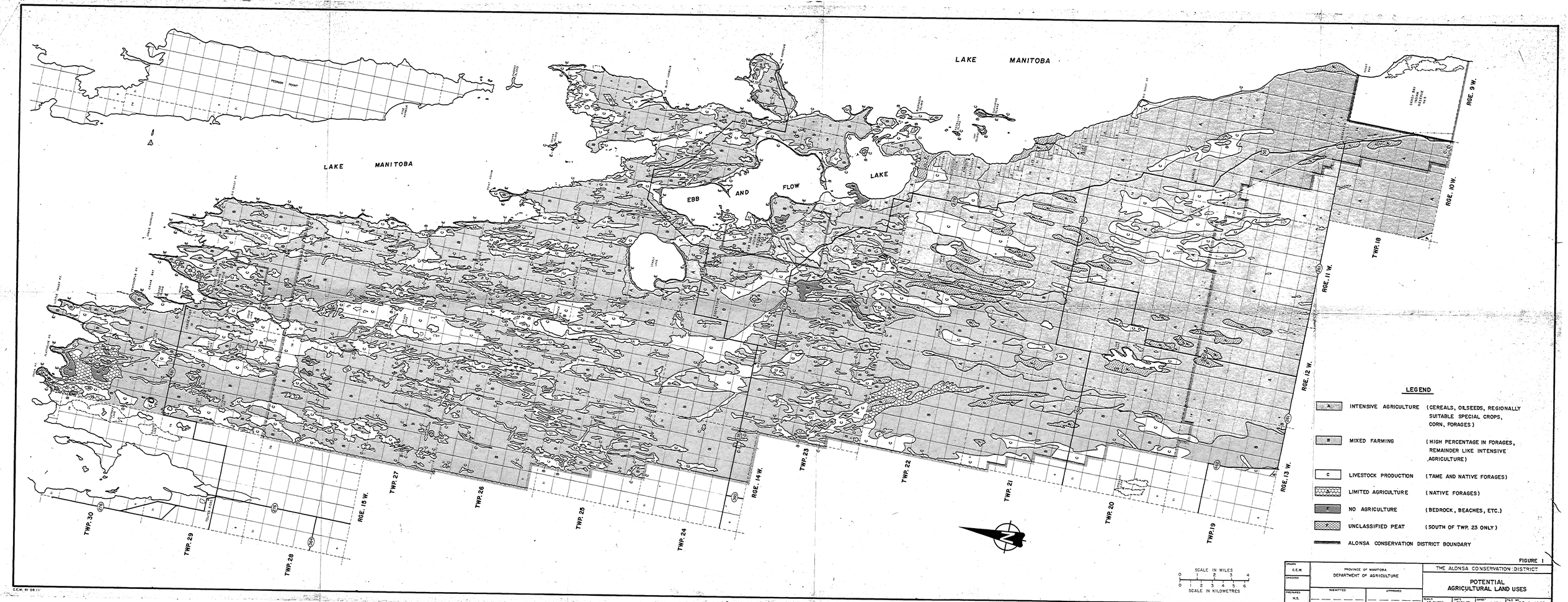
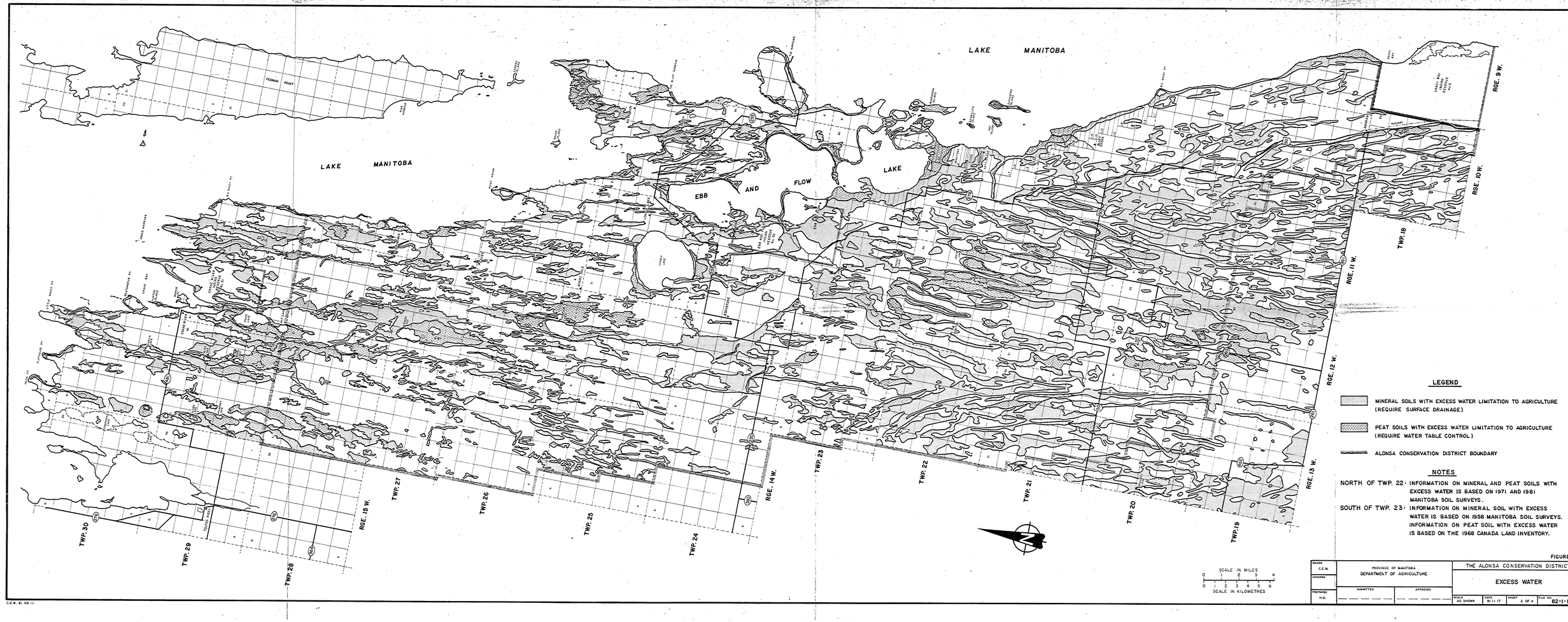


FIGURE 1

DRAWN C.E.M.	PROVINCE OF MANITOBA DEPARTMENT OF AGRICULTURE	THE ALONSA CONSERVATION DISTRICT	
CHECKED		POTENTIAL AGRICULTURAL LAND USES	
PREPARED M.S.	SUBMITTED / APPROVED	SCALE AS SHOWN	DATE 81 09 23
		SHEET 1 OF 4	FILE NO. 82-1-1223

C.E.M. 81 08 11


LAKE MANITOBA
LAKE MANITOBA
EBB AND FLOW LAKE
PEGWAN POINT
TWP. 30
TWP. 29
TWP. 28
TWP. 27
TWP. 26
TWP. 25
TWP. 24
TWP. 23
TWP. 22
TWP. 21
TWP. 20
TWP. 19
TWP. 18
RGE. 16 W.
RGE. 14 W.
RGE. 13 W.
RGE. 12 W.
RGE. 11 W.
RGE. 10 W.
RGE. 9 W.
LEGEND
MINERAL SOILS WITH EXCESS WATER LIMITATION TO AGRICULTURE (REQUIRE SURFACE DRAINAGE)
PEAT SOILS WITH EXCESS WATER LIMITATION TO AGRICULTURE (REQUIRE WATER TABLE CONTROL)
ALONSA CONSERVATION DISTRICT BOUNDARY
NOTES
NORTH OF TWP. 22: INFORMATION ON MINERAL AND PEAT SOILS WITH EXCESS WATER IS BASED ON 1971 AND 1981 MANITOBA SOIL SURVEYS.
SOUTH OF TWP. 23: INFORMATION ON MINERAL SOIL WITH EXCESS WATER IS BASED ON 1958 MANITOBA SOIL SURVEYS. INFORMATION ON PEAT SOIL WITH EXCESS WATER IS BASED ON THE 1968 CANADA LAND INVENTORY.
SCALE IN MILES
SCALE IN KILOMETRES
FIGURE 2
DRAWN C.E.W.
CHECKED
PREPARED N.S.
PROVINCE OF MANITOBA
DEPARTMENT OF AGRICULTURE
SUBMITTED
APPROVED
THE ALONSA CONSERVATION DISTRICT
EXCESS WATER
SCALE AS SHOWN
DATE 81 11 17
SHEET 2 OF 4
FILE NO. 82-1-1223
C.E.W. 81 08 11

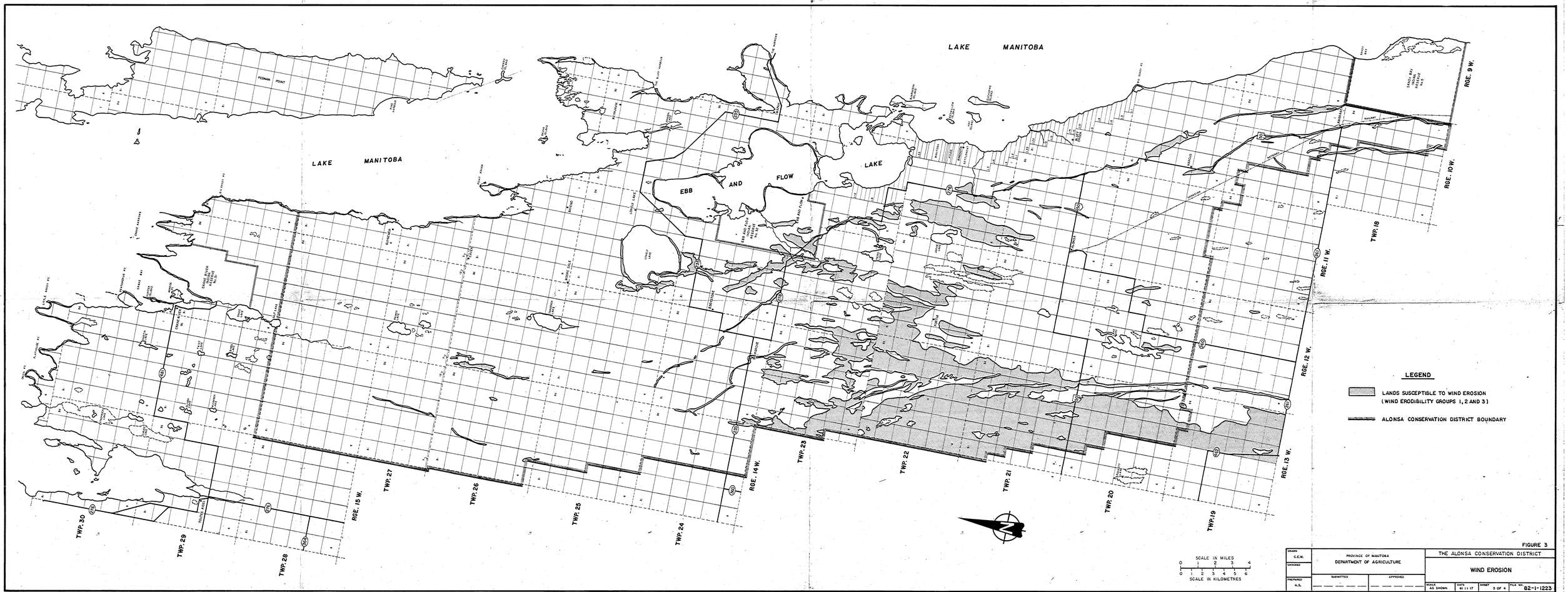


FIGURE 3

DRAWN C.E.W.	PROVINCE OF MANITOBA DEPARTMENT OF AGRICULTURE	THE ALONSA CONSERVATION DISTRICT
CHECKED		WIND EROSION
PREPARED K.S.	SUBMITTED — APPROVED —	SCALE AS SHOWN · DATE 81.11.17 · SHEET 3 OF 4 · FILE NO. 82-1-1223

C.E.W. 81 08 11

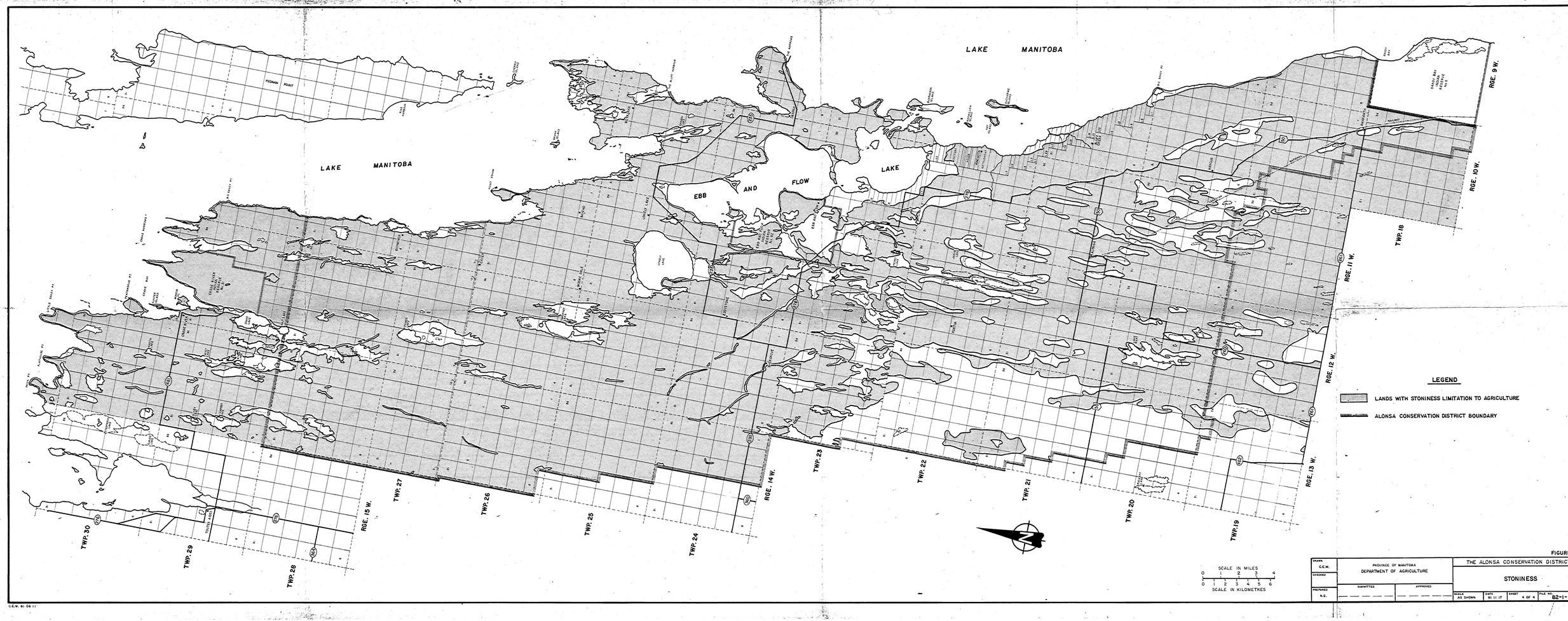


FIGURE 4

DRAWN C.E.W.	PROVINCE OF MANITOBA DEPARTMENT OF AGRICULTURE	THE ALONSA CONSERVATION DISTRICT
CHECKED		STONINESS
PREPARED H.S.	SUBMITTED / APPROVED	SCALE AS SHOWN · DATE 81 11 17 · SHEET 4 OF 4 · FILE NO. 82-1-1223

C.E.W. 81 06 11

APPENDIX 2
SELECTED
AGRICULTURAL STATISTICS

SELECTED AGRICULTURAL STATISTICS

FOR THE

ALONSA CONSERVATION DISTRICT

1966 to 1981

Compiled from Statistics Canada sources by

- H Schellenberg
  Ag Resource Economist
  Policy Development Branch

- A Strutinsky
  Research Officer,
  Economic Analysis Branch

POLICY AND ECONOMICS DIVISION
MANITOBA AGRICULTURE

September 1983
Winnipeg, Manitoba

LIST OF TABLES

TABLE 1

Population

	L G D of Alonsa				Manitoba			
	1966	1971	1976	1981	1966	1971	1976	1981
					- '000 -			
Total Population	3,592	2,585	2,476	2,315	963 1	988 2	1,021 5	1,026 2
Village of Alonsa	169	158	140	123				
Farm Population	1,943	1,652	1,076	1,063	161 7	131 2	114 1	98 4

Percent Change 1966 to 1981

Total Population	-35 6	6 6
Village of Alonsa	-27 2	-
Farm Population	-45 3	-39 1

NOTE Up to and including 1976, a farm was defined as a farm, ranch or other agricultural holding of one acre or more with sales of $50 or more During the past twelve months for the 1981 Census, the definition was amended by dropping the one acre size requirement and increasing the minimum sales value to $250 In addition, farms with anticipated sales of $250 or more in 1981 were also included

TABLE 2

1981 Land Ownership

	L G D of Alonsa		Manitoba	
	Total	% of Total	Total	% of Total
Total Number of Farms	321	100 0	29,442	100 0
- Owners[1]	104	32 4	16,083	54 6
- Tenant[2]	25	7 8	2,259	7 7
- Part-Owner - Part-Tenant	192	59 8	11,100	37 7
	Acreage ('000)	% of Total	Acreage ('000)	% of Total
Total Area of Farmland	459 4	100 0	18,819 4	100 0
- Area Owned	148 4	32 3	12,596 6	66 9
- Area Rented	310 9	67 7	6,222 8	33 1
Total Area Operated by				
- Owner	48 0	10 4	6,592 2	35 0
- Tenant	97 7	21 3	1,430 4	7 6
- Part-Owner - Part-Tenant	313 7	68 3	10,796 7	57 4

[1] Own all land on farm

[2] Rent all land on farm

NOTE Areas rented or leased include land rented or leased on a cash basis, rented on a share crop basis, land used rent-free or leased from federal, provincial or municipal governments Land used under a per head grazing fee was not included

Figures may not add due to rounding

TABLE 3

Farm Land Use

- '000 acres -

	L G D of Alonsa			Manitoba		
	1971	1976	1981	1971	1976	1981
Total Area of Farmland	556 7	486 9	459 4	19,008 3	19,026 3	18,819 4
Improved Land						
- Total Improved	77 8	86 2	99 6	12,804 0	12,890 8	13,600 6
- % of Total Farmland	14 0	17 7	21 7	67 4	67 8	72 3
- Under Crops	49 8	57 6	71 1	9,122 5	9,507 5	10,923 0
% of Total Improved	64 0	66 8	71 4	71 2	73 8	80 3
- Summerfallow	11 7	13 9	8 6	2,655 2	2,308 2	1,478 5
% of Total Improved	15 0	16 1	8 6	20.7	17 9	10 9
- Pasture	11 7	10 8	11 5	730 5	769 2	871 1
% of Total Improved	15 0	12 5	11 5	5 7	6 0	6 4
- Other	4 6	3 8	8 4	295 8	305 9	328 1
% of Total Improved	5 9	4 4	8 4	2 3	2 4	2 4
Unimproved Land						
- Total Unimproved	478 9	400 7	359 8	6,204 3	6,135 4	5,218 7
% of Total Farmland	86 0	82 3	78 3	32 6	32 2	27 7
- Woodlands	23 1	64 3	25 2	960 2	928 4	613 3
% of Total Unimproved	4 8	16 0	7 0	15 5	15 1	11 8
- Other	455 8	336 4	334 5	5,244 1	5,207 0	4,605 5
% of Total Unimproved	95 2	84 0	93 0	84 5	84 9	88 2

Figures may not add due to rounding

NOTE Figures related to area of woodland have been cause for concern over the years By definition, it includes farm woodlots, land leased for cutting, sugar bush and cut-over land with young growth which has or will have value as timber, fuel-wood or Christmas trees The area of new planting for windbreaks is also included Excluded are larger timber tracts which are run as a separate business from the farm There is some evidence that changes in the area of this item between censuses may be due to differences in interpretation of the definition This would be particularly true in areas of bushland

TABLE 4

Crop Area by Type

- '000 acres -

	L G D of Alonsa			Manitoba		
	1971	1976	1981	1971	1976	1981
Wheat	7 3	9 5	10 8	2,519 4	3,815 9	3,936 1
- % of Total	14 9	17 0	15 7	29 0	40 7	37 2
Oats	10 5	11 0	7 7	1,397 2	1,224 7	594 6
- % of Total	21.4	19 6	11 2	16 1	13 1	5 6
Barley	5 8	3 2	6 0	2,051 8	1,647 4	2,326 8
- % of Total	11 8	5 7	8 7	23 6	17 6	22 0
Rye	-	-	0 2	128 2	92 7	185 5
- % of Total	-	-	0 3	1 5	1 0	1 8
Flaxseed	1 7	1 7	2 7	565 6	523 3	710 4
- % of Total	3 5	3 0	3 9	6 5	5 6	6 7
Mixed Grain	1 5	0 7	0 8	284 1	172 8	119 2
- % of Total	3 1	1 2	1 2	3 3	1 8	1 1
Tame Hay	19 1	28 0	32 5	1,084 1	1,425 7	1,257 5
- % of Total	38 9	50 0	47 3	12 5	15 2	11 9
Rapeseed (Canola)	1 8	0 6	1 7	580 8	231 0	600 5
- % of Total	3 7	1 1	2 5	6 7	2 5	5 7
Corn for Silage	-	-	0 1	9 7	32 6	48 7
- % of Total	-	-	0 1	0 1	0 3	0 5
Oats for Fodder	1 4	1 2	2 9	71 1	51 7	80 6
- % of Total	2 9	2 1	4 2	0 8	0 6	0 8
Sunflowers	-	-	-	-	49 9	271 6
- % of Total	-	-	-	-	0 5	2 6
Grain Corn	-	-	0 1	-	16 6	221 1
- % of Total	-	-	0 1	-	0 2	2 1
Buckwheat	-	0 1	3 1	-	43 7	126 7
- % of Total	-	0 2	4 5	-	0 5	1 2
Field Peas	-	-	0 1	-	37 8	102 4
- % of Total	-	-	0 1	-	0 4	1 0
TOTAL	49 1	56 0	68 7	8,692 0	9,365 8	10,581 7
% OF TOTAL CROPPED LANDS	98 6	97 2	96 6	95 3	98 5	96 9

NOTE May not add due to rounding

TABLE 5

Livestock and Poultry

('000)

	L G D of Alonsa			Manitoba		
	1971	1976	1981	1971	1976	1981
Total Cattle	36 9	37 1	35 8	1,138 1	1,399 9	1,176 0
- % of Province	3 2	2 7	3 0			
Milk Cows	0 6	0 5	0 8	109 8	91 5	83 2
- % of Total Cattle	1 6	1 3	2 2	9 6	6 5	7 1
Pigs	2 7	0 9	0 8	1,070 6	625 9	875 0
- % of Province	0 3	0 1	0 1			
Sheep	4 4	2 1	2 1	42 5	21 0	36 4
- % of Province	10 4	10 0	5 8			
Total Hens & Chickens	13 7	11 6	9 8	6,677 8	5,857 9	6,155 0
- % of Province	0 2	0 2	0 2			

NOTE Livestock and poultry were reported on the holdings where they were located, regardless of ownership, except for livestock kept on community pastures In this case, livestock are related to the holding of the operator owning them rather than to the community pasture

TABLE 6

Farm Gross Sales
1981 Census

	L G D of Alonsa	Manitoba
Farms Reporting Sales in 1980 of		
- Under $2,500	44	2,925
% of Total	13 7	9 9
- $2,500 - $9,999	65	5,094
% of Total	20 2	17 3
- $10,000 - $24,999	81	6,308
% of Total	25 2	21 4
- $25,000 - $49,999	72	6,394
% of Total	22 4	21 7
- $50,000 - $99,999	50	5,530
% of Total	15 6	18 8
- $100,000 - $249,999	8	2,591
% of Total	2 5	8 8
- $250,000 and Greater	1	600
% of Total	0 3	2 0
TOTAL FARMS	321	29,442
% of Farms with Sales Under $10,000	34 0	27 2
% of Farms with Sales Under $25,000	59 2	48 7

NOTE Figures may not add due to rounding

TABLE 7

Farms with Sales of $2,500 or More in 1980

by Type of Farm

	L G D of Alonsa		Manitoba
	No	%	%
Type of Farm			
- Dairy	13	4 7	6 8
- Cattle (Excluding dairy)	196	70 8	21 4
- Hogs	2	0 7	3 8
- Poultry	1	0 4	1 5
- Wheat	14	5 1	23 0
- Small Grains	35	12 6	32 2
- Other Field Crops (forage seed potatoes, etc)	3	1 1	1 9
- Fruit and Vegetables	-	-	0 3
- Miscellaneous Specialty	3	1 1	2 2
- Mixed Farm- livestock (predominant)	7	2 5	4 3
- Mixed Farm- field crops (predominant)	-	-	0 4
- Mixed Farm- other (predominant)	3	1 1	2 0
TOTAL FARMS	277	100 0	100 0

NOTE Figures may not add due to rounding

Each census farm with sales of $2,500 or more was classified according to its predominant production enterprise Potential sales were estimated from the inventories of crops and livestock reported on the census questionnaire Each of these potential sales was accumulated to derive a potential sales total The commodity or group of commodities which accounted for 51% or more of total potential sales determined the product type of the farm

TABLE 8

Size of Farms

		L G D of Alonsa			Manitoba		
		1971	1976	1981	1971	1976	1981
Average Farm Size (acres)		1,304	1,271	1,431	543	593	639
Percent Change (1981 as a % of 1971)				9 7			17 7
Size Distribution of Farms (acres)							
- Small (1 to 239)	No	49	50	45	8,782	8,104	7,994
	%	11 4	13 1	14 0	25 1	25 2	27 2
- Moderate (240 to 759)	No	165	141	93	18,784	15,881	12,963
	%	38 6	36 8	29 0	53 7	49 5	44 0
- Large (760 to 1,599)	No	123	104	104	6,291	6,648	6,555
	%	28 8	27 2	32 4	18 0	20 7	22 3
- Very Large (1,600+)	No	90	88	79	1,124	1,471	1,930
	%	21 1	23 0	24 6	3 2	4 6	6 6
TOTAL FARMS		427	383	321	34,981	32,104	29,442
Percent Change (1981 as a % of 1971)				-24 8			-15 8

TABLE 9

1981

Percentage of Farms Reporting Certain Land Uses

	L G D of Alonsa	Manitoba
Cropland	82	93
Summerfallow	34	49
Pasture	27	30
Woodland	23	20
Other Unimproved	90	63

TABLE 10

Farm Capital

	L G D of Alonsa			Manitoba		
	1971	1976	1981	1971	1976	1981
Capital per Farm ($'000)						
- Total Value	46 1	75 3	236 6	58 8	141 3	355 0
% of Province	78	53	67			
- Land and Buildings	23 3	41 3	136 3	39 3	99 9	266 1
% of Province	59	41	51			
- Machinery and Equipment	78	15 5	37 6	17 8	29 9	61 9
% of Province	44	52	61			
- Livestock and Poultry	15 0	18 6	62 7	7 7	11 4	26 9
% of Province	195	163	233			
Capital per Farmland Acre ($)						
- Total Value	35	59	165	108	238	555
% of Province	32	25	30			
- Land and Buildings	18	32	95	72	169	416
% of Province	25	19	23			
- Machinery and Equipment	6	12	26	23	50	97
% of Province	26	24	27			
- Livestock and Poultry	11	15	44	14	19	42
% of Province	79	79	105			

NOTE Above figures represent values of the various types of census farm capital Farm operators were asked to give a value of land, buildings, machinery, equipment, livestock and poultry located on their holding regardless of ownership Values of land, buildings, machinery and equipment reported were to be an estimate of the present market value, not the original, replacement or assessed value Values for livestock and poultry were compiled from data on average farm values for various types of livestock and poultry

APPENDIX 3
SURFACE WATER MANAGEMENT PLAN

PROVINCE OF MANITOBA
DEPARTMENT OF NATURAL RESOURCES
WATER RESOURCES BRANCH

SURFACE WATER MANAGEMENT PLAN
FOR THE
ALONSA CONSERVATION DISTRICT

Revised August, 1983
Winnipeg, Manitoba

Prepared by
D J Kozusko, P Eng
Senior Planning Engineer
Conservation Districts Section
Water Management Service

SYNOPSIS

This report, prepared as part of the scheme for the Alonsa Conservation District, contains the results of a surface water management study of the District This study describes the District's hydrology, historical flood damages, agricultural drainage requirements and major water development opportunities Recommendations of the report are as follows

1 Hydrometric stations should be established for the subwatersheds in the District as indicated in this report

2 Drainage and flooding problems should be investigated on a watershed basis and not in an ad hoc manner

3 When a road crossing sustains significant flood damage, its capacity should be reviewed and adjusted

4 Detailed records should be kept on the amount, type (i e delay in seeding, haystack spoilage), and location of agricultural crop damage due to excess moisture in the District

5 The following three levels of drainage should be adopted for the areas indicated in this report

Level 1 - Intensive Agriculture

Level 2 - Mixed Farming

Level 3 - Livestock Production

6 The proposed water management guidelines for soils with excess water problems should be adopted and implemented as required on the basis of the subwatersheds identified in this report

7 The procedure for drainage management should be adopted and implemented on the basis of the subwatersheds identified in this report

SYNOPSIS (CONTINUED)

8 An investigation should be undertaken to identify benefits and effects of the proposed Portia Complex project

9 An investigation should be undertaken providing recommendations which would form a basis of agreement for a development plan of the Garrioch Creek subwatershed

10 The northern boundary of the Alonsa Conservation District should be extended north to Lake Manitoba to include those portions of the Crane River and Crane Narrows subwatersheds currently outside the authority of the District

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1 INTRODUCTION

1 1 General

Officially incorporated on February 8, 1978 by Order-in-Council 119/78, the Alonsa Conservation District became the third such district in operation under the legislative authority of the Conservation Districts Act The Alonsa Conservation District was formed primarily for agricultural land drainage improvement and land management This report will address the surface water management portion of the scheme A scheme is a program developed by or for a district in accordance with the purposes of the Conservation Districts Act Surface water supply has not been identified as a concern Consequently, surface water supply has not been addressed in this report

1 2 General Topographic Features

The Alonsa Conservation District is located on the western shore of Lake Manitoba as shown on Figure 1 From an elevation of approximately 312 4 metres (1025 feet) on the southwestern portion of the District, the land generally slopes in a northeasterly direction to Lake Manitoba Lake Manitoba has a range of regulation[1] between 247 16 metres (810 87 feet) to 247 77 metres (812 87 feet) as recommended by the Lakes Winnipeg and Manitoba Board in 1958 In the Alonsa Conservation District there are numerous low ridges extending in a north and a northwesterly direction These ridges form barriers to drainage of low-lying marshy tracts between the ridges Some of the ridges are composed of sand and gravel and are

ancient beaches that continue for long distances Other low ridges are composed of boulder clay The ridges control the drainage pattern in the District and are the key to solving any surface water problems

2 SURFACE WATER HYDROLOGY

A hydrologic appraisal permits an understanding of the source, extent and character of runoff in a watershed on which an evaluation of control and utilization of the water resource is to be based A hydrologic appraisal of water resources is the basic requirement for planning, designing, constructing and operating water resources projects This section will form a brief hydrologic appraisal of water resources in the District Included in the appraisal is a discussion of the available hydrologic information, the surface water runoff and the formation of subwatersheds

2 1 Hydrologic Information

One of the first steps in planning water resources development is the collection and utilization of hydrologic information Information concerning precipitation and the stage and streamflow of watercourses is necessary to properly assess flood control and drainage requirements

Daily precipitation has been recorded from 1972 to date at a climate station at Cayer This information is useful for predicting and assessing runoff in the northern portion of the District To fill a void in the precipitation information available in the southern portion of the District, climate stations have been established near Alonsa and near Amaranth in 1981

There are currently no long term hydrometric stations in the District recording the stage and streamflow of watercourses However, during spring runoff in 1979 the stage and the streamflow were recorded on

Garrioch Creek at P R No 278 and P T H No 50 and on the Lonely Lake Drain at P R No 235 Hydrographs of the spring runoff in 1979 at the aforementioned locations have been plotted and are shown on Figure 2 To provide a rational basis for development of drainage works in the District, a streamflow gauging network should be established A location plan of sites proposed for the establishment of hydrometric stations is shown on Figure 3 In locating a hydrometric station, consideration has been given to the contributing drainage area, land use, slope and shape of the watershed Once the hydrometric stations have been established, runoff data can be statistically analyzed for design and planning purposes A variety of watershed characteristics and conditions can be represented by the few gauged streams Stochastic hydrology techniques could be applied to transfer the collected information to ungauged streams

2 2 Surface Water Runoff

2 2 1 Drainage Pattern

Surface water runoff is initially concentrated in swales from ridges throughout the District Ridges and swales were formed by glaciation and are oriented longitudinally in a northerly direction Once depressions in the swales are filled with surface water, intermittent streams are formed which generally convey runoff northward If a swale encounters an obstruction such as a beach ridge, a delay in flow is caused until sufficient head is built up to overcome the obstruction or change its course of direction Beach ridges formed by Lake Aggasiz are oriented longitudinally in a northwesterly direction

acting as a barrier to northward water movement The drainage pattern of flow in the District is shown on Figure 3 Along swales and areas of significant depressional storage the drainage pattern was defined with the aid of a Landsat image (April 23, 1974)

Development of land in the District should be undertaken with care Significant depletion of available surface water storage or significant shortening of the length of natural channel from headwater to outlet could cause runoff to have a negative impact downstream of the development

2 2 2 1979 Flood

During the spring of 1979 a significant runoff event occurred as a result of rainfall near the peak of snowmelt runoff Due to the lack of climate stations in the District at that time the extent of rainfall outside the Lonely Lake area was unknown Normal precipitation for the period of November to April inclusive would be about 145 millimetres (5 7 inches) as interpreted from data supplied by the Atmospheric Environment Service Precipitation for the same period in 1978 - 1979 amounted to approximately 259 millimetres (10 2 inches) Under normal circumstances, approximately 31 millimetres (1 2 inches) of runoff may be expected in the spring, if depressions and soil were assumed to store 114 millimetres (4 5 inches) of precipitation However, during the spring of 1979 the rain on top of the snowmelt created about 145 millimetres (5 7 inches) of runoff With snowmelt reducing the available surface water storage capability of the District, the

rain greatly enhanced runoff conditions Consequently, severe flooding occurred Associated flood damages have been documented in section three

2 3 Watershed Description

In conjunction with collecting hydrologic information, the District should be divided into subwatersheds This would limit the size of study area and enable management objectives to be focussed on specific areas Hence, a watershed basis for water resources management and development would foster a rational and economical approach of resolving water related problems

The major drainage systems in the District are the Crane River, Lonely Lake, Sucker Creek and Garrioch Creek Other drainage systems would include Reedy Creek, Bluff Creek, North Leifer Drain, Harcus Drain and Smalley School Drain The boundaries of these subwatersheds and the magnitude of the respective gross drainage areas are shown on Figure 4 The gross drainage area boundaries were delineated with the aid of Landsat imagery (April 23, 1974) The dotted portion of the watershed boundaries shown on Figure 4 indicates areas where there is water transferred between subwatersheds during high water conditions

A problem occurred in defining the southern boundary of the Garrioch Creek and Harcus Drain subwatersheds Landsat imagery indicated the watershed boundaries to be somewhat south of the District boundary However, the drainage works in this area indicate a southerly flow of water to the Big Grass Marsh in the Whitemud Watershed Conservation

District Further field reconnaissance would be necessary to resolve this matter

3 FLOOD DAMAGE ASSESSMENT

Flood damage in the District occurs to agricultural land and to the transportation system A flood damage assessment is used to measure the benefit of preventing flood damage and flood loss Adequate flood damage information is essential when it comes to the making of important decisions to prevent flood damage

3 1 Agricultural Flood Damage

As a result of flooding, agricultural productivity in the District has been reduced Agricultural flood damages occur to improved and unimproved land Of all improved land[8] in the Alonsa Conservation District, approximately 67 percent is in cropland (comprised of approximately 43 percent cereal crops and 50 percent tame hay), 13 percent in improved pasture (used for pasture or grazing having had some improvements made to it recently such as cultivation, drainage, fertilization, seeding down or spraying) and 4 percent in other improved land (i e area of barnyards, home gardens, lanes and roads on farms) Unimproved land included woodland, areas of native pasture or hayland that has not been cultivated, brush pasture, grazing or waste land, sloughs, marsh and rocky land

The severity of agricultural flood damage depends on the date and duration of flooding Inundation of land in annual crops during the spring delays planting until the water recedes and the soil moisture content is suitable for seeding A portion of the growing season normally

available for the crop to mature is lost thereby reducing crop yields Spring inundation of tame hay for a period of greater than one week causes reduced yields of any alfalfa component if growth has been initiated After two weeks of inundation the alfalfa component can be expected to be destroyed In a year such as 1979, the duration of spring flooding was such that there was insufficient time in the growing season for crop production to be possible on some fields The Manitoba Crop Insurance paid out approximately $5,000 in 1979 in assistance for unseeded acreage due to excess moisture With regard to summer flooding, inundation damage can be highly variable depending on the type of crop grown, the duration of flooding and the maturity of the crop July flooding of wheat, for example, can result in total crop loss after three or four days Flooding of mature alfalfa in July can result in severe damage even after one day of inundation However, there is generally insufficient documentation to substantiate the total amount of flood damage sustained on the improved land in the District

As a result of spring and summer flooding, flood damage is also sustained on unimproved agricultural land The flood damage can be in the form of reduced animal grazing days, delays in putting up native hay resulting in poorer quality of hay produced, reduced yields and haystack spoilage Lengthy inundation of native hay meadows can result in a species change the following year[2] Less nutritive and palatable coarse sedges and reed grasses replace the normally occurring native grass species Following a year of flooding, it requires a minimum of one year and sometimes two years of drier conditions for the meadows to

revert to the former more productive grass species There is insufficient documentation to substantiate flood damage to unimproved land in the District

An analysis of flood damage on agricultural land in the District could not be undertaken due to insufficient documentation of agricultural flood damage A system should be set up whereby detailed records on the amount, type (i e delay in seeding, haystack spoilage) and location of flood damage incurred in the District could be maintained Such a system may involve a farm survey by questionnaire following years of excessive flood damages which could be administered through the Local Government District office

3 2 Other Flood Damages

3 2 1 Damages to Roads and Crossings

Significant flood damage to roads and crossings occurred in 1976 and 1979 These damages were assessed as the cost of flood fighting and the cost of restoration The detour costs incurred as a result of bridge closures have not been included in the flood damage assessment due to the paucity of information

Flood damage to Provincial roads and bridges was estimated on the basis of information supplied by the Manitoba Department of Highways The total cost in 1982 dollars of flood fighting and restoration incurred by the Manitoba Department of Highways in 1979 in the Alonsa Conservaton District has been estimated at $68,000

Records of flood damages have not been retained by the Manitoba Department of Highways in the Alonsa Conservation District prior to 1979

The cost of flood damages to municipal crossings and roads was obtained from flood claims by the Local Government District of Alonsa under the 1976 and 1979 Provincial Flood Assistance Program The total damage in 1982 dollars to municipal roads and crossings in 1976 and 1979 amounted to approximately $30,000 and $22,000 respectively

3 2 2 Social Impact

3 2 2 1 Transportation

Flooding of the many watercourses in the Alonsa Conservation District has resulted in the temporary closure of a number of roads These closures have caused an inconvenience to District residents The duration of bridge closures in the District during the spring of 1979 is shown in Table 1 Due to the relatively underdeveloped nature of the District, some residents were isolated by road closures for a period of about three weeks in the spring of 1979

3 2 2 2 Public Schools

Although flooding in the Alonsa Conservaton District has not caused any property damage to public schools, damages have occurred in the form of disrupted classes Road closures and poor road conditions in the spring of

1979 delayed or prevented the transportation of many District students to Junior High and High Schools in Ste Rose and in Amaranth Insufficient documentation has prevented any further comment on conditions prior to 1979

4 DRAINAGE

Adequate drainage is essential to maintain or to improve the productivity of many agricultural soils The level of drainage required should be governed by the capability of the soil to sustain a particular type of land use and by the nature of the soil For example, land capable of intensive agriculture should have a higher level of drainage than land capable of livestock production Agricultural land drainage improves productivity by extending planting time, reducing costs per unit of production, increasing yield and reducing losses at harvest Investment in drainage is only warranted if the resulting monetary returns from productivity are higher than the costs of drainage

4 1 Levels of Agricultural Drainage

Lands in the Alonsa Conservation District have been classified for agricultural development on the basis of soil capability[6] The four major categories of agricultural land use are intensive agriculture, mixed farming, livestock production and limited agriculture Each category of agricultural land use can be associated with a desired level of drainage as indicated on Figure 5 Soils with excess moisture problems requiring drainage have been identified in the Agricultural Land Use and Management report[6] for the District To identify specific drainage system requirements in the District would require further study and is beyond the scope of this report

Lands suitable for intensive agriculture generally provide the highest economic returns if utilized for annual cropping A high level of drainage can usually be justified on these lands In general, all surface water should be removed from a field within 48 hours after ponding begins to prevent significant loss of cereal crop yield Determination of the actual standard of agricultural drainage on a particular subwatershed would be governed by a benefit-cost analysis The intent of conducting a benefit-cost analysis would be to establish the level of drainage providing the most prudent use of limited funds

The majority of land in the Alonsa Conservation District has been classified as mixed farming Although annual cropping may be possible on land classified for mixed farming, forages for hay and pasture would likely be the predominant crop Of the forages grown the alfalfa component is the most sensitive to ponding water In general, ponded surface water should be removed within four days to prevent declining alfalfa yields Due to this extreme drainage requirement, alfalfa may not be a practical crop to grow on soils subject to excess moisture Other forages are much less sensitive to wetness problems Therefore a lower agricultural drainage standard (Level 2 drainage) is proposed for land suitable for mixed farming than for land suitable for intensive agriculture The capacity of a level 2 standard of agricultural drainage on a particular subwatershed would be governed by a benefit-cost analysis

Land suitable only for livestock production is generally located on natural waterways and in or adjacent to wetlands These lands are scattered throughout the District Due to the very severe limitations

restricting their agricultural capability, drainage should be limited to ensuring that water on these lands should not remain ponded for a duration greater than one month This would reduce the risk of hay meadows undergoing a species change[2] to less nutritive and palatable coarse sedges and reed grasses due to native hay standing in water for a prolonged period of time Therefore, construction of a path for water to travel or grassed waterway should be sufficient for agricultural drainage The intent of this level 3 drainage is to provide an outlet for surface water When sufficient streamflow information is available the level 3 drainage standard for the District may be adjusted to better suit local conditions

No drainage is proposed for lands classified in the Agricultural report[6] as Limited Agriculture and No Agriculture as economic returns would not be sufficient to justify cost of drainage Lands south of township 23 classified as Peat have not been sufficiently examined to determine agricultural capability due to inadequate soils data Some provision for drainage of these lands might be made following a more detailed soils study

The number of hectares of agricultural land classified for a level 1, level 2 or level 3 standard of drainage is shown by subwatershed in Table 2

4 2 Water Management Guidelines for Agricultural Lands

From the southerly limit of Township 23 north, soils in the Alonsa Conservation District have been mapped in detail at the series

level by Manitoba Soil Survey This soils information is contained in the Manitoba Soil Survey Reports entitled Soils of the Ste Rose du Lac Area, Report No 21, 1982 and Soils of the Grahamdale Area, Report No 16, 1971 In these reports, soils were grouped into seven capability classifications on the basis of their suitability for dryland farming The first three classes are considered capable of sustaining arable agriculture The fourth class is marginal for such sustained agriculture The fifth class is of use only for improved permanent forages while the sixth class is useful only for unimproved permanent forages The seventh class has no practical value for agriculture The recommended agricultural land uses presented in the report entitled "Agricultural Land Use and Management in the Alonsa Conservation District" are based on these seven capability ratings

Each of these seven capability classes is further subclassified according to the nature of the soil limitation or hazard Such limitations include stones, droughtiness, excessive moisture and topography In the report entitled "Agricultural Land Use and Management in the Alonsa Conservation District", all lands with excess water, stoniness and wind erosion problems were identified This section goes still one step further It describes in more detail the management requirements for all soils with excess water problems However, detailed studies are required to qualify and validate the suggested water management recommendations Even within a specific capability class and water limitation subclass, management requirements can vary considerably depending upon the specific soil characteristics, location and environment

The water management problems and recommendations described herein were obtained directly from the Soil Survey Reports referred to previously Recommendations are provided only for those soils rated suitable for intensive agriculture (capability classes 1 to 3), mixed farming capability class 4) and livestock production (capability class 5) Lands suitable only for limited agriculture (capability class 6) are not dealt with in this report as improvement practices are considered infeasible on these low quality lands

Lands south of Township 23 could not be dealt with as the soils information required for detailed water management recommendations does not exist

The suggested water management recommendations are described in Table 3 In these descriptions, a mineral soil is indicated if there is only one number before a letter in the soil classification symbol The number, either a 3, 4 or 5, indicates the agricultural capability class of the land unit being described Where there are two numbers preceding the letter, namely an O followed by a 3, 4 or 5, the O indicates that the soil is of organic nature, while the 3, 4 or 5 refers to its agricultural capability class after the corresponding water management recommendation has been implemented The letters following the agricultural capability class number refers to the specific subclass limitation, namely

W - excess water, other than that brought about by inundation,

M - droughtiness owing to coarse soil texture and low water holding capacity,

N - the presence of soluable soils (salinity),

P - stoniness,

D - undesirable soil structure and/or low permeability

Any numbers for mineral soils at the end of the symbol refer simply to a specific management group For example, soils classified as 3W2 have a finer texture than those classified 3W3 Care must be taken in the latter grouping to ensure that groundwater levels are not lowered excessively as these soils can be very droughty Soils series names and abreviations that correspond to the soil classification symbols are listed in Appendix 1

Two maps were prepared to show the location of soils having excess moisture problems Those lands capable of intensive agriculture and of mixed farming are shown on Figure 7 These are mostly in the southern portion of the mapped area Figure 8 indicates the location of land suitable for livestock production These lands comprise the majority of the mapped area

Water management recommendations on these soils with excess moisture problems have been suggested solely on the basis of specific soil characteristics Difficulties in implementing the recommendations could arise due to the environment and location of a soil within a particular watershed Consequently the recommendations do not supersede but are intended to compliment and guide detailed surface water and groundwater studies Such studies would determine the feasibility of alleviating soil wetness for agricultural production

Soil complexes occur on the original Soil Survey maps due to the complexity of the landscape and the map scale For example, a land unit

might be mapped as being comprised of 70 percent of one soil type and 30 percent of another soil type The first soil might not have any water problem while the second soil type has a problem of excess moisture In such a case only the 30 percent is indicated and is shown by use of a number 3 as a superscript A land unit can also have two or three management classes, all with a water problem Thus a soil with 40 percent 4NW and 60 percent 5W would be mapped as $4NW^4$ on Figure 7 and $5W^6$ on Figure 8 This splitting up was necessary as the map scale was too small to permit putting all land units on one map with clarity If a particular subwatershed is being dealt with a new map should be drafted to put all the soils data on maps of a larger scale Examples of such maps are shown on Figures 9 and 10 for the Lonely Lake subwatershed

4 3 Procedure for Drainage Management

For drainage management to be successful there must be comprehensive planning on a watershed basis in advance of project implementation Effective resource management of the Alonsa Conservation District could be better accomplished by assigning a representative group a formal role in the planning process for drainage in the District(7) This planning group would include no less than two Board members and the regional water manager The planning group would form the initial planning process as to where and when future drainage would be desirable These future projects would form a comprehensive plan for drainage management which would allow for the approval and timing of project implementation and enable coordination among agencies in project operation

The Alonsa Conservation District Board would refer all drainage problems to the planning group which would discuss the problem, consider other resource uses, formulate a project under the advice of the regional water manager and related discipline specialists and report back to the Board The Board could then pass a resolution requesting the Conservation District planning engineer to investigate the project in detail and prepare a drainage assessment The Conservation District planning engineer would work closely with the planning group The drainage assessment would give the Board recommendations on the type of action to be taken The purpose of this procedure is to streamline project implementation such that sufficient time can be allotted for project planning prior to construction

The drainage assessment (3, 4, 5) would include four basic parts (A) a statement of the purpose of the drain, (B) a description of the proposed drain and any alternative proposal, (C) a description of potential benefits and (D) recommendations on the type of action to be taken The statement of the purpose of the drain would define the area that requires drainage and outline reasons why the drainage is required The intent would be to define what the drain is expected to do Part "B" would involve any multidisciplinary or feasibility studies necessary to develop a preliminary design and cost estimate A description of benefits would be used to indicate whether it would be worthwhile to proceed to construction phase After careful scrutiny of the aforementioned information the Conservation District planning engineer would recommend the most economical course of action to be taken to solve the problem If necessary, this would include the option of no action to be taken

The drainage report would then be forwarded by the Conservation District planning engineer to the Board for consideration Once the drainage report is approved by the Board the project could be placed in the next fiscal year budget for construction

5 DEVELOPMENT OPPORTUNITIES

5 1 Lonely Lake Project

The Alonsa Conservation District Board in conjunction with Ducks Unlimited (Canada) is undertaking construction of the Lonely Lake project This project consists of bridge improvements, enlargement of the Lonely Lake outlet drain and installing a fixed crest weir to regulate water levels on Lonely Lake between elevation 247 50 and 249 25 metres The outlet of Lonely Lake would be able to handle an estimated five percent flood discharge of 27 75 m^3/s (980 cfs)

The control of water levels on Lonely Lake would permit Ducks Unlimited (Canada) to proceed with habitat improvement for waterfowl in the area In addition, the regulation of the lake would provide a degree of flood control that would enhance the surrounding lands for hay and grazing

5 2 Portia Complex Project

Ducks Unlimited (Canada) is currently investigating the feasibility of developing eight marshes, including Jarvie and Pedro Lakes, for habitat improvement for waterfowl in the area The project could affect a gross drainage area of about 230 square kilometres which is composed of about 35 square kilometres of the Ebb and Flow subwatershed, 139 square kilometres of the Sucker Creek subwatershed and all of the Reedy Creek subwatershed The marshes would be divided into cells In all, about fourteen cells are proposed for waterfowl habitat improvement A location

plan of the proposed Portia Complex project is shown on Figure 6

The proposed cells would have water levels controlled using fixed crest weirs to pass high flows and stop-logged culverts to provide a variable control feature at low flows There are two outlets proposed for the project One is to use both Reedy Creek and Sucker Creek as outlets to take advantage of the existing natural northerly flow of water The second is to use only Reedy Creek as an outlet which hinges on the feasibility of directing the flow of Pedro Lake to the south To alleviate fishery concerns downstream of the structures, releases of less than 0 14 m^3/s (5 cfs) could be maintained until July However, due to the importance of Sucker Creek for fisheries, the Provincial Fisheries Branch should have any concerns addressed prior to the final planning of the project Although the regulation of the marshes may not provide significant flood control benefits to surrounding agricultural land, there may be a benefit to agriculture through the provision of an improved drainage outlet for the proposed project area

5 3 Lake Mary Water Level Regulation

As part of Ducks Unlimited (Canada) development plan for the Alonsa Conservation District, the water level of Lake Mary would be controlled to permit habitat improvement for wildlife in the area The outlet for Lake Mary is provided by Garrioch Creek Garrioch Creek may require drainage improvements since the subwatershed has approximately 26,000 hectares of land recommended for intensive agriculture Lake Mary

could potentially be used for headwater storage thus reducing the capacity requirement of any drainage improvement to Garrioch Creek The stored water could be released slowly over a period of time for the benefit of fisheries Until a multidisciplinary study has been undertaken and recommendations provided to resolve this potential conflict between fish, wildlife and agriculture, no agreement should be entered into between Ducks Unlimited (Canada) and the Board to regulate the Lake

6 RECOMMENDATIONS

(1) HYDROMETRIC STATIONS SHOULD BE ESTABLISHED FOR SUBWATERSHEDS IN THE DISTRICT AT THE LOCATIONS SHOWN ON FIGURE 3

A streamflow gauging network in the District is necessary to provide a rational basis for planning and development of the District's water resources

(2) DRAINAGE AND FLOODING PROBLEMS SHOULD BE INVESTIGATED ON A WATERSHED BASIS AND NOT IN AN AD HOC MANNER

The intention of this recommendation is to encourage a systematic approach to problem solving which would involve plan formulation on a watershed basis

(3) WHEN A ROAD CROSSING SUSTAINS SIGNIFICANT FLOOD DAMAGE, ITS CAPACITY SHOULD BE REVIEWED AND ADJUSTED

The estimated 1979 flood damage to roads in 1982 dollars amounted to approximately $90,000 The high incidence of road crossing washouts indicates a problem with road crossing capacities Road crossing capacities may have been underestimated due to uncertainty of the contributing drainage area In determining an adequate road crossing capacity, the contributing drainage area may be assessed using Figure 4

(5) DETAILED RECORDS SHOULD BE KEPT ON THE AMOUNT, TYPE (I E DELAY IN SEEDING, HAYSTACK SPOILAGE) AND LOCATION OF AGRICULTURAL CROP DAMAGE DUE TO EXCESS MOISTURE IN THE DISTRICT

The maintenance of such records would allow plan formulation to alleviate excess moisture problems A farm questionnaire could be distributed through the local government district office which would be responsible for maintaining the records The Water Resources Branch could assist the Board in setting up the questionnaire

(5) THE FOLLOWING THREE LEVELS OF DRAINAGE SHOULD BE ADOPTED FOR THE AREAS INDICATED ON FIGURE 5

Level 1 - Intensive Agriculture

Level 2 - Mixed Farming

Level 3 - Livestock Production

The intention of this recommendation is to indicate broad drainage categories in terms of the level of drainage required under normal meteorological conditions during the crop growing season The level of drainage required should be governed by the capability of the soil to sustain a particular type of land use

(6) THE SUGGESTED WATER MANAGEMENT GUIDELINES FOR SOILS WITH EXCESS WATER PROBLEMS SHOULD BE ADOPTED AND IMPLEMENTED AS REQUIRED ON THE BASIS OF THE SUBWATERSHEDS IDENTIFIED ON FIGURES 7 AND 8

The proposed water management guidelines are intended to complement and guide detailed surface water and groundwater studies Once an area experiencing soil wetness problems is identified these guidelines could be used as a basis for these studies to assess the

feasibility of alleviating soil wetness for agricultural production Such a measure should promote more efficient investigations and planning

(7) THE PROCEDURE FOR DRAINAGE MANAGEMENT SHOULD BE ADOPTED AND IMPLEMENTED ON THE BASIS OF THE SUBWATERSHEDS IDENTIFIED ON FIGURE 4

The proposed procedure for drainage management is intended to maintain a continuous effort to comprehensively plan projects needed in the District Projects planned well in advance of construction would promote a better and more coordinated works program Such an effort would ensure prudent use of Provincial and Board funds

(8) AN INVESTIGATION SHOULD BE UNDERTAKEN TO IDENTIFY BENEFITS AND EFFECTS OF THE PROPOSED PORTIA COMPLEX PROJECT

Due to the magnitude of the project, substantial Provincial and Board funding may be required The intent of the investigation would be to protect any agricultural and fisheries interests and ensure prudent use of funds

(9) AN INVESTIGATION SHOULD BE UNDERTAKEN PROVIDING RECOMMENDATIONS WHICH WOULD FORM A BASIS OF AGREEMENT FOR A DEVELOPMENT PLAN OF THE GARRIOCH CREEK SUBWATERSHED

Due to a potential conflict between fisheries, wildlife and agriculture, no major works should be constructed until the investigation has been completed

(10) THE NORTHERN BOUNDARY OF THE ALONSA CONSERVATION DISTRICT SHOULD BE EXTENDED NORTH TO LAKE MANITOBA TO INCLUDE THOSE PORTIONS OF THE

CRANE RIVER AND CRANE NARROWS SUBWATERSHEDS CURRENTLY OUTSIDE THE AUTHORITY OF THE DISTRICT

The outlets of these aforementioned subwatersheds lie outside the District Any work done in these subwatersheds could affect land and watercourses beyond the authority of the Alonsa Conservation District

REFERENCES

1 The Manitoba Water Commission, Lake Manitoba Regulation, Volume 1, Winnipeg, Manitoba, December, 1973

2 Neil J Bell, An Evaluation of Agricultural Potential and Proposed Drainage Benefits, Manitoba Department of Agriculture, Dauphin, Manitoba, December, 1978

3 W S Young, P Eng , Evaluating Drainage Benefit, IN Proceedings of the Drainage Engineers Conference, Engineering Technical Publication Number 19, University of Guelf, Guelf, Ontario, November, 1969

4 M E Plewes, A Process for Environmental Impact Appraisal, IN Proceedings of the Drainage Engineers Conference, Engineering Technical Publication 126-29, University of Guelf, Guelf, Ontario, October, 1973

5 R E Crysler, P Eng , Environmental Appraisal, IN Proceedings of the Drainage Engineers Conference, Technical Report 126-36, University of Guelf, Guelf, Ontario, 1977

6 B Graham, H Schellenberg, Agricultural Land Use and Management in the Alonsa Conservation District, Manitoba Department of Agriculture, Winnipeg, Manitoba, January, 1982

7 B B Berger, M O Ertel, E R Kaynor, Integrated Management of the Connecticut River Basin, IN Symposium Proceedings on Unified River Management, American Water Resources Association, Minneapolis, Minnesota, May, 1980 pp 175 - 186

8 Conservation Districts Section, Water Resources Branch, Selected Agricultural Statistics for the Alonsa Conservation District (1961 to 1976), Manitoba Department of Natural Resources, Winnipeg, Manitoba, January, 1982

TABLE 1

DURATION OF THE CLOSURE OF BRIDGES
IN THE ALONSA CONSERVATION DISTRICT
1979

Location	Date Road Closed	Date Road Placed Back in Operation	Type of Damage	Subwatershed
P R 235 in section 2-25-12W	May 4	May 16	Roadway cut bridge washout	Lonely Lake
Birdina Road, East of 24-23-13W	April 23	May 13	Road washed out	Lonely Lake
Birdina Road, East of 13-23-13W	April 23	May 13	Road washed out	Lonely Lake
Birdina Road East of 1 23-13W	April 23	May 13	Road washed out	Lonely Lake
Birdina Road North of 36-22-13W	April 23	May 13	Road washed out	Lonely Lake
Birdina Road, North of 30-22-12W	April 23	May 13	Road washed out	Sucker Creek
Birdina Road, North of 17-22-12W	April 23	May 13	Water over road	Sucker Creek
Birdina Road Northeast corner of 4-22 12W	April 23	May 13	Culvert washed out	Sucker Creek
Birdina Road East of 15 21-12W	April 23	May 13	Water over road	Sucker Creek
South Leifer Road, Northeast corner of 14-20-10W	April 20	April 20	Bridge approaches washed out	Harcus Drain
Amaranth North 8 locations in 10 miles	April 20	April 26	Water over road	Smalley School Drain
Smalley School Road North of 26-19-10W	April 20	April 28	Road washed out	Smalley School Drain
Cayer Road East of 13-25-13W	April 24	May 11	Road washed out and bridge approach damaged	Lonely Lake
Cayer Road, East of 36-26-13W	April 24	May 11	Water over road	Cayer
Cayer Road 3 locations in 4 miles in Township 27	April 24	May 11	Water over road	Cayer
Cayer Road North of 31-26-12W	April 24	May 11	Bridge damaged	Cayer
Cayer Road East of 12-25-13W	April 24	May 11	Water over road	Cayer
Carrier Road East of 5 8 and 17-19 9W	April 21	May 14	Culvert washed out	
Richards Road 4 locations 13 14, 15 16-25-13W	April 20	May 23	Road washed out	Lonely Lake
Morely Road 4 locations north of 21 20-26-13W	April 20	May 24	Road washed out	Crane River
Alonsa North Road West and North of 33-22-11W	April 21	April 26	Road washed out	Reedy Creek

TABLE 2

PROPOSED LEVELS OF AGRICULTURAL DRAINAGE
WITHIN A SUBWATERSHED

Subwatershed	Estimated Total Gross Drainage Area (Hectares)	Estimated Area Requiring A Specific Level of Drainage (Hectares)
Crane River	53 500	300 Level 1 36 200 Level 2 16 000 Level 3 1 000 no drainage recommended
Lonely Lake	49,400	1,700 Level 1 31 700 Level 2 11 500 Level 3 4,500 no drainage recommended
Crane Narrows	7,200	4 900 Level 2 2,100 Level 3 200 no drainage recommended
Guynemer	2,600	1 550 Level 2 1 000 Level 3 50 no drainage recommended
Cayer	6,300	4 300 Level 2 2,000 Level 3
Mooredale	5,800	4 000 Level 2 1 800 Level 3
Bayend	2 400	1 800 Level 2 600 Level 3
Johnson	3 100	1 500 Level 2 1,500 Level 3 100 no drainage recommended
Sucker Creek	43,300	12 100 Level 1 21 300 Level 2 4 700 Level 3 5 200 no drainage recommended
Ebb and Flow	7 000	3 000 Level 1 1 400 Level 2 1,700 Level 3 900 no drainage recommended
Reedy Creek	5 600	3 700 Level 1 150 Level 2 1 400 Level 3 350 no drainage recommended
Garrioch Creek	35 000	26 000 Level 1 3,400 Level 2 2 600 Level 3 3 000 no drainage recommended
Bluff Creek	4,500	3 900 Level 1 400 Level 3 200 no drainage recommended
North Leifer Drain	4 200	2 800 Level 1 1 400 Level 3
Harcus Drain	8 100	4 900 Level 1 3 200 Level 3
Smalley School Drain	6,300	6 200 Level 1 100 no drainage recommended

TABLE 3

WATER MANAGEMENT RECOMMENDATIONS

Soil Classification	Water-Related Problem	Soil Texture	Topography (% slope in brackets)	Recommendations
Intensive Agriculture (suitable for a wide range of crops)				
2W2	Moderately poor surface and internal drainage	Medium to moderately fine	Level to gently sloping (0 to 5%)	All crop residues should be incorporated Surface drainage is required in level areas
3W2	High groundwater levels and very slow surface runoff	Medium to moderately fine	Level to depressional (0 to 0 5%)	Surface drainage is essential
3W3	Flooding in springtime or after heavy rains High groundwater levels	Coarse	Level to depressional (0 to 0 5%)	Surface drainage is essential
3WM	Periodic high groundwater levels Droughtiness	Coarse to moderately coarse	Level to very gently sloping (0 to 2%)	The water table should be maintained within the crop rooting zone Organic matter should be added to increase water retention capacity
03W	Shallow peat with high groundwater levels	Organic up to 130 cm deep underlain by stonefree materials	Depressional to level (0 to 0 5%)	Lower and control groundwater table to between 45 and 90 cm from surface during the cropping season
Mixed Farming (best suited for forages, some annual cropping)				
4NW	Slightly to moderately saline Subject to ponding	Moderately coarse to moderately fine	Level to very gentle sloping (0 to 2%)	Surface drainage is required Farm management should ensure continuous cropping and use of salt tolerant cereal and forage species
04WD	Deep peat with high groundwater level	Organic up to 130 cm deep underlain by very stony materials	Level to depressional (0 to 0 5%)	Lower and control groundwater table to between 45 and 90 cm from surface during the cropping season This requires major reclamation If organic matter is lost very severe management problems will result from stony sub-surface
Livestock Production (suitable for forages only)				
5W	Surface water part of year and high groundwater levels much of year Periodic droughtiness	Coarse gravelly	Level to depressional (0 to 0 5%)	Reduce surface flooding while maintaining the water table within the rooting zone of forages
5WN	Slow surface runoff, poor internal drainage variable salinity	Medium to moderately fine	Level to very gently sloping (0 to 2%)	Surface drainage and water table control is required to enable salt tolerant forages to be grown
5WP1	Saturated with water for considerable portions of growing season	Medium to fine, stony	Level to depressional (0 to 0 5%)	Surface drainage improvements are required
05WD	Shallow peat high groundwater levels	Organic mostly from 60 to 130 cm thick underlain by very stony to excessively stony subsoil	Level to depressional (0 to 0 5%)	Lower and control groundwater table to between 45 and 90 cm from surface This may be difficult where peat is less than 60 cm deep If the organic matter is lost these soils will have little value for agriculture

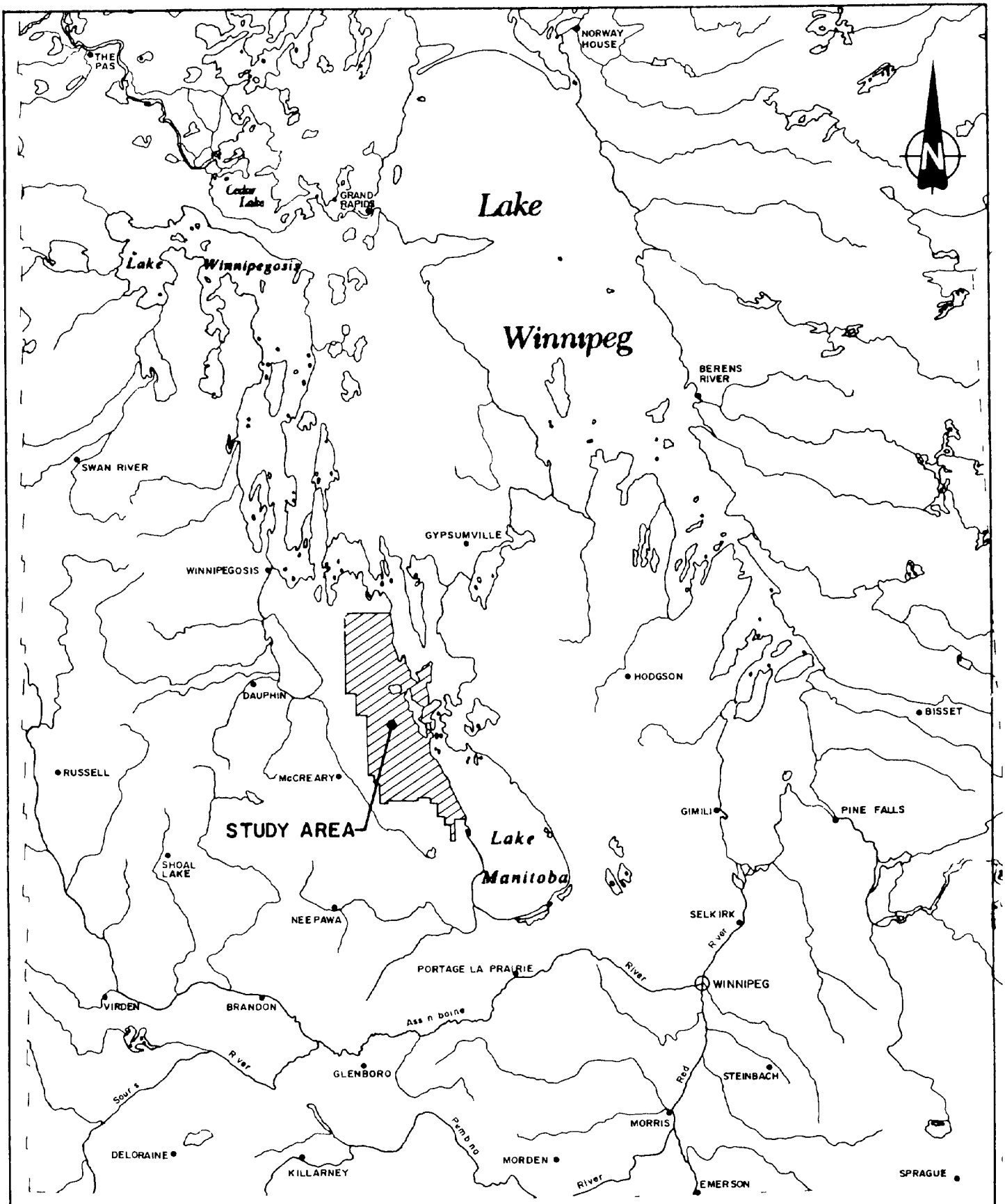
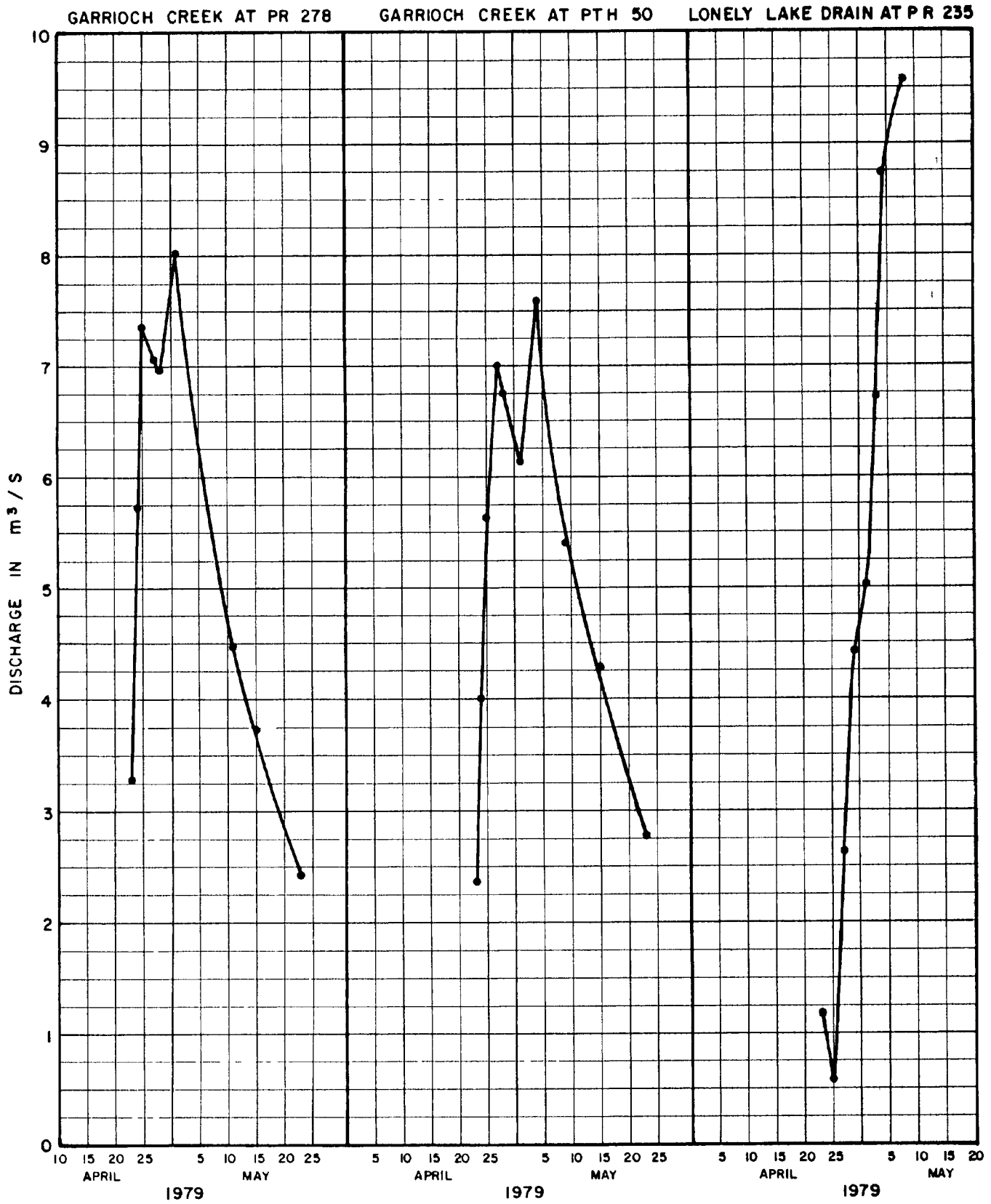


FIGURE 1

PROVINCE OF MANITOBA DEPARTMENT OF NATURAL RESOURCES **WATER RESOURCES BRANCH**	THE ALONSA CONSERVATION DISTRICT **LOCATION PLAN**
PREPARED: DJK; DRAWN: C E W; CHECKED; SUBMITTED; APPROVED	SCALE: N T S; DATE: 81 01 30; SHEET: 1 OF 10; FILE NO: 82-1-1224

MG 78b1



NOTE FIRST PEAK DUE TO SNOWMELT
SECOND PEAK DUE TO RAIN ON SATURATED WATERSHED

FIGURE 2

PROVINCE OF MANITOBA
DEPARTMENT OF NATURAL RESOURCES
WATER RESOURCES BRANCH

THE ALONSA CONSERVATION DISTRICT

HYDROGRAPHS OF GARRIOCH CREEK AND LONELY LAKE DRAIN – 1979

PREPARED	DRAWN	SUBMITTED	APPROVED	SCALE	DATE	SHEET	FILE NO
DJK	CEW			AS SHOWN	82 01 05	2 OF 10	82-1-1224
	CHECKED						

MG 7961

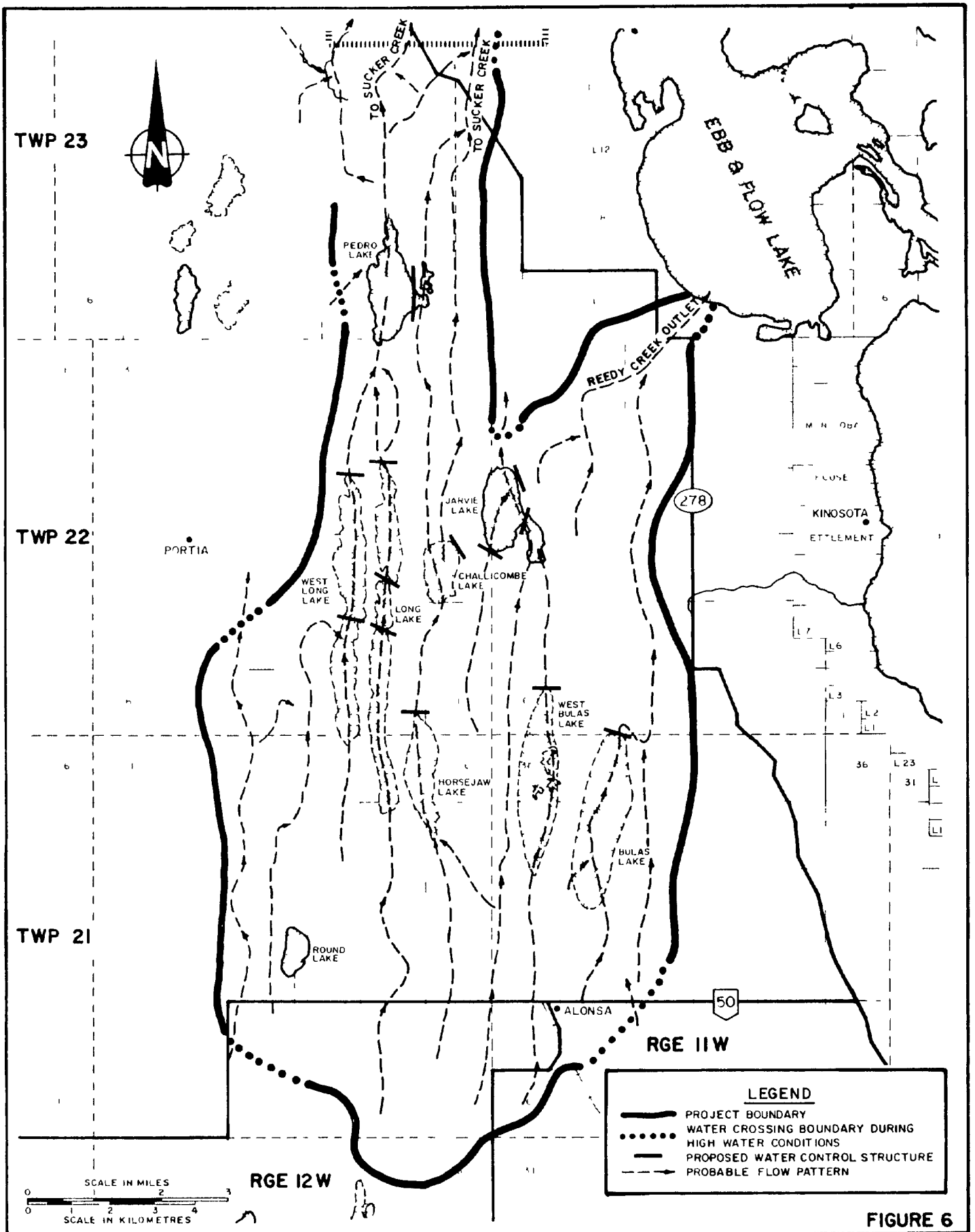


FIGURE 6

PROVINCE OF MANITOBA
DEPARTMENT OF NATURAL RESOURCES
WATER RESOURCES BRANCH

THE ALONSA CONSERVATION DISTRICT

LOCATION PLAN OF PROPOSED PORTIA COMPLEX PROJECT

PREPARED	DRAWN	SUBMITTED	APPROVED
D J K	C E W		
	CHECKED		

SCALE	DATE	SHEET	FILE NO
AS SHOWN	82 04 14	6 OF 10	82-1-1224

APPENDIX 1

SOIL SERIES NAMES

Soil series names and abbreviations that correspond to the soil Classification symbols are as follows

---

Intensive Agriculture

2W2

My	McCreary
Pl	Plum Ridge
Pl/T	Plum Ridge, till substrate

3W2

Gf	Glenfields
Gf(P)	Glenfields, peaty phase
We	Wentland
We(T)	Wentland, till substrate
We(P)	Wentland, peaty Phase

3W3

Mlc(P)	Melnice
Vp	Valpoy
Vp(P)	Valpoy, peaty phase
Vp(P)/T	Valpoy, peaty phase, till substrate
Vp/T	Valpoy, till substrate

3WM

Als	Almasippi
Als/T	Almasippi, till substrate
Cb	Colby

03W

Cax	Cayer complex

Mixed Farming

4NW

Pl(sa)	Plum Ridge, saline phase

04WD

Mcw	Macawber

Livestock Production

	5W		5WN
Ey	Eddystone	Gf(P)	Glenfields, peaty phase
So	Somme	Pl(sa)	Plum Ridge, saline phase
Su(P)/T	Sundown, peaty phase till substrate		

	5WP1		O5WD
C	Clarkleigh	Cx	Crane Complex
C(p)	Clarkleigh, peaty phase		
Ml	Meleb		
Ml(P)	Meleb, peaty phase		

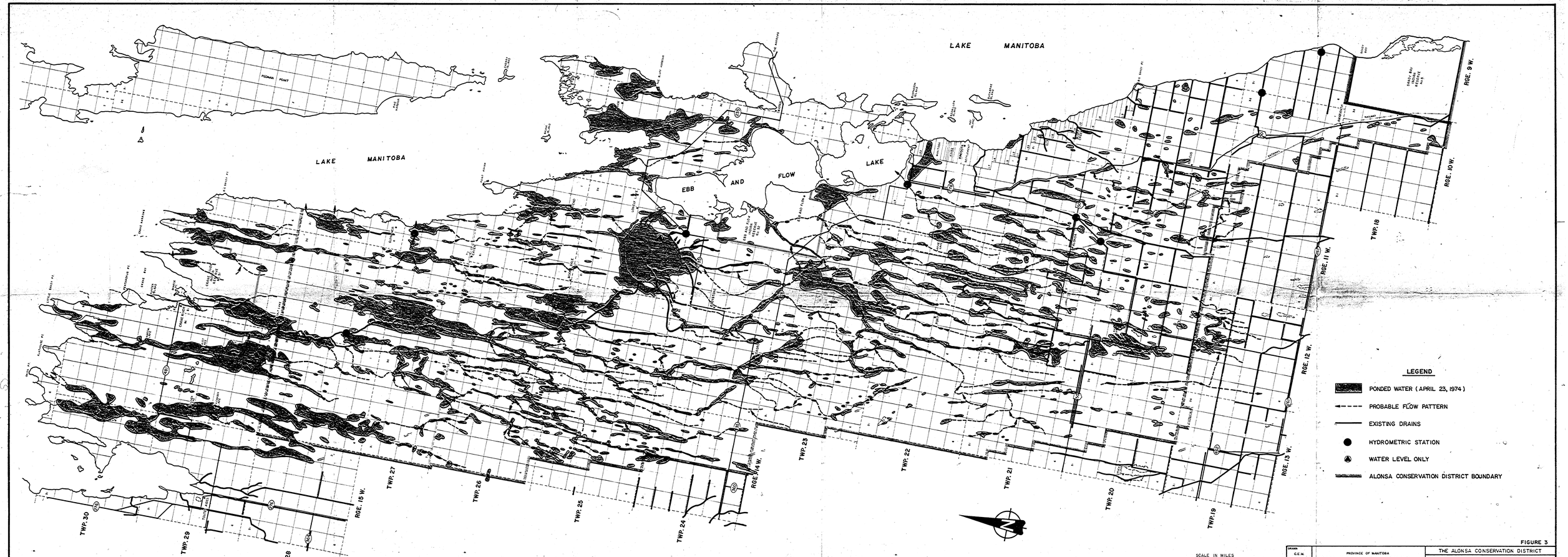


FIGURE 3

DRAWN C.E.W.	PROVINCE OF MANITOBA DEPARTMENT OF NATURAL RESOURCES WATER RESOURCES BRANCH	THE ALONSA CONSERVATION DISTRICT FLOODED AREAS AND FLOW PATTERN
CHECKED		
PREPARED D.A.K.	SUBMITTED APPROVED	SCALE AS SHOWN · DATE 81 10 20 · SHEET 3 OF 10 · FILE NO. 82-1-1224

C.E.W. 81 08 11

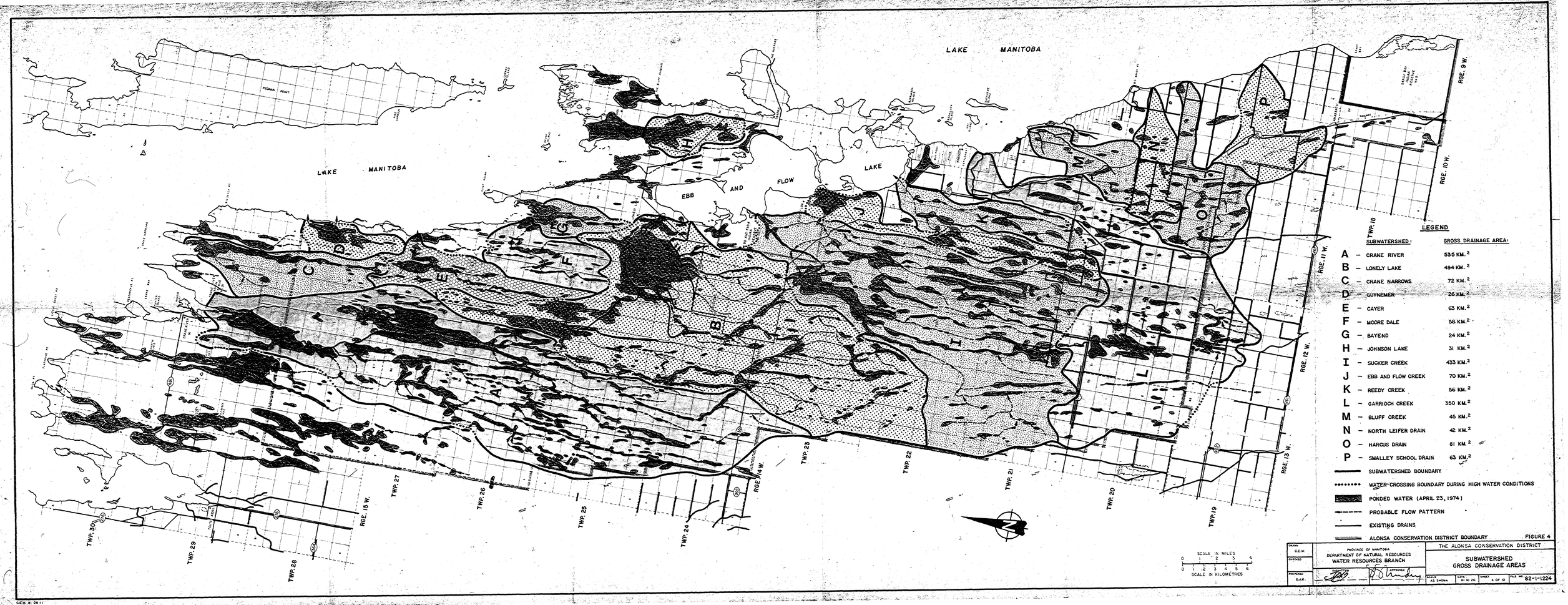


FIGURE 4

DRAWN: C.E.W.	PROVINCE OF MANITOBA DEPARTMENT OF NATURAL RESOURCES WATER RESOURCES BRANCH	THE ALONSA CONSERVATION DISTRICT
CHECKED:		SUBWATERSHED GROSS DRAINAGE AREAS
PREPARED: G.J.K.	SUBMITTED: [signature] APPROVED: [signature]	SCALE: AS SHOWN DATE: 81 10 20 SHEET: 4 OF 10 FILE NO: 82-1-1224

C.E.W. 81 08 11

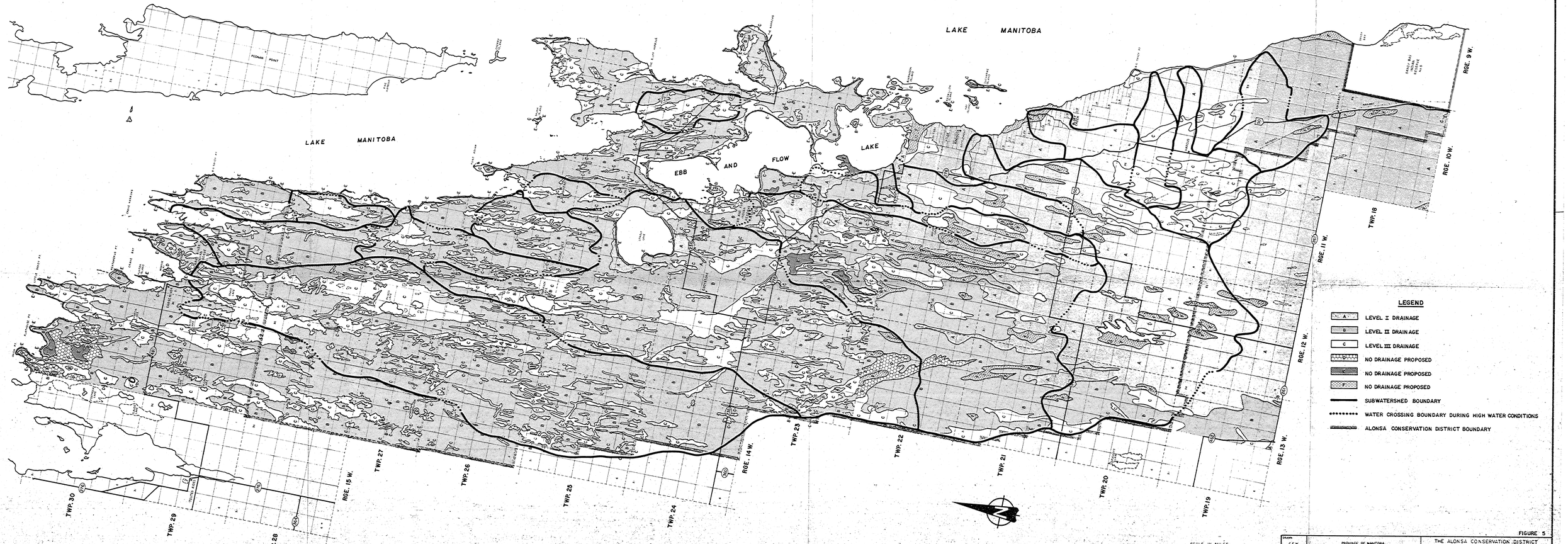


FIGURE 5

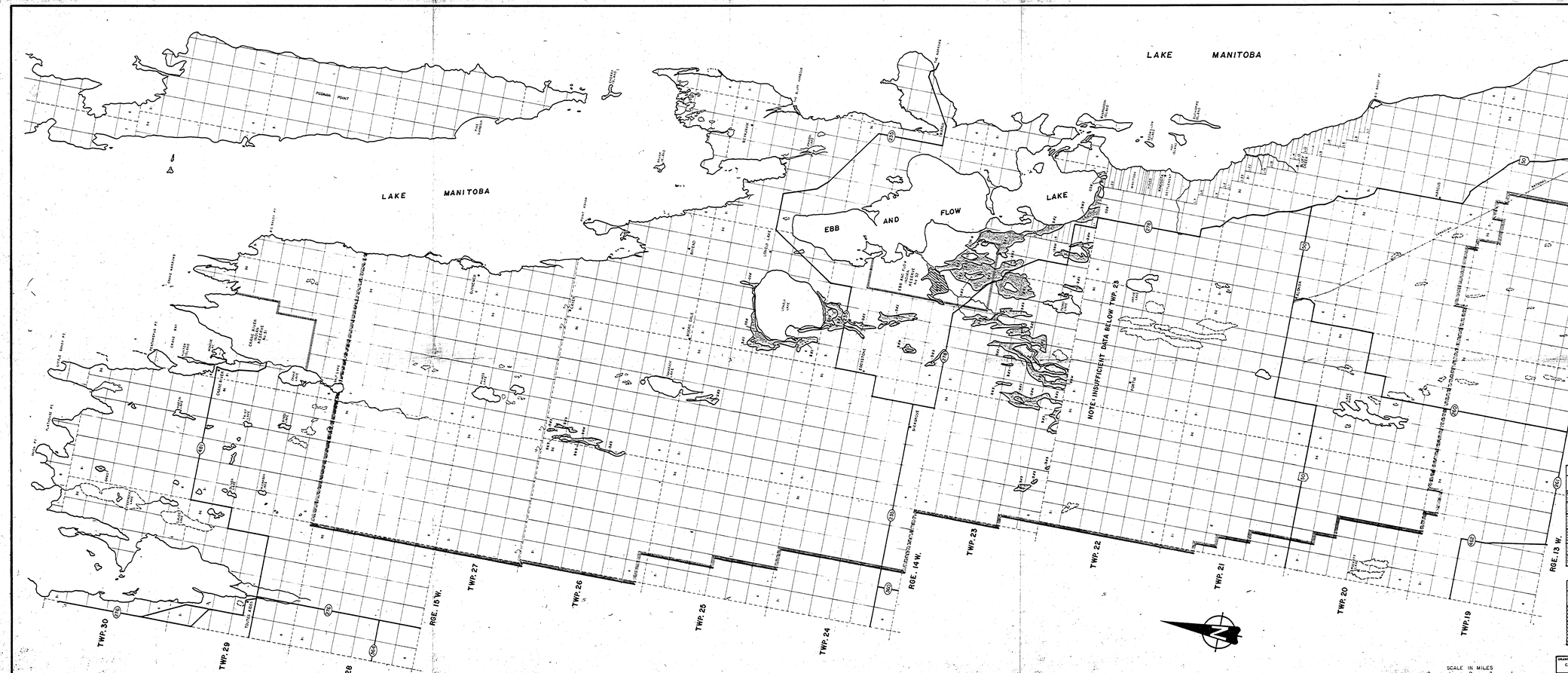
THE ALONSA CONSERVATION DISTRICT

PROPOSED LEVELS OF AGRICULTURAL DRAINAGE

PROVINCE OF MANITOBA
DEPARTMENT OF NATURAL RESOURCES
WATER RESOURCES BRANCH

DRAWN C.E.W.
CHECKED
PLOTTED C.E.W.
SUBMITTED
APPROVED
SCALE AS SHOWN
DATE 82 02 16
SHEET 5 OF 10
FILE NO. 82-1-1224

C.E.W. 82 02 16



LEGEND

ALONSA CONSERVATION DISTRICT BOUNDARY

NOTE: SOIL COMPLEXES OCCUR ON THE ORIGINAL SOIL SURVEY MAPS DUE TO THE COMPLEXITY OF THE LANDSCAPE AND THE MAP SCALE. FOR EXAMPLE, A LAND UNIT MIGHT BE MAPPED AS BEING COMPRISED OF 70 % OF ONE SOIL TYPE AND 30 % OF ANOTHER SOIL TYPE. THE FIRST SOIL MIGHT NOT HAVE ANY WATER PROBLEM WHILE THE SECOND SOIL TYPE HAS A PROBLEM OF EXCESS MOISTURE. IN SUCH A CASE ONLY THE 30 PERCENT IS INDICATED AND IS SHOWN BY USE OF A NUMBER 3 AS A SUPERSCRIPT.

INTENSIVE AGRICULTURE (suitable for a wide range of crops)

SOIL CLASSIFICATION	WATER-RELATED PROBLEM	SOIL TEXTURE	TOPOGRAPHY (% SLOPE IN BRACKETS)	WATER MANAGEMENT RECOMMENDATIONS
	• MODERATELY POOR SURFACE AND INTERNAL DRAINAGE	MEDIUM TO MODERATELY FINE	LEVEL TO GENTLY SLOPING (0 TO 5 %)	• INCORPORATE CROP RESIDUES • SURFACE DRAINAGE REQ'D.
	• HIGH GROUNDWATER LEVELS • VERY SLOW SURFACE RUNOFF	MEDIUM TO MODERATELY FINE	LEVEL TO DEPRESSIONAL (0 TO 0.5 %)	• SURFACE DRAINAGE ESSENTIAL
	• FLOODING IN SPRINGTIME OR AFTER HEAVY RAINS • HIGH GROUNDWATER LEVELS	COARSE	LEVEL TO DEPRESSIONAL (0 TO 0.5 %)	• SURFACE DRAINAGE ESSENTIAL
	• PERIODIC HIGH GROUNDWATER LEVELS • DROUGHTINESS	COARSE TO MODERATELY COARSE	LEVEL TO GENTLY SLOPING (0 TO 2 %)	• CONTROL WATER TABLE • ADD ORGANIC MATTER
	• SHALLOW PEAT WITH HIGH GROUNDWATER LEVELS	ORGANIC, UP TO 130 cm. DEEP, UNDERLAIN BY STONEFREE MATERIAL	DEPRESSIONAL TO LEVEL (0 TO 0.5 %)	• CONTROL WATER TABLE

MIXED FARMING (best suited for forages, some annual cropping)

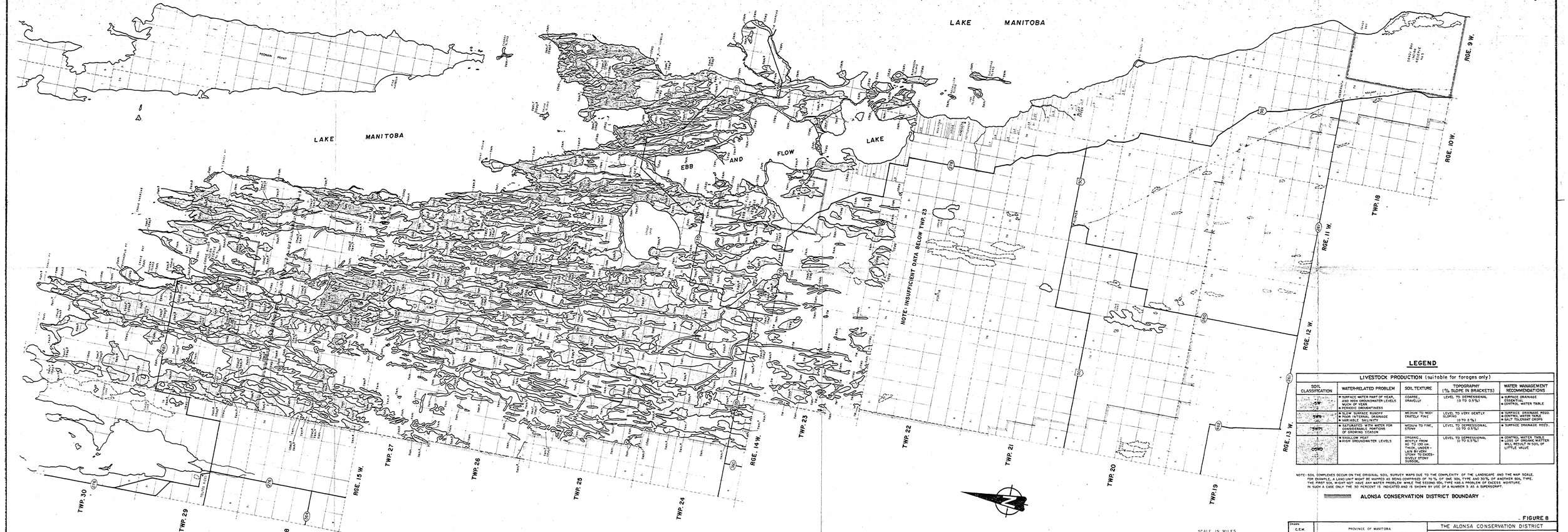
SOIL CLASSIFICATION	WATER-RELATED PROBLEM	SOIL TEXTURE	TOPOGRAPHY (% SLOPE IN BRACKETS)	WATER MANAGEMENT RECOMMENDATIONS
	• SUSCEPTIBLE TO MODERATELY SALINITY • SUBJECT TO PONDING	MODERATELY COARSE TO MODERATELY FINE	LEVEL TO VERY GENTLY SLOPING (0 TO 2 %)	• SURFACE DRAINAGE REQ'D. • CONTINUOUS CROPPING • SALT TOLERANT CROPS
	• DEEP PEAT • HIGH GROUNDWATER LEVELS	ORGANIC UP TO 130 cm. DEEP, UNDERLAIN BY VERY STONY MATERIAL	LEVEL TO DEPRESSIONAL (0 TO 0.5 %)	• CONTROL WATER TABLE • MAJOR RECLAMATION REQ'D. • LOSS OF ORGANIC MATTER WILL RESULT IN VERY SEVERE MANAGEMENT PROBLEMS

SCALE IN MILES
0 1 2 3 4
0 1 2 3 4 5 6
SCALE IN KILOMETRES

FIGURE 7

DRAWN C.E.M.	PROVINCE OF MANITOBA	THE ALONSA CONSERVATION DISTRICT
CHECKED H.D.S.	DEPARTMENT OF NATURAL RESOURCES WATER RESOURCES BRANCH	WATER MANAGEMENT OF SOILS SUITABLE FOR INTENSIVE AGRICULTURE AND MIXED FARMING
PREPARED D.A.K.	MANITOBA	APPROVED
SCALE AS SHOWN	DATE 82 12 02	SHEET 7 OF 10
FILE NO. 82-1-1224		

C.E.M. 81 08 11



LEGEND

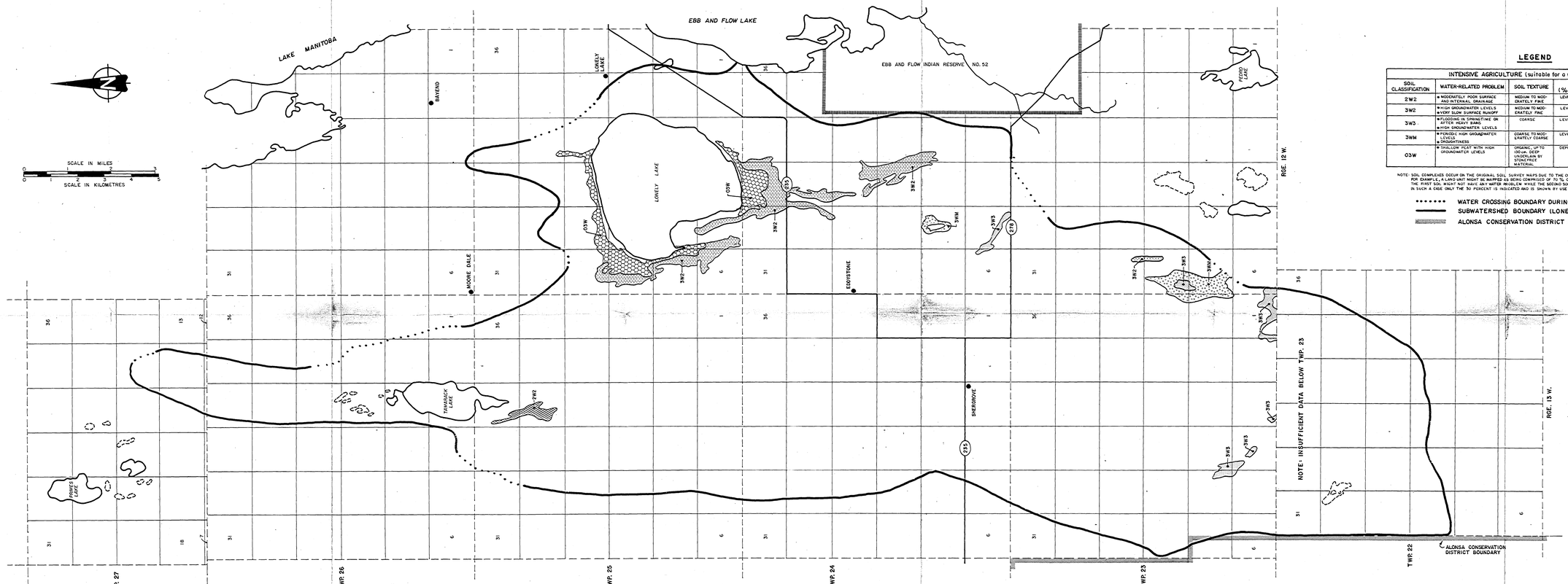
SOIL CLASSIFICATION	LIVESTOCK PRODUCTION (suitable for forages only)			
	WATER-RELATED PROBLEM	SOIL TEXTURE	TOPOGRAPHY (% SLOPE IN BRACKETS)	WATER MANAGEMENT RECOMMENDATIONS
SW	• SURFACE WATER PART OF YEAR, AND/OR HIGH GROUNDWATER LEVELS • PERIODIC DROUGHTINESS	COARSE, GRAVELLY	LEVEL TO DEPRESSIONAL (0 TO 0.5%)	• SURFACE DRAINAGE • IRRIGATION • CONTROL WATER TABLE
SWN	• SLOW SURFACE RUNOFF • POOR INTERNAL DRAINAGE • VARIABLE SALINITY	MEDIUM TO MODERATELY FINE	LEVEL TO VERY GENTLY SLOPING (0 TO 2 %)	• SURFACE DRAINAGE REQD. • CONTROL WATER TABLE • SALT TOLERANT CROPS
SWPS	• SATURATED WITH WATER FOR CONSIDERABLE PORTIONS OF GROWING SEASON	MEDIUM TO FINE, STONY	LEVEL TO DEPRESSIONAL (0 TO 0.5%)	• SURFACE DRAINAGE REQD.
OSWD	• SHALLOW PEAT • HIGH GROUNDWATER LEVELS	ORGANIC MOSTLY 10cm TO 160 cm THICK, UNDERLAIN BY VERY STONY TO EXCESSIVELY STONY SYMBOLS	LEVEL TO DEPRESSIONAL (0 TO 0.5%)	• CONTROL WATER TABLE • LOSS OF ORGANIC MATTER LEVEL MAY BE SOIL OF LITTLE VALUE

NOTE: SOIL COMPLEXES OCCUR ON THE ORIGINAL SOIL SURVEY MAPS DUE TO THE COMPLEXITY OF THE LANDSCAPE AND THE MAP SCALE. FOR EXAMPLE, A LAND UNIT MIGHT BE MAPPED AS BEING COMPRISED OF 70 % OF ONE SOIL TYPE AND 30 % OF ANOTHER SOIL TYPE. THE FIRST SOIL MIGHT NOT HAVE ANY WATER PROBLEM WHILE THE SECOND SOIL TYPE HAS A PROBLEM OF EXCESS MOISTURE. IN SUCH A CASE ONLY THE 30 PERCENT IS INDICATED AND IS SHOWN BY USE OF A NUMBER 3 AS A SUBSCRIPT.

ALONSA CONSERVATION DISTRICT BOUNDARY

FIGURE 8

DRAWN C.E.W.	PROVINCE OF MANITOBA DEPARTMENT OF NATURAL RESOURCES WATER RESOURCES BRANCH	THE ALONSA CONSERVATION DISTRICT WATER MANAGEMENT OF SOILS SUITABLE FOR LIVESTOCK PRODUCTION
CHECKED M.D.S.	SUBMITTED	APPROVED
PREPARED D.J.K.	SCALE AS SHOWN	DATE 82 12 02 SHEET 8 OF 10 FILE NO. 82-1-1224



LEGEND

INTENSIVE AGRICULTURE (suitable for a wide range of crops)				
SOIL CLASSIFICATION	WATER-RELATED PROBLEM	SOIL TEXTURE	TOPOGRAPHY (% SLOPE IN BRACKETS)	WATER MANAGEMENT RECOMMENDATIONS
2W2	• MODERATELY POOR SURFACE AND INTERNAL DRAINAGE	MEDIUM TO MODERATELY FINE	LEVEL TO GENTLY SLOPING (0 TO 5 %)	• INCORPORATE CROP RESIDUES • SURFACE DRAINAGE REQ'D.
3W2	• HIGH GROUNDWATER LEVELS • VERY SLOW SURFACE RUNOFF	MEDIUM TO MODERATELY FINE	LEVEL TO DEPRESSIONAL (0 TO 0.5 %)	• SURFACE DRAINAGE ESSENTIAL
3W3	• FLOODING IN SPRINGTIME OR AFTER HEAVY RAINS • HIGH GROUNDWATER LEVELS	COARSE	LEVEL TO DEPRESSIONAL (0 TO 0.5 %)	• SURFACE DRAINAGE ESSENTIAL
3WM	• PERIODIC HIGH GROUNDWATER LEVELS • SALINITY/SODICITY	COARSE TO MODERATELY COARSE	LEVEL TO GENTLY SLOPING (0 TO 2 %)	• CONTROL WATER TABLE • ADD ORGANIC MATTER
O3W	• SHALLOW PEAT WITH HIGH GROUNDWATER LEVELS	ORGANIC, UP TO 130 cm. DEEP UNDERLAIN BY STONY/FREE MATERIAL	DEPRESSIONAL TO LEVEL (0 TO 0.5 %)	• CONTROL WATER TABLE

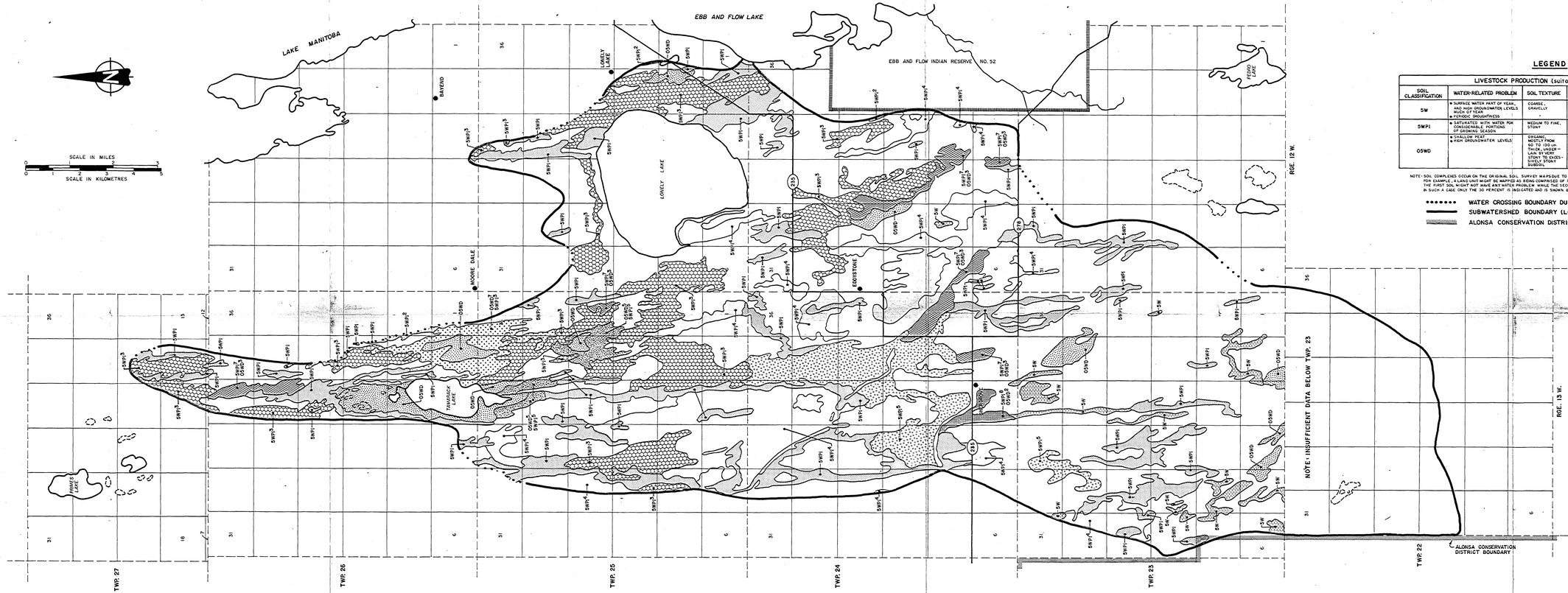
NOTE: SOIL COMPLEXES OCCUR ON THE ORIGINAL SOIL SURVEY MAPS DUE TO THE COMPLEXITY OF THE LANDSCAPE AND THE MAP SCALE FOR EXAMPLE, A LAND UNIT MIGHT BE MAPPED AS BEING COMPRISED OF 70 % OF ONE SOIL TYPE AND 30% OF ANOTHER SOIL TYPE. THE FIRST SOIL MIGHT NOT HAVE ANY WATER PROBLEM WHILE THE SECOND SOIL TYPE HAS A PROBLEM OF EXCESS MOISTURE. IN SUCH A CASE ONLY THE 30 PERCENT IS INDICATED AND IS SHOWN BY USE OF A NUMBER 3 AS A SUPERSCRIPT.

- WATER CROSSING BOUNDARY DURING HIGH WATER CONDITIONS
- SUBWATERSHED BOUNDARY (LONELY LAKE)
- ALONSA CONSERVATION DISTRICT BOUNDARY

FIGURE 9

DRAWN C.E.W.	PROVINCE OF MANITOBA DEPARTMENT OF NATURAL RESOURCES WATER RESOURCES BRANCH	THE ALONSA CONSERVATION DISTRICT
CHECKED		WATER MANAGEMENT OF SOILS SUITABLE FOR INTENSIVE AGRICULTURE LONELY LAKE SUBWATERSHED
PREPARED D.J.K.	SUBMITTED ——— APPROVED	SCALE AS SHOWN · DATE 83.08.02 · SHEET 9 OF 10 · FILE NO. 82-1-1224

C.E.W. 83 01 12



LEGEND

LIVESTOCK PRODUCTION (suitable for forages only)

SOIL CLASSIFICATION	WATER-RELATED PROBLEM	SOIL TEXTURE	TOPOGRAPHY (% SLOPE IN BRACKETS)	WATER MANAGEMENT RECOMMENDATIONS
5W	• SURFACE WATER PART OF YEAR, AND HIGH GROUNDWATER LEVELS MUCH OF YEAR • PERIODIC DROUGHTINESS	COARSE, GRAVELLY	LEVEL TO DEPRESSIONAL (0 TO 0.5%)	• SURFACE DRAINAGE ESSENTIAL • CONTROL WATER TABLE
5WPI	• SATURATED WITH WATER FOR CONSIDERABLE PORTIONS OF GROWING SEASON	MEDIUM TO FINE, STONY	LEVEL TO DEPRESSIONAL (0 TO 0.5%)	• SURFACE DRAINAGE NEED'D.
OSWD	• SHALLOW PEAT • HIGH GROUNDWATER LEVELS	ORGANIC MOSTLY FROM 40 TO 120 cm. THICK, UNDER-LAIN BY VERY STONY TO EXCESSIVELY STONY SANDY MIN.	LEVEL TO DEPRESSIONAL (0 TO 0.5%)	• CONTROL WATER TABLE • LOSS OF ORGANIC MATTER WILL RESULT IN SOIL OF LITTLE VALUE

NOTE: SOIL COMPLEXES OCCUR ON THE ORIGINAL SOIL SURVEY MAPS DUE TO THE COMPLEXITY OF THE LANDSCAPE AND THE MAP SCALE FOR EXAMPLE, A LAND UNIT MIGHT BE MAPPED AS BEING COMPRISED OF 70 % OF ONE SOIL TYPE AND 30 % OF ANOTHER SOIL TYPE. THE FIRST SOIL MIGHT NOT HAVE ANY WATER PROBLEM WHILE THE SECOND SOIL TYPE HAS A PROBLEM OF EXCESS MOISTURE. IN SUCH A CASE ONLY THE 30 PERCENT IS INDICATED AND IS SHOWN BY USE OF A NUMBER 3 AS A SUPERSCRIPT.

- WATER CROSSING BOUNDARY DURING HIGH WATER CONDITIONS
- SUBWATERSHED BOUNDARY (LONELY LAKE)
- ALONSA CONSERVATION DISTRICT BOUNDARY

FIGURE 10

DRAWN C.E.W.	PROVINCE OF MANITOBA DEPARTMENT OF NATURAL RESOURCES WATER RESOURCES BRANCH	THE ALONSA CONSERVATION DISTRICT WATER MANAGEMENT OF SOILS SUITABLE FOR LIVESTOCK PRODUCTION LONELY LAKE SUBWATERSHED
CHECKED		
PREPARED D.J.K.	SUBMITTED — APPROVED	SCALE AS SHOWN · DATE 83 08 02 · SHEET 10 OF 10 · FILE NO. 82-1-1224

C.E.W. 83 01 12

APPENDIX 4
GROUNDWATER RESOURCES

MANITOBA

DEPARTMENT OF NATURAL RESOURCES

WATER RESOURCES BRANCH

GROUNDWATER RESOURCES IN THE ALONSA CONSERVATION DISTRICT

Prepared by: M. Rutulis, P. Eng.
Groundwater Section
Water Investigations Service

October, 1980
Winnipeg, Manitoba

SUMMARY

* The estimated total supply of groundwater in the Alonsa Conservation District is abundant for existing requirements and considerable new development.

* The groundwater resources of the District are not evenly distributed; in some areas groundwater is readily available, in other areas a satisfactory supply may be difficult to find, and in some parts of the District potable water aquifers do not exist.

* Indications are that groundwater is readily available along the western boundary and in the central part of the District.

* In the eastern part of the District, along Lake Manitoba the availability of groundwater varies considerably from place to place; the supply is abundant in some areas and potable groundwater is not available in other areas.

* Most of the groundwater problems in the District are caused by a deep salty water flow system that exists in the deeper aquifers and has intruded into shallow water bearing formations in the southeast corner of the District, in the vicinity of Ebb and Flow Lake and in the Cayer area.

* Groundwater quality in the District ranges from excellent to unpotable. Unpotable or very poor quality water is common in the southeast corner and in a few other areas along Lake Manitoba. In the rest of the District groundwater, in general, is of fair to good quality. Excellent quality groundwater is common in the southwest corner of the District.

* Fairly extensive flowing well and high water level areas exist along Lake Manitoba and around other lakes in the District. Special well design is required in these areas to prevent uncontrolled groundwater discharge that may cause various problems.

CONTENTS

ILLUSTRATIONS

1 INTRODUCTION

The purpose of this report is to provide background information on the groundwater conditions in the Alonsa Conservation District.

The report is based on available information comprising reports on groundwater, geology and soils in the area and basic groundwater data in the files of the Water Resources Branch of the Department of Natural Resources. The availability of information is not uniform; most of it covers the southern part of the District (a 10 km to 15 km wide eastwest belt south of Alonsa) and a narrow zone along Lake Manitoba; in extensive areas in the northern and western part of the District detailed groundwater information (e.g., well logs) is not available. However, enough is known about geological conditions throughout the district to provide a generalized view of groundwater resources in the District. More specific information regarding resource conditions and development considerations can be obtained from the Water Resources Branch of the Department of Natural Resources.

The International System of Units, SI, (commonly referred to as the metric system) and the following symbols of the SI units are used in the report:

metre	m
square metre	m^2
cubic metre	m^3
kilometre	km
square kilometre	km^2
litre	L
second	s
litres per second	L/s
cubic metres per day	m^3/d
cubic metres per year	m^3/a (annum)
milligrams per litre	mg/L

All dimensions and quantities are also given in commonly used Imperial units in parentheses.

2 PHYSIOGRAPHY

The District occupies a lowland along the western shore of Lake Manitoba. In most of the District the ground elevation is less than 30 m (100 ft.) above Lake Manitoba; in a small area near the southwest corner the land rises 60 m (200 ft.) above the Lake and, on the other hand, extensive areas are only a few metres (feet) above the Lake level.

Because of the flatness of the area and the numerous slight surface undulations that trend roughly paralled to Lake Manitoba and interfere with drainage, shallow lakes, marshes and swamps are common in the District. The areal extent of these features ranges from a few hectares (acres) to tens of square kilometers (miles). Only the more extensive swampy areas and lakes are indicated in the attached illustrations (Figure 1, Figure 3). Very few well defined natural stream channels exist in the District.

3 GEOLOGY

3.1. Geology and Groundwater

Because the rocks and the unconsolidated deposits overlying the bedrock contain the openings through which groundwater flows and in which it is stored, the geology of an area has a significant effect on groundwater resources in it. Consequently the geological setting of the Alonsa Conservation District related to the groundwater conditions in the District is described.

3.2. Bedrock

In the northern and central parts of the District the bedrock, which is the solid rock that underlies the unconsolidated deposits, consists of Devonian limestone and dolostone with some thin shale beds (Figures 1 and 2). The total thickness of the Devonian limestone and dolostone formations is 100 m - 140 m (335 - 450 ft.). The Devonian formations are underlain by a 270 m (900 ft.) thick sequence of Silurian and Ordovician rocks consisting of dolomite and dolomitic limestone and some 45 m (150 ft.) of shale and sandstone at the base of the sedimentary rocks. These sedimentary rocks are underlain by granitic and other igneous and metamorphic rocks.

The granitic and other hard rocks are practically impermeable and are considered to be the base of the zone in which significant groundwater movement takes place. The Devonian limestone and dolostone formations contain permeable fractured zones and, therefore, have a significant effect on groundwater resources in the area. The Ordovician dolostone and limestone formations underlying the Devonian rocks also transmit water but, because they are at considerable depth they have no direct effect on groundwater resources in the District. Only the upper part of the limestone and dolostone rocks, in which the groundwater movement that influences groundwater resources in the District takes place, is shown in the block diagram in Figure 1.

In the southern part of the District the limestone and dolostone beds are overlain by Jurassic formations comprising shale, limestone and gypsum layers. (Figures 1 and 2). Because the Jurassic formations contain gypsum, which is highly soluable in water, the pre-

sence of them has a detrimental effect on water quality in an area. The thickness of the Jurassic beds ranges from zero to forty metres (0 - 130 ft.).

The depth to bedrock in the eastern part of the District generally is less than 40 m (130 ft.) and more than 40 m in the western part. A deep northwesterly trending buried bedrock valley runs through the southwestern corner of the District (Figure 1). The approximate depth to bedrock is indicated in Figure 4. No doubt the bedrock topography is much more irregular than indicated by the depth to bedrock map. In extensive areas no wells or test holes have been drilled or where they exist they do not reach the bedrock. Consequently the available information is not sufficient to indicate the bedrock topography in more detail.

3.3. Surficial Deposits

3.3.1. Classification

The surficial deposits in the District have been deposited by glaciers, glacial lakes and streams during the Ice Age and to a much lesser extent by recent or post glacial lakes and streams. Based on mode of origin and the material forming them the following major units of surficial deposits can be discerned in the District:

- till,
- sand and gravel,
- sand, silt and clay,
- swamp deposits.

The total thickness of the surficial deposits is indicated by the depth to bedrock on the map in Figure 3.

3.2.2. Till

Till is a mixture of clay, silt, sand, gravel and boulders

deposited by glaciers during the Ice Age. Till overlies the bedrock in almost the whole District and, as indicated on the surface deposits map in Figure 4, it is exposed at surface in most of the district. The till underlies all the other surface deposits in the District. In the south-western corner and in the central part of the District the till commonly is interbedded with fairly thick and extensive sand and gravel deposits. In the rest of the District lenses of sand and gravel in the till seem to be common. Because the permeability of till is low, it constitutes a zone that retards groundwater movement. The sand and gravel deposits embedded in the till, however, can transmit and store water.

Numerous small swamps occur in the till area. Because they are insignificant in respect to the general geological conditions in the area, they are not shown on the surface deposits map.

3.3.3. Sand and Gravel

Surface sand and gravel deposits in the District occur mainly as north and northwesterly trending narrow ridges. The ridges are ancient beach deposits laid down along the shores of Lake Agassis during late stages of the Lake. Most of these beach deposits are at the most only a few metres thick. Buried sand and gravel deposits seem to be more common and more extensive in the District than sand and gravel at surface. Indications are that the most extensive and thickest sand and gravel deposits exist in the southwest corner of the District where more than 30 m (100 ft) thick sand and gravel deposits have been reported. Extensive sand and gravel deposits also seem to be common in the central part of the District. The extensive sand and gravel deposits likely are outwash deposits deposited by proglacial streams. Although the available information leaves little

doubt that extensive buried sand and gravel deposits exist in the District, it is not adequate to outline even approximate boundaries of them. The sand and gravel deposits are permeable and porous and, therefore, are significant features in respect to groundwater movement and storage.

3.3.4. Sand, Silt and Clay

Fairly extensive sand, silt and clay deposits overlay the till along the western boundary in the southern part of the District as indicated on the surface deposits map in Figure 3. A few smaller sand, silt and clay areas occur in the central part of the southern half of the District. The sand, silt and clay deposits were deposited by glacial Lake Aggassiz. Because these lake deposits in some areas consist mainly of sand and silt and in other areas of clay and silt, on the surface deposits map the lake deposits are divided into a sand and silty sand unit and a clay and silt unit. Since sand deposits are permeable, the sand and silty sand areas may contain water bearing zones. The permeability of the clay and silt deposits is practically zero and therefore they retard groundwater movement. In addition to the sand, silt and clay areas indicated on the map (Figure 4) numerous small areas of very thin lake deposits, which have no significant effect on the groundwater conditions and are not indicated on the map, occur throughout the District.

3.3.5. Swamp Deposits

Extensive swamp deposits overlie the till in low areas adjacent to lakes and in a few other low lying areas. Because of the poor drainage, almost everywhere in the District the till is overlain by small pockets of thin swamp deposits. These minor swamps are not shown on the surface deposits map because they are too small to be mapped on the scale of the map and they are insignificant as far as general geological and groundwater conditions in the District are concerned.

4 GROUNDWATER

4.1. Aquifers

4.1.1. Definition and Classification

In the discussion of the geology of the District it was indicated that some kinds of bedrock and surficial deposits readily transmit and store groundwater. The rock formations and surficial deposits that yield water to wells at a rate sufficient for water supply are called aquifers.

Based on the materials forming them the aquifers can be classified as follows:

- sand and gravel,
- limestone and dolostone,
- shale and gypsum.

4.1.2. Sand and Gravel Aquifers

Depending on their dimensions and stratigraphic position the sand and gravel aquifers can be subdivided into:

- sand and gravel at surface,
- extensive buried sand and gravel,
- lenses of sand and gravel.

The surface sand and gravel aquifers are formed by the ancient beach ridges or the lacustrine deposits that overlie the till. These aquifers occur in the surface sand and gravel areas indicated on the surface deposits map (Figure 4). However, not all of the beach ridges contain saturated gravel zones; the beach deposits often are thin and dry. Consequently, the surface sand and gravel areas cannot be considered to be aquifers without detailed investigation of each beach ridge. For this reason no extensive surface sand aquifers are shown on the aquifer map. The surface sand and gravel aquifers are the only source of water in areas where all deeper aquifers are too highly mineralized to be used for water supply.

As it was indicated in the section on surficial deposits, extensive sand and gravel deposits interbedded in the till exist in the District. Consequently there can be little doubt that major sand and gravel aquifers exist in the District. The most extensive sand and gravel aquifers likely occur in the southwestern corner of the District in the buried bedrock valley area (Figures 1 and 3). As the available information is not sufficient to map the extensive buried sand and gravel deposits, it is also impossible to outline the subsurface sand and gravel aquifers on the aquifer map.

The till contains numerous lenses of sand and gravel that may form minor aquifers. The size of these aquifers may range from less than a hectare (100 x 100 m or 330 ft. x 330 ft.) to several hectares. It appears that these aquifers are common in most of the area and they often are developed for water supply in areas where the surficial deposits are more than 30 m (100 ft.) thick. Although the lenses of sand and gravel are common, they do not necessarily exist at every point. Hence, the aquifer map indicates only the general area where the sand and gravel lense aquifers exist and where they are the most probable source of groundwater. It does not mean that every well or test hole drilled in the area will penetrate a sand and gravel aquifer. Consequently, some test drilling may be required to find the aquifers.

4.1.3. Limestone and Dolostone Aquifer

The limestone and dolostone formations that underlie the whole District form an extensive aquifer that is continuous throughout the District. Consequently, water can be obtained from this aquifer at almost any location in the District. The limestone and dolostone aquifer is the main source of water in the eastern part and near the northwestern corner of the District as indicated on the aquifer map in Figure 5. In the southeastern corner, in some areas along the southern boundary and in the vicinity of Ebb and Flow Lake and Cayer water in the limestone and dolostone aquifer is salty and not suitable for potable

water supply. Since the limestone aquifer underlies also the areas where the usual aquifers used for water are lenses of sand and gravel, at locations where the sand and gravel deposits do not exist one can drill deeper to the limestone and dolostone aquifer, except in areas where water in it is salty.

The yield of domestic and farm wells completed in the limestone and dolostone aquifer usually is more than 0.5 L/s (7 GPM) and often more than 1.0 L/s (13 GPM).

Because at some locations, e.g., the buried bedrock valley area near the southwest corner, the depth to the limestone and dolostone formations may be more than 75 m (250 ft.) fairly deep wells may be required to reach the aquifer.

The shale, limestone and gypsum beds that overlie the limestone and dolostone formations may contain minor limestone aquifers. The yield of these aquifers is likely to be low and the water quality poor. Very few wells in the district draw water from these aquifers.

4.1.4. Shale and Gypsum Aquifers

A few wells in the District draw water from the shale and gypsum beds. Indications are that the yields are low and quality very poor. It appears that these aquifers are used only in places where sand and gravel aquifers do not exist and water in the extensive limestone and dolostone aquifer that underlies the shale and gypsum beds is salty. Because, in general, water quality in the shale and gypsum aquifers is not satisfactory for use and the occurance of acceptable water in these rocks is very spotty and irregular, the gypsum beds are not indicated as aquifers on the aquifer map.

4.1.5. Very Deep Aquifers

The base of the limestone and dolostone formations in the District is at about 425 m (1400 ft.) below ground level and they are underlain by a sandstone and shale beds. Thus it is very likely that

water bearing zones exist in the limestone and dolostone beds at considerable depth. The sandstone beds no doubt are water bearing. Because groundwater in the District is available in water bearing zones in the upper part of the bedrock and in aquifers within the surficial deposits and water in the very deep aquifer is salty, the very deep aquifers are not likely to be used for water supply.

4.1.6. Groundwater Problem Areas

In several areas of the District a satisfactory supply of groundwater is very difficult or impossible to find. The problems in these areas are caused mainly be unacceptable groundwater quality. The groundwater problem areas are indicated on the aquifer map in Figure 5.

The most extensive groundwater problem area is the southeast corner of the District. In this area groundwater quality seems to be strongly affected by the gypsum beds in the bedrock, high gypsum content in the till and the regional groundwater flow system. The dissolved gypsum has caused very high sulphate and hardness in shallow aquifers and the regional flow of salty water has intruded the limestone and dolostone aquifer that underlies the shale, gypsum and limestone beds. (Figure 1) Consequently, almost the only potable water aquifers in this area are very shallow sand and gravel aquifers formed by sand and gravel beach deposits. Since the saturated thickness of these aquifers is minimal, they often dry up during the winter or during periods of drought.

The other groundwater problem areas are around Ebb-and-Flow Lake and in the vicinity of Cayer. In these areas the deep salty water flow system has intruded the upper part of the bedrock and the sand and gravel deposits above the bedrock. Thus, in these areas, water even in shallow wells may be salty and fresh water may be difficult or impossible to find at some locations.

In addition to the above areas, which are indicated by the available information, other groundwater problem areas may exist in a 5 km - 10 km wide belt along the shore of Lake Manitoba because the salty water zone is not too far below ground level.

4.2. Groundwater Flow Systems

Groundwater constitutes the underground component of the water that flows through the District. Part of the groundwater that flows through the District originates as precipitation outside the District and enters it as subsurface inflow. The groundwater flow that may have originated up to hundreds of kilometers west of the District is called the regional flow system. The flow systems that originate within the District and, in some places, just outside it are called local flow systems; in areal extent they may cover a large part of the District or less than one square kilometre. The main trends of groundwater flow systems through the District are indicated in the block diagram Figure 1. In general, the flow is toward Lake Manitoba.

Because groundwater dissolves the minerals of the strata through which it flows, the water that arrives in the District after travelling long distances is considerably more mineralized than the groundwater of the local flow systems. In the Alonsa District groundwater in the regional flow system is salty and it is the source of the salty groundwater in the District.

The local flow systems originate in sandy and gravelly areas and in the slightly elevated parts of the District. Because groundwater in most of the local flow systems has travelled through the subsoil only a short distance, it usually is fresh.

The flow systems have strong influence on groundwater quality in the District; in places or depth zones where the local flow systems dominate it generally is fresh and where the regional flow system is dominant it is salty. In some places, the waters of the two systems merge and mix. In these areas groundwater is likely to be of poor

quality and the quality may vary considerably from place to place or with depth below ground level.

In the western and central parts of the District, the local flow systems dominate in the sand and gravel aquifers and in the upper water bearing zones in the bedrock and the regional flow system dominates in deep water bearing zones in the bedrock. The regional flow system has intruded shallow aquifers in the southeastern corner of the District and in some places along Lake Manitoba. Mixing and merging of the two flow systems seem to be common along Lake Manitoba and Ebb and Flow Lake. Thus, in general, groundwater quality is better in the western and central parts of the District than along the eastern boundary.

It should be noted that the groundwater flow systems that exist in the District are interacting and that the conditions that exist are in a dynamic equilibrium. The equilibrium in some places could be sensitive to slight changes in the flow system such as decreased recharge or increased discharge. Consequently artificially changing groundwater conditions may result in noticeable change in the quality and, less likely, the quantity of groundwater in some parts of the District. Because the local flow systems originate as infiltration from precipitation, changing the existing drainage may cause changes in groundwater quality; depending on local conditions it may be beneficial or detrimental, e.g., improved drainage could cause a reduction in recharge that could result in deterioration of groundwater quality.

4.3. Recharge

In the discussion of the groundwater flow systems in the District it was indicated that the fresh or potable groundwater flow systems originate as precipitation that infiltrates the soil within

the District. Hence, the fresh groundwater supply in the District to a large extent depends on the infiltration of precipitation or aquifer recharge from precipitation.

Under normal conditions groundwater recharge in Manitoba is mainly from snowmelt and early spring rains. Precipitation during the summer usually is returned to the atmosphere by evapotranspuration before it can contribute to the recharge of the aquifers.

Because recharge conditions appear to be good in the southwestern part of the District and fairly good in extensive areas in the District and adjacent areas that are likely to contribute to the local groundwater flow systems, it is reasonably safe to assume that the total recharge area is equal to about one half of the District or about 1300 km^2. Groundwater recharge on the Prairies may range from less than one to 7.5 percent of the total annual precipitation (Mayboom, 1966). For a conservative estimate of the annual groundwater recharge for the District it is assumed that recharge is about one percent of the annual precipitation or 0.005 m (0.02 ft.) of water over the recharge area. The total yearly recharge then is 6.5×10^6 m^3 (5265 acre-feet). It is equal to a sustained pumping rate of 206 L/s (2750 IGPM)

4.4. Sustained Yield

The sustained yield of the fresh water aquifers or the pumping rate at which they could be pumped indefinately, cannot exceed the rate of recharge of the local flow systems. Because of natural discharge the sustained yield usually is considerably less than the recharge. Hence, the total sustained yield of all fresh water aquifers in the District is at the most 206 L/s (2750 IGPM).

Large quantities of unpotable water are available from the deep aquifers which do not depend on the local recharge.

4.5. Well Yield

The yield of wells drawing water from the fresh water aquifers in the District generally is more than 0.5 L/s (7 IGPM) and is adequate for domestic and farm requirements.

The yield of properly designed high capacity wells in the limestone and dolostone aquifers and in some of the more extensive and thicker sand and gravel aquifers may be in the 50 to 100 L/s range (650 to 1300 IGPM). Conditions favourable for high capacity wells may not exist at all locations in the District and, therefore, it cannot be assumed without adequate test drilling that high yields could be obtained at a particular location.

In general, well yield is not likely to be the limiting factor in respect to water supply in the District; most of water supply problems are likely to be related to water quality.

4.6. Quality

Groundwater quality in the District ranges from excellent to unpotable very salty water. (The terms used for quality descriptions are defined in Appendix "A"). In general, the quality is better in the central and western parts of the District than in the area along Lake Manitoba. Water quality at various locations and depth zones is indicated by the water analyses in Table 1.

In most of the District groundwater is potable in sand and gravel aquifers above the bedrock and in the upper part of the bedrock and salty in deepar water bearing zones in the bedrock as indicated in Figure 1.

In the vicinity of Amaranth and south of there groundwater is poor quality or salty even in fairly shallow aquifers. In this area almost the only fresh water aquifers are shallow sand and gravel deposits at surface. The area where these conditions exist is shown as ground-

water problem area on the aquifer map (Figure 4).

Salty water has been reported in some wells in the Cayer area in the northern part of the District and in the Ebb-and-Flow Lake area.

The presence of salty water in the shallowest aquifers of an area indicates that the deep salty water flow system (Figure 1) has an upward trend and has intruded shallow aquifers. Consequently, if drilling a well the first water encountered is salty, there is no reason to expect fresh water in deeper water bearing zones.

In the southern part of the District where the Jurassic formations of the bedrock contain gypsum beds, water in the bedrock aquifers and deeper sand and gravel aquifers commonly has very high sulphate ion concentrations and is also very hard. This type of water generally is not acceptable for domestic use or for livestock.

The best quality groundwater in the District is reported in the southwest corner where in some wells it is of excellent quality.

4.7. Availability

The availability of groundwater in an area depends on the kind of aquifers and water quality that exist there. Hence the aquifer map in Figure 5 can be used to indicate groundwater availability in the District.

Groundwater in the District is readily available in the northwestern corner of the District and along Lake Manitoba where the main aquifer is formed by limestone and dolostone bedrock. Because this aquifer is continuous throughout the indicated area, adequate supply for domestic and farm requirements should be available at any point.

In the sand and gravel aquifer areas (Figure 5) the aquifers, which are the shallowest aquifers, may not exist at every point. The

limestone and dolostone aquifer, however, underlies the sand and gravel aquifer area throughout the District. Consequently, at locations where the sand and gravel aquifers do not exist, water could be obtained from the deeper limestone and dolostone aquifer, if quality is acceptable. Thus in the western and central parts of the District, where water in the upper part of the bedrock aquifers generally is fresh, potable groundwater should be available at any location, although at some locations fairly deep wells may be required. Groundwater in sand and gravel aquifer areas along Lake Manitoba may not be as readily available as west of there, because water in the limestone and dolostone aquifer can be salty and, therefore, the only source of fresh water could be the sand and gravel aquifers. Because the latter are not continuous over the whole sand and gravel aquifer area, adequate supply may not be available at every point where it is required.

Although the limestone and dolostone bedrock, which forms an extensive water bearing zone (Figure 1) underlies the whole District, fresh groundwater is not available or is difficult to find in some parts of the District because the deep salty water flow system has intruded the upper part of the bedrock and the sand and gravel aquifers above it. These conditions exist in the southeastern corner of the District and other areas shown as groundwater problem areas on the aquifer map (Figure 5). Indications are that salty water is likely to cause groundwater supply problems in the Ebb-and-Flow Lake area, in the vicinity of Cayer and probably at other locations along the shore of Lake Manitoba.

Indications are that at some locations transmissivity of the limestone and dolostone aquifer is high and conditions are favourable for high capacity wells. Some of the sand and gravel aquifers also are likely to be suitable for high capacity wells. Thus it is reasonably certain that groundwater for municipal and industrial requirements is available in some parts of the District.

In general, the limiting factor of availability of groundwater in the District is water quality and not the lack of aquifers.

4.8. Present Consumptive Use

Groundwater in the District is used only for domestic and farm supply. Water supply in towns, villages and settlements is from individual private wells. No irrigation or industrial groundwater users have been licenced in the District.

The total population in the District is 2476 (Statistics Canada, 1976 census). Assuming a water consumption of 250 litres per person per day, which is about average according to water consumption statistics for small towns, the total consumption for domestic requirements then is approximately 619 m^3/d (cubic metres per day).

The approximate daily water consumption by livestock is as follows:

Cattle, feeders	741 m^3	(54L x 13716)
Cattle, dairy	61 m^3	(135L x 454)
Pigs and sows	88 m^3	(18L x 4874)
Poultry	3 m^3	(0.5 L x 6247)
Total daily consumption	893 m^3	(198,000 gallons per day)

As some of the livestock likely use surface water it is assumed that the groundwater consumption by livestock is at the most 850 m^3/d (189,000 gallons per day).

The total estimated consumptive use of groundwater in the District is:

Domestic	619 m^3/d	
Livestock	850 m^3/d	
Total	1469 m^3/d	(326,444 gallons per day).

Expressed as sustained pumping rate the consumption is 17 L/s (227 IGPM). The total yearly consumptive use of groundwater is about one half million cubic metres (434 acre-feet).

The above estimates indicate that less than one tenth of the total available groundwater supply of some 6 million cubic metres per year is used.

4.9. Flowing Well and High Groundwater Level Areas

Fairly extensive flowing well and high groundwater level areas exist along the shores of Lake Manitoba, Ebb-and-Flow Lake and other lakes in the District as indicated in Figure 6. In these areas groundwater level is from less than 2 m below ground level to a few metres above ground level. The flowing and high water level wells can cause a number of problems, if they are not properly designed and constructed. Flowing and high water level wells should be designed so that flow from them can be controlled and, in the case of the high water level wells, there is no flow or seepage outside the casing. The problems that may be caused by flowing and high water level wells are discussed in Appendices "B" and "C" and the recommended basic well design is shown in Figure 7.

4.10. Pollution Hazard Areas

Groundwater pollution hazard in the District exists in areas where the limestone and dolostone rock or sand and gravel deposits are at or near ground surface. In these areas seepage from septic drain fields, leachates from waste disposal grounds and spilled toxic substances could readily percolate to the water bearing zone and cause groundwater pollution. The groundwater pollution hazard areas are indicated on the map in Figure 8.

Areas where sand and gravel deposits are at surface are classified as groundwater pollution hazard areas, because the deposits may contain aquifers. It is likely that some of these deposits or parts of them are dry and therefore no pollution hazard exists. The available information, however, is not adequate to differentiate surface sand and gravel that forms aquifers from dry deposits. Consequently, all surface sand and gravel areas have been classified as pollution hazard areas. Which of these deposits are dry and which form aquifers can be determined only by detailed field investigation.

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APPENDIX "A"

GROUNDWATER QUALITY DESCRIPTION

To describe groundwater quality the terms excellent, good, fair, poor and combinations and modifications of them are used in this report. Unless other uses are specified these terms indicate how acceptable the water is for domestic use. The quality description is based on the total dissolved solids, the concentration of the common ions that affect quality, hardness, appearance, taste and odour of the water.

The meaning of the terms used for groundwater quality description is as follows:

1. Excellent: The water has no objectionable properties and treatment of it to improve quality is not necessary; the total dissolved solids concentration is less than 500 mg/L and hardness less than 250 mg/L.
2. Good: The water has higher mineral concentration than the excellent water and is rated less than excellent mainly because of higher hardness; the total dissolved solids concentration ranges from 500 to 100 mg/L and hardness is from 250 to 500 mg/L. The hardness is likely to cause incrustation of kitchen utensils. The water can be used without treatment or, if desired, the hardness can be readily reduced.
3. Fair: The water has one or more objectionable properties and fairly commonly may require treatment to improve quality. The most common undesirable property is high hardness; it ranges from 500 to 1000 mg/L. The hardness can be reduced to acceptable level with conventional water softeners. The water may have high enough sulphate, iron and chloride ion concentrations to slightly impair its taste or, in the case of sulphate, have a laxative effect on persons not used to it. The

total dissolved solids of the water is from 1000 to 2000 mg/L.

4. Poor: The water has one or more serious undesirable properties and it is difficult to impossible to improve the water quality by conventional water treatment. The water commonly is very hard (more than 1000 mg/L) and it may be difficult (also expensive) or impratcial to reduce the hardness with conventional water softeners. The water may also have a very high sulphate ion concentration (500 to 2500 mg/L). In some places the water may be rated as poor quality because of high sodium chloride (salt) concentration, which makes it taste salty. The water may be also less than desirable in appearance and may have unpleasant odour.
5. Very Poor: The undesirable properties of the water are just below a tolerable maximum limit.

APPENDIX "B"

FLOWING WELLS

Numerous flowing well areas exist in Manitoba. In the flowing well areas the water level in most wells rises above ground level and in others it is near ground level. Some of the wells may flow when groundwater levels are high and stop flowing during periods of low levels.

Uncontrolled discharge from flowing wells may cause some of the following problems:

1. Icing up of drains, that, in turn, results in ice covered roads and flooding during spring runoff;
2. Damage to roads, bridges and drains;
3. Damp basements;
4. Damage to buildings due to excessive soil moisture or ice;
5. Wet and swampy yards and fields;
6. Flooding of septic tank drain fields.

In view that the above problems caused by uncontrolled flowing wells are likely to affect the well owner, his neighbours and public property in the vicinity, wells in flowing well areas should be constructed so that discharge can be controlled.

The discharge from flowing wells can be brought under control by proper well construction. A basic design for controlled flowing wells is shown in Figure 7.

APPENDIX "C"

HIGH WATER LEVEL WELLS

High water level wells are defined as wells where the water level is below ground level but above or near the basement floor level.

If high water level wells are not properly designed they may cause problems similar to some of those caused by flowing wells, such as:

1. Damp basements,
2. Flooding of septic tank drain fields,
3. Unnecessary pumping from sumps,
4. Damage to foundations and basement floors.

The problems are caused by water seeping or flowing up outside the well casing and then flowing through the backfill of water pipe excavations towards the building. If well pits are used to make connections between the well and the water pipe these problems may be caused by water flowing from the well into the pit and thence to the basement.

To prevent the above problems wells in high groundwater level areas should be constructed in the same manner as controlled flowing wells. The basic design for high water level wells is shown in Figure 7.

TABLE 1 WATER QUALITY

LOCATION	AQUIFER*	ZONE SAMPLED METRES	CATIONS MG/L			ANIONS MG/L			HARDN. CACO3 MG/L	DISS. SOLIDS MG/L
			CA	MG	NA+K	HCO3	SO4	CL		
SW06-19-09W	S.G.	13-14	452	172	190	250	1820	69	1840	3112
SW06-19-09W	SS+SH	19-22	464	150	214	292	1820	72	1780	3290
SW06-19-09W	LST-SH	39-24	464	131	702	244	2200	490	1700	4486
NE06-19-09W	S.G.	15-	208	383	483	793	1000	345	2100	4174
NW07-19-09W	LST+SS	42-58	309	134	606	182	1815	457	1325	3700
NE01-19-10W	S.G.	13-	104	116	118	414	460	64	740	1200
NE01-19-10W	LST+SS	57-58	448	155	1639	204	2395	1820	1758	6923
01-19-10W	LST+SH	44-73	554	127	1287	187	2272	1357	1911	5958
SE02-19-10W	S.G.	-23	139	39	36	375	150	43	510	750
SE06-19-10W	S.G.	42-45	488	121	254	250	1825	117	1720	3212
SE06-19-10W	LST+SH	77-80	456	121	2210	237	3150	2100	1640	7916
NW12-19-10W	S.G.	17-	568	189	115	766	1550	127	2200	3478
SE23-20-10W	LST	27-30	216	73	112	390	675	18	840	1296
NW31-20-10W	LST	35-38	424	136	430	152	2180	43	1620	3492
NE07-21-11W	S.G.	30-34	100	102	179	393	208	310	670	1532
NE36-20-12W	S.G.	13-16	568	133	196	305	1950	35	1970	3138
NE36-20-12W	LST	54-57	197	84	173	384	790	26	840	1592
SE01-21-12W	S.G.	13-15	86	283	74	774	530	142	1380	2212
SE02-21-12W	S.G.	41-43	98	69	87	261	450	15	530	928
NE12-21-12W	S.G.	29-30	328	121	462	250	1920	37	1320	3206
NE01-26-12W	S.G.	-	66	44	517	150	203	761	349	1691
SW18-26-12W	S.G.	24-	39	40	130	140	207	149	261	677
NE28-26-12W	S.G.	-	52	46	202	227	150	292	318	888
NW33-26-12W	S.G.	-	90	72	715	172	296	1160	523	2696
NW16-27-12W	S.G.	-	393	165	2358	134	1164	3860	1661	8218
NE30-27-12W	S.G.	21-	380	165	2152	123	1110	3416	1631	7581
SW34-20-13W	S.G.	-40	30	22	77	320	40	17	165	382
SE01-21-13W	S.G.	60-63	28	15	124	283	62	49	132	458
SE01-21-13W	LST	85-88	16	7	222	457	90	44	70	622
SW06-21-13W	S.G.	16-20	46	35	50	361	37	19	256	452
SW06-21-13W	SH	39-42	10	7	473	895	14	220	56	1264
SW06-21-13W	SS	55-58	226	62	2093	470	3200	1220	820	7 66
SW06-21-13W	LST	98-101	936	233	7742	181	1915	12950	3300	24764

* S.G.- SAND AND GRAVEL, SH-SHALE, SS-SANDSTONE, LST-LIMESTONE

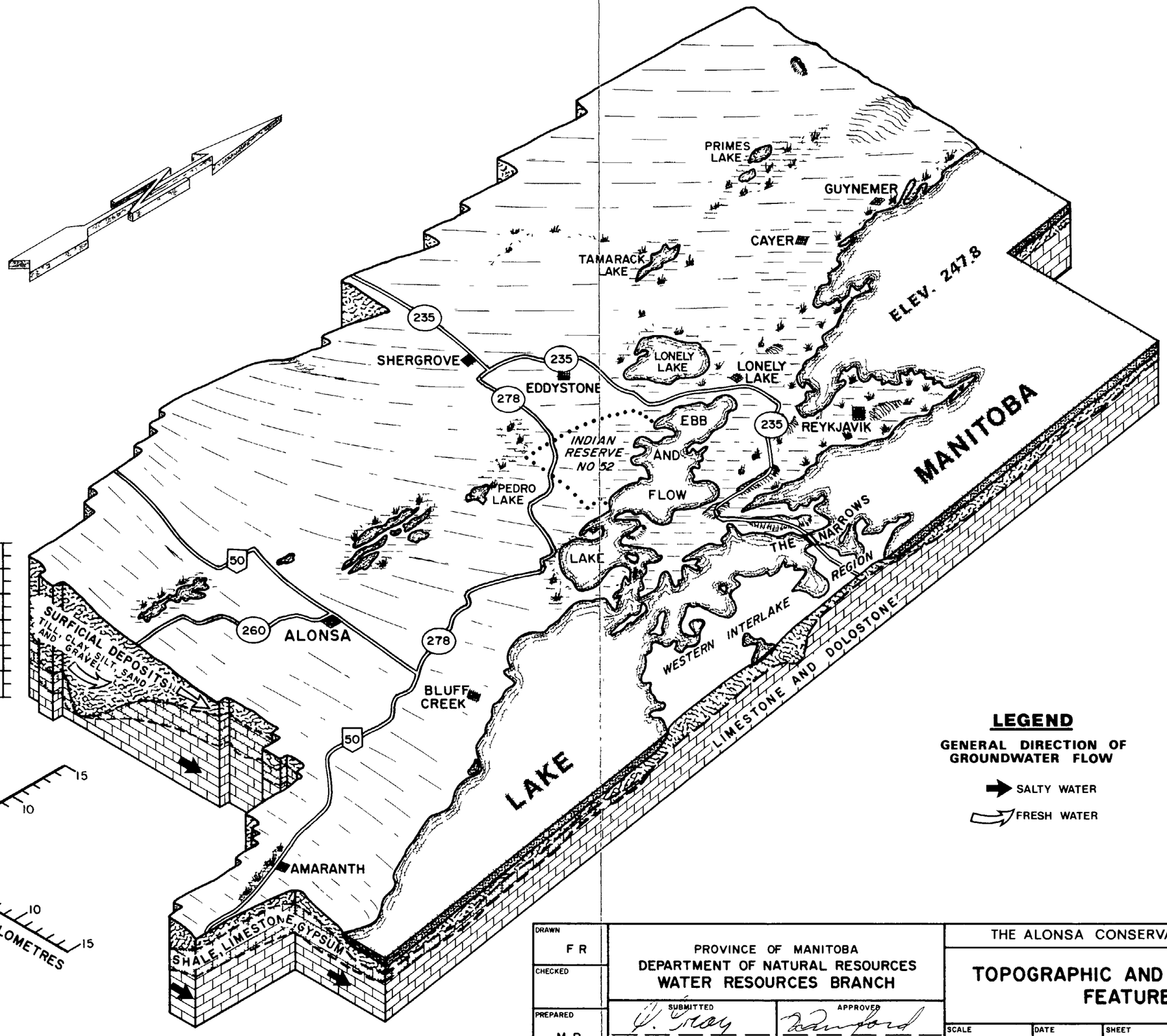


FIGURE 1

DRAWN: F R CHECKED: PREPARED: M R	PROVINCE OF MANITOBA DEPARTMENT OF NATURAL RESOURCES WATER RESOURCES BRANCH SUBMITTED: W. Gray — HEAD GROUNDWATER SECTION APPROVED: — CHIEF WATER INVESTIGATIONS	THE ALONSA CONSERVATION DISTRICT **TOPOGRAPHIC AND SUBSURFACE FEATURES** SCALE: AS SHOWN · DATE: 80 11 07 · SHEET: 1 OF 8 · FILE NO: 80-1-7-1032

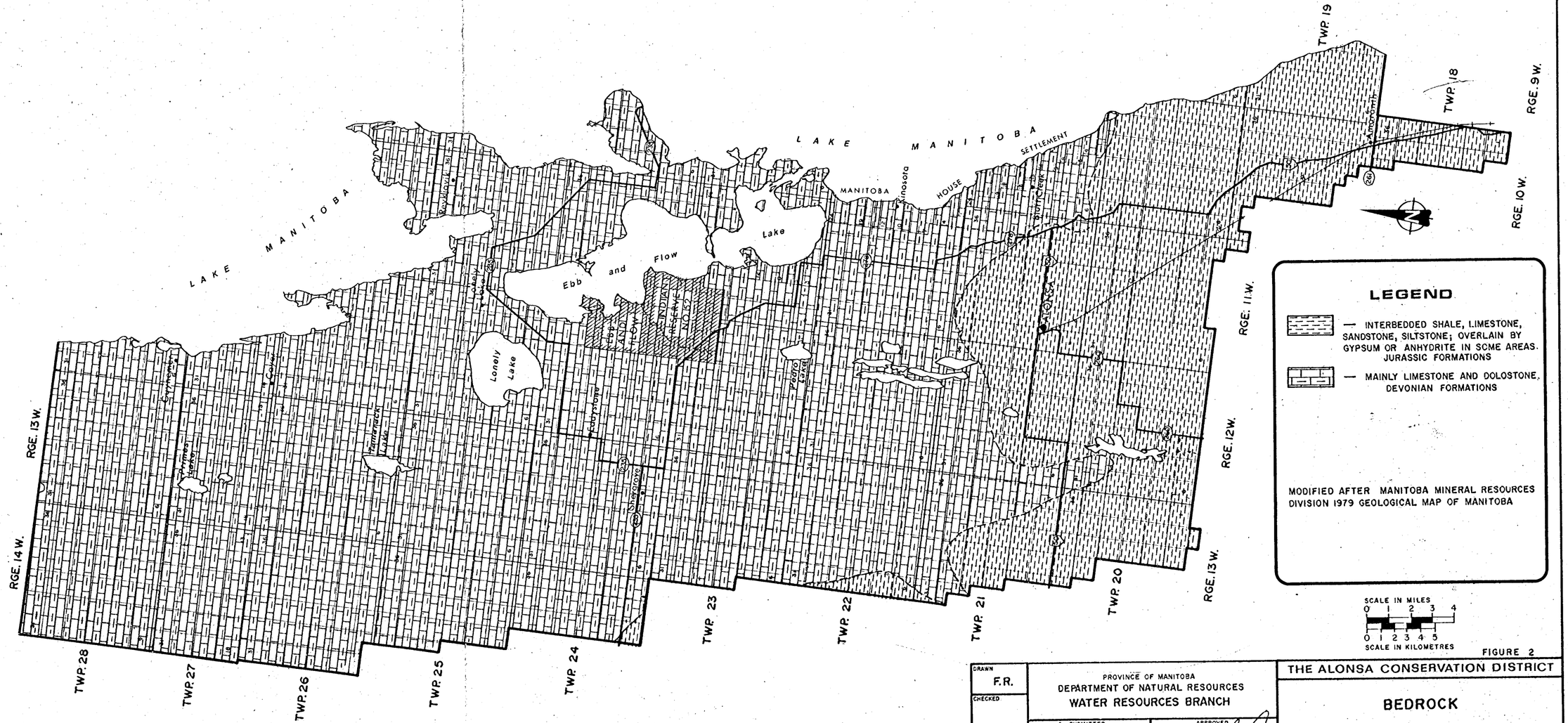


FIGURE 2

DRAWN F.R.	PROVINCE OF MANITOBA DEPARTMENT OF NATURAL RESOURCES WATER RESOURCES BRANCH		THE ALONSA CONSERVATION DISTRICT
CHECKED			BEDROCK
PREPARED M.R.	SUBMITTED HEAD, GROUNDWATER SECTION	APPROVED CHIEF, WATER INVESTIGATIONS	SCALE AS SHOWN · DATE 80 11 07 · SHEET 2 OF 8 · FILE NO. 80-1-7-1032

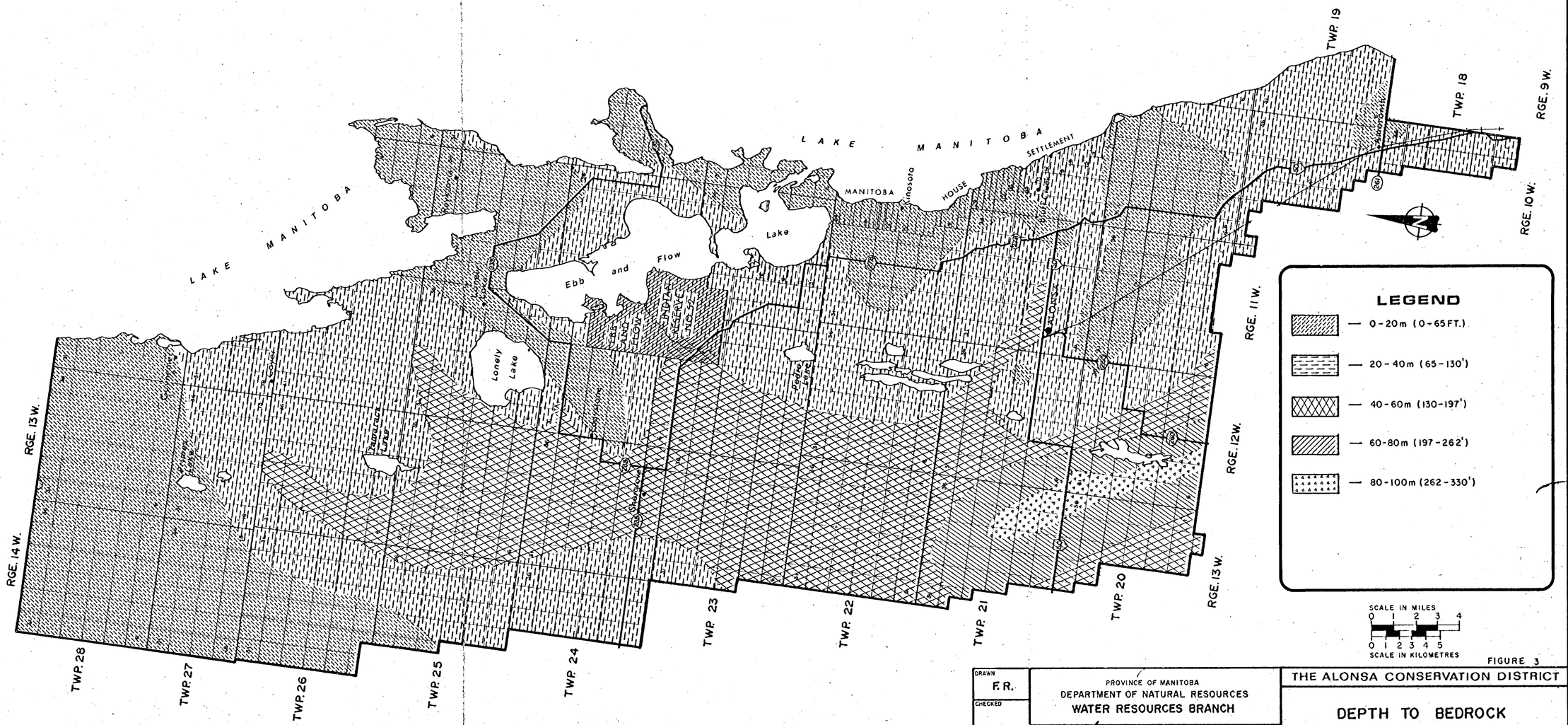


FIGURE 3

DRAWN F.R.	PROVINCE OF MANITOBA DEPARTMENT OF NATURAL RESOURCES WATER RESOURCES BRANCH	THE ALONSA CONSERVATION DISTRICT
CHECKED		DEPTH TO BEDROCK
PREPARED M.R.	SUBMITTED: HEAD, GROUNDWATER SECTION — APPROVED: CHIEF, WATER INVESTIGATIONS	SCALE AS SHOWN · DATE 80 11 07 · SHEET 3 OF 8 · FILE NO. 80-1-7-1032

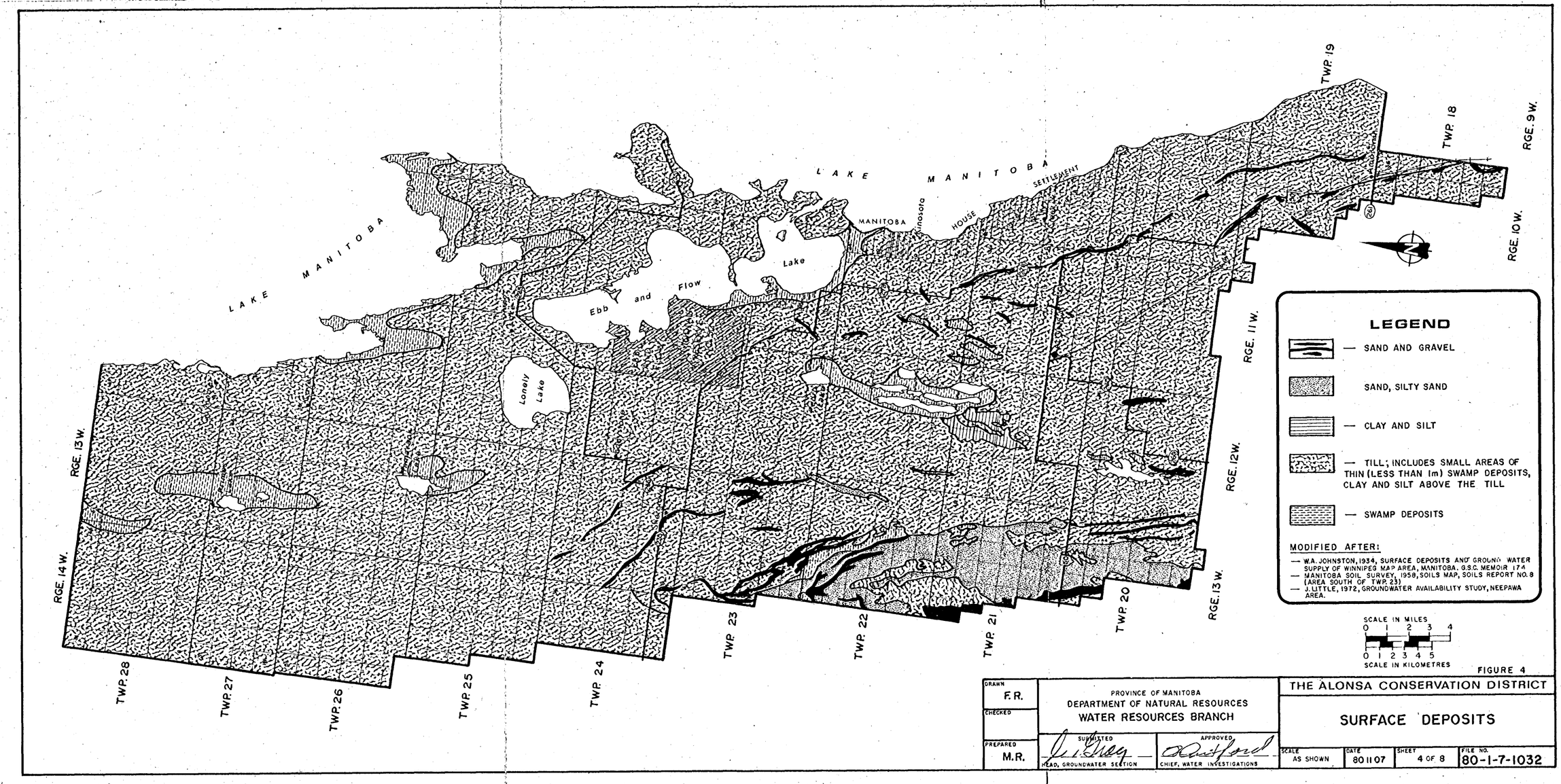
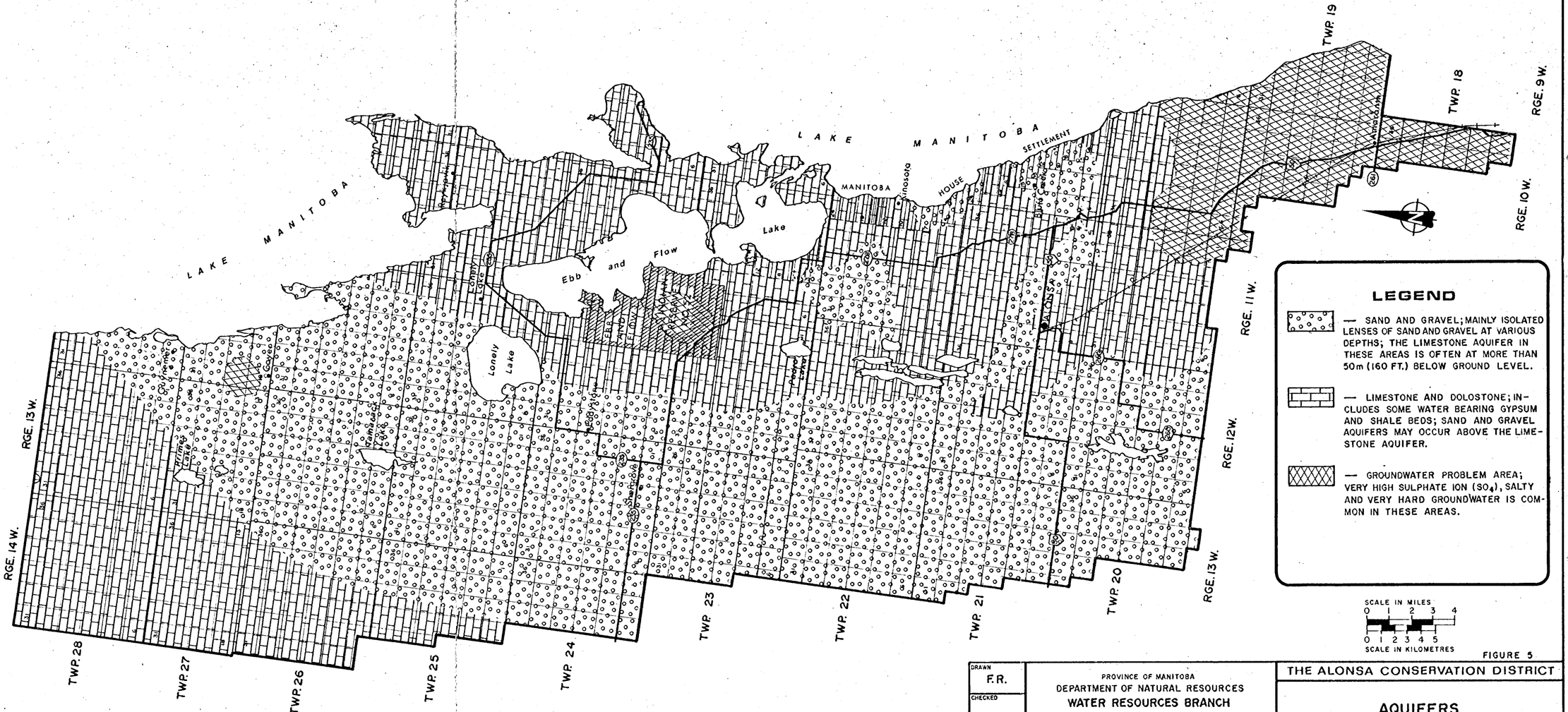


FIGURE 4

DRAWN F.R.	PROVINCE OF MANITOBA DEPARTMENT OF NATURAL RESOURCES WATER RESOURCES BRANCH	THE ALONSA CONSERVATION DISTRICT
CHECKED		SURFACE DEPOSITS
PREPARED M.R.	SUBMITTED _____ HEAD, GROUNDWATER SECTION APPROVED _____ CHIEF, WATER INVESTIGATIONS	SCALE AS SHOWN · DATE 80 11 07 · SHEET 4 OF 8 · FILE NO. 80-1-7-1032



LEGEND

— SAND AND GRAVEL; MAINLY ISOLATED LENSES OF SAND AND GRAVEL AT VARIOUS DEPTHS; THE LIMESTONE AQUIFER IN THESE AREAS IS OFTEN AT MORE THAN 50m (160 FT.) BELOW GROUND LEVEL.

— LIMESTONE AND DOLOSTONE; INCLUDES SOME WATER BEARING GYPSUM AND SHALE BEDS; SAND AND GRAVEL AQUIFERS MAY OCCUR ABOVE THE LIMESTONE AQUIFER.

— GROUNDWATER PROBLEM AREA; VERY HIGH SULPHATE ION (SO_4), SALTY AND VERY HARD GROUNDWATER IS COMMON IN THESE AREAS.

SCALE IN MILES 0 1 2 3 4

SCALE IN KILOMETRES 0 1 2 3 4 5

FIGURE 5

DRAWN F.R.	PROVINCE OF MANITOBA	THE ALONSA CONSERVATION DISTRICT
CHECKED	DEPARTMENT OF NATURAL RESOURCES	
PREPARED M.R.	WATER RESOURCES BRANCH	AQUIFERS
SUBMITTED HEAD, GROUNDWATER SECTION	APPROVED CHIEF, WATER INVESTIGATIONS	SCALE AS SHOWN · DATE 80 11 07 · SHEET 5 OF 8 · FILE NO. 80-1-7-1032

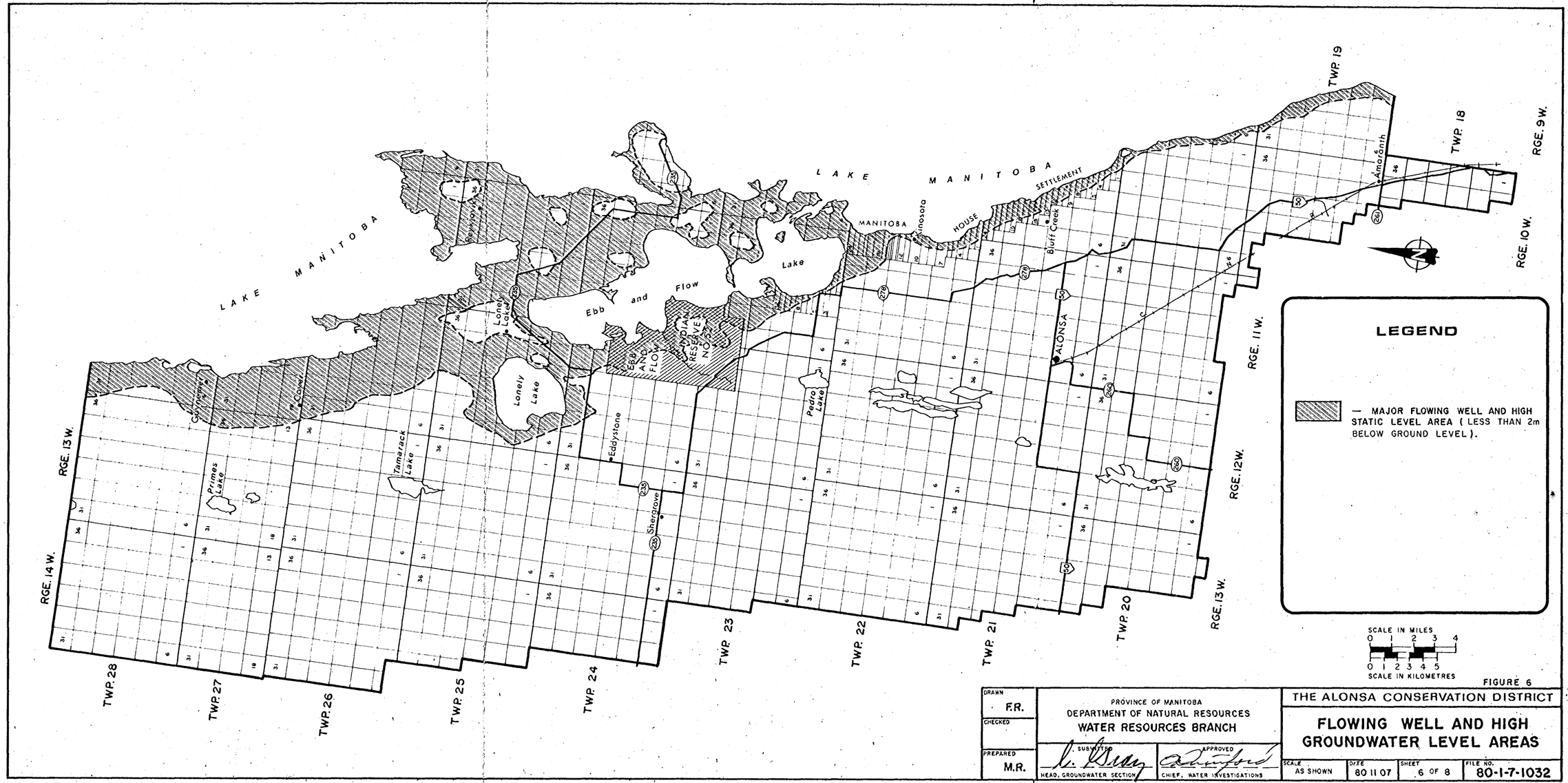
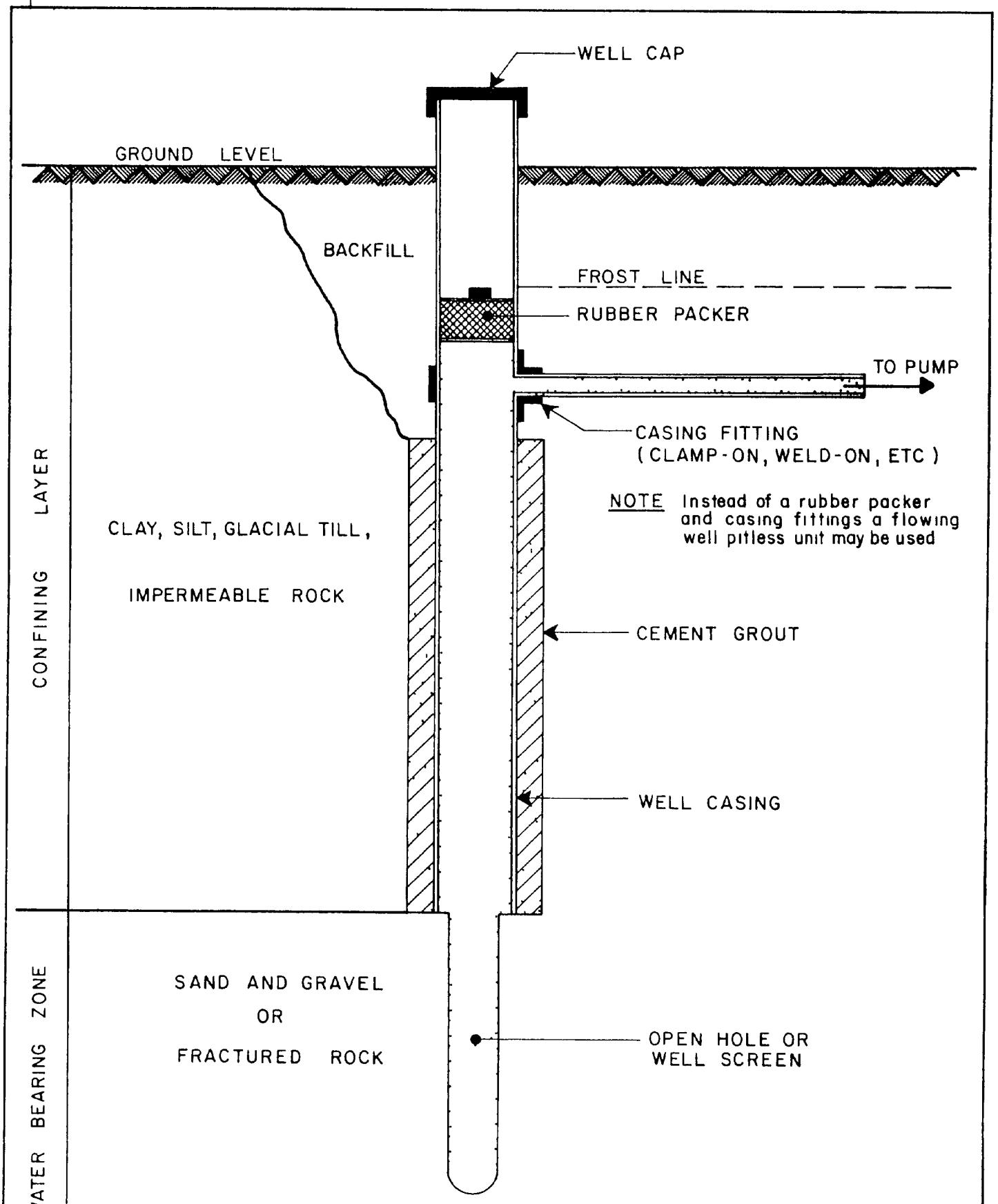


FIGURE 6

DRAWN F.R.	PROVINCE OF MANITOBA DEPARTMENT OF NATURAL RESOURCES WATER RESOURCES BRANCH	THE ALONSA CONSERVATION DISTRICT
CHECKED		FLOWING WELL AND HIGH GROUNDWATER LEVEL AREAS
PREPARED M.R.	SUBMITTED: HEAD, GROUNDWATER SECTION — APPROVED: CHIEF, WATER INVESTIGATIONS	SCALE AS SHOWN · DATE 80 11 07 · SHEET 6 OF 8 · FILE NO. 80-1-7-1032

80/13



NOTE This design is also advisable in places where the water level is below ground level but above or near basement floor level

FIGURE 7

PROVINCE OF MANITOBA
DEPARTMENT OF NATURAL RESOURCES
WATER RESOURCES BRANCH

THE ALONSA CONSERVATION DISTRICT

BASIC WELL DESIGN FOR CONTROLLED FLOWING WELLS

PREPARED	DRAWN	SUBMITTED	APPROVED	SCALE	DATE	SHEET	FILE NO
M R	FR	L. Gray		N T S	80 11 07	7 OF 8	80-1-7-1032
	CHECKED						

APPENDIX 5
WILDLIFE

PROVINCE OF MANITOBA
DEPARTMENT OF NATURAL RESOURCES
WILDLIFE BRANCH

WILDLIFE
IN THE
ALONSA CONSERVATION DISTRICT

November, 1981

Prepared by:
Dwain Davies
Regional Wildlife Specialist

SYNOPSIS

A land use plan for the Legal Government District of Alonsa is being developed, which will allow for agricultural expansion and wildlife habitat development.

Deer are found throughout the District and are the only big game species available in the area. The existing Alonsa Wildlife Management Area with a deer density of 12.3 deer per square mile, and the proposed Westlake Wildlife Management Area and North Cayer Wildlife Management Area with deer densities of 15.6 and 5.0 per square mile are the priority deer wintering areas. To protect these major deer wintering areas the proposed Wildlife Management Areas should be established by Order in Council.

Upland game birds, both sharp-tailed and ruffed grouse are found throughout the District. One of the most important areas for sharp-tailed grouse is in the Alonsa Wildlife Management Area.

The Giant Canada Goose became re-established as a nesting species in the Reykjavik area in the mid-fifties. This population has grown steadily and in 1980 production totalled 667 goslings. These birds have been expanding their nesting range and the total population of birds is estimated at 1,000 to 2,000. Several small marshes and island complexes have been identified as goose nesting areas. To allow the Canada Goose population to increase, recommendations have been made to establish additional refuges and protect nesting cover on islands.

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No.

1. INTRODUCTION

1.1 General

The Alonsa Conservation District has an abundance of wildlife habitat. This unique situation within southern Manitoba will allow for orderly development of land which will accommodate all resources. Existing land, for which a land use plan is being developed, is mainly owned by the Crown and the Local Government District (LGD) of Alonsa. The land use plan will provide for agricultural and wildlife habitat development.

2. WHITE-TAILED DEER

Deer are found throughout the District and are the only big game species available in the area. They are an important resource for both residents and non-residents of the area and provide an important food source for local Treaty Indians.

Although the deer are dispersed throughout the District most of the year, heavy concentrations occur in the traditional wintering areas. Aerial surveys in recent years have identified the areas of major winter concentrations. Deer densities throughout the District are indicated on Figure 1 with the existing and proposed wildlife management areas identified as high and medium deer density and the remainder of the area as medium and low deer density. Table I shows a comparison between deer densities within the existing Alonsa Wildlife Management Area (WMA) and the land adjacent to the Alonsa WMA in the LGD of Alonsa.

TABLE 1

DEER SURVEY
IN AND ADJACENT TO THE
ALONSA WILDLIFE MANAGEMENT AREA

	Alonsa WMA					Land Adjacent to the Alonsa WMA				
Year	Area (Sq. mi.)	Coverage (Percent)	Deer Counted	Estimated Population	Deer* Density	Area (Sq. mi.)	Coverage (Percent)	Deer Counted	Estimated Population	Deer Density*
1974	40.5	50	66	132	3.3	167.5	50	135	270	1.6
1975	40.5	50	69	138	3.4	193.5	50	178	356	1.8
1976	40.5	20	95	475	11.7					
1978	40.5	20	84	420	10.4					
1979	40.5	20	100	500	12.3	525.5	20	383	1915	3.7

* deer density is the number of deer per square mile

Deer densities have increased steadily since 1974. In 1979, the deer density within the Alonsa WMA was estimated to be approximately three times greater than on the adjacent land in the LGD of Alonsa.

The proposed Westlake and North Cayer wildlife management areas have stands of poplar which provide winter cover for the deer. Deer are attracted to these areas because of the cover and existing land use. These proposed wildlife management areas have had little or no grazing pressure but are used for hay production. Land within the proposed wildlife management areas is owned by the Crown and the LGD of Alonsa.

A comparison between deer densities within the proposed Westlake WMA and the surrounding area is shown in Table 2.

TABLE 2

DEER SURVEY
IN AND ADJACENT TO THE
PROPOSED WESTLAKE WILDLIFE MANAGEMENT AREA

	Proposed Westlake WMA					Land Adjacent to the Proposed Westlake WMA				
Year	Area (Sq. mi.)	Coverage (Percent)	Deer Counted	Estimated Population	Deer* Density	Area (Sq. mi.)	Coverage (percent)	Deer Counted	Estimated Population	Deer* Density
1974	24.5	50	30	60	2.4	573.5	50	175	350	0.6
1975	24.5	50	24	48	2.0	558.5	50	110	220	0.4
1976	24.5	33	77	233	9.4	588.5	33	195	591	1.0
1977	24.5	33	88	267	10.8	588.5	33	259	785	1.3
1978	24.5	41	157	383	15.6	588.5	41	326	795	1.4

* deer density is the number of deer per square mile

In 1978 the deer density within the proposed Westlake WMA was estimated to be approximately eleven times greater than on the surrounding area.

Deer densities within the proposed North Cayer WMA are shown in Table 3.

TABLE 3

DEER SURVEY
OF THE
PROPOSED NORTH CAYER
WILDLIFE MANAGEMENT AREA

Year	Area (Sq. mi.)	Coverage (Percent)	Deer Counted	Estimated Population	Deer* Density
1974	6.0	50	4	8	1.3
1975	6.0	50	8	16	2.7
1976	6.0	33	3	9	1.5
1977	6.0	33	10	30	5.0
1978	6.0	10	1	10	1.7

* deer density is the number of deer per square mile

The proposed North Cayer WMA reached a maximum density of five deer per square mile in 1977 compared to a density of 1.3 deer per square mile (Table 2) in the surrounding area. The area adjacent to the proposed Westlake WMA was used for the comparison due to its close proximity to the proposed North Cayer WMA.

3. UPLAND GAME BIRDS

Ruffed and sharp-tailed grouse are found throughout the District. Ruffed Grouse are confined to the more heavily wooded poplar areas while sharp-tailed grouse are found in the grassland - shrub complexes and adjacent to farmland.

One of the most important sharp-tailed grouse areas is the Alonsa WMA. Spring dancing ground counts were carried out over a three year period (1976 to 1978). During this period, the number of dancing grounds found ranged from a low of 12 in 1977 to a high of 19 in 1976 with the total number of birds on the dancing grounds ranging from 182 to 222.

4. WATERFOWL

4.1 Ducks

All of the common species of ducks inhabit the available wetlands within the District. Good waterfowl habitat in the form of productive marshes and sloughs is limited. Production on most marshes is relatively low and therefore ducks as a species are not a significant resource in the area. In exceptionally wet years, considerably greater numbers of ducks are attracted to the area in the spring and during fall migration. On such years recreational hunting opportunity is greatly increased.

The more productive waterfowl areas are being evaluated by Ducks Unlimited. The location of existing and proposed Ducks Unlimited projects in the District is shown on Figure 2. Ducks Unlimited attempts to design its projects to the benefit of waterfowl and agriculture. Agricultural benefits occur by way of regulated water control providing flood protection benefits. Existing Ducks Unlimited projects known as Bluff Harbour, Johnson Lake and

Lussier are located in the vicinity of the town of Reykjavik. These projects are peripheral marshes along Lake Manitoba. Future projects under consideration are the Lonely Lake, Mary Lake, Alonsa Community Pasture Marsh, Portia Complex (This area consists of eight basins including Jarvie and Pedro Lakes), Primes Lake and Tamarack Marsh projects. Ducks Unlimited plans to conduct preliminary investigations on Oliver Lake, Twist Lake, Sykes Lake, Micauber Lake, Martin Lake, Salt Lake and several peripheral marsh areas along Lake Manitoba.

Evaluation of other project areas and development of those areas with potential will continue within the District.

4.2 Geese

The Giant Canada Goose became re-established as a nesting species in the mid-fifties in the Reykjavik area. In 1966 a game bird refuge was established at Reykjavik when field studies identified a nesting population of at least 32 pairs. The breeding population at Reykjavik has been growing steadily since that time and in 1980, 667 goslings were produced from 163 nests. The Reykjavik goose flock having increased to a population of 1000 to 2000 birds has been expanding its nesting range in recent years.

Known nesting locations for geese within the Alonsa Conservation District which are shown on Figure 3 are Primes Lake, Tamarack Lake, Lonely Lake, Big Sandy Point, Jarvie Lake, Pedro Lake and Point Asham. Geese nest within the community pasture on the marsh in section 35-19-12W and on Mary Lake in 20-12W. Islands in Lake Manitoba adjacent to the LGD of Alonsa are important goose nesting habitat. Bjarnason, Redwillow, Hay and Ducharme islands along with several small unnamed islands south of the Narrows are important nesting habitat and should be protected. Cherry island, Skunk

island, islands in the bay north of Johnson Lake, and islands in the bay west of Point Asham north of the Narrows are important nesting islands for geese. Three major areas yet to be checked by field investigation to determine goose nesting are Ebb and Flow Lake, islands north of Point Asham in Lake Manitoba and Lake Manitoba shoreline north of Guynemer.

5. RECOMMENDATIONS

1. The proposed Westlake and North Cayer wildlife management areas should be established to ensure that these major deer wintering areas are protected.

2. Game bird refuge status should be considered for Pedro Lake and Jarvie Lake to provide protection for nesting Canada Geese to allow the population to increase.

3. Agricultural use of larger islands such as Bjarnason, Redwillow, Hay and Ducharme islands should be restricted to hay use only to allow for some protection of goose nesting cover on these islands.

TABLE 1

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IN AND ADJACENT TO THE
ALONSA WILDLIFE MANAGEMENT AREA

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* deer density is the number of deer per square mile

TABLE 2

DEER SURVEY
IN AND ADJACENT TO THE
PROPOSED WESTLAKE WILDLIFE MANAGEMENT AREA

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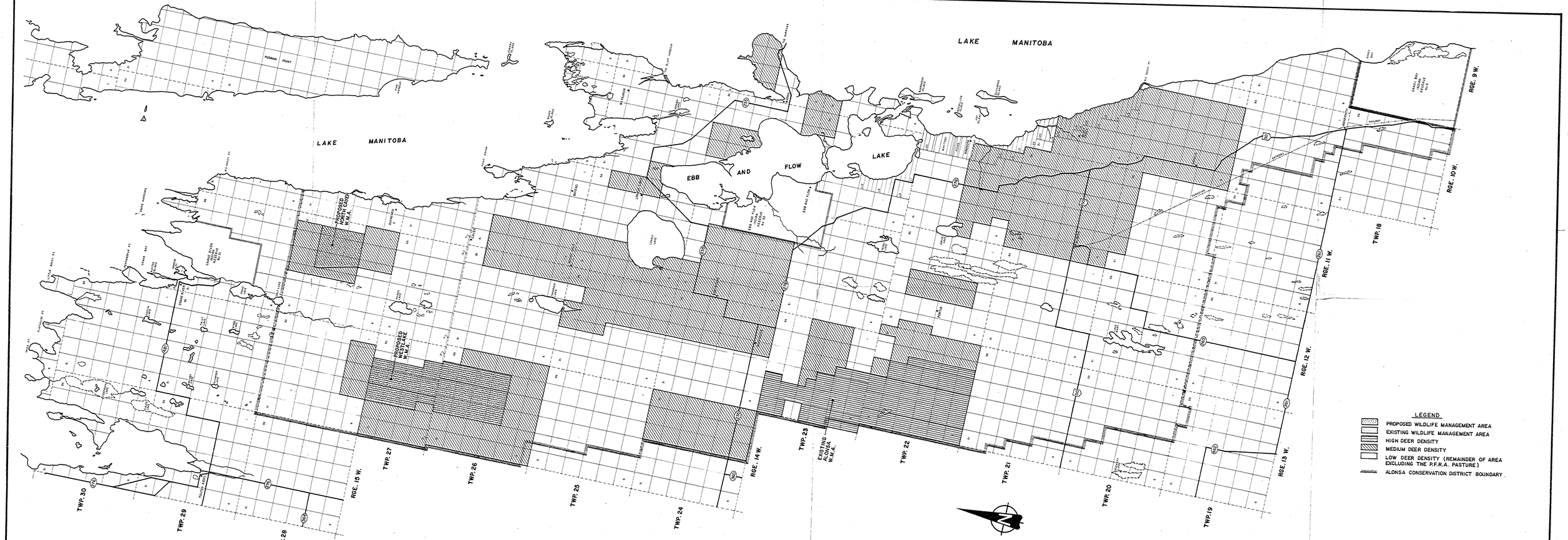
* deer density is the number of deer per square mile

TABLE 3

DEER SURVEY
OF THE
PROPOSED NORTH CAYER
WILDLIFE MANAGEMENT AREA

Year	Area (Sq. mi.)	Coverage (Percent)	Deer Counted	Estimated Population	Deer* Density
1974	6.0	50	4	8	1.3
1975	6.0	50	8	16	2.7
1976	6.0	33	3	9	1.5
1977	6.0	33	10	30	5.0
1978	6.0	10	1	10	1.7

* deer density is the number of deer per square mile



C.E.W. 81 08 11

FIGURE 1

DRAWN C.E.W.	PROVINCE OF MANITOBA DEPARTMENT OF NATURAL RESOURCES WILDLIFE BRANCH	THE ALONSA CONSERVATION DISTRICT
CHECKED D.K.		EXISTING AND PROPOSED WILDLIFE MANAGEMENT AREAS AND DEER DENSITIES
PREPARED D.K.	SUBMITTED ——— APPROVED ———	SCALE AS SHOWN · DATE 81 08 19 · SHEET 1 OF 3 · FILE NO. 82-1-1220

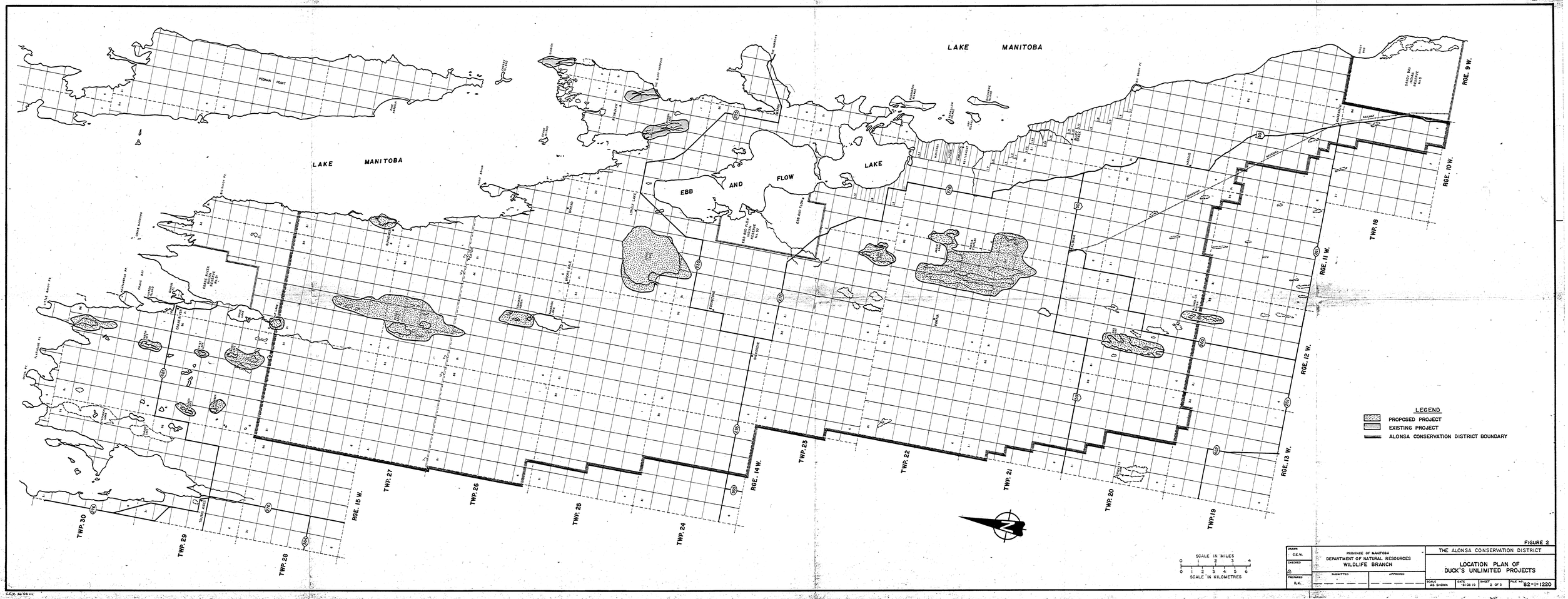


FIGURE 2

DRAWN C.E.W.	PROVINCE OF MANITOBA DEPARTMENT OF NATURAL RESOURCES WILDLIFE BRANCH	THE ALONSA CONSERVATION DISTRICT
CHECKED		LOCATION PLAN OF DUCK'S UNLIMITED PROJECTS
PREPARED D.K.	SUBMITTED — APPROVED	SCALE AS SHOWN · DATE 81.06.19 · SHEET 2 OF 3 · FILE NO. 82-1-1220

C.E.W. 81-06-11


LAKE MANITOBA
REYKJAVIK GAME BIRD REFUGE
PEONAN POINT
LAKE MANITOBA
EBB AND FLOW LAKE
TWP. 18
TWP. 19
TWP. 20
TWP. 21
TWP. 22
TWP. 23
TWP. 24
TWP. 25
TWP. 26
TWP. 27
TWP. 28
TWP. 29
TWP. 30
RGE. 9 W.
RGE. 10 W.
RGE. 11 W.
RGE. 12 W.
RGE. 13 W.
RGE. 14 W.
RGE. 15 W.
LEGEND
KNOWN NESTING LOCATIONS OF GIANT CANADA GEESE
ALONSA CONSERVATION DISTRICT BOUNDARY
SCALE IN MILES
0 1 2 3 4
0 1 2 3 4 5 6
SCALE IN KILOMETRES
FIGURE 3
DRAWN C.E.W.
CHECKED
PREPARED D.K.
PROVINCE OF MANITOBA
DEPARTMENT OF NATURAL RESOURCES
WILDLIFE BRANCH
SUBMITTED
APPROVED
THE ALONSA CONSERVATION DISTRICT
KNOWN NESTING LOCATIONS OF GIANT CANADA GEESE
SCALE AS SHOWN
DATE 81 08 19
SHEET 3 OF 3
FILE NO. 82-1-1220
C.E.W. 81 08 11

APPENDIX 6
FISHERIES CONCERNS

PROVINCE OF MANITOBA
DEPARTMENT OF NATURAL RESOURCES
FISHERIES BRANCH

FISHERIES CONCERNS IN THE ALONSA CONSERVATION DISTRICT

November, 1981

Prepared by:
Hugh Valiant
Regional Fisheries Biologist

SYNOPSIS

This report, prepared for the Alonsa Conservation District, examines areas of concern to the Fisheries Branch within the District boundaries. Specifically, Crane River, Lonely Lake, Johnson Lake, Sucker Creek, Reedy Creek, Bluff Creek and Garrioch Creek are the major fish spawning areas within the District. Due to their importance to the Lake Manitoba fishery, measures should be taken to insure that the capability of these spawning areas to produce fish is not inadvertently reduced when carrying out agricultural drainage projects.

Channelization projects, such as the drainage improvement on Garrioch Creek, present the greatest negative impact on fish spawning as a result of seasonal changes in stream flow. To accomplish agricultural drainage objectives without damaging fish populations it is recommended that water retention areas be established with enough capacity to maintain stable downstream channel flows.

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1. INTRODUCTION

1.1 General

A highly significant commerical fishery exists on Lake Manitoba, with approximately 3 million pounds of fish taken annually; this fishery generates several hundred primary seasonal jobs. An important sport fishery also exists. In 1977, at three of the more popular angling locations (Manipogo Beach, Crane River and the Narrows) an estimated total of 60,000 manhours was spent catching approximately 25,000 pounds of walleye, sauger, pike and perch.

The fish populations in Lake Manitoba are sustained in part, by spawning habitat consisting of streams located within the boundaries of the Alonsa Conservation District and it is essential to the well-being of the commercial and sport fisheries that these spawning streams are maintained in a condition suitable for use as spawning areas. The location of spawning streams in the Alonsa Conservation District is shown on Figure 1.

2. FISHERIES CONCERNS

The type of drainage improvement which has been carried out in the past, consisting of channelization of streams to increase their capacity and the construction of smaller drains which run into these channelized streams, has had a major negative impact on many of the fish populations in the southern part of the province.

2.1 Stability of Water Discharge

Successful fish spawning requires that the spawning stream has a reasonable flow of water well into the summer, so that the adult fish have access to the spawning areas and both adults and fry are able to get back downstream. Channelized streams tend to dry up too early in the year, which

results in mortality of adults, fry, or both.

2.2 Siltation

The eggs of certain species of fish are extremely sensitive to silt and tend to suffocate with even minor amounts of silt deposition on the spawning beds. Silt load is generally higher in channelized streams than in unimproved streams because of the more rapid runoff from cultivated fields.

2.3 Nutrient Loading

Nutrient load is generally not a limiting factor for fish in running waters as long as a reasonable water discharge is maintained. The major effect that high nutrient loads have on fish is oxygen depletion and as long as the water keeps running, aeration is usually sufficient to overcome the oxygen demand even in nutrient rich waters. In very intensive drainage situations, however, such as the Dauphin Lake drainage basin, nutrient concentrations can reach a level where fish mortality begins to occur in the lake which the drains run into.

2.4 Obstructions to Fish Movement

It should also be mentioned that certain types of structures such as ford crossings and silt traps, can act as barriers which prevent upstream movement by fish. Installation of culverts in ford crossings is often not sufficient to allow fish passage because the velocity of water running through the culverts may be too great for the fish to get through. In this type of situation it will be necessary to install some type of fish passage structure, such as a baffled culvert or fish ladder. The type of fish passage structure required mainly depends on the size of the obstruction and the amount of water

passing over it. The Fisheries Branch should be consulted prior to construction of any ford crossing or other structure in a stream known to support a fish run to determine what type of fish passage structure is required.

3. FISHERIES OBJECTIVES

The above concerns are all related to excessively high water discharge and velocity in tributary spawning streams at certain times of the year, and the primary fisheries objective is to maintain a stable and moderate flow of water in the tributary streams for as long as possible into the summer. Aside from ensuring that no obstructions to fish movements are placed in the stream and that certain structural features of the stream channel are maintained, stable water discharge is the only objective of any importance to fish; if a steady flow of water is maintained, fish habitat quality will be guaranteed.

The objective of a stable water discharge is potentially in conflict with the agricultural objective of getting standing water off the land as quickly as possible in the spring and during times of flood. It would seem that in most cases the only workable solution would be to construct one or more water retention areas with sufficient capacity to maintain a stable downstream discharge. Intensive drainage improvements could be made upstream of the water retention area, while maintaining a stable downstream discharge. The location of proposed water retention areas is shown on Figure 1.

3.1 Specific Objectives

3.1.1 Crane River

Downstream areas of the Crane River presently support heavy spawning runs of walleye, pike and suckers. Most of the spawning activity is con-

centrated in the area from Salt Lake downstream although in wet years pike and suckers have run all the way up to Primes Lake. Fish habitat quality in this area is directly dependent on slow seepage of water out of Primes Lake and the surrounding marsh area and any drainage improvement or channel construction between Primes Lake and Salt Lake would have a catastrophic effect on the value of this stream as spawning habitat. Drainage of the surrounding marsh area into Primes Lake would probably have no significant effect on downstream spawning areas as long as Primes Lake was developed as a water retention area and stable flow out of Primes Lake was guaranteed, with no channel improvements downstream.

3.1.2 Lonely Lake and Lonely Lake Drain

A spawning run occurs every spring up the Lonely Lake drain into Lonely Lake. This run consists primarily of suckers with some pike; walleye are not present in large numbers most years although when enough water is running down the drain, such as in 1979, large numbers of walleye can be attracted into the area. We have no information available concerning the magnitude of the spawning runs prior to construction of the drain and the control structure on Lonely Lake can act as a barrier to fish movement in some years.

The primary fisheries concern with respect to the proposed Ducks Unlimited development project is that access of fish into Lonely Lake is not impeded. Consequently, Ducks Unlimited has agreed to construct a fish ladder as part of the proposed control structure. The Fisheries Branch will provide a design for this ladder.

3.1.3 Johnson Lake

Johnson Lake historically supported a major spawning run of walleye

and pike until the area was developed by Ducks Unlimited in the early 1970's. At that time a carp screen was installed in the control structure which prevented access by adult pike and walleye and effectively eliminated an extremely valuable spawning area. After discussing the situation with Ducks Unlimited in 1980, the screens were modified in 1981 to allow access by spawning fish.

Drainage into Johnson Lake should be avoided as any silt deposition would have an adverse effect on what is not valuable spawning habitat.

3.1.4 Sucker Creek

Sucker Creek supports an extremely heavy spawning run of suckers, along with some pike and walleye. In the spring of 1979, 500,000 pounds of suckers with a commercial value of approximately $50,000 were caught by local residents. Most of the creek lies within the boundaries of the Ebb and Flow Indian Reserve, although it depends on Pedro Lake and the wet areas surrounding Pedro Lake for a stable water supply.

Any drainage improvements between Pedro Lake and the south boundary of the Ebb and Flow Indian Reserve would have a serious negative impact on the value of this stream as spawning habitat. The Pedro Lake area has the same function in stabilizing the flow in Sucker Creek that the Primes Lake area has for Crane River. Some drainage upstream of Pedro Lake could probably be carried out with little adverse effect on spawning habitat in Sucker Creek as long as Pedro Lake was developed as a water retention area so that stable flows in Sucker Creek were guaranteed.

3.1.5 Reedy Creek and Bluff Creek

These two creeks support moderate spawning runs of pike and suckers. The major limitation to their capability as spawning habitat is a lack of a consistent and stable water flow, which is a result of the small size of the

watersheds.

It is difficult to outline a headwater area which should be protected for either of these streams because the water supply for both consists of diffuse surface drainage from the surrounding land.

3.1.6 Garrioch Creek

Prior to channelization, Garrioch Creek was one of the three most important walleye spawning streams on the west side of Lake Manitoba, along with Toutes Aides Creek and the Whitemud River, and was used as a walleye spawn collection site by hatchery staff. As a result of drainage improvement this spawn taking operation had to be terminated a few years ago because the walleye run had declined to a point where egg collection was no longer feasible.

This creek still supports some pike and sucker spawning and consequently further channelization or drain construction work should be avoided unless the water can be ponded at some point downstream of the drained area as suggested for Crane River and Sucker Creek.

4. SUMMARY

Maintaining spawning habitat in the tributary streams around Lake Manitoba is crucial to the Lake Manitoba fishery. Large-scale drainage projects carried out to date have done considerable damage to fish spawning habitat and have resulted in loss of fish production. In order to accomplish drainage objectives without adversely affecting fish populations, the most promising approach appears to be the use of water retention areas to restabilize downstream flows due to upstream drainage improvements.

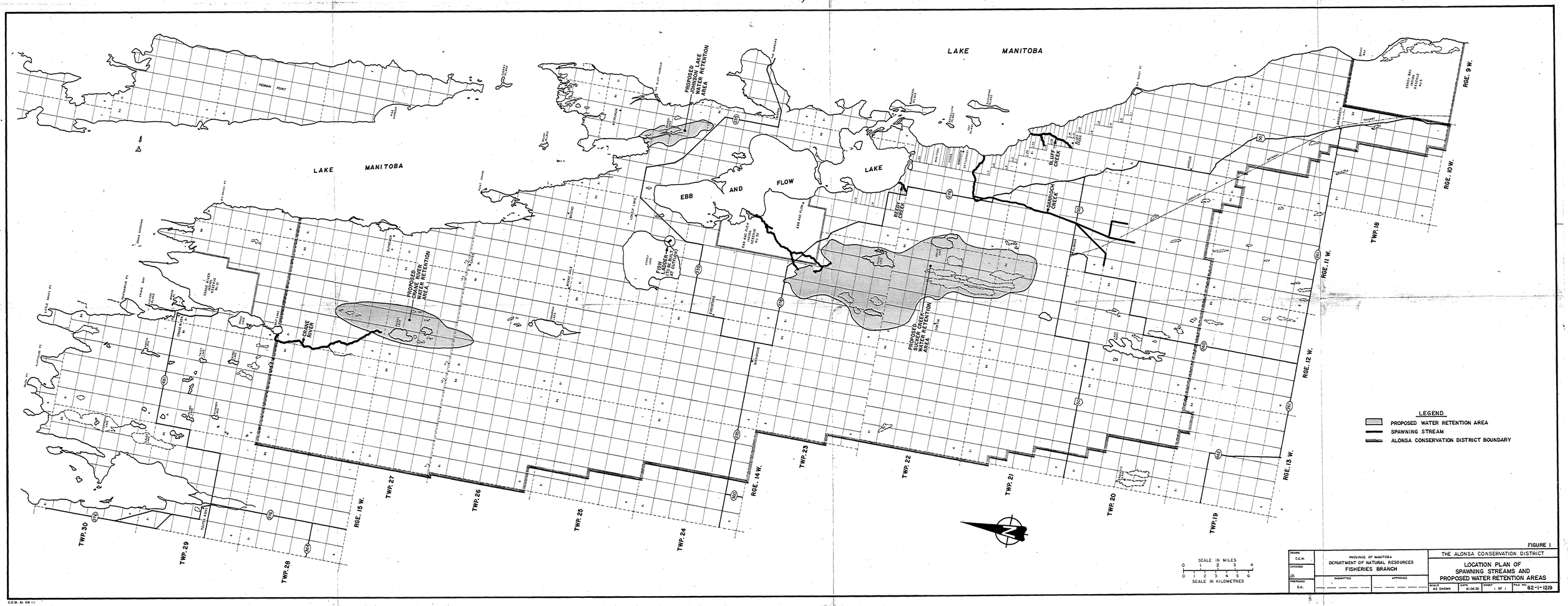

FIGURE 1

DRAWN C.E.W.	PROVINCE OF MANITOBA DEPARTMENT OF NATURAL RESOURCES FISHERIES BRANCH	THE ALONSA CONSERVATION DISTRICT
CHECKED		LOCATION PLAN OF SPAWNING STREAMS AND PROPOSED WATER RETENTION AREAS
PREPARED D.K.	SUBMITTED APPROVED	SCALE AS SHOWN · DATE 81 06 22 · SHEET 1 OF 1 · FILE NO. 82-1-1219

C.E.W. 81 06 11

APPENDIX 7
RECREATION

PROVINCE OF MANITOBA
DEPARTMENT OF NATURAL RESOURCES
WATER RESOURCES BRANCH

OUTDOOR RECREATION
IN THE
ALONSA CONSERVATION DISTRICT

August, 1983
Winnipeg, Manitoba

Prepared by:
D. J. Kozusko, P. Eng.
Senior Planning Engineer
Conservation Districts Section
Water Management

SYNOPSIS

The outdoor recreation report for the Alonsa Conservation District has been undertaken to encourage the safeguarding of scarce recreational and scenic resources in the District This outdoor recreation report will provide a basic information framework to aid the Alonsa Conservation District Board in the formation of policies and programs related to management of the outdoor recreation resource. Land suitable for outdoor recreation has been identified. These lands have been classified on the basis of the Government of Canada, Department of Regional Economic Expansion publication "Land Capability Classification for Outdoor Recreation". The existing outdoor recreation facilities and opportunities have been identified. Guidelines for the development of outdoor recreation have been recommended. Outdoor recreation areas should be developed in conjunction with the proposed Lake Winnipegosis-Lake Manitoba Recreational Waterways Project. Development of the proposed Big Sandy Point recreation area, harbour/docking facilities at Crane River and Narrows recreation area is recommended to be investigated by the Parks Branch Investigation of the feasibility of upgrading and/or expanding existing tourist facilities and services in the District is recommended.

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1 INTRODUCTION

This study has been undertaken to identify outdoor recreation resources in the Alonsa Conservation District and in the area associated with the purposed extended District boundary. The existing outdoor recreation facilities and opportunities are described. Land suitable for outdoor recreation are identified. These identified lands are classified for possessing outstanding or unique recreational values on the basis of the Government of Canada, Department of Regional Economic Expansion publication "Land Capability Classification for Outdoor Recreation"(1). Opportunities to enhance existing outdoor recreation are identified This outdoor recreation report provides a basic information framework to aid the Board in the formation of policies and programs related to management of the outdoor recreation resource. To support the basic information framework further planning studies would be necessary to outline the details of the feasibility of any proposed development

2. EXISTING OUTDOOR RECREATION

The area in the vicinity of the Alonsa Conservation District offers outdoor recreation involving fisheries, wildlife and recreation parks. For those who travel in the area there are tourist facilities available. The following summarizes the existing recreation features as outlined by staff of the Fisheries Branch, Wildlife Branch, Municipal Planning Branch, Traval Information Services and Parks Branch of the Province of Manitoba.

2.1 Fisheries

The major angling locations in the vicinity of the Alonsa Conservation District are the Narrows and Crane River. A certain amount of angling also occurs in the spring at the Johnson Lake control structure, at the Lonely Lake drain and in the Cayer area

The quality of angling at Crane River depends on maintaining the existing habitat quality. This would involve no agricultural drainage improvement between Primes Lake and Crane River Bay. At the Narrows, quality of angling and the number of fish available to the anglers depends primarily on the number of fish taken in the commercial fishery during the winter

A creel census was carried out at the Narrows and at Crane River between May, 1977 and October, 1977. At the Narrows, a total of 48,000 man-hours were spent catching 13,000 fish during this period. Similarly at Crane River, 3,000 man-hours were spent catching 2,000 fish with most of the pressure occurring in May and June at this location.

The amount of angling pressure at the Narrows makes it one of the most popular angling locations in the southern part of the province. Approximately 2% of the anglers at the Narrows were residents of the immediate local area, 91% came from other parts of Manitoba (mostly Winnipeg) and 7% were from outside Manitoba.

In terms of benefits to the local residents, the winter commercial fishery is carried out entirely by locals, while most of the anglers are not residents of the local area Some businesses, such as the hotel and the bait dealer, benefit directly from angling traffic but more money is pumped into the local economy via the commercial fishery.

2.2 Wildlife

The Alonsa Conservation District encompasses portions of three game hunting areas, (19B, 24 and 24A) as shown on Figure 2. The major species sought after by recreational hunters are deer, upland game birds and geese

Some of the most heavily hunted areas are Reykjavik, Point Asham, Lonely Lake, Lake Manitoba Narrows, Lake Manitoba shoreline and newly developed alfalfa fields throughout the area.

The area is presently providing sufficient numbers of deer to meet the recreational sport hunting demand. Future demand is expected to increase slowly with supply increasing to support this demand Deer numbers are expected to increase as a result of the clearing of Crown land for agriculture. This land clearing is providing a more diversified

habitat and increasing the tame hay production throughout the area Deer hunting within the District has traditionally attracted approximately 1,000 hunters who harvest an estimated 500 deer annually and spend 3,500 man-days in pursuing their sport.

The District supports good populations of upland game birds (sharptailed grouse and ruffed grouse) during peak years of their cycle and fair numbers of Hungarian partridge in years with mild winters Upland game birds are found throughout the area and some of the more popular hunting areas are the Amaranth-Alonsa area, the Alonsa Wildlife Management Area, the area west of Cayer and north of Lonely Lake. During the period of 1972-1975,hunter numbers ranged from 600 to 1,500 with harvests of 2,800 to 5,300 birds. Hunters spent 2,900 to 5,500 man-days of recreation and harvested from 2.6 to 7.5 birds per hunter.

Waterfowl hunting is mainly confined to geese. The Canada Goose population has been growing steadily since the mid sixties and is providing ever increasing hunting opportunity. The annual goose harvest is estimated at 500 birds. This population of geese is part of a wintering flock at Rochester, Minnesota which has been increasing steadily. Future demand is expected to be accommodated by an increasing supply of birds. The Canada Goose population will likely continue to expand its nesting range throughout the District and beyond

2.3 Parks

The Alonsa Conservation District encompasses two Provincial Recreation Parks operated by Parks Branch These parks are locally known

as Amaranth Beach and Margaret Bruce Wayside Park Both of the Recreation Parks are associated with Lake Manitoba. The water-based recreational uses such as boating, swimming and fishing are popular activities which attract visitors.

The Amaranth Recreation Area is located immediately north of the Sandy Bay Indian Reserve and is a linear pressure ridge development. Facilities offered to the public include·

- overnight camping (approximately 10 unserviced sites)

  No camping fees are charged.

- day use area and kitchenette
- swimming and beach
- boat launch
- non-modern washroom
- potable water

Currently the Park is primarily used by local and regional residents. The Parks Branch does not have any short term development plans for the site. If warranted, the area could be expanded northward along the pressure ridge.

The Margaret Bruce Recreation Area is located approximately 8 miles east of the town of Alonsa and is another development associated with Lake Manitoba. Facilities offered to the public include:

- overnight camping (approximately 25 unserviced sites)

  No camping fees are charged.

- day use area
- boat launch

- concession
- non-modern washroom and changehouses
- potable water

Similar to Amaranth Beach, the Margaret Bruce Wayside Park primarily services the local and regional market. Current visitor use statistics do not warrant large scale expansion of this site. Facility upgrading such as improvements to camping sites, washrooms, roads, etc., has been identified by the Parks Branch.

2 4 Tourist Facilities

The following tourist facilities exist in the study area.

- Alonsa Hotel

  The hotel has been licensed by the Liquor Control Commission but has not been star rated by Travel Manitoba

- Amaranth Hotel

  The hotel has been licensed by the Liquor Control Commission but has not been star rated by Travel Manitoba

- Crane River Reserve Beach and Campground

  This facility is licensed and inspected by the Department of Economic Development and Tourism. The operation is presently expanding the facility to include additional sites and a central washroom building.

- Crane River Camp

  This camp is licensed, inspected and rated by the Department of Economic Development and Tourism. Presently Travel Manitoba has given the camp a one star rating.

- Ebb and Flow Tourist Campgrounds

  At this time the campgrounds have not been licensed by the Department of Economic Development and Tourism. An inspection of the facility is expected to be conducted by a Department field officer in the near future

3. LAND CAPABILITY FOR RECREATION

Land in the Alonsa Conservation District has been classified according to its natural capability to provide opportunity for recreation. Compatible recreational land management and development practices have been assumed for all areas in practical relation to their natural capability for recreation. Further detailed studies would be required to assess the feasibility of developing the identified land capability for outdoor recreation. The location and present access development of a potential recreation area have not influenced its classification.

3.1 Recreational Land Capability Classes

The recreational land capability of the District and purposed extended area of the District has been divided according to seven classifications The basis of these classifications is the quantity of recreation which may be generated and sustained per unit area of land per year under perfect market conditions. The ranking of the land capability for recreation classification is very dependent on the ability of an area to sustain intensive use. Outdoor recreation activities recognized in this classification are shown in Table 1, Appendix 1 The seven capability classes are

- Class 1

  These lands have natural capability to engender and sustain very high total annual use based on intensive outdoor recreation activities.

- Class 2

  These lands have natural capability to engender and sustain high total annual use based on intensive outdoor recreation activities

- Class 3

  These lands have natural capability to engender and sustain moderately high total annual use for outdoor recreation based usually on intensive or moderately intensive outdoor recreation activities.

- Class 4

  These lands have natural capability to engender and sustain moderate total annual use based usually on dispersed outdoor recreation activities.

- Class 5

  These lands have natural capability to engender and sustain moderately low total annual use based on dispersed outdoor recreation activities.

- Class 6

  These lands either lack natural attractiveness or present severe obstacles to their enjoyment, but have the ability to engender and sustain low total annual use based on dispersed outdoor recreation activities.

- Class 7

  These lands have very little capability for any popular types

of outdoor recreational activity. There may be some capability for very specialized activities with recreational aspects, or they may merely provide open space.

In this report, lands classified as 1, 2 and 3 have been identified as shown on Figure 1. Areas which could sustain less intensive outdoor recreation use were not considered. Further detailed studies would be required to determine whether development of Class 4 and lower class lands would be desirable for outdoor recreation

3.2 Recreational Land Capability Sub-classes

A recreation sub-class identifies the major uses of land for recreation as indicated by popular preferences in Table 1, Appendix 1. It is an exception rather than the rule that an area is ranked on the strength of a single feature. Unless an adequate development area is readily available, land for recreation cannot generate intensive use. The requirements for a development area vary among features, but in general a Class 1 ranking of land for outdoor recreation requires more area than land ranked Class 2

The following are general guidelines on the recreational land capability sub-classes in the District and its purposed extended area.

- Sub-class A

  Angling: Land associated with this sub-class provides access to water with natural capability for production, harvesting

and/or viewing of sport fish The quality of the water, the depth and flow, the bottom conditions and other limnological factors influence angling capability.

- Sub-class B

Beach· A beach is a part of shoreland adjacent to and extending into a body of water and comprises level to moderately sloping deposits of granular material ranging from fine sand to firm till, pebbles and cobbles Bedrock may also be included The usefulness of beaches is increased by their length, the size of the body of water (for boating and associated activities), the variety of water conditions (paddling to deep water swimming),the amount and location of usable backshore, and the contrast of water, rock and vegetation (viewing and recording). The beaches identified on Figure 1 are all classified as warm water beaches suitable for swimming. Limitations affecting the capability of beaches is shown in Table 2, Appendix 2 Beaches require backshore area for supporting the development of facilities such as access roads, car parks, games areas, sanitary facilities, picnic areas and campgrounds. Lower class beaches do not have as high a requirement for development area as high class beaches Suggested development area requirements are· Class 1 - 25 acres; Class 2 - 15 acres, Class 3 - 10 acres.

- Sub-class K

Organized Camping Shoreland associated with this sub-class is suited to organized tent or trailer camping. The essential requirements for organized camping capability are: stable but unconsolidated surface materials, extensive area of low gradients or very frequent level terraces, proximity to potable water, tree cover to provide wind and sun shelter, and capability for vehicle or boat access. A scenic environment is desirable.

- Sub-class N

Lodging: Land associated with this sub-class is suited to family cottage or other recreation lodging use. Activities associated with lodging include viewing, family bathing, swimming, fishing, family or deep water boating and walking (Lodging may then lead to high total annual use) Lodging implies temporary or permanent occupation of non-urban land selected because of recreation capabilities and developed for private or commercial accommodation use.

Beach and water conditions affecting capability for fishing, swimming, bathing and boating are highly important. Beach gradients most suited to cottage use should provide good capability for the beaching of boats and the construction of short stable docks. Backshore slopes may range from level, with reasonably good drainage, to very steep (30% - 100%), with moderate slopes (7% - 15%) the most suitable because they

permit tiered development. Views are important, as is ease of access from shore. A terraced slope may be an asset. Shelter from winds, exposure to sun, capability for vegetative cover, outward aspect (viewing), soil materials for foundations and sewage disposal, and fresh water availability, are all important factors. Capability for vehicle access is important, although on large water bodies water access may be an alternative.

- Sub-class U

  Deep Water Boating Area: Shoreland in this sub-classification fronts water suitable for yachts and other large craft (yachting or deep water boat tripping). Deep water boating areas are usually associated with large water bodies suited to larger craft which provide sleeping accommodation and safety for boat tripping.

  The shoreland area should provide shelter from prevailing winds and wave and ice action. Such shelter is usually found in bays, or in natural or artificial harbours. The harbours themselves may be suitable places for family boating and other aquatic activities. Deep water harbours, in addition to providing shelter from hazards associated with the main body of water, should in themselves be largely hazard free. There should be sufficient channel entrance, depth of water and space for manoeuvring boats, as well as freedom from submerged reefs and/or bars.

Deep water boating areas should have sufficient shoreland suitable for development of needed service facilities such as parking space for cars and trailers, sites for docks and launching ramps, and capability for road access.

- Sub-class V

  Viewing: Land associated with this sub-class has a vantage point which provides a superior view or an area which provides frequent good viewing opportunities. Capability for access and adequate development area should also exist.

- Sub-class Y

  Family Boating Shoreland in this sub-classification fronts water suitable for popular forms of family boating activity. Family boating is concerned with a variety of activities on small water bodies or sheltered portions of large water bodies. These include activities associated with both land and water. Family boating is essentially "day boating" and is normally a fairly dispersed type of activity. This means that boat launching opportunities are important, as well as space for cars and trailers

  Areas providing launching opportunities are focal points for family boating, particularly if the backshore permits the development of support facilities and road access

3.3 Interpretation of Recreational Land Capability Classification

Classification and sub-classifications of recreational land

capabilities have been identified on Figure 1. Identified land areas have been assigned a combination of symbols indicating the capability class (1, 2 or 3) plus three sub-classes (recreational features) appearing vertically in order of significance.

Example 1:
B
2 K
N

This symbol indicates a class 2 recreational land capability with a bathing beach (B), terrain suitable to camping (K) and to family cottage or other lodging use (N) in that order of importance.

Example 2:
A
3 K
V

This symbol indicates a Class 3 recreational land capability with terrain accessible to adjoining angling water (A) and suitable for camping (K), and having a vantage point providing a good view across Lake Manitoba (V) in that order of importance

The lands identified, classified and sub-classified in this report for their capability to engender and sustain intensive outdoor recreation activities would require further detailed study. These studies would outline the demand, feasibility and economic viability of developing potential outdoor recreation opportunities in the District. The detail from such studies would give guidance to the Board on priorities for development of outdoor recreation in the District

4. OUTDOOR RECREATION DEVELOPMENT OPPORTUNITIES

4.1 Lake Winnipegosis and Lake Manitoba Recreational Waterways Project

Lake Winnipegosis and Lake Manitoba have been the focus for many recent studies which define the recreational potential along the shorelines and in conjunction with the water bodies themselves. These studies have resulted in a recreational development proposal referred to as the Lake Winnipegosis and Lake Manitoba Recreational Waterways Project[2]. The Lake Winnipegosis and Lake Manitoba Recreational Waterways Development Board has attempted to increase recreational use and tourism viability throughout the project area. Specific project initiated or undertaken by this Development Board include

- Hydrographic survey of Lake Manitoba
- Development plan for the area (Alonsa Conservation District comprises part of the project area).
- Feasibility study for a "Lakes Nature Touring Route".
- A recreational inventory of beaches along Lake Manitoba and Lake Winnipegosis

The Parks Branch and other government branches should be involved when any major development proposals are initiated. Current demand is not great for increased recreational facilities and services throughout the Lake Winnipegosis-Lake Manitoba project area. Although it is difficult to quantify projected levels of visitor use, many of the projects proposed by the Development Board do not currently appear feasible from a benefit-cost analysis standpoint.

The natural and cultural resource base associated with lands along Lake Manitoba and Lake Winnipegosis have potential to attract and sustain relatively high numbers of visitor use A strong marketing campaign may be able to create a demand for these resources Major recreational potential for the Alonsa Conservation Area includes.

- Potential cottaging and/or recreational vehicle lot development in conjunction with many of the beaches exhibiting high recreational capability, e.g., Big Sandy Point. Cottage development could be initiated by either private or public developers. Proposed recreation areas based on the Waterways Concept have been shown on Figure 1. Detailed study would be necessary to determine the viability of development.
- Potential for a major waterway route in Manitoba to divert some of the boating use on Lake Winnipeg. Completion of the hydrographic survey on Lake Manitoba is essential due to shallow water depths.
- Lake Manitoba Narrows is a popular recreational spot and route of travel along P R. 235 Currently a private developer has a lodge, campground, gas station, etc., along the east shore. Potential exists for a Provincial Wayside Park along the west shore of the Narrows.

In general, the shoreline of Lake Manitoba should be safeguarded against development which would adversely affect beach site quality The pressure ridge separating the lake from the backshore should not be eroded

otherwise beach site integrity will be altered. The problem with periodic flooding and ice damage should be considered before construction of any recreational facility adjacent to Lake Manitoba is approved.

4.2 Tourist Facilities

Generally, there appears to be a definite need to upgrade/ modernize the existing tourist facilities in the study area, in particular, the Crane River Camp The Crane River Camp consists of four non-modern units with outdoor privies. These units should be replaced with fully-modern accommodation units. Expansion could also be considered to include either additional cabins or motel type units. The operator of Crane River Camp has considered examining the feasibility of expanding the facilities of the camp However, financial limitations have restricted progress of the camp expansion.

Additional public and private tourist camping facilities should be investigated. Generally, the Alonsa Conservation District currently offers very little in the way of tourist facilities and services

5. OUTDOOR RECREATION DEVELOPMENT GUIDELINES

Areas of high outdoor recreation capability and existing outdoor recreation developments of local, provincial and regional significance have been identified as shown on Figure 1. The purpose of identifying these areas has been to encourage the safeguarding of scarce recreational and scenic resources. Outdoor recreation development should follow the following guidelines

(1) Lands having high recreation capability should not be subdivided if the Board and Municipality, through consultation with the Municipal Planning Branch, are satisfied that sufficient lands of similar high recreational capability will not be available to satisfy local and regional recreation needs for the foreseeable future (i e., 20 years). Lands having high recreation capability means land that has been identified by the Canada Land Inventory as having a recreation capability in Classes 1 to 3. Lands designated as lower classes (e.g , Class 4) by Canada Land Inventory, due to an inability to support intensive recreation activities, may in fact rate very high in their ability to support activities not requiring intensive development. Class 4 lands acceptable for development should be afforded the same protection as lands classified 1, 2 and 3.

(2) Recreational development should only be allowed to the carrying capacity of the resource being utilized to prevent overdevelopment. Overdevelopment of these recreational areas could result in damage to the physical resource and/or a decline in the quality of the intended

recreational experience. The Board should request carrying capacity studies to be undertaken before recreational development takes place to minimize or eliminate degradation of recreation areas. Carrying capacity means the level of use an area can withstand while providing a sustained high quality of recreation in accordance with the recreational objectives of the area. Where such studies do not exist or are not feasible, recreation space standards may be used. Recreation space standards means those standards based on years of recreation area management experience and research, which indicate minimum spatial requirements for various recreation activities and can be used to supplement estimates of physical carrying capacity. Information regarding recreation space standards can be obtained from government agencies such as the Parks Branch

(3) Waterways, water bodies and shorelands having recreational significance to the public should be afforded protection. Key shorelands should be maintained and managed to meet recreation and erosion protection requirements. Shoreland means land within 1,000 feet of the ordinary high water mark of a lake, sea or inlet thereof; or land within 300 feet of the ordinary high water mark of a river, stream, watercourse, creek, spring or other body of water The Board can request that certain shorelands be designated for protection (public shoreland reserves) solely to ensure the right of the public to fully utilize the province's major waterways and water bodies. Municipalities, Planning Districts or the Province may designate shorelands as having significance to the general public for recreational reasons Depending on the local situation,

acquisition may occur through direct purchase or from dedication through the subdivision process In all such cases the amount of land required and provisions of access shall be designed to suit the local situation. In some cases public use of the public shoreland reserves may be intensive, e.g., beach areas, whereas in other locations actual public presence on the reserve may be minimal. Zoning controls or easements rather than acquisition, may prove adequate in unique cases, but the public attraction of most of these sites will normally necessitate public ownership.

(4) Recreation areas should be afforded protection from adjacent uses that would degrade or endanger their primary function. The primary function of significant recreation areas should be permanently maintained through implementation of guidelines which will affect the use of lands adjoining such parks or reserves. Significant recreation areas means major areas which may require considerable funds to establish or replace which have been designated or established to recognize sensitive areas of high recreational importance to the District or to a specific area within the District. No intensive residential, industrial, agricultural or commercial development or subdivision potentially detrimental to the recreation area or park character or experience should be permitted in this peripheral zone.

6 RECOMMENDATIONS

(1) Lands suitable for outdoor recreation should be developed under the advisement of the Parks Branch, Department of Economic Development and Tourism and the Municipal Planning Branch.

(2) Lands classified 1, 2 or 3 for outdoor recreation capability should not be subdivided if the Board and Local Government District of Alonsa, through consultation with the Municipal Planning Branch, are satisfied that sufficient lands of similar capability are not available to satisfy local and regional recreation needs for the foreseeable future (i.e. 20 years).

(3) Carrying capacity studies should be undertaken before recreational development takes place to minimize or eliminate degradation of recreation areas. Where such studies do not exist or are not feasible, recreation space standards may be used

(4) The Board should oppose intensive residential, industrial, agricultural or commercial development or subdivision adjacent to outdoor recreation areas which are potentially detrimental to the recreation area or park character.

(5) The Board should promote outdoor recreation area development in harmony with the proposed Lake Winnipegosis-Lake Manitoba Recreational Waterways Project.

(6) The Board should request the Parks Branch to undertake an investigation for the development of the proposed Big Sandy Point recreation area.

(7) The Board should request the Parks Branch to undertake an investigation for the development of the proposed harbour/docking facilities at Crane River.

(8) The Board should request the Parks Branch to undertake an investigation for the devleopment of the proposed Narrows recreation area.

(9) The Board should request the Provincial Department of Economic Development and Tourism to investigate the feasibility of upgrading and/or expanding existing tourism facilities and services in the Alonsa Conservation District.

REFERENCES

1. Canada Department of Regional Economic Expansion, The Canada Land Inventory, Land Capability Classification for Outdoor Recreation, Report No. 6, Ottawa, 1969.

2. Hilderman, Feir, Witty and Associates, Lake Winnipegosis and Lake Manitoba Recreational Waterways Project, Proposed Development Plan, Winnipeg, December 1980.

3 Province of Manitoba, Provincial Land Use Policies, Winnipeg, November 1980.

ACKNOWLEDGEMENTS

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The manuscript was typed by K Ho.

APPENDIX 1

OUTDOOR RECREATION ACTIVITIES

TABLE 1

POPULAR OUTDOOR RECREATION ACTIVITIES

family bathing
sun bathing
paddling
swimming

downhill skiing
cross-country skiing

wildlife viewing
general viewing
recording
viewing waterfalls and rapids
viewing glaciers

summer cottaging
winter cottaging
commercial lodging

family boating
boat launching and landing
water skiing
boat mooring
boat wharfing
boat tripping
sailing

angling
fish viewing

organized camping
primitive camping

wetland hunting
upland hunting

still-water canoeing
white-water canoeing
canoe tripping

walking and hiking
gathering and collecting
picnicking
unorganized games
horseback riding
driving for pleasure

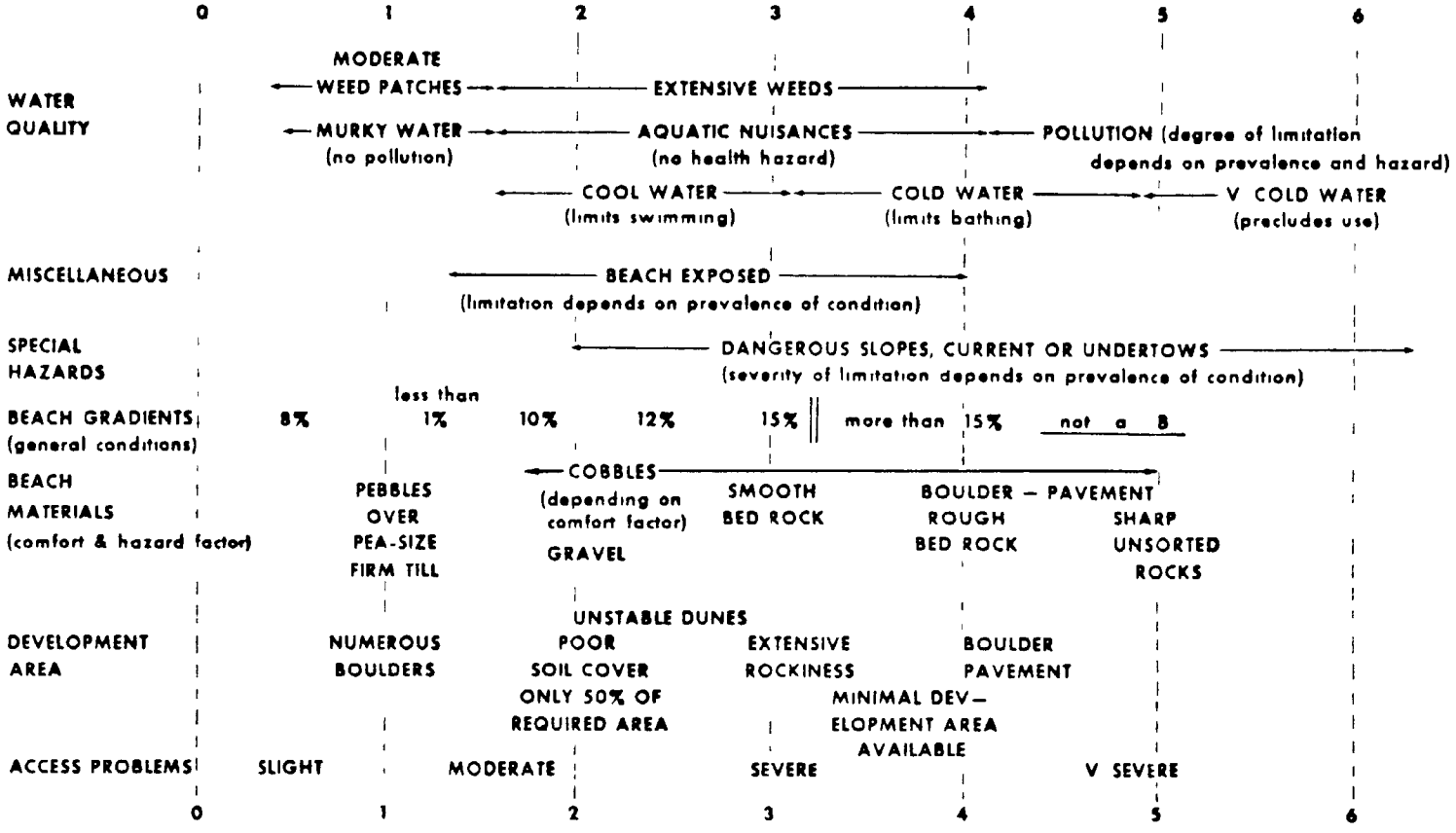
exploration
nature interpretation
history and prehistory interpretation
cultural and industrial interpretation
rock climbing
ice climbing
mounting climbing
snowshoeing
tobogganing
auto-tobogganing
skating

APPENDIX 2

LIMITATIONS AFFECTING THE CAPABILITY OF BEACHES

TABLE I.

LIMITATIONS AFFECTING CAPABILITY OF BEACHES



INSTRUCTIONS FOR USE

1 Ascertain approximate value for individual limitations

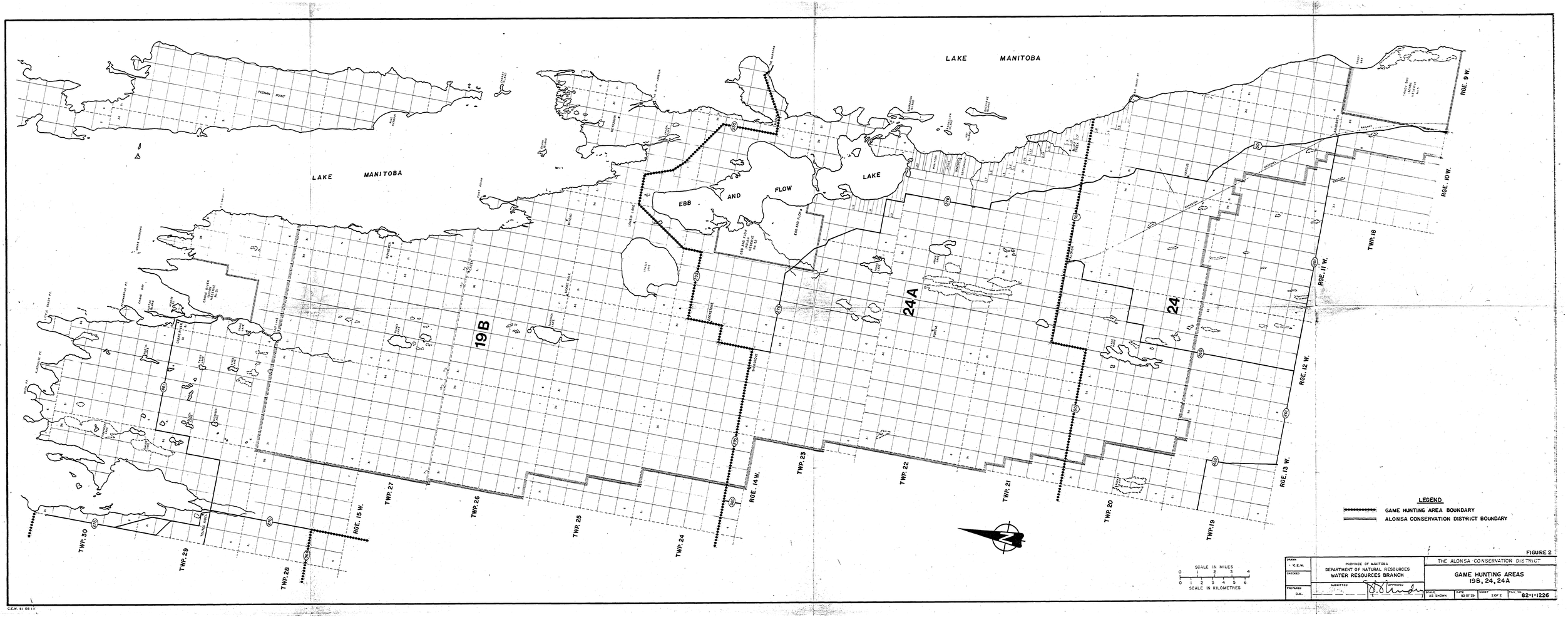
2 Total values for all limitations

value		
2	----------	downgrade 1 class
4	----------	" 2 classes
6	----------	" 3 classes
8	----------	" 4 classes
8+	----------	look for other features

3 These are general guide lines Do not deduct full points where limitations overlap (e g exposed beach and very cold water aquatic nuisances and extensive weeds)

4 Presence of other recreation features may overcome a degree of limitation


LAKE MANITOBA
LAKE MANITOBA
EBB AND FLOW LAKE
PROPOSED HARBOUR DEVELOPMENT
PROPOSED RECREATION AREA
PROPOSED RECREATION AREA
PROPOSED RECREATION AREA
PROPOSED RECREATION AREA
PROPOSED RECREATION AREA
PROPOSED RECREATION AREA
PROPOSED HARBOUR / DOCKING FACILITIES
AMARANTH BEACH
MARGARET BRUCE WAYSIDE PARK
ELMERS BEACH
CAYER BEACH
TWP. 18
TWP. 19
TWP. 20
TWP. 21
TWP. 22
TWP. 23
TWP. 24
TWP. 25
TWP. 26
TWP. 27
TWP. 28
TWP. 29
TWP. 30
RGE. 9 W.
RGE. 10 W.
RGE. 11 W.
RGE. 12 W.
RGE. 13 W.
RGE. 14 W.
RGE. 15 W.
LEGEND
CLASS 2 LANDS IN THIS CLASS HAVE A HIGH CAPABILITY FOR OUTDOOR RECREATION.
CLASS 3 LANDS IN THIS CLASS HAVE A MODERATELY HIGH CAPABILITY FOR OUTDOOR RECREATION.
SUBCLASS A - LAND PROVIDING ACCESS TO WATER AFFORDING OPPORTUNITY FOR ANGLING OR VIEWING OF SPORT FISH.
SUBCLASS B - SHORELAND CAPABLE OF SUPPORTING FAMILY BEACH ACTIVITIES. IN HIGH CLASS UNITS THIS WILL INCLUDE FAMILY BATHING.
SUBCLASS K - SHORELAND OR UPLAND SUITED TO ORGANIZED CAMPING, USUALLY ASSOCIATED WITH OTHER FEATURES.
SUBCLASS N - LAND (USUALLY SHORELAND) SUITED TO FAMILY OR OTHER RECREATION LODGING USE.
SUBCLASS U SHORELAND FRONTING WATER ACCOMMODATING YACHTING OR DEEP WATER BOAT TRIPPING.
SUBCLASS V - A VANTAGE POINT OR AREA WHICH OFFERS A SUPERIOR VIEW RELATIVE TO THE CLASS OF THE UNIT (S) WHICH CONTAIN IT, OR A CORRIDOR OR OTHER AREA WHICH PROVIDES FREQUENT VIEWING OPPORTUNITIES.
SUBCLASS Y - SHORELAND PROVIDING ACCESS TO WATER SUITABLE FOR POPULAR FORMS OF FAMILY BOATING.
GOVERNMENT CAMP SITE
PICNIC SITE
HARBOUR / DOCKING FACILITIES
ALONSA CONSERVATION DISTRICT BOUNDARY
SCALE IN MILES
0 1 2 3 4
0 1 2 3 4 5 6
SCALE IN KILOMETRES
FIGURE 1
DRAWN C.E.W.
CHECKED
PREPARED D.K.
PROVINCE OF MANITOBA
DEPARTMENT OF NATURAL RESOURCES
WATER RESOURCES BRANCH
SUBMITTED
APPROVED
THE ALONSA CONSERVATION DISTRICT
OUTDOOR RECREATION AREAS
SCALE AS SHOWN
DATE 81 12 20
SHEET 1 OF 2
FILE NO. 82-1-1226


LAKE MANITOBA
LAKE MANITOBA
EBB AND FLOW LAKE
EBB AND FLOW
19B
24A
24
TWP. 30
TWP. 29
TWP. 28
TWP. 27
TWP. 26
TWP. 25
TWP. 24
TWP. 23
TWP. 22
TWP. 21
TWP. 20
TWP. 19
TWP. 18
RGE. 15 W.
RGE. 14 W.
RGE. 13 W.
RGE. 12 W.
RGE. 11 W.
RGE. 10 W.
RGE. 9 W.
LEGEND
GAME HUNTING AREA BOUNDARY
ALONSA CONSERVATION DISTRICT BOUNDARY
SCALE IN MILES
SCALE IN KILOMETRES
FIGURE 2
THE ALONSA CONSERVATION DISTRICT
GAME HUNTING AREAS
19B, 24, 24A
PROVINCE OF MANITOBA
DEPARTMENT OF NATURAL RESOURCES
WATER RESOURCES BRANCH
DRAWN C.E.W.
CHECKED
PREPARED D.K.
SUBMITTED
APPROVED
SCALE AS SHOWN
DATE 83 07 29
SHEET 2 OF 2
FILE NO. 82-1-1226
C.E.W. 83 08 17

APPENDIX 8
CLIMATE

MANITOBA
DEPARTMENT OF NATURAL RESOURCES
WATER RESOURCES BRANCH

CLIMATE
OF THE
ALONSA CONSERVATION DISTRICT

FEBRUARY, 1981
WINNIPEG, MANITOBA

Prepared by:
A. Warkentin
Hydrometeorologist
Water Investigations Service

CLIMATE OF THE ALONSA CONSERVATION DISTRICT

The District has a continental type of climate which is characterized by large variations in temperature and precipitation from day to day, from month to month and from season to season. Local variations in climate are primarily due to the proximity of the District to Lake Manitoba and Dauphin Lake. However, such variations cannot be quantified at this time due to a lack of sufficient climatological data in the District.

The median annual temperature of the District ranges from $2^{\circ}C$ in the northern area to $3^{\circ}C$ in the southern area. The median July temperature is $19.5^{\circ}C$ and the median January temperature is $-17.8^{\circ}C$

Information on precipitation in the District is summarized in Table 1.

TABLE 1

ALONSA CONSERVATION DISTRICT
PRECIPITATION

	Millimetres of Water		
	Median	90 percent of Time Less Than	10 percent of Time Less Than
Annual Precipitation	432	559	330
Growing Season Precipitation (May to September)	280	381	178
Prime Growing Season Precipitation (July and August)	127	216	69
Harvest Season Precipitation (August and September	99	158	46

The median length of the frost free period is 110 days. The frost free period is less than 135 days 90 percent of the time and less than 95 days 10 percent of the time. The mean date of the last frost in spring is May 25 and the mean date of the first frost in fall is September 15. The prevailing wind directions are westerly and northwesterly. Monthly wind speeds average

from 16 to 21 kilometres per hour. As of 1976, the maximum observed hourly wind speed at Dauphin was 80 kilometres per hour and the maximum gust speed was 122 kilometres per hour.

On the average, Dauphin has 2255 hours of bright sunshine annually with an average of 320 hours in July and 95 hours in November. Many parts of the District may have less sunshine than Dauphin due to the cloud producing effect of large bodies of water to the east and north of the District.