

AN APPRAISAL OF
THE MANAGEMENT OF SAND AND GRAVEL PITS
IN THE SOUTH RIDING MOUNTAIN PLANNING DISTRICT, MANITOBA

By
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A Practicum Submitted
In Partial Fulfillment of the
Requirements for the Degree,
Master of Natural Resources Management

Natural Resources Institute
The University of Manitoba
Winnipeg, Manitoba, Canada

12 January 1981

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ABSTRACT

The Manitoba Department of Energy and Mines is presently compiling a data base of Manitoba's aggregate resources which will provide a basis for the development of resource management and land use plans. Generally covering organized Planning Districts, the data collected includes geological inventories together with pit and quarry rehabilitation information. This information, plus that obtained for other resources, is integrated by planning consultants for the Planning Districts and results in overall objectives for land use planning being formulated. The resource management proposals developed by the Mineral Resources Division of the Department of Energy and Mines have two parts: a management proposal for the aggregate resource itself and this study, which comprises a management proposal for surface mining as a land use.

To develop a realistic and meaningful proposal for the management of the pits in the District this study inventories, classifies and analyses the sand and gravel pits in the District then develops and proposes strategies for their management. The existing legislation regulating the operation of pits is also examined. The study finds that most of the pits are unregulated, but that regulated pits account for most of the area disturbed by surface mining. The number of unregulated pits present problems of lack of control over abandoned land and progressive rehabilitation within the

District. It is recommended that the District should develop to the fullest extent the powers to control, permit and regulate sand and gravel pits that are given by the Planning Act, especially in the area of financial incentives to rehabilitate.

ACKNOWLEDGEMENTS

The author is most grateful to Mr. Brian Bailey of the Manitoba Department of Energy and Mines; Dr. Jack Romanowski of the Department of Geography, University of Manitoba; and Professor Charles Thomsen of the Department of Landscape Architecture, University of Manitoba, for their constant assistance in the development of the practicum material. Their input and advice were invaluable to the completion of this study.

Special thanks are due to the Aggregate Resources Section of the Manitoba Department of Energy and Mines; Mineral Resources Division which provided the funding and support services which made this study possible.

The author also wishes to express his thanks and love to his wife, Darlene, who provided so much understanding and support.

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CHAPTER ONE

INTRODUCTION

1.1 General Problem Statement

Land requirements for mineral extraction are relatively small in comparison with requirements for agriculture, timber harvesting and recreation, but nonetheless are probably the most controversial. Extractive industries are often associated with environmental problems because new developments often require construction of roads or railroads and strip mining is involved in the extractive process itself.

A very common type of extractive land use is sand and gravel quarrying. As basic inputs into concrete and roadways, sand and gravel are associated with almost every kind of construction in Manitoba. Substantial surface disturbance often occurs because of the open pit excavation methods used. Since the excavation sites are at times associated with surface streams or groundwater, stream sedimentation or groundwater pollution may occur. There are also problems of noise, dust and visual blight associated with these operations. When sand and gravel quarries are situated near urban centres, desirable suburban or rural settlement areas may be used up (Ringrose and Large, 1979).

The Manitoba Department of Energy and Mines is presently compiling a data base of Manitoba's aggregate resources which will provide a basis for the development of resource management

and land use plans. Generally covering organized Planning Districts, the resource data collected includes geological inventories, economic demand projections and pit and quarry rehabilitation information. Field surveys of the regions result in maps indicating the location of sand and gravel deposits distinguished by quality, and location of sand and gravel quarries, and in a report describing surficial geology, evaluating mineral aggregate resources, assessing the regions' potential as a supplier of aggregate and recommending actions to protect valuable, high quality deposits. Also included in the aggregate resources management proposal are supply and demand aspects and proposals for management and rehabilitation of quarries.

The South Riding Mountain Planning District, located in the north and west of Winnipeg and immediately south of Riding Mountain National Park was established in 1979 under Part III of the Planning Act (R.S.M. 1975, c.29). Member municipalities in the District include the Rural Municipality of Strathclair, and the Local Government District of Park (Figure 1).

Upon the formation of the regional Planning District, resource management proposals and schemes are solicited from concerned government departments by the Manitoba Municipal Planning Branch. The Proposals and schemes are integrated by planning consultants hired by the District and result in overall objectives for land use planning being formulated. The proposals from the Mineral Resources Division have two

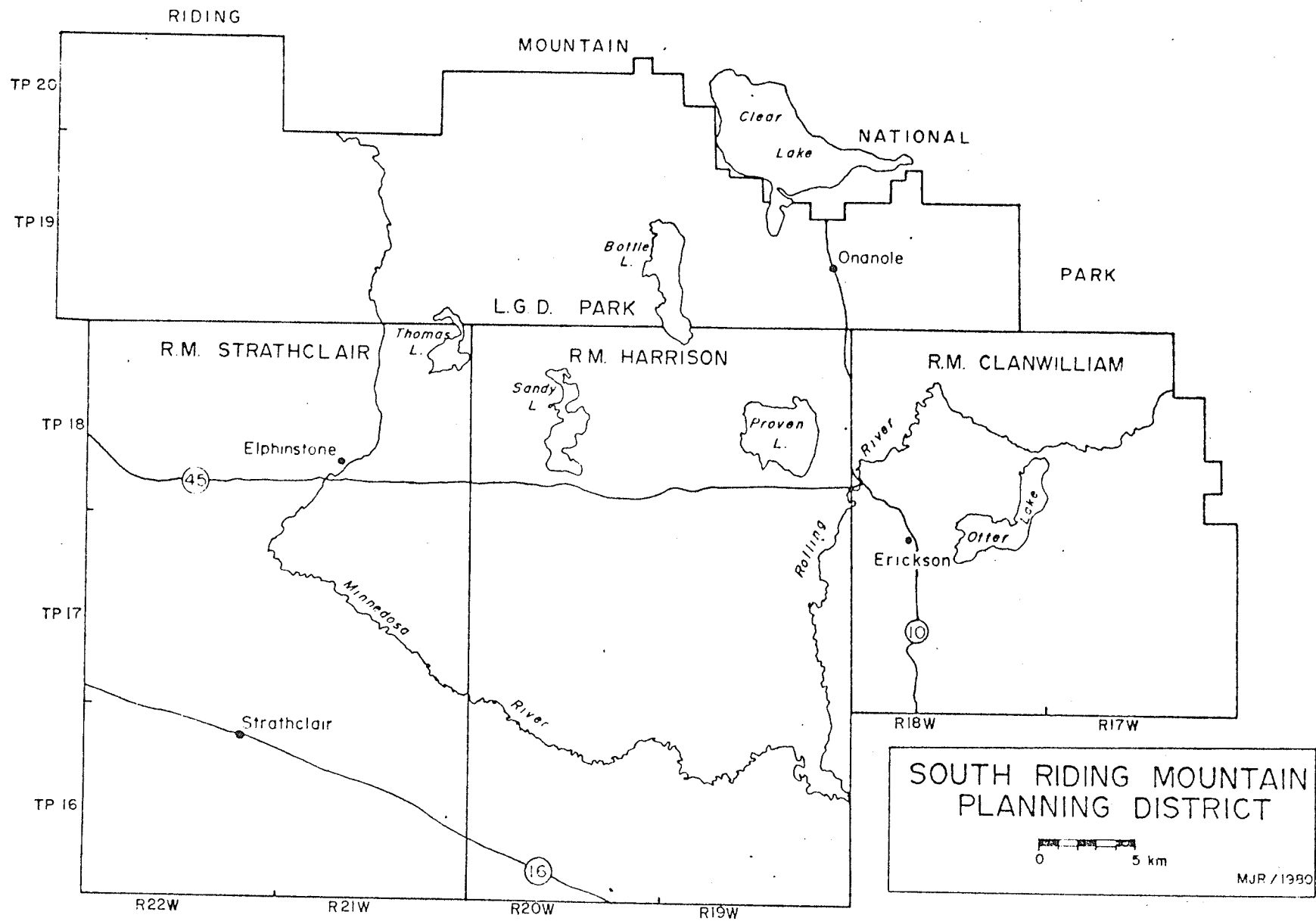


Figure 1. Study Area

main parts: a management proposal for the aggregate resource itself, and a management proposal for surface mining as a land use.

At the present time there is no inventory, classification or analysis of the sand and gravel quarries in the South Riding Mountain Planning District. In order to develop a realistic and meaningful proposal for the management of the quarries in the District, this study inventories, classifies and analyses the sand and gravel quarries in the South Riding Mountain Planning District and proposes strategies for the management of the existing and future quarries within the District.

1.2 Background

The study of surficial geology in the Riding Mountain area by Klassen (1966) indicates that while sand and gravel are generally abundant on glaciated landscapes, they may occur at depths below the surface, in limited quantities, or at distances from users which make them uneconomical to develop at present. Accurate estimates of the total quantity of aggregate in the South Riding Mountain Planning District are being developed but are not presently available.

Within the study area sand and gravel are used for gravelling or paving roads and for building and fill purposes. Presently no complete inventory of aggregate resources and pits exists. Pits within the study area are both private and government owned.

Ringrose and Large (1979) indicated several problems

that have occurred in Manitoba associated with aggregate extraction. These problems, such as disruption of agricultural land by excavation; visual blight and noise pollution contributing to reduction of value for recreation and residential development; excavation below the water table, resulting in flooding of pits; development of housing on top of economic aggregate deposits either precluding their extraction or increasing pressures to extract aggregate and disrupt existing activities; and the burdens to municipalities of having to construct access to deposits and maintaining facilities while receiving few benefits from the mining activity, also exist in other areas of the country including Saskatchewan (Talbot, 1978) and Ontario (Anonymous, 1971). Also, as in Manitoba, other provinces have enacted legislation to direct the reclamation and rehabilitation of pits. Hogan (1978) provides information that every province has laws governing the extraction of mineral aggregates.

Several provinces have enacted legislation to provide incentives for the completion of rehabilitation procedures. Hogan (1978) indicates that the Quebec regulation requires a guarantee of \$5,000.00 per hectare for the first hectare or part of a hectare to be stripped and \$4,000.00 for each additional hectare or part. In Manitoba each commercial operator must pay or post a cash bond of \$5,000.00 for each commercial pit he operates up to a maximum \$50,000.00 total.

1.3 Research Objectives

The objectives of this study, as related to the problem statement and background are:

1. to provide basic information on inventory, location and status of pits for the South Riding Mountain Planning District Board so that it can formulate objectives for land use planning.
2. To provide an inventory classification and analysis of the sand and gravel pits in the District.
3. To recommend management options and strategies for the pits in the District.
4. To provide a model for future mineral aggregate resource management proposals.

1.4 Delimitations

This study will not attempt to develop rehabilitation and management options and strategies on a site specific basis. All recommendations will be made relative to the general classification and analysis of quarries within the District.

No attempt will be made to inventory, classify or analyse quarries outside the South Riding Mountain Planning District.

1.5 Definition of Terms

- a. abandoned pit: means a pit where all excavation has been discontinued for any reason.

- b. commercial pit: means a pit from which more than 2,000 cubic yards of quarry minerals are removed annually and is operated for any purpose except for the personal use of an owner.
- c. depleted pit: means a pit where excavation has been discontinued because the quarry mineral of economic value has been mined out.
- d. district board: means the body responsible for the preparation, adoption, administration and enforcement of a district development plan or basic planning statement and is responsible for the administration and enforcement of the zoning by-law or a planning scheme of any municipality within the district; the building by-law or any municipality within the district; and the by-law for minimum standards of maintenance and occupancy of buildings of any municipality within the district.
- e. pit: means a quarry operated to win, take and carry away clay, sand, gravel, bentonite, kaolin, shale, or other unconsolidated mineral.
- f. planning district: means a planning district as established under The Planning Act and comprising such lands as would constitute a logical, rational area for planning purposes based on, but not limited to such considerations as topographic features, the extent of existing and probably urban development, the existence of important agricultural,

resource, conservational, recreational, or other urban or rural concerns, the existence or desirability of uniform social and economic interests and values and the existence of planning concerns common to the municipalities or communities concerned.

- g. quarry: means a mine which is an open excavation from which a quarry mineral is removed.
- h. quarry mineral: means the following minerals obtained by quarrying: shale, kaolin, bentonite, gypsum, clay, sand, gravel, peat, salt, coal, and rock or stone used for any purpose other than as a source of metal, asbestos, potash, oil and natural gas.
- i. reclaimed pit: means a pit where no active rehabilitation has been carried out but where natural revegetation of the pit has occurred.
- j. rehabilitated pit: means a pit where planned excavation and progressive reshaping of the mine landscape have occurred, based on the objectives of:
 - 1. Ensuring public safety;
 - 2. Protecting the environment;
 - 3. Optimizing the productivity of the post-mining landscape for some social or economic purposes and
 - 4. Efficiently utilizing the available resource.

1.6 The Study Area

The study area for the purpose of this report is the

South Riding Mountain Planning District comprised of the Rural Municipalities of Clanwilliam, Harrison and Strathclair, and the Local Government District of Park (Figure 1). This study area of approximately 200,000 hectares is located approximately 200 kilometers to the northwest of Winnipeg on the southern slopes of the Riding Mountain Upland (Figure 2). The area is characterized by undulating, hilly moraine-type land forms with numerous lakes and wetlands and elevations between 600 and 750 meters above sea level (Klassen, 1966).

Klassen (1966) indicated that the soils developed in the area are black earth and grey-wooded zonal soils. The soil areas are generally coincident with boundaries of sufricial geologic units with the soil associations based on differences in parent materials. The surface deposits are mainly of loamy textured till derived from Cretaceous shales, Precambrian granites and Paleozoic limestones and dolomites. Bedrock underlying the area is light grey, hard shale and greenish, soft shale.

Michalyna and Holmstrom (1980) stated that the climate for the area is designated transitional, cool boreal to moderately cold cryoboreal, subhumid continental. Klassen (1966) indicated that the average yearly precipitation is approximately 46 centimeters, with minimums as low as 25 centimeters and maximums as high as 67 centimeters. The wettest month is usually June while the driest months are February and December. January is generally the coldest month with an average temperature of -19°C , and July is usually the warmest month with an

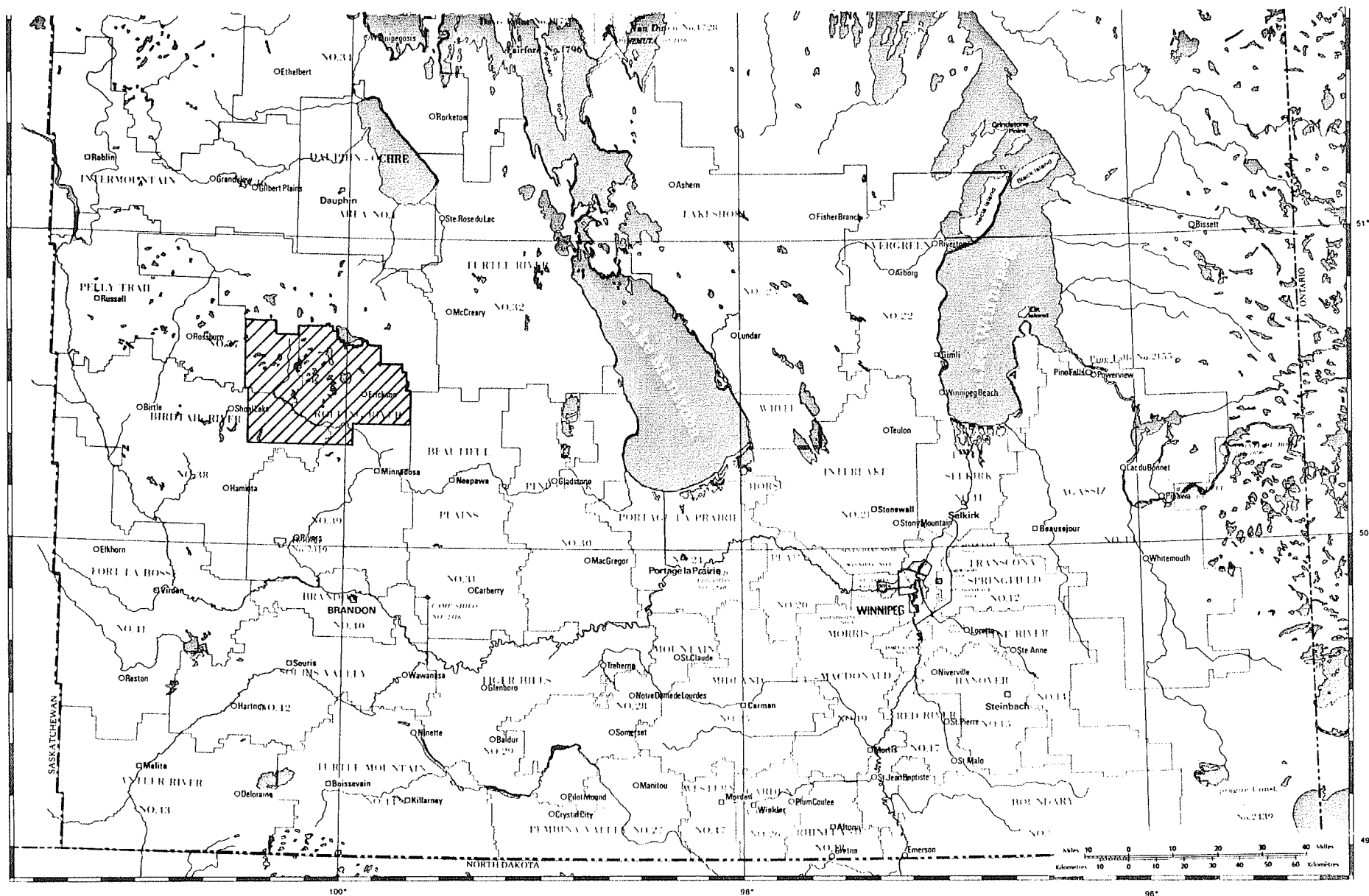


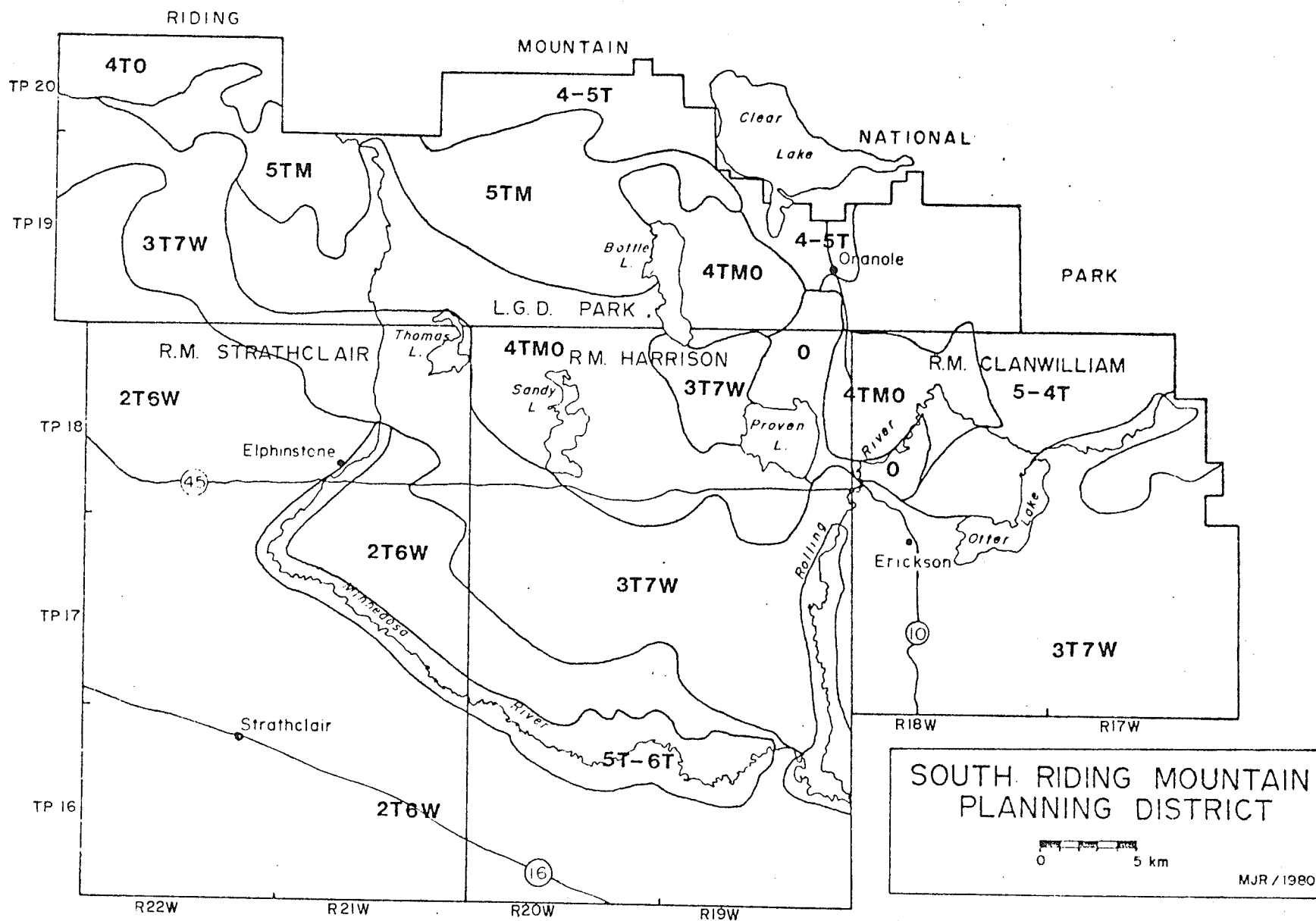
Figure 2. Study Area Location

average temperature of 18°C. From November to March inclusive, the average monthly temperatures are below 0°.

Agriculture is the predominant land use, with some residential and recreation land use. The dominant type of farming is cereal grain production, followed by mixed grain and livestock, and ranching. The major portion of farmlands is used for cereal crops or forage and hay production. Grain farms are found mainly in areas of moderate relief with some poorly drained, depressed areas. The mixed and ranching operations are generally located in areas of rolling to strongly sloping topography. Native vegetation is mixed woods of the Boreal Forest Region with aspen, white spruce and paper birch, and minor occurrences of white elm, green ash, Manitoba maple and bur oak. In poorly drained areas vegetation consisting of tamarack, black spruce and sedges occurs (Michalyna and Holmstrom, 1980).

The Canada Land Inventory (CLI) was started in the early 1960's to provide base information in an inventory of land capability for agriculture and also of the potential for submarginal agricultural land to support alternative uses. The system developed classifications to map land capability for agriculture, recreation, forestry, ungulates and water fowl. The capability inventory was based on airphoto interpretation and field surveys. The five following maps present the CLI information concerning land capability for agriculture (Figure 3), forestry (Figure 4), recreation (Figure 5), ungulates (Figure 6), and waterfowl (Figure 7) for the study

area. A Composite map of CLI Critical Capability Areas (Figure 8) indicates the areas that have a high capability for one or more resource uses. These are key capability areas in that they represent lands that are most productive, or best suited to a range of uses, or that are essential for maintenance and production of wild life. Each map is followed by the map legend as given by CLI.



Source: CLI Map-Manitoba-South Part, 1:1,000,000. Soil Capability for Agriculture. 1974. Figure 3. Soil Capability for Agriculture

Map Legend - Soil Capability for Agriculture.

CLASSES

- Class 1 - Soils in this class have no significant limitations to use for crops.
- Class 2 - Soils in this class have moderate limitations that restrict the range of crops or require moderate conservation practices.
- Class 3 - Soils in this class have moderately severe limitations that restrict the range of crops or require special conservation practices.
- Class 4 - Soils in this class have severe limitations that restrict the range of crops or require conservation practice, or both.
- Class 5 - Soils in this class have very severe limitations that restrict their capability to producing perennial forage crops, but improvement practices are feasible.
- Class 6 - Soils in this class are capable of producing perennial crops only, and improvement practices are not feasible.
- Class 7 - Soils in this class have no capability for crop use or permanent pasture.
- Class 0 - Organic soils (not placed in capability classes).

SUBCLASSES

- M - Deficient soil moisture.
- T - Adverse relief because of steepness or pattern of slopes.
- W - Excessive soil moisture.

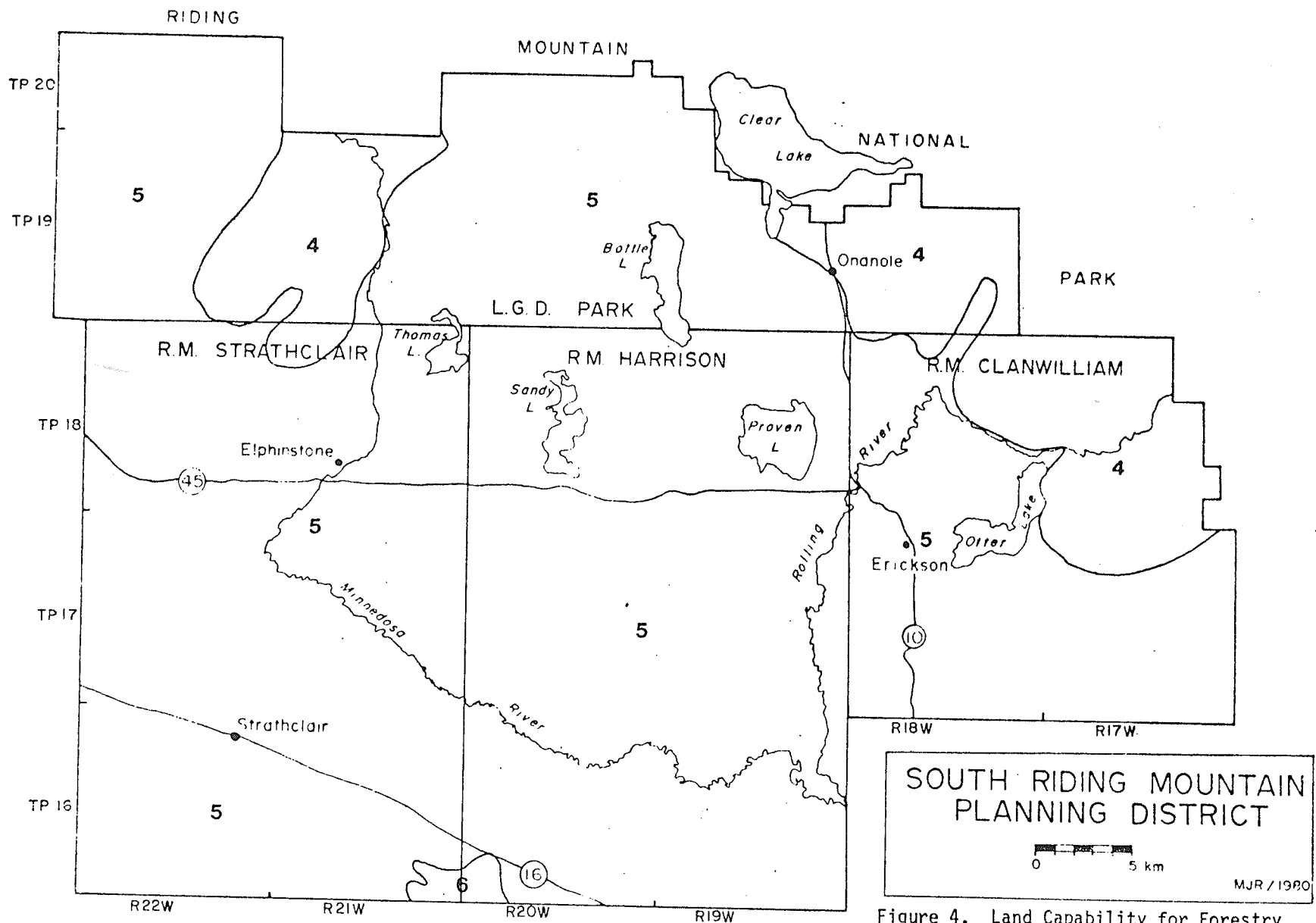


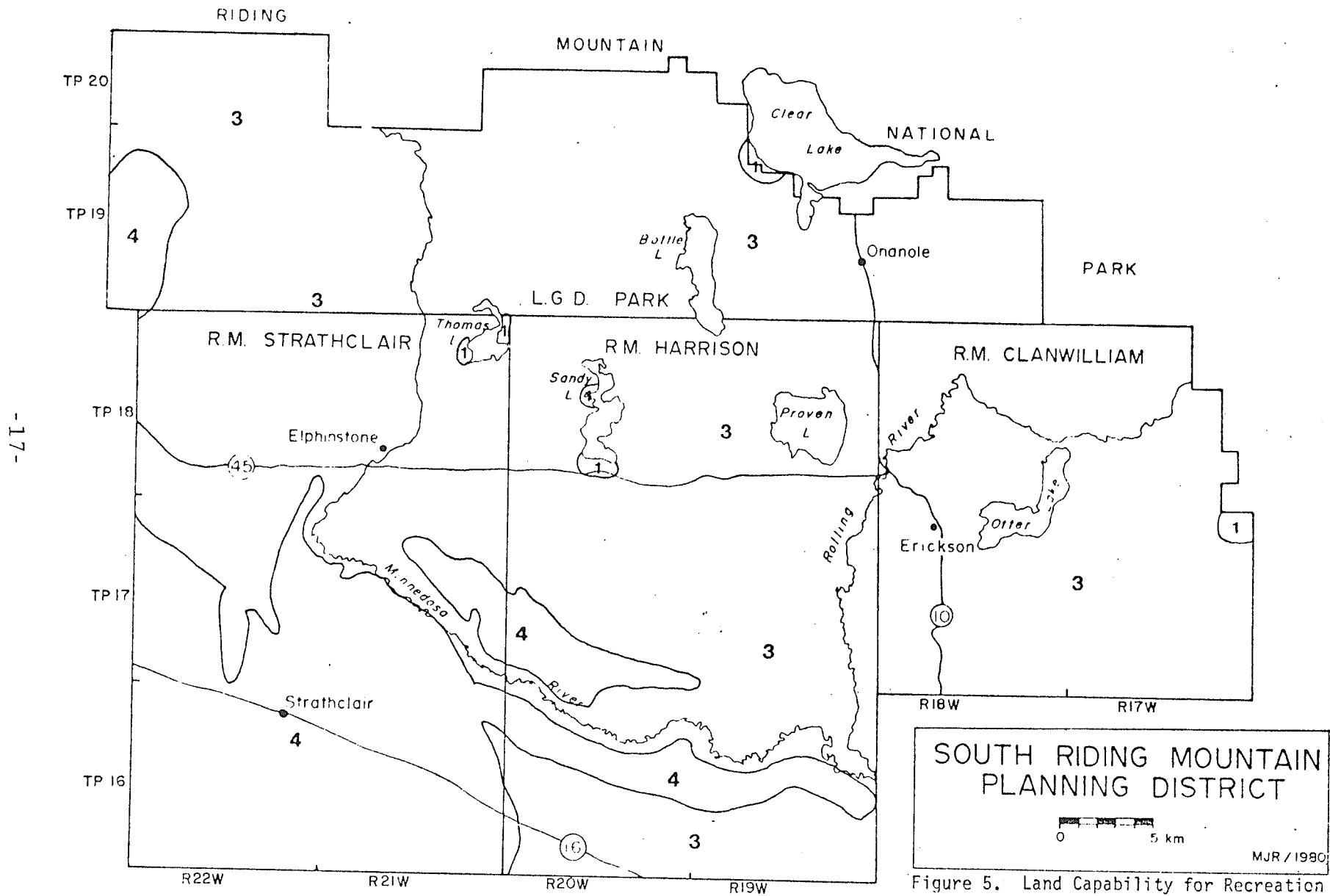
Figure 4. Land Capability for Forestry

Source: CLI Map-Manitoba-South Part, 1:1,000,000. Land Capability for Forestry. 1977.

Map Legend - Land Capability for Forestry.

CLASSES

- Class 1 - Lands having no important limitations to the growth of commercial forests.
- Class 2 - Lands having slight limitations to the growth of commercial forests.
- Class 3 - Lands having moderate limitations to the growth of commercial forests.
- Class 4 - Lands having moderately severe limitations to the growth of commercial forests.
- Class 5 - Lands having severe limitations to the growth of commercial forests (poor moisture-holding and low fertility).
- Class 6 - Lands having severe limitations to the growth of commercial forests (poorly-drained organic soils).
- Class 7 - Lands having severe limitations that preclude the growth of commercial forests.



Source: CLI Map-Manitoba-South Part, 1:1,000,000. Land Capability for Recreation. 1974.

Map Legend - Land Capability for Outdoor Recreation

- 1 - Lands that have high to very high capability for outdoor recreation.
- 2 - Lands that have moderately high capability for outdoor recreation.
- 3 - Lands that have moderate to moderately low capability for outdoor recreation.
- 4 - Lands that have low to very low capability for outdoor recreation.

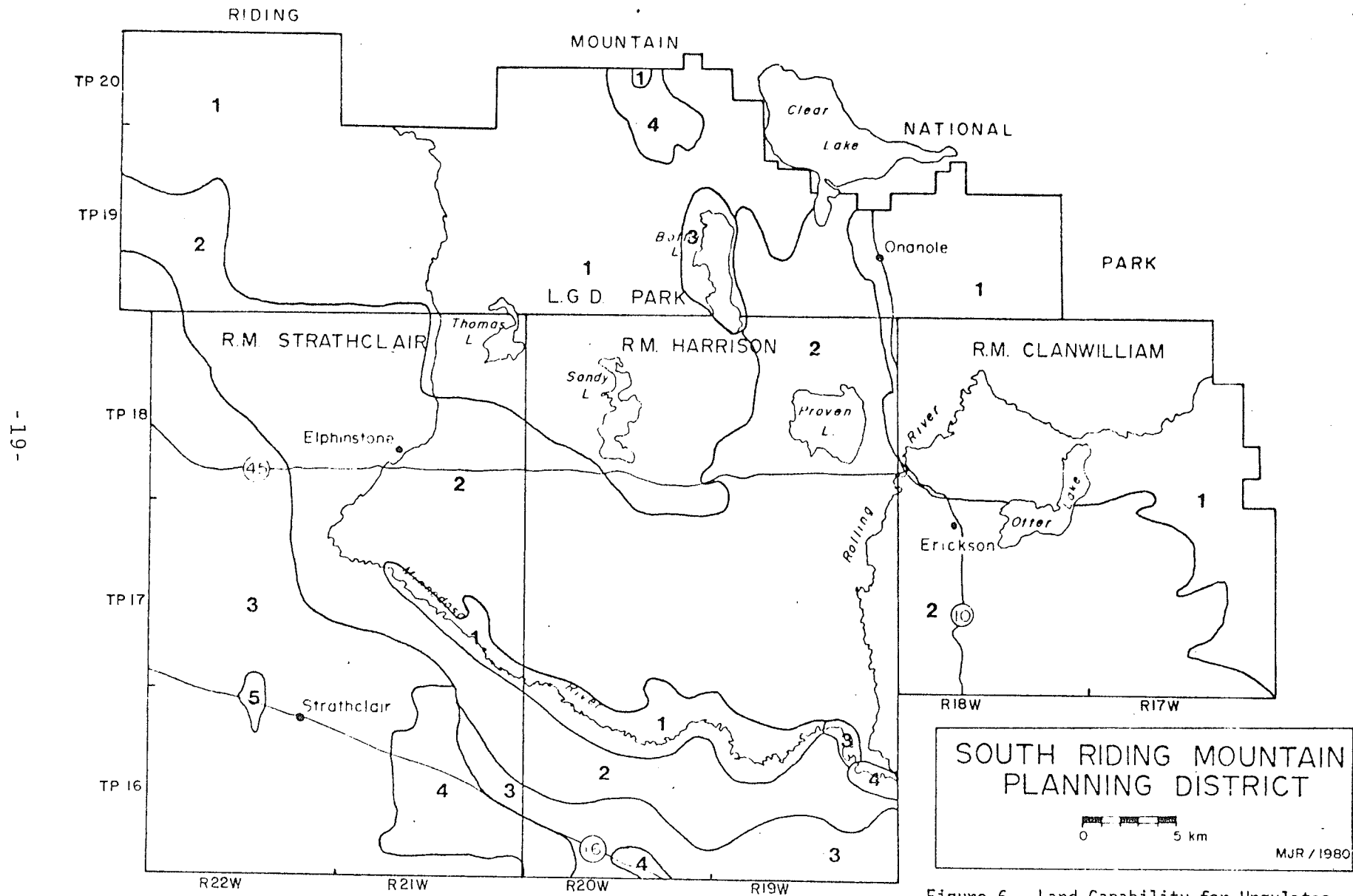


Figure 6. Land Capability for Ungulates

Source: CLI Map-Manitoba-South Part, 1:1,000,000. Land Capability for Ungulates. 1976.

Map Legend - Land Capability for Ungulates

- 1 - Lands that have great importance for wintering ungulates.
- 2 - Lands that have high capability for production of ungulates.
- 3 - Lands that have slight limitations to production of ungulates.
- 4 - Lands that have moderate limitations to production of ungulates.
- 5 - Lands that have severe limitations to the production of ungulates.

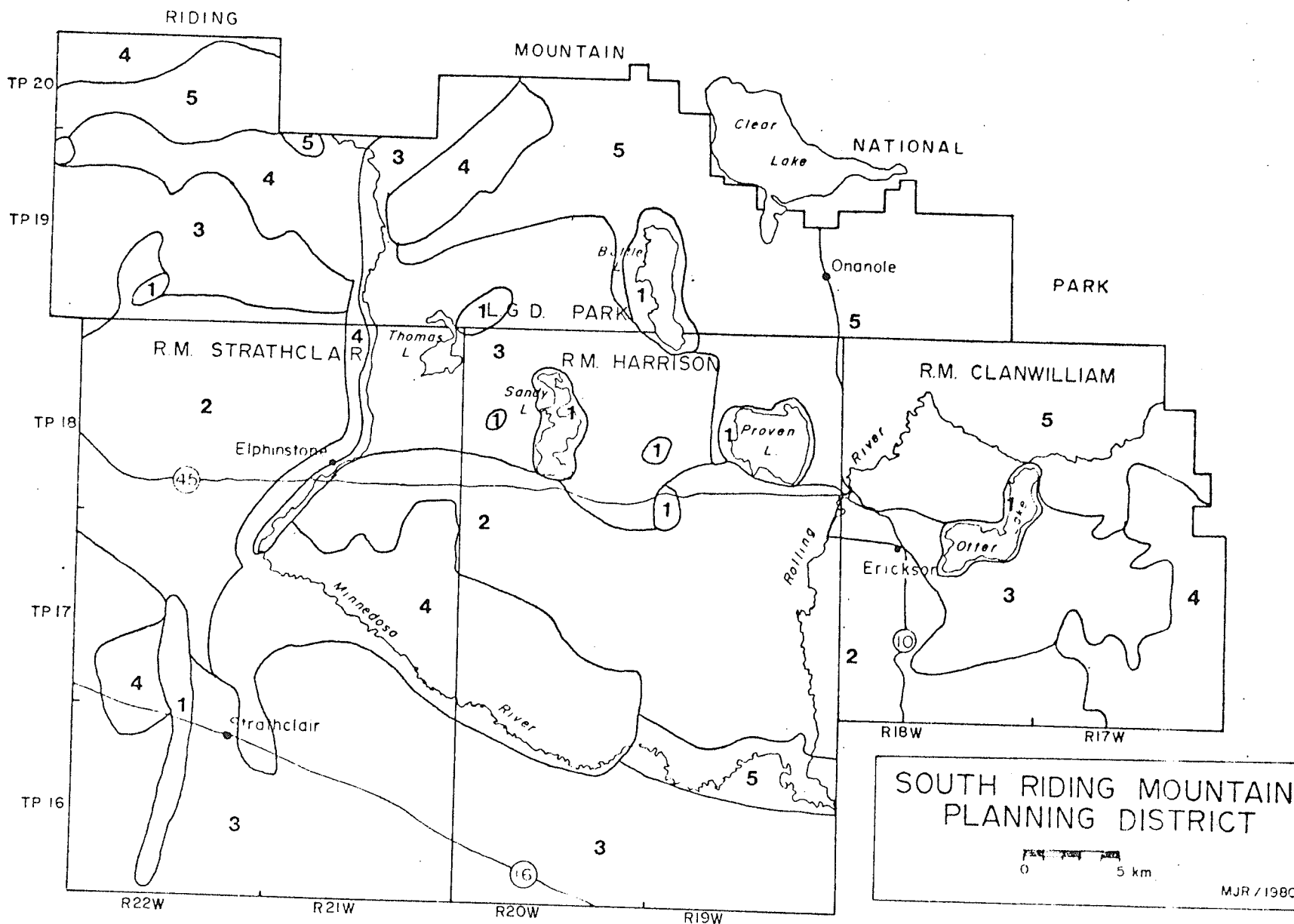


Figure 7. Land Capability for Waterfowl

Source: CLI Map-Manitoba-South Part, 1:1,000,000. Land Capability for Waterfowl. 1974.

Map Legend - Land Capability for Waterfowl.

- 1 - Lands that have great importance for migration or wintering waterfowl.
- 2 - Lands that have high capability for production of waterfowl.
- 3 - Lands that have slight limitations to production of waterfowl.
- 4 - Lands that have moderate limitations to production of waterfowl.
- 5 - Lands that severe limitations to production of waterfowl.

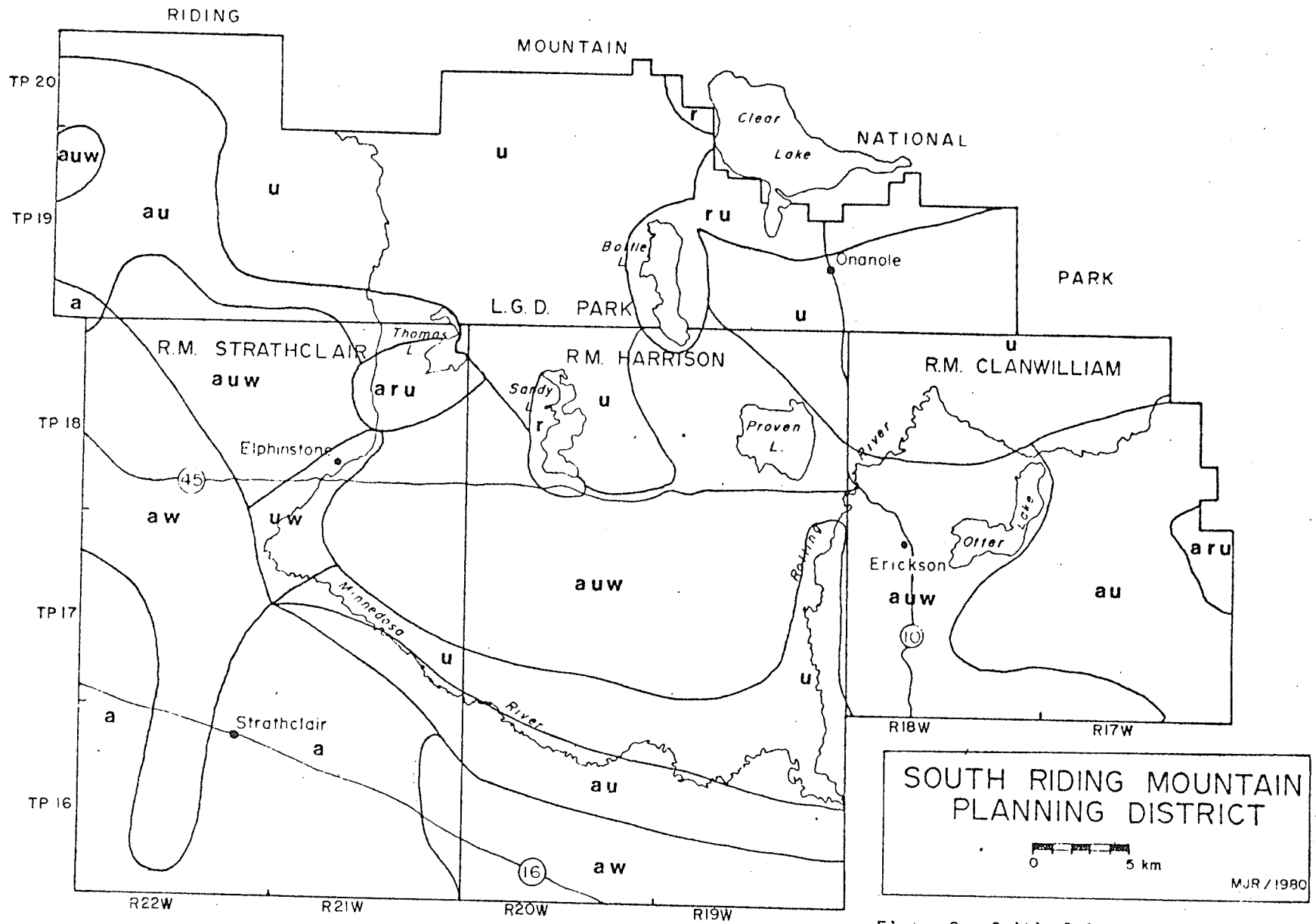


Figure 8. Critical Capability Areas

Source: CLI Map-Manitoba-South Part, 1:1,000,000. Critical Capability Areas, 1975.

Map Legend - Critical Capability Areas.

- a - Agriculture - Soils in this category range from those having no significant limitation in use for crops to those having moderately severe limitations that restrict the range of crops or require special conservation practices.
- f - Forestry - Lands in this category range from those having no important limitations to the growth of commercial forests to those having moderate limitations to the growth of commercial forests.
- r - Recreation - Lands in this category range from those having a very high capability to those having a moderately high capability for outdoor recreation.
- u - Ungulates - Lands in this category include those having no significant limitations and those having very slight limitations to the production of ungulates, and those that also have no significant limitations to slight limitations as winter ranges.
- w - Waterfowl - Lands in this category include those having no significant limitations and those having very slight limitations to the production of waterfowl, and those that also have no significant limitations to slight limitations as migration stops.

- XX - Lands in this category are of prime importance for a combination of two of the above sectors and will contain the two letters from those sectors.
- XXX - Lands in this category are of prime importance for any combination of three or more of the above sectors and will contain the letters from those sectors.

CHAPTER TWO

REHABILITATION CONCEPTS AND LEGISLATION

Because rehabilitation has not been in a consistent practice in the past, many abandoned pits and quarries exist in the province. Although most of the mineral resources are located on Crown Lands, control over these resources is often held by private individuals and firms under a variety of arrangements which include mineral claims and mineral leases.

Sand and gravel quarrying operations may result in conflicts with recreational, wildlife, fisheries, agricultural and urban land uses. Disruption of surface and groundwater systems may occur. Mineral extraction operations often produce noise and traffic problems which detract from environmental quality.

Notwithstanding these constraints, progress has been made to reduce or eliminate conflicts between surface mining and other land uses. Legislation and regulations requiring surface rehabilitation have been introduced. Although the responsibility for rehabilitation is placed on the developer, the question of responsibility for rehabilitation of old and abandoned sites has not been entirely settled. The combination of mineral resource regulation and land resource regulation has led to some improvements with respect to both environmental quality and the attitudes of the public toward mineral extraction as a land use.

2.1 Rehabilitation of Pits and Quarries

The dictionary definition of rehabilitation is "to restore, to put into original condition, to repair". While Manitoba Regulation 226/76 does not state that rehabilitation is the planned excavation and progressive reshaping of the mine landscape, based on department policy and interpretation the objectives are:

1. Ensuring public safety;
2. Protecting the environment;
3. Optimizing the productivity of the post mining landscape for some social or economic purpose; and
4. Efficiently utilizing the available resource.

To achieve these objectives Section B3 of Appendix B of Regulation 226/76 states:

"B3 Unless otherwise approved, rehabilitation shall comprise:

- (a) The removal of vegetative cover and over burden in advance of the working face at a minimum distance of twice the height of the working face;
- (b) Upon depletion, the sloping of the quarry walls no steeper than 45 degrees;
- (c) The distribution of overburden over the surface of the sloped quarry walls and the quarry floor;
- (d) Planting of vegetation appropriate to the environ-

ment of the commercial quarry on the surface covered by overburden;

- (e) The contouring of quarry walls standing below water level to minimize danger to the public;
- (f) Disposing of all debris, refuse, scrap or inflammable liquids in an approved manner,
- (g) Any other activities of a similar nature to any of those described in clauses (a) to (f)."

Schmidt (1977) indicates that the terms reclamation and rehabilitation usually imply restoration of repair of misused lands and indicates a negative attitude to sand and gravel extraction. In many cases operations have left abandoned sites requiring restoration of lands before additional uses were possible. McLellan, Yundt and Dorfman (1979) differentiated between rehabilitation and reclamation. The former is explained as:

"... the treatment of land to develop and improve it into a beneficial form. It is the end product of man's or nature's efforts to make its appearance blend into the surrounding landscape. It also serves a specific beneficial societal use."

The latter is described as:

"... only partial rehabilitation in the sense that only one of the two necessary components is present. Total rehabilitation requires an acceptable change

in both the physical appearance and the use of the pit."

Of great importance to pit and quarry rehabilitation is sequential land use planning prior to the start of mining operations. Ringrose and Large (1979) indicated that the process would include: definition of aggregate resource deposits; planning for temporary land uses until the gravel is excavated; extractive operations planning (a mining plan for acquiring the gravel resource while minimizing environmental and neighbourhood conflicts), and rehabilitation planning to optimize potential after-use of mined-out lands. The benefits of sequential land use planning include:

1. Operational advantages to the operator by incorporating land shaping activities into the standard mining procedure thereby providing an efficient use of equipment, materials, labour, and time. Schmidt (1977) provides examples of preplanned mining and rehabilitation where the handling and moving of overburden and fill material were minimized and greater efficiency and cost savings resulted.
2. Minimizing of objectionable operational characteristics which are of a heavy industry nature.
3. Improvements in the appearance of the mining area during and after operations.
4. Creation of useable land areas and more valuable

real estate for the after use of mined-out sites.

5. Economic advantages related to efficient use of mining equipment, and the resulting increase in land value with the provision of useable land areas.

Bailey (1978, and pers. comm.) has stressed that one of the main goals of rehabilitation programs is the optimization of potential for utilization of the landscape during and after the mining operation. Past views of surface mining as a final use of land have changed to a certain degree with public education. Professionally prepared rehabilitation programs have shown that a large range of alternative land uses are possible and that the landscape need not necessarily be returned to its original state. The conditions prevalent at each site will dictate which uses cannot be made of that particular site rather than which uses can be made. That some beneficial use is made of a site is probably more important than which use in particular is made. The Mineral Resource Division has prepared a "Guide for Preparation of Rehabilitation Plans" (Attached as Appendix I) to aid operators of commercial quarries in the planning of mining and rehabilitation. Of concern are that rehabilitated slopes on the mine site are appropriate for the intended use, and that intended use does not conflict with the development pattern established by the municipality.

In the area of environmental protection, the main concern is to identify and resolve any problems before they

occur. The Water Rights Act (R.S.M. 1972, c.289) regulates treatment and use of surface and groundwater while noise, dust, emission and vibration are matters subject to the Clean Environment Act (R.S.M. 1972, c. 76).

Hazards to public safety in mining areas are presented by the creation of steep slopes and new water bodies. In sand and gravel pits the placing of overburden and fill material on slopes can generally minimize the problems. However, in stone quarries the steep and often vertical slopes left are extremely difficult to reslope and generally fences, berms and signage are used to mitigate the dangers somewhat. The rehabilitation of rock quarries, especially from a safety standpoint is a subject of ongoing study in the Division.

2.2 Policies and Legislation

2.2.1 The Mines Act

The requirements of the Mines Act (R.S.M. 1970, c. M160) and any of its regulations are binding upon the operator of a mine and the owner or lessee of the mineral rights, who initiates the mining and derives the main benefits of any returns. This may exclude the owner of the surface rights, if he does not also own the mineral rights. Although the mineral and surface rights may be held together, there are instances where they have been separated in previous transactions or to facilitate mining. Prior to January 11, 1890 land titles issued by Canada conveyed to the holder of the land title surface rights, mineral under-rights and sand and

gravel. Between 1890 and July 15, 1930, when land titles were issued by Canada, the Crown reserved mineral under-rights while conveying surface rights and sand and gravel to the owner of the land title. On July 15, 1930, the Federal Government transferred to the western provinces, including Manitoba, all resources including lands, forests, and mines. Land titles issued by Manitoba after July 15, 1930 conveyed surface rights to the owner of the land title and reserved for the Crown sand and gravel and mineral under-rights.

The Quarrying Minerals Regulation (Manitoba Regulation 226/76) passed pursuant to the Mines Act deals with most surface mineral extraction operations, except metallic minerals. This regulation requires the rehabilitation of all commercial quarries. (As defined in the regulation a commercial quarry means a pit or quarry from which more than 2,000 cubic yards of mineral are removed annually and which is operated for any purpose except for the personal use of an owner). The Mineral Resources Division recognizes and supports a concept of sequential land use planning with respect to pit and quarry operations as an interim land use, which includes: identification of the mineral resource, planning for temporary use of identified resource areas until the mineral is extracted, extractive operations planning (for example, a mining plan to minimize environmental conflicts), and a rehabilitation plan to optimize after-use of the mined-out land.

The regulation places the onus of site rehabilitation on pit and quarry operators and has as its major focus the establishment of controls to achieve safe operation and rehabilitation of pits and quarries. The regulation is administered on the basis that rehabilitation is the planned excavation and progressive reclamation of a site with the objectives of: minimizing hazards to public safety, protecting the environment, optimizing the productivity of the post mining landscape, and efficiently utilizing the available resources. As an incentive to carry out the rehabilitation the Regulation provides for the cash payment of \$5,000.00 for each commercial pit up to a maximum of \$50,000.00 for 10 or more commercial pits operated by the same operator. This money is returned to the operator when rehabilitation of the pit has been completed.

The Quarrying Minerals Regulation applies only to those pits and quarries which have been worked after January 1977. The regulation is not binding on mines worked out before January 1977 nor does it apply to operations removing less than 2,000 cubic yards of mineral annually.

Parts II, III and IV of Regulation 226/76 deal with the mining of quarry minerals on Crown lands. The granting of the permissions to mine Crown minerals on Crown lands can be made subject to certain conditions (Appendix II). Generally, under Part II dealing with casual permits, conditions are placed on the mining operation which are in effect progressive rehabilitation steps. The Crown can

develop mining and rehabilitation plans as outlined in Appendix B of the Regulation which are then carried out by a series of operators as they take out their allotted amount of quarry mineral. In lieu of rehabilitation, the Crown collects a 5¢ per cubic yard charge to be used for rehabilitation. Part III deals with exploration for quarry minerals on Crown lands and requires a plan of activities to be carried out and the resultant rehabilitation necessary. Part IV of the Regulation deals with leases. In the case of lease holders, the rehabilitation regulation requires the submission of plans for rehabilitation and mining as outlined in the "Guide for Preparation of Rehabilitation Plans" attached as Appendix I. The plans are reviewed by the Mining Engineering and Inspection Section in general consultation with local municipal officials and other government departments which provide expertise in such fields as groundwater, forestry, agriculture, wildlife and agriculture.

Where mining of quarry minerals occurs on privately owned lands and where the sand and gravel are privately owned, the rehabilitation applies only to commercial pits. A commercial pit is defined in the Regulation as: "a pit from which more than 2,000 cubic yards of quarry minerals are removed annually and is operated for any purpose except for the personal use of an owner". Regulation 226/76 requires the submission of plans for rehabilitation and mining as set out in the "Guide" attached as Appendix I.

All mining activities are monitored by mines inspectors.

Consultation with operators and the issuance of "orders" are means used to bring operations into compliance with the Mines Act and its regulations. The legislation provides for the imposition of fines for contravention and for the submission of a bond which is held by the Crown pending completion of the rehabilitation requirements.

2.2.2 The Planning Act

In 1976 Manitoba proclaimed a new Planning Act (R.S.M. 1975, c.29) to facilitate land use planning in the province. The incentive for the legislation stemmed mainly from the need to resolve land use conflicts between rural farm communities and exurban developments in the countryside. These conflicts were generated by different lifestyles, value systems, social needs and expectations. Conflicts arose because of the inequitable taxation effect of farm land values grossly increased by the proximity of exurban residential development and from the impact of environmental controls which restricted farming practices and curtailed agricultural opportunity while protecting residential use. Conflicts were the result of scattered, unplanned and uncontrolled development.

Part IV of the Act stipulated that neither land subdivisions nor development could take place in the absence of an approved development plan. It required that a District Plan must be approved by the designated provincial authority before it may be put into official use and that all subsequent development must conform to the Development Plan.

For plan development, Part III of the Act provides for the formation of Planning Districts, each being a small number of rural municipalities and incorporated settlements which have been grouped for land use planning purposes. Planning districts comprise "a logical area for planning purposes based on, but not limited to such considerations as topographic features, the extent of existing and probably urban development, the existence of important agricultural, resource, conservation, recreational, or other urban concerns, the existence or desirability of uniform social and economic interests and values, and the existence of planning concerns to the municipalities or communities concerned." [R.S.M. 1975, C.29, s.13(2)].

Philosophically, the Act represents a belief that the most rational process of planning is from the bottom up. The Planning Districts were established at the local government level and were based on three factors: first, basic provincial law allocates land use control to local governments; second, current problems are most pressing at the local government level; and third, at the municipal level government and people can come closer to each other. Recognition was given the idea that comprehensive planning must consider and integrate two levels of need: municipal and provincial. The Act provides for this through the provision of provincial policy and related guidelines which provide guidance for the Planning District (Bell and Keleher, 1977).

The Planning Districts are each administered by a

Planning Board, and are offered technical assistance from Provincial government departments that have an interest in land or resource use. These provincial interests are co-ordinated by the Department of Municipal Affairs, Municipal Planning Branch, which solicits resource management proposals, arranges presentation and discussion of these proposals with Planning Boards, and provides a forum for resolution of resource conflicts. The Planning Board makes decisions about regional planning for the District. The results of its work are: a Basic Planning Statement, comprised of concerns of the District, objectives; and a Development Plan containing a detailed proposal for land use within the District. Interested provincial departments and agencies and the public have the opportunity to review and make recommendations about both phases of the process. The Planning Board finalizes its Basic Planning Statement and Development Plan after public hearings. The Provincial Land Use Committee of Cabinet reviews submissions to ensure all reasonable concerns have been addressed and also make recommendations to Cabinet for approval of the planning documents. The end result of the planning process is the transfer of the authority to approve land subdivisions and development from the provincial to the local administration. The Planning Act and the co-ordination role of the Department of Municipal Affairs provide an administrative framework facilitating provincial technical input into regional planning, while maintaining the decision-making authority at the local level (Ringrose and Large, 1979).

The regulation and control, both directly and indirectly, of pits and quarries may be carried out under several sections of the Planning Act. Part V of the Act, entitled Land Use Control contains the bulk of the sections where direct control may be exercised. Provision is made under Section 39 for the prohibition of development, for interim development control orders, for development permits and for regulation of development permits. Specifically, developments must conform to the adopted development, planning scheme, zoning by-law and basic planning statement and to the provisions of the Planning Act (Section 39.1). Section 40 deals with the development and contents of zoning by-laws. Under Section 41, general development standards and development standard provisions are developed. Specifically, section 41(2) subsection (c) indicates that zoning by-laws may prohibit the making or establishment of sand and gravel pits or quarries. Section 41(4) states that the powers of prohibition given in section 41(2)(c) include the powers to permit and regulate the pits or quarries. Essentially, power is given under the Planning Act to the district board to permit or prohibit and to regulate the establishment and continuing operation of sand and gravel pits and quarries within its planning district. Under section I of the Planning Act, "development" is defined as:

- "i) the carrying out of construction, erection or placing of any building or excavation or other operation on, over or under land, or
- ii) the making of any change in the use or intensity of use of any land or buildings or premises."

2.2.3 Provincial Land Use Policies

Under the Provincial Land Use Committee of Cabinet, thirteen Provincial Land Use Policies have been developed. The purpose of these policies is to guide the management of land resources in the province; to provide direction towards a rational allocation of land in order to meet social and economic needs while protecting provincial resources of prime agricultural land, historical and cultural sites, natural features, recreational areas, and valuable sand, gravel and limestone deposits. Each land use policy is explicit in its objectives and application, and is offered by the province as a guideline to regional land use planners. The land use policies appear in Appendix III.

Of particular concern to mineral extraction land use is Provincial Land Use Policy 13, which states: "Economically valuable aggregate and quarry mineral deposits should be protected from surface land uses that would interfere with their ongoing and future exploitation" (Provincial Land Use Committee of Cabinet, 1978). For each Planning District, the Department of Energy and Mines, Mineral Resources Division, prioritizes resource deposits according to quality, quantity, past use, present land use, and predicted future need for material. Land use and other conflicts are identified and analysed.

CHAPTER III

RESEARCH METHODOLOGY

3.1 Inventory

Preliminary information on the location of pits in the study area was obtained from interpretation of large scale aerial photographs and from Department of Highways Material Inventory and Analysis of Sand and Gravel Deposits (1977). The most recent aerial photo coverage of the study area, at a scale of approximately 4 miles to 1 inch, was flown in 1964. Limited further information was obtained from smaller scale, 1 mile to 1 inch; photographs flown in 1970. The Department of Highways inventory was carried out in summer of 1976.

During 38 days of field-work in summer of 1980, sand and gravel pits were identified, photographed and site inspected for existing conditions. Using the preliminary information gathered from aerial photos and Department of Highways inventory, a system of field inspections was developed. Pit locations were plotted on 1:50,000 NTS topographic sheets and the sites were visited as the study area was traversed. The field-work for this study was combined with field-work for a study of surficial geology and location of sand and gravel deposits within the same study area. The traverses followed the municipal one mile grid road system whenever possible, and this method allowed for investigations of geology and the possibility of other pits between those sites found from

preliminary sources.

With emphasis in this study on pit rehabilitation and management, the site features inspected included: areal extent of disturbed area; size of operation, whether a commercial pit and therefore having 2,000 cubic yards or more of material removed per year; type of surrounding land use and vegetation; quality of mineral aggregate; and state of mining operation. The information gained from site inspections was complemented with information concerning surface and mineral ownership; age of mining operations, and legal description of the site location. A compilation and analysis of this information would result in a means of classifying the pits in the study area.

3.2 Site Information

3.2.1 Legal Description

Legal description of site locations provides the basic information of pit location. In cases where pits are extensive, the legal description given is either the centre of the pit or location of the largest area. Legal description also provided preliminary information to determine surface and mineral ownership. Legal descriptions were determined by transferring pit locations from aerial photographs onto 1:50,000 NTS topographic sheets.

3.2.2 Disturbed Area

The area disturbed by mining and related activities

at each site provided a basis for comparison with area used by other land uses, and when totalled for the study area, provides some indication of the area of land use for surface mining.

3.2.3 Commercial Pits

Site inspections were used to determine the age of the pit and amount of material removed, thereby giving an indication of whether less than or greater than 2,000 cubic yards per year were removed.

3.2.4 Age of Pit

Of major importance regarding the age of the pits in the study area is whether or not pits were active before January 1, 1977. Only pits mined after January 1, 1977 or areas of pits mined after January 1, 1977 (where the pits were in existence prior to January 1, 1977) are regulated by the rehabilitation regulation.

Pits on the 1964 and 1970 aerial photographs existed prior to 1977. The Highways inventory, carried out in the summer of 1976 also showed pits in existence prior to 1977.

3.2.5 Surface Rights and Sand And Gravel Ownership

The information regarding ownership was derived from the files of Manitoba Department of Natural Resources, Lands Branch, Land Registry Section. The differences in application of the rehabilitation regulations were discussed in an earlier



section and the ownership information serves to indicate where these differences will occur.

3.2.6 Adjacent Land Use

Site inspections provided land use data indicating possibilities for rehabilitation based on surrounding land use and also the extent to which surface mining may conflict with adjacent land uses. Land use classes examined included: agricultural - those lands either in crops or summer fallow at the time of inspection; pasture - those lands including grassland and forest being grazed; residential - lands being used for residential subdivisions, including cottages but not including single residences such as farmsteads; and forest-lands with predominantly aspen, spruce and/or pine vegetation.

3.2.7 Adjacent Vegetation

Vegetation information gathered from site inspections consisted of three categories: aspen, crops and grassland. Of significance in this section are the natural reclamation possibilities afforded by aspen and grassland vegetation, and the possibility of reduction of agricultural lands due to pit enlargement. No distinction was made as to type of crops in the category and summer fallow was also considered a "crop".

3.2.8 Aggregate Quality

Aggregate quality was determined at each site based on

visual analysis of the amount (percentage) of gravel in the deposit. Low quality aggregate contained 0 to 25 per cent gravel; 25 to 75 per cent gravel comprised Medium quality; and 75 to 100 per cent comprised High quality aggregate.

3.2.9 State of Mining Operation

Of prime importance in the present condition of the existing pits. The state of mining operations can be divided into 5 categories:

1. Active - a pit that is being mined.
2. Rehabilitated - a pit where planned excavation and progressive reshaping of the mine landscape have occurred, based on the objectives of:
 1. Ensuring public safety;
 2. Protecting the environment;
 3. Optimizing the productivity of the post mining landscape for some social or economic purpose; and
 4. Efficiently utilizing the available resource.
3. Abandoned, depleted - a pit where mining has been discontinued because the quarry mineral of economic value has been mined out.
4. Abandoned, not depleted - a pit where mining has been discontinued for reasons other than that the quarry mineral of economic value has been mined out.
5. Abandoned, reclaimed - a pit where mining has been discontinued and where revegetation has occurred

naturally, but where no active rehabilitation has been carried out.

3.3 Analysis

All locations of sand and gravel pits within the study area were plotted on a base map (Scale: 1 to 50,000) provided by the Brandon Field Office of the Manitoba Department of Municipal Affairs, Municipal Planning Branch. Information provided by this map shows locations of all pits which can be used either to maintain regulation of the pits or to determine where aggregate for specific projects may be mined.

Data obtained in the inventory stage of the study were placed in a matrix (Table 1). With data presented in this manner comparison with the requirements of the rehabilitation regulation and with characteristics of other pits is easily carried out. Data were analysed for compliance with the rehabilitation regulation (Regulation 226/76), which resulted in establishment of a system of classifying pits. The comparison would provide information to determine the effectiveness of the existing rehabilitation regulation. This classification would also provide the basis for determining the quality of pit management in the District.

Initially, the classification was established to determine whether or not the pits were actually covered by Regulation 226/76. Using this system, the three following classes of pits were developed:

1. Pits regulated by Regulation 226/76;
2. Pits regulated by 226/76 by reason of being Crown owned; and
3. Pits not regulated by 226/76.

TABLE 1 Pits In The South Riding Mountain Planning District

Legal Description	Disturbed Area (ha)		Material Removed/Year		Age of Pit		Surface Ownership		Sand and Gravel Ownership		Adjacent Land Use				Vegetation			Aggregate Quality			State of Operation				
					Pre 1977	Post 1977	Crown	Private	Crown	Private	Forest	Agriculture	Pasture	Residential	Aspen	Grassland	Crops	Excellent	Medium	Poor	Active	Rehabilitated	Abandoned, Depleted	Abandoned, Not Depleted	Reclaimed
	< 2000 cu. yds.	≥ 2000 cu. yds.																							
LS8-9-17-17W	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS4-18-17-17W	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS 1&8-29-17-17W	0.04	-	-	-	-	+	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS12-36-17-17W	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS2&7-6-18-17W	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS2-7-18-17W	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS7-7-18-17W	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS4-16-18-17W	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS9-16-18-17W	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS1&2-18-18-17W	0.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS14-23-18-17W	0.4	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS5-33-18-17W	0.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS3&4-28-17-18W	0.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS1-5-18-18W	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS15-8-18-18W	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS1&8-9-18-18W	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS11-9-18-18W	1.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS14-9-18-18W	1.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS3&4-10-18-18W	1.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS8-10-18-18W	0.4	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS12-12-18-18W	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS6-16-18-18W	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS11&12-16-18-18W	32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS15-21-18-18W	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS7&10-33-18-18W	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS11&14-33-18-18W	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS16-33-18-18W	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS14-2-19-18W	0.04	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS11-3-19-18W	.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS9-4-19-18W	0.2	-	-	-	-	-	+	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS1&2-5-19-18W	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS5-5-19-18W	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS6-5-19-18W	0.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS2-6-19-18W	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS4-10-19-18W	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS12-10-19-18W	1.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS12-5-19-18W	0.2	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS2-16-19-18W	0.2	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS4&5-20-19-18W	40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS9&10-21-19-18W	0.4	-	-	-	-	-	+	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS12-20-16-19W	1.6	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS2-26-16-19W	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS2-26-16-19W	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SW27-16-19W	48	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS9&10-30-16-19W	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS5-31-16-19W	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS12-31-16-19W	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS10-4-17-19W	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS12-21-17-19W	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS8-29-17-19W	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LS12-5-18-21W	0.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

TABLE 1 Pits in The South Riding Mountain Planning District, continued

Legal Description	Disturbed Area (ha)		Material Removed/Year		Age of Pit		Surface Ownership		Sand and Gravel Ownership		Adjacent Land Use				Vegetation			Aggregate Quality			State of Operation				
	< 2000 cu. yds.	≥ 2000 cu. yds.	Pre 1977	Post 1977	Crown	Private	Crown	Private	Forest	Agriculture	Pasture	Residential	Aspen	Grassland	Crops	Excellent	Medium	Poor	Active	Operation					
																				Rehabilitated	Abandoned, I-pleted	Abandoned, Not Depleted	Retained		
LS7-8-18-19W	.04	-																							
LS8-12-18-19W	0.1	-																							
LS7-17-18-19W	0.4	-		+				+																	
LS13-36-18-19W	0.4	-																							
LS9&16-12-19-19W	0.2	-																							
LS15-29-19-19W	0.4	-						+																	
LS1-32-19-19W	0.2	-																							
LS11-32-19-19W	0.1	-																							
NW-32-19-19W	0.2	-																							
LS10-32-19-19W	.16	+																							
LS4&5-33-19-19W	1.2	-																							
LS16-5-20-19W	0.4	-						+																	
SW7-16-20W	0.4	-																							
LS11-8-16-20W	0.4	-																							
LS11-32-16-20W	0.1	-																							
SW6-17-20W	0.1	-		+																					
LS5-19-17-20W	0.2	-																							
LS5-25-17-20W	0.4	-																							
LS3-10-18-20W	0.4	-		+																					
LS7-10-18-20W	0.8	-																							
LS9&10-10-18-20W	1.6	-																							
LS6-11-18-20W	0.2	-																							
LS7-11-18-20W	0.4	-																							
LS12-11-18-20W	0.04	-		+																					
LS4-1-19-20W	.1	-						+																	
SW12-19-20W	0.2	-																							
LS12-15-19-20W	0.3	-																							
LS13-17-19-20W	0.6	-																							
LS16-18-19-20W	0.1	-																							
LS4-20-19-20W	0.2	-																							
LS3-21-19-20W	0.8	-		+																					
LS5&6-21-19-20W	0.4	-																							
LS4-6-20-20W	0.2	-						+																	
NE1-17-21W	2.5	+																							
SE-30-17-21W	0.4	-																							
NE-30-17-21W	.64	+																							
LS3-8-18-21W	2	-																							
W&15-18-21W plus)	8	+																							
EA-16-18-21W						+		+																	
LS2-27-18-21W	0.2	-					+																		
LS7-27-18-21W	0.2	-																							
NW32-18-21W	0.2	-																							
LS15-2-19-21W	0.4	-																							
NW19-19-21W	3.5	-																							
LS15&16-20-19-21W	0.4	-																							
LS6-23-29-21W	0.4	-																							
LS4&5-24-19-21W	.04	-																							
LS16-6-20-21W	0.4	-																							
LS5-1-16-22W	0.2	-																							
LS16-10-16-22W	0.4	-																							
LS16-2-18-22W	.04	-		+																					
LS9-25-19-22W	0.2	-																							
LS13-34-19-22W	0.4	-																							
LS9-3-20-22W	0.3	-																							
LS12-7-20-22W	0.4	-																							
LS3-13-20-22W	.04	-																							

CHAPTER FOUR

RESULTS

4.1 Inventory

During the 38 day field season, 106 sand and gravel pits were identified in the study area. Figure 9 presents locations of the pits inventoried. Appendix IV describes the locations in more detail.

4.2 Site Characteristics

4.2.1 Site Locations

There are 27 pits in the Rural Municipality (R.M.) of Clanwilliam; 26 pits in the R.M. of Harrison; 12 pits in the R.M. of Strathclair; and 42 pits in the Local Government District of Park.

4.2.2 Disturbed Area

Area disturbed by surface mining at each site varied from 0.004 hectares to 48 hectares. Total area disturbed by surface mining operations within the study area is 265 hectares, which comprises 0.132 percent of the total area. The majority (85) of sites have a disturbed area of less than one hectare and these sites account for only 29.304 hectares of 11.1 percent of the total disturbed area.

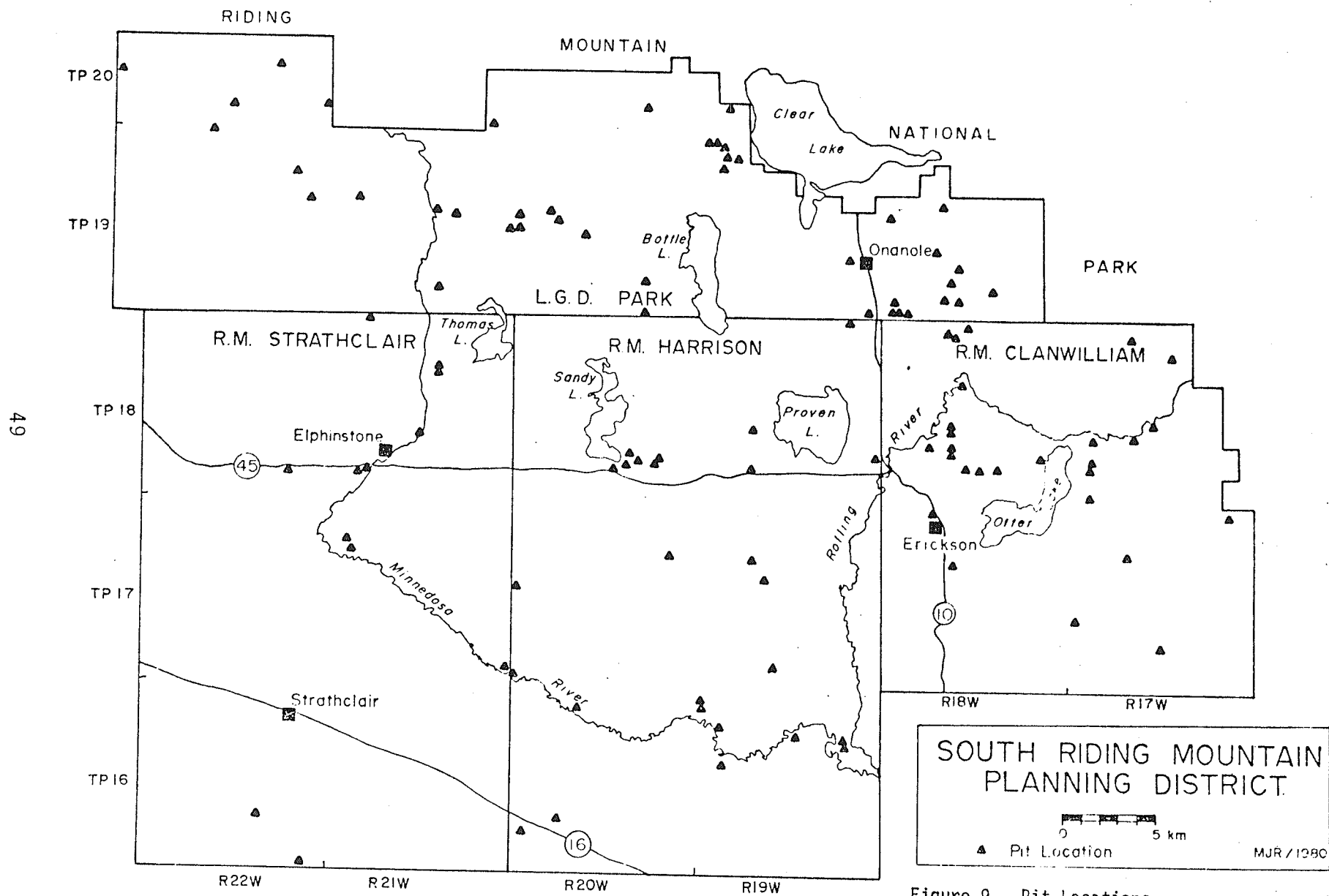


Figure 9. Pit Locations

4.2.3 Commercial Pits

Commercial pits made up a relatively small proportion of the total number of sand and gravel pits in the study area. A total of six pits were classified as commercial and these six pits had a disturbed area of 140.1 hectares which comprised 53.1 percent of the total disturbed area.

4.2.4 Age of Pit

Most of the pits inventoried were found to have been mined prior to 1977. Of the total number of pits in the study area, 97 were found to have been mined prior to January 1, 1977.

4.2.5 Surface Rights and Sand and Gravel Ownership

Of the four possible combinations of Crown and private ownership of surface rights and sands and gravel rights, only three are present in the study area. None of the sites had Crown surface ownership with private sand and gravel ownership. The predominant combination was private surface ownership coupled with private sand and gravel ownership. This combination was applicable to 90 of the sites. The second combination, comprised of private ownership of surface rights and Crown ownership of sand and gravel rights applied to 12 of the sites. Five of the sites had Crown ownership of both surface rights and sand and gravel. Included within this final group were three sites under Federal Crown ownership on the Keeseekoowenin Indian Reserve.

4.2.6 Adjacent Land Use

In several cases sand and gravel pits were surrounded by more than one land use. The land use found adjacent to most of the pits was pasture (55), followed by forest (38), agriculture (27) and residential (1). Combinations of forest and agriculture (6), agriculture and pasture (4), forest and pasture (3), and forest and residential (1) occurred.

4.2.7 Adjacent Vegetation

Occurrence of vegetation adjacent to sites was directly related to adjacent land uses. In several cases there were combinations of vegetation surrounding the pits. Combinations included: aspen and grassland at 26 sites; aspen and crops at 6 sites; and grassland and crops at 5 sites. Sixty-two sites had aspen vegetation, 54 had grassland and 27 had crops.

4.2.8 Aggregate Quality

Based on a visual analysis of the aggregate material at each site, three grades of material were established. Within the study, the quality ranged from excellent, with a high percentage of gravel to low, with a low percentage of gravel and including till materials. Excellent quality aggregate was found at five sites, medium quality at 70 sites and poor quality at 31 sites.

4.2.9 State of Mining Operation

Presently, there are 44 active sand and gravel pits

pits in the South Riding Mountain Planning District. Four previously active pits have been or are being rehabilitated. There are 46 abandoned, nondepleted pits and 12 abandoned, depleted pits in the study area. All of the depleted abandoned pits have been reclaimed naturally and 34 of 46 non-depleted abandoned pits have been reclaimed naturally.

4.3 Classification

4.3.1 Commercial Quarries Regulated by Regulation 226/76

Of major importance to this study of sand and gravel pit management and rehabilitation is the extent to which existing pits in the study area are regulated. The first class of pits developed includes the pits which are regulated under Regulation 226/76, the current rehabilitation regulation. Strictly speaking, this class includes pits which are commercial quarries as defined by Regulation 226/76. Within the study area there are six such commercial operations, five of which are regulated. The commercial quarry at W1/2-15-18-19W/E1/2-16-18-19W is on a Federal Indian Reserve, therefore exempt from Provincial regulation, and appears in the final class of unregulated pits. The site characteristics of the remaining five pits are shown in Table 2.

The five regulated commercial operations have a total disturbed land area of 132.1 hectares. All five commercial pits have privately owned surface and sand and gravel rights, and all were mined prior to January 1, 1977. None of the pits

TABLE 2 Commercial Pits

Legal Description	Disturbed Area (ha)		Material Removed/Year		Age of Pit		Surface Ownership		Sand and Gravel Ownership		Adjacent Land Use				Vegetation			Aggregate Quality			State of Operation				
	< 2000 cu. yds.	≥ 2000 cu. yds.	< 2000 cu. yds.	≥ 2000 cu. yds.	Pre 1977	Post 1977	Crown	Private	Crown	Private	Forest	Agriculture	Pasture	Residential	Aspen	Grassland	Crops	Excellent	Medium	Poor	Active	Rehabilitated	Abandoned, Depleted	Abandoned, Not Depleted	Reclaimed
LS12-20-16-19W	1.6	+	+	+	+	+									+	+					+	+			
SW-27-16-19W	48	+	+	+	+	+									+	+					+	+			
LS10-32-19-19W	16	+	+	+	+	+																			
NE-1-17-21W	2.5	+	+	+	+	+																			
NE-30-17-21W	64	+	+	+	+	+																			

TABLE 3 Regulated Pits: Crown Owned Surface and Sand and Gravel

Legal Description	Disturbed Area (ha)		Material Removed/Year		Age of Pit		Surface Ownership		Sand and Gravel Ownership		Adjacent Land Use				Vegetation			Aggregate Quality			State of Operation				
	< 2000 cu. yds.	≥ 2000 cu. yds.			Pre 1977	Post 1977	Crown	Private	Crown	Private	Forest	Agriculture	Pasture	Residential	Aspen	Grassland	Crops	Excellent	Medium	Poor	Active	Rehabilitated	Abandoned, Depleted	Abandoned, Not Depleted	Reclaimed
IS9-4-19-18W	0.2						+			+															
IS9&10-21-19-18W	0.04																								

have undergone rehabilitation measures, while four of the pits are still active and one has been abandoned, but not depleted, and reclaimed.

4.3.2 Crown Pits Regulated by Regulation 226/76

There are two subclasses of pits within this class:

1. Pits with Crown-owned surface and sand and gravel;
and
2. Pits with Crown-owned sand and gravel and privately owned surface.

This class would exclude commercial Crown pits as well as pits located on Federal Indian Reserves.

4.3.2.1 Crown-Owned Surface and Sand and Gravel

Pits regulated under Regulation 226/76 by reason of being wholly Crown-owned appear in Table 3. There are two pits in this class, with a total disturbed area of 0.24 hectares. Neither of these pits has been rehabilitated and neither has been depleted. Both of these pits are abandoned but not depleted, have been reclaimed naturally, are forested sites and have medium quality material.

4.3.2.2 Crown-Owned Sand and Gravel, Privately-Owned Surface

Pits regulated under Regulation 226/76 by reason of the sand and gravel being Crown-owned appear in Table 4. The 12 pits in this subclass have a total disturbed area of 3.84 hectares. Two of these operations started after 1977,

TABLE 4 Regulated Pits: Crown Owned Sand and Gravel, Privately Owned Surface

Legal Description	Disturbed Area (ha)		Material Removed/Year		Age of Pit		Surface Ownership		Sand and Gravel Ownership		Adjacent Land Use				Vegetation			Aggregate Quality			State of Operation				
	< 2000 cu. yds.	≥ 2000 cu. yds.	Pre 1977	Post 1977	Crown	Private	Crown	Private	Forest	Agriculture	Pasture	Residential	Aspen	Grassland	Crops	Excellent	Medium	Poor	Active	Rehabilitated	Abandoned, Depleted	Abandoned, Not Depleted	Reclaimed		
LS8-9-17-17W	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
LS1&8-29-17-17W	0.04	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
LS14-23-18-17W	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
LS11-3-19-18W	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
LS12- 5-19-18W	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
LS2-16-19-18W	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
LS7-17-18-19W	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
LS15-29-19-19W	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
LS16-5-20-19W	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
LS4-1-19-20W	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
SW-12-19-20W	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
LS4-6-20-20W	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		

the remainder started prior to January 1, 1977. None of these sites have been rehabilitated. Six of the pits are still active; five are abandoned but not depleted (four of which have been reclaimed); and one pit is depleted, abandoned and reclaimed. Five of the eight pits containing medium quality aggregate, as well as the one pit containing excellent material, are active and the six pits containing poor material have been abandoned. Three of the sites have agricultural cropland as an adjacent land use, the remainder have forest and pasture.

4.3 Pits Not Regulated

The 87 pits that are not regulated by Regulation 226/76 appear in Table 5. These pits are neither commercial operations nor are they Crown-owned. The area of land disturbed by mining operations in this class is 128.62 hectares. Four of the pits in this class have been rehabilitated and 11 are depleted, abandoned and reclaimed. Thirty-four of the pits are currently active, 28 pits have been abandoned (not depleted) and reclaimed, and ten have been abandoned (not depleted) and not reclaimed. Included within these totals are 3 pits on the Keeseekoowenin Indian Reserve that are outside the jurisdiction of the Planning District or the Province of Manitoba.

4.4 Examples of Site Conditions

Figures 10 to 22 show some of the types of operations and site conditions in the South Riding Mountain Planning District.

TABLE 5 Unregulated Pits

Legal Description	Disturbed Area (ha)		Material Removed/Year		Age of Pit		Surface Ownership		Sand and Gravel Ownership		Adjacent Land Use				Vegetation			Aggregate Quality		State of Operation				
	< 2000 cu. yds.	≥ 2000 cu. yds.	Pre 1977	Post 1977	Crown	Private	Crown	Private	Forest	Agriculture	Pasture	Residential	Aspen	Grassland	Crops	Excellent	Medium	Poor	Active	Rehabilitated	Abandoned, Depleted	Abandoned, Not Depleted	Reclaimed	
LS4-18-17-17W	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LS12-36-17-17W	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LS2&7-6-18-17W	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LS2-7-18-17W	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LS7-7-18-17W	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LS4-16-18-17W	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LS9-16-18-17W	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LS1&2-18-18-17W	0.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LS5-33-18-17W	0.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LS3&4-28-17-18W	0.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LS1-5-18-18W	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LS15-8-18-18W	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LS1&8-9-18-18W	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LS11-9-18-18W	1.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LS14-9-18-18W	1.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LS3&4-10-18-18W	1.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LS8-10-18-18W	0.4	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LS12-12-18-18W	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LS6-16-18-18W	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LS11&12-16-18-18W	32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LS15-21-18-18W	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LS7&10-33-18-18W	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LS11&14-33-18-18W	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LS16-33-18-18W	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LS14-2-19-18W	0.004	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LS1&2-5-19-18W	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LS5-5-19-18W	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LS6-5-19-18W	0.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LS2-6-19-18W	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LS4-10-19-18W	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LS12-10-19-18W	1.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LS4&5-20-19-18W	40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LS2-26-16-19W	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LS2-26-16-19W	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LS9&10-30-16-19W	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LS5-31-16-19W	0.4	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LS12-31-16-19W	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LS10-4-17-19W	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LS12-21-17-19W	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LS8-29-17-19W	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LS7-8-18-19W	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LS8-12-18-19W	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LS13-36-18-19W	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LS9&16-12-19-19W	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LS1-32-19-19W	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LS11-32-19-19W	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
NW-32-19-19W	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LS4&5-33-19-19W	1.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
SW-7-16-20W	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LS11-8-16-20W	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

TABLE 5 Unregulated Pits, continued

Legal Description	Disturbed Area (ha)		Material Removed/Year		Age of Pit		Surface Ownership		Sand and Gravel Ownership		Adjacent Land Use				Vegetation			Aggregate Quality			State of Operation				
	< 2000 cu. yds.	≥ 2000 cu. yds.	Pre 1977	Post 1977	Crown	Private	Crown	Private	Forest	Agriculture	Pasture	Residential	Aspen	Grassland	Crops	Excellent	Medium	Poor	Active	State of Operation					
																				Rehabilitated	Abandoned, Depleted	Abandoned, Not Depleted	Reclaimed		
LS3&4-33-16-20W	0.1																								
SW-6-17-20W	0.1			+																					
LS5-19-17-20W	0.2																								
LS5-25-17-20W	0.4																								
LS3-10-18-20W	0.4			+																					
LS7-10-18-20W	0.8																								
LS9&10-10-18-20W	1.6																								
LS6-11-18-20W	0.2																								
LS7-11-18-20W	0.4																								
LS12-11-18-20W	.04			+																					
LS12-15-19-20W	0.3																								
LS13-17-19-20W	0.6																								
LS16-18-19-20W	0.1																								
LS4-20-19-20W	0.2																								
LS3-21-19-20W	0.3																								
LS5&6-21-19-20W	0.4																								
SE-30-17-21W	0.4																								
LS3-8-18-21W	2																								
W&S-15-18-21W plus																									
E&S-16-18-21W	8	+				+		+																	
LS2-27-18-21W	0.2					+		+																	
LS7-27-18-21W	0.2																								
NW-32-18-21W	0.2																								
LS15-2-19-21W	0.4																								
NW-19-19-21W	3.5																								
LS15&16-20-19-21W	0.4																								
LS6-23-19-21W	0.4																								
LS4&5-24-19-21W	.04																								
LS16-6-20-21W	0.4																								
LS5-1-16-22W	0.2																								
LS16-10-16-22W	0.4																								
LS16-2-18-22W	.04			+																					
LS9-25-19-22W	0.2																								
LS13-34-19-22W	0.4																								
LS9-3-20-22W	0.3																								
LS12-7-20-22W	0.4																								
LS3-13-20-22W	.04																								
LS12-5-18-21W	0.8																								

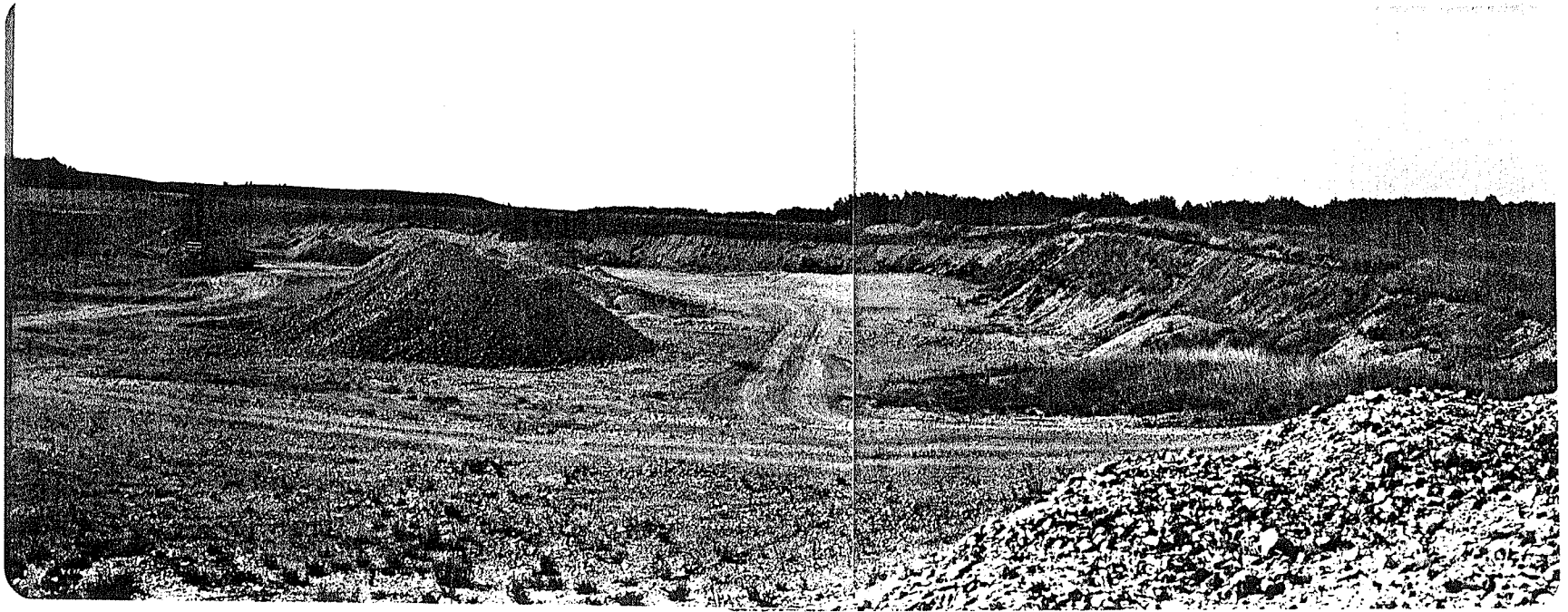


Figure 10. LS10-32-19-19W An Active commercial pit surrounded by cropland.

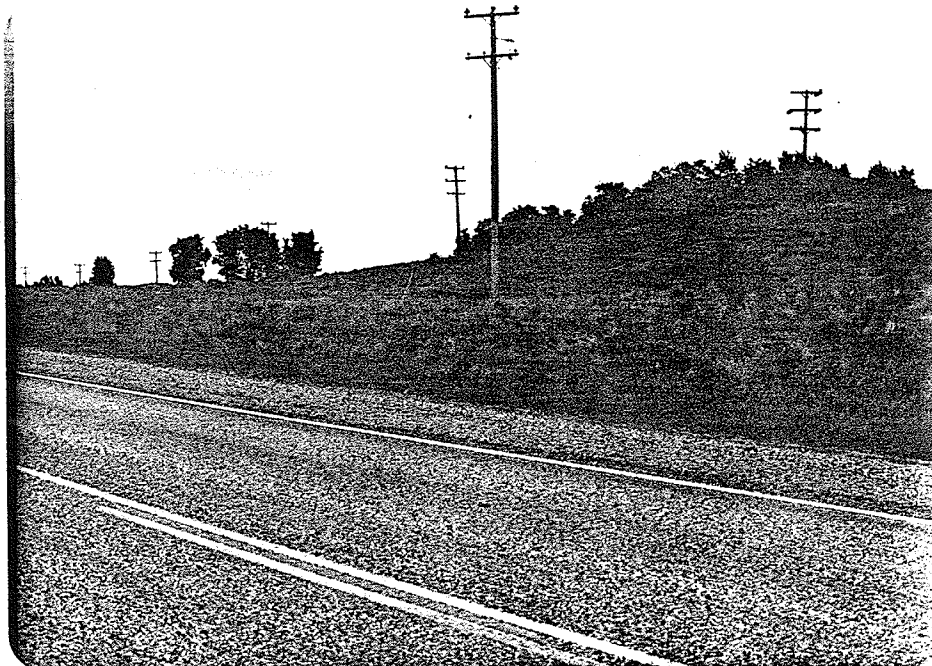


Figure 11. LS11-8-16-20W Rehabilitated pit along Highway 16.



Figure 12. LS5-5-19-18W Private pit surrounded by cropland and being infilled to rehabilitate back to cropland.



Figure 13. LS16-18-19-20W Unregulated pit in pasture.



Figure 14. LS14-2-19-18W Typical small-scale private pit, unregulated.



Figure 15. LS7-8-18-19W Unregulated pit in pasture, surrounded by aspen.



Figure 16. LS9-25-19-22W Unregulated pit being reclaimed by aspen.



Figure 17. LS16-33-18-18W Depleted pit, reclaimed by grass-
land and aspen.

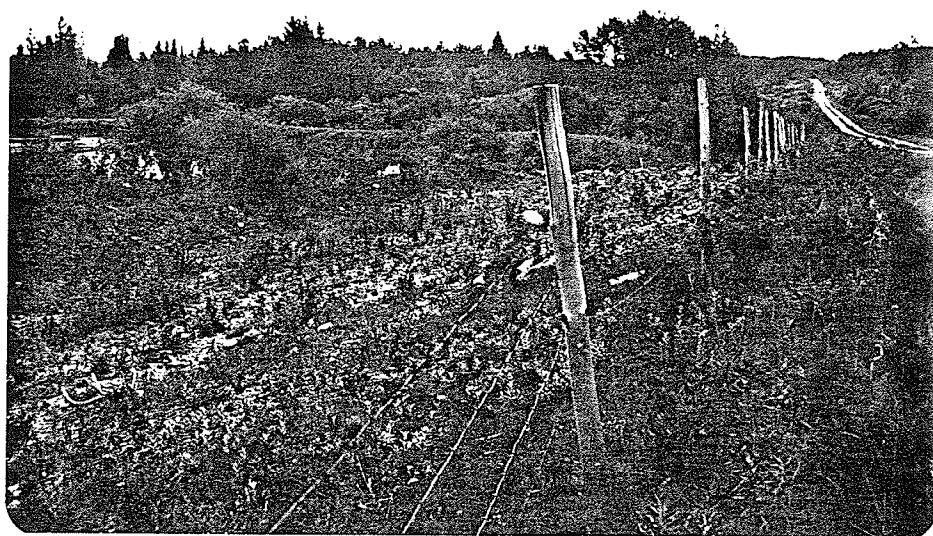


Figure 18. LS5-33-18-17W Depleted pit reclaimed by aspen
and pine.

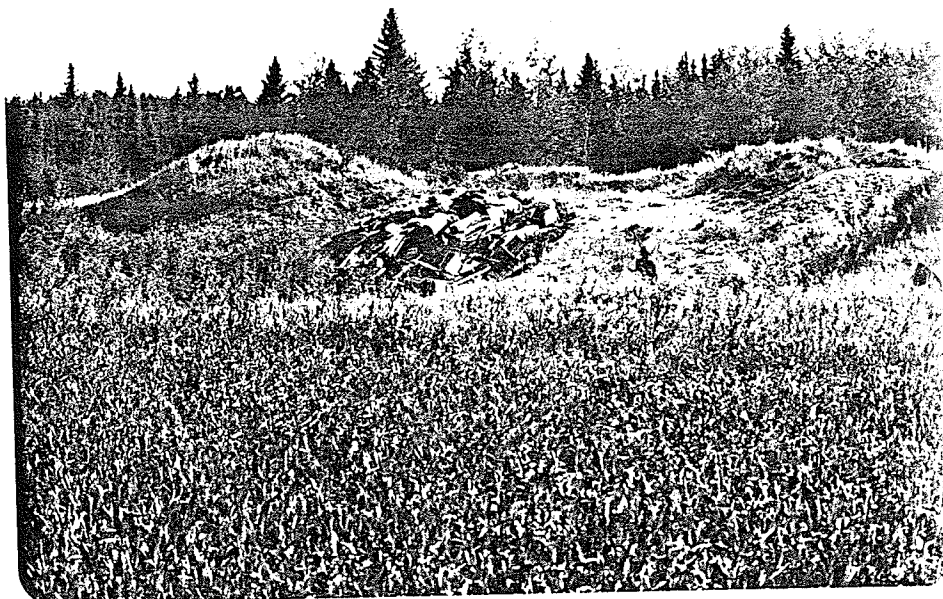


Figure 19. LS11-32-19-19W Unregulated pit surrounded by cropland and aspen/pine forest. Reclaimed by aspen and grass and used as an unauthorized garbage dump.



Figure 20. LS9&10-10-18-20W Unregulated pit reclaimed by grassland and aspen and being partly used to protect beehives.

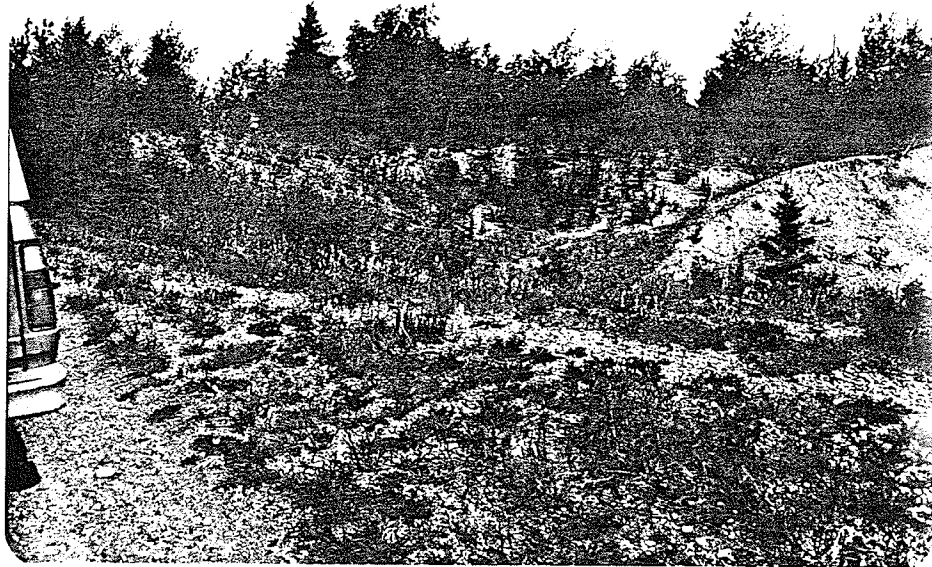


Figure 21. LS9-4-19-18W Crown regulated pit; abandoned not depleted, reclaimed by aspen and spruce.



Figure 22. LS15-29-19-19W Active Crown regulated pit.

CHAPTER FIVE

DISCUSSION

The wasteful use of land is inefficient and may deprive future generations of an essential, finite resource. Rural land is not necessarily allocated in terms of use efficiency and often it is the individual owner's interests and tastes which dictate what use will be made of the land. As land and associated resources become increasingly scarce, society as a whole has a greater stake in assuring that land is not misused to the detriment of present and future generations. The geological formations, topography, underground and surface water, soil conditions, vegetation, and other factors have much to do with the efficient use of land. It is possible to develop basic rules to direct what should and should not be done with certain kinds of land (CPAC Conference, 1974).

Among current land use demands are those related to recreation aesthetics and environmental quality. The demands for these uses are not normally met through market processes; some public action is generally required. Possibilities for conflicts occur because the characteristics of the resource user group (those seeking recreation aesthetics and improved environments) are generally different from the resource owners (farmers, railroads). Part of the conflict over the meaning of land and the relative values to be placed on alternative services of land stems from the separation of resource users from resource owners (Winnipeg Region Study,

1976).

The growing awareness of the possibility of resource scarcity has contributed to changes in the attitudes regarding land. In Manitoba the total land area may not be utilized but in some areas there are problems of congestion, conflicts between uses and shortages for some uses. Important in land use debates has been the provision of land for agricultural uses.

In Manitoba important issues respecting agricultural land use include urban encroachment, conflicts between agricultural and other uses, and conflicts within the agricultural sector. There are some land use issues within agriculture of particular concern. Problems regarding over-grazing, feedlot operations, stubble burning, top soil removal, soil compaction, mono-culture and lack of weed control are common (Manitoba Department of Agriculture, 1975).

The provincial government has the responsibility for guiding development of resources and maintaining an attractive environment. This requires the wise use of land to meet the long-term needs of society. Consequently, the province has the prime responsibility to ensure that the public interest is reflected in land use decisions. Because of the large responsibility, it is absolutely essential that the actions of government departments and agencies complement, rather than oppose or duplicate each other.

The public's attitude toward land ownership and land tenure reflect the diversity of Manitoba's social fabric.

Land is viewed both as a commodity and as a resource. Some feel that the market should dictate land use; others feel that comprehensive government plans should be the prime determinant. Some people feel that the individual should hold the sole discretion over land use while others believe that the government should exercise the discretion. Inherent in the contrasting attitudes is the basic issue of the rights of the individual land owner and the rights of the public as reflected by the government. The diversity of opinion regarding these basic issues has created intense pressures and conflicts over land ownership and the right to determine land use (CPAC Conference, 1974).

The bulk of the previous studies concerning land use planning and surface mining have been carried out in urban fringe areas. Bauer (1970) and McLellan, Yundt and Dorfman (1979), among others, indicate the extreme conflicts between urban activities and surface mining activities. Due to the nature of these conflicts and the great number of people affected, a great deal of study has been given the subject. However, in rural areas, especially those not near large urban centres, problems of surface mining conflicting with other land uses have been virtually ignored.

Indicative of the rural character of the study area is the fact that only one of the mining operations has a residential subdivision as an adjacent land use. As indicated by Michalyna and Holmstrom (1980) and by field data, predominant land uses are forest, pasture and agriculture, all rural land

uses.

The area, as well as being rural, is not near any large urban centres. Ringrose and Large (1979) indicated that in Manitoba the biggest users of mineral aggregates were construction industries in large urban centres, and that aggregate supplies closest to the centres would be most valuable and most active. The South Riding Mountain Planning District is approximately 200 kilometres from Winnipeg and approximately 75 kilometres from Brandon, the nearest city. Both of these cities presently have supplies of aggregate much closer and better than those found in the study area.

While this study area is not directly comparable with the one of McLellan, Yundt and Dorfman (1979) some of the information can be compared and contrasted. The Regional Municipality of Waterloo contained a larger population, more urban areas and consisted of a smaller area. The intensity of activity in that area was shown by a total of 246 pits covering 2792 hectares. In this study 106 pits covered 265 hectares. The land area disturbed by mining in this study area was 0.132 percent of the total study area. The Department of Energy, Mines and Resources (1977) has shown that in Canada the land area disturbed by mining is 0.006 percent of the total land area of the country. The difference may be explained by the concentration of surface mining of sand and gravel in the more settled regions of the country.

Of considerable importance to planning land use in the South Riding Mountain Planning District is the extent to which

surface mining operations in the district are regulated. Manitoba Regulation 226/76 is the major instrument by which pits and quarries in the Province of Manitoba are regulated. Conceivably, Crown and commercial sand and gravel pits in the study area should be the most regulated and present the fewest problems for management and rehabilitation.

The five commercial pits which fall under the rehabilitation regulation account for 132.1 hectares or 50 percent of the total area disturbed by surface mining in the study area. The 14 Crown pits within the study area regulated under 226/76 comprise a disturbed area of 4.08 hectares. In total the land area disturbed by regulated pit operations is 136.18 hectares; 51.6 percent of the total disturbed land area in the study area. McLellan, Yundt and Dorfman (1979) found that in the Regional Municipality of Waterloo, Ontario a small number of regulated pits and quarries (69) accounted for the largest part of disturbed lands (2416 hectares). In the Waterloo Municipality the average area of the regulated pits was 38 hectares as compared to an average area of approximately 7.1 hectares in the South Riding Mountain Planning District.

The study in the Waterloo area found that the area of regulated lands would eventually be rehabilitated, either progressively or after mining operations had ceased. According to the literature, the most effective manner of sand and gravel pit management and rehabilitation is the application of sequential land use planning principles (Bailey, 1979).

The Commercial and Crown pits in this area show little evidence of the application of this concept. Only presently are the aggregate resource deposits in the study area being delineated. Consequently, no planning of temporary land uses can be carried out. Mining plans and rehabilitation plans are currently required for commercial and Crown pits within the province. However, none of the commercial or Crown pits in The South Riding Mountain Planning District has a plan for mining and rehabilitation. Rehabilitation of the disturbed land areas in the South Riding Mountain Planning District can be accomplished. However, all of the rehabilitation will be reclamation because none of the commercial or Crown pits located in this area have a mining or rehabilitation plan.

There are several possible reasons for the lack of planning of sand and gravel pit operations. One of the main reasons could be lack of knowledge by pit operators that regulations exist. The present system of regulation requires that commercial operators submit plans of mining and rehabilitation activities to the Mineral Resources Division for approval. This system depends on the operators' knowledge of what constitutes a commercial pit and indeed on their knowledge that the regulation in fact exists. At the present time, there is no built-in system for public information regarding the regulation. Information is available from the Mineral Resources Division concerning rehabilitation but is only given out on request or when operations are carried out on Crown lands. In the cases of sand and gravel leases on Crown land the

operator must provide the mining and rehabilitation planning while on Crown lands where casual permits are given the Mineral Resources Division does the mining and rehabilitation planning.

Together with the lack of necessary public information concerning existence of Regulation 227/76 is the lack of a system to provide information regarding techniques of mining and rehabilitation to operators. In other areas, both operators and governments have developed publications to inform about techniques of rehabilitation but also about the benefits of rehabilitation. These publications have taken the form of small, easily read pamphlets by the Ontario Aggregate Producers Association to larger color presentations by individual producers. No matter what form the publication takes, the importance of disseminating valuable information has been acknowledged. Of special importance is the need for information regarding possible after-use of sites. The information presented needs to indicate the range of possible uses; site characteristics necessary for or harmful to certain uses; and the availability of help with such problems as demand studies and design expertise for recreation and housing projects.

Schmidt (1977) indicates there are no set standards or procedures that can be followed explicitly during the planning and design of land use programs for pits, but that there are some general forecasting and selection techniques. The complexities of planning the future land use of a pit begin with the difficulty of forecasting future developments in the area. Zoning, policy and technology can change drastically

if a pit has a long lifespan.

Schmidt (1977) states:

"The local market must be analysed, future demands anticipated, physical restrictions on the site explored, operational life estimated, and a feasibility study of the entire program performed. Then results from these activities can be incorporated into basic objectives. Finally, a master plan involving simultaneous extraction and development can be created. This master plan must be flexible to allow alteration throughout the life of the operation. Setting up a land-use program requires the assistance of qualified professionals, but a basic understanding of the process is important to any stone producer."

Access to these professionals is generally easier for the Crown than for the commercial operator. In many cases government departments have in their employ individuals to do any of the work necessary to provide pit management and planning. On the other hand, the commercial operators do not have the ease of access to the professionals. In the case of the private citizen the costs incurred to plan the mining and rehabilitation of the pit must come from the income generated by that operation. In the past, it was possible to leave the land derelict and move on to other area. This was especially true in rural areas with lower land values and fewer people to complain. As urban areas spread out, derelict land has been reclaimed and pressure has been put on operators to rehabilitate. Although not the case in this and other rural areas, in near urban areas once the benefits of rehabilitation have been pointed out, especially in terms of increased land values and increased productivity, rehabilitation efforts have taken place. The land itself has actually been made more

valuable by the mining and subsequent rehabilitation. In the existing Regulation a system of cash payments of \$5,000.00 per commercial pit has been introduced as a measure to get commercial operators to rehabilitate and thereby have their \$5,000.00 refunded by the Province. While this system is moving in the right direction, it should be noted that in many operations, if the cash were forfeited, the \$5,000.00 would not pay for the rehabilitation of the disturbed area. A system similar to that in effect in Quebec, with performance bonds of \$5,000.00 per hectare disturbed might provide more incentive for rehabilitation. Possibly a system combining payment based on area disturbed and volume of aggregate removed could be studied. In any case the amount of money required in performance bonds should be more than that necessary to rehabilitate the sites and should not be construed as a deterrent to development of aggregate resources. The size of the bond might be based on a certain dollar value per fraction of a hectare. For example, \$500.00 per one-tenth hectare and could then be applied to smaller non-commercial operations that might not be able to pay out \$5,000.00 and may not disturb one hectare. Once the information concerning Regulation 226/76, opportunities and options available to operators, and the location of technical expertise is made available more interest in and activity in rehabilitation can be expected.

One other reason for failure of regulated operations in the study area to conform to the rehabilitation regulation could be a possible lack of enforcement of the regulation by the

Crown. A major reason for the poor enforcement is the lack of information concerning the existence of pits. Once sites have been inventoried, officials whether municipal or provincial, can inspect and provide information to the operators regarding compliance with the regulation.

The greatest problem perceived at the start of the study carried out by McLellan, Yundt and Dorfman was that of the unregulated pits and quarries in their study area. That study showed that while there were a relatively large number of unregulated pits (177), they comprised only 376 hectares of the total disturbed land and had an average area of approximately 2.1 hectares. That study indicated that the problem of unregulated pits was smaller than first anticipated but that it still remained a problem.

In the South Riding Mountain Planning District 87 unregulated pits account for 128.6 hectares of disturbed land with an average area of 1.5 hectares per site. In the Waterloo study, the ratio of the area of regulated lands to unregulated lands was approximately 6:1. In this study that ratio is approximately 1:1. Clearly, in the South Riding Mountain Planning District unregulated pits make up a larger portion of the total and might be seen as a larger problem. However, McLellan, Yundt and Dorfman indicate that in the Waterloo area little concern was shown regarding the unregulated pits due to their small area and the fact that many are being privately utilized by the land owner. The same situation seems to exist in this study area because almost all of the

unregulated pits are privately owned and the small average area would indicate private use which is specifically exempt from Regulation 226/76.

The problem of unregulated pits in the South Riding Mountain Planning District is reduced by the existence of the three pits on Federal lands (W1/2-15-18-21W/E1/2-16-18-21; LS7-27-18-21W; and LS2-27-18-21W), four pits that have been rehabilitated and 11 depleted, abandoned and naturally reclaimed pits. These 19 pits, comprising 16.8 hectares either will not require rehabilitation or cannot be dealt with under Provincial regulations. The remaining 68 unregulated pits comprise a land area of 114.9 hectares. The rehabilitated and reclaimed pits have resulted in additions to pasture and forest lands, and in one case, final rehabilitation will result in eventual conversion to agricultural cropland.

McLelland, Yundt and Dorfman indicated that abandoned surface mining sites are left more unsightly, less productive and less useful than possible. Problems with after use, and health and safety often result but sites have potential for after uses with proper treatment. Ultimate use of abandoned sites is determined by needs of the community and by site characteristics. Of the remaining 68 sites in the South Riding Mountain Planning District, 33 are presently active and the remaining 35 have been abandoned but not depleted, with 10 of those having been reclaimed naturally.

While those sites that have been naturally reclaimed have added to the forest and pasture land they do not meet

the four objectives of rehabilitation, namely: ensuring public safety; protecting the environment; optimizing the productivity of the post-mining landscape; and efficiently utilizing the available resource. Management and progressive rehabilitation of the mined landscape could meet those objectives. In cases of abandoned pits, objectives may have been met by chance. In abandoned pits no re-sloping is carried out to minimize hazards to health and safety. Environmental protection is met in one way by allowing natural revegetation but is not encouraged by the replacement of soil and recontouring of steep slopes. Productivity of sites is not optimized since many abandoned pits have material of economic value remaining and in depleted pits no actions to make use of the resulting landforms have been taken. The available resources have not been efficiently utilized because non-depleted pits have revegetated and the material vegetation would have to be disturbed a second time if mining operations were renewed.

These 68 sites, comprising approximately 43.5 percent of the total disturbed land area present the problem of unplanned, uncontrolled activity that may or may not be carried out in the best possible way. Each site, while possibly quite small, contributes to the problem of lands being left in an unsafe, unproductive and unsightly state. The effects of this may be relatively quite small or quite large.

Human Settlement in Canada (1976, P.53) gives an excellent example of the effects of the loss of agricultural lands. In the area around Edmonton, approximately 6400

hectares prime, class I and II agricultural land were taken out of production. The report goes on to discuss the perspective of crop producing potential:

"Canadian wheat farming produces an average of 0.7 tons per acre (1.6 tonnes per hectare). Thus the Class I and II expected to produce at least 11,200 tons (10,200 tonnes) of wheat per year. This would be compared with total Canadian wheat production of 17.1 million tons which is over 1,500 times the potential of the urban land lost in Edmonton. When it is further realized that Canada produced only 4.6% of the world wheat crop in 1973 (the USA and USSR between them produced 42%), one sees that the impact of Canadian urbanization on global food production is rather insignificant. But this cannot be said if the same process is multiplied again and again around the world.

It can legitimately be argued that every acre lost is one acre too many in a world where millions are malnourished or starving. Viewed from this perspective, it is seen that the 11,200 tons of wheat "lost" to Edmonton each year could provide dietary essential for 16,000 starving people. In human terms this is anything but insignificant".

When applied to the South Riding Mountain study area with the unregulated, disturbed areas taken into consideration, a total of approximately 128 hectares have been removed from production. If it is assumed that these areas were also Class I and II, then the amount of lost agricultural production would be 205 tonnes. This may be considered small in relation to Canadian and world totals but, if this is repeated again and again a more significant impact on local economy and world food production would result. The study area also has a large area used for pasture. There the same comparisons could be made for loss of productivity.

However, the main difference in productivity lost to

urban expansion in Edmonton and that lost to surface mining in the South Riding Mountain Planning District is potential of rehabilitation of the mined sites to serve some useful purpose in agriculture.

Because the study area is rural in nature, options available for site rehabilitation are limited. McLelland, Yundt and Dorfman indicated that upon surveying rural residents, agriculture was deemed to be the most needed after use of the mined sites. In the Riding Mountain Planning District the majority of sites reclaimed or rehabilitated have rural, but not necessarily agricultural, after-uses. In the case of the commercial pit operating near a residential area, options for rehabilitation may be increased as this area is being developed for rural recreation on an extensive scale.

Principles of progressive rehabilitation can conceivably be applied to unregulated pits in the study area. While on a smaller scale individually, total area rehabilitated would be significant. A start could be made by encouraging the small private operations to conform to the requirements for sloping under Regulation 226/76. Ideally, the pits in this class would undergo progressive rehabilitation rather than being abandoned and left for nature to reclaim. Minimum requirements of sloping would at least make natural revegetation easier, while comprehensive planning could achieve highest use capability of the land. In the case of these pits, which are generally on a much smaller scale than commercial pits,

options for rehabilitation may be severely limited. At the minimum, land owners would be left with a piece of land that did not present safety problems (slopes) and could be utilized for agricultural purposes such as stock-watering and grazing. A productive land use would be better than land being left derelict.

Since unregulated pits are not regulated by Regulation 226/76 the Planning District might explore other avenues to the control of small surface mining operations. As stated in an earlier section, the Planning Act gives organized Planning Districts jurisdiction in placing controls on operation and management of pits within the Planning District, the District Board can ensure at least a minimum amount of site rehabilitation and therefore reduce the problems of abandoned surface mining sites. With control of the smaller, private operations at a local level, management and rehabilitation of the pits can be carried out with the objectives of the District Development Plan zoning by-laws, once they are developed. The basic intent of the District Board should not be to discourage the use of aggregate resources. Rather, the Board should encourage the concept that surface mining is only an interim land use, and that there are alternatives to leaving derelict land after mining operations have ceased.

CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

It has been the objective of this practicum to provide basic information concerning sand and gravel mining for the South Riding Mountain Planning District Board, to utilize in formulating objectives for land use planning in the District. An inventory, classification and analysis of the sand and gravel pits in the South Riding Mountain Planning District was carried out. In the study area 106 pits were inspected to determine site characteristics and then classified and analysed on the basis of pit management and rehabilitation. Under Regulation 226/76 there are 19 regulated pits which account for 51.6 percent of the land area disturbed by mining. While those sites are regulated and eventually will be rehabilitated, to date they have not been managed or operated in compliance with Regulation 226/76. The remaining 87 pits are unregulated and account for 48.4 percent of the disturbed land. While not subject to regulation these pits also show poor management and planning for rehabilitation.

The literature has shown that progressive rehabilitation and planning can result in sites being left with excellent capabilities for uses which exceed original site capabilities. The literature has also indicated that most of the rehabilitation activity has occurred in areas near to urban centres with the primary incentive being increased land values. In other areas incentives to rehabilitate have taken

the form of either performance bonds as in Ontario or the posting of a cash deposit as in Manitoba. The regulation of commercial surface mining activities in some other areas has led to the rehabilitation of sites to useful functions. Regulation of commercial and Crown sand and gravel pits in the South Riding Mountain Planning District has not led to progressive rehabilitation activities. Unregulated operations in this study area and others, have resulted in problems of abandoned pits and unproductive lands. Within this area, the existing regulations pertaining to progressive rehabilitation have not been adhered to nor enforced. There has been a lack of communication between pit operators and regulating agency in this area concerning mining regulations and rehabilitation information.

This practicum recommends that the Manitoba Department of Energy and Mines, Mineral Resources Division enforce their regulations. The Mineral Resources Division should develop a system of public information concerning mining and rehabilitation techniques and regulations. The Planning District Board should develop to the fullest extent the powers given to it by the Planning Act to control, permit and regulate sand and gravel pits to reduce the problems of uncontrolled land use and abandoned, unproductive lands. Both the Mineral Resources Division and the Planning District should explore the possibilities of increased incentives to rehabilitate pits by requiring cash deposits or performance bonds being posted, based on the amount of aggregate removed or area of

land disturbed by the mining operation. Because of the rural nature of the study area the incentive of increased land values cannot be depended upon to generate rehabilitation activities. Further study is necessary to develop incentives to rehabilitate in rural areas.

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APPENDIX I

GUIDE FOR PREPARATION OF REHABILITATION PLANS

GUIDE FOR PREPARATION OF REHABILITATION PLANS

Manitoba Regulation 226/76 requires the owner of a commercial quarry to rehabilitate the quarry and submit a rehabilitation plan. The following guide lines are for the assistance of quarry operators in preparation of their rehabilitation plans.

Prepared by:

MINING ENGINEERING AND INSPECTION BRANCH
MINERAL RESOURCES DIVISION
DEPARTMENT OF MINES, NATURAL RESOURCES AND ENVIRONMENT

PART I - SUBMISSION OF REHABILITATION PLAN

Rehabilitation Program:

The objectives of the Quarry Rehabilitation Program may be summarized as follows:

1. To ensure that each commercial quarry is developed and operated in a manner that will minimize adverse impacts on the surrounding environment.
2. To abate hazards to the public caused by mining operations such as unstable slopes, steep banks, and open water excavations.
3. To return the area disturbed by mining operations to a useful purpose compatible with the surrounding environment.

Subsidiary objectives included:

1. To promote the efficient utilization of the non-renewable resource.
2. To encourage, during the mining operation the effective and efficient use of equipment and materials in the shaping of land forms required for final rehabilitation.

The Rehabilitation Submission:

In order to assess whether a proposed quarry operation may meet the above objectives, Manitoba Regulation 226/76 requires the submission in duplicate of a plan of rehabilitation. This plan should show essentially an organized approach to mining of the aggregate material with progressive rehabilitation of the area to provide a compatible and useful purpose for the land on termination of the operation.

The rehabilitation plan to be submitted consists of the following items:

1. Cash Deposit:

A cash deposit is required to provide funds for carrying out the program in the event of default by the owner. This may take the form of cash or an irrevocable letter of credit. (Sample attached.)

2. A completed form - "Submission of a Rehabilitation Plan", which includes:

- (a) Statistical and operating data required by the Regulation.
- (b) A written description of the operation.

- (c) A written description of the progressive and final rehabilitation program.

The form has been prepared with specific questions and space for inserting answers which apply to the particular quarry. The items are mostly of a statistical or descriptive nature which are difficult to show on a drawing.

A review of the operation for conformity with other regulations should be made at this time, i.e.,

- does the operation conform to municipal land use and zoning by-laws?
- will noise, dust or waste disposal require licencing by the Clean Environment Commission?
- will the water table be affected requiring a licence under the Water Rights Act?

It is realized that the estimate of the production and proposed rehabilitation for the next three years will be tentative and may be subject to market fluctuations and other factors outside the control of the aggregate operator.

3. Drawing of the Mining Operation

Duplicate drawings are required to illustrate the proposed mining operation and compliance with the Regulation. In the enclosed example, this drawing is called the "Mining Plan".

The scale of the drawing must be suitable to show the details of the operation. A good working scale is 200 feet the the inch. For a small quarry, the drawing can be prepared by plotting the quarry on the grid as indicated on the attached example. The example also shows how symbols and arrows can be used to show the required information.

More complex or larger quarries may require surveys and professionally-prepared drawings to show the operation in a meaningful way. Aerial photographs, enlarged to a scale of 200 feet to the inch may be suitable for some quarries.

Typical cross-sections can be used to provide data not shown otherwise.

The drawing should include all the applicable information listed on the example drawing which includes: location and outline of the quarry with reference to legal land survey; property boundaries; buffer zones; pertinent installations and natural features such as roads, power lines,

streams, etc.; depth, shape and extent of the deposit; location of stripping and stockpiles; forested areas, pasture lands, crop lands, etc.; mining depths and relation of mining to the water table; areas which will be mined below the water table; location of processing equipment, plant or buildings and of settling ponds; location of buildings within 500 feet outside of the property boundary; location of tree screens, berms, fencing, planting vegetation on unworked areas and slopes.

4. Drawing of the Proposed Rehabilitation

Duplicate drawings (titled Rehabilitation Plan) are required to illustrate rehabilitation as mining progresses and when mining is completed. These drawings may be submitted on the attached blank plans titled "Rehabilitation Plan", or may include any other drawings in accordance with the size and complexity of the mining operation. The drawings should include details of berms, tree screens, vegetation slopes, and proposed afteruse.

The basic objective of rehabilitation is to leave the areas aesthetically pleasing and suitable for productive afteruse. It is realized that some quarries may operate for many years during which time the original conceptual plan may be subjected to many changes as the quarry progresses. However, it is necessary to have a suitable goal to work towards, recognizing that changes are likely to occur and that revised plans may be approved as variations in the quarry operation or adjacent land-use occur.

Through the development of the "Submission of a Rehabilitation Plan" form, the mining drawing and rehabilitation drawing, a comprehensive overview of the total operation will have been made. By this process, it is anticipated that the objectives of the rehabilitation program can be recognized and fulfilled.

PART II - REHABILITATION

The following information is provided for assisting quarry operators in the preparation of their Rehabilitation Plans.

1. Slopes

Of prime importance in any rehabilitation program is the establishment of slopes appropriate for the afteruse of the quarry.

During operation, safety regulations require that slopes

not exceed 45 degrees from the horizontal for unconsolidated material. The following table is offered as a guide to slopes that are suitable for various afteruses.

<u>Grade</u>	<u>Slope</u>	<u>Typical Uses</u>
50%	2:1	Vegetated bank - unmowed
30%	3:1	Wildlife Preserve, auto test course, mowed lawn, highrise residential tract, ski slopes, hiking trails.
20%	5:1	Campsites, hunting resort, toboggan slopes.
15%	6½:1	Single family residential - low density, tree farm, golf course, grazing land.
10%	10:1	Picnic areas, intensive campsites, hard surfaced streets, cottage and utility buildings, ramps, driveways, concrete walkways, commercial sites, archery, riding.
8%	12½:1	Seasonal cottages, golf driving range, single family residential (medium density), intensive play areas, zoo, roads.
5%	20:1	Service areas, parking areas, industrial sites, nursery farm, truck farm.

Underwater slopes require special considerations. Safety must be a prime consideration. Slopes above and below water must be such as to enable persons to escape should they accidentally fall in. Drop-offs in normal wading depth could be a serious hazard and should be avoided.

<u>Grade</u>	<u>Slope</u>	<u>Typical Underwater Slopes</u>
5%	1:20	Swimming.
15%	6½:1	Stormwater retention lake, cattle dugout.
20-25%	4 to 5:1	Boat launching ramp.

It should be noted that steeper shoreline slopes tend to control aquatic plant growth. Excessive plant growth may cause stagnation, oxygen depletion, mosquito breeding and loss of aesthetics.

2. Vegetation

Tree screens, effectively improve the appearance of the operation and mitigate the impact. If the operation has natural trees, these may provide suitable screening and should be preserved to the extent possible.

Alternatively, on an open pasture setting, an acceptable screen may sometimes be provided by the use of overburden to build berms which can be sloped and seeded.

Screening requirements vary, but must be considered adjacent to roads and residences.

3. Stockpiles

- (a) Topsoil and Overburden - locations should be selected to minimize movement of material and to keep topsoil and overburden separate. Since these are normally left for a few years before being used for rehabilitation, they should be sloped at an angle which would permit seeding to prevent wind erosion and improve appearance.

Overburden uses

- a) used as a berm and to control view of mining operation,
- b) fill shallow water areas and depressions,
- c) as backfill to stabilize slopes.

- (b) Product Stockpile - normally angle of repose is adequate. A low profile or tree screening may be indicated when in proximity to residences, public areas or main highways.
- (c) Waste or reject material - can be used to advantage in sloping depleted areas.

4. Easements and Buffer Zones

- (a) No mining, stripping or stockpiles within 50 feet of property boundary except with agreement of the owner of adjacent property, or upon approval.
- (b) All easements and allowances for roads, hydro lines and railways are treated as other property boundaries.

APPENDIX II

LIST OF MINING CONDITIONS

THE DEPARTMENT OF MINES, NATURAL RESOURCES AND ENVIRONMENT
HAS STIPULATED THAT THE FOLLOWING CONDITIONS BE COMPLIED WITH:

- 1) Prior to commencement of mining, a work permit must be obtained from the local Conservation Officer, as well as, notice is to be given to the Mines Inspector at
Telephone No.:
- 2) The floor and sides of the pit are to be cleaned of any available material before advancing any faces.
- 3) Existing stockpiles of processed material are not to be mined without proper authorization.
- 4) If stripping is required, overburden is in no case to be pushed into standing timber, but is to be removed in advance of mining and stockpiled at a location so as not to interfere with future mining operations.
- 5) The stripping of overburden is to be maintained in advance of the face in a distance not less than twice the height of the working face. The minimum stripping requested is 30 feet.
- 6) No slash or timber is to be combined with overburden nor is it to be deposited within 25 feet of standing timber.
- 7) Any slope resulting from this operation is to be left at an angle not steeper than 1-foot horizontal to 1-foot vertical, and the pit floor is to be cleared of any loose material.
- 8) Mining operations are not to encroach upon any road allowance.
- 9) No material is to be removed within a distance of 150 feet from the forest access roads, streams, lakes or other bodies of water.
- 10) Any damage to roads or trails occurring while mining is to be repaired before leaving the mining site.
- 11) The area is to be maintained and left in a clean and orderly condition satisfactory to the Mines Inspector.
- 12) A copy of the permission to remove with the above mentioned conditions must be kept at the work site.

APPENDIX III

PROVINCIAL LAND USE POLICIES

POLICY #1

AREAS SHOULD BE PRESERVED FOR A FULL RANGE OF AGRICULTURAL ACTIVITIES WHERE (PART 1) AGRICULTURE IS IN THE DOMINANT POSITION ON PRIME AGRICULTURAL LAND AND (PART 2) WHERE AGRICULTURAL ACTIVITIES ARE DOMINANT ON LOWER CLASS LANDS AND IT IS DESIRABLE TO PROTECT SUCH ACTIVITIES.

A. Policy Objectives

The objective of this policy is to protect the present and future agricultural industry, to protect land for present and future food production, and to foster growth and development in the agricultural industry.

B. Policy Application (see Glossary of Terms for definitions)

1. Part 1

There will be cases where prime agricultural land on a land unit will not constitute 60% or more of the land area and would, therefore, be categorized under Policy #1, Part 2. There will also be cases where even though the land itself is considered prime agricultural land, agriculture may not be in the dominant position and, therefore, would be considered under Policy #2. Where a land unit of prime agricultural land abuts a number of land units which are in conflicting use, such land may be considered under Policy #2.

The subdivision of land for agricultural uses in Policy #1, will be of a minimum parcel size of 80 acres, or 2 legal subdivisions which abut one another, except in the case of the following conditional uses:

- (a) Livestock and poultry confinement operations.
- (b) Specialized agriculture.
- (c) Farmer owned and operated small family businesses.

This policy seeks to encourage the retention of prime agricultural lands for crop production. Most of the conditional uses do not require prime agricultural lands and will therefore be encouraged to locate on lands as defined in Part 2 of this policy.

Farmstead subdivision shall be permitted only when the subdivision is for the retiring former resident farmer or for an immediate member of his family who requires title to a residence separate from the farm operation while still involved in farming as a major source of income.* Farmstead subdivisions should not exceed 10 acres. There may be no more than two titles created from one title when this process takes place. This process may occur only once on a quarter section of land or a riverlot. The intention is to protect farmland and agricultural activities from encroachment by non-farm residences in the future where agriculture is viable and where the land base is able to facilitate agricultural production. Where it is shown that additional housing is necessary to the success of the farm enterprise, such accommodation should be provided on the existing farmyard as part of the farm unit in order to avoid further subdivision on the farm.

A farmstead includes the residence of the farm operator and may include those buildings which are directly or indirectly related to the farm operation.

In instances where a farmstead is no longer required as part of a farm unit, and is located in an area deemed by the Rural Municipality or Local Government District not to be experiencing undue land use pressures, such a farmstead may be considered for subdivision from the farm unit upon approval by the R.M. or L.G.D.

2. Part 2

This policy serves to protect those lower class soils which can be used for many different types of mixed agricultural enterprises.

*Where farmstead subdivisions take place along limited access highways, there may be limitations under Highway Policy #12.

This policy also serves to protect livestock operations. The livestock operations are divided into two categories.

(a) Livestock grazing operations (extensive).

The viability of this type of operation under this policy would be protected.

(b) Livestock confinement operations (intensive).

This policy would protect these operations from possible encroachment and potential conflicts.

C. *Glossary of Terms*

1. Full Range of Agricultural Activities: Any agricultural activity within the laws of the Province of Manitoba including all types and sizes of agricultural field and livestock operations.
2. Prime Agricultural Land: Land defined as Classes 1, 2, and 3 soils by the agricultural land capability system of the Canada Land Inventory and interpreted as such by the Soil Survey, Manitoba Department of Agriculture. A land unit that has 60% or more agricultural land shall be considered to be prime agriculture in total.
3. Land Unit: Shall be defined as a quarter section or a riverlot.
4. Dominant: Shall be interpreted to categorize land where more than 75% of the land on a land unit is used for agricultural activities excluding utilities, public reserves and water bodies. There may be up to 3 residences at the present time per land unit, excluding towns and villages.
Land upon which agriculture is deemed dominant shall not be changed under the Policy by farmstead subdivision. The maximum number of farmstead subdivisions per land unit shall be three excepting farm villages. At the effective date of these policies no rural residential subdivision can take place on land units in areas under Policy #1 where there are less than 3 residences. Where there is more than one residence on a single title they shall be deemed to be one residence for purposes of this Policy.
5. Lower Class Lands: Lands which are not prime but which are used for agriculture or have the potential of being used for agriculture.
6. Desirable: Shall be interpreted as any situation where there is an established pattern of agricultural land use providing a permanent economic support base to the existing social infrastructure.
7. Legal Subdivision: Every section of land is divided into 16 quarter quarter sections, each of which is 40 acres, more or less.

POLICY #2

AREAS SHOULD BE PRESERVED FOR LIMITED AGRICULTURE WHERE BECAUSE OF THE MIXTURE OF THE LAND USES A FULL RANGE OF AGRICULTURAL ACTIVITIES MAY NO LONGER BE POSSIBLE.

A. Policy Objectives

The policy intention is to designate areas where the encroachment and fragmentation of agricultural land by residential and other uses limits full agricultural development.

The policy would permit viable agricultural activities to function by placing restrictions on further encroachment by incompatible land uses.

Such designated areas will serve to restrict incompatible land uses and set aside land for possible future agricultural development. It is intended that such areas would be designated according to the needs of local situations.

B. Policy Application

1. Criteria would be developed specifying the conditions under which land can be used. This would accomplish buffering of existing uses and rational future development.

The criteria would form the basis of the building permit or application for conditional use. As an example, consideration would be given to the following criteria in order to approach a rational decision related to the establishment or expansion of a livestock operation.

- (a) The type of livestock operation. (Feedlots, hog operations, dairy farm, hobby farm, etc.)
- (b) Management practices. (operating, waste disposal methods, etc.)
- (c) Proximity to other users. (Next door neighbours or at opposite ends of $\frac{1}{4}$ section.)
- (d) Land as a media for waste disposal. (soil type, permeability, runoff, etc.)
- (e) Waste disposal area. (Ratio of amount of land to Livestock Waste Unit (L.W.U.)).
- (f) Size. (How many L.W.U.'s?)

2. Similar criteria should be developed to arrive at rational decisions for conditional use related to other types of activities or land uses.

C. Glossary of Terms

- 1. Limited: All land uses under this policy are conditional uses. The limitations enforced would be those authorized by Municipal by-law.
- 2. Compatible: Activities which are able to co-exist.
- 3. Mixture: Means those kinds of land uses which by virtue of their nature and their land uses are found in close proximity to each other with resultant conflicts.

POLICY #3

LANDS MAY BE DESIGNATED FOR RURAL RESIDENTIAL DEVELOPMENT PROVIDED THE SITING AND DESIGN OF SUCH DEVELOPMENT SHALL REFLECT ITS ROLE AS AN ALTERNATIVE TO THE URBAN LIFESTYLE AND NOT AS AN EVOLUTIONARY STEP TOWARDS AN URBAN ENVIRONMENT. IN ADDITION THE DEVELOPMENT SHALL BE PLANNED TO MINIMIZE CONFLICT WITH RESOURCE RELATED INDUSTRIES AND ACTIVITIES.

A. Policy Objectives

1. This policy recognizes rural residential development as a legitimate form of land use and ensures that rural residential development takes place in a planned framework that will:

- (a) Satisfy the consumer demand for a rural lifestyle.
- (b) Safeguard the present and future utilization of the province's natural resources.
- (c) Be complementary to the existing urban centres of the province.
- (d) Not create hardships for municipalities or property owners due to the development being premature or haphazard.

2. Rural residential development, if properly planned, provides a living option that reduces pressures on the urban housing market and adds to the diversity and hence viability of the rural environment. Directed into appropriate areas the development can provide significant tax revenue from lands deemed unproductive for agriculture, forestry, or other resource-based developments. As well, the new development can be located so as to maximize the utilization of an area's existing infrastructure investment. Increased population density may also allow the provision of certain services, or service levels, previously unaffordable in rural areas. This is particularly true in the field of social services like recreation facilities, day-care centres, etc.

If left unplanned however, the physical and social costs of rural residential development are such, that it can affect land, people and activities to a degree far out of proportion to its own actual land needs. Agriculture activities can be adversely affected, highway efficiency impaired, schools overloaded, and servicing costs increased far beyond the revenue producing capacity of such development.

B. Policy Application

The key to applying this policy is the premise that rural residential development should only take place in a "planned setting". There are two components to the policy application. The first component deals with the general criteria for designating areas for rural residential development. The second component deals with the more specific criteria to be involved in siting the rural residential development within the designated rural residential area.

1. General Criteria

- (a) Areas will not be designated for rural residential development if they have been identified as suitable for a full range of agricultural activities as defined in agricultural policy #1.
- (b) Areas will not be designated for rural residential development if they have been identified in accordance with provincial land use policies as a resource protection area for parks, wildlife, ecological, hazard land, aggregate minerals or other purposes unless it is clearly demonstrated that the proposed development will not conflict with the stated resource goals.
- (c) Areas will not be designated for rural residential development if those areas are within two miles of the boundary of an incorporated urban centre or the built-up area of an unincorporated urban centre. Rural residential development should however, be located conveniently enough to draw on these centres for social, recreational and commercial services.

By their nature, rural residential subdivisions are not suited to servicing by urban sewer and water systems. Allowing their location on the periphery of an urban centre often creates difficulties for that community to develop in an orderly manner and provide the necessary municipal services at reasonable costs.

Exceptions to these criteria may be made if it can be demonstrated that such development will not at any time in the foreseeable future have a detrimental influence on the urban centre. An example of such an exception might be where some land within the two mile radius is for all practical purposes isolated from the centre by means of a major topographical feature, such as a river.

- (d) Rural residential development must be planned in a manner that will not produce unacceptable social or economic costs. The approving authority will consider the impact of such development on the economic provision of such public services as schools, hydro, telephone, highways, police, fire protection, health care and recreation facilities.

2. Siting Criteria

Considerations are discussed below which deal with the siting, location and extent of rural residential development. This policy statement notes that rural residential development is an alternative to the urban life-style. The criteria established in this policy emphasize the distinction between the two land uses. With such a definition, rural residential development should not be thought of, or normally planned, as an evolutionary step between a rural landscape and an urban development.

Notwithstanding the above, it is realized that in certain areas around Winnipeg rural residential densities have already yielded an environment that in this context is more urban than rural in nature. Rural service standards have proved inadequate in such areas, yet their low density design has made expensive the cost of urban servicing. Residential infilling may be required in such areas to make service upgrading feasible.

The following matters should be taken into account in the design of rural residential subdivision:

- (a) Lots shall be of such dimensions as to accommodate the proper function of a septic field or other approved method of disposal of domestic effluent.
- (b) Irrespective of criterion (a) above, a minimum lot size of 2.0 acres will be required in order to maintain the rural character of the land. Where it can be demonstrated that a two acre minimum is inadequate for this purpose, the minimum acreage can be increased at the discretion of the Planning Authority. At the same time care must be exercised to ensure that maximum lot sizes are reasonable and are not wasteful of land.
- (c) The subdivision must take into account the need for an adequate supply of potable water. This may involve provision of wells, or a water hauling system.
- (d) The subdivision must have regard for an adequate surface drainage system.
- (e) In order to minimize the fragmentation of land until development plans are in force, it will be the responsibility of the developer to demonstrate that there is sufficient demand for developed lots to justify further subdivision.
- (f) Where subdivisions are proposed in areas of treed land, the subdivision design should protect or enhance existing treed acreage.
- (g) It must be demonstrated that a rural residential development is not incompatible with existing land uses in the vicinity of the development.
- (h) In areas where substantial rural residential development is anticipated, the municipality shall devise a system of roads that will provide the major regional streets and establish the points of intersection with the provincial road network. The local streets proposed in any individual subdivision will be required to be adaptable to this regional collector system.

In applying the above criteria the extent of detail required must be related to some degree to the size of the subdivision. In particular, small scale subdivision (1-3 lots) will require some local discretion in isolated or low land use conflict areas. The combined adverse effects of a large number of small subdivisions however, are such that the degree of discretion should be considered carefully.

There are two levels of examination required in considering the siting of rural residential development. It will be the responsibility of the developer to provide information on the suitability of the site itself and on

the impact the development will have on the immediate area. The planning authority on the other hand must be in a position to assess the regional implications of the development. As an example, the developer will be required to demonstrate that potable water can be provided in adequate quality and quantity for the scale of his development. The planning authority will have to be able to assess what impact, if any, the development might have on the regional water supply, watertable, etc.

There are a number of municipalities, without development plans, that are currently receiving a large volume of subdivision applications. Other municipalities may face this problem in the future. Proper analysis of the total implications of these proposed developments becomes nearly impossible for the planning authorities. The consequences of this runaway development are such that the "planned setting" referred to earlier as a prerequisite, is no longer present. Therefore, in those instances where the approving authority is of the opinion that the consequences of such development cannot be adequately assessed, he may, after consultation with the Provincial Land Use Committee, direct that no further subdivision will be allowed in all or in any part of that municipality until a development plan or basic planning statement is adopted.

C. Glossary of Terms

1. Rural Residential Development: Can be defined for the purpose of this policy as the establishment of rural non-farm residences. Cottages or resort type developments would normally be excluded.
2. Urban Centre: Includes incorporated cities, towns and villages, "unincorporated village districts", and those "local improvement districts" created for sewer and water purposes. The term may also include any recognized settlement of 25 or more residences.

POLICY #4

PROPOSED URBAN LAND USES SHALL BE DIRECTED TOWARD THE STRENGTHENING OF EXISTING CENTRES RATHER THAN ESTABLISHING NEW COMPETING CENTRES. GROWTH OF EXISTING CENTRES:

- (a) WILL BE IN A MANNER SUCH THAT WATER AND SEWER SERVICES CAN BE MADE AVAILABLE AT AN ECONOMICALLY FEASIBLE COST.*
- (b) BORDERING ON ONE SIDE OF A MAJOR HIGHWAY SHALL WHEREVER FEASIBLE BE RESTRICTED TO THE SAME SIDE OF THAT HIGHWAY.*
- (c) MAY NECESSITATE THEIR EXPANSION ONTO ADJOINING LANDS. IN THESE INSTANCES THE LAND REQUIREMENTS OF THE URBAN CENTRE SHALL NORMALLY HAVE PRIORITY OVER THE EXISTING USE OF THAT LAND.*

A. Policy Objectives

Manitoba has an hierarchical, reasonably well distributed system of urban service centres. Each of these centres, relative to its size, possesses a significant public and private investment in infrastructure facilities. This policy represents a commitment to existing centres and implies that the establishment of new urban centres will be discouraged.

Growth of existing urban centres will be encouraged, but this growth would be planned with an awareness of the costs of servicing new development. Urban growth would also be guided so as to minimize conflict with the primary provincial roadways.

B. Policy Application

1. Development proposals should be examined from the viewpoint of their relationship to existing urban centres. If the approving authority is of the opinion that the development constitutes a threat or a potential threat to the viability of, or investment in, an existing community, the development should not be permitted. It is the general intent of this policy to direct any proposed urban type activity into an existing urban centre. It is realized however, that there are certain types of commercial activities that are highly supportive of and directly related to agriculture, that are oriented toward highway location due to quantity or type of traffic and that require large land areas or that may be of a hazardous nature.
In these instances the approving authority may accept a rural siting providing that it is in proximity to an urban centre, is in a planned location, does not conflict with any other provincial policy and is not a threat to the viability of an urban centre.
2. It is accepted that new urban centres may from time to time be required to service resource related development, e.g. a new mine, in the more remote areas of the Province.
3. At the present time not all defined urban centres require central water and sewer services. For those centres experiencing growth however, it will be required that development be planned in a manner that lends itself to economical servicing.
4. A significant number of urban centres are bordered on one side by a provincial trunk highway. In preparing development plans or considering subdivision applications, planning authorities should, wherever possible, direct growth to that side of the highway on which the urban centre is already located. This approach will allow the maintenance of a high level of service on the highway, minimize heavy cross traffic with its safety hazards, and reduce the likelihood of constructing a highway bypass at some time in the future.
5. Expansion of urban centres onto adjoining lands will be required where growth warrants it. Taking into account factors such as those raised above, some expansion onto prime agricultural lands may result, where that is the only logical direction of growth. In cases such as this, urban expansion will

normally override agricultural considerations. Boundary adjustments may be required in the case of growing incorporated urban centres.

6. Urban development must be planned in a manner that will not produce unacceptable social or economic costs. The approving authority will consider the impact of such development on the economic provision of such public services as schools, hydro, telephone, highways, police, fire protection, health care, and recreation facilities.

C. Glossary of Terms

1. Urban Centres includes incorporated cities, towns and villages, "unincorporated village districts", and those "local improvement districts" created for sewer and water purposes and may include any recognized settlement of 25 or more residences.

POLICY #5

DEVELOPMENT PLANS SHALL IDENTIFY AREAS OF HIGH RECREATION CAPABILITY AND EXISTING RECREATION DEVELOPMENTS OF REGIONAL AND PROVINCIAL SIGNIFICANCE.

A. Policy Objectives

The purpose of this policy is to encourage the safeguarding of scarce recreational and scenic resources. Suitable sites are becoming particularly scarce within the day-trip zones of larger urban centres where the need for open space for leisure time pursuits is the greatest. Development plans can anticipate future recreational needs through proper recognition and zoning of high quality recreational lands. In addition to offering needed opportunities for recreative experiences, such areas can add to the general environmental quality by providing visual buffers and wildlife habitat and by pre-empting undesirable uses of marginal land or land with high amenity potential.

B. Policy Application

1. Subdivision on lands having high recreation capability within the municipality should be prohibited, until such time as a development plan is implemented.
2. In the interim before a development plan is formed, a land use other than recreation involving the alteration or destruction of high capability recreation land may be approved subject to the municipality, through consultation with the Municipal Planning Branch, having satisfied itself that sufficient lands of similar high recreation capability will still be available to satisfy local and regional recreation needs for the foreseeable future.
3. When lands having a high recreation capability are being considered during preparation of a development plan, recreation uses shall normally have priority over industrial, commercial, or residential uses until such time as sufficient suitable land has been designated to satisfy local and regional recreation needs for the foreseeable future as specified through the municipality, Municipal Planning Branch and the Department of Tourism, Recreation and Cultural Affairs during the planning process.
4. Designation of lands surrounding present and future recreation developments specified by the municipality, Municipal Planning Branch and the Department of Tourism, Recreation and Cultural Affairs during the formation of a development plan shall be of such a nature so as not to endanger the primary function of that recreation development.

C. Glossary of Terms

1. High Recreation Capability: Land within a municipality identified by the Canada Land Inventory as having a recreation capability in classes 1-3. In municipalities where these ratings are absent or minimal, lower class designations shall be considered. Exploited gravel pits, lakes and rivers may also have a high recreation capability potential.
2. Suitable Land: Land of such an acreage and having such a nature as to be able to support the proposed recreational activity at the proposed intensity of use.
3. Foreseeable: Based upon current recreation and population trends for a minimum of 20 years.
4. Endanger: Render the recreation development unable or unsuitable or significantly detract from the recreation development's ability to maintain a particular activity and the level and quality of activity for which it was planned.

POLICY #6

RECREATIONAL DEVELOPMENTS SHALL BE PERMITTED ONLY TO THE CARRYING CAPACITY OF THE RESOURCE BEING UTILIZED.

A. Policy Objectives

The purpose of this policy is to prevent overuse and consequent degradation of recreational resources. Overuse is a major threat to outdoor recreation areas, particularly where there are a limited number of sites suitable for the creative use of leisure time within close proximity to large urban centres, or at or near significant provincial resource areas. Where such a situation occurs, there is a tendency to overdevelop existing recreation areas, which results in damage to the physical resource and a decline in quality of the recreational experience.

B. Policy Application

In order to minimize or eliminate degradation of resource areas, carrying capacity studies shall be undertaken before recreational development takes place. Where appropriate methods do not exist or are not feasible, recreation space standards shall be applied.

Development of a recreational site shall be limited to the level suggested by the most limiting carrying capacity or space standard.

Where recreation space standards or carrying capacities can be artificially increased, and where that manipulation does not conflict with the recreational objectives of a proposed or existing development plan or other existing planning constraint, nor endanger nor degrade the surrounding environment, that development may be permitted at the discretion of the approving authority.

C. Glossary of Terms

1. Carrying Capacity: The concept of carrying capacity represents the level of use an area can withstand while providing a sustained high quality of recreation. Physical carrying capacity refers to the amount of human impact a given recreation site can absorb without excessive deterioration of the resource and loss of aesthetic qualities. Psychological carrying capacity, on the other hand, refers to the limits of use an area can sustain without deterioration of the recreational experience through crowding and resource degradation. The latter, while much more difficult to establish, is no less real. Both types of carrying capacities can be enhanced through careful design and proper management practices. The deliberate creation of an artificial carrying capacity can substantially increase the potential of a natural site to absorb use and development.
2. Recreational Development: Any development, whether intensive or extensive which facilitates recreation in a special area: e.g. campground development, trails etc.
3. Recreation Space Standards: These standards, based on years of recreation planning experience and research, indicate minimum spatial requirements for various recreation activities and can be used to supplement estimates of physical carrying capacity. Information regarding space standards and carrying capacity can be obtained from the Provincial Parks Branch.

POLICY #7

SHORELAND OF WATERWAYS AND WATERBODIES HAVING ENVIRONMENTAL, RECREATIONAL, OR OTHER GENERAL SIGNIFICANCE TO THE PUBLIC SHOULD BE AFFORDED PROTECTION.

A. Policy Objectives

The purpose of this policy is to recognize the importance of key shorelands to the public and to protect the integrity and usefulness of this finite resource. Key shorelands should be maintained and managed to meet recreation, erosion protection and water table retention requirements and to ensure the viability of critical environments for local flora and fauna. In addition to these specific reasons, it is anticipated that certain shorelands will be designated for protection solely to ensure the right of the public to fully utilize the province's major waterways and waterbodies.

B. Policy Application

Identification of shorelands requiring protection will be achieved through land use planning programs at both the provincial and local levels. The extent of protection required will be directly related to the characteristics of the local situation. The size and configuration of the waterbody, the need for public access, the erosion rate, the recreation potential, etc. will all have a bearing on the mode of protection adopted.

Shoreland reserves will be created to protect shorelands. Subdivision approval, development plans and zoning by-laws adopted under The Planning Act, will be the primary vehicles for implementing a system of reserves.

Two types of shoreland reserves are suggested as vehicles for shoreland protection:

1. Environmental Reserves

Erosion control and protection of existing flora and fauna will be the primary concern along many of Manitoba's waterways and waterbodies. In these cases development plans will identify the shorelands requiring protection and will ensure, through zoning by-laws that adequate land use controls are enforced to achieve this protection. This would likely involve restrictions on shoreland development or clearance of vegetative cover. In most cases public acquisition or access will be unnecessary. In unique circumstances however, the degree of land use control required may make public acquisition the only logical alternative.

2. Public Shoreland Reserves

Municipalities, planning districts or the province may designate certain shorelands as having a significance to the general public for historic, cultural, recreational or other reasons. In such cases development plans will identify the appropriate areas, with public acquisition as the stated goal for these lands. Dependent on the local situation, acquisition might occur through direct purchase or from dedication through the subdivision process. In all such cases the amount of land required and provision of access to the reserves will be designed to suit the local situation. In some cases public use of the reserves may be intensive, e.g. beach areas, whereas in other locations actual public presence on the reserve may be minimal. An example of the latter might be a reserve designed to ensure an unobstructed view of the waterbody along a scenic drive. 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.

C. Glossary of Terms

1. Significance: Shorelands of significance will be those identified and designated for protection by municipalities, planning district boards, or the Province.

2. Shoreland: 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.
3. Development: The carrying out of the construction, erection or placing of any building or excavation or other operation on, over or under land, or the making of any change in the use or intensity of use of any land or buildings or premises.

POLICY #8

RECREATION AND RESOURCE AREAS SHALL BE AFFORDED PROTECTION FROM ADJACENT USES THAT WOULD DEGRADE OR ENDANGER THEIR PRIMARY FUNCTION.

A. Policy Objectives

The character of land use adjacent to provincial recreation and resource areas is a major factor affecting the continued viability of the primary function of these reserves. By their very nature, these areas are quite vulnerable to all types of environmental disturbances (water pollution, noise pollution, water table draw down, habitat destruction, etc.). The purpose of this policy is to ensure that these significant areas are not adversely affected by adjacent land uses.

B. Policy Application

The primary function of significant recreation and resource areas shall be permanently maintained through implementation of guidelines which will affect the use of lands adjoining such parks or reserves. No intensive residential, industrial, agricultural or commercial development or subdivision potentially detrimental to the resource area or park character or experience will be permitted in this peripheral zone. Until such time as detailed land use plans for the areas involved are formulated by the municipalities and government agencies concerned, and formalized in a district plan, development shall be controlled by means of an interim development plan prepared by the government departments concerned and approved by the Provincial Land Use Committee of Cabinet.

C. Glossary of Terms

1. Significant Recreation and Resource Areas: Major areas which may require considerable provincial funds to establish or replace, which have been established by the Crown to recognize sensitive areas of high historic, natural or recreational importance to the Province.
2. Interim Development Plan: A provisional zoning of lands immediately adjacent to the resource areas involved. Such a plan would be prepared by the provincial agency responsible for the resource area in consultation with the affected municipality. This plan would take into consideration the goals and objectives of the resource area involved and provide land use management direction until a formal municipal development plan has been prepared.

POLICY #9

AREAS CRITICAL TO THE EXISTENCE OF RARE OR ENDANGERED PLANTS OR ANIMALS, SIGNIFICANT NATURAL FEATURES, AND CULTURAL AND HISTORIC SITES OF THE REGION SHALL BE IDENTIFIED AND SHOULD BE DESIGNATED AND PRESERVED.

A. Policy Objectives

The purpose of this policy is to:

1. Assist in the maintenance of rare or endangered plants and animals by ensuring that areas critical to their existence are protected.
2. Protect significant natural features which characterize a region and are in danger of being eliminated or reduced to such an extent as to become atypical.
3. Commemorate, protect and reconstruct significant themes and events in history by preserving prehistoric and cultural sites and artifacts in order to increase an understanding of the contributions to Manitoba's historical development made by significant groups and individuals.
4. Encourage awareness and continued use of Manitoban buildings which illustrate unique or interesting architectural form and design or that are connected with historically significant people, groups, places, events or themes in Manitoba's development.

B. Policy Application

1. No subdivision or development should be approved for those areas formally identified as critical to the existence of rare or endangered plants or animals, significant natural features or significant cultural and historic sites. The areas identified shall be large enough to effectively protect the site.

Development may take place at a site of cultural or historic significance after the site has been examined by the Historic Resources Branch or its designate.

The salvage costs incurred as a result of the development of a site which eliminates a cultural or historic site should be at the expense of the developer and such work should be completed before the commencement of any proposed site development. Such costs should be identified as part of the budget of the development work which will actually disturb the site and in no case should exceed 1 percent of the total cost of such development work. (This procedure is laid out in the Natural Historic Sites and Objects Act.)

All commercial exploitation of historic sites should be approved by the Historic Resources Branch.

2. For the purpose of applying this policy:

- (a) Areas critical to the existence of rare and endangered plants or animals shall be identified from the "Rare or Endangered Species Areas List".
- (b) Areas of significant natural features shall be identified from the "Significant Natural Features List".
- (c) Significant cultural and historic sites shall be identified from the "Cultural and Historic Sites List".

C. Glossary of Terms

1. Rare or endangered Plants or Animals: Plants and animals currently identified by the Federal Government of Canada and relevant to Manitoba and by the Provincial Government of Manitoba as having a rare or endangered status. Species identification will be in accordance with Federal and Provincial legislation.

2. Areas Critical to the Existence: For animals: breeding, denning and migration habitats. For plants: the area occupied by the identified plant species.
3. Significant Natural Features: Natural land forms, flora and fauna which characterize a region and are in danger of being eliminated or reduced to such an extent as to become atypical. For example, tall grass prairie in the Winnipeg area, Carberry Sandhills, Colonial Nesting Bird areas.
4. Rare or Endangered Species Areas List: The list approved by the Provincial Land Use Committee prepared and periodically updated by concerned departments of government. This list identifies and describes areas critical to the existence of rare or endangered plants and animals.
5. Significant Natural Features List: The list approved by the Provincial Land Use Committee prepared and periodically updated by concerned departments of government. This list identifies and describes areas of significant natural features.
6. Cultural and Historic Sites List: The list approved by the Provincial Land Use Committee prepared and periodically updated by the Department of Tourism, Recreation and Cultural Affairs. This list identifies and describes significant cultural and historic sites.
7. Development: As per "The Planning Act" (i) the carrying out of construction, erection or placing of any building or excavation or other operation on, over or under land, or (ii) the making of any change in the use or intensity of use of any land or building or premises.

POLICY #10

AREAS SHALL BE IDENTIFIED, DESIGNATED AND RESERVED FOR RENEWABLE RESOURCE PRODUCTION, UTILIZATION AND PRESERVATION BY OUTLINING:

- (a) AREAS OF EXISTING PRIME WILDLIFE HABITAT.*
- (b) EXISTING EXCEPTIONAL FORESTRY VALUE AREAS.*
- (c) AREAS OF EXISTING PRIME FISH HABITAT.*
- (d) OTHER AREAS OF RENEWABLE RESOURCE SIGNIFICANCE.*

A. Policy Objectives

1. The purpose of this policy is to enhance the quality of life by:
 - (a) Maintaining and promoting economic opportunities associated with renewable resource utilization through the protection of renewable resource areas. (e.g. commercial fishing)
 - (b) Maintaining and promoting ecological diversity by protecting wildlife and fish habitats and important forestry areas.
 - (c) Maintaining and protecting wildlife and fish populations through habitat protection for use by Manitobans.
 - (d) Maintaining the aesthetic qualities of the rural landscape.
 - (e) Maintaining existing natural erosion protection and preventing southern Manitoba from becoming a monoculture of bald prairie.
 - (f) Ensuring that provincial money spent on stocking waters will provide a higher degree of benefit.
2. It is important to realize that the lands protected by this policy are also important for recreation, shoreline maintenance and erosion control and that this overlap with other policies underlines the importance of the remaining wooded areas.

B. Policy Application

1. No subdivision or development, except for agricultural and agriculture related purposes, shall be approved for the following types of resource areas unless it can be clearly demonstrated that the proposed subdivision or development will not conflict with their resource values:
 - (a) Land which is presently wooded, and has Canada Land Inventory class designations 1, 2, 3 or 4 for wildlife - ungulates and where in that municipality 20 percent or less of the total municipal area is Crown Land.
 - (b) Existing wooded deer wintering areas, regardless of size, as defined by the Canada Land Inventory Classification as 1W, 2W, or 3W for Wildlife - Ungulates and those additional deer wintering areas formally identified and listed in the "Renewable Resources Areas List".
 - (c) Existing wetlands greater than or equal to 40 acres.
 - (d) Existing wetlands less than 40 acres within areas designated class 1, 2, 3 by the Canada Land Inventory Wildlife - Waterfowl Classification.
 - (e) Lands formally identified and listed for forestry purposes in the "Renewable Resources Areas List".
 - (f) Land adjacent to formally identified highly productive fishing waters, stocked waters or fish spawning beds as listed in the "Renewable Resources Areas List". (See also Policy #6.)
 - (g) Other land formally identified and listed as having renewable resource significance in the "Renewable Resources Areas List".
2. The above noted areas are identified by reference to:
 - (a) Canada Land Inventory Capability Maps Wildlife - Ungulates and Wildlife - Waterfowl, at a scale of 1:500,000.

- (b) Aerial photographs and present land use maps and surveys.
- (c) The "Renewable Resources Areas List".

C. Glossary of Terms

1. Crown Land: Provincially owned land which is administered under "The Crown Lands Act", "The Forest Act", "The Wildlife Act", "The Fisheries Act" or "The Park Lands Act".
2. Development: As per "The Planning Act", (i) the carrying out of the construction, erection or placing of any building or excavation or other operation on, over or under land, (ii) the making of any change in the use or intensity of use of any land or buildings or premises.
3. Exceptional Forest Value Areas: Areas identified by the Department of Renewable Resources and Transportation Services and deemed to be significant for forestry purposes.
4. Habitat: As per "The Wildlife Act", the soil, water, food and cover components of the natural environment that are necessary to sustain wildlife or exotic animals.
5. Land: Water, land under water and land in the terrestrial or dry land sense.
6. Municipality: Rural municipality or local government district.
7. Other Areas of Renewable Resource Significance: Those areas identified by concerned departments of government as having particular significance for renewable resource production, utilization or preservation.
8. Prime Fish Habitat: Areas identified by the Department of Renewable Resources and Transportation Services as highly productive fishing waters, stocked waters and fish spawning beds.
9. Renewable Resource Areas List: The list approved by the Provincial Land Use Committee prepared and periodically updated by concerned departments of government. This list identifies and describes areas of prime wildlife habitat not previously identified by 1:500,000 scale Canada Land Inventory maps for Wildlife - Ungulates and Wildlife - Waterfowl, exceptional forestry value areas, prime fish habitat and other areas of renewable resource significance.
10. Stocked Waters: Those waters stocked with fish by the Department of Renewable Resources and Transportation Services excluding those waters stocked by the Department of R.R.T.S. by agreement with private individuals and any waters stocked for the purposes of fish farming by private individuals.
11. Ungulates: White tailed deer, mule deer, elk, moose and caribou.
12. Waterfowl: Wild ducks, geese and swans as defined by "The Migratory Birds Convention Act".
13. Wetlands: Depressional lowlands including sloughs, potholes, marshes, oxbows and fringed open water one acre or more in area containing temporary, intermittent or permanent water and supporting emergent vegetation consisting of a variety of reeds and grasses such as cattails, bullrushes, bluejoint, whitetop and phragmites and submerged and floating aquatic plants such as water milfoil, bladderwort, pondweeds and waterlily.
14. Wildlife: As per "The Wildlife Act", a vertebrate animal of any species or type excluding fish that is wild by nature in the province.
15. Wooded: Any contiguous block of uncultivated land 40 acres or more in area on which trees or shrubs or a combination of trees and shrubs are growing or standing with a crown closure of 50 percent or more and within which any contiguous areas of natural open space enclosed by trees or shrubs or any combination of trees or shrubs is less than 25 percent of the total area deemed to be wooded.

POLICY #11

LANDS SUBJECT TO HAZARDS SUCH AS FLOODING OR EROSION SHOULD BE RETAINED FOR OPEN SPACE OR AGRICULTURAL USE. MORE INTENSIVE DEVELOPMENT SHOULD ONLY BE CONSIDERED WHERE THE HAZARD CAN BE ELIMINATED OR WHERE THE USE WOULD BE COMPATIBLE WITH THE RISK.

A. Policy Objectives

1. Development within hazard areas leads to: acceleration of environmental damage, interference with natural processes, public expenditures for remedial works or assistance, waste of resources, and, personal loss and hardship. To mitigate against these potential expenses and damages, the objectives of the policy, through judicious land use, are:

- (a) To minimize personal hardship and inconvenience, adverse affects on public health, and loss of life and safety.
- (b) To minimize property damage and public expenditures for relief or protection.
- (c) To restrict activities which would accelerate or promote damages arising from causes such as erosion or bank instability.
- (d) To maintain the natural capability of streams to convey flood flows.
- (e) To restrict activities which could negate the benefits from existing flood control works.

B. Policy Application

1. Agricultural or open space recreational activities may be acceptable within hazard areas but any other use involving a higher intensity of development should be restricted. Hazard areas include lands subject to flooding, water erosion, bank instability, landslides or subsidence.

2. Criteria

- (a) Lands subject to flooding are all lands which are subject to flooding by the 100 year flood, a recorded flood exceeding the 100 year flood, or a flood specified by the Water Resources Division in areas protected by flood control works.
 - (b) Lands subject to water erosion are all lands which would, within a fifty year period, be eroded away or become instable due to the action of water contained in an adjacent water course or water body.
 - (c) Lands subject to other hazards such as landslides or subsidence are those lands where actual effects of such hazards have occurred or have been predicted.
3. It may not be practical or desirable for economic or social reasons to totally restrict development in all hazard areas. Developments should, however, be carefully controlled to ensure that they are compatible with the risks or that the hazard has been eliminated or protected against. Where such exceptions are made, the following criteria should be applied:
- (a) The development shall not adversely alter, obstruct or increase water flow, flood velocities or flood stages.
 - (b) There shall be no added risk to life, health, or safety.
 - (c) All structures and services shall be protected against damage and shall be functional under hazard conditions.
 - (d) Activities such as dumping, excavation and clearing, which would accelerate or promote damages arising from causes such as erosion or bank instability, shall be prohibited.
 - (e) Natural tree and vegetative cover shall be preserved to reduce erosion.
 - (f) Potential damages to any permitted open space uses shall be minimal under hazard conditions.

C. Glossary of Terms

1. Erosion: Is the process by which the earth's surface is worn away by the action of wind or water.
2. Flood: Is a temporary rise in flows or water levels of a watercourse or water body that results in inundation of areas not ordinarily covered by water.
3. Landslides: Are all types of localized movements, except subsidence, of the earth's crust caused fundamentally by gravity and taking place because of some inherent instability in the arrangement of the materials.
4. 100 Year Flood: Is a flood which is likely to occur, on the average, only once in 100 years, or more specifically, a flood which has a one per cent chance of being equalled or exceeded in any year. Also described as a one per cent flood or as a flood having a return period of 100 years.
5. Subsidence: Is the vertical settlement, lowering or falling of the earth's surface.
6. Water Body: Means a lake, pond or reservoir either naturally or artificially created which periodically or continuously contains water.
7. Watercourse: Is an open, defined channel, river, drain or ditch, either naturally or artificially created, which intermittently or continuously contains moving water.

POLICY #12

NEW DEVELOPMENT SHOULD BE RESTRICTED IN THE VICINITY OF PROVINCIAL HIGHWAYS SO AS TO AVOID ANY INTERFERENCE WITH THE MAIN FUNCTION OF THIS REGIONAL TRANSPORTATION NETWORK.

A. Policy Objectives

The primary role of the provincial highway system is to move traffic over relatively long distances with maximum safety and minimal interruption. The consequences of allowing adjacent development to interfere with this function are to increase the degree of hazard and amount of delay for motorists, and to accelerate the need for costly highway improvements. The reasons for proposing this policy are therefore as follows:

1. To maintain a high level of service and safety on the Province's highways.
2. To prevent premature obsolescence of existing facilities, and thus protect the provincial investment in highways already in place.
3. To minimize disruption to local development in the future, and reduce the cost to the Province for land acquisition when highway upgrading is required.

The purpose of this policy is to ensure firstly, that the more important provincial highways located outside of built-up areas are protected within a corridor wide enough to safeguard both traffic operations and options for roadway expansion in the future. It is not being advocated that such highways be enclosed in a "glass case" and shut off from development altogether. Rather, the policy is aimed at keeping only certain types of land use far enough back from major provincial highways in rural areas so as to avoid serious conflict, now and later.

On the other hand, this policy recognizes that it may be impractical to exclude certain activities next to mainline highways where considerable fragmentation of land has already occurred. However, in these areas it is still considered necessary to establish some basic planning criteria for minimizing friction between the highway facility and adjoining development. It is intended that such criteria also be applied to development that may be planned in the vicinity of any other provincial highway not defined as "major" under this policy.

B. Policy Application

1. For major provincial highways located outside of urban centres:
 - (a) The type of development that would cause significant interference (in general, residential, excepting farmstead subdivisions, industrial and commercial*) should not be allowed within 1,000 feet of the centreline of a major provincial highway or within one-half mile from the centreline intersection of a major provincial highway and any other provincial highway.
 - (b) Compatible land uses (for example, agriculture, moderate recreation, wayside parks) would be permitted adjacent to major provincial highways provided that individual parcels do not measure less than 1,000 feet in width of highway frontage+.

Exceptions to these provisions should only be considered where adjacent development has already occurred to the extent that the setback and frontage controls cannot be fully applied.

* Highway Commercial uses (including service stations, roadside restaurants and cafes, motels and hotels, and uses of like character that provide essential services to highway users) next to provincial highways are considered acceptable at designated locations.

+ This dimension can be reduced for (i) a farmstead subdivision provided such subdivision does not create a new access closer than 1,000 feet from an existing connection to the highway, and (ii) individual parcels within a designated Highway Commercial area provided a service road is incorporated in the planning of such an area.

2. In areas where residential (including rural non-farm and seasonal types), commercial or industrial uses are to be allowed in close proximity to a provincial highway, the following development criteria should be observed:

- (a) Strip development along the highway, whereby direct connections to the highway are continuously relied upon for providing access to abutting properties, shall not be permitted.
- (b) The kind of development that would generate traffic in an amount or of a type that would unduly impair the present and potential capability of the adjoining highway to carry traffic safely and efficiently, shall not be permitted.
- (c) The local road or street network associated with any type of proposed development shall be designed to be in accord with both the existing and planned road and street system of the neighboring areas.

C. *Glossary of Terms*

- 1. Provincial Highway System: Comprised of provincial trunk highways and provincial roads which have been so declared under The Highways Department Act.
- 2. Major Provincial Highway: For the purpose of this policy, any limited access highway which has been so designated under The Highway Protection Act. All provincial trunk highways have limited access status unless the Traffic Board declares otherwise by regulation.
- 3. Urban Centre: Includes incorporated cities, towns and villages, "unincorporated village districts", and those "local improvement districts" created for sewer and water purposes. The term may also include any recognized settlement of 25 or more residences.
- 4. Development: As per The Planning Act (i) the carrying out of construction, erection or placing of any building or excavation or other occupation on, over or under land, or (ii) making of any change in the use or intensity of use of any land or buildings or premises.
- 5. Other Provincial Highway: For the purpose of this policy, means any provincial trunk highway or provincial road not designated as a limited access highway.
- 6. Strip Development: As applied in this policy, means any development which contributes to the evolution of a row of lots of relatively small holdings (with highway frontage less than 500 feet each, for example), all relying on direct access connections to the adjoining highway for servicing.

POLICY #13

ECONOMICALLY VALUABLE AGGREGATE AND QUARRY MINERAL DEPOSITS SHOULD BE PROTECTED FROM SURFACE LAND USES THAT WOULD INTERFERE WITH THEIR ONGOING AND FUTURE EXPLOITATION.

A. Policy Objectives

The objectives of this Policy are:

- (a) To protect aggregate and quarry mineral resources for future construction and development in the Province.
- (b) To ensure that materials are available to support local and provincial construction needs and industrial minerals production at a reasonable cost.
- (c) To ensure that pit and quarry operations are reasonably compatible with adjacent land uses.
- (d) To integrate aggregate and quarry mineral extraction into the overall land use planning process by allocating areas specifically for extraction and by assuming that as the economic climate changes so areas allocated to resource extraction will also change.
- (e) To pursue sequential land use practices such that on a known deposit (a) a non-conflicting land use is applied to the surface of the deposit prior to mineral extraction, and (b) the land is returned to a practical and compatible use once extraction has ceased.

B. Policy Application

Deposits of sand and gravel and near-surface limestone which are in demand as construction materials by industry, local communities or government departments and agencies, should be protected. In certain parts of the Province such minerals as bentonite, shale, gypsum, high calcium limestone, silica sand and other quarry minerals should also be protected to ensure a supply of these materials to industrial mineral related industries. These include both surface deposits and shallow subsurface deposits overlain by till or clay.

For the purpose of this Policy:

- (a) Conflicting land uses include residential subdivision lots highways or utility corridors. Such development should be deferred until the mineral is extracted and the site rehabilitated.
- (b) Marginally conflicting land uses include the incorporation of aggregate and quarry mineral deposits into a Provincial or National Park, a Wildlife Management Area, a Community Pasture or a Provincial Forest or the establishment of a garbage dump on part of a deposit. In these cases, mineral extraction can take place alongside the alternative land use, provided that agreement is reached between the two concerns, to ensure optimal utilization of all resources involved.
- (c) Non-conflicting land uses include recreation outside of Provincial Parks, low value timber stands, general agricultural practices and temporary occupation, such as trailer parks or parking lots. Pit and quarry operations can develop in these areas whenever such activities become economically feasible.

In some areas aggregate or quarry mineral extraction should be recognized as a primary land use. In other areas a marginal or non-conflicting land use may be permitted providing that it could later be converted to a gravel or mineral extraction operation.

In order to indicate areas where conflicting land uses should be disallowed, the Mineral Resources Division is in the process of producing aggregate and quarry mineral resource maps for certain regions of the Province. These will take the form of "Stop - Caution - Go" maps. "Stop" indicates valuable deposits upon which no conflicting land use should be allowed. "Caution" denotes a deposit whose full potential is not proven or whose quality is not high but which has been recognized as of value to the region. Deposits with a status of "Caution" may be designated for a conflicting land use, after local needs have been scrutinized. "Go" denotes a deposit of no present recognized value as an aggregate or quarry mineral source. Periodic revision to the "Stop - Caution - Go" status of deposits will reflect continuing exploration and changing economic conditions. It is understood that the maps will be subject to approval by the Provincial Land Use Committee.

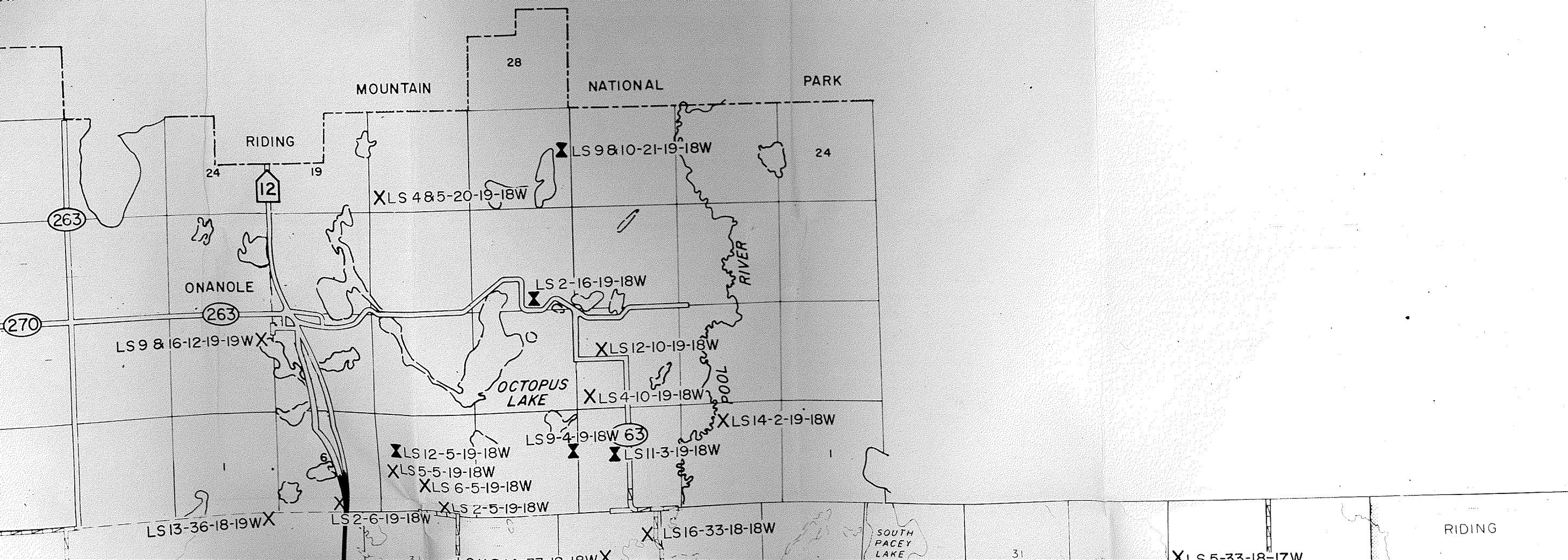
The rehabilitation of pits and quarries on both Crown and private land is governed by Regulation under The Mines Act. The rehabilitation takes place in accordance with an approved plan. Consensus for the plan is derived from concerned Municipal and Provincial agencies. The Mineral Resources Division requires such plans from all commercial operators.

Following mineral exploitation and rehabilitation, the land can be restored to some compatible use.

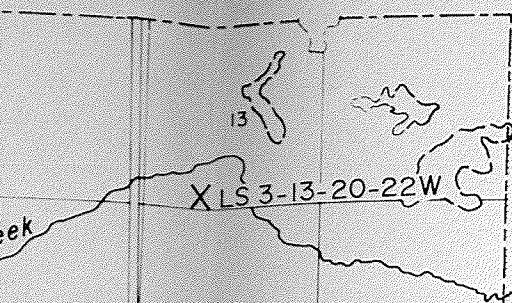
C. Definitions

For the purpose of this Policy:

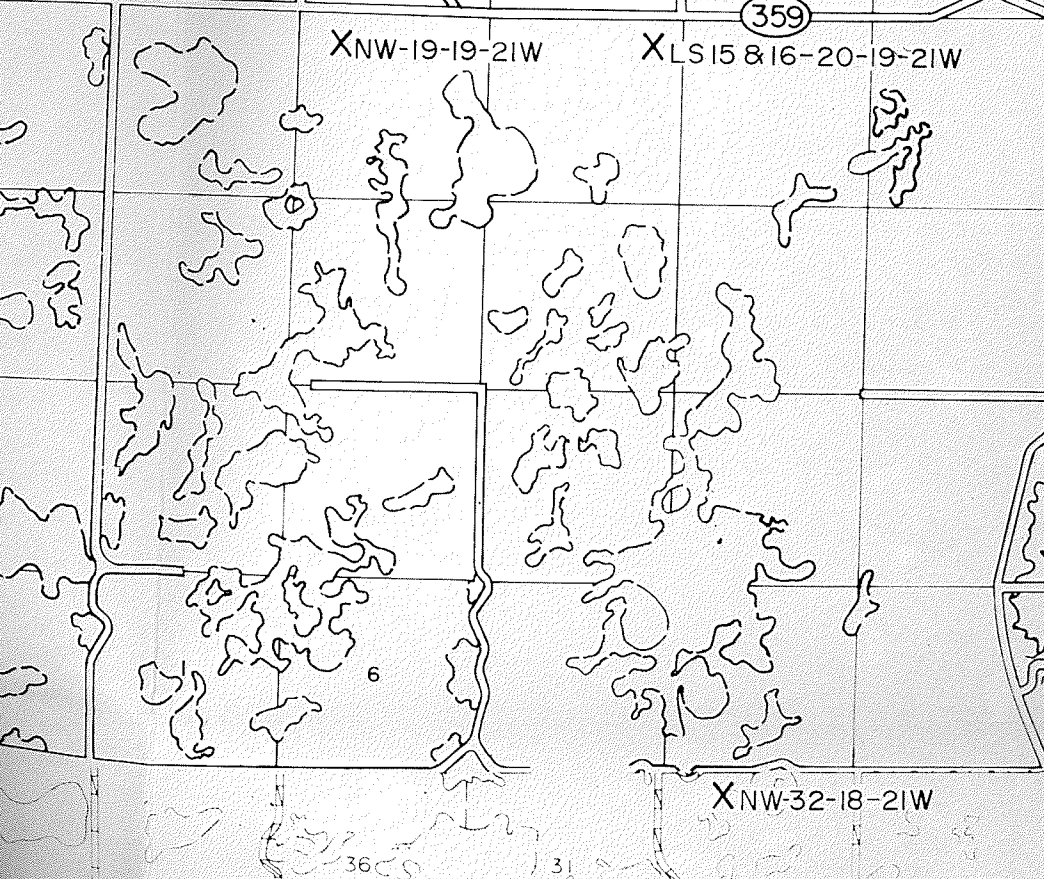
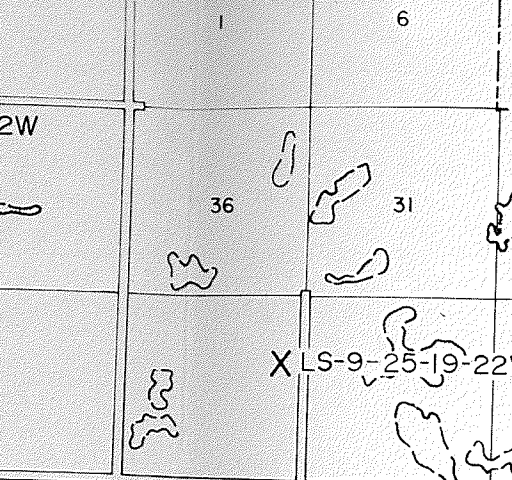
- (a) "Aggregate" means sand, gravel, or both, or crushed rock.
- (b) "Economically Valuable Mineral" means those areas of mineral resource which have a high potential for extraction based on supply and demand projected over 25 years.
- (c) "Quarry Minerals" means those minerals obtained by quarrying, including: shale, kaolin, bentonite, gypsum, clay, silica-rich sand, peat, salt, coal, and rock or stone used for any purpose other than as a source of metal, asbestos, potash, oil and natural gas.



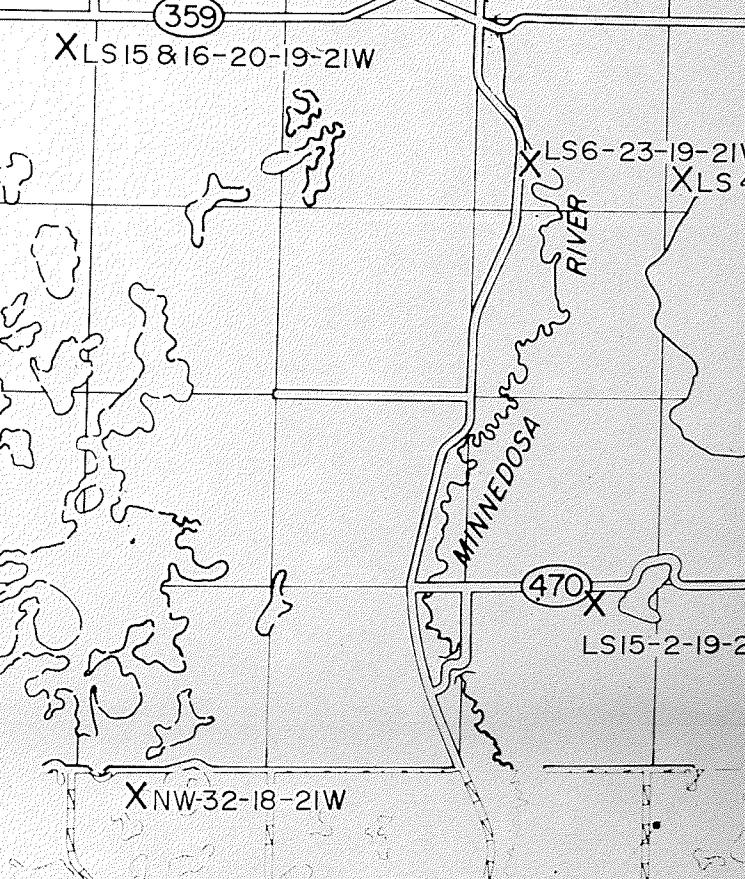
NAL PARK



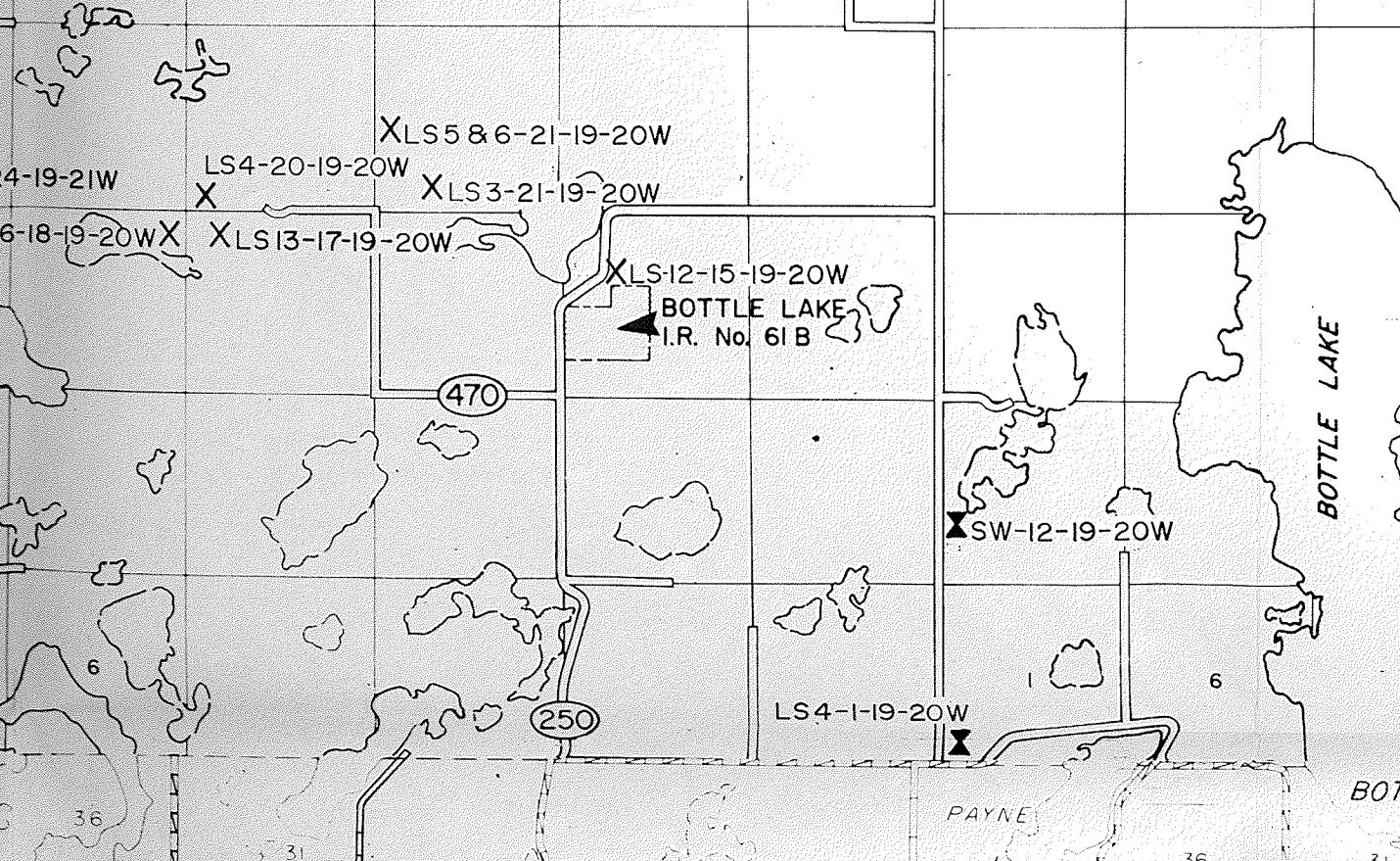
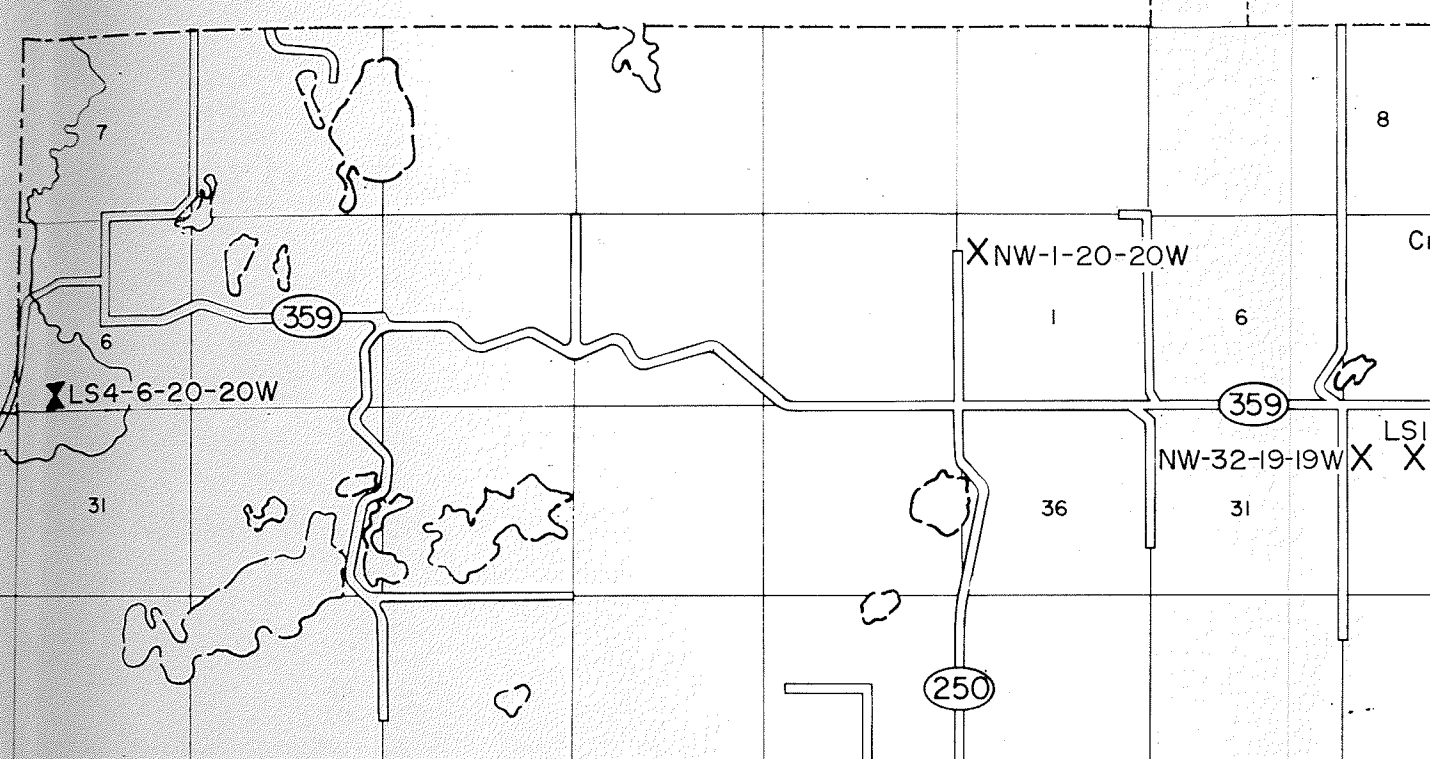
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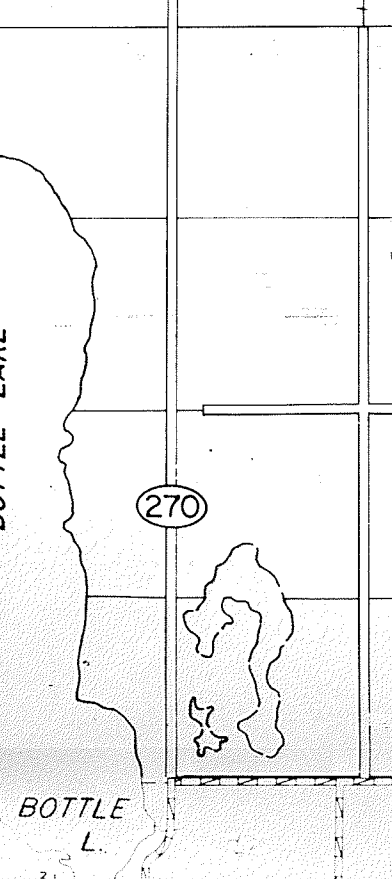
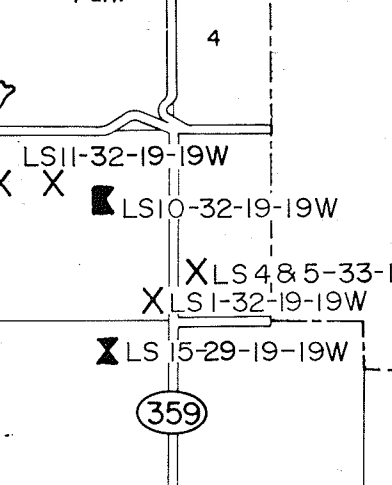
RIDING MOUNTAIN NATIONAL PARK

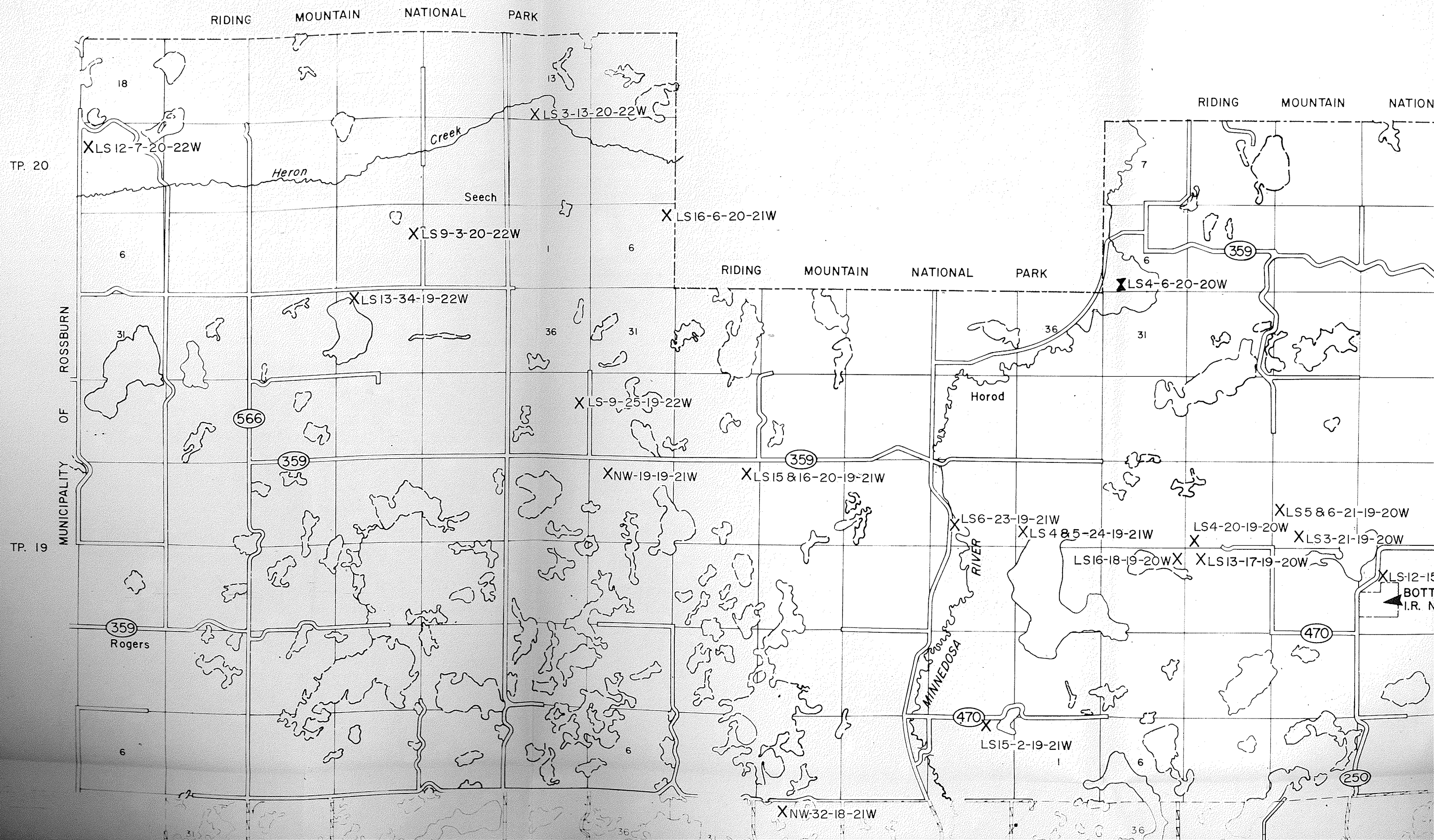


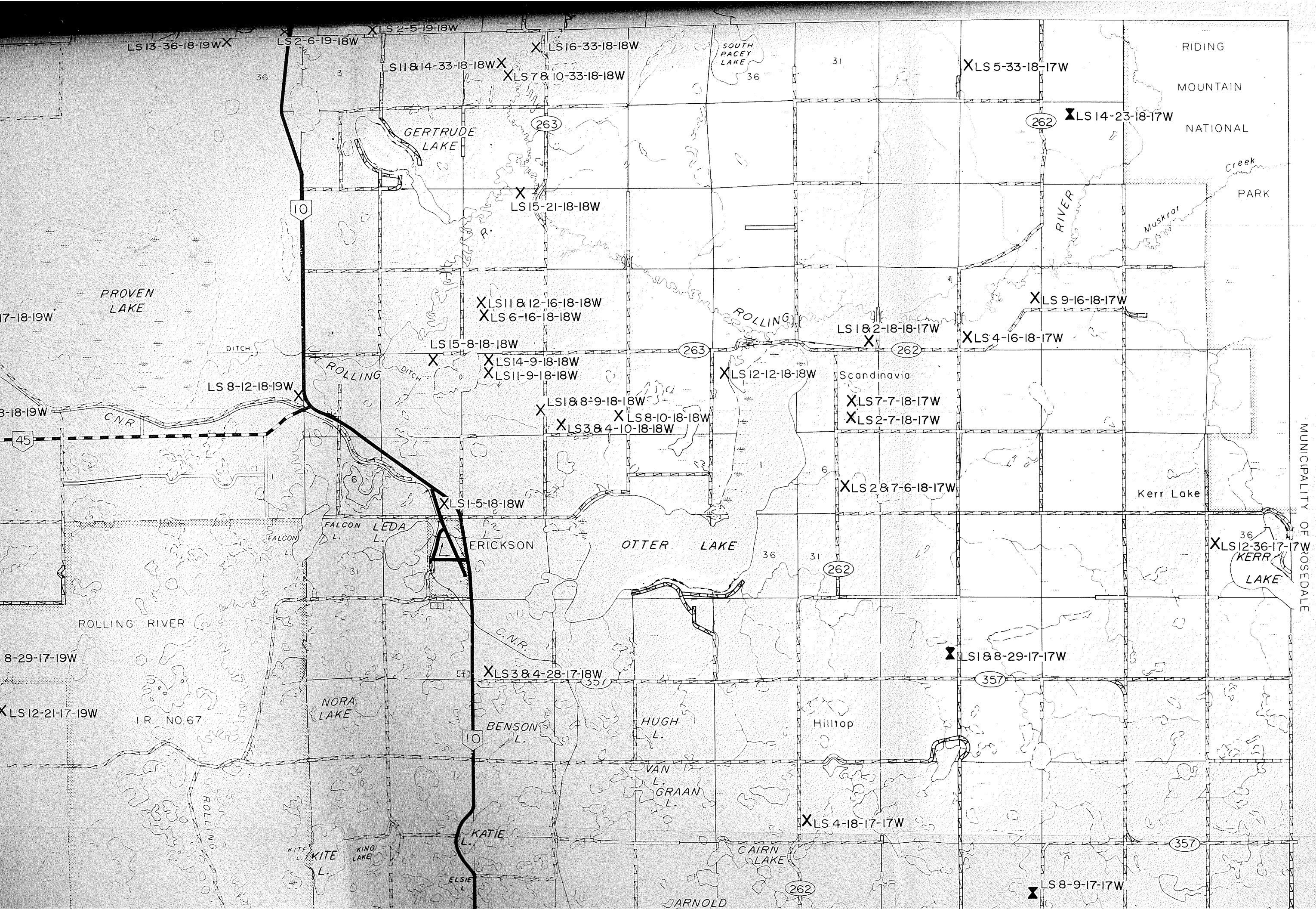
RIDING MOUNTAIN NATIONAL PARK

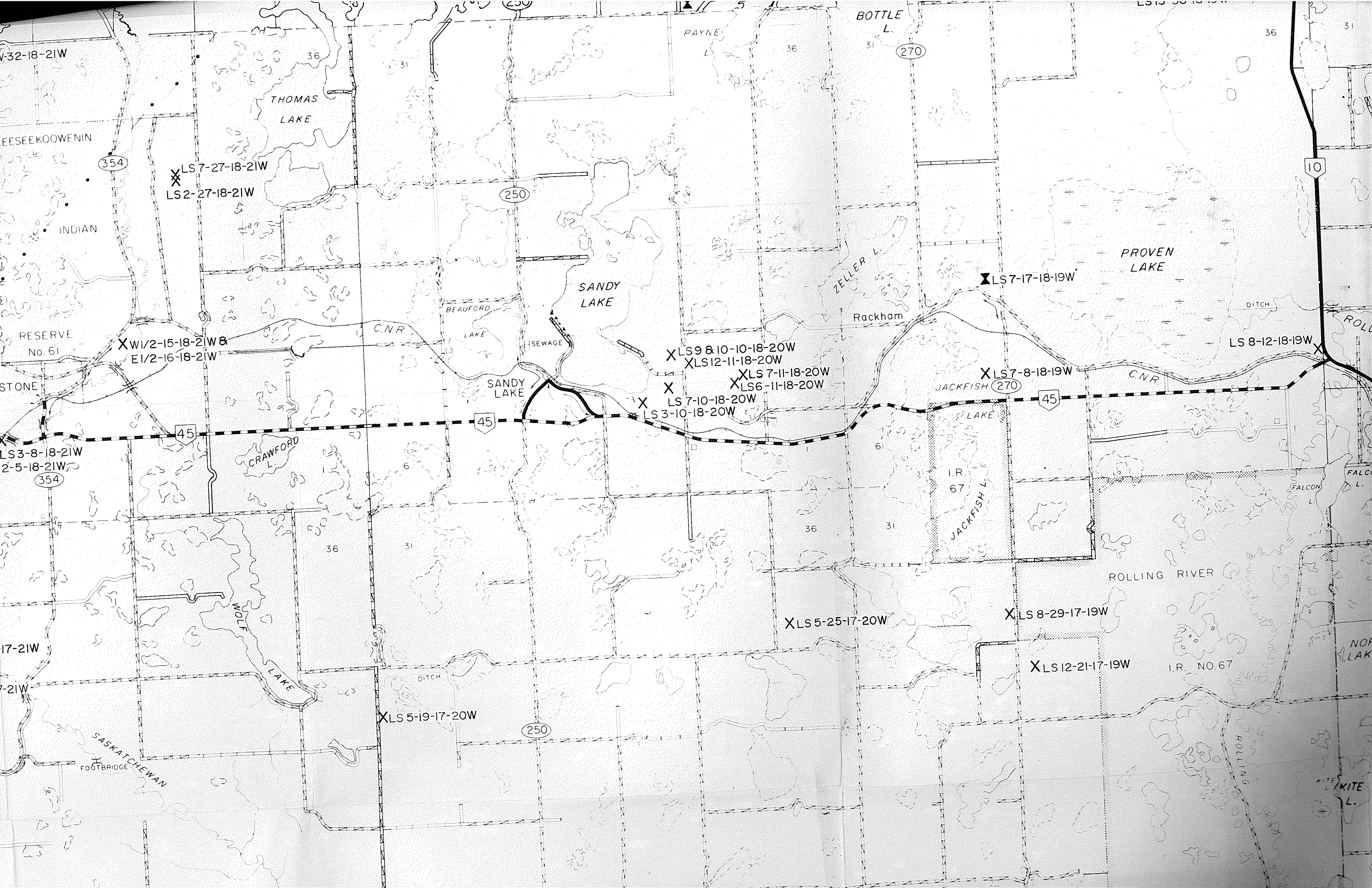


Crawford Park

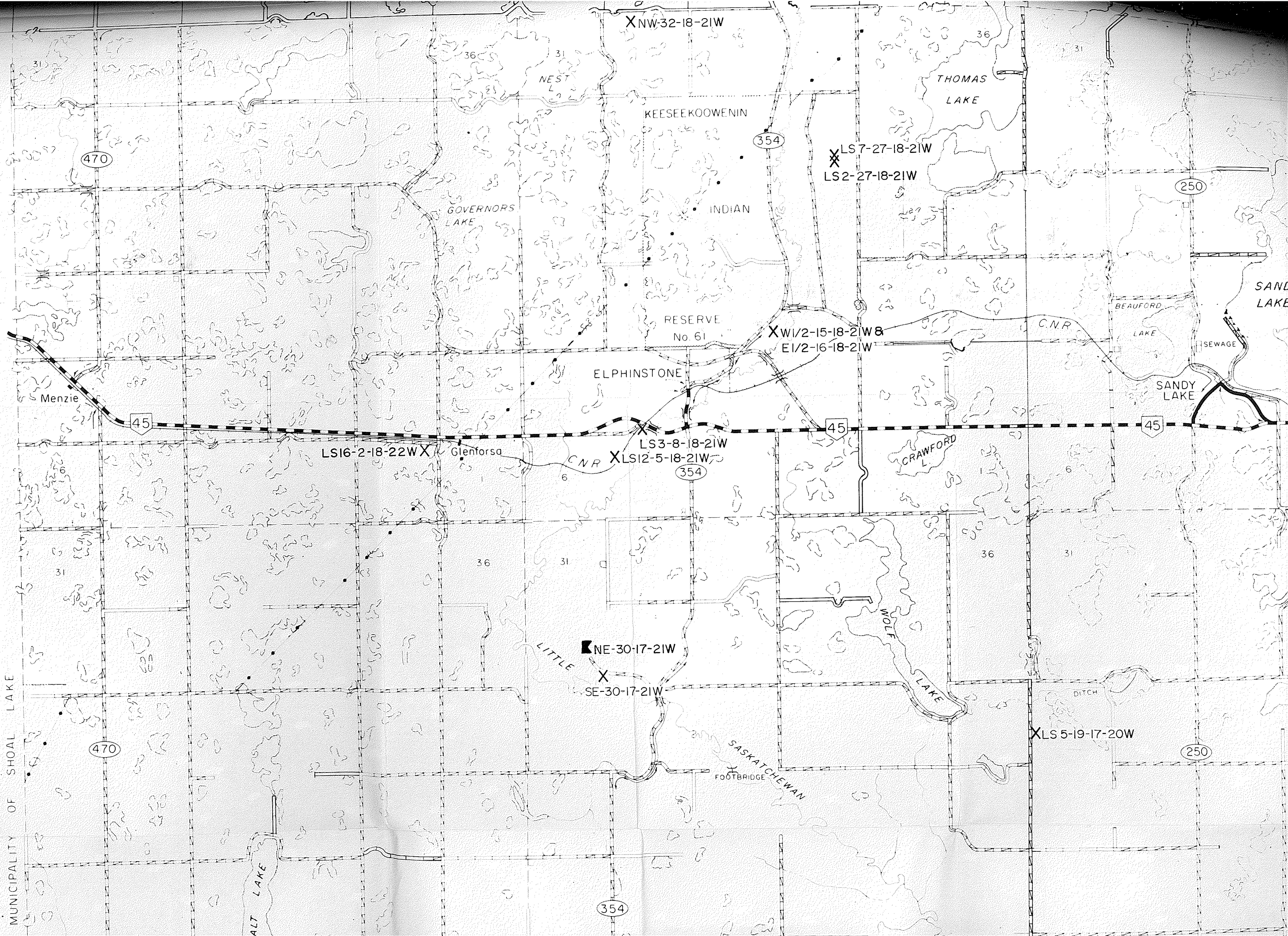




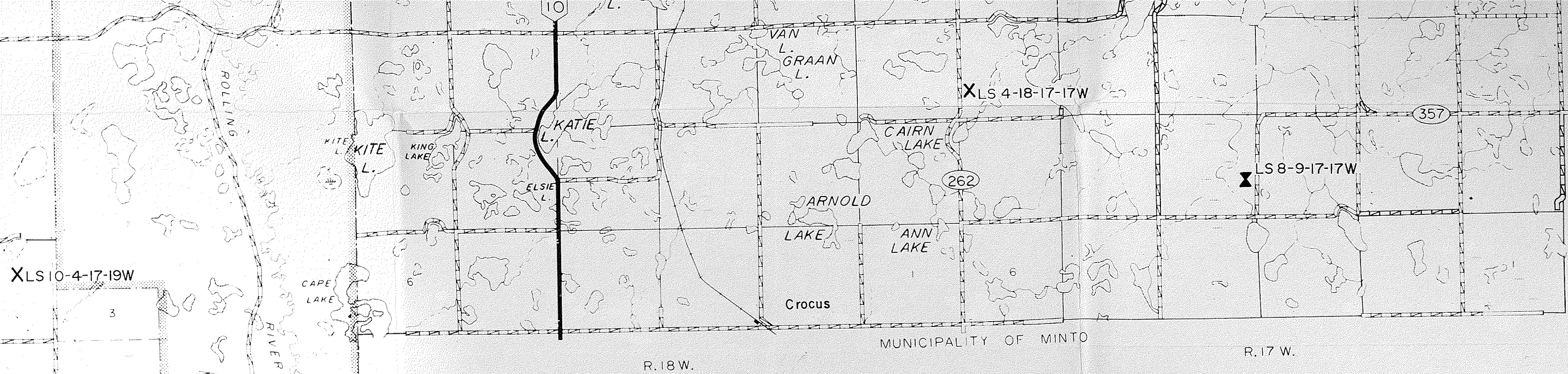




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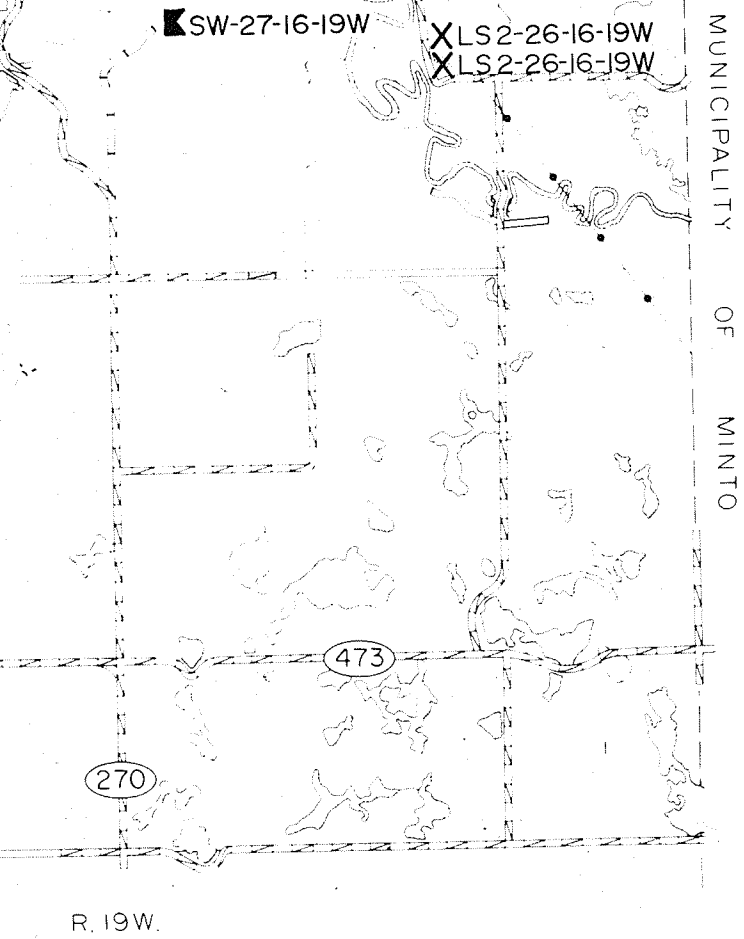
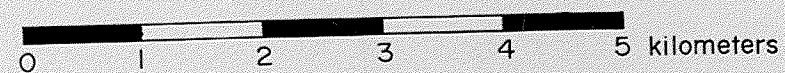


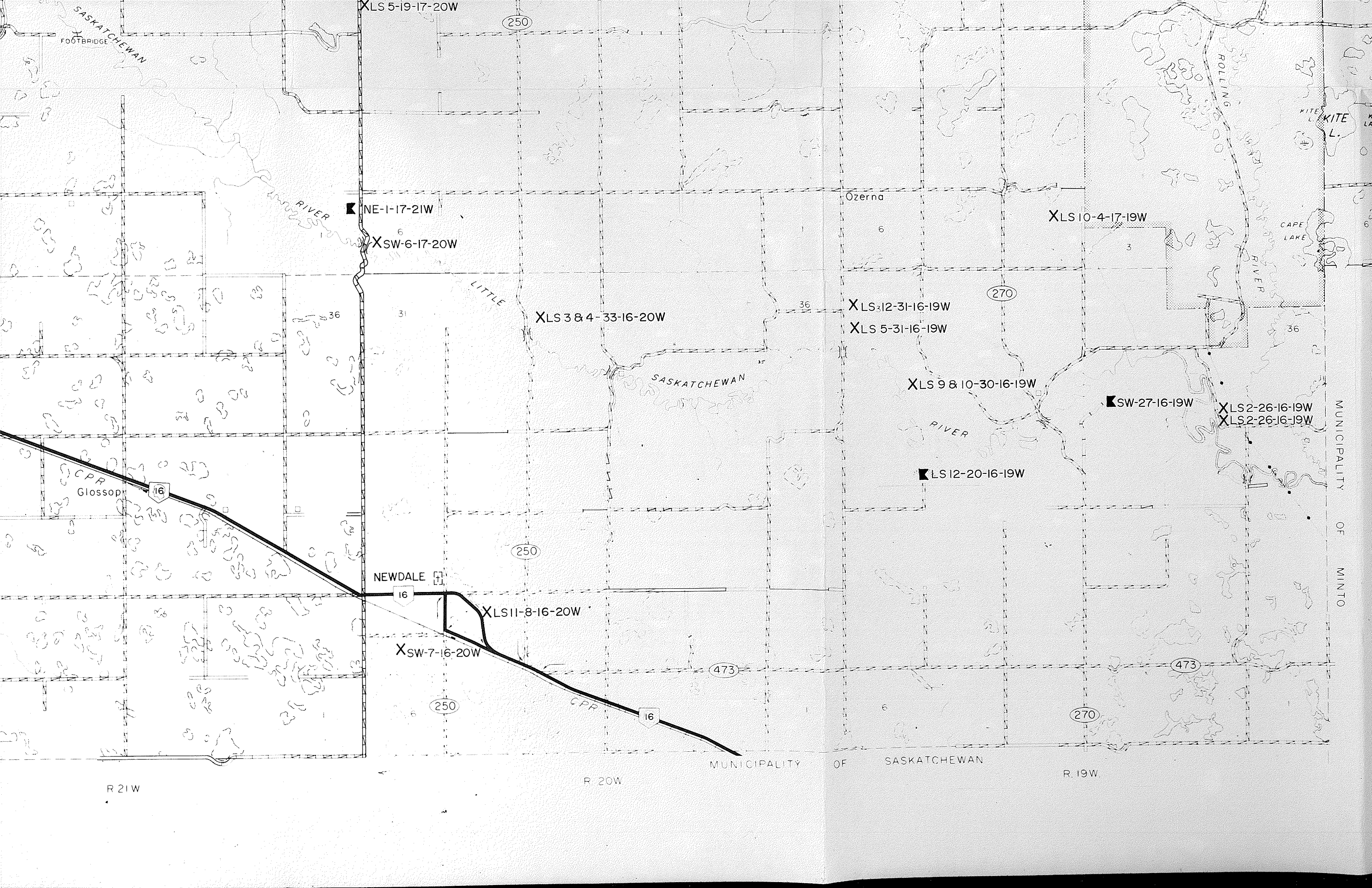
SOUTH RIDING MOUNTAIN PLANNING DISTRICT

- LSI 2-20-16-19W : Pit location and legal description, Commercial
- XLS 2-26-16-19W : Pit location and legal description, Unregulated
- ▲ LSI 9-4-19-18W : Pit location and legal description, Crown

Map base : Municipal Planning Branch, 1980

Pit Information : Mineral Resources Division, 1980





XLS 5-19-17-20W

250

FOOTBRIDGE
SASKATCHEWAN

NE-1-17-21W

XSW-6-17-20W

Ozerna

XLS 10-4-17-19W

LITTLE

XLS 3 & 4-33-16-20W

XLS 12-31-16-19W

XLS 5-31-16-19W

XLS 9 & 10-30-16-19W

SW-27-16-19W

XLS 2-26-16-19W

XLS 2-26-16-19W

LS 12-20-16-19W

CPR
Glossop

16

NEWDALE

16

XLS 11-8-16-20W

XSW-7-16-20W

250

473

250

16

CPR

MUNICIPALITY OF SASKATCHEWAN

R. 19W

R 21W

R. 20W

MUNICIPALITY OF MINTO

XLS 5-19-17-20W

(250)

SASKATCHEWAN
FOOTBRIDGE

(354)

NE-1-17-21W

XSW-6-17-20W

XLS3&4

LITTLE RIVER

STRATHCLAIR
SEWAGE

Ipswich

CPR

SL

CPR
Glossop

NEWDALE

XLS11-8-16-20W

XSW-7-16-20W

XLS5-1-16-22W

XLS16-10-16-22W

MUNICIPALITY OF SHOOTING STAR

MUNICIPALITY OF BLANSHARD

R 22W

R 21W

TP17

TP16

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NORTH SALT LAKE

SALT LAKE