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WATER POLLUTION CONTROL FACILITIES REPORT

Lakeview Township,
Minnesota

August 1978

RIEKE CARROLL MULLER ASSOCIATES INC

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WATER POLLUTION CONTROL FACILITIES REPORT

FOR

LAKEVIEW TOWNSHIP, BECKER COUNTY, MINNESOTA

AUGUST 1978

LAKEVIEW TOWNSHIP BOARD

David Ryder, Chairman
David Gohman
James Hartness
Conrad Ohm, Clerk

CONSULTING ENGINEERS

RIEKE CARROLL MULLER ASSOCIATES, INC.

WATER POLLUTION CONTROL FACILITIES REPORT

FOR

LAKEVIEW TOWNSHIP, BECKER COUNTY, MINNESOTA

AUGUST 1978

I hereby certify that this report was prepared by me or under my direct supervision and that I am a duly registered Professional Engineer under the laws of the State of Minnesota.

David O. Husby — Minnesota Reg. No. 6280

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August 31, 1978

Lakeview Township Board
Lakeview Township
Becker County, Minnesota

Gentlemen:

In accordance with our contract for engineering services, we have completed the investigations and studies of the water pollution control problems in Lakeview Township. Our findings and recommendations are contained within the following report entitled "Water Pollution Control Facilities Report for Lakeview Township, Becker County, Minnesota".

This report reviews the present and projected future problems in the planning area, design criteria and several feasible alternatives. The proposed alternative has been selected after economic, environmental, technical and social aspects were evaluated.

Following your review and consideration of this report, we would welcome the opportunity to discuss or explain any items that you wish to review so that further action can be initiated without delay.

At this time we wish to thank the Township Board for their cooperation during this project and Wayne Ruona for his assistance in obtaining information locally.

Respectfully submitted,

RIEKE CARROLL MULLER ASSOCIATES, INC.

David O. Husby, P.E.

Gregory P. Struve E.I.T.

LAKEVIEW FACILITY PLAN
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C) Public Hearing Proceedings

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F) Feasible Alternative Detailed Costs

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I. SUMMARY, CONCLUSIONS, RECOMMENDATIONS

A. Summary

In accordance with the provisions of the agreement between Lakeview Township, Becker County, Minnesota and Rieke Carroll Muller Associates, Inc., a facilities plan evaluating the feasibility of providing wastewater collection and treatment for the township was initiated. The findings of the evaluation to date are present herein. The enclosed information reviews water quality objectives and goals, present conditions, design criteria, feasible alternative solutions for Lakeview Township's water pollution control problems, and the environment with and without the proposed project.

B. Conclusions

As a result of the study, the following conclusions were made:

1) The majority of the individual septic/disposal systems now located in the lakeshore areas of Lakeview Township are in violation of separation distances outlined by the Minnesota Pollution Control Agency in WPC 40 and the Minnesota Department of Natural Resources Shoreland Management Act. The dwelling owners are typically aware of their violations but have been hesitating to spend money to conform before this wastewater disposal study was completed.

2) The existing disposal systems are seen as a major potential pollution threat to the shallow wells located nearby. Most dwellings do not have sufficient lot size to conform to outlined drainfield/well separation distances.

3) Recent studies have shown various pollution effects of lakeside disposal systems on the lakes. This pollution problem has been publicly recognized throughout the township.

4) The Minnesota Pollution Control Agency has completed and evaluated a "Needs Determination for Lakeview Township". Based on this evaluation dated September 22, 1977 "a need for some type of treatment facility exists in parts of the planning area and the 'no action' alternative is unacceptable for those areas." The alternatives specified will serve the areas of Lakeview Township as outlined in this "Needs Determination".

5) The most feasible alternatives are widely different, including various types of treatment (mechanical treatment facilities, stabilization ponds and septic tanks) and various types of effluent disposal (continuous discharge, intermittent discharge, irrigation and drainfield application).

6) Considering factors such as system reliability, operational flexibility, public acceptance, environmental impact, and

costs, the most desirable solution for the Lakeview Township wastewater management problem appears to be the alternative consisting of a gravity/forcemain sewer system with stabilization pond treatment and land irrigation of effluent.

7) Federal and state grant funds are potentially available for assistance with eligible construction costs provided all federal and state requirements are fulfilled.

8) Construction of new wastewater collection and treatment facilities for Lakeview Township is financially and environmentally feasible and should be accomplished without delay.

C. Recommendations

Based on the information presented herein, the following recommendations are submitted:

1) All questions and comments brought out at the public hearing should be addressed and an effort should be made to resolve any objections by the public.

2) The alternative considered most desirable for Lakeview Township should be selected and endorsed in writing by the community to the Minnesota Pollution Control Agency (MPCA) and the U.S. Environmental Protection Agency (USEPA) as soon as possible.

3) Site acquisition should be initiated.

4) An archeological resources investigation of the proposed treatment site prior to site acquisition should be conducted as soon as possible.

5) Final approval of the completed facilities plan should be obtained from the MPCA and USEPA as soon as possible.

6) Upon receiving authorization from the MPCA and the USEPA, a Step II grant application (for preparation of final plans and specifications) should be completed and submitted to the MPCA.

II. INTRODUCTION

A. General

With the completion of this Facility Plan, a five year effort on the part of Lakeview Township will be finished.

Lakeview Township, concerned with the degradation of their surface and groundwaters, initiated a study with RCM to generate feasible alternatives to their pollution problems. In a report prepared and submitted in 1973, (Ref. 1) RCM developed a then economically feasible alternative.

Drastic changes in both construction costs and pollution regulation policies in the last five years have necessitated numerous revisions in the original report to meet Step I Facility Plan guidelines and to reflect changing costs.

In a "Needs Determination and Evaluation" prepared by the MPCA in 1977 (Appendix A) it was concluded that a need for some type of treatment facility exists in parts of the planning area. This evaluation can be considered a restatement of a problem that the Lakeview Township community recognized five years ago.

B. Purpose and Scope

The purpose of this project is to eliminate further degradation and to

provide for the natural recovery of the lakes and streams contained in Lakeview Township. This will be accomplished by the most cost-effective method available, selected particularly for the existing and future (Year 2000) needs of Lakeview Township.

This action will serve to improve not only the natural environment but also economic stability in the form of a growing tourism industry. Reference of this economic meaning can be taken from a letter to Governor Anderson from the Northwestern Minnesota Resort Association dated September 13, 1974 (Appendix B).

C. Planning Area

The area under consideration is Lakeview Township, a lakeside recreational area located in south central Becker County, Minnesota (see Fig. 1). The township encompasses three main lakes - Detroit Lake (2,850 acres), Lake Melissa (1,725 acres), and Lake Sallie (1,200 acres). These three lakes alone cover 5,775 acres, or 25%, of the township. The area of these three lakes, added to the area of the many smaller lakes and streams, comprise approximately 50% of the total surface area of the township. (see Fig. 2)

Lakeview Township can be divided into areas that fall under three categories. The first is the rural population; second, the underdeveloped lakeshore areas; and third, the densely populated developed lakeshore lots.

FIGURE 1

LOCATION MAP

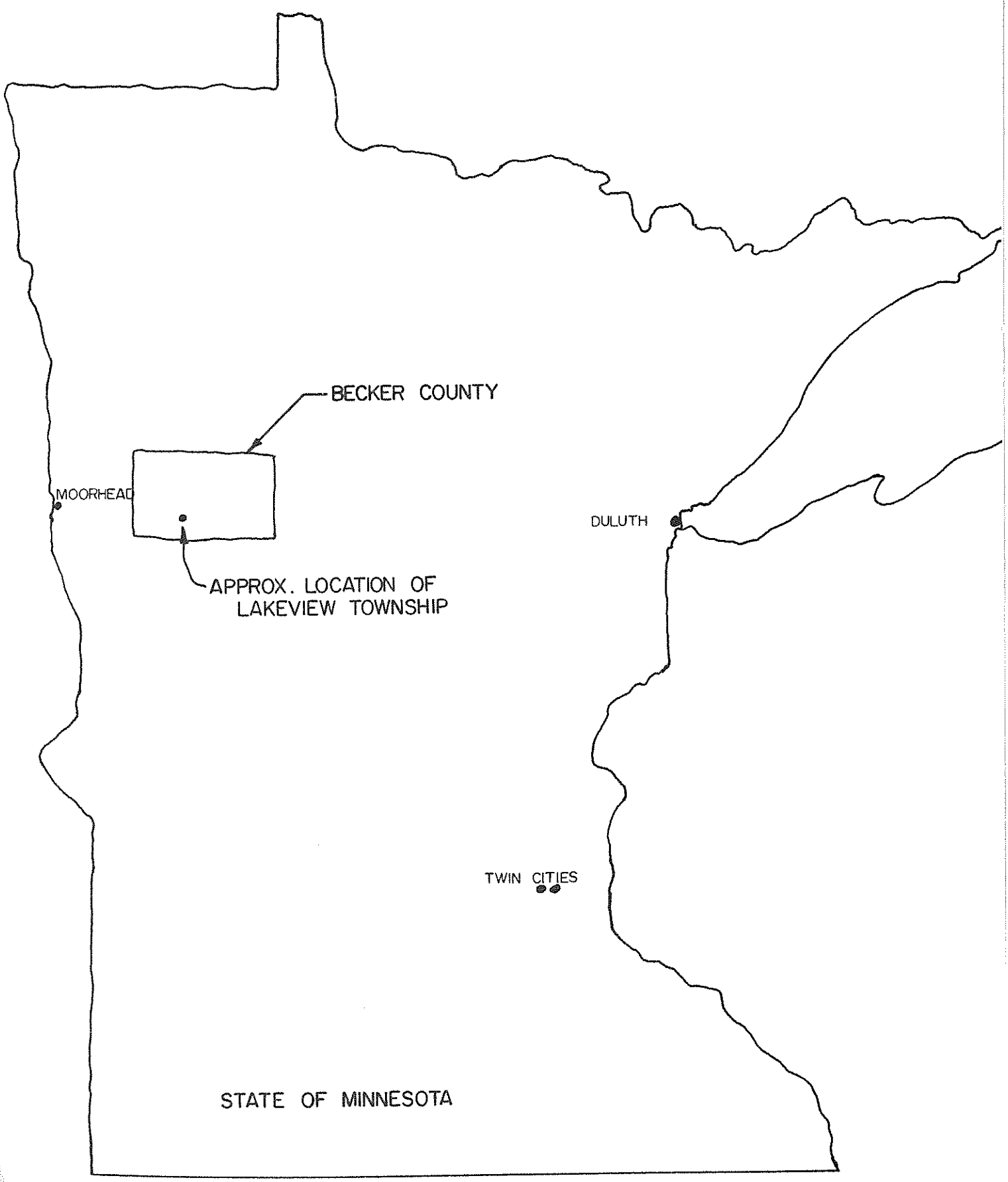
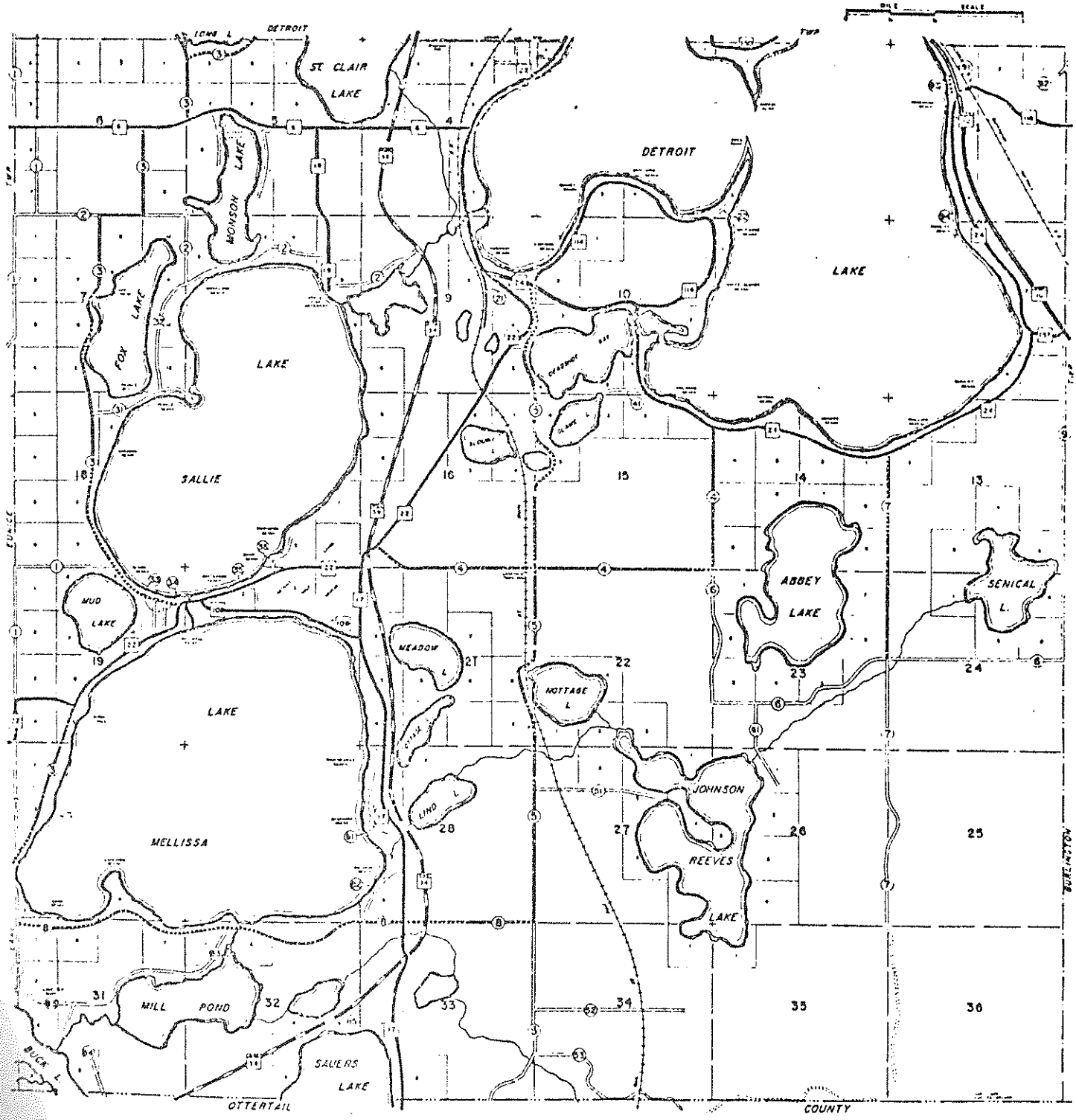


FIGURE 2

LAKEVIEW TWP.
Becker County, Minnesota
TOWNSHIP 138 NORTH RANGE 41 WEST



The first, the rural area, is only of minor concern to this plan. The population located in the rural areas of Lakeview Township is not expected to increase during the planning period (up to year 2000) to the density necessary to warrant wastewater planning beyond their existing private systems.

The underdeveloped lakeshore areas must be considered as to their use during the planning period. Their expected development, outlined later, will have an effect on the considerations of this plan.

The third area is the most important consideration for the formulation of this plan. Developed areas on the three major lakes consist of narrow lots with individual wastewater disposal systems. These systems vary in age and location on the lakeshore lot and have been shown in various studies (see Environmental Assessment) to be one of the major causes of surface water degradation.

Common to recreational areas in northern Minnesota, Lakeview Township shows a seasonal variation in population that will be an important consideration in facilities planning. This variation is especially prevalent in the lakeshore areas.

All aspects outlined in this introduction and additional problems found by further study and the environmental assessment have been considered in the formulation of this Facility Plan.

D. Planning Participation and Coordination

Many types of planning inputs and comments have contributed to the compilation of this Facilities Plan. The State Planning Agency in St. Paul has reviewed the Facility Plan Proposal in accordance with Circular A-95 and all state agencies interested or affected have been notified (Appendix G).

Response to the A-95 notification has been received by the township in the form of an approval by the West Central Regional Development Commission. Inquiries to the Minnesota DNR and the Minnesota Historical Society have been answered and will be addressed in the environmental assessment.

Interested agencies at the local level have been notified and have responded. The Lake Detroiters Association, Inc. has had an active participation in the project in the form of private well information, circulation of petitions, public information and input from residents of the area.

Participation at all levels has fulfilled or exceeded all necessary requirements up to the public hearing that will be included as an item in the summary and as an Appendix C.

III. DESCRIPTION OF EXISTING ENVIRONMENT

A. Geological Elements

The U.S.G.S. topographic map indicates a moderately rolling to steep topography in the planning area. The topographic information, in conjunction with the area's numerous lakes, indicates several low marsh areas as shown on the first figure of the Needs Determination (Appendix A).

The geography of the area is typical of the Minnesota region that has experienced glacial advancement and withdrawal leaving a rough, rolling topography, numerous lakes and either sandy soils or glacial till.

There are no known geographical faults or caves in the facility planning area.

The soils of this area, also shown on the first Needs Determination figure, consist of sandy loams to gravelly sandy loams over the north and west three-quarters of the planning area. The southeastern one quarter of the township varies to a Moraine Till or a clay silt loam, somewhat sandy with occasional gravel and boulders. These soils maps were verified by a series of soil borings taken in connection with an alternative outlined later in this report (Appendix D). These soils are shown to be typically uniform down to bedrock. The location of bedrock in the planning area has been estimated by the U.S. Geological Survey as somewhere between 400 and 500 feet below the ground surface (Ref. 6, 9).

The geography and soils of the planning area lend themselves greatly to the transport of groundwater. The permeability of the predominantly sandy soils and the large area of surface waters create a near balance of groundwater discharge and recharge (Ref. 10).

B. Hydrologic Elements

The planning area contains a large portion of surface water. The township lies within the Ottertail River watershed and a major tributary, the Pelican River, flows through the planning area.

The principal direction of the surface water flow in the planning area is from northeast to southwest. The Pelican River flows between Detroit Lake and Lake Sallie, down through Lake Melissa and out of the area. The other lakes and streams of the area can be considered local tributaries to the Pelican River.

The Pelican River gauge is located just below the planning area. It gauges a drainage area of 123 square miles of which Lakeview Township contributes 36 square miles, or 29%. The many lakes, lowlands and marshes of Lakeview Township are effective in reducing peak flow rates of the Pelican River at the gauging point. The evaporation and seepage losses are also an influence in volume of runoff. This is evidenced by a variation of flow at the gauge from a maximum of 229 CFS to a minimum of 0.1 CFS with an average discharge of 38.9 CFS. This represents an annual runoff of 4.30 inches (Ref. 3).

The flood stages at this station are unique in that the natural storage in the many lakes upstream of the river produces an equalization effect such that the predicted 25 year flood will not overflow the river bank at the gauging location. The topography of the area, in addition to the equalization effect, produces a minimal flooding danger along the short reaches of the Pelican River contained in the planning area.

The quality of the surface water in Lakeview Township is far below natural levels. This degradation has resulted from a few different sources. First, the Detroit Lakes wastewater treatment plant has been operating at various levels of treatment for many years. Its discharge into St. Clair Lake has contributed to the obvious excessive algae growth in this lake and lakes downstream. Algae growth is an obvious indication of a high phosphorous level, but but may also lead to the assumption of excessive levels of other pollutants such as nitrogen derivatives. In particular, Lake Sallie has been adversely affected. At one time, a major lawsuit had been brought against the City of Detroit Lakes by an organization of Lake Sallie property owners (Ref. 6). The results of this suit could not relate to the Detroit Lakes wastewater treatment plant as the only source of pollution. The findings showed agricultural runoff and private disposal systems as additional pollution contributors.

Agricultural runoff of chemical fertilizers, herbicides and insecticides is widely variable from year to year with no reliable references for evaluation of this source of pollution.

The effect of private disposal systems around the lake has been indicated by several studies including Septic Tank Nutrients in Groundwater Entering Lake Sallie, Minnesota, by David Robert Lee (Ref. 4), and Hydrology of Lake Sallie, Northwestern Minnesota, with Special Attention to Groundwater-Surface Water Interactions, by Mark Stuart McBride (Ref 5).

Almost all of the potable water used in the township comes from private wells. The high permeability of the soils lends itself to the use of shallow, low yield wells. Recent well water testing, along with data from the Detroit Lakes municipal wells and the U.S.G.S. maps have been used to evaluate groundwater quality. It is typically of good quality, with no known toxic materials present and all characteristics fall below the primary and secondary USEPA drinking water standards. Some of the major characteristics are listed in the following table:

TABLE 1
DRINKING WATER QUALTIY

Characteristic	Units	USEPA Limits
Dissolved Solids	400 mg/l	500 mg/l
Total Hardness as $CaCO_3$	400 mg/l	-------
Chloride	3.0 mg/l	250 mg/l
Fluoride	0.20 mg/l	2.0-2.4 mg/l*
Sulfates	8 mg/l	250 mg/l
Nitrate Nitrogen	0.11 mg/l	10 mg/l
Iron	0.2 mg/l	0.3 mg/l
pH	7.05	Between 6.5 and 8.5
Coliform (per 100 ml)	.22 mg/l	-------

* Temperature Dependent

There is a current problem that must be considered for groundwater quality. The lakeshore lot private septic systems have been shown by a study to carry nutrients by subsurface flow into the lake (Ref 4, 5 and 6). In some cases, it has been reported that wells have been relocated because of contamination by nearby septic systems.

C. Climatic Elements

The climate of the planning area is generally described as continental with warm summer days, cool summer nights, and cold snowy winters. Mean temperatures vary from $6^{o}F$ in January to $71^{o}F$ in July, with extremes from $100^{o}F$ above to $35^{o}F$ below zero. Total annual precipitation averages 23.6 inches of water, most of which falls as spring and summer rains. Monthly precipitation of record varies from a maximum of 12.15 inches in June to a minimum of just a trace in February. The prevailing wind of record is from the north with an average speed of 12.8 mph (Ref. No. 10).

D. Botanical and Zoological Elements

The botanical aspects of the area are varied. These range from the simple aquatic plants to the wooded regions of the area. Additional information on effects will be presented in the environmental assessment located in a later section of this plan.

There is also a diverse zoological population in the area due to the variation of topography. The lake areas provide excellent habitat for all types of game fish and the rolling land and wooded areas provide shelter for a wide variety of animals. The effect on existing zoological populations will also be covered in the environmental assessment.

E. Historical, Archeological and Cultural Elements

Economic and transportation facility growth in this area has lead to development of the lakeshore around Lake Detroit, Lake Melissa and Lake Sallie. This major development occurred in the 1920's and the early 1930's. The major growth during this period, with a slower degree of growth up to the present time, has resulted in almost complete development around Detroit Lake and Lake Melissa and a lesser development of Lake Sallie due to topography around the lake.

F. Air Quality

The absence of heavy industry, in conjunction with a prevailing wind, has resulted in no evident air quality degradation.

G. Land Use

The lake areas of Lakeview Township have been developed as seasonal recreational areas for the nearby metropolitan areas of Detroit Lakes,

Fargo-Moorhead and even Minneapolis-St. Paul. The three lakes of major concern are of size and depth to be used for swimming, boating and fishing. Rural land of the area supports some limited farming where the topography is suitable.

IV. PROJECT AREA INFORMATION

A. Water Supplies

All of the water used in the planning area is obtained from private wells. Each developed lot has an individual well with an average depth of 14 to 30 feet. Problems have existed for many years because the shallow wells have been contaminated by subsurface wastewater effluent. This has necessitated relocation of many wells to different locations and depths. Due to a lack of adequate monitoring, the extent of this contamination is not well known. There have been no confirmed cases of illness or disease transfer reported due to contaminated wells in the planning area to date.

B. Wastewater Sources

The population components of Lakeview Township, as listed below, are typical of this type of recreational area.

1. Base residential (year-round) population.
2. Seasonal residential (spring, summer, fall) population.
3. Non-resident population from outside the planning area.

The base residential population of the entire township was 1,856 as outlined

by the 1970 census. There are a total of 577 occupied residences with an average of 3.22 persons per residence. The lakeshore component of this total was estimated to be 289 residences, or a population of 930.

The seasonal residential population in 1970 was outlined in the Becker County Comprehensive Water and Sewer Study (Ref. 2). It was assumed that the majority of this type of population was located on the three major lakes - Detroit Lake, Lake Sallie and Lake Melissa.

The estimated number of seasonal residences on these lakes is 701 units, representing an estimated population of 2,295. The resorts add an additional potential population of 250, giving a total of 2,545.

The non-resident population can also be shown to be seasonal. Construction and domestic services are prevelant in the warmer months and the effect of this portion of the population can only be considered during the summer recreational season. This portion is estimated to be only 100 over the season.

Table 2 summarizes the 1970 population.

TABLE 2
LAKEVIEW TOWNSHIP - 1970 POPULATION

Component	Permanent	Lakeshore (Seasonal)
Base Residential	1856	930 (= 50% of base residential)
Seasonal Residential	0	2545
Non-Resident	0	100
Totals	1856	3575

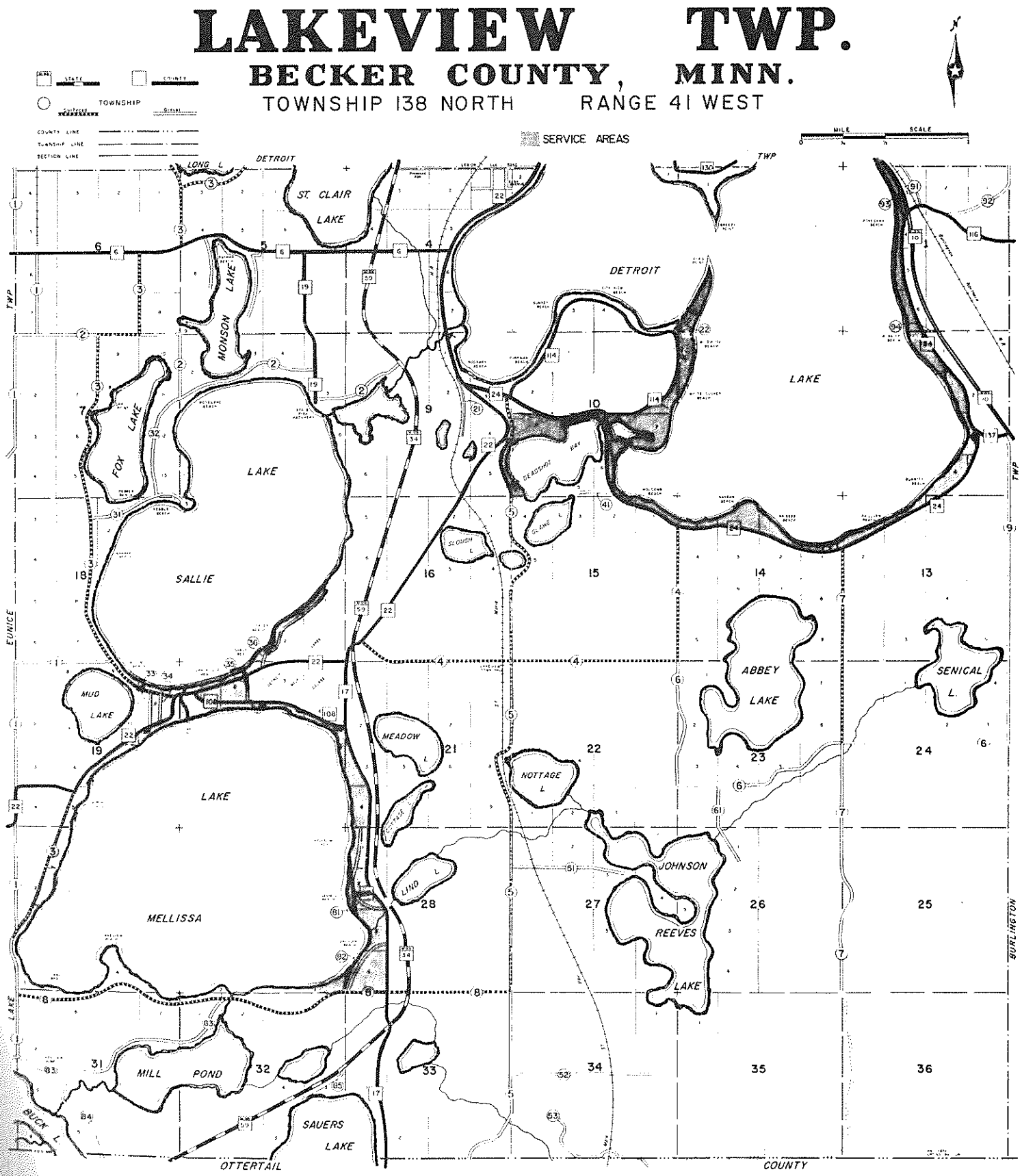
Since the 1970 census, when these data were formulated, there have been changes in the service areas under consideration. The City of Detroit Lakes has annexed portions of shoreline on the west shore of Detroit Lake from the north border of the township to a point on the southwest shore. In 1977 the Needs Determination committee of the MPCA concluded that sewage system development was needed in the specific areas of lakeshore around Detroit Lake, the southern shore of Lake Sallie adjoining the community of Shoreham, and the north, east and west shores of Lake Melissa (see Fig. 3).

It will be assumed that the areas under consideration for the facility plan alternatives will be those shown on Figure 3. For all other shoreline and rural acreage, it will be assumed that private disposal systems will be sufficient for the planning period (to year 2000). Any additional service connections that can be made with minimal cost into the selected alternative (outside the areas under consideration) will be considered a secondary benefit.

C. Wastewater Flows and Strengths

There is no wastewater collection system in the planning area. The volume and quality of the present wastewater can be estimated by using certain assumptions. First, the base residential population is assumed to contribute 75 gpd/cap for the entire year. This is somewhat less than the usual 100 gpd/cap used for design because of the lack of light industry, lack of

FIGURE 3


LAKEVIEW TWP.
BECKER COUNTY, MINN.
TOWNSHIP 138 NORTH RANGE 41 WEST
STATE
COUNTY
TOWNSHIP
COUNTY LINE
TOWNSHIP LINE
SECTION LINE
SERVICE AREAS
MILE
SCALE
LONG L
DETROIT
ST. CLAIR LAKE
MONSON LAKE
DETROIT
TWP
LAKE
FOX LAKE
LAKE
SALLIE
BEADSHOT
SLOUGH
SLOUGH
EUNICE
TWP
ABBEY LAKE
SENICAL L.
MUD LAKE
MEADOW L
NOTTAGE L
LAKE
LIND L
JOHNSON
REEVES LAKE
MELLISSA
MILL POND
SAUERS LAKE
BUCK L
OTTERTAIL
COUNTY
WOLVERTON
LAKE

extensive water using appliances (dishwashers, garbage grinders, etc.) and the limitations of private water systems. Second, the seasonal residential component will be assumed to contribute only 60 gpd/cap. Finally, the resort and motel component is classified at 150 gpd per unit.

The existing wastewater flows and strengths have been included in Section VI Design Considerations. This was done for comparison purposes to relate existing estimated flows and strengths with future expected values.

D. Receiving Waters

Due to the type of individual systems in this area, there are no known open discharges to surface waters. It has been shown that there is an indirect discharge to surface waters from private lakeside disposal systems through associated groundwater/surface water contact.

V. EXISTING COLLECTION AND TREATMENT SYSTEM

A. General

Lakeview Township contains no metropolitan areas and exists as a rural and recreational area in which each lakeshore lot or rural property has its own individual wastewater disposal system. Each system includes an interior system of drains from the property owner's sinks, tubs and toilets to a single sanitary pipe. This pipe, in most cases, is laid an appropriate distance (whatever was considered appropriate at the time of construction) to a septic tank. The sanitary overflow from this tank was usually then routed to a drainfield or cesspool for subsurface discharge.

B. Performance of Existing Systems

The majority of the septic tank systems, located in the areas under consideration, were constructed in the 1920's and 1930's when the area underwent considerable development. Through interviews with the local officials, it is believed that these were single tank systems. At the lakeshore lots the tanks and disposal systems were located in front of the dwelling, on the side towards the lake. In these cases it was known that the groundwater flow was towards the lake and seepage from the drainfield was believed to flow toward the lake away from the owner's well, usually located behind the dwelling, away from the lake (Ref. 6).

At the time of construction of these systems there was little in the way of design ordinances, such as today's Shoreland Management Act of the DNR. Systems were designed by common sense by the contractor and it can be shown today that in most cases there is violation of today's separation ordinances.

The majority of these sytems, due to intermittent use (see Seasonal Populations) are not serviced regularly, but only when there is an obvious failure. For this reason, and considering the age of these systems, it may be assumed that many are not operating effectively at this time.

These violations, plus proof of lake degradation by existing systems, will be a major point of the alternative consideration located later in this Facility Plan.

VI. DESIGN CONSIDERATIONS

A. Water Quality Objectives and Management Goals

The standards of quality and purity for discharges to surface waters within the Detroit Lakes area are specified within Water Pollution Control Regulation 23. The following limiting concentrations are applicable:

Fecal Coliform Organisms	200 most probable number per 100 milliliters (MPN/100 ml.)
5-Day Biochemical Oxygen Demand	25 milligrams per liter (mg/l)
Suspended Solids	30 mg/l
Turbidity	25 turbidity units
Phosphorus	1 mg/l (applicable to lake discharge only)

Alternative methods of providing the levels of treatment outlined above will be presented in Section VII of this report.

Due to the lack of technical staff available to the township, it is felt that all systems considered in this plan should be the type that will require limited technical operation and maintenance. It is also suggested that any type of system should be adaptable to a simple and straight-forward management and billing system.

B. Planning Period

The time period under consideration for this plan will be up to and including year 2000, giving a design period of 20 years beyond the expected startup of the selected plan.

C. Regionalization and Land Use

An important aspect of analyzing population is to determine its distribution on the land. This has an important bearing on the design of the wastewater collection system as only those areas with sufficient population density can be economically served. The general land use pattern in Lakeview Township is essentially strip residential and commercial development on lake-fronting property. Other development in the township is basically in the form of scattered farmsteads and rural homes on large lots located on township roads.

It is anticipated that many seasonally occupied dwelling units will be converted to year-around use. However, an increase in rental units is expected to maintain current numbers of seasonal residences. These rental units will be in high density developments, decreasing the ratio of lakeshore to dwelling unit.

D. Population Projections

Population growth in the planning area was at first related to Minnesota Department of Health projections. Minnesota Department of Health projections indicate that Region 4, consisting of nine counties (Becker, Clay, Douglas, Ottertail, Stevens, Traverse, Wilkins, Grant and Polk) will maintain a stable population base for the next 20 to 30 years. Becker County, however, is projected to decline in population from a 1973 population of 24,372 to 20,002 (Table 3) or 23,910 near 2000 (Table 3). For the purposes of this study, the higher projection will be used.

TABLE 3
RURAL AND URBAN POPULATION PROJECTIONS
BECKER COUNTY*

	1970	1975	1980	1985	1990	1995	2000
Total Mn Dept of Health	24372	23838	23049	22198	21527	20870	-20022-
Total Mn Highway Dept	24372				19608		
Total Hoyt & Nelson	24372	24378	24191	24112	24039	23971	-23910-
Urban (Det. Lakes)	5797	5903	6009	6116	6224	6332	6441
Rural	18575	18375	18182	17995	17815	17639	17469
Rural Unincorporated	16078	15936	15794	15654	15514	15376	15238
Rural Incorporated	2497	2439	2388	2342	2300	2264	2231

*Source: Population Projections - County and Development Regions in Minnesota Agricultural Extension Service, University of Minnesota

These projections show a small decline in population. It must be remembered, however, that these projections are for the base residential population only,

and do not include the seasonal recreation population. Another type of evaluation was needed for a realistic population projection.

Both existing and anticipated development have been considered in the increased population for the planning period. Another aspect which will influence the population is the conversion of seasonal residences to permanent residences as stated earlier.

Occupied and vacant lots in the lakeshore area were evaluated by a field survey in 1975 and counts were taken. Township officials were then interviewed in regard to future growth potential in the area.

Evaluation of the vacant lots showed a wide variety of conditions. Rough topography, access to lake, and secondary development were all taken into consideration. Building permits issued in recent years were also considered. A detailed population density study was undertaken for consideration of the individual systems alternative and will be outlined in a later section, "Alternative Systems Considerations".

These combined efforts produced an estimated lot development for the next 20 years. The results of the field survey and the estimated projected figures for only the area under consideration are shown on Table 4.

TABLE 4

LAKEVIEW TOWNSHIP SERVICE AREAS

Year 1977 - Based on Previous Percentages -

	Developed Lots	Total Dwellings @ 1.5 Lot/Dwell*	Permanent Dwellings	Seasonal Dwellings	Trailer** Motel Units
Detroit	449	300	132	33	150
Melissa	350	245	25	200	40
Sallie	105	70	7	63	0
Shoreham	109	73	8	51	0
			172	407	190 Units
Population @ 3 Capita/Dwelling			516	1221	---

Year 2000 - Based on Expected Percentages -

	Expected Developed Lots	Total Dwellings @ 1.5 Lot/Dwell*	Permanent Dwellings	Seasonal Dwellings	Trailer** Motel Units
Detroit	665	445	223	116	215
Melissa	530	355	75	245	100
Sallie	150	100	20	80	
Shoreham	150	100	20	80	
			340	520	315 Units
Population @ 2.7 Capita/Dwelling			920	1405	---

* Based on (1) Field Survey (2) Needs Determination

** Estimated that one (1) average dwelling approximately equals two (2) trailer or motel units.

E. Flow and Load Projections

The flow projections are shown on the following Table 5 and are based on the populations defined just prior to this section and the percentage of

flow related to the time of year as defined in the Project Information section.

The organic loading of wastewater is characterized in terms of the biochemical oxygen demand (BOD). Based upon an equivalent connected population and a per capita organic contribution, both maximum and average organic discharges can be estimated as shown by Table 5.

Where historical data on organic loading is not available, it is common practice to select a per capita BOD contribution of 0.17 lbs per day. Reflecting a trend toward increased per capita BOD contributions, the year 2000 design loading will be based on 0.2 lbs per capita per day.

The values shown within Table 5 will be an important consideration in the sizing of wastewater treatment facilities. The values reflect the anticipated BOD contribution from domestic and light commercial sources within the township and contain no allowance for industrial process wastes.

F. Alternative Systems Considerations

Individual Systems is a general category of alternatives that can range from an overall common solution to a widespread variety of solutions that are especially selected for each individual situation. To be able to evaluate the wide variety of individual systems, an extensive investigation of the

TABLE 5

FLOW AND LOAD PROJECTIONS

1980 Startup

Component	Flow @ 100% Contribution (gpd)	90.25 Dec Jan Feb (gpd)	92 Mar Apr May (gpd)	92 Jun Jul Aug (gpd)	91 Sep Oct Nov (gpd)
Permanent Resident 516 @ 75 gpd/cap	38,700	100% 38,700	100% 38,700	100% 38,700	100% 38,700
Seasonal Resident 1220 @ 60 gpd/cap	73,200	5% 3,660	10% 7,320	100% 73,200	10% 7,320
Motel, Trailer 190 Units @ 150 GPD/Unit	28,500	5% 1,425	10% 2,850	100% 28,500	20% 5,700
Quarterly Totals - 1980		43,800 gpd	48,900 gpd	140,400 gpd	51,700 gpd
BOD_5 lb/day (0.17 lb/cap/day) 272 mg/l - 75 gpc/cap		100 lb/day	110 lb/day	320/lb/day	120 lb/day

Design - 2000

Component	Flow @ 100% Contribution (gpd)	Dec Jan Feb	Mar Apr May	Jun Jul Aug	Sep Oct Nov
Permanent Resident 920 @ 75 gpd/cap	69,000	100% 69,000	100% 69,000	100% 69,000	100% 69,000
Seasonal Resident 1405 @ 60 gpd/cap	84,300	5% 4,215	10% 8,430	100% 84,300	10% 8,430
Motel, Trailer 315 Unit @ 150 gpd/unit	47,250	5% 2,363	10% 4,275	100% 47,250	20% 9,450
Quarterly Totals - 2000		75,000 gpd	82,200 gpd	200,600 gpd	86,900 gpd
BOD_5 - lb/day (0.20 lb/cap/day) 320 mg/l 75 gpd/cap		170 lb/day	187 lb/day	455 lb/day	197 lb/day

service area, on a lot by lot basis, had to be completed.

To begin this evaluation, quarter section plat maps of the service area were obtained and pieced together into a large composite. Twelve major areas were selected from this composite, using lot density and topography to determine the boundaries. These area maps can be seen in Appendix E. of this report and locations are listed in Table 6.

TABLE 6
AREA LOCATIONS

Area	
A	North Section of East Shore - Detroit Lake
B	South Section of East Shore - Detroit Lake
C	East Section of South Shore - Detroit Lake
D	West Section of South Shore - Detroit Lake
E.	Central Section of West Shore - Detroit Lake
F	North & West Shores - Deadshot Bay, Detroit Lake
G	South Section of West Shore - Lake Melissa
H	West Section - Shoreham
I	East Section - Shoreham
J	Southeast Shore - Lake Sallie
K	North Section of East Shore - Lake Melissa
L	Southeast Shore - Lake Melissa

In addition to reviewing available U.S.G.S maps, a field survey was done to determine the adverse geographical conditions and potential treatment sites. These distinctions are shown also on the area maps.

The field survey, aerial photos and topographic maps were then used to refine the available characteristics of these major areas. These details include dwelling densities, dwelling elevations in relation to lake level and access roads, and the actual layout of each dwelling area in relation to its placement on the lot and locations of it's outbuildings.

The average lakeshore lots have a typical lake frontage of 50 feet and the majority of the adjoining lots also have a 50 foot width. Although lot depths vary from 100 to 400 deep, they are typically between 100 and 200 feet deep with an overall average of 212.5 feet. This means the typical dimensions of a lot found in the service area are 50 feet by 212.5 feet. This is a summary of the data researched and outlined in Table 7.

TABLE 7
AREA LOT SUMMARY

Area	Lots Potential	Typical Width	Depth Range	Depth Average
A	177	50'	150'-300'	250'
B	153	50'	150'-400'	240'
C	94	50'	125'-275'	210'
D	103	50'	175'-400'	275'
E	150	50'	100'-350'	210'
F	35	- Wide Variation -		
G	120	50'	100'-220'	170'
H	150	50'	200'	200'
I	220	50'-100'	100'-220	185'
J	42	50'	150'	150'
K	118	50'	150'-200'	190'
L	101	50'	150'-250'	165'

The dwelling intensity within the outlined areas is variable, but has a tendency to be very dense in the more favorable lakeshore areas found. In these areas it was found that there is one cabin per 50 foot lot. It has been found that with the inclusion of the less favorable shoreline areas and the limited secondary development, there is an existing ratio of about 1.5 lots per dwelling. This is an average value and it is expected that the remaining undeveloped portions of lakeshore will also develop at the same ratio through the facility planning period.

The information shown on the area maps in Appendix E will be used to determine Individual Treatment Alternative designs in addition to supporting data taken from the Needs Determination by the Minnesota Pollution Control Agency.

VII. ALTERNATIVES

Basis for Design

As developed within Section VI, Design Considerations, the wastewater volumes and loadings applicable to the entire system design of wastewater facilities are summarized below:

TABLE 8

SUMMARY OF WASTEWATER TREATMENT DESIGN BASIS

	INITIAL	YEAR 2000
Average Daily Flow (Sept-May)	48,200 gpd	81,600 gpd
Average Daily Flow (June-July-Aug)	140,400 gpd	200,600 gpd
Estimated Maximum Flow	300 gpm	420 gpm
BOD Loading (Sept-May)	110 lb/day	215 lb/day
BOD Loading (June-July-Aug)	320 lb/day	520 lb/day
Annual Volume	26 MG	41 MG

In addition to the fundamental economic considerations, it is felt that the treatment systems evaluated within this report must be of a type easily expanded to serve future development and flexible enough to serve as part of a system meeting more stringent water quality and/or effluent standards in years to come.

The potential for effective system operation without highly trained personnel is also a major consideration in the selection of candidate processes.

A. Preliminary Alternatives

1. No Project - Do Nothing - As determined by the Needs Determination of the Minnesota Pollution Control Agency, this alternative will not be acceptable for the service area now under consideration.

2. Treatment and Discharge - Four systems have been considered for treatment, but only two of these will involve discharge into surface waters. The third system involves land irrigation for final discharge and the fourth involves below ground discharge. The types of treatment considered prior to disposal are as follows:

a) Joint Treatment with the City of Detroit Lakes.
b) Conventional Mechanical Treatment
c) Stabilization Ponds
d) Individual Septic Tank Systems - Cluster Systems

a) Joint Treatment with the City of Detroit Lakes

This alternative would involve a forcemain and metering station preceding a connection to the existing Detroit Lakes system. This additional flow would immediately bring the Detroit Lakes wastewater treatment plant to its design capacity and its facilities would have to be expanded to provide service for both communities for 20 years.

Lakeview Township would be required to provide the expansion facilities in addition to assuming a fair share of the existing debts.

b) Conventional Mechanical Treatment

Mechanical treatment would involve an extended aeration package plant including tertiary treatment. Tertiary treatment would be required since any of the sites in which such a plant could be located would involve lake discharge or indirect lake discharge, which must meet phosphorous content restrictions. Due to the wide variation of flows through the year, careful attention must be made to provide constant and adequate treatment.

c) Stabilization Ponds

This is a revised version of the recommended plan as outlined in the September 1973 Report on Wastewater Collection and Treatment Facilities for Lakeview Township, Becker County, Minnesota. This plan would involve primary and secondary wastewater treatment ponds with a design detention time of 210 days at an initial peak surface loading in the primary ponds of below 22 lb BOD_5/Acre/Day. Final discharge from this type of system would be made either by land irrigation or tertiary treatment and discharge. This plan would have the type of flexibility needed with minimal operation and maintenance.

d) Individual Systems - Cluster Systems

The fourth method consists of a broad category of systems under the category of "Individual System Alternatives". This category has involved a detailed evaluation as stated earlier. The detailed preliminary alternatives under this category are stated as follows:

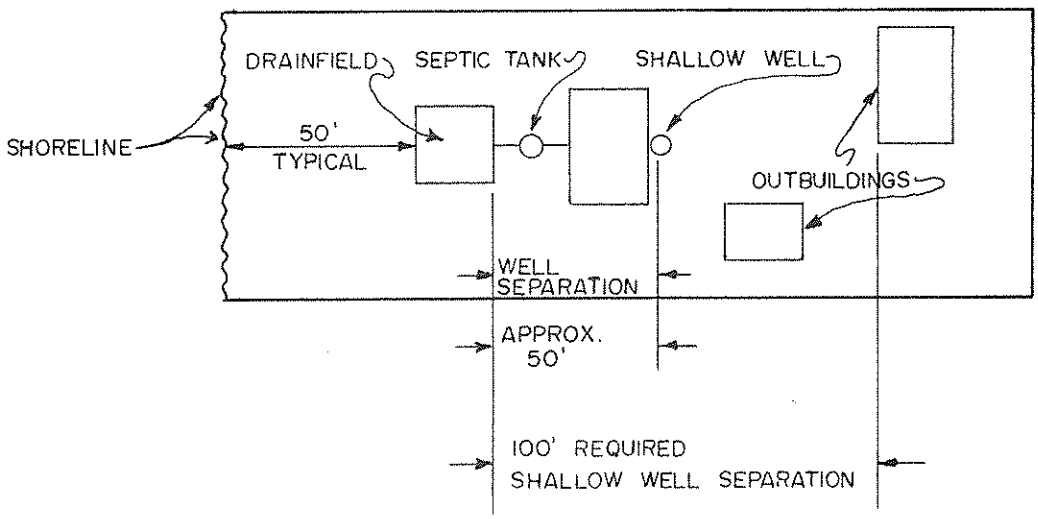
i) Upgrading every individual system with consideration for development.
ii) Water conservation and improved operation and maintenance.
iii) Holding tanks.
iiii) Cluster systems.

i) Upgrading Individual Systems

Detailed lot by lot evaluation and data from field surveys have revealed a particular problem in the area under consideration. As stated in an earlier section, the typical platted lot is 50 feet wide and has an average depth of 212 feet. Normally, 1½ of these 50 foot lots have been used per building site and the dwelling sits in the center of the site. This typical development does not allow clearances between the shoreline, the septic tank and the well as outlined in WPC 40 (see Figure 4).

FIGURE 4

EXISTING AVERAGE LOT LAYOUT



This alternative would require not only replacement of most of the septic systems but also relocation of all wells. A variation would be to locate the disposal systems off lot, but in nearly all cases suitable, directly adjoining land is not available. The cost involved for this alternative would be about $2,000 each for the septic/drainfield system. This does not include the cost for relocation. In addition to this, there seems to be a consensus by the local population and it has been shown in various reports, that lakeside septic systems cause a flow of pollutants into the lake. It is not the intention of this report to say that this is a significant polluting factor, but it is a publicly acknowledged factor nevertheless.

ii) Improved Operation and Maintenance and/or Water Conservation

In all cases, minimum sizing and setback regulations as set forth by WPC 40 must be used for design and no assumptions can be made in regard

to uniform water conservation. For this reason and the separation distance problem mentioned in the previous paragraphs, this alternative cannot be considered feasible at this time.

Another suggestion for improved operation and maintenance would be the replacement of septic tanks with aerobic tanks. It was found that the cost savings for aerobic tank size does not compare with the additional cost involved for the electrical/mechanical installation. In addition to this, there is no saving in number of disposal systems since there can be no reduction in drainfield size (WPC 40).

iii) Holding Tanks

This alternative is reasonable in regard to first cost, especially when applied to seasonal residences. Operation and maintenance costs are high, however, and at 3 cents per gallon, it would cost the township residents from 0.78 million dollars per year at startup to 1.23 million dollars per year by the year 2000. Other adverse considerations to this alternative must be considered, such as reliability of servicing, high level alarms, accessability during the winter months and the overall inflexibility of the system.

iiii) Cluster Systems

This alternative involves gathering raw sewage or septic tank effluent

from a number of dwellings and pumping it to an available treatment/ disposal area. These systems would serve 20 to 100 dwellings apiece. The collection system for each of these clusters could include gravity sewers, low pressure piping or combinations of both.

Several varieties of cluster systems were evaluated. Major factors considered were gravity systems vs. pressure systems, raw sewage flow vs. septic tank flow, frost depth, and dewatering due to high water tables in most areas.

It has been found that septic tank effluent would be the easiest to handle. It would allow for use of existing septic facilities and smaller piping for transport because of expected minimal solids carryover.

Gravity collection was favored but due to low-lying service areas and the high cost of dewatering during construction, a combination of gravity and pressure collection was required in this case.

Table 9 shows the cost differences between alternative systems and will show the most cost-effective alternative under this subgroup.

TABLE 9

INDIVIDUAL SYSTEM ALTERNATIVES

ALTERNATIVE	CAPITAL ($1,000)	AV. YEARLY O & M ($1,000)	P.W* O&M ($1,000)	SALVAGE ($1,000)	P.W.* SALVAGE ($1,000)	TOTAL P.W. EQUIVALENT COST ($1000)
Upgrading Individual	Not evaluated due to basic physical restriction - see alternative.					
Improved O & M	Not evaluated - see alternative explanation					
Holding Tank	1,000	(1,000)	10,965	(500)	- 138.6	11,830
Cluster System	5,992.7	(58.1)	633.9	1,295.3	- 359.1	6,270

Of these Individual Systems alternatives, the Cluster Systems are the most cost-effective and will be used in the final evaluation.

* Present worth of a uniform series at 6-5/8%
** 20 year present worth at 6-5/8%.

3. Water Reuse

Direct Reuse - Since groundwater is easily attainable with shallow wells and the cost of tertiary treatment is prohibitive, direct reuse treated wastewater is economically as well as politically infeasible.

Recreation - Due to the vast amount of surface water that is available in the area in relation to the small amount that will come from treatment facilities, there can be little, if any, additional benefit in this respect.

Groundwater Recharge - Even though the major source of potable water in the area is from wells, and has been for many years, there is no documented source that has shown that there has been any effect on the groundwater level or volume available. Groundwater recharge will not be considered as beneficial to the township.

Industrial Reuse - There is no large volume, water-using industry in the township or within a reasonable distance outside the township.

4. Land Application

The use of secondary effluent to supplement natural rainfall has been shown to benefit growth of vegetation. In addition, distribution of wastewater effluent upon the land provides for natural evaporation, use of nutrients contained in the effluent, and in a properly designed irrigation area, minimizes direct runoff into surface waters. The limiting of direct runoff provides for additional natural treatment in regard to excessive nutrients, such as phosphorous, before it gets into groundwater or surface water.

Irrigation is one of the major alternatives for discharge of effluent following the stabilization ponds addressed earlier.

B. Potentially Feasible Alternatives

1. Cluster System - This system combines use of new techniques of collection

with an older form of treatment and disposal.

The septic tank has been in use for many years, usually in rural areas. The septic tank is a sealed storage tank with adequate volume to collect raw sewage and provide time for its anaerobic decomposition.

In this system the septic tank supernate will be gathered by gravity flow or will be pumped into a small local collection system. This supernate, from 20 to 100 septic tanks, is then pumped to a publicly owned disposal field for subsurface discharge and final treatment in the soil.

This method removes the final disposal area away from the lake but also creates other problems to consider.

Septic supernate has a strong odor and any collection system must be designed to minimize the escape of such odors.

A unique management system and special sewer use ordinance would be needed to obtain adequate and fair billing for the individual use of such aystems. The township is not staffed to handle such a design at the present time.

The operation and maintenance will be a special difficulty, because the township must take full responsibility of the system from the

point at which wastewater enters the septic tank to final disposal. This would mean an annual inspection of each of the 1000 septic tanks, 160 pumping units and monthly inspections of the 13 lift stations and disposal areas. There can be problems with accessibility, and easement rights to and around septic tanks would have to be obtained.

This is a general overview of immediate difficulties with such a system and does not consider additional possibilities.

Two major assumptions have been made about this system at this point that have not been justified - 1) that a drainfield system of this size, with a wide variation of flows will not be affected by freezing and will last the assumed 20 years, and 2) that these large drainfields, designed with the appropriate separation distances from groundwater, will not affect the groundwater within the 20 years of use.

Until these assumptions can be justified, there remain serious questions as to the reliability of this type of system.

2. Joint Treatment with Detroit Lakes

In many situations of adjoining municipalities, an apparent alternative is shared wastewater facilities. However, the City of

Detroit Lakes has recently completed facilities to serve that city until 1990. Inclusion of Lakeview Township would immediately bring this plant to capacity and Lakeview Township would be responsible for a fair share of the existing facilities, plus cost of additional facilities to give this plant a Year 2000 treatment capacity. This alternative has been considered and will be included, even though the Detroit Lakes City Council has gone on record stating the City will not accept any wastewater from outside the city limits and will accept additional service areas only by annexation into the city (Appendix G).

3. Stabilization Pond

a) A stabilization pond system providing the equivalent of secondary treatment, including chlorination, followed by land disposal of the stabilized effluent.

b) A stabilization pond system with facilities for intermittent phosphorous precipitation and filtration prior to discharge to surface waters.

Both of the above alternatives are acceptable to the Minnesota Pollution Control Agency and conceptual designs and comparative cost estimates will be presented in later sections.

Both alternatives utilize the wastewater stabilization pond as the initial step of treatment. The stabilization pond is a widely used

method of treatment in Minnesota where land price and availability permit. Acting as a form of biological treatment, a pond system is designed to stabilize the incoming wastewater with oxygen supplied through photosynthetic activity of algae and reaeration at the surface of the water.

Stabilization pond capacity will be identical for both alternatives to be evaluated. Two primary cells and one secondary cell will have sufficient volume to retain the wastewater flow of over 400 days at startup to a 210-day design period in the year 2000.

The two primary treatment ponds will have sufficient surface area to limit organic loadings to less than 22 lbs/acre/day at peak initial loadings to less than 35 lbs/acre/day at maximum expected year 2000 loadings.

An effective seal to meet outlined criteria losses from the pond will be provided by an approved combination of bentonite and clay liner.

a) Land Disposal Alternate

A stabilization pond system will generally provide a level of treatment sufficient to meet MPCA effluent standards with the exception of the 1 mg/l maximum phosphorous concentration.

Phosphorous compound residuals in treated wastewater are recognized as contributing to the rapid growth of algae and bottom rooted acquatic growth within our lakes.

Due to the relatively high cost of chemically removing phosphorous from the wastewater, disposal by irrigation upon the land continues to be an economically attractive alternate. However, in the selection of such a system, care must be taken to insure that the enhancement of the surface waters is not attained at the expense of our groundwater quality. Several systems, most notably one at Penn State University, have shown that land disposal techniques are viable alternatives to continued surface water discharge.

The design of pumping, flow measuring and irrigation equipment necessary to handle the effluent volume will be based upon a recommended application rate of 24 inches per acre per year obtained from a local Soil Conservation Service (S.C.S.) (Appendix D) recommendation of crop uptake and precipitation related to MPCA design criteria which limits maximum application rate before evaporation to 2 inches per acre per week over an irrigation season not to exceed 18 weeks. Additionally, effluent must not be applied at a rate exceeding one half inch per hour with the maximum application during one hour not to exceed one fourth of an inch.

Based upon the wastewater volume assignable to the initial service area, approximately 63 acres of land would be required to provide the necessary irrigation area without the required separation distance. An additional 46 acres would be necessary for construction of a stabilization pond system having a total water surface area of approximately 23 acres.

b) Chemical Precipitation Alternate

The use of mechanical equipment to remove phosphorous from stabilization pond effluent is a reasonable alternative to the use of land disposal procedures. This equipment would be designed to operate at a constant rate during an 18 week summer period on a Monday through Friday basis. Processing of stabilization pond effluent during the summer months would result in significant operational savings.

The necessary equipment would consist of a reactor-type clarifier, chemical feed and storage equipment, and a two compartment dual-media filter all housed in a prefabricated metal building.

4. Mechanical Treatment Alternate

This alternative is a standard alternative, but does have limitations. The design considered involves preliminary treatment with comminution,

extended aeration, final clarification, alum application for phosphorous removal, final filtration for tertiary treatment, chlorination and sludge storage facilities. This design is unique in that it has a modular design where parallel series of units can be taken in and out of service to treat a wide variety of flows. Due to the size of these units, and the wide flow variation over the year, all treatment units would be covered. The building which would house the units would be insulated with limited heating and ventilation to provide limited energy loss.

It is shown that this system will involve high capital and operation and maintenance costs. This will be shown comparatively in the summary section.

C. Evaluation of Feasible Alternatives

1. Financial

Initial capital costs are listed in Table 10. These and the tables following are summaries of each feasible alternative cost located in Appendix F.

TABLE 10

ESTIMATED CAPITAL COSTS WITH SALVAGE (LAND INCLUDED)

Alternate	Capital Cost $1,000	Salvage $1,000	P.W. Salvage $1,000	Total $1,000
Cluster System	5992.7	1295.3	359.1	5633.6
Joint with D.L.	4317.9	1481.5	410.7	3907.2
Ponds and Irrigation	4384.7	1695.1	469.9	3914.8
Ponds and Discharge	4890.5	1768.7	490.3	4400.2
Mechanical Treatment	4363.5	1704.5	472.5	3891.0

The operation and maintenance costs involve two different aspects. First, the expected yearly operation and maintenance costs. Second, the replacement cost of mechanical equipment in 10 years for each associated alternative. These two aspects and their associated Present Worth values are listed in Table 11.

TABLE 11

ESTIMATED OPERATION AND MAINTENANCE COST

Alternative	Annual O&M $	20 Yr P.W.* O & M $1,000	10 Yr Mech Replace $1,000	P.W. Mech** Replace $1,000	P.W. Total $1,000
Cluster System	45,800	499.7	254.9	134.2	633.9
Joint with D.L.	24,050	262.4	275.3	145.0	407.4
Ponds & Irrigation	15,500	169.1	215.8	113.6	282.7
Ponds & Discharge	35,800	390.6	431.9	227.4	618.0
Mechanical Treat	73,900	806.3	371.1	195.4	1001.7

* Present Worth Uniform Series 20 Yr - 6-5/8% = 10.910

** Present Worth Future Value 10 Yr - 6-5/8% = .5265

The final considered costs in Table 12 is the added final values of Tables 10 and 11.

TABLE 12
ESTIMATED TOTAL EQUIVALENT COSTS

Alternate	Total Capital Costs ($1,000)	Total O&M Costs ($1,000)	Final Total ($1,000)
Cluster System	5,633.6	633.9	6,267.5
Joint with D.L.	3,907.2	407.4	4,314.6
Ponds & Irrigation	3,914.8	282.7	4,197.5
Ponds & Discharge	4,400.2	618.0	5,018.2
Mechanical Treat.	3,891.0	1001.7	4,892.7

2. Selected Alternative

All of the listed feasible alternatives were considered in the following areas:

a) Cost Effective Analysis

b) Environmental Concerns

c) Ease of Operation and Maintenance

d) Reliability and Associated Functional Factors under Existing and Future Conditions

a) Cost - Table 13 provides a brief summary of the Cost Effective Analysis outlined earlier.

TABLE 13
COST EFFECTIVE ANALYSIS SUMMARY

Alternative	Total Equivalent Costs * -Million Dollars-	% Greater than Most Cost Effective Alternate
Ponds and Irrigation	4.198	0%
Joint Treatment with D.L.	4.315	3%
Continuous Mech Treatment	4.893	17%
Ponds and Discharge	5.018	20%
Cluster Systems	6.268	49%

This table shows that the Ponds and Irrigation alternative is the most cost effective alternative.

*Details of costs are located in the Financial Evaluation section and Appendix F.

b) Environmental Concerns - Briefly, a comparison summary is located in Table 14. More detailed information will be found in the Environmental Assessment.

This table shows that the mechanical treatment alternative should have the smallest effect.

c) Ease of Operation and Maintenance

The estimated ease of operation and maintenance can be compared by the annual operation and maintenance costs summarized in the following table.

TABLE 15
OPERATION AND MAINTENANCE COST COMPARISONS

Alternative	Estimated O&M Costs/Yr	% Greater Than Least Cost O&M Alternative
Ponds and Irrigation	15,500	0%
Joint Treatment with D.L.	24,050	62%
Ponds and Discharge	35,800	131%
Cluster Systems	45,800	195%
Mechanical Treatment	73,900	377%

This table shows that the Pond and Irrigation alternative will involve the most inexpensive operation and maintenance.

d) Reliability and Associated Functional Factors - A comparison summary has again been formed into a summary Table 16. It is shown here that the Pond and Irrigation alternative is the most favorable in the described conditions.

TABLE 14

SUBJECTIVE QUANTIFICATION OF ENVIRONMENTAL EFFECTS

Environmental Effects	Weighted Importance	Relative Impact Number[a]					Relative Impact Number[b]				
		Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Surface Water	10	0	-1	0	1	0	0	-10	0	10	0
Ground Water	10	0	-1	1	1	1	0	-10	10	10	10
Terrestrial	5	-1	0	-1	-1	0	-5	0	-5	-5	0
Aquatic Biota	10	0	0	0	0	0	0	0	0	0	0
Wildlife Habitat	10	-1	0	-1	-1	0	-10	0	-10	-10	0
Air Quality	10	0	0	-1	-1	0	0	0	-10	-10	0
Aesthetics	15	-1	0	0	0	0	-15	0	0	0	0
Cultural/Historical Areas	10	0	0	0	0	0	0	0	0	0	0
Land Use	10	-2	0	1	-1	0	-20	0	10	-10	0
Resource Commitment	10	-1	-2	-1	-1	-2	-10	-20	-10	-10	-20
	100						-60	-40	-15	-25	-10

(a) -2 - considerable adverse impact
-1 = minor adverse impact
0 = no impact
+1 = minor favorable impact
+2 = considerable favorable impact

(b) (Relative impact number) = (weighted importance) x (individual impact rating)

Alternative 1 = Cluster Systems
Alternative 2 = Joint Treatment with Detroit Lakes
Alternative 3 = Stabilization Pond & Irrigation
Alternative 4 = Stabilization Pond & Discharge
Alternative 5 = Mechanical Treatment

TABLE 16

SUBJECTIVE QUANTIFICATION OF FUNCTIONAL CONCERNS

Functional Concerns	Weighted Importance	Individual Impact Rating[a] Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Relative Impact Rating[b] Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Reliability	30	0	0	2	1	0	0	0	60	30	0
Flexibility	25	-1	-1	1	0	-1	-25	-25	25	0	-25
Implementation	25	-2	-2	1	1	-1	-50	-50	25	25	-25
Expansion Capability	20	0	-1	0	0	0	0	-20	0	0	0
	100						-75	-95	110	55	

(a) -2 = considerable adverse impact
-1 = minor adverse impact
0 = no impact
+1 = minor favorable impact
+2 = considerable favorable impact

(b) (Relative impact number) = (weighted importance) x (individual impact rating)

Alternative 1 = Cluster Systems
Alternative 2 = Joint Treatment with Detroit Lakes
Alternative 3 = Stabilization Ponds and Irrigation
Alternative 4 = Stabilization Ponds and Discharge
Alternative 5 = Mechanical Treatment

Of all the factors taken under consideration, the Pond and Irrigation alternative is the most favorable except for a slight negative aspect in regard to general environmental concerns.

The Pond and Irrigation alternative is the selected alternative. Detailed costs are located in Appendix F, and the detailed layout and environmental concerns will be addressed in the following Environmental Assessment section.

3. Construction Grant Effects

The construction grant effects for the selected plan is outlined in Table 17 along with expected township costs. The estimated construction cost is approximately $4.385 million. The total federal (75%) and state (15%) responsibility of the grant eligible portion amounts to $1.269 million or only 29% of the total. A portion of the remaining $3.116 million will be submitted to the Farmer's Home Administration for consideration of a grant and/or loan.

TABLE 17

CONSTRUCTION GRANT EFFECTS

ITEM	GRANT ELIGIBLE PORTION	TOWNSHIP (FmHA) COST
75,900 LF - 8" Gravity Swr	0	948,800
37,950 LF - Dewater	0	246,700
37,950 LF - 6" F.M.	41,000	300,600
Lift Stations - 17	0	510,000
Manholes - 253	0	189,800
Pave Restore	32,200	94,500
22,500 LF - 8" F.M.	236,300	0
Air Release Manhole	21,300	0
Main Lifts	100,000	0
Pond Construction	627,400	0
Irrigation	65,000	0
	1,123.200	2,290,400
Engr-Cont @ 20%	224,600	458,100
Int Const @ 6-5/8%	0	226,100
	1,347,800	2,974,600
Land Costs- Irrigation & Storage	62,500	Township Portion 141,030
Total Grant Eligible Amount	1,410,300	Township Total 3,115,630

Federal Portion @ 75%	1,057,725
State Portion @ 15%	211,545
Township Portion @ 10%	141,030
	1,410,300

VIII. ENVIRONMENTAL ASSESSMENT

A. General

The Environmental Assessment is designed to provide information regarding environmental aspects relating to the proposed actions as outlined by the selected alternative of this Facility Plan.

B. Future Environment Without the Project.

It has been recognized by the Minnesota Pollution Control Agency that there exists a need for wastewater facilities to serve portions of Lakeview Township. This conclusion was drawn from an evaluation of a Needs Determination for Lakeview Township.

If no wastewater facilities are made available to portions of the township, especially the lakeshore areas, several adverse conditions would develop. First, in anticipation of wastewater facilities, residents of Lakeview Township have hesitated to comply with the outlined regulations of the Shoreland Management Act of the Minnesota Department of Natural Resources. A great number of dwellings are now in violation of this act and these violations threaten wells, surface water and groundwater quality, and the health of the residents.

Second, the lack of wastewater facilities threatens the potential growth and development of the lakeshore areas. The majority of the existing lots do not have the area to provide appropriate separation distances as outlined by the Shoreland Management Act and WPC 40 and full development of all lots is impossible. This exhibits a negative economic impact.

C. Environmental Effects of the Proposed Action

1) Proposed Treatment Facilities

a) The minimum allowable eight (8) inch gravity sewer pipe layed at the minimum allowable slope will provide flow potential that exceeds the expected peak design flows at any part of the system. A proposed layout of the sewer system is shown on Figure 5. This system involves the use of gravity sewer and forcemain to minimize lift stations, to conform to and make the best use of the topography along the collection system, and, most importantly, to minimize cost. A detailed cost summary of the collection system is included in Appendix F.

The treatment facility will involve two (2) primary treatment stabilization ponds and one (1) final pond. These ponds are designed to be used in parallel or series. A scale drawing of the proposed pond layout is shown in Figure 6. Final disposal will be by spray irrigation over adjoining farmland.

FIGURE 5

LAKEVIEW TWP.
Becker County, Minnesota

TOWNSHIP 138 NORTH RANGE 41 WEST

8" SANITARY SEWER

8" FORCEMAIN

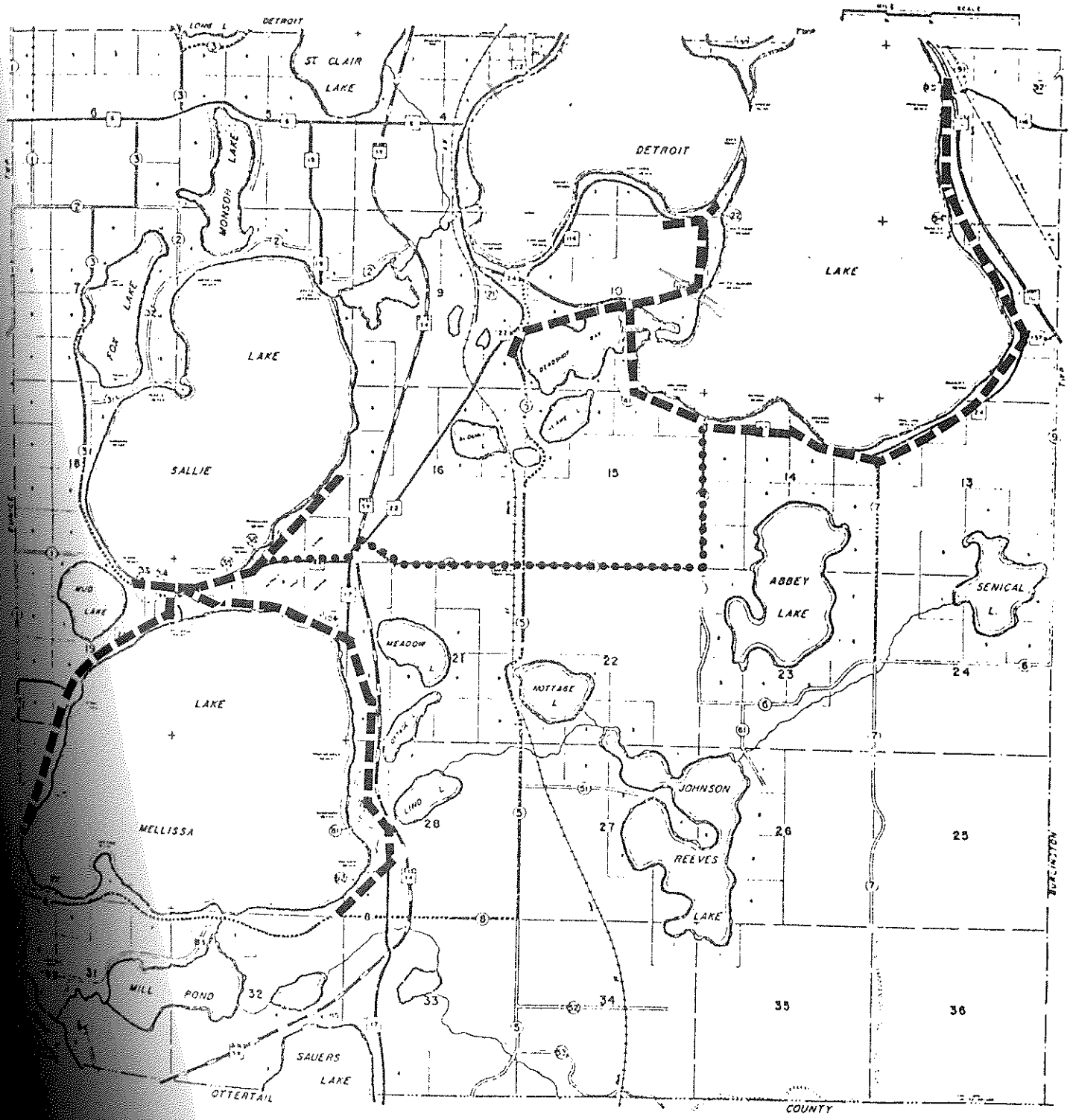


FIGURE 5

LAKEVIEW TWP.
Becker County, Minnesota

TOWNSHIP 138 NORTH RANGE 41 WEST

8" SANITARY SEWER

8" FORCEMAIN

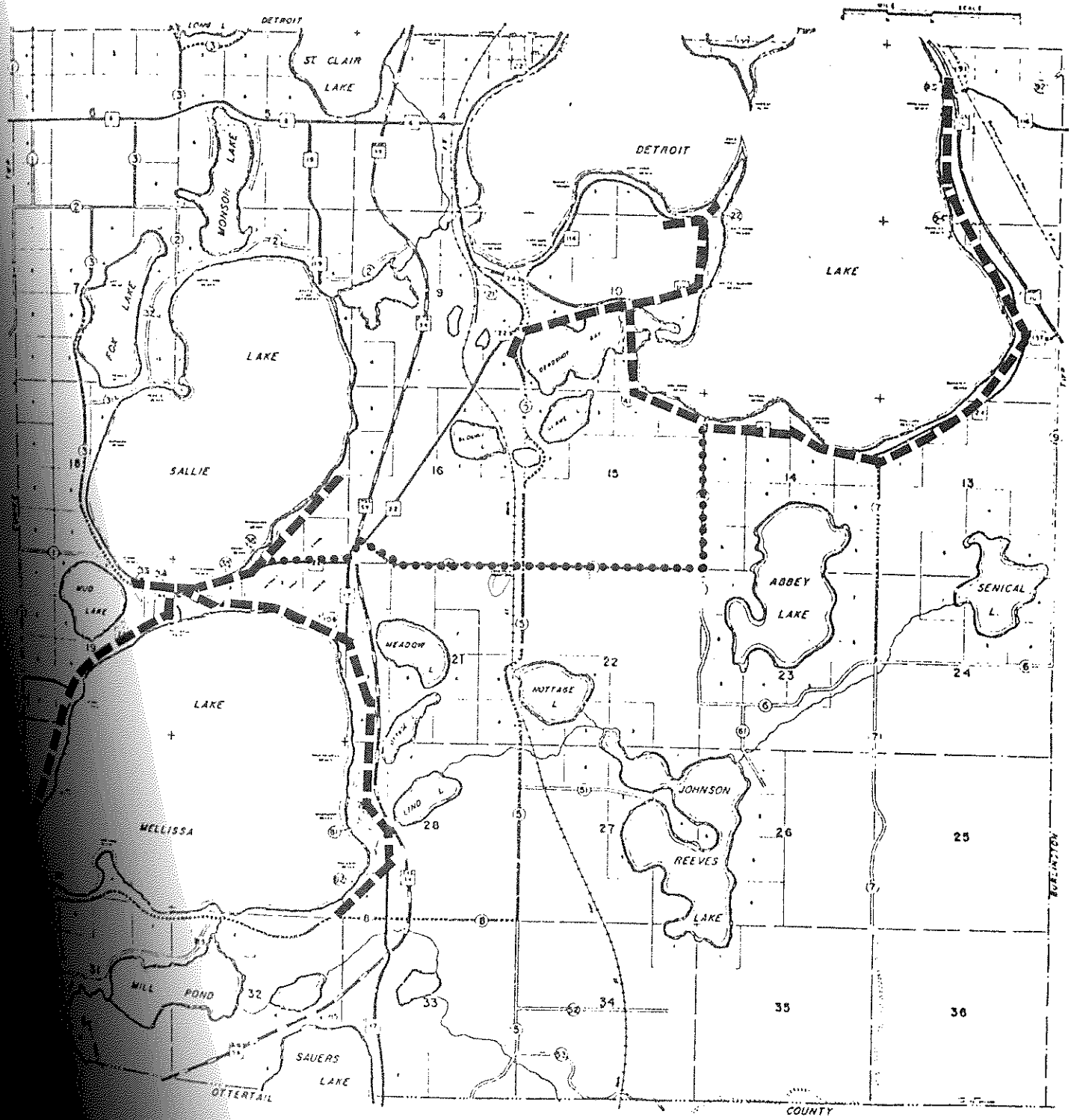
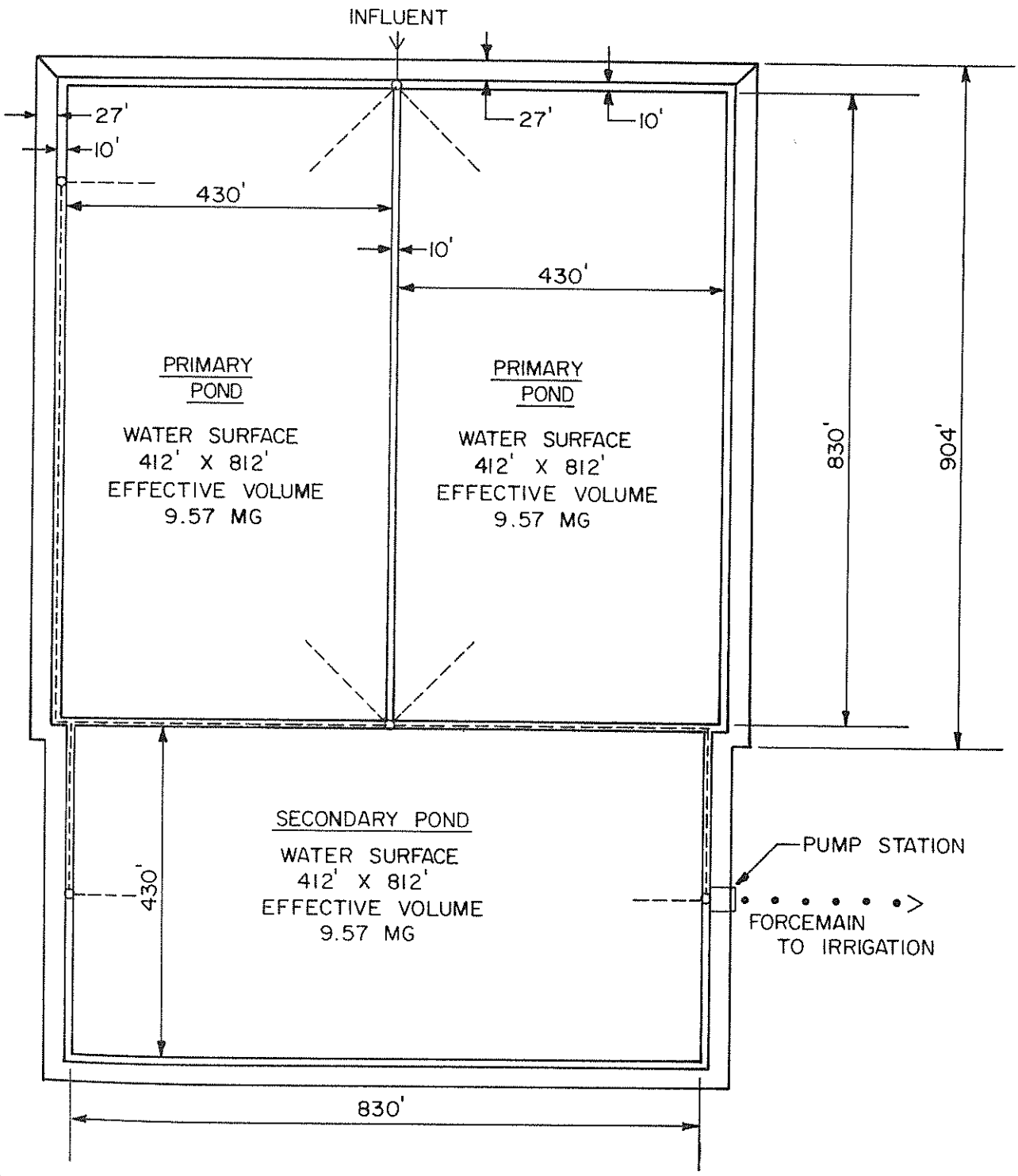


FIGURE 6

PROPOSED POND LAYOUT

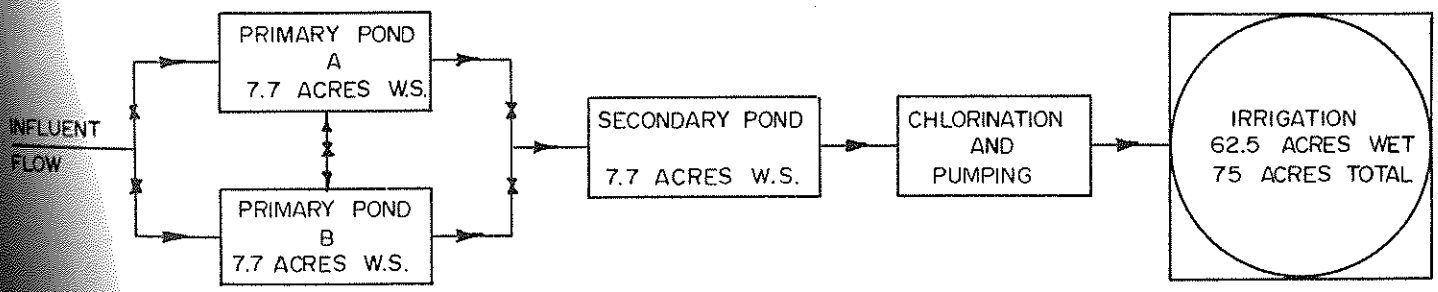


This will involve a maximum 24 inch application over approximately 62.5 acres at the design year 2000. The proposed sites of the ponds and irrigation are shown on Figure 7.

b) Flow Schematic

The flow schematic of the selected alternative is shown in Figure 8.

FIGURE 8
FLOW SCHEMATIC
STABILIZATION PONDS AND IRRIGATION



c) Degree of Treatment Expected

This stabilization pond design with the appropriate detention times of 210 days at final design (a longer detention time at start-up decreasing to 210 days at the design year 2000) will provide secondary treatment and meet the discharge requirements outlined earlier with the exception of the phosphorous requirement.

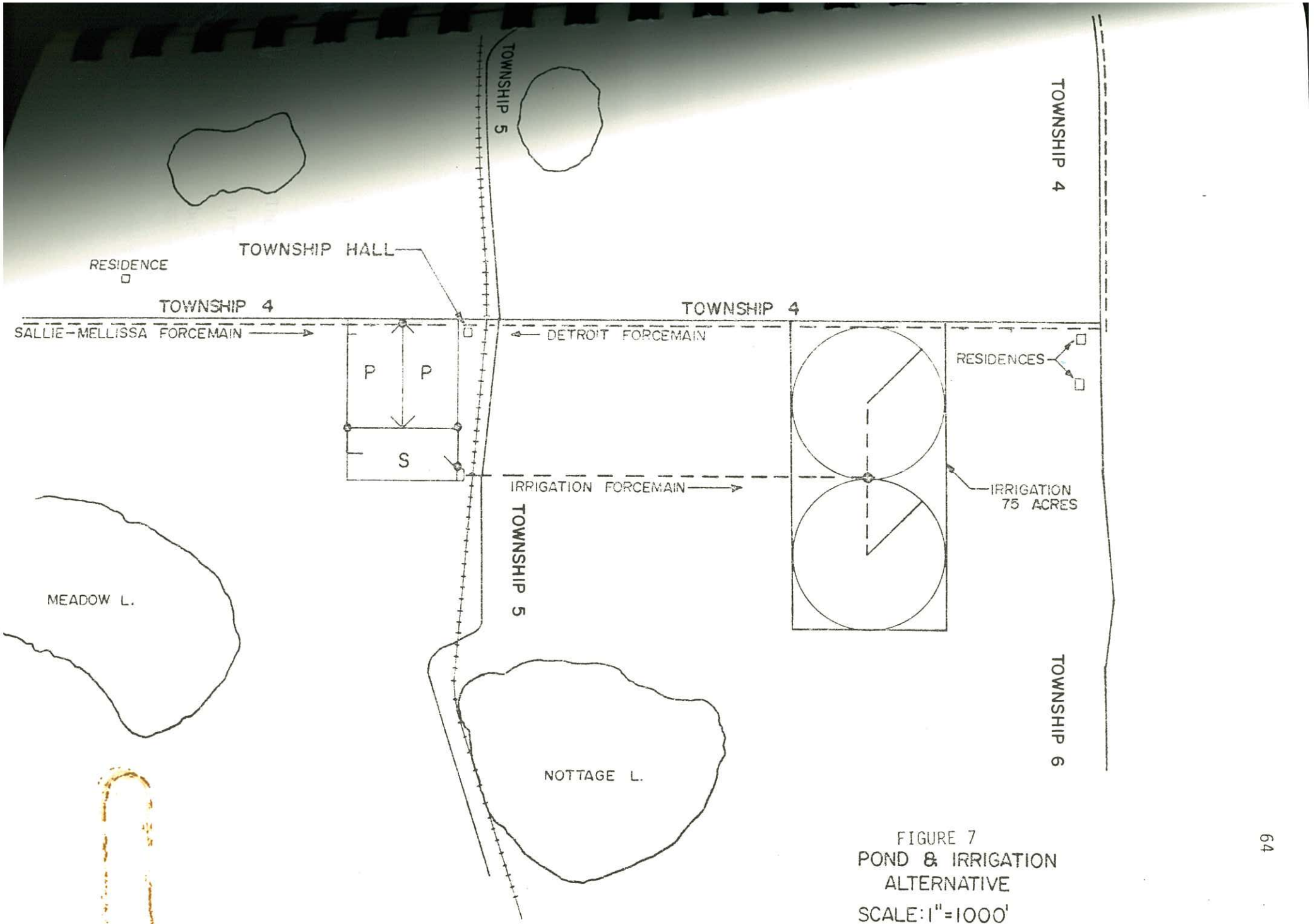


FIGURE 7
POND & IRRIGATION
ALTERNATIVE
SCALE: 1"=1000'

d) Expected Influent and Effluent Quality

Influent and effluent quality is summarized in the following Table 18.

TABLE 18
QUALITY

Item	Expected Influent	Expected Effluent
5-Day Biochemical Oxygen Demand	272-320 mg/l	Less than 25 mg/l
Suspended Solids	250 mg/l	Less than 30 mg/l
Phosphorous	7 mg/l	5 mg/l
Fecal Coliform Organisms	N.A.	200 MPN/100 ml**

* mg/l = milligrams per liter.

** MPN/100 ml = most probable number per 100 milliliters.

e) Land Recommended for Proposed Facility

The stabilization pond system will require approximately 45 acres including all diking and fencing.

The irrigation design will involve two (2) center pivot rotating irrigation rigs. This will irrigate a circular area of 62.5 acres but will involve a rectangular area of approximately 75 acres.

2) Primary Impacts - "Primary Impacts are those impacts that can be attributed directly to the proposed action".

a) Alterations to land forms/streams/natural drainage patterns - Construction of the selected lagoon/irrigation alternative would result in minor environmental changes to the proposed treatment facility sites. The proposed sites are relatively flat and are currently used for agricultural purposes.

The stabilization pond will involve construction of earthen berms approximately six to eight feet in height. Since the proposed site area is relatively level, the natural drainage patterns of the area would not be significantly altered by this construction.

Irrigation will involve only very minor earthwork so that the area under irrigation can accomodate the center-pivot system and some other additional changes might be necessary to provide drainage and erosion control on the irrigated land.

b) Erosion Losses - Erosion losses would be expected during construction until final ground coverage is completed. Control measures to be implemented to minimize these losses would be as follows:

i) Scarify only that portion of the site to be used for construction.

ii) Utilize proper construction techniques to minimize erosion during construction (including proper compaction and wetting of construction site to minimize wind erosion.)

iii) Seed all areas disturbed during construction as soon as possible.

c) Vegetation and trees - The proposed pond site is currently being used to grow agricultural crops and the 45 acres involved would have to be taken out of production. The irrigation site would only temporarily disturb the agricultural crops, dependent on date of construction.

d) Clearing - Herbicides, defoliants, blasting or burning will not be used to clear the construction sites unless proper permits are obtained from local, county and state agencies.

e) Final disposal method for soil, vegetation and construction wastes - Ponds - Since the influent will be pumped into the ponds and pumped out for irrigation, pond water surface level is not a crucial factor. The pond dike design can be adjusted to a nearly equal cut and fill condition. Expected leftover topsoil can be easily disposed of to nearby farm land. Any remaining vegetation encountered can be landfilled.

f) Relocation of Residences - No relocation of residents or dwellings will be necessary.

g) Bypassing wastewater during construction - All dwellings would continue to use their own on-site disposal systems until connection to the proposed sewer system. No connections will be made to the sewer system until the stabilization ponds are complete.

h) Present water quality - A favorable environmental impact is foreseen following construction of the proposed facilities since the combined subsurface discharge of all the existing private drainfields will be eliminated. This will remove any threat to existing private wells and eliminate the suggested possibility of surface water pollution by lakeside drainfield systems.

i) Project's physical relation to area flood plains - In accordance with previous information presented, the proposed wastewater stabilization ponds and irrigation site area are not within a major flood plain.

j) Odor problems - Waste stabilization ponds of this type, with the expected minimum winter flows, will freeze over a portion of the year. This sealing of the pond causes an anerobic condition to to develop and odors are released after the spring thaw. The location of the pond, in relation to the populated areas and the prevailing wind, will minimize the effect of these odors.

k) Noise levels - Construction noise levels will be prevelant only within the immediate vicinity of the ponds and along the sewer alignment for the duration of the construction period. Noise will be generated from dozers, graders, backhoes and earthmovers. It is expected that the noise levels will be concentrated during working hours and will have minimum effect on the area residents. The construction period is estimated to be up to approximately 18 months.

After construction, the only apparent noises will be from the irrigation system, if any.

l) Incineration - Incineration will not be part of the proposed plan. If, during construction, any burning is requested, appropriate permits will be obtained or another disposal method will be used.

m) Disposal methods for grit, ash, and sludge - The ponds of the selected alternative will accumulate, over a period of years, a sludge layer on the pond bottom. It may be possible that some time between 10 and 20 years either primary pond may be temporarily drained and the sludge removed. It is expected that disposal of this sludge on nearby farmland will present no problem and may even be considered an asset as a soil conditioner. It may also be noted that most pond systems of this

type have been used for over 20 years without necessitating sludge removal.

3) Secondary Impacts

Secondary impacts are defined as indirect or induced changes as a result of this project.

a) Type and amount of land - This has been discussed previously in Section VIII C-1-e.

b) Beneficial uses of land eliminated - The amount of agricultural land taken out of production for the defined stabilization ponds is approximately 45 acres. The decrease in agricultural productivity will be partially offset by the increased productivity on the irrigated land, and result in only minor losses.

c) Changes in land use and population density - Due to the high existing population density now existing in the lakeshore service areas, there is no expected increase in density beyond that already outlined.

d) Population growth - The proposed project is not expected to trigger undesirable growth in the population of the area.

e) Effect of project on historic, archeological, recreational and natural preserve sites - As previously mentioned, there does exist a potential for discovery of an archeological site. There will be, as suggested by the Minnesota Historical Society, an archeological survey of the proposed site and alternate sites prior to preparation of plans and specifications. At the time of this writing, arrangements for the survey are being made with the Department of Anthropology, Moorhead State University (Appendix G).

4) Unavoidable Adverse Impacts

Most of the unavoidable adverse impacts have been referred to in previous sections of this environmental assessment. These include removal of agricultural land from production, landscape disruption and noise during construction of the proposed facilities. The other apparent effects will be slight odor problems in the spring. However, it is felt that the net positive impact will result by removal of the water pollution and well contamination potential in Lakeview Township.

5) Irreversible and Irretrievable Commitments of Resource

A small quantity of resources would be irretrievably committed during the proposed project. Since the land required for the ponds would be altered, there would be semi-irretrievable commitment of agricultural land resources to water pollution control. The concrete and other

materials associated with the gravity sewers, forcemains, lift stations, pond control structures and irrigation equipment would be only partially recoverable. The energy required by pumping in the collection system and irrigation would be an irretrievable use of resource, but relatively small compared to other forms of wastewater treatment.

6) Relationship Between Local Short-term Uses of Environment and Maintenance and Enhancement of Long-term Productivity.

The prime objectives of the proposed project are to eliminate contamination of groundwater supplies effecting local wells and remove a recognized surface water pollution source. Following construction of the proposed project, the enhancement of long-term productivity from the standpoint of drinking water and surface water quality will be realized. In addition, agricultural production will be enhanced as a result of irrigation. These effects outweigh the local short-term uses of the environment associated with the construction of the facilities.

D. Public Objections to Project

Early in the history of this project, there was some objection by residents in the sparsely developed areas of Lakeview Township. Since that time, the service area has been modified by the Township and at the suggestion of the

Minnesota Pollution Control Agency (MPCA) in the Needs Determination. In addition to the service areas, there was some question in regard to cost prior to grant availability. With the inclusion of grants, the costs have been reduced to a reasonable level.

It is anticipated that the public hearing, included as an Appendix C to this report, could possibly raise some minor questions, but they will be addressed at that time.

E. Documentation

There have been environmental responses in regard to plant and animal habitats, endangered species, and area changes in the form of a letter received from the Minnesota D.N.R. This letter and other applicable correspondence can be found in Appendix G.

X. IMPLEMENTATION

A. Institutional Responsibility

It has been understood that Lakeview Township has the legal authority and potential financial capability to construct and operate the proposed facility. A resolution of intent to construct and operate the proposed facilities will be submitted with the Step II grant application.

B. Financial Requirements

Lakeview Township is involved with construction grant programs which provide for a seventy-five percent federal grant and a fifteen percent state grant for that portion of the proposed plan that is considered grant eligible. Lakeview Township would be responsible for that portion of the plan not considered grant eligible in addition to the remaining ten percent of the grant eligible portion.

Lakeview Township is also eligible for additional financial consideration from the Farmer's Home Administration (FmHA) in the form of grants or low interest loans.

At the time of this writing it was understood that a potential FmHA grant could be available for up to 50% of the remaining township project costs with possible FmHA low interest loans available for the remaining portion. This is outlined in Table 19.

TABLE 19

POSSIBLE FmHA GRANT EFFECTS

Total Project Cost		4,384,900	
Grant Eligible Portion	1,410,300		
75% Federal Grant	1,057,725		
15% State Grant	211,545		
Total Grants	1,269,270		
Remaining Township Cost		3,115,630	3,115,630
0% FmHA Grant		-0-	
50% FmHA Grant			1,557,815
Final Remaining Township Cost*		3,115,630	1,557,815

* All or a portion of this remaining cost will be assessed to each dwelling unit. The remaining portion will be financed and paid through monthly sewer billing (debt retirement plus operation and maintenance) and hookup charges (new dwellings).

C. Operation and Maintenance

A plan of operation and maintenance will be prepared to provide outlines for staffing, management, training, sampling and analysis for effective operation and maintenance of the collection system, ponds and irrigation. The plan of operation and maintenance will be prepared concurrently with the preparation of the engineering drawings and specifications and submitted with those plans and specifications. This collection system and treatment facilities with irrigation would now be classified as a Class C facility but revision of operation regulations now being done by the MPCA will reclassify it as a Class D facility and a qualified operator will be required.

REFERENCES

1. "Wastewater Collection & Treatment System for Lakeview Township - Becker County, Minnesota"; Rieke Carroll Muller Associates, Inc., September 1973.

2. "Becker County Comprehensive Sewer & Water Study"; Noson-Wehlman-Chapman Associates, Inc.

3. "Water Resources Data for Minnesota, Part 1, Surface Water Records"; United States Department of the Interior Geologic Survey, 1976.

4. "Septic Tank Nutrients in Groundwater Entering Lake Sallie, Minnesota"; David Robert Lee.

5. "Hydrology of Lake Sallie, Northwestern Minnesota, with Special Attention to Groundwater-Surface Water Interactions"; Mork Stewart McBride.

6. "The Eutrophication-Pollution Situation in the Detroit Lakes Area"; Water Resources Research Center Bulletin 22, University of Minnesota, Minneapolis, 1970.

7. "The Distribution of Seepage within Lakebeds"; M. S. McBride and H. O. Pfannkuch (in cooperation with the USEPA).

8. "The Hydrologic Balance of Lake Sallie, Becker County, Minnesota"; William B. Mann IV and Mork S. McBride.

9. "Water Resources of the Otter Tail River Watershed West Central Minnesota"; T. C. Winter, L. E. Bidwell and R. W. Maclay.

10. "Becker County Comprehensive Plan"; Nason, Wehrman, Knight and Chapman, Inc.

Other Supporting References

"Pelican River Watershed District - Overall Plan"; Pelican River Watershed District.

"Detroit Lakes Sewer Ordinance No. 450.01"; City of Detroit Lakes, Minnesota.

APPENDIX A

1) Needs Determination, MPCA

2) Needs Determination Evaluation

MPCA, September 22, 1977

RECEIVED
NOV 30 1977
Rieke-Carroll-Muller Associates Inc.
Box 130 Hopkins, Minn. 55343

Needs Determination for

Lakeview Township

Lakeview Township is located in southern Becker County between the City of Detroit Lakes and the Otter Tail County border. This needs determination will analyze those areas on the southern and eastern shores of Detroit Lake, and all shoreland on Lakes Mellissa and Sallie including the area between them referred to as Shoreham. It is presently undecided, however, whether the south shore of Lake Mellissa, or the east, west and north shores of Lake Sallie will be included in the proposed project.

I. Soils:

A detailed soil survey has not been done by the Soil Conservation Service (SCS) on shorelands in Lakeview Township. Therefore, soils information was obtained from a soil association map and from on-site investigations. Subsurface soils in this area have been identified according to texture and differentiated into the following groups:

1) Sand and Gravel - This group is by far the most extensive soil in the area (see attached map). It is located on shorelands around all three lakes and consists of Arvilla, Maddock, Marquette, Osakis, Sioux and Sverdrup soils. The percolation rate of this group is ten minutes per inch or faster. The SCS has these soils listed as having a rapid permeability which can lead to ground water pollution.

2) Loam - Nebish soils make up this group which is found only along the eastern shore of Detroit Lake. Percolation rates

range from 30 to 100 minutes per inch.

3) Marsh - These small areas are widely scattered on shorelands of all three lakes. The group cannot be classified as to percolation rate due to a highly variable texture.

II. Ground Water Depth:

Information on ground water levels were determined according to soil series from soil interpretation sheets. An attached map shows the location of areas adequate for individual systems (water table is five feet or greater) and those considered inadequate. Inadequate areas (less than five feet to the water table) are found where marshes have formed. However, a field inspection revealed two other areas with ground water problems. One is found in the Shoreham district (situated between Mellissa and Sallie) where a local resident indicates that ground water has been observed at four feet. The other area is located on the southwest shore of Lake Mellissa where dwellings have been constructed on fill less than five feet above the lake level.

III. Lot Sizes:

Because of slightly different characteristics in development, shorelands around each lake will be dealt with on an individual basis. Each lake will be analyzed for lot area, width, and degree of development.

1) Lot Area - Lot areas were determined from plat maps and then classified into one of three groups. The following table shows that most lots are 20,000 square feet or less.

	Total No. of lots	Percent of Lots: 10,000 ft^2 and less	10,001 to 20,000 ft^2	Over 20,000 ft^2
Detroit Lake	624	34.1	55.0	10.9
Lake Sallie	233	61.4	33.0	5.6
Lake Mellissa	474	36.1	54.2	9.7
Shoreham	107	43.9	51.4	4.7

The general location of these lot area groups are shown on an attached map.

2) Lot Width - Width was also determined for these ~~some~~ platted lots. The total number of lots analyzed do not correspond precisely with those for lot area because irregularly shaped lots were not included. Data shows that most lots are 50 feet or less.

	Total No. of lots	Percent of Lots: 50 feet or less	51-75 feet	76-100 feet	100+ feet
Detroit Lake	619	82.2	7.0	3.8	7.0
Lake Sallie	233	76.0	13.3	8.1	2.6
Lake Mellissa	474	65.2	24.3	1.6	8.9
Shoreham	101	58.4	21.8	13.8	6.0

3) Developed Lots - The most recent data available on the amount of development within these shorelands is found in a 1969 county comprehensive plan. This study measures percent of development according to footage of lakeshore.

	Percent Developed
* Detroit Lake	69.0
** Lake Sallie	53.0
** Lake Mellissa	89.8

* This percent has been adjusted from development on all lakeshore frontage to frontage on the south and east shores only.

** Shoreham development has been allocated into these totals.

A further analysis was done on building site sizes. These were determined from county tax rolls in which it was assumed a lot or sequence of lots in a single ownership is equivalent to one building site. These sites tend to show the amount of property in which a dwelling is currently or may be situated on. Therefore, the following table will show sites that are not presently developed:

		Percent of Sites		
	Total No. of lots	10,000 ft^2 and less	10,001 to 20,000 ft^2	Over 20,000 ft^2
etroit Lake	336	10.4	47.6	42.0
ke Sallie	167	36.5	37.7	25.8
ke Mellissa	327	20.2	47.7	32.1
oreham	24	16.7	37.5	45.8

These sites have not been specifically mapped because their location varies considerably. However, generally they correspond to the location of similarly sized platted lots.

Lot widths were evaluated in the same manner.

	Percent of Sites			
	50 feet or less	51-75 feet	76-100 feet	100+ feet
Detroit Lakes	23.1	18.9	35.5	22.5
Lake Sallie	39.6	18.0	18.0	24.4
Lake Mellissa	32.0	29.3	21.3	17.4
Shoreham	8.3	16.7	58.3	16.7

IV. Age of Systems:

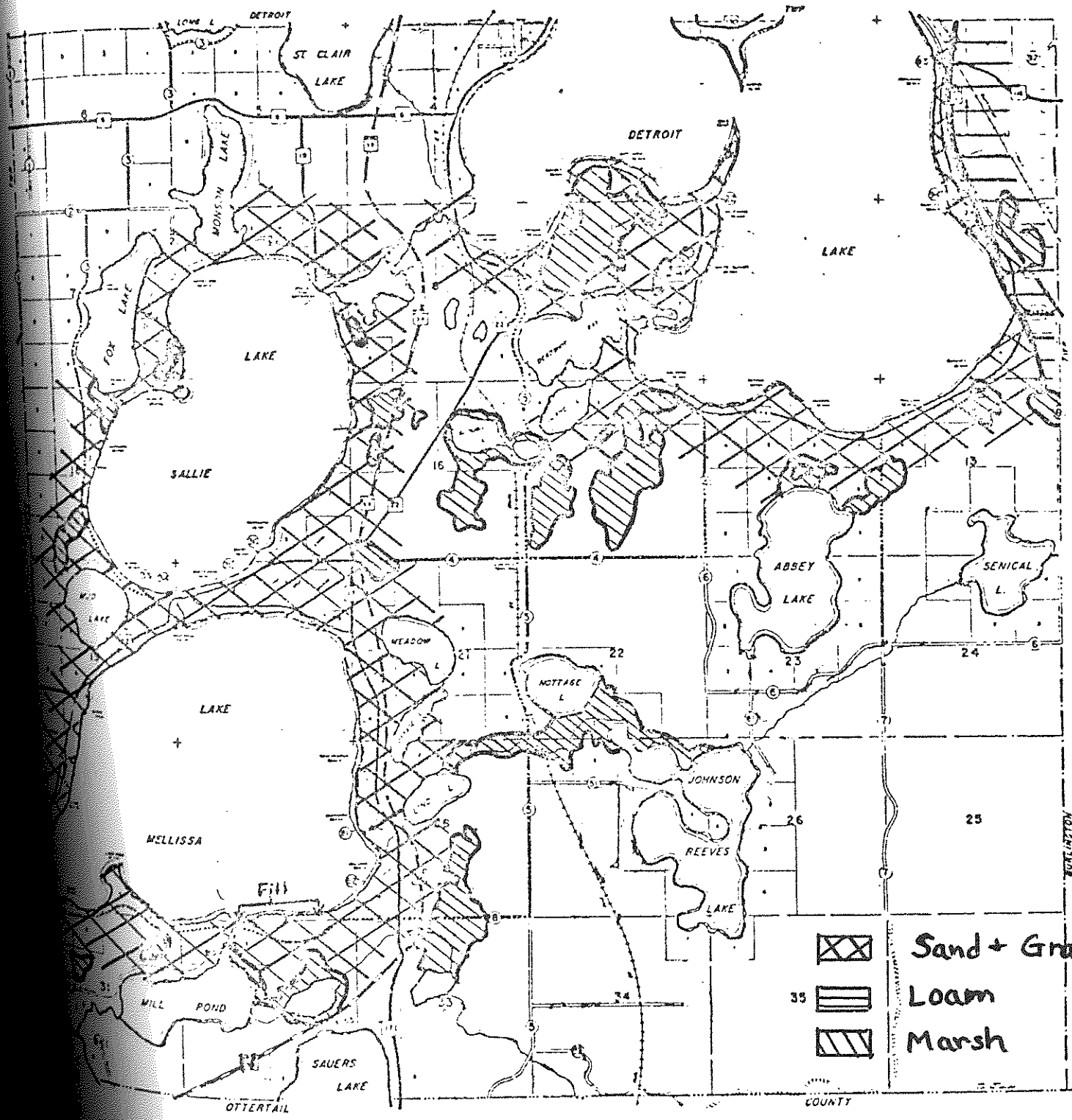
No record is available on the type or age of existing systems before a county sanitary ordinance was adopted in 1972. However, there are records for 9 percent of all on-site systems around Detroit Lake, 21 percent around Lake Mellissa and 13 percent around Lake Sallie which were built since 1972. According to the county zoning administrator, these systems mainly consist of septic tanks with drainfields and a few holding tanks. Data also shows that most of these systems are used on a seasonal basis.

	Percent Used:	
	Seasonally	Year-round
Detroit Lakes	60	40
Lake Sallie	94	6
Lake Mellissa	93	7

As before, Shoreham totals are allotted within the totals of Lakes Mellissa and Sallie.

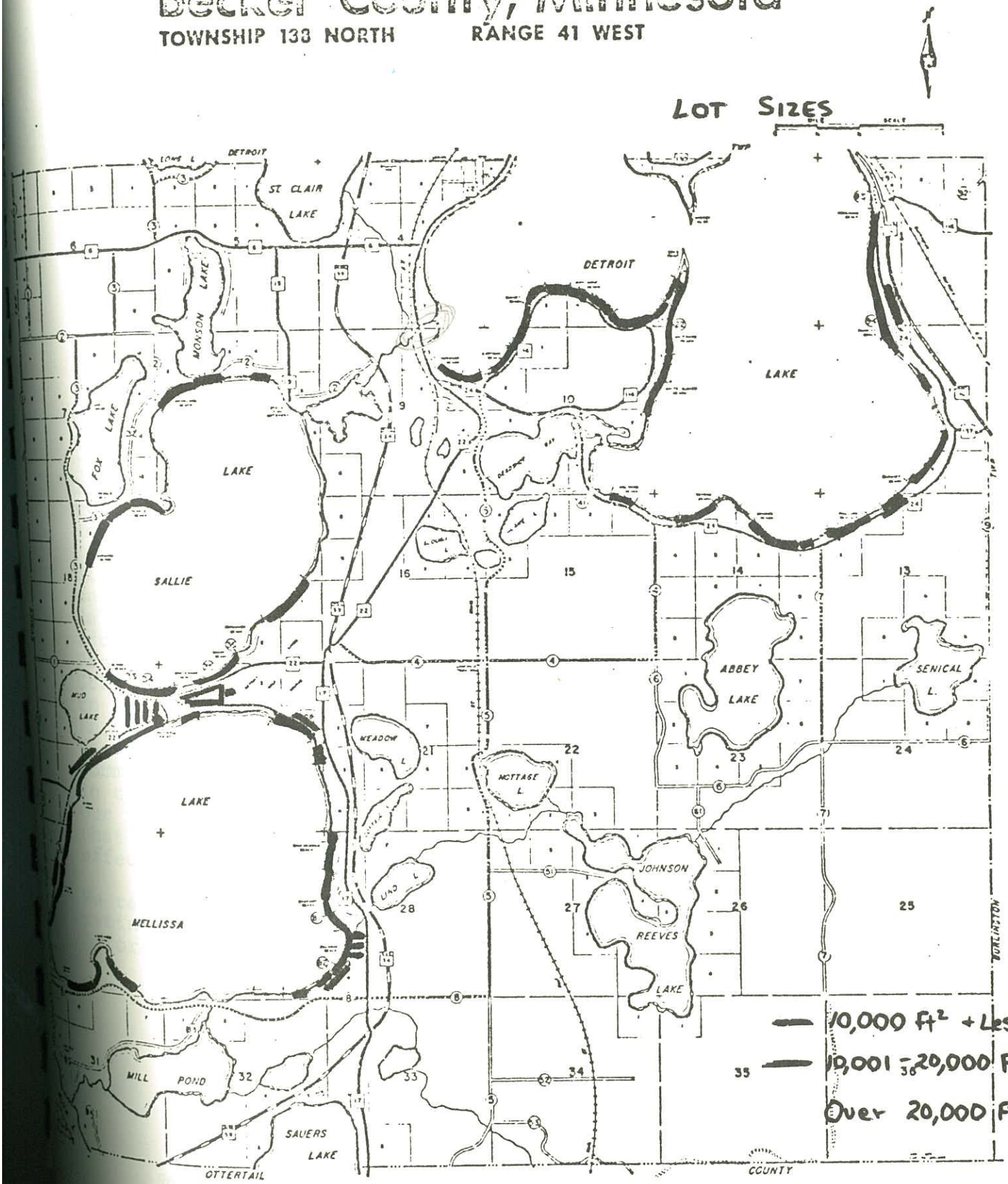
LAKEVIEW TWP.
Becker County, Minnesota
TOWNSHIP 138 NORTH RANGE 41 WEST

SOILS - GROUNDWATER



WT < 5 Feet

LAKEVIEW TWP.
Becker County, Minnesota
TOWNSHIP 138 NORTH RANGE 41 WEST



Minnesota Pollution Control Agency

RECEIVED SEP 28 1977
SEP 26 1977
Rieke-Carroll-Muller Associates Inc.
Box 130 Hopkins, Minn. 55343

Lakeview Township Board
c/o Mr. Wayne Ruona
Route 5
Detroit Lakes, Minnesota 56501

Re: Lakeview Township Needs Determination (C270841-01)

Dear Board Members:

The Needs Committee has completed evaluating data relating to wastewater treatment needs in Lakeview Township. Based on information provided by you and your consultant and that collected by our staff, it was determined that a need for some type of treatment facility exists in parts of the planning area and the "no action" alternative is unacceptable for those areas.

Since the Committee does not feel that a need exists in all unsewered areas around Detroit Lakes, Lakes Mellissa and Sallie, it is requiring that your facilities plan provide additional information as outlined in the Environmental Protection Agency's (EPA) "Suggested Checklist for Determining Conformance with PRM 77-8" (see enclosure) for those portions to be included in the proposed service area. This is necessary in documenting that a new system is needed. Furthermore, it was felt that upgrading individual systems and the use of common drainfields or cluster systems must also be addressed in the facilities plan as wastewater treatment alternatives. Our responsibility in the funding of the project is to see that all feasible alternatives be evaluated and the most cost-effective alternative selected.

We realize this work will incur an additional cost. Hence, we remind you to obtain written authorization for these costs before proceeding with any work.

SEP 2 2 1977

If you or your consultants have any questions regarding this matter, please call me at (612) 296-7359.

Yours truly,

Bradley R. Sielaff

Bradley R. Sielaff, Soil Scientist
Facilities Section
Division of Water Quality

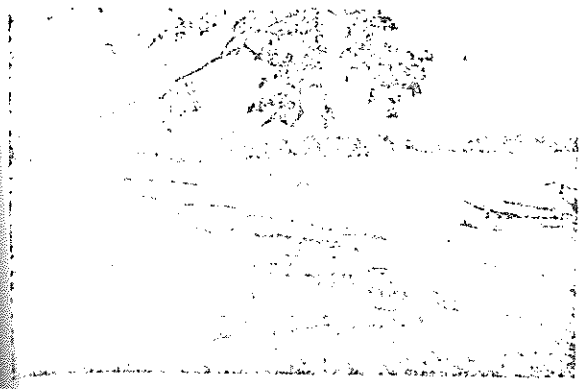
BRS:da

Enclosure
cc: Mr. Dale Watson, Rieke-Carroll-Muller Associates, Inc., Hopkins (with enclosure)
U. S. Environmental Protection Agency, Construction Grants, Region V, Chicago

APPENDIX B

1) Letter to Governor Anderson from the Northwestern Minnesota Resort Association.

2) Response to above letter from Grant J. Merritt of Governor Anderson's office.



NORTHWESTERN MINNESOTA RESORT ASSOCIATION

SEPTEMBER 13, 1974

SEP 16 1974

HONORABLE WENDELL ANDERSON
GOVERNOR, STATE OF MINNESOTA
GOVERNOR OFFICE, STATE CAPITOL
ST. PAUL, MINNESOTA 55101

DEAR GOVERNOR ANDERSON:

MINNESOTA CLEAN LAKES AND RIVERS ACT PASSED IN 1972, IS CURRENTLY STARTING TO CAUSE CONSIDERABLE HARDSHIP ON A NUMBER OF RESORTS, PARTICULARLY THOSE LYING IN LOW AREAS BECAUSE IN THIS LEGISLATION THERE WAS NO PROVISION MADE TO HELP FUND SEWAGE PROJECTS THAT WILL BENEFIT THE PUBLIC.

TO UP-DATE RESORT SEWER DISPOSAL SYSTEMS SO THAT THEY WILL MEET STATE REQUIREMENTS, IT IS BEING NECESSARY TO ESTABLISH A SEWER DISTRICT AND DEVELOP A SEWER SYSTEM THAT WILL RUN COMPLETELY AROUND THE LAKE. THE COST OF THESE SEWAGE SYSTEMS IS FAR BEYOND THE MEANS OF RESORT OPERATORS AND WILL FORCE MANY TO PLAT THEIR LAND AND SELL OUT TO A NUMBER OF INDIVIDUALS FOR PRIVATE LAKE-SHORE HOMES. THIS WILL DECREASE THE NUMBER OF RESORTS FOR VACATIONERS AND THE ACCESSIBILITY OF THE LAKES TO THE TOURIST RESULTING IN THE TOURIST INDUSTRY DECREASING IN THE STATE OF MINNESOTA. IN OTHER WORDS, THE FINANCIAL BURDEN CREATED BY THE CLEAN LAKES ACT COULD ALMOST ELIMINATE THE TOURIST INDUSTRY FROM THE STATE OF MINNESOTA IN MANY RESORT AREAS.

THE RESORT INDUSTRY BRINGS INTO THEIR OWN AREA EVERY YEAR MILLIONS OF DOLLARS OF OUTSIDE MONEY MAKING TOURISM THE THIRD LARGEST INDUSTRY IN THE STATE OF MINNESOTA OR THE SECOND LARGEST IN THE NORTHERN PART OF THE STATE. IN SOME COUNTIES, IT IS BASICALLY THE ONLY INDUSTRY. THE HUNDREDS OF THOUSANDS OF DOLLARS BROUGHT INTO AN AREA IN TURN GENERATE WITHIN THAT AREA MILLIONS OF DOLLARS OF ADDITIONAL BUSINESS BEFORE THE MONEY LEAVES THE AREA. WHEN THIS MONEY DOES LEAVE THE AREA, A GREAT DEAL OF IT STAYS WITHIN THE STATE AND AGAIN GENERATES ADDITIONAL BUSINESS. AS AN EXAMPLE:

THREE AVERAGE SIZED RESORTS IN THE DETROIT LAKES AREA SPEND ABOUT $100,000.00 IN THE CITY OF DETROIT LAKES EACH YEAR. USING AN ECONOMIC FACTOR OF 5, THIS $100,000.00 TURNS OVER 5 TIMES BEFORE IT LEAVES THE AREA. OR, IT GENERATES $500,000.00 WORTH OF BUSINESS

700 WASHINGTON AVE. * DETROIT LAKES, MINN. 56501 * PHONE (218) 847-9202



NORTHWESTERN MINNESOTA RESORT ASSOCIATION

IN DETROIT LAKES. (THIS IS NOT COUNTING THE MONEY THE TOURIST SPENDS AT OTHER BUSINESSES WHILE IN THE AREA AND IT IS ESTIMATED THAT A FAMILY SPENDS AN EQUAL AMOUNT IN STORES AND AMUSEMENT AREAS FOR FOOD, CLOTHING, ETC. WHILE VACATIONING AT A RESORT.) WHEN THIS MONEY LEAVES THE RESORT AREA, A GREAT DEAL OF IT STAYS WITHIN THE STATE AND SO GENERATES ADDITIONAL BILLIONS OF DOLLARS OF BUSINESS WITHIN THE STATE. IF A NUMBER OF RESORTS ARE FORCED TO CLOSE, WHERE WILL THE MONEY COME FROM TO HELP SUPPORT THE STATE?

THE PROPOSED SEWER ASSESSMENT FOR RESORTS IN LAKEVIEW TOWNSHIP, BECKER COUNTY, MINNESOTA, IS CURRENTLY RUNNING FROM $10,000.00 TO $50,000.00 DEPENDING ON THE SIZE OF THE OPERATION. THIS DOES NOT INCLUDE THE COST OF HOOKING UP THE RESORT COTTAGES TO THE MAIN SERVICE. SO THERE COULD BE AN ADDITIONAL COST OF $5,000.00 TO $20,000.00.

THE YEARLY GROSS INCOME FROM MANY RESORTS DOES NOT EVEN EQUAL THE PROPOSED ASSESSMENTS. THE NET INCOME IN MANY CASES WILL BE NEARLY COMPLETELY ELIMINATED BY THE SEWER PAYMENTS LEAVING THE RESORTER WITH NEXT TO NOTHING TO LIVE ON.

THE RESORTS (TOURIST) INDUSTRY NEEDS HELP. MILLIONS OF DOLLARS OF PUBLIC MONEY IS SPENT EACH YEAR TO PROMOTE INDUSTRY IN THE STATE OF MINNESOTA. ALSO, MILLIONS ARE SPENT OT SUBSIDIZE THE FARM INDUSTRY. IN COMPARISON, VERY LITTLE HAS EVER BEEN SPENT TO PROMOTE OR DEVELOP AND IMPROVE THE RESORT (TOURIST) INDUSTRY IN THE STATE OF 10,000 LAKES.

WHEN THE CLEAN LAKES ACT WAS PASSED, NO PROVISION WAS MADE TO HELP FINANCE THE COST OF UPDATING THE LAKESHORE SEWAGE SYSTEMS. YET WHEN NEW HIGHWAYS, ROADS, DAMS, RE-CHANNELING RIVERS ETC. ARE DEVELOPED TO THE BENEFIT OF THE GENERAL PUBLIC, PUBLIC FUNDS ARE USED. THE LAKES THAT THE STATE IS TRYING TO CLEAN UP AND STOP FURTHER POLLUTION ON, ARE PUBLIC LAKES. THEY DO NOT BELONG TO THE PEOPLE WHO OWN PROPERTY AROUND THEM AND IT ISN'T NECESSARILY THESE PROPERTY OWNERS THAT ARE POLLUTING THEM. QUITE FREQUENTLY THERE IS MORE POLLUTION COMING OFF THE FARM FEEDLOTS, DRAINAGE DITCHES, STORM SEWERS, ETC. THAT RUN INTO RIVERS AND STREAMS THAT FEED INTO THE LAKES THAN COME FROM PROPERTY OWNERS AND HOMES THAT ARE ABOUT THE LAKES. SINCE THE LAKES ARE PUBLIC WATERS AND THE PUBLIC IS HELPING TO POLLUTE THEM, THEN IT IS OUR FEELING THAT THE PUBLIC SHOULD HELP PAY FOR THE ANTI-POLLUTION CONTROLS THAT ARE NECESSARY TO INSTALL TO KEEP OUR WATERS CLEAR AND CLEAN.

00 WASHINGTON AVE. * DETROIT LAKES, MINN. 56501 * PHONE (218) 847-9202

612-296-7301

October 4, 1974

Mr. William Brown, President
Northwestern Minnesota Resort Association
700 Washington Avenue
Detroit Lakes, Minnesota 56501

Dear Mr. Brown:

This is in response to your letter received on September 26, 1974 regarding the proposed sewer project for Lakeview Township.

One of the main concerns of this Agency is, of course, the control of pollution in Minnesota's lakes, which is a major factor in the attraction of tourists to the state. The tourist industry is indeed an important source of revenue to the state which should not be jeopardized in any way.

Your point that the lakes themselves are public property - and their maintenance should, therefore, be supported by public money - is well taken. To add to our problem, half the public money authorized via the Federal Water Pollution Control Act Amendments of 1972 by Congress for this purpose for Fiscal Years 1973, 74 and 75 was impounded by the former Administration and will very likely not be voluntarily released by the present Administration. This represents approximately $170 million which should be allocated to the State of Minnesota.

Minnesota is currently involved in a lawsuit being brought against the U. S. Environmental Protection Agency for the release of these funds. Although this case is currently held up in the 8th Circuit Court, the Supreme Court is scheduled to hear a similar case this fall and will, in all likelihood, eventually rule on the constitutionality of impoundment.

With the funds currently available, we are able to fund only one outstate project for FY 1972, Western Lake Superior, plus six Metropolitan Area projects. No money has yet been authorized for FY 1976

and beyond. However, should money be available in amounts similar to those for FY's 1973, 74, and 75, two other high-priority and expensive projects will take a large portion of it - Rochester and Alexandria.

Lakeview Township, with a priority ranking of 50, could perhaps be eligible for Step I funding in FY 1977 or 78; but if construction commences before a grant is awarded, they will by law become ineligible.

We appreciate and share your concern over the fiscal problems involved in solving these problems.

Many Minnesota communities or sewer districts around lakes are faced with the same problems; but with the current funding situation and costs involved in construction of waste treatment facilities, we are only able to appeal to Congress for continued and expanded financial support.

Yours very truly,

GRANT J. MERRITT
Executive Director

cc: Governor Wendell R. Anderson
Robert Berglund
John A. Blatnik
Donald M. Fraser
William Frenzel
Hubert H. Humphrey
Joseph E. Karth
Walter F. Mondale
Ancher Nelsen
Albert H. Quie
John M. Zwach

bcc: SCM
GJM/SCM:mlj

APPENDIX C

Public Hearing

APPENDIX D

SOIL BORING LOGS - United States Department of Agriculture, Soil Conservation Service.

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

August 18, 1976

Wayne Ruona, Project Coordinator
for Lake View Township Waste Water
Collection and Treatment System
Rt. 5 Box 211
Detroit Lakes, Minnesota 56501

Dear Mr. Ruona;

The enclosed sheet gives the soils log of the borings taken for the Lake View collection and treatment system. The borings were logged by Donald DeMartelaere, Soil Scientist of the Soil Conservation Service Area Office in Fergus Falls, Minnesota.

Sites number 1, 3 and 5 were the possible lagoon sites.

If we can provide any further information please contact me.

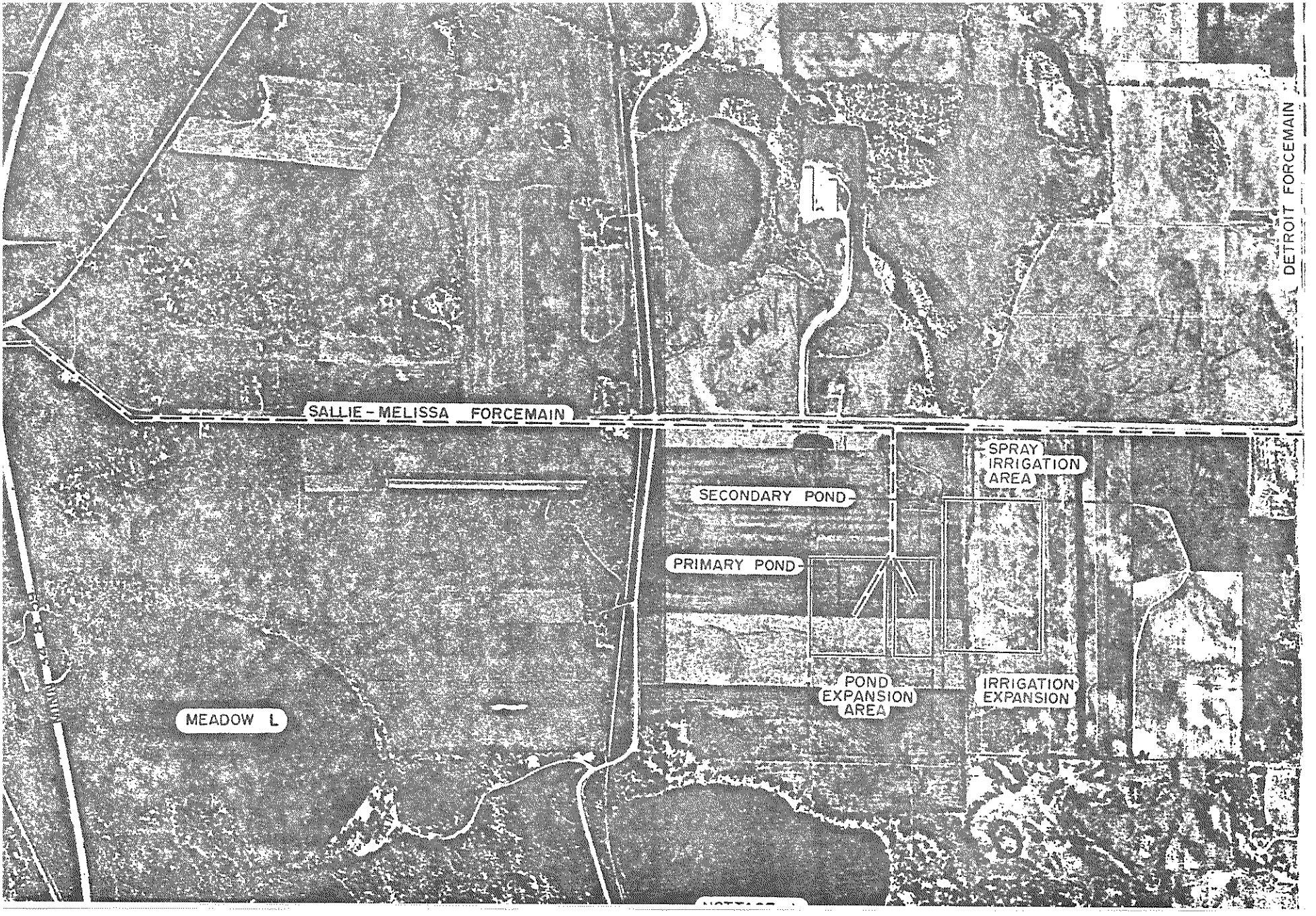
Sincerely,

Lee R. Johnson
District Conservationist

LRJ/as

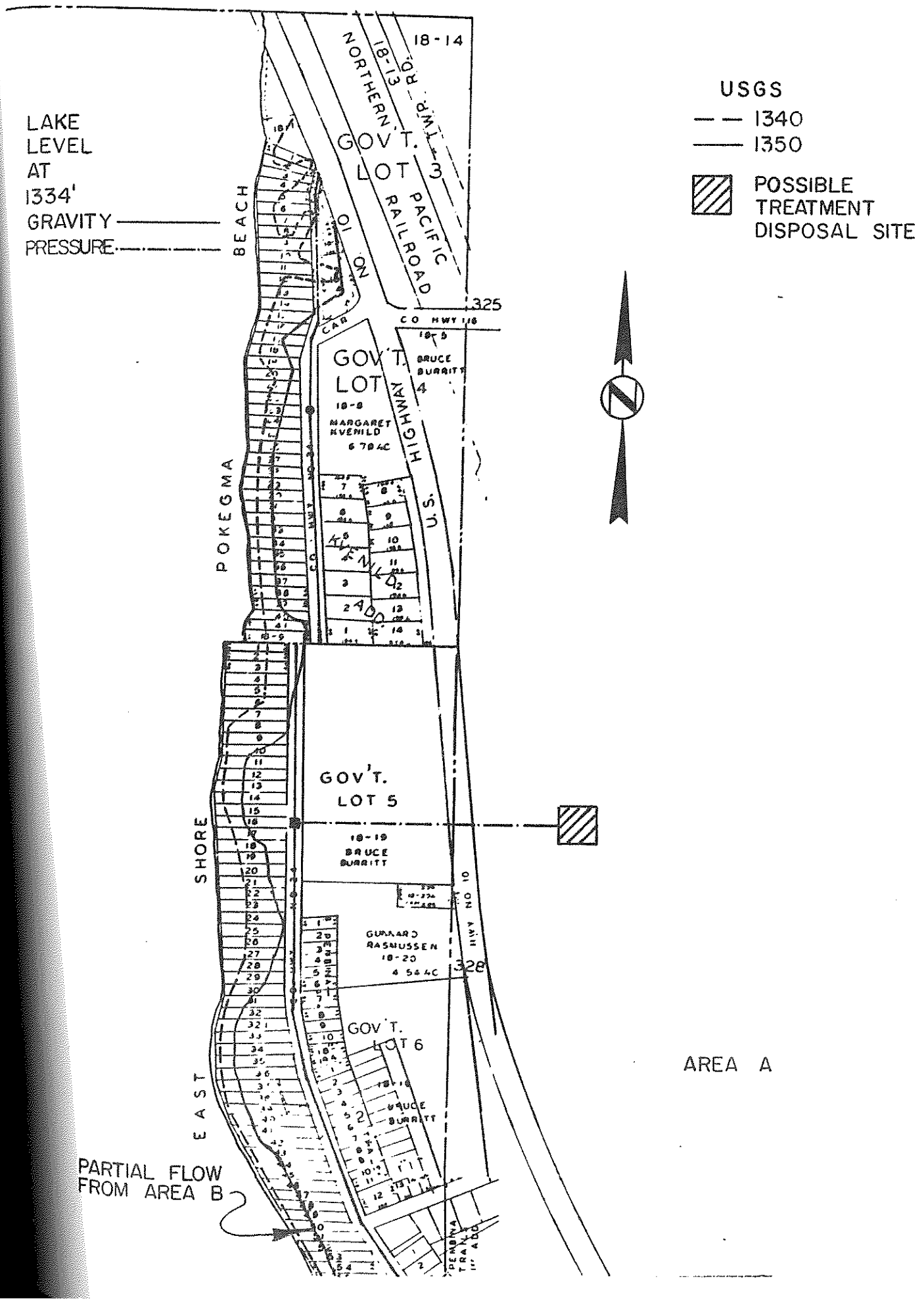
DEPTH	TEXTURE	ENG. CLASS	PERMEABILITY (INCHES PER HOUR)
SITE 4 NE¼ Sec. 22 Lake View Twp.			
0-½ foot	Sandy loam	SM	2.0-6.0
½-1 foot	Loamy sand	SM	6.0-20.0
1-24½ feet	Medium & coarse sand	SP	6.0-20.0
NO WATER TO 24½ feet			
SITE 5 SE¼ Sec. 15 Lake View Twp.			
0-8 inches	Sandy loam	SM	2.0-6.0
8-18 inches	Sandy loam	SM	2.0-6.0
18 inches to 15 feet	Gravelly coarse sand	SP	6.0-20.0
15-45 feet	Med. & coarse sand	SP	6.0-20.0
WATER TABLE AT 15 FEET			
SITE 6 SE¼ Sec. 15 Lake View TWP.			
0-8 inches	Sandy loam	SM	2.0-6.0
8-20 inches	Loamy sand	SM	6.0-20.0
20 inches-18 feet	Med. & coarse sand	SP	6.0-20.0
20-29½ feet	medium sand	SP	6.0-20.0
SITE 1 NE¼ Sec. 21 Lake View Twp.			
0-2 feet	Sandy loam	SM	2.0-6.0
2-7 feet	Coarse sand	SP	6.0-20.0
7-14 feet	Coarse sand	SP	6.0-20.0
14-24½ feet	Fine & med. sand	SP	6.0-20.0
WATER TABLE WAS AT 7 FEET			
SITE 2 NE¼ Sec. 21 Lake View Twp.			
0-6 inches	Loamy sand	SM	6.0-20.0
6 inches to 27 feet	Medium sand	SP	6.0-20.0
27 to 37 feet	Fine sand	SP	6.0-20.0
37 to 43 feet	Med. & coarse sand	SP	6.0-20.0
43 to 45 feet	Medium sand	SP	6.0-20.0
45 to 49½ feet	Clay	CH	less than 0.06
WATER TABLE AT 43 FEET			
SITE 3 NE¼ Sec. 22 Lake View Twp.			
0-2 foot	Loamy sand	SM	6.0-20.0
2-16 feet	Med. & coarse sand	SP	6.0-20.0
16-30 feet	Fine sand	SP	6.0-20.0
30-40 feet	Med. & coarse sand	SP	6.0-20.0
40-49½ feet	Coarse sand	SP	6.0-20.0

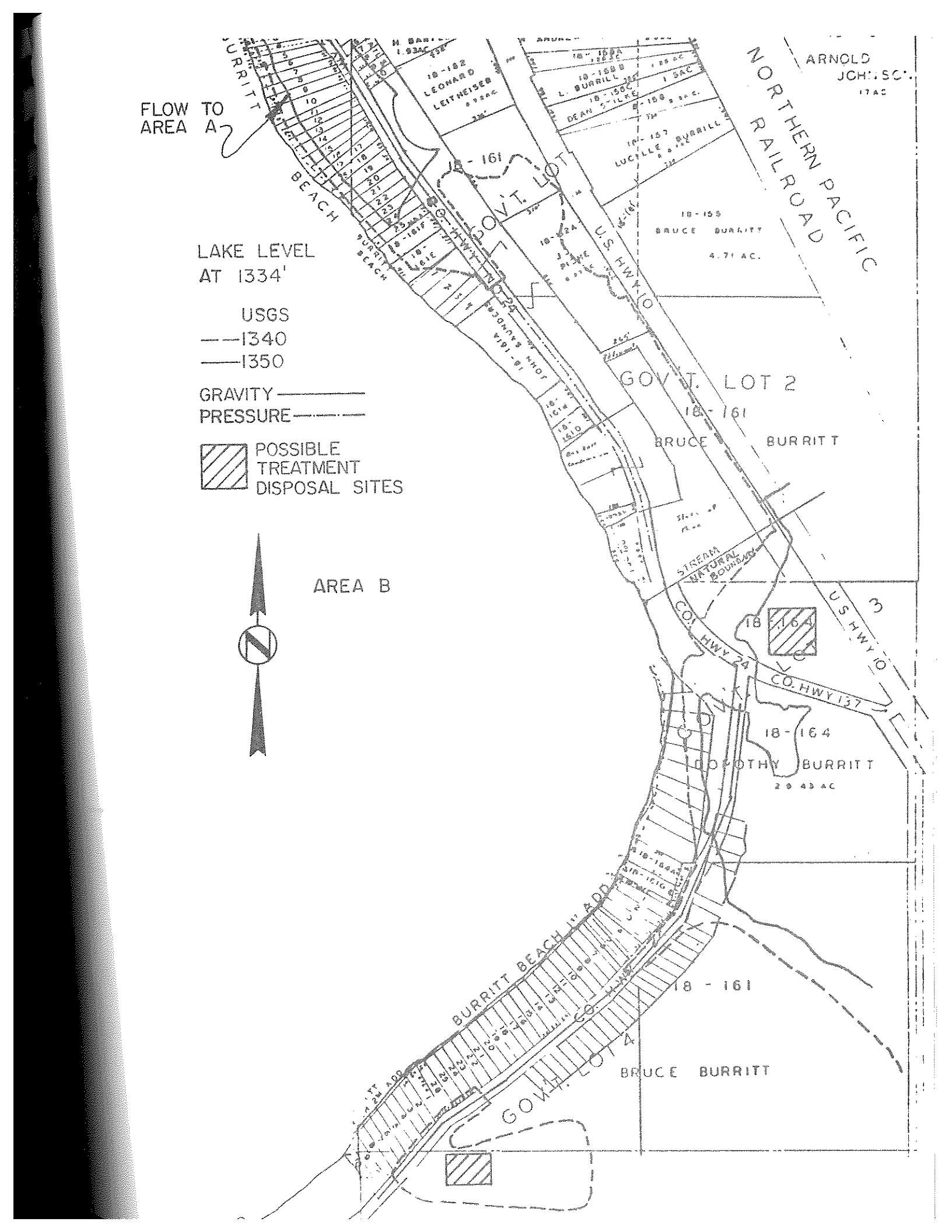
DEPTH	TEXTURE	SNG. CLASS	PERMEABILITY (INCHES PER HOUR)
SITE 4 NE¼ Sec. 22 Lake View Twp.			
0-½ foot	Sandy loam	SM	2.0-6.0
½-1 foot	Loamy sand	SM	6.0-20.0
1-24½ feet	Medium & coarse sand	SP	6.0-20.0
NO WATER TO 24½ feet			
SITE 5 SE¼ Sec. 15 Lake View Twp.			
0-8 inches	Sandy loam	SM	2.0-6.0
8-18 inches	Sandy loam	SM	2.0-6.0
18 inches to 15 feet	Gravelly coarse sand	SP	6.0-20.0
15-45 feet	Med. & coarse sand	SP	6.0-20.0
WATER TABLE AT 15 FEET			
SITE 6 SE¼ Sec. 15 Lake View TWP.			
0-8 inches	Sandy loam	SM	2.0-6.0
8-20 inches	Loamy sand	SM	6.0-20.0
20 inches-18 feet	Med. & coarse sand	SP	6.0-20.0
20-29½ feet	medium sand	SP	6.0-20.0
SITE 1 NE¼ Sec. 21 Lake View Twp.			
0-2 feet	Sandy loam	SM	2.0-6.0
2-7 feet	Coarse sand	SP	6.0-20.0
7-14 feet	Coarse sand	SP	6.0-20.0
14-24½ feet	Fine & med. sand	SP	6.0-20.0
WATER TABLE WAS AT 7 FEET			
SITE 2 NE¼ Sec. 21 Lake View Twp.			
0-6 inches	Loamy sand	SM	6.0-20.0
6inches to 27 feet	Medium sand	SP	6.0-20.0
27 to 37 feet	Fine sand	SP	6.0-20.0
37 to 43 feet	Med. & coarse sand	SP	6.0-20.0
43 to 45 feet	Medium sand	SP	6.0-20.0
45 to 49½ feet	Clay	CH	less than 0.06
WATER TABLE AT 43 FEET			
SITE 3 NE¼ Sec. 22 Lake View Twp.			
0-½ foot	Loamy sand	SM	6.0-20.0
½-18 feet	Med. & coarse sand	SP	6.0-20.0
18-26 feet	Fine sand	SP	6.0-20.0
26-40 feet	Med. & coarse sand	SP	6.0-20.0
40-49½ feet	Coarse sand	SP	6.0-20.0
WATER TABLE AT 26 FEET			


SALLIE - MELISSA FORCEMAIN
DETROIT FORCEMAIN
SPRAY IRRIGATION AREA
SECONDARY POND
PRIMARY POND
POND EXPANSION AREA
IRRIGATION EXPANSION
MEADOW L

APPENDIX E

Individual Systems Area Maps


LAKE LEVEL AT 1334'
GRAVITY
PRESSURE
USGS
1340
1350
POSSIBLE TREATMENT DISPOSAL SITE
POKEGMA BEACH
SHORE
EAST
NORTHERN PACIFIC RAILROAD
GOV'T. LOT 3
GOV'T. LOT 4
GOV'T. LOT 5
GOV'T. LOT 6
U.S. HIGHWAY NO 10
CO HWY 118
325
328
18-14
18-13
18-9
18-8
18-19
18-20
MARGARET KVEPILD
6.78 AC
BRUCE BURRITT
GUNNARD RASMUSSEN
4.56 AC
KENWOOD 2ND ADD
PENBINA TRAILER CT 1ST ADD
PARTIAL FLOW FROM AREA B
AREA A

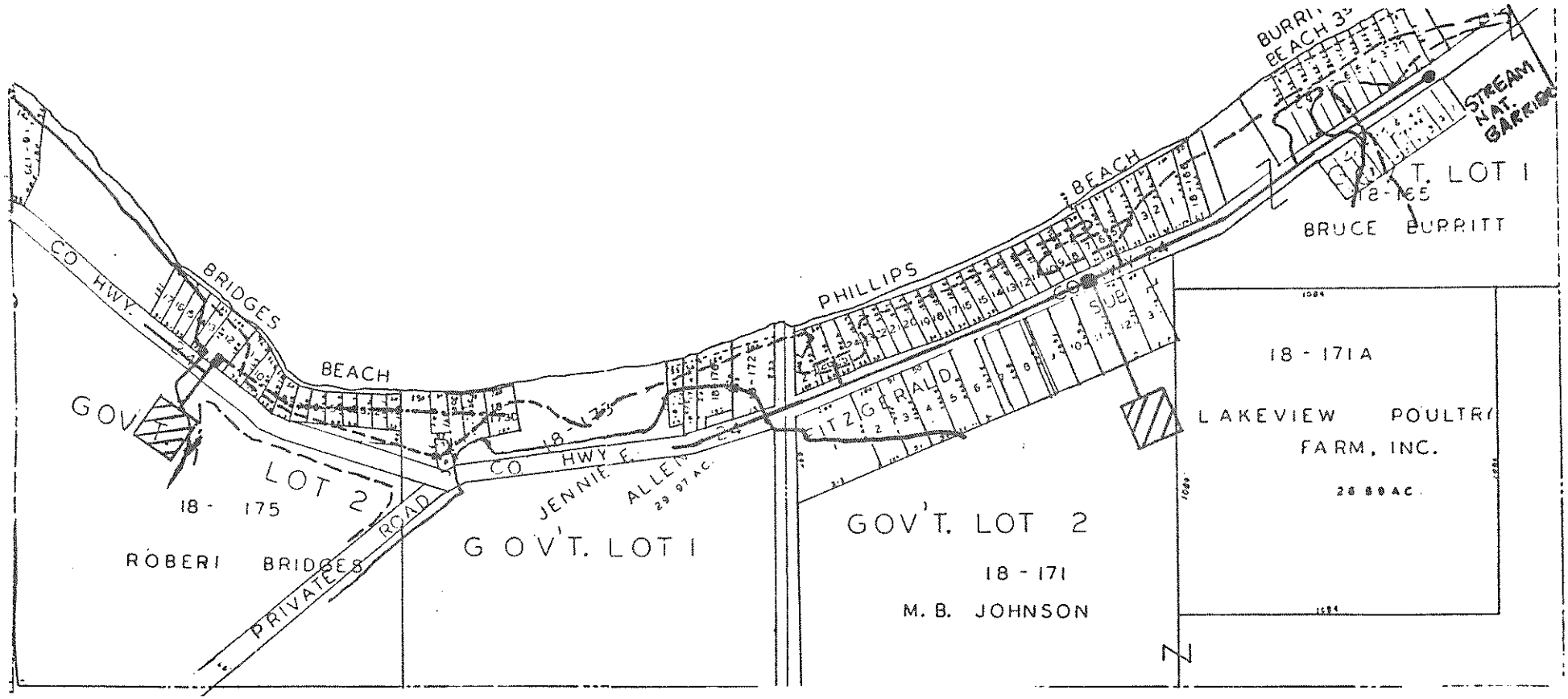

FLOW TO AREA A
LAKE LEVEL AT 1334'
USGS
1340
1350
GRAVITY
PRESSURE
POSSIBLE TREATMENT DISPOSAL SITES
AREA B
N
BURRITT BEACH
NORTHERN PACIFIC RAILROAD
U.S. HWY 10
CO. HWY 24
CO. HWY 137
STREAM NATURAL BOUNDARY
GOVT. LOT 1
GOVT. LOT 2
GOVT. LOT 4
18-161
18-164
BRUCE BURRITT
DOROTHY BURRITT
BURRITT BEACH 1ST ADD.

AREA C

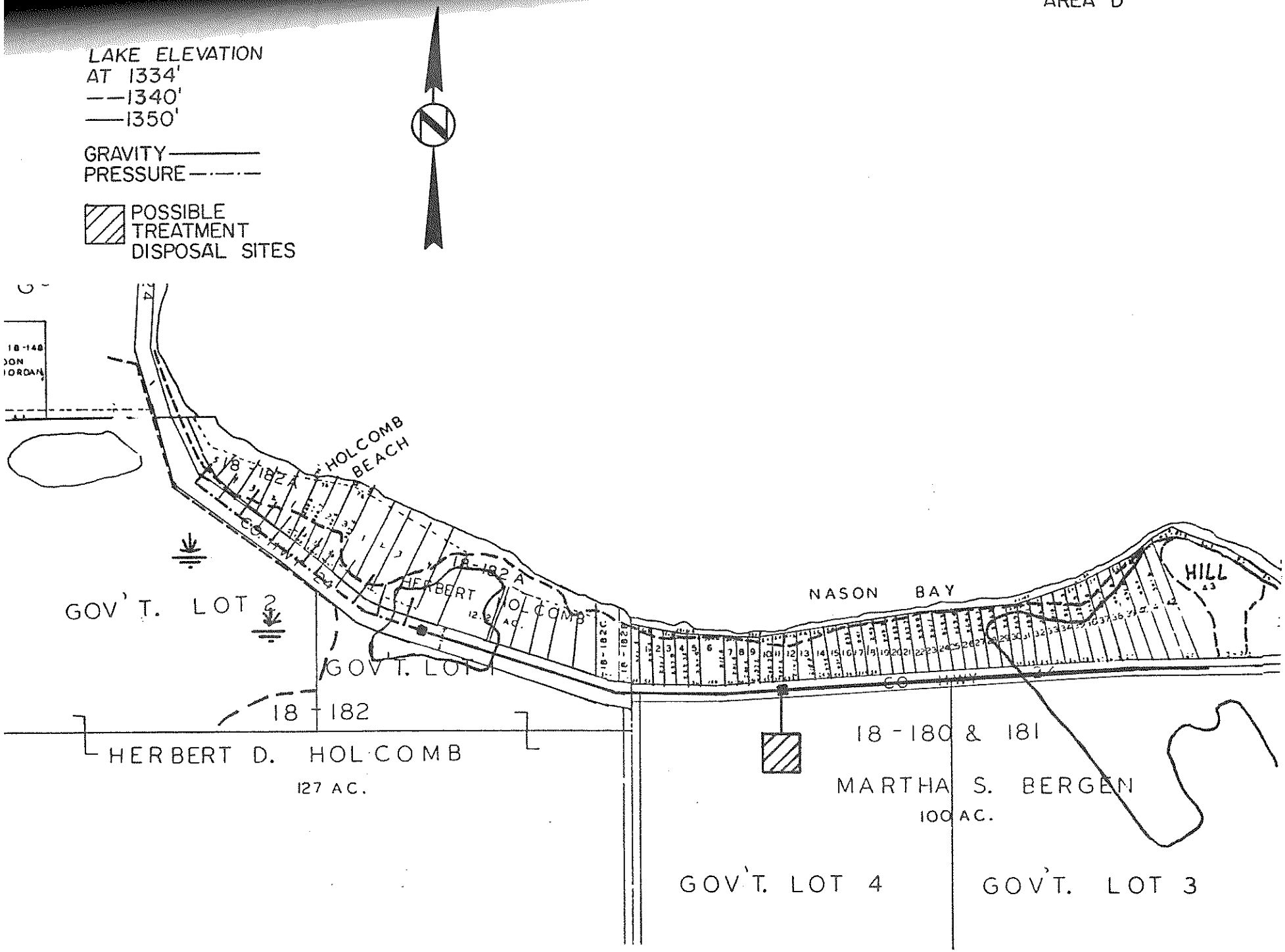
LAKE ELEVATION
AT 1334'
——1340'
——1350'

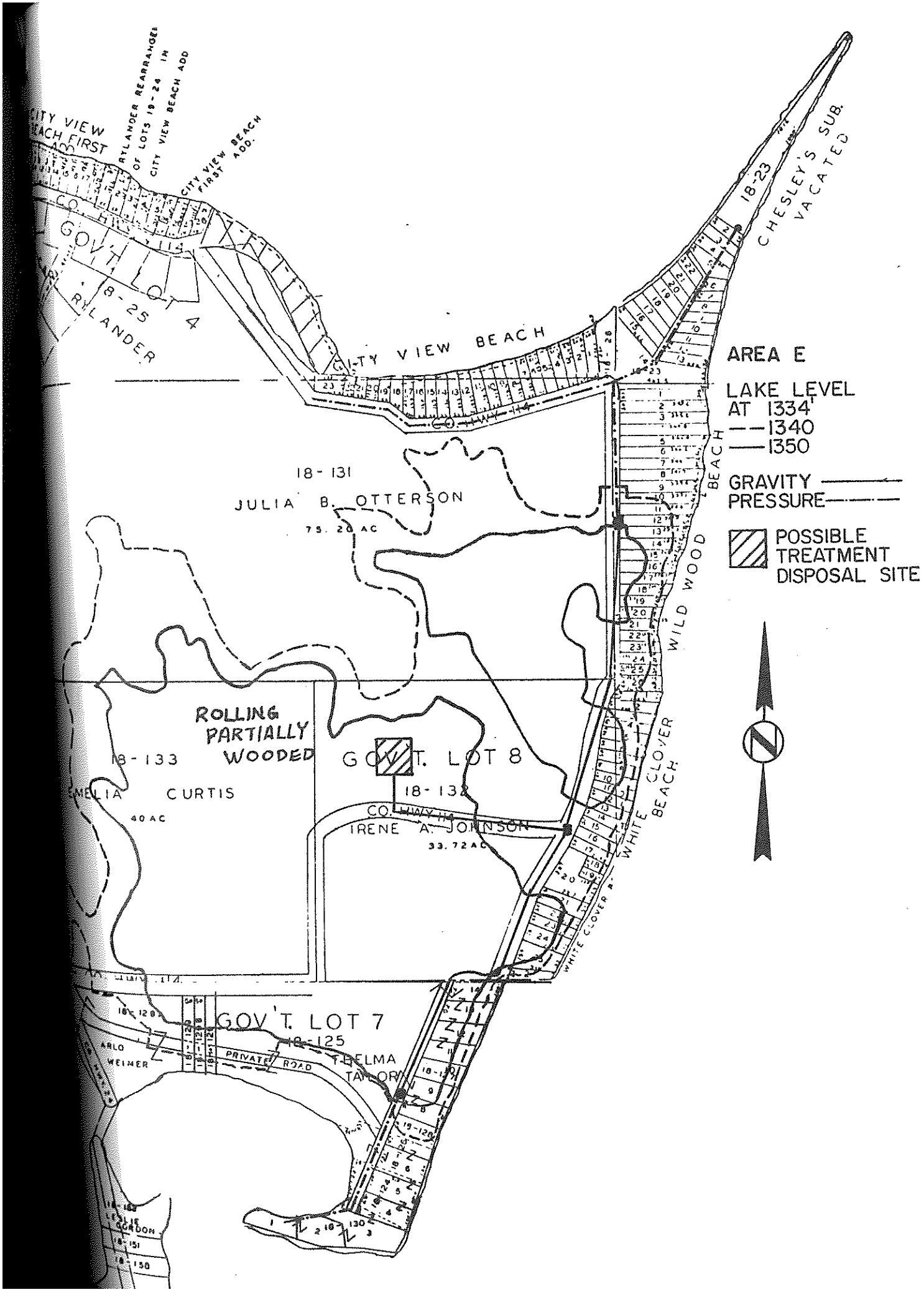
GRAVITY ————
PRESSURE —·—·—

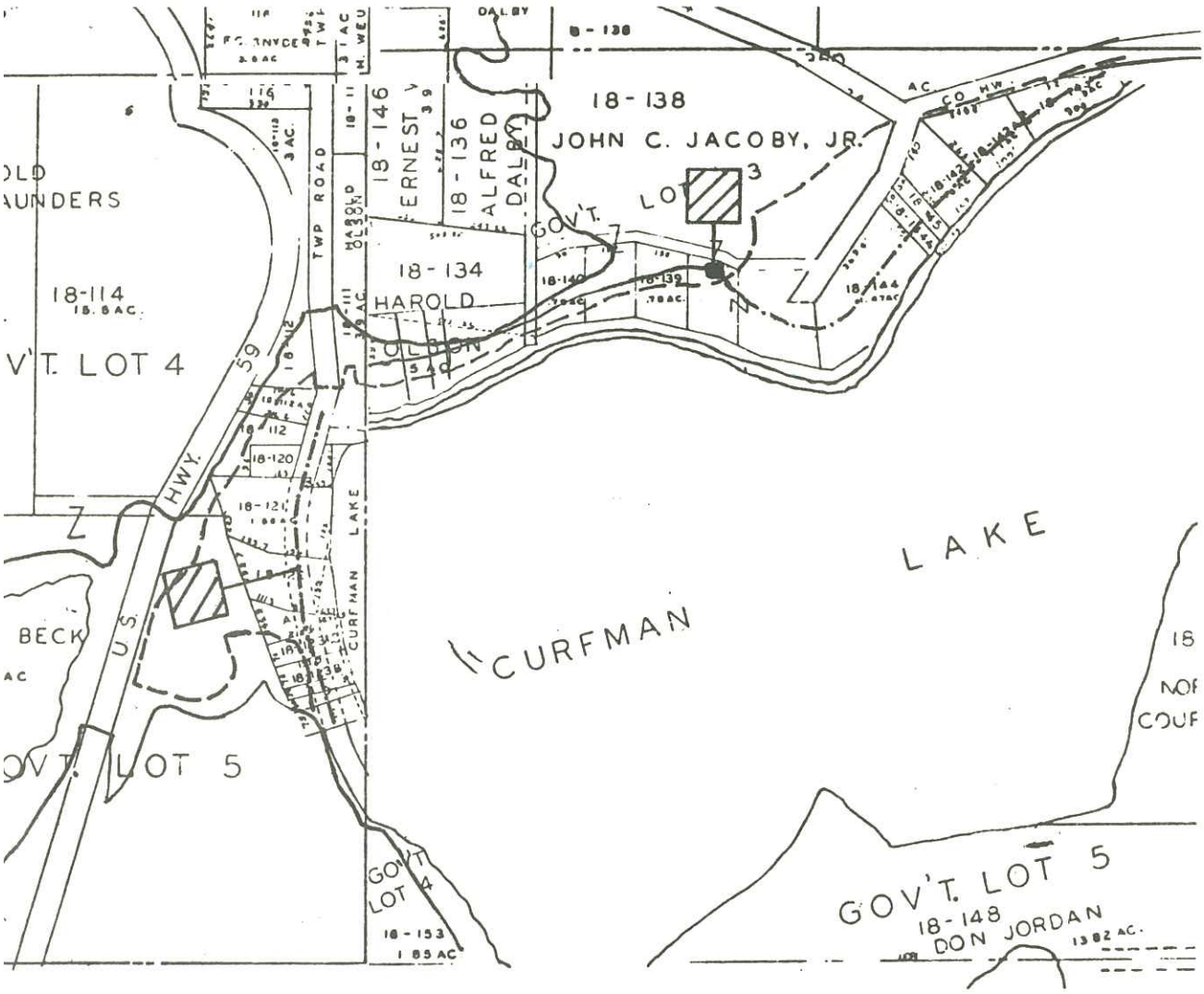
POSSIBLE
TREATMENT
DISPOSAL SITES



AREA D


LAKE ELEVATION
AT 1334'
——1340'
——1350'
GRAVITY ———
PRESSURE —·—·—
POSSIBLE
TREATMENT
DISPOSAL SITES
HOLCOMB
BEACH
18-182 A
18-182 A
HERBERT HOLCOMB
12.2 AC.
18-182C
18-182B
NASON BAY
HILL
GOV'T. LOT 2
GOV'T. LOT 1
18 - 182
HERBERT D. HOLCOMB
127 AC.
18 - 180 & 181
MARTHA S. BERGEN
100 AC.
GOV'T. LOT 4
GOV'T. LOT 3


CITY VIEW BEACH FIRST ADD.
RYLANDER REARRANGED OF LOTS 19-24 IN CITY VIEW BEACH ADD
CITY VIEW BEACH FIRST ADD.
CHESLEY'S SUB. VACATED
GOV'T LOT 4
18-25
RYLANDER
CITY VIEW BEACH
18-23
AREA E
LAKE LEVEL
AT 1334'
1340
1350
GRAVITY
PRESSURE
POSSIBLE
TREATMENT
DISPOSAL SITE
18-131
JULIA B. OTTERSON
75.20 AC
WILD WOOD BEACH
ROLLING
PARTIALLY
WOODED
18-133
GOV'T. LOT 8
18-132
CURTIS
40 AC
IRENE A. JOHNSON
33.72 AC
WHITE CLOVER BEACH
GOV'T. LOT 7
18-125
ARLO WEIMER
PRIVATE ROAD
THELMA TAYLOR
GORDON
18-151
18-150

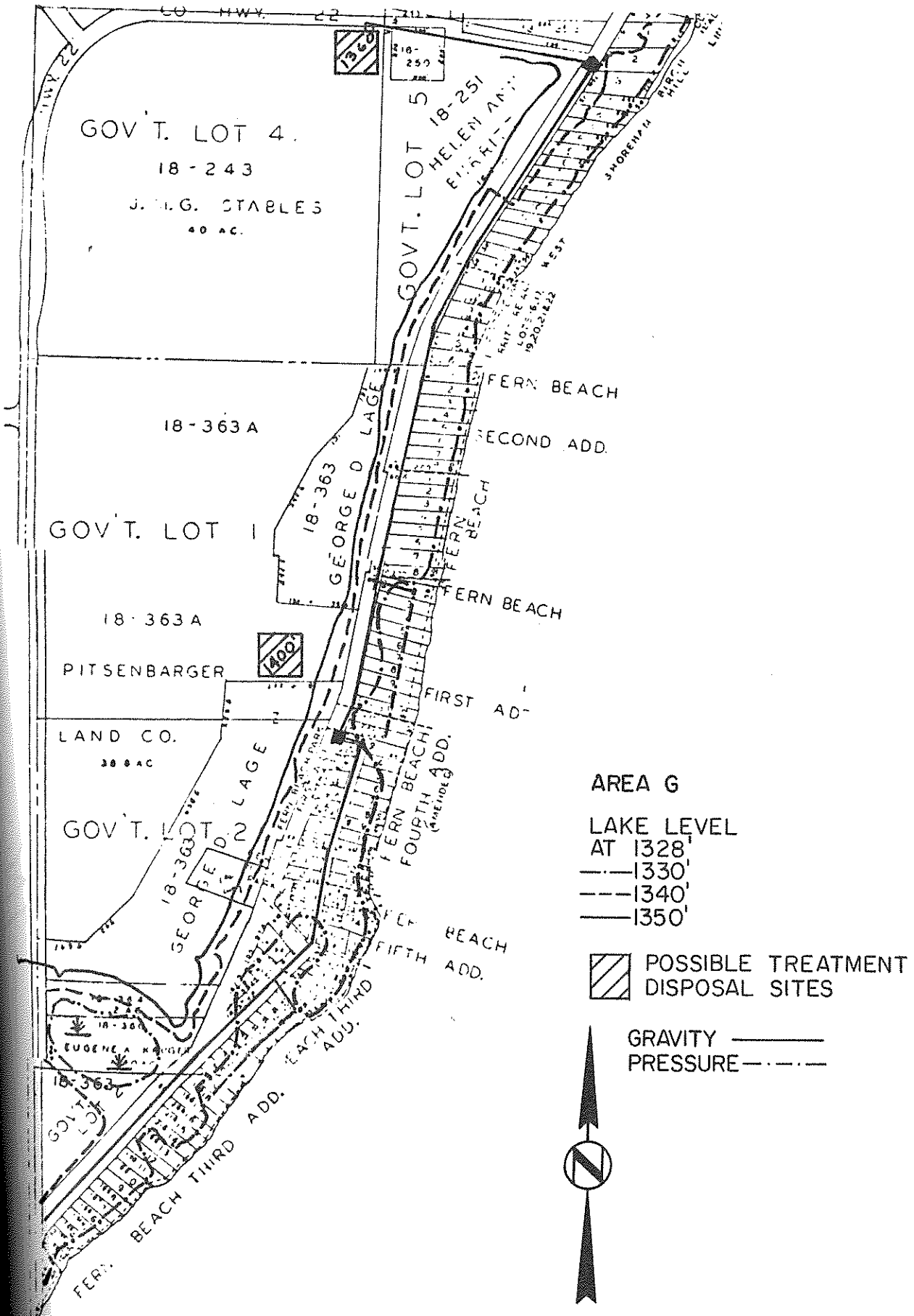


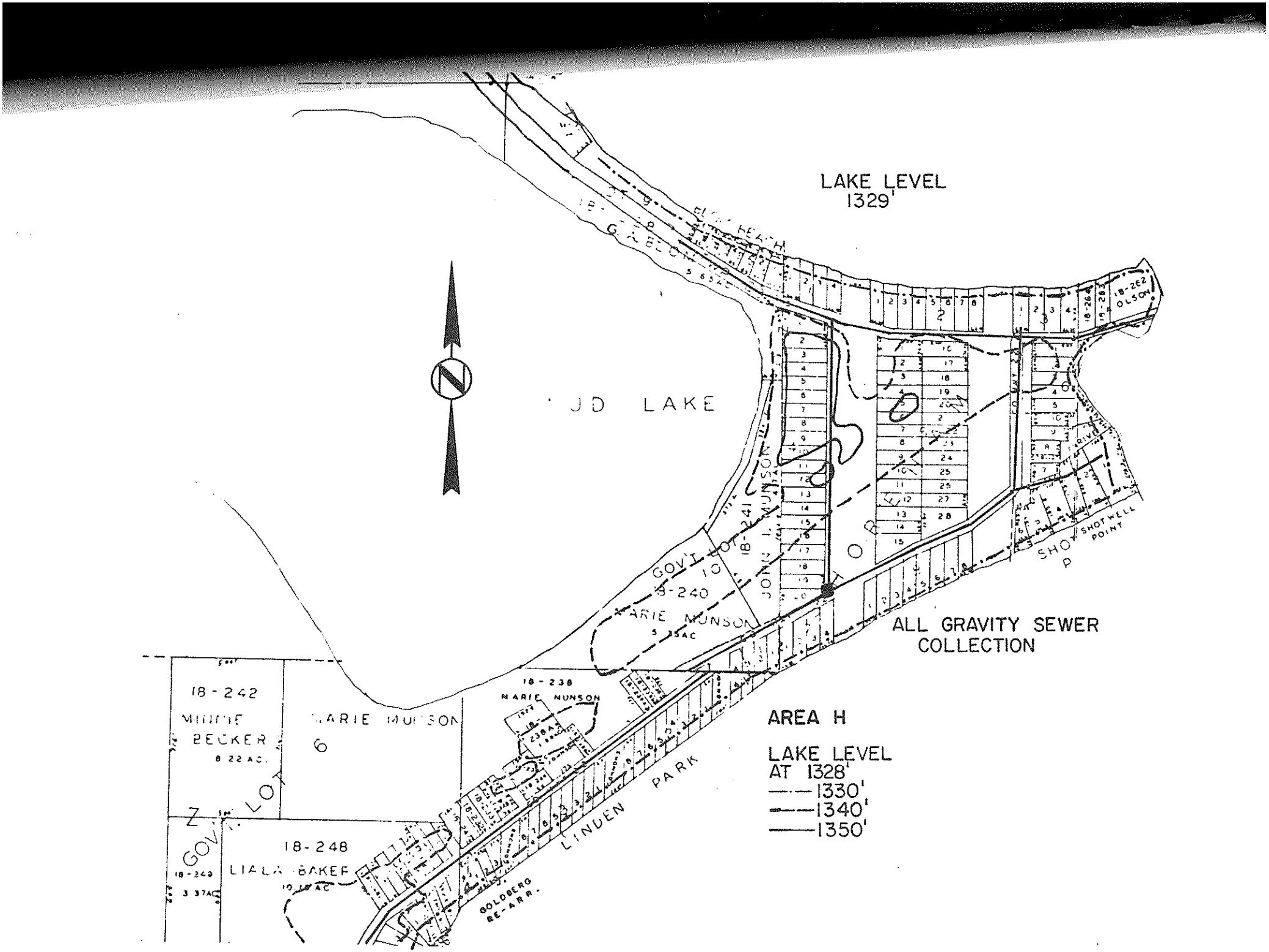
AREA F

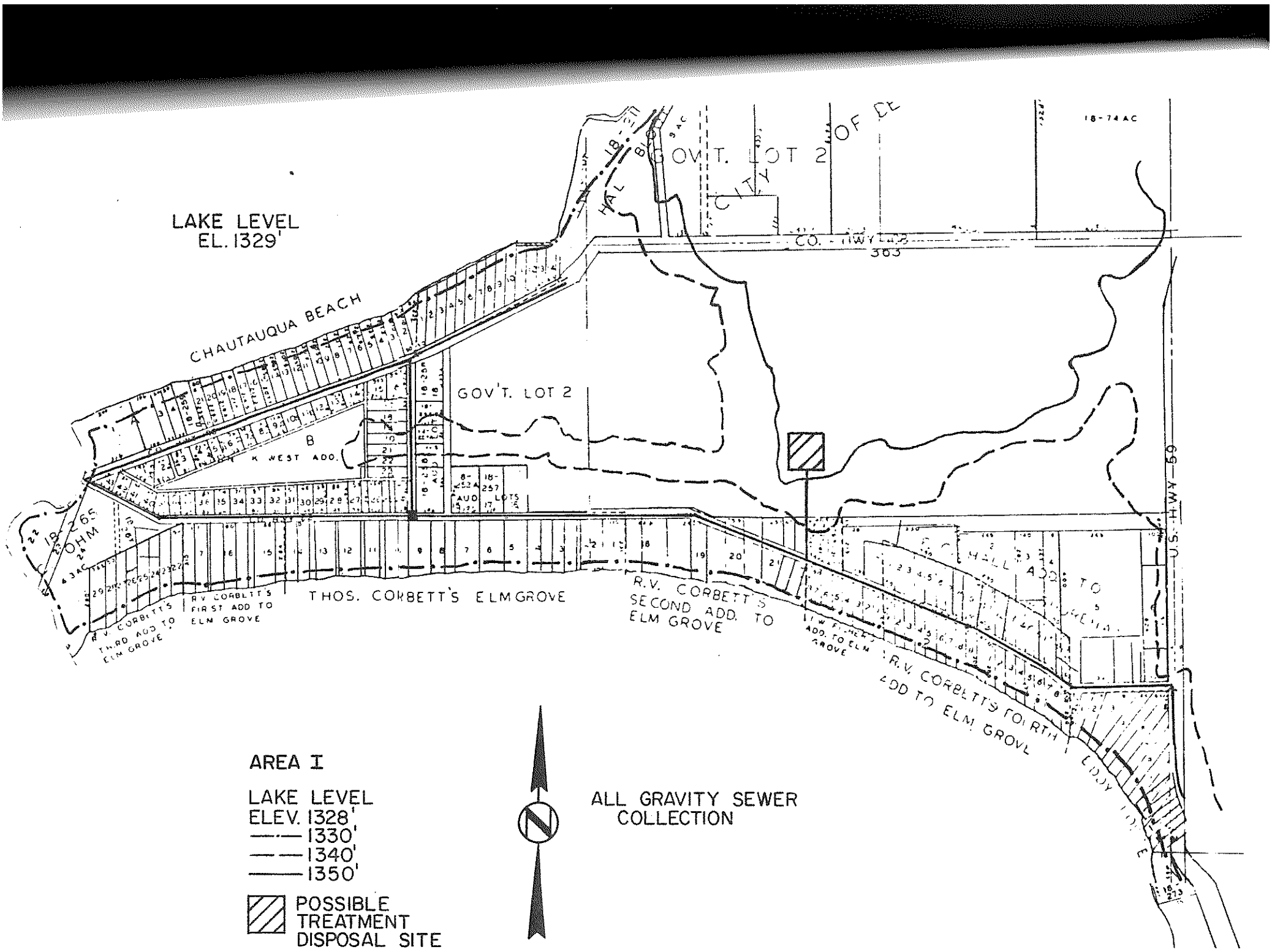
LAKE LEVEL
AT 1334'
——1340'
——1350'

GRAVITY ————
PRESSURE——·——

POSSIBLE
TREATMENT
DISPOSAL SITES


CO HWY. 22
HWY 22
GOV'T. LOT 4.
18-243
J. H. G. STABLES
40 AC.
GOV'T. LOT 5
18-251
HELEN AMY
EUGENIA
SHOREHAM
BIRCH HILL
WEST
18-363A
GEORGE D LAGE
FERN BEACH
SECOND ADD.
GOV'T. LOT 1
18-363A
PITSENBARGER
LAND CO.
38.8 AC
FIRST ADD.
FOURTH ADD.
GOV'T. LOT 2
18-363
GEORGE D LAGE
FIFTH ADD.
EUGENE A KNIGHT
GOV'T. LOT
FERN BEACH THIRD ADD.
EACH THIRD ADD.
1360
1400
18-250
AREA G
LAKE LEVEL
AT 1328'
1330'
1340'
1350'
POSSIBLE TREATMENT
DISPOSAL SITES
GRAVITY
PRESSURE


LAKE LEVEL
1329'
JD LAKE
ALL GRAVITY SEWER
COLLECTION
AREA H
LAKE LEVEL
AT 1328'
—·—1330'
—··—1340'
——1350'
LINDEN PARK
GOV'T LOT 6
GOV'T LOT 7
18-242
MARIE MUNSON
18-248
LIALA BAKER
18-238
MARIE MUNSON
18-240
MARIE MUNSON
18-241
JOHN L. MUNSON
18-262
OLSON
SHOTWELL POINT
GOLDBERG
RE-ARR.

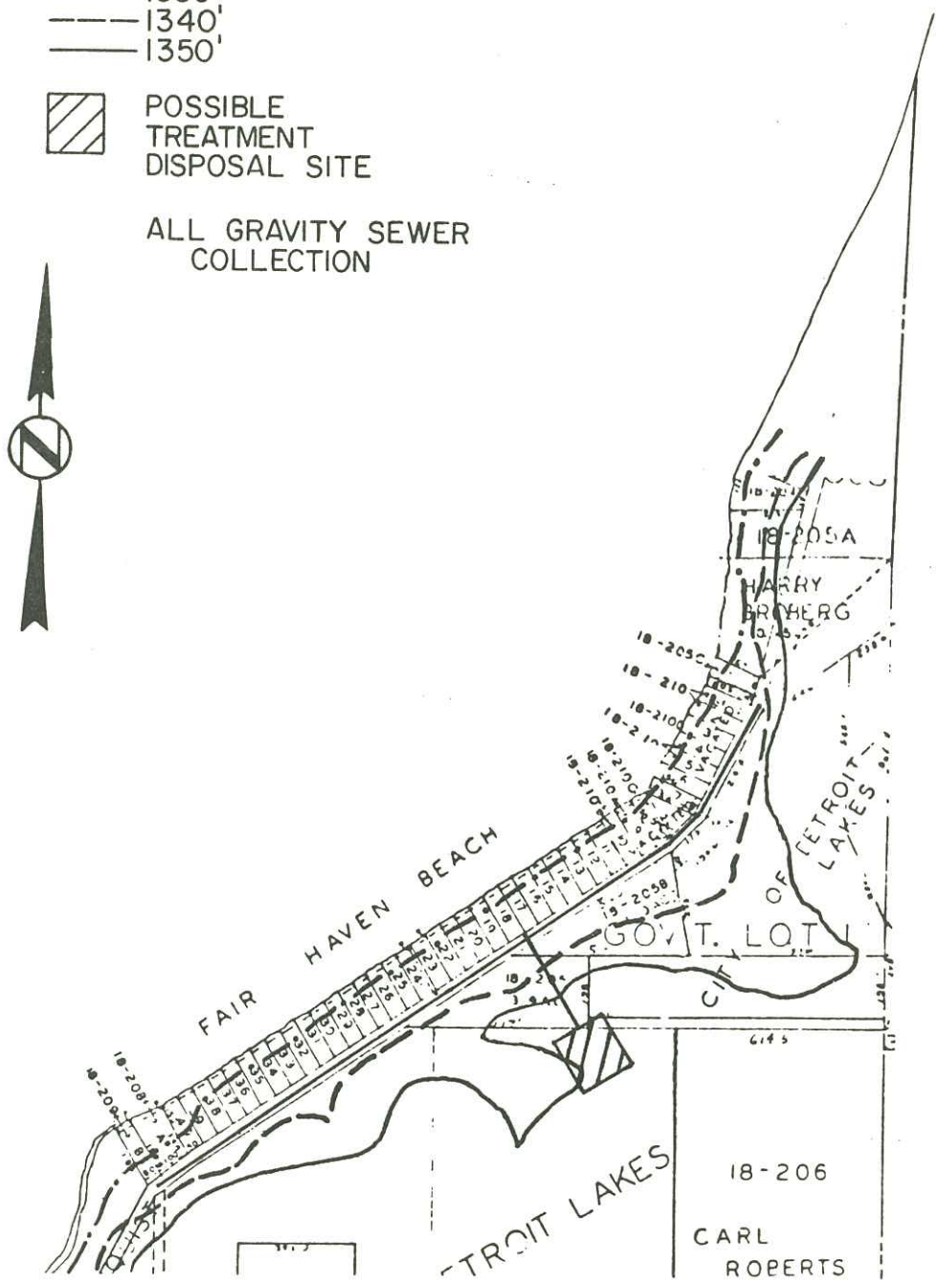

LAKE LEVEL
EL. 1329'
CHAUTAUQUA BEACH
GOV'T. LOT 2
GOV'T. LOT 2 OF CITY
CO. HWY 363
U.S. HWY 59
THOS. CORBETT'S ELMGROVE
R.V. CORBETT'S SECOND ADD. TO ELM GROVE
R.V. CORBETT'S FIRST ADD TO ELM GROVE
R.V. CORBETT'S THIRD ADD TO ELM GROVE
R.V. CORBETT'S FOURTH ADD TO ELM GROVE
AREA I
LAKE LEVEL
ELEV. 1328'
1330'
1340'
1350'
POSSIBLE TREATMENT DISPOSAL SITE
ALL GRAVITY SEWER COLLECTION

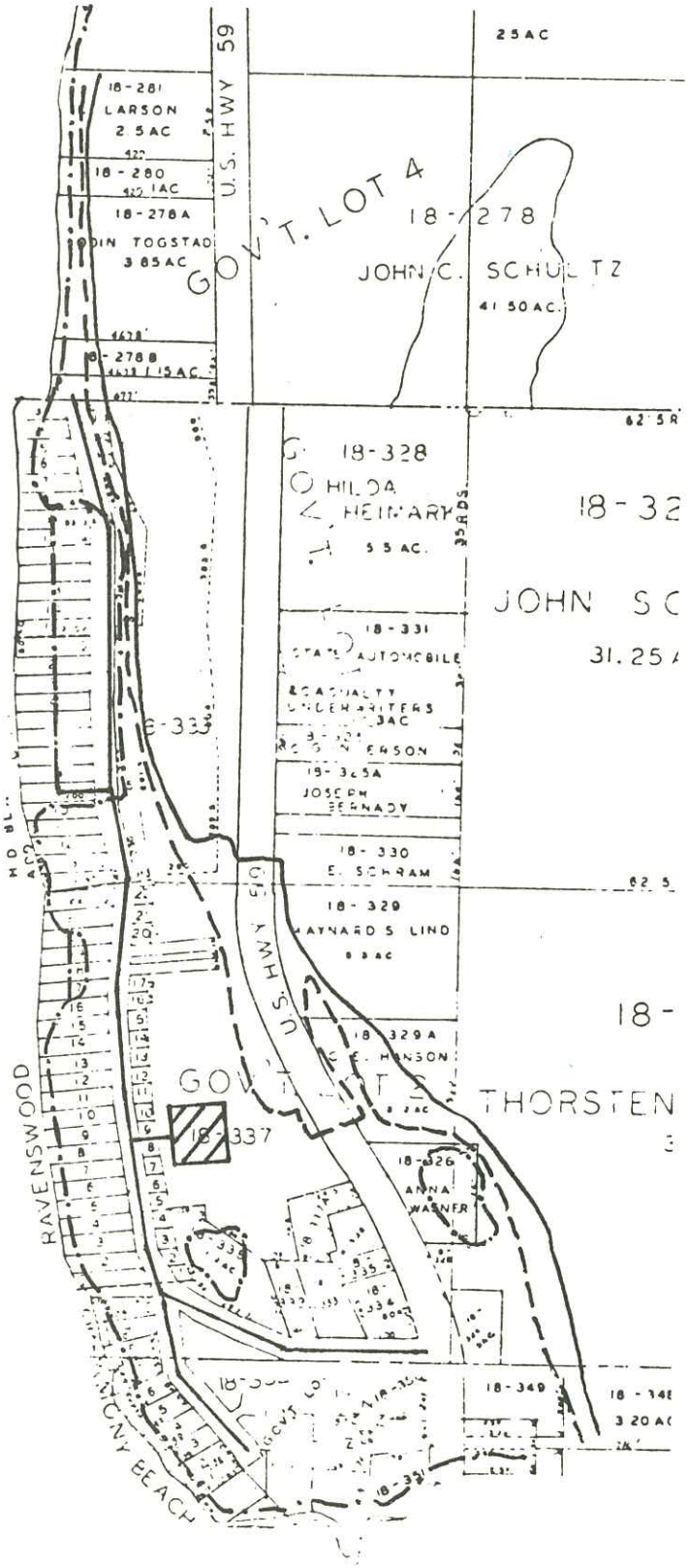
AREA J

LAKE LEVEL
ELEV. 1329'
—·— 1330'
— — — 1340'
——— 1350'

POSSIBLE
TREATMENT
DISPOSAL SITE

ALL GRAVITY SEWER
COLLECTION





AREA K

LAKE LEVEL
ELEV. 1328'
—·— 1330'
— — — 1340'
——— 1350'

GRAVITY —·—·—
PRESSURE ———

POSSIBLE
TREATMENT
DISPOSAL SITE

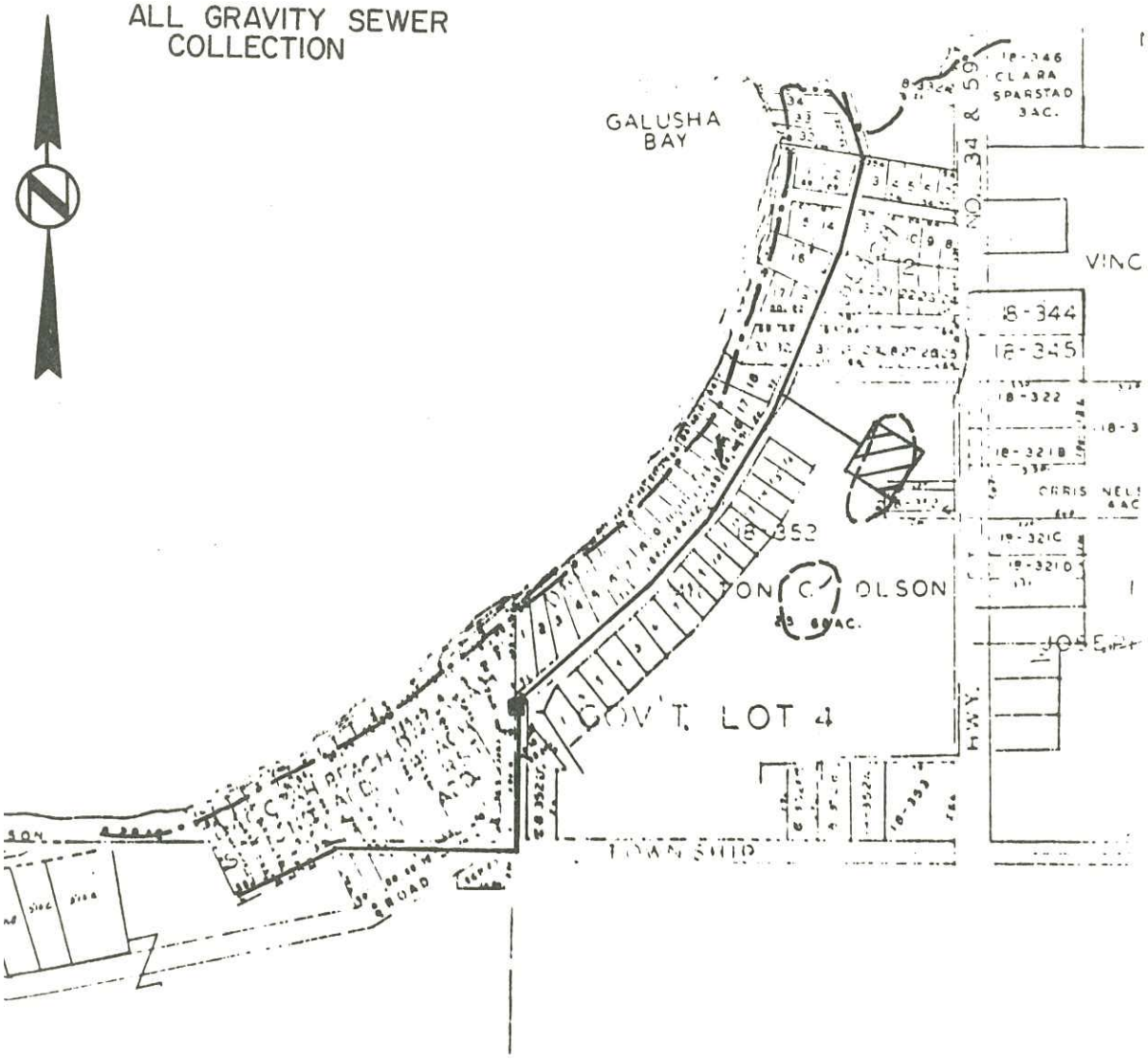


AREA L

LAKE LEVEL
ELEV. 1328'
—·— 1330'
— — — 1340'

POSSIBLE
TREATMENT
DISPOSAL SITE

ALL GRAVITY SEWER
COLLECTION



APPENDIX F

Feasible Alternative Detailed Costs

APPENDIX F

SELECTED PLAN DETAILED COST
STABILIZATION PONDS AND IRRIGATION

A. COLLECTION SYSTEM

ITEM	AMOUNT	UNIT PRICE	TOTAL ($1000)	20 YEAR SALVAGE ($1000)	10 YEAR MECH. REPLACEMENT ($1000)
8" Gravity Sewer	75,900 LF	12.50/LF	948.8	474.4	-----
Dewatering	37,950 LF	6.50/LF	246.7	123.4	-----
8" Forcemain	22,500 LF	10.50/LF	236.3	78.8	-----
6" Forcemain	33,400 LF	9.00/LF	300.6	100.2	-----
Lift Stations	17	30,000/EA	510.0	170.0	127.5
Manholes	253	750/EA	189.8	94.9	-----
Air Release MH	25	850/EA	21.3	10.6	1.6
Main Lifts	2	50,000/EA	100.0	33.3	25.0
Pave. Rest.	25,300 LF	$5/LF	126.5	----	-----
SUBTOTAL			2680.0	1085.6	154.1

TREATMENT SYSTEM

M	AMOUNT	UNIT PRICE	TOTAL ($1000)	20 YEAR SALVAGE ($1000)	10 YEAR MECH REPLACEMENT ($1000)
non Excavation	72,000 CY	$1.00/CY	72.0	36.0	-----
e Construction	74,000 CY	1.00/CY	74.0	37.0	-----
e Riprap	10,710 TON	10.00/TON	107.1	53.6	-----
l Seal	1,081,270 SF	0.25/SF	270.0	11.1	-----
trol & Piping	-----	-----	57.8	28.9	-----
ing	4,660 LF	3.00/LF	14.0	7.0	-----
oil, Seed	6.8 AC	1500.00/AC	10.2	5.1	-----
. Site	45 AC	500.00/AC	22.3	11.3	-----
ible Relocate dent	1	50,000.00	50.0	----	-----
SUBTOTAL			627.4	190.0	0.0

DISPOSAL SYSTEM

orcemain	4,500 LF	$900/LF	41.0	13.7	----
gation Equipment		30,000	30.0	----	5.0
Station & Chlorination		25,000	25.0	----	10.0
allation		10,000	10.0	----	1.3
SUBTOTAL			106.0	13.7	16.3

STABILIZATION PONDS
AND LAND IRRIGATION
-COST SUMMARY-

	COST ($1000)	20 YEAR SALVAGE ($1000)	10 YR. MECH. REPLACEMENT ($1000)
A. Collection System	2680.0	1085.6	154.1
B. Treatment System	527.4	190.0	-----
C. Disposal System	106.0	13.7	16.3
Subtotal	3413.4	1289.3	170.4
Engineering Contingencies @ 20%	682.7	257.0	34.1
Interest During Const. @ 6-5/8%	226.1	85.4	11.3
Construction Subtotal	4322.2	1632.6	215.8
Replace Mechanical in 10 Yrs 215.8 x 0.5265*	+113.6		
20 Year Salvage Value 1632.6x 0.2772**	-452.6		
Land 125 Acres at $500/AC	+ 62.5		
Land Salvage 62.5x 0.2772**	- 17.3		
Operation & Maintenance $15,500/Yr x 10.910***	+169.1		

COST EFFECTIVE ANALYSIS TOTAL 4.198 MILLION DOLLARS

* 10 year present worth factor at 6-5/8%

** 20 year present worth factor at 6-5/8%

*** Present worth of a uniform series factor at 6-5/8%

INDIVIDUAL TANKS AND CLUSTER DRAINFIELD
DETAILED COSTS

ITEM	AMOUNT	UNIT PRICE	TOTAL $1000	20 YEAR SALVAGE $1000	10 YEAR MECH. REPLACE
5" Gravity Sewer	51,000 LF	$11.50	586.5	293.3	---
5" Pressure Pipe	14,230 LF	9.00	128.1	42.7	---
5" Forcemain	5,105 LF	9.00	45.9	15.3	---
Dewater Pipe 1/2 Grav. Length	25,500 LF	6.50	165.8	82.9	---
Septic Tanks	914	750/EA	685.5	228.5	---
Gravity MH (Assume 300')	170	750/EA	127.5	63.8	---
Air Release MH (Assume 1000')	20	850/EA	17.0	8.5	1.3
Individual Pumps	160	1000/EA	160.0	0	40.0
Pump Station	16	30K/EA	480.0	160	120.0
3 Drainfields	396.2 KSF	5/SF	1981.0	0	---
Truck Garage, Misc.	30 Truck 40 Garage 20 Misc.	90K	90.0	0	40.0
Save Restoration	25,000 LF	5.00	127.5	0	---
Prepare Ordinance	985	10/Dwell.	9.9	0	---
			4604.7	895	201.3
Eng., Cont. @ 20%			920.9	179	40.3
Cost Int @ 6-5/8%			305.1	59.3	13.3
			5830.7	1133.3	254.9
Replace Mech. 254.9 x .5265*			+ 134.2		
Salvage 1133.3 x .2772**			- 314.2		
Land 16.2 ACre at $10,000/AC			+ 162.0		
Land Salvage 162.0 x .2772			- 44.9		
O & M 45.8K/Yr x 10.910			+ 499.7		
COST EFFECTIVE ANALYSIS TOTAL			6267.5		

*, ** - See Page 3

WSR

JOINT TREATMENT WITH CITY OF DETROIT LAKES
DETAILED COSTS

M	AMOUNT	UNIT PRICE $1000	TOTAL $1000	20 YEAR SALVAGE $1000	10 YEAR MECH REPLACE $1000
lection System					
m "A" Selected Plan					
ailed Costs	---	---	2680.0	1085.6	154.1
itional 8"					
cemain	3900 LF	$10.50/LF	41.0	13.7	---
rade D.L. Plant					
logical Treatment	3	58.3	175.0	20.0	2.0
al Clarifier	1	30.0	30.0	5.0	3.0
robic Digester	1	95.0	95.0	10.0	15.0
ids Contact Unit	1	69.0	69.0	5.0	7.0
tiary Filter	1	53.0	53.0	5.0	20.0
igation Equipment	---	92.0	92.0	---	5.0
. Piping, Pumping					
it Modifications	---	86.0	86.0	15.0	8.8
trical Modification		29.0	29.0	5.0	2.5
t. Plant Debt					
rement		6.0	6.0	---	---
e of Tertiary Plant		40.0	40.0	6.0	---
e of Interceptor					
r Debt Service		11.0	11.0	---	---
e of Industrial Park					
nitary Sewer District		3.0	3.0	---	---
			3410.0	1170.3	217.4
Eng., Cont. @ 20%			682.0	234.0	43.5
Const. Interest @ 6-5/8%			225.9	77.5	14.4
First Capital Cost			4317.9	1481.5	275.3
Replace Mech. 275.3 x 5265*			145.0		
Salvage 1481.5 x .2772**			- 410.7		
Operation & Maintenance 24,050 x 10.910***			262.5		
COST EFFECTIVE ANALYSIS TOTAL			4314.6		

*, **, *** - See Page 3

WSR

STABILIZATION PONDS AND INTERMITTENT DISCHARGE
DETAILED COSTS

	AMOUNT	UNIT PRICE $1000	TOTAL $1000	20 YEAR SALVAGE $2000	10 YEAR MECH. REPLACE
ection System "A" Selected Plan iled Costs			2680.0	1085.6	154.1
Treatment System "B" Selected Plan iled Costs			627.4	190.0	0.0
tivator Clarifier	1	80.0	80.0	10.0	10.0
iary Filters	3	90.0	270.0	45.0	90.0
·ination Tank	1	13.0	13.0	3.5	3.0
ıy Sludge Storage	1	20.0	20.0	10.0	----
Storage and ·ibution	1	15.0	15.0	5.0	3.0
	2000 LF	$18/LF	36.0	18.0	----
:llaneous Pumps, ıg, Sludge Truck, ·ols	---	---	101.0	10.0	81.0
			3842.4	1377.1	341.1
Eng., Cont. at 20%			768.5	275.4	68.2
Const. Interest @ 6-5/8%			254.6	91.2	22.6
			4865.5	1743.7	431.9
Replace Mech. 431.9 x .5265*			+ 227.4		
Salvage P.W. 1743.7 x .2772**			- 483.4		
Land 50 Acres @ $500/AC			+ 25.0		
Land Salvage P.W. 25 x .2772**			- 6.9		
Operation & Maintenace 35.8 x 10.910***			+ 390.6		
COST EFFECTIVE ANALYSIS TOTAL			5018.2		

*, ** - See Page 3

MECHANICAL TREATMENT

DETAILED COSTS

ITEM	AMOUNT	UNIT PRICE $1000	TOTAL $1000	20 YEAR SALVAGE $1000	10 YEAR MECH. REPLACE $1000
Collection System Item "A" Selected Plan Detailed Costs			2680.0	1085.6	154.1
Preliminary Treatment	1	22.0	22.0	4.0	7.0
Extended Aeration	1	117.0	117.0	42.0	16.0
Final Clarifiers	1	78.0	78.0	14.0	----
Tertiary Filters	1	90.0	90.0	15.0	30.0
Chlorination Tank	1	13.0	13.0	3.5	3.0
Sludge Storage	1	50.0	50.0	25.0	----
Alum. Storage and Distribution	1	7.0	7.0	2.0	2.0
Outfall - 12"	2000 LF	$18/LF	36.0	18.0	----
Misc. Pumps, Piping, Sludge Truck, Controls	---	---	106.0	12.5	81.0
Plant Building	9800 LF	$25/SF	245.0	122.5	----
			3444.0	1344.1	293.1
Eng., Cont. at 20%			688.8	268.8	58.6
Const. Int. at 6-5/8%			228.2	89.1	19.4
			4361.0	1702.0	371.1
Replace Mech. 371.1 x .5265*			+ 195.4		
Salvage P.W. 1702.0 x .2772**			- 471.8		
Land 5 Ac @ $500/Ac			+ 2.5		
Land Salvage 2.5 x .2772**			- 0.7		
Operation & Maintenance 73.9 x 10.910***			+ 806.3		
COST EFFECTIVE ANALYSIS TOTAL			4892.7		

*, **, *** - See Page 3

APPENDIX G

Planning Participation and Coordination

STATE OF MINNESOTA

STATE PLANNING AGENCY
100 CAPITOL SQUARE BUILDING
550 CEDAR STREET
ST. PAUL, 55101

October 6, 1975

Mr. David O. Husby, P.E.
Rieke Carroll Muller Assoc., Inc.
1011 First Street South
Hopkins, Minnesota 55343

RE: Lakeview Township Waste Treatment Facility Step I
SCH # 75100609

Dear Mr. Husby:

This is to certify that the Minnesota State Planning Agency has in accordance with the Project Notification and Review System (PNRS) procedures, established by the Office of Management and Budget Circular A-95, reviewed the Lakeview Township Waste Treatment Facility Step I proposal noted above. State agencies which may be interested in or affected by this proposal have been notified by our office.

This letter represents the final action of the State Planning Agency's review of the proposal in its performance of the function as the State Clearinghouse under the PNRS procedures. Lakeview Township is, therefore, authorized to submit its application without further notice or review by this agency. A copy of this letter should be attached to said application.

Sincerely,

Thomas H. Harren
State Clearinghouse

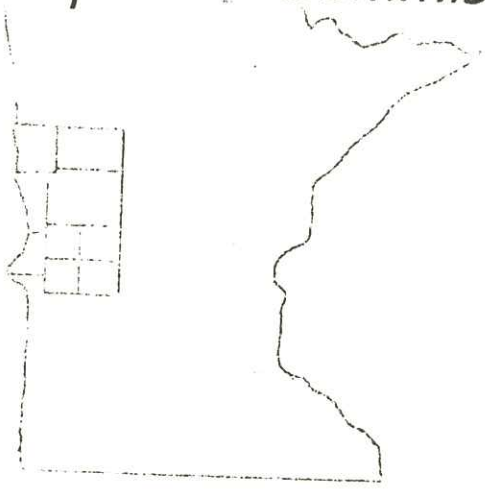
THH:lw

RECEIVED
OCT 8 1975
Rieke-Carroll-Muller Associates Inc.
Box 130 Hopkins, Minn. 55343

West Central Regional Development Commission

Fergus Falls Community College
Administration Building

Fergus Falls, Minnesota 56537
Phone: 218-739-3356



October 2, 1975

Mr. Wayne Ruona
Rural Route
Detroit Lakes
Minnesota 56501

Subject: A-95 Review Update of Lakeview Township Sewer Project

Dear Mr. Ruona:

The West Central Regional Development Commission originally approved the Lakeview Township Sewer Project in January of 1974.

The purpose of this letter is to re-affirm the approval of the West Central Regional Commission on the Lakeview Township Sewer Project.

Sincerely,

Keith Zarling

Keith Zarling, Chairman

Curtis S. Carlson

Curtis S. Carlson, Regional Planner

KZ/CC/nw

RECEIVED
OCT 7 1975
Rieke-Carroll-Muller Associates Inc.
Box 130 Hopkins, Minn. 55343

STAT OF MINNESOTA
DEPARTMENT OF NATURAL RESOURCES

Route 5, Box 41A
Bemidji, MN 56601

June 15, 1976

RECEIVED
JUN 16 1976
Rieke-Carroll-Muller Associates Inc.
Box 130 Hopkins, Minn. 5534

Dale Watson
RIEKE CARROL MULLER ASSOCIATES, INC.
Post Office Box 130
Hopkins, MN 55343

Dear Mr. Watson:

Your request for information from the Department of Natural Resources pertaining to a proposed wastewater collection and treatment facility was forwarded to this office for a reply.

The proposal was reviewed by our hydrologist and wildlife manager and the following comments are submitted.

1. There are no designated wetlands or wildlife areas or parks in the project area. There is a natural dedicated area known as Shoreham Commons between Lakes Sally and Mellissa. It appears this may be within the project area. If so, it should be protected from damaging changes. The Pelican River and Sucker Creek are also within the project area and should be protected from adverse changes. Because Nottage Lake is quite close to the proposed lagoon site, careful planning and protective considerations should be provided.

2. No known threatened or endangered species of plants or animal life exists in the planning area.

3. No adverse plant or animal life effects are foreseen due to this project, based on knowledge or information available to me.

4. If the course, current or cross-section of any public water will be changed by the construction of this project, the necessary permits should be requested from this department.

If further comments are needed, please feel free to contact this office at any time.

Sincerely yours,

Merlyn L. Wesloh
Regional Administrator

MLW:jf cc: V. Hagen

ovember 23, 1976

A special meeting of the Public Utilities Commission was called to order in he office of the Clerk-Treasurer at 1:00 P. M. Tuesday, November 23, 1976, all embers of the Commission and the Committee of the Council having been duly otified of the meeting and the business to be transacted.

Present: Commissioners Amos R. Anderson, George H. Legler, and Lyndon A. Higdem; Public Utilities Superintendent Kenneth E. DeVillers; Mayor Kent M. Freeman; and Deputy Clerk-Treasurer Ina G. Haugen.

Absent: Aldermen: Arnold A. Porkkonen, Kenneth M. Mickelberg, and John Hoeglund, members of the Public Utilities Committee of the Council; and Clerk-Treasurer Wayne Lance.

The meeting was called to order by President Anderson, who then called upon uperintendent DeVillers for a report on the design capacities of the waste ater treatment plant facilities. Superintendent DeVillers advised the ommission that the primary treatment plant had a design capacity of 1.5 million allons per day, or 1,042 gallons per minute, while the chemical precipitation lant had a design capacity of 1.44 million gallons per day, or 1,000 gallons per inute. Superintendent DeVillers also advised the Commission that during 1975, he average flow was 38 million gallons per month, or 1.27 million gallons per ay. During this period of time, the high month flow was recorded in July, when 9.322 million gallons, or 1.64 million gallons per day were processed through he waste water treatment plant. Up to the present time, for the year 1976, the average flow was 32 million gallons per month, or 1.07 million gallons per ay. During this period of time, the high month flow was recorded in August, hen 36,836,500 gallons per month, or 1.23 million gallons per day were processed hrough the plant. Considerable discussion followed the information that had een presented by Superintendent DeVillers. Upon inquiry, Superintendent eVillers advised the Commission that the present waste water treatment facilities ould handle the waste water from around Big and Little Detroit Lakes, but that he plant capacity would not be adequate to handle the waste water for all of ake View Township.

The Commission was advised that several communities process waste water for reas outside their municipal limits. This is sometimes accomplished by creating hat is known as a sanitary sewer district to serve a specific area.

The motion was made by President Anderson, seconded by Commissioner Higdem nd unanimously carried to recommend to the City Council that the present policy of not accepting requests for extension of sanitary sewer and water main outside the city limits be continued. Water & Sewage would be provided if area was annexed to city. This would be on a Piecemeal basis.

The business for which the meeting was called having been completed, resident Anderson declared the meeting adjourned. (1:42 P. M.)

Respectfully submitted,

PUBLIC UTILITIES COMMISSION

By: Amos R. Anderson
By: George H. Legler
By: Lyndon A. Higdem

By: _____
Ina G. Haugen



MINNESOTA HISTORICAL SOCIETY

690 Cedar Street, St. Paul, Minnesota 55101 • 612-296-2747

14 May 1976

Mr. Dale A. Watson
RIEKE CARROLL MULLER ASSOCIATES, INC.
Post Office Box 130
Hopkins, Minnesota 55343

Dear Mr. Watson:

RE: LAKEVIEW TOWNSHIP WASTEWATER FACILITY PLAN
RCM FILE NO. 751028
Becker County

The project described above has been reviewed pursuant to responsibilities given the State Historic Preservation Officer by the National Historic Preservation Act of 1966 and the Procedures of the National Advisory Council on Historic Preservation (36CFR800)

Considerable attention has been given this application by both the Survey and Planning and the Archaeology sections of the Minnesota Historical Society. The Survey and Planning section believes because there are no recorded historic sites in the area that the proposed project will have no effect upon structures of historic significance.

The Arcaheology section, however, believes that the proposal area possesses considerable potential as an archaeological site. Therefore, the Minnesota Historical Society requests that prior to construction an archaeological survey be prepared of the site. Such a survey may be performed by any of the archaeologists whose names appear on the appended sheet. Questions about such a survey, should they arise, may be directed to Mr. Edward Lofstrom, Survey Archaeologist for the Minnesota Historical Society. 726-1630

Your continued attention to historic and archaeological values in the review and construction process will be appreciated.

Sincerely,

Russell W. Fridley
State Historic Preservation Officer

RWF/fr
Encl.

RECEIVED
MAY 18 1976
Rieke-Carroll-Muller Associates Inc.
Box 130 Hopkins, Minn. 55343

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G. Joseph Hudak
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Dr. Elden Johnson
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University of Minnesota
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255-0121 info

Richard Lane
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Jan Streiff
Environmental Branch
U.S. Army Corps of Engineers
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(612) 725-5935

Richard Strachan
Department of Sociology
Mankato State College
Mankato, Minnesota 56001

Alan Woolworth
Minnesota Historical Society
Building 27, Fort Snelling
St. Paul, Minnesota 55111
(612) 726-1630

Larry J. Zimmerman
Dept of Sociology & Anthropology
Univ. of South Dakota
Vermillion, S.D. 57069

MOORHEAD STATE COLLEGE MOORHEAD, MINNESOTA 56560

ANTHROPOLOGY PROGRAM

Aug. 13, 1976

Rieke, Carroll and Muller
P.O. Box 130
Hopkins, MN. 55343

Dear Sirs,

This letter is a response to an inquiry made by Mr. Dale Watson on Aug. 10 concerning an archaeological survey of a proposed construction site in Becker Co. MN., south of Detroit Lakes. I am willing to complete the necessary archaeological work for you, although if it is to be done after Sept. 5, I will have to do the survey on a weekend to avoid conflict with my teaching responsibilities.

Surveys such as this are usually conducted in two parts.
1. An on site inspection which involves a visual examination of the ground, especially where it has been disturbe d by plowing or erosion, to determine whether artifacts are present. Also, the excavation and screening of a number of test units, in order to discover whether or not there are below surface materials.
2. Historical background research, which entails checking local historical records, old Plat maps, etc., to insure that no Euro-American or historic Indians left significant remains on the site.

Following the research and actual survey, I will write a report indicating what effect proposed construction would have on any archaeological resources.

The cost of such a survey varies somewhat depending on the amount of time involved. I would estimate that considering the size of the site(about 25 acres), the total cost to you, covering my fees and expenses, would be approximately $200.

I will be happy to inform you more fully of the nature of this work if you wish. Hopefully, this letter serves to answer some of the more obvious questions.

Respectfully Yours,

Michael G. Michlovic

Michael G. Michlovic
Asst. Professor, Anthropology
Moorhead State University
Moorhead, MN. 56560
Tel. (218) 236-2632

RECEIVED
AUG 16 1976
Rieke-Carroll-Muller Associates Inc.
Box 130 Hopkins, Minn. 55343