# Linn Sanitary District

## Facilities Planning Report

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**Prepared by:**

**Baxter & Woodman, Inc.**
**Consulting Engineers**
**256 South Pine Street**
**Burlington, Wisconsin**
**262.763.7834**

BAXTER WOODMAN
*Consulting Engineers*

Linn Sanitary District
Facilities Planning Report

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## EXECUTIVE SUMMARY

The Linn Sanitary District is located in Walworth County in southeastern Wisconsin. The District encompasses an area of more than 4,000 acres of unincorporated Linn Township surrounding Geneva Lake. The current year-round population of the District is approximately 1,700 people, which increases to nearly 4,600 during the recreationally active spring and summer seasons. The year-round population is projected to increase to 2,400 by the year 2020. The seasonal population is expected to increase to nearly 5,300.

Wastewater treatment and disposal is currently provided by on-site systems. The District has experienced continuing problems with failing septic systems in specific areas characterized by small lot sizes, poorly drained soils, steep slopes, and high groundwater conditions. Continued reliance on the existing on-site systems within these problem areas will result in additional septic system failures, degradation of groundwater quality, and deterioration of water quality in Geneva Lake. This report evaluates alternatives to continued reliance upon the on-site systems.

The District has held several meetings with representatives of adjacent communities to discuss the possibility of connecting the problematic areas to the existing Regional WWTP's in the area. It currently appears that connection of the problem areas north of Geneva Lake to the existing WALCOMET WWTP will be feasible. Discussions with Lake Geneva, Fontana and Walworth related to connecting the problematic areas south of Geneva Lake to their existing treatment plants have to date been unsuccessful.

The following alternatives were selected for inclusion in our cost-effectiveness analysis:

**Alternative I** – Installation of Individual Holding Tanks
**Alternative IIA** – Treatment at Existing Regional WWTP's
**Alternative IIB** – Treatment at New Decentralized WWTP's
**Alternative IIC** – Treatment at a New Regional WWTP
**Alternative IID** – Pumping to Community Holding Tanks

Our opinion of probable costs for each alternative, when applied on a planning-area wide basis, are summarized as follows:

**Opinion of Probable Cost ($1,000,000)**

| | Alternative I | Alternative IIA | Alternative IIB | Alternative IIC | Alternative IID |
|---|---|---|---|---|---|
| Capital Cost | $9.3 | $25.0 | $30.3 | $31.7 | $28.0 |
| Present Worth of Salvage Value | ($1.0) | ($2.1) | ($2.7) | ($2.7) | ($2.5) |
| Present Worth of O&M | $32.9 | $6.2 | $6.0 | $6.0 | $13.8 |
| Total Present Worth Cost | $41.2 | $29.1 | $33.6 | $35.0 | $39.3 |
| Number of Homes | 1636 | 1292 | 1292 | 1292 | 1292 |
| **Present Worth Cost per Home** | **$25,200** | **$22,500** | **$26,000** | **$27,100** | **$30,400** |

Alternative I addresses wastewater treatment and disposal needs on an individual house by house basis. The District must adopt and enforce a rigorous inspection and maintenance program. Dwelling units that are determined to have failing and/or non-compliant systems would be forced to install the necessary improvements at the expense of the individual property owners. The total probable costs presented above represent maximum costs, assuming that all of the existing on-site systems are replaced with holding tanks. The cost per household is accurate for those homes where holding tanks are in fact installed. Households having compliant systems would incur no additional cost.

Should a system-wide approach be implemented, the total cost for the improvements would be shared by all residents. The construction of the improvements would be financed through low-interest loans from the Wisconsin DNR Clean Water Fund, special assessments and connection fees. To illustrate the impact on the typical user, the anticipated cost per connection under Alternative IIB would be approximately as follows:

| | |
|---|---|
| Abandon On-Site System | $1,500 |
| Connection Charge | $4,000 |
| Annual Assessment | $1,700 |
| Quarterly O & M Costs | $ 130 |

The up-front cost to the typical user would be approximately $5,500 with an annual cost of about $2,220 over the 20 year loan repayment period.

***Recommendations*** – The direction taken by the District will obviously have a significant financial impact on some or all of the District's constituents. The use of on-site systems has and continues to be a method acceptable to the State for wastewater treatment and disposal. We recommend that the District undertake a comprehensive public awareness and hearing process to solicit public opinion. Residents must be made aware that the District is about to undertake an aggressive on-site system inspection and compliance enforcement program, with a clear understanding of the ramifications for those homeowners having non-compliant systems.

Should the District receive a public response which endorses the construction of the collection systems necessary, we recommend that Alternative IIA be implemented as the cost-effective option for planning Subareas 1 and 2 north of Geneva Lake. For the planning Subareas south of Geneva Lake, we would recommend Alternative IIB be implemented as the cost-effective solution should future negotiations with the City of Lake Geneva and the Villages of Fontana and Walworth continue to prove unproductive.

# 1. INTRODUCTION

## 1.1 Study Purpose and Scope

The purposes of a facilities planning report are to evaluate the current wastewater collection and disposal facilities in the planning area and to determine if the existing facilities have sufficient capacity to meet the current and future needs of the area. If the existing facilities do not have adequate capacity, alternative facilities to meet the needs must be identified and compared. The most cost-effective (economical) alternative must be determined and clearly described. The environmental impacts of the alternatives must also be compared during the evaluation process.

A facilities plan report consists of six major tasks. They are described below.

***Assessment of Current Situation*** – The existing conditions in the facilities planning area are evaluated, including the performance of the existing, on-site sewage collection, treatment, and disposal systems.

***Infiltration and Inflow Analysis*** - An infiltration/inflow analysis must typically be performed as part of the facilities planning efforts, to determine whether excessive infiltration/inflow exists in the existing wastewater collection systems. Excessive infiltration/inflow is defined as that which is less costly to find and remove (through sewer system rehabilitation) than to continue to transport and treat. If the economic comparison determines that excessive infiltration/inflow exists, a follow-up sanitary sewer system evaluation survey is required.

Since wastewater treatment within the Linn Sanitary District is currently achieved through the use of on-site systems, an infiltration/inflow analysis is not required in the absence of an existing wastewater collection system.

***Assessment of Future Situation*** – The probable situation in the area during the 20-year planning period is assessed. This includes demographic and economic projections and forecasts of flow and waste loads.

***Development and Evaluation of Alternatives*** – Alternatives for wastewater collection and treatment are evaluated based on both the cost and environmental impacts of the proposed facilities.

***Selection of Plan*** – The most cost-effective alternative is identified and selected for implementation.

***Financial Considerations*** – The financial impact on the average system user is determined based upon the expected financing plan for the facilities.

## 1.2 State and Regional Considerations

A facilities plan report is required by the Wisconsin Department of Natural Resources (WDNR) for all major wastewater collection, conveyance, and treatment facilities. The requirements for the facilities plan report are listed in the Wisconsin Administrative Code, Section NR 110.09 for Sewage Treatment Facilities Projects, Section NR 110.10 for Sewage Collection Systems Projects, and Section NR 110.11 for Sewage Lift Stations. This report is intended to comply with the WDNR requirements.

One requirement of the WDNR is that all facility plan report recommendations must be in conformance with the approved area-wide water quality management plan. The

Southeastern Wisconsin Regional Planning Commission (SEWRPC), in 1979, prepared an area-wide water quality management plan. The 1979 management plan recommended continued utilization of on-site wastewater treatment and disposal systems within the Linn Sanitary District planning area. An amendment to that plan will be needed from SEWRPC to implement the recommendations of this planning report for the Linn Sanitary District planning area.

## 1.3 Related Studies and Reports

A number of studies have been previously completed within the planning area. A brief description and summary of each follows:

*1.3.1 A Regional Water Quality Management Plan for Southeastern Wisconsin – 2000* – The SEWRPC completed a water quality management report detailing the comprehensive study of wastewater treatment in the (Illinois) Fox River basin in 1979. The report noted the pollutant-sensitive nature of inland lakes located in the region and the potential for surface water pollution related to improperly installed or maintained on-site wastewater disposal systems.

*1.3.2 Geneva Lake Facilities Plan – East Planning Area* – A facility planning report was completed by Donohue & Associates in 1981. The report covered the City of Lake Geneva, the Lake Como Beach area, the area of Linn Township east of North Lake Shore Drive and north of Geneva Lake. South of Geneva Lake, the study area extended from the City of Lake Geneva west to Black Point, between South Shore Drive and the lake. The report recommended conventional gravity sewers for the Robinson Hillside Subdivision area, cluster mound systems for the Genevista and Edgewater Terrace Subdivision areas and

replacement of existing on-site wastewater disposal systems with mound systems in the remainder of the Linn Sanitary District area.

*1.3.3 **Geneva Lake Facilities Plan – West Planning Area*** – This facility planning report was also completed by Donohue & Associates in 1981. The report covered the Villages of Fontana, Walworth, and Williams Bay, and Sections 4 and 5 of Linn Township north of Geneva Lake. South of the lake, the study area extended from the Village of Fontana east to Black Point. The report recommended conventional gravity sewers for the Camp Sybil/Shore Haven, Academy Estates, and Cisco Beach areas, cluster mound systems for the Sunset Hills Subdivision area and replacement of existing on-site wastewater disposal systems with mound systems in the Maple Hills Subdivision and the remainder of the Linn Sanitary District area.

*1.3.4 **Environmental Impact Statement Wastewater Treatment Facilities for the Geneva Lake Area*** – The United States Environmental Protection Agency (USEPA) completed an Environmental Impact Statement in 1984 covering both the east and west planning areas of the 1981 facility planning reports. The USEPA concluded that the 1981 facilities plans did not establish the need to improve the existing on-site wastewater disposal systems in the Linn Sanitary District, and therefore, any sewer extensions into these areas would not be federally funded. The USEPA recommended establishment of management districts for upgrading and operating the existing on-site systems.

*1.3.5 **A Water Quality Management Plan for Geneva Lake*** – The SEWRPC completed a water quality management plan for Geneva Lake in 1985. The plan identified factors affecting lake water quality and made recommendations for water quality

management measures. The plan recommended the extension of sanitary sewer service to portions of the drainage area directly tributary to the lake, with treatment and discharge at the existing Lake Geneva, Fontana-Walworth Water Pollution Control Commission (FWWPCC), and Walworth County Metropolitan Sewerage District (WALCOMET) wastewater treatment plants. The report also recommended the establishment of a management district for the inspection, maintenance, and replacement of existing on-site wastewater disposal systems.

*1.3.6 **Walworth County Metropolitan Sewerage District Service Area Additions*** – Howard, Needles, Tammen, & Bergenhoff completed a Facility Plan Amendment for WALCOMET in 1990. The Facility Plan Amendment was prepared to address the immediate and long range impacts to the WALCOMET system. The report also evaluated the cost-effectiveness of adding the Lake Como northshore area to the WALCOMET system. The report recommended that wastewater from the Lake Como area be discharged to the WALCOMET system and that provisions be included within the Geneva National Development to incorporate the future flows from Lake Como.

*1.3.7 **Sanitary Sewer Service Areas for the Walworth County Metropolitan Sewerage District*** – The SEWRPC amended the boundary of the WALCOMET sewer service area in 1991. The Knollwood Subdivision area of the Linn Sanitary District is within the boundaries of WALCOMET's sewer service area.

*1.3.8 **Sanitary Sewer Service Area for the City of Lake Geneva and Environs*** – The SEWRPC amended the boundary of the City of Lake Geneva sewer service area in 1992. A portion of the Linn Sanitary District falls within the boundaries of the Lake Geneva sewer service area, including the area between the City and Robinsons/Trinke Estates Subdivisions.

*1.3.9* ***Preliminary Sanitary Sewer Study*** - A study was completed by Graef, Anhalt, Schloemer & Associates in 1994, which investigated the costs associated with providing sanitary sewer service to that portion of the Linn Sanitary District south of Geneva Lake from the Village of Fontana to the Northwestern Military Academy property. The report recommended conventional gravity sewers with discharge to the Village of Fontana sanitary sewer system.

*1.3.10* ***Sanitary Sewer Service Areas for the Village of Fontana and Walworth and Environs*** – The SEWRPC amended the boundary of the FWWPCC sewer service area in 1995. A portion of the Linn Sanitary District falls within the boundaries of the FWWPCC sewer service area, including the Maple Hills Subdivision and the area north of South Shore Drive between Academy Estates and the Village of Fontana.

*1.3.11* ***Report and Evaluation of Sanitary Sewer Options to Serve Lands Proposed for Annexation to the Village of Fontana*** - A study was completed by Graef, Anhalt, Schloemer & Associates for the Town of Linn dated September 16, 1999, which investigated the costs associated with providing sanitary sewer service to the Fontana area region of the Linn Sanitary District. In the summer of 1999, a development on the south shore of Lake Geneva, known as Kaye's Park, was under consideration for annexation to the Village of Fontana. The annexation of this development would have also required annexation of the existing homes between the proposed development and the Village of Fontana limits. This report was undertaken by the Town in an effort to contest the annexation. The study area was expanded to include the south shore of Geneva Lake from the Village of Fontana to the City of Lake Geneva. The report recommended conventional gravity sewers with a new

regional wastewater treatment plant along Willow Road, south of the City of Lake Geneva, discharging to the North Branch of Nippersink Creek.

*1.3.12 Linn Sanitary District Fontana Area Wastewater Collection and Treatment Facilities Report* – A study was completed by Baxter & Woodman, Inc. dated October 13, 1999, which presented the preliminary results of a cost-effective analysis for the Fontana planning area portion of the Linn Sanitary District. In the summer of 1999, an area of the Town of Linn was under consideration for annexation to the Village of Fontana. This report was presented to reveal the preliminary results of this Facilities Planning Report to Town residents in the Fontana area. This report described the assessment of the current and future conditions, an analysis of the sanitary disposal needs of the Fontana planning area, and presented the development of wastewater collection and treatment alternatives. The alternatives considered include; 1) a sewage collection and conveyance system with treatment at a regional wastewater treatment plant, 2) a sewage collection and conveyance system, and a decentralized treatment system, and 3) a holding tank alternative. The cost-effective analysis revealed that the present worth cost of the alternatives considered for this area were essentially equal and that non-economic factors must be considered.

# 2. CURRENT CONDITIONS

## 2.1 Introduction

This section provides a broad overview of the Linn Sanitary District planning area evaluated for the purposes of this Facilities Planning Report. The location and boundaries of the planning area are defined. Existing land use, population, topography, and soil conditions are discussed. The current water quality of Geneva Lake is assessed, and the existing water supply and wastewater treatment and disposal systems are described.

Extensive efforts were conducted to establish the condition of the existing on-site wastewater disposal systems. Time of sale inspection reports and County Sanitarian records were reviewed. A District-wide survey was conducted by questionnaire. Random inspections were performed and the opinion of the County Sanitarian was sought and obtained. This exhaustive compilation of data allowed us to identify deficiencies within the existing systems and determine where improvements are necessary to eliminate human health hazards and/or to avoid degradation of the surface water and groundwater quality.

## 2.2 Planning Area Description

**2.2.1** ***Sanitary District Location and Boundaries*** - The Linn Sanitary District was formed in the 1940's, and is located approximately 50 miles southwest of Milwaukee and 60 miles southeast of Madison, within unincorporated Linn Township, Walworth County, Wisconsin. The Sanitary District boundaries are shown on Exhibit A.

The Sanitary District extends along the north shore of Geneva Lake between the Village of Williams Bay and the City of Lake Geneva, and between the City of Lake Geneva and the Village of Fontana along the south shore. The Sanitary District also includes a small

area within Walworth Township along the west shores of Geneva Lake, between Fontana and Williams Bay. A portion of the Sunset Hills Subdivision, an unsewered area along the north shore that is located within both the Town of Linn and the Town of Geneva to the north, also falls within the District's boundaries.

*2.2.2* ***Land Use*** - The Linn Sanitary District encompasses an area of more than 4,000 acres, not including Geneva Lake. Current land use consists predominantly of residential development. Residential lot sizes vary widely from 4,000 square feet to 20 acres or more. There is some agricultural usage in the southern regions and a few small commercial establishments scattered across the planning area.

*2.2.3* ***Population*** - Population has remained relatively stable from 1970 through 1999. Information supplied by SEWRPC lists the 1990 permanent population of the Linn Sanitary District at 1,669. Information supplied by the Wisconsin Department of Administration shows that the 1990 permanent population of Linn Township was 2,062. Since the Linn Sanitary District has historically made up 80 percent of the total population of the Township, this equates to a 1990 permanent population of 1,650, which closely matches the information supplied by SEWRPC. Population estimates by the Department of Administration list the 1999 permanent population of Linn Township to be 2,105. We estimate the 1999 permanent population of the Linn Sanitary District at approximately 1,684.

*2.2.4* ***Topography and Soil Conditions*** - The topography of the planning area is predominantly moderate to steep slopes with some low-lying flat topography along reaches of the lakefront. Moderate (6%) to steep (12%) slopes can be found in 25 to 50 percent of

the planning area. Ground surface elevations range from 864 (lake level) to 1100 feet above sea level.

Based upon data found in the United States Department of Agriculture Soil Survey, the soils in the Geneva Lake area are generally of the Miami-McHenry association. The predominant soil types along the north lakeshore are Kendall, St. Charles, and Miami. Miami soils dominate the remainder of the planning area on the north side of the lake. The Kendall soils have severe limitations for sanitary filter fields and the St. Charles soils have moderate limitations, both related to high groundwater. The Miami soils have moderate limitations where slopes are 6% to 12%, and severe limitations for sanitary filter fields on slopes more than 12%. The predominant soils south of the lake are McHenry in the east and Miami soils in the west. McHenry and Miami soils have moderate limitations for sanitary filter fields where slopes are 6% to 12%, and severe limitations on slopes more than 12%. Figure 1 summarizes the suitability of soils in the Geneva Lake area for on-site wastewater disposal systems.

*2.2.5 **Geneva Lake Water Quality*** - The waters of Geneva Lake cover an area of approximately 5,425 acres, or about 8.5 square miles. The lake drains into the White River, which is tributary to the (Illinois) Fox River. The tributary drainage area is rather small, about 20 square miles, and is approximately 37 percent urbanized. The mean depth of the lake is 57 feet with a maximum depth of 144 feet. The lake level is maintained predominantly by groundwater sources.

The 1985 Water Quality Management Plan prepared by SEWRPC indicated that Geneva Lake had relatively low concentrations of phosphorus and nitrogen. Hillside Creek

and Trinke Creek were found to have intermediate water quality, with slightly higher concentrations of biochemical oxygen demand and fecal coliform than the other perennial streams entering the lake.

The swimming beaches are monitored by the Geneva Lake Environmental Agency. Sampling results from 1994 through 1998 indicated that coliform bacteria concentrations exceeding 200 colonies per 100 ml were found in numerous locations. The bacteria are only found in warm-blooded animals and can cause a serious potential for the spread of virus and disease. A summary of the sampling results can be found in Appendix A.

*2.2.6 **Water Supply*** - The Linn Sanitary District has no municipal water supply system. There are a few community wells maintained by property owners associations. In the past, these community water systems had been drained and taken out of service during the winter months. With the increasing full time occupancy of the area, most of these community wells are being abandoned and individual private wells installed for water supply. The average lot size in many of the platted subdivisions is approximately 5,000 square feet, so the private wells and septic systems are in close proximity.

*2.2.7 **Sewage Treatment and Disposal*** - The majority of the houses in the Linn Sanitary District use on-site soil absorption systems for sewage treatment and disposal. The treatment system generally includes a septic tank, which is a buried, watertight receptacle typically constructed of concrete. The tanks are designed to receive wastewater from a home or commercial business. Septic tanks separate the solids from the liquids, store the solids, and discharge partially clarified liquid for further treatment and disposal. Partial decomposition of retained solids occurs within the septic tank through limited anaerobic

digestion. Scum and other floatables, including oils, greases, and some fecal material, are retained in the tank through the use of baffles.

Septic tanks are typically the first component of an on-site soil wastewater treatment and disposal system. They must be followed by additional treatment and/or disposal units. In most cases, the septic tank effluent (leachate) is discharged to a soil absorption system where treatment is provided through natural physical, chemical, and biological processes within the soil-water matrix. Types of soil absorption systems include the seepage trench, seepage bed, seepage pit, in-ground pressurized distribution system, and the mound system.

Seepage trenches are a gravel-filled trench with perforated pipe extending through its length. The trench is typically a shallow, level excavation, 30 inches to 48 inches deep and 12 to 60 inches wide. The bottom is filled with 6 inches of aggregate over which is laid a single line of perforated distribution piping. Additional aggregate is placed over the pipe and a semi-permeable barrier is installed to prevent the backfill from penetrating the stone. The seepage trench is installed level so that the clarified effluent from the septic tank drips out from all the perforations along its length. Over time, as the liquid spreads over the soil, it induces the growth of a bio-mat on the wetted soil. The mat is composed primarily of facultative (aerobic/anaerobic) bacteria. The mat provides a matrix where biological activity takes place and biodegradable materials and some microbes are consumed. In addition, it filters out most pathogens and parasites as it delivers liquid to the soil at a rate usually slower than the soils infiltrative capacity. This results in unsaturated downward flow which provides an aerated environment that enhances the soils ability to capture microbes that may have passed through the mat. The other soil absorption systems operate in a similar manner

with treatment provided by the bio-mat formed in the surrounding soil. Soil absorption systems require little or no attention as long as the systems are not hydraulically overloaded and the wastewater discharged into them is nearly free from solids, greases, and oils. This requires that the upstream septic tank be well maintained. Figure 2 depicts a conventional septic tank and in-ground soil absorption system.

Absorption fields can fail in two ways; 1) They can fail to absorb the septic tank leachate, or 2) They can fail to treat the leachate by not filtering out parasites and pathogenic organisms. If the absorption field fails, sewage may be discharged to the ground surface or back up into the house. Sewage on the ground surface can be a threat to the health and well being of the residents. A less evident health hazard is associated with the discharge of untreated or partially treated leachate to the ground water table. As this happens below ground, it is unseen and, therefore, not considered a high priority. If parasites and pathogenic organisms are not filtered out before the liquid enters the groundwater the untreated waste may affect wells used for drinking water or be discharged to the lake affecting swimming beaches. Failures of absorption fields can be complex and can be the result of a combination of factors including poor siting, poor design and construction, or hydraulic overloading. The frequency of absorption field failure may range from occasional to continuous.

Records from the Walworth County Sanitarian show approximately 180 holding tanks, 25 new and replacement in-ground pressure distribution systems, and 200 new and replacement mound systems were installed since 1981 in the planning area.

## 2.3 Sewage Treatment and Disposal Needs

This section will describe the information compiled to analyze sewage treatment and disposal needs within the Linn Sanitary District, including records collected, inspections completed, the opinion of the County Sanitarian, and a summary by study Subarea.

A major task of this facility planning process was the collection and evaluation of information related to the condition of the existing private sewage treatment and disposal systems. Needs are established by documenting that the improvements are necessary to eliminate human health hazards and/or to avoid degradation of surface water and groundwater quality. The work completed to document the need for improvements consisted of the following:

- Time of Sale Inspection Reports
- County Sanitarian Records
- Sanitary Needs Questionnaire
- Random Inspections
- Opinion of the Walworth County Sanitarian

A summary of each of these items follows.

*2.3.1* ***Time of Sale Inspection Reports*** – In an effort to gather information about the condition of the existing on-site wastewater disposal systems, the Linn Sanitary District requires all systems to undergo an inspection at the time of sale. This information was compiled in a database for further review and analysis. A summary of this data and a copy of the inspection report form is included in Appendix A.

*2.3.2* ***County Sanitarian Records*** – Records from the Walworth County Sanitarian were compiled in a database. These records consisted of Inspection Reports, Violation Reports, new and replacement septic system permits, and soil testing information. This

information was compiled in a database for further review and analysis. A summary of this data is included in Appendix A.

*2.3.3 Sanitary Needs Questionnaire* – A questionnaire was developed to request information from the current residents of the Linn Sanitary District in a way that could be easily tabulated and reviewed. A blank copy of the "Sanitary Needs Questionnaire" is included in Appendix A. The responses to most questions were in a multiple choice or yes/no format. This provided objective answers to many of the questions and allowed a consistent way to tabulate the answers. The last portion of the questionnaire included spaces for respondents to sketch their sewage disposal system and add their own comments. Eleven hundred questionnaires were mailed to the owners of all developed property within the Linn Sanitary District in September of 1997. Completed questionnaires were returned by 598 residents, a 54 percent response rate.

A Citizens Survey was mailed to the residents in the southwest region of the Linn Sanitary District in 1994, a copy is included in Appendix A. This information was also compiled in a database for further review and analysis.

The questionnaire revealed that 36 percent of the households surveyed were occupied year round. This is similar to the percentages found in the 1994 Citizens Survey. Eighty-two percent of the homes were reported to be more than 20 years old. This suggests that many of these homes may have septic system problems, as the typical life of a septic system is 15 to 20 years.

The questionnaire revealed that 72 percent of the houses had a drilled well. This implies that water quality may be better than expected with newer and deeper drilled wells

than for point wells typical of homes in a lake area that are more than 20 years old. The results also showed that 32 percent of the wells had been tested in the last year with a 3 percent failure rate.

Ninety to ninety-five percent of homeowners reported no problems with their septic system, although 5 to 15 percent reported surface water problems around their septic systems. Ten percent of homeowners reported pumping their septic more than once a year. This would indicate that the septic tank is being used as a small holding tank and the septic field has failed. Forty percent of the septic tanks are pumped every 1 to 2 years, which indicates these systems are most likely maintained properly.

More than half of the respondents reported use of washing machines or water softeners, which places additional stress on septic systems, because of the amount of water they discharge. In general, as many as 75 percent of septic system failures can be attributed to hydraulic overloading.

The number of people reported seeing sewage on the ground surface in their neighborhood was 12, or approximately 2 percent. This is an indication of failed septic systems, which are a public health hazard. Three percent of the respondents had a cesspool, which is not compliant with the plumbing code. Twelve percent of the septic systems had been replaced, although the average age of the replaced systems is 16 years, signaling that they are nearing the end of the typical life span. The results showed that 23 percent of the septic systems had been inspected in the last year, and 4 septic systems or approximately 1 percent reportedly did not pass inspection.

The Linn Sanitary District was divided into nine Subareas, roughly following township section lines and current sewer service area boundary lines. These Subareas are delineated on Exhibit A. The results of the Sanitary Needs Questionnaire is summarized by Subarea in Table 1.

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**TABLE 1**

**Summary of Sanitary Needs Questionnaire**

| Study Area | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| # of homeowners responded to the Questionnaire | 107 | 48 | 11 | 5 | 132 | 82 | 65 | 85 | 34 |
| % of the homes in this area are more than 20 years old | 82 | 73 | 91 | 80 | 85 | 77 | 85 | 86 | 91 |
| % of the properties had their wells tested for bacteria in 1997 | 41 | 33 | 27 | 60 | 21 | 28 | 28 | 32 | 56 |
| % of those tested were bacterialogically unsafe | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 7 | 10 |
| % of the respondents had a washing machine | 48 | 71 | 100 | 91 | 60 | 57 | 68 | 51 | 38 |
| % have a garbage disposal | 25 | 25 | 60 | 18 | 20 | 29 | 26 | 28 | 21 |
| % have a water softener | 45 | 63 | 60 | 73 | 45 | 49 | 60 | 38 | 26 |
| % reported sewage on the ground or entering the lake in their neighborhood | 7 | 6 | 0 | 0 | 4 | 1 | 4 | 2 | 12 |
| % of the respondents pump their septic system more than once per year | 7 | 10 | 0 | 0 | 12 | 11 | 11 | 11 | 12 |
| % of the properties had their septic systems tested inspected in 1997 | 29 | 31 | 60 | 18 | 21 | 18 | 25 | 19 | 29 |
| % of those tested reported their systems passed inspection | 100 | 100 | 100 | 100 | 100 | 93 | 94 | 94 | 20 |

*2.3.4 **Random Inspections*** – Field inspections of 32 on-site wastewater disposal systems were performed in 1998 by a certified soil tester. The inspections included pumping of the septic tank by a wastehauler, inspection of the system components, and a hydraulic loading test of the system. Three to five inspection sites were chosen at random within each of the 9 subareas studied. A summary report submitted by the soil tester is included in Appendix A. This information was compiled in a database for further review and analysis.

The random inspections revealed that the average age of on-site wastewater disposal systems was 26 years. Of the 32 systems evaluated, only 8 had been installed since 1980. This date is significant in that soil evaluations for septic systems were not completed prior to 1980. The inspections found 10 systems to be functioning adequately, 10 systems to be

functioning adequately but required some repair work, 4 systems functioning at reduced capacity, 5 systems failing, and 3 systems that were not code compliant. A summary is included in Appendix A.

*2.3.5 **Opinion of Walworth County Sanitarian*** - The Walworth County Sanitarian provided an opinion as to the general condition of existing septic systems within the Linn Sanitary District in a letter dated August 23, 1999. The County Sanitarian reported that there are several areas within which they have had continuing problems with failing systems, and that these areas commonly have small lot sizes, poorly drained soils, and high groundwater. The prime areas of concern listed were: all parcels from the Fontana Village limits east to the Northwestern Military Academy, Robinson Hillside and Lake Geneva Beach Subdivision area, and Lake Geneva Highlands Subdivision area on the south shore; and Knollwood/Cisco Beach Subdivision area, and Sunset Hills Subdivision area on the north shore. A copy of the County Sanitarian's letter depicting probable areas of problematic septic systems or "hot spots" is included in Appendix A. The location of these subdivisions are shown on Figure 3.

*2.3.6 **Summary of Sanitary Disposal Needs*** - The existing on-site systems within each of the planning subareas were assessed based on the following criteria:

- Density of existing development
- Limitations on area available for replacement systems
- Steep slopes
- Condition of existing on-site wastewater disposal systems
- Soil types and separation to groundwater

Based upon all of the information compiled, it is apparent that continued reliance upon on-site wastewater treatment and disposal for specific areas within the Linn Sanitary

District may result in degradation of the groundwater supplies and surface water quality of Geneva Lake.

Our findings by study Subarea, are summarized as follows:

***Area 1*** – Area 1 includes 275 homes in the Knollwood (Cisco Beach) subdivision and surrounding area as well as 8 homes in the Town of Walworth area between the villages of Williams Bay and Fontana. The conditions found in Area 1 indicate that it fails 4 out of 5 of the deficiency criteria listed above. Based upon the density of the existing development, limited area available for replacement systems, steep slopes near the lake, and marginal condition of the existing septic systems, a need for improvements to the on-site wastewater disposal systems in the Linn Township portion of Area 1 is warranted.

***Area 2*** – Area 2 includes 200 homes in the Sunset Hills, Elgin Club, S.B. Chapin, Alta Vista Estates, and Bonnie Brae Subdivisions and surrounding area. The conditions found in Area 2 indicate that it fails 3 out of 5 of the deficiencies listed above. Based upon the density of the existing development along the lake, limited area available for replacement systems along the lake, and marginal condition of the existing septic systems, a need for improvements to the on-site wastewater disposal systems is warranted.

***Area 3*** – Area 3 includes 15 large estate lots and a few small subdivisions. The conditions found in Area 3 indicate that it fails 2 out of 5 of the deficiencies listed above. Based upon the large estate type lots and area available for replacement of on-site wastewater disposal systems and low density of existing development in this area a need for improvements to the on-site wastewater disposal systems is not warranted. Use of the existing on-site wastewater disposal systems would continue.

*Area 4* – Area 4 includes 4 large estate lots and 1 small subdivision. The conditions found in Area 4 indicate that it fails 2 out of 5 of the deficiencies listed above. Based upon the large estate lots and area available for replacement of on-site wastewater disposal systems and low density of existing development in this area a need for improvements to the on-site wastewater disposal systems is not warranted. Use of the existing on-site wastewater disposal systems would continue.

*Area 5* – Area 5 includes 360 homes in the Paradise Vista Subdivision, Robinsons Subdivisions, Lake Geneva Beach and Trinke Estates Subdivisions, 1 hotel, and many small unplatted lots along the lake front. The Geneva Inn located on the south shore of Buttons Bay is currently connected to the City of Lake Geneva wastewater collection system. The conditions found in Area 5 indicate that it fails 4 out of 5 of the deficiencies listed above. Based upon the density of the existing development, limited area available for replacement systems, high ground water conditions near the lake, and marginal condition of the existing septic systems, a need for improvements to the on-site wastewater disposal systems is warranted.

*Area 6* – Area 6 includes 275 homes in the Birches Subdivisions, Lake View Park, Lake Geneva Terrace, and Genevista Subdivision areas. The conditions found in Area 6 indicate that it fails 4 out of 5 of the deficiencies listed above. Based upon the density of the existing development, limited area available for replacement systems, high ground water conditions near the lake east of Linn Pier Road, and marginal condition of the existing septic systems, a need for improvements to the on-site wastewater disposal systems is warranted.

*Area 7* – Area 7 includes 150 homes in the Wooddale Subdivision and lake front lots east of Wooddale. The conditions found in Area 7 indicate that it fails 4 out of 5 of the deficiencies listed above. Based upon the density of the existing development along the lake, steep slopes along the lake front, limited area available for replacement systems along the lake, and marginal condition of the existing septic systems, a need for improvements to the on-site wastewater disposal systems north of Black Point Road is warranted. The need for improvements to the wastewater disposal systems in the remainder of Area 7 has not been substantiated and therefore, use of the existing systems would continue.

*Area 8* – Area 8 includes 200 homes in the Edgewater Terrace and Lake Geneva Highlands Subdivisions and lake front lots west to Basswood Drive. The conditions found in Area 8 indicate that portions of it fail on 4 out of 5 of the deficiencies listed above. Based upon the density of the existing development, steep slopes, limited area available for replacement systems, and marginal condition of the existing septic systems, a need for improvements to the on-site wastewater disposal systems in the Edgewater Terrace and Lake Geneva Highlands Subdivisions is warranted. The need for improvements to the wastewater disposal systems in the remainder of Area 8 has not been substantiated and therefore, use of the existing systems would continue.

*Area 9* – Area 9 includes 225 homes in the Camp Sybil, Shore Haven, Lake Geneva Club Subdivisions between the Fontana Village limits and the Northwestern Military Academy (currently abandoned) and also including the Maple Hills and Academy Estates Subdivisions. The conditions found in Area 9 indicate that it fails 5 out of 5 of the deficiencies listed above. Based upon the density of the existing development, limited area

available for replacement systems, high ground water conditions near the lake, steep slopes south of South Shore Drive, and marginal condition of the existing septic systems, a need for improvements to the on-site wastewater disposal systems is warranted.

# 3. FUTURE CONDITIONS

## 3.1 Introduction

Current and projected wastewater treatment and disposal needs are critical concerns of the facilities planning process. This section describes the planning considerations which determine how wastewater flows have been determined for this Facilities Planning Report. Planning considerations discussed include land use, population projections, per capita wastewater flows, and effluent quality requirements for various types of wastewater treatment.

Section NR 110.09 of the Wisconsin Administrative Code requires that facilities planning efforts address wastewater treatment and disposal needs within the planning area for a 20-year period. Accordingly this report addresses population projections and density assumptions with the planning area through the year 2020.

## 3.2 Land Use

The Town of Linn Land Use Plan is shown on Figure 4. Primary environmental corridors can be found in the planning area, concentrated along the north side of the lake and southwestern region of the Sanitary District. They are shown on Figure 5.

## 3.3 Population Projections

U.S. Census data for the year 1990 was provided by the SEWRPC. This data has been adjusted due to overlaps of the quarter sections into the adjacent municipalities. This data shows that of the total 1,728 housing units within the Linn Sanitary District planning area, approximately 1,106 units are occupied on a seasonal basis. This closely approximates

the percentage of seasonal units reported in response to the Sanitary Needs Questionnaires at about 64 percent.

The SEWRPC also reports the average number of occupants per household at approximately 2.6. We, therefore, estimate the part-time seasonal population within the planning area at about 2,876 (1,106 units times 2.6 people per unit).

The SEWRPC provided year 1999 year-round population estimates and year 2020 projections for the planning area based on intermediate growth and included in Appendix E. Current and projected population estimates are summarized in Table 2.

**Linn Sanitary District**
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**TABLE 2**

**Population Projections**

| Population | Year 1999 | Year 2020 |
|---|---|---|
| Non-Seasonal Residential | 1,684 | 2,400 |
| Seasonal Residential | 2,876 | 2,876 |
| Total Seasonal Population | 4,560 | 5,276 |

## 3.4 Per Capita Wastewater Flows

Section NR 110.09 of the Wisconsin Administrative Code requires that current and future wastewater flows be calculated by multiplying a gallon per capita per day (gpcd) allowance by the estimated total of the existing and future resident populations to be served. This allowance includes estimates for commercial and institutional sources as well as residential sources.

For communities having a projected 10-year population of 5,000 people or less, the Administrative Code allows the use of a per capita wastewater generation rate of between 60 and 70 gpcd. For larger communities, a generation rate of 65 to 80 gpcd is allowed. For purposes of facilities planning, we projected wastewater flows based on a per capita wastewater generation rate of 70 gpcd.

The Administrative Code also permits facilities planning efforts to provide allowances for industrial flows of up to 10 percent of the total design flow for communities having populations of 10,000 people or less. We do not anticipate any significant industrial contribution with the Linn Sanitary District planning area, and therefore included no such allowance.

### 3.5 On-Site Wastewater Disposal System Regulations (Comm 83)

Several alternative types of on-site wastewater treatment systems are currently under consideration by the State as part of a possible revision to the Wisconsin Administrative Code Department of Commerce Chapter 83. Some of the alternative systems that may become available are aerobic pretreatment units, sand filters, drip-line effluent dispersal, plastic filter media, and disinfection units.

Aerobic pretreatment units, by their definition, pretreat effluent from a septic tank before the wastewater is discharged to a soil absorption system. These units are typically employed on site for each individual user. Disinfection units employ chlorination, ozone disinfection, or ultraviolet light disinfection to treat effluent from septic systems. Sand filters remove contaminants in wastewater and can include single pass or recirculating filters. Drip-line dispersal units slowly meter the discharge of wastewater into the soil. Potential

drawbacks can be encountered due to power required and regular maintenance of this somewhat complicated system. These systems are relatively new and are not yet fully tested. Plastic filter media augments or replaces the filter bed of a conventional in ground septic system by increasing the contact surfaces for the wastewater and thereby decreasing the surface area required for the filter bed.

Hearings on the Comm 83 code package were held before legislative committees intermittently from 1991 through 2000. Upon conclusion of the latest hearings, the committees jointly sent a request to the Department of Commerce regarding consideration of modifications to the proposed code. At the time this report was written, the legislative committees had approved revisions to the Comm 83 code to take effect in the spring of 2000. The revisions include a provision allowing municipalities the option of waiting up to 3 years before implementing the new rules. This is intended to allow local governments more time to enact land use plans and implement permitting programs.

Unfortunately, the significant number of problems throughout the Linn Sanitary District planning area, documented in Section 2, preclude the replacement of existing on-site wastewater disposal systems with such alternate type systems due to the unsuitable soil types, steep slopes, high groundwater conditions, and limited area available for replacement systems

# 4. EVALUATION OF ALTERNATIVES

## 4.1 Introduction

One of the primary purposes of a facilities planning report is to conduct a cost-effective analysis of appropriate alternatives. This section summarizes the evaluation of alternatives for wastewater treatment and disposal within the Linn Sanitary District planning area.

The alternatives presented herein can generally be classified into two distinct categories, including:

***Type I Improvements***

Improvement programs which address wastewater treatment and disposal needs on an individual house by house basis. The District would adopt and enforce a rigorous inspection and maintenance program. Dwelling units that are determined to have failing and/or unacceptable systems would be forced to install the necessary improvements at the expense of the individual property owner.

***Type II Improvements***

Improvement programs which address wastewater treatment and disposal needs on a District-wide or neighborhood by neighborhood basis. These programs would involve the elimination of the existing on-site systems, and construction of collection and pumping systems to convey wastewater to remote site(s) for treatment and ultimate disposal.

As demonstrated in Section 2 of this report, Subareas 3 and 4 do not require improvements to be made to the existing on-site wastewater treatment and disposal systems. For these areas, a septic system inspection and management program must be implemented. This will ensure the proper operation and maintenance of the existing systems as well as the proper design and installation of new septic systems. The inspection and management program must include a visual inspection of each septic tank and leachfield or drywell to

identify any malfunctioning systems. Subsequent to the initial inspections, approximately 20 percent of the systems would be inspected at least once every 5 years. When deficiencies are found during an inspection, orders must be given for corrective action with a specified period of time.

## 4.2 Type I Improvements

For the Type I improvement programs, the District has two options. The first option is to initiate a comprehensive and sustained effort to inspect all of the existing on-site systems and force the abandonment of failing septic systems with installation of holding tanks. This approach will directly target those individual homeowners whose inadequate systems pose a threat to groundwater and Geneva Lake water quality.

The second option available to the District is to merely replace all of the existing on-site septic systems with individual household septage holding tanks. This option has the greatest up-front capital cost of all Type I improvements, but will completely eliminate the need, and cost, to initiate any type of septic system inspection and maintenance program. For comparison with the Type II improvements, we have evaluated the costs associated with replacing all existing on-site systems with individual holding tanks.

*4.2.1* ***Holding Tanks*** - Holding tanks are watertight containers designed for the collection and holding of sewage. The tanks are constructed of concrete, steel, or glass-fiber reinforced polyester. Wastewater from each building is conveyed through pipeline by gravity to the holding tank, which is typically located on private property. The wastewater is stored in the holding tank until a pumper truck pumps it out. The tank is equipped with a warning device that activates an audible and/or visible alarm when the level in the tank is

almost full. Actuation of the alarm indicates to the owner that the tank needs to be pumped. Treatment would be provided at a remote wastewater treatment plant.

Holding tanks for residential homes are sized based criteria in the plumbing code, which references the number of bedrooms. The minimum allowable capacity is 2,000 gallons and a typical holding tank capacity is 3,000 gallons. The Wisconsin Administrative Code dictates a wastewater flow rate of 60 to 70 gallons per capita per day. Based on 2.6 people per house and 70 gallons of water per person per day equates to approximately 180 gallons of water per day per house. With a typical 3,000 gallon holding tank pumping would be required every 16 days for homes in use full time. The individual household holding tank alternative detailed cost analysis is included in Appendix B. Seasonal residences were calculated based on ½ time usage and ½ of the existing holding tanks in each subarea were considered to be adequate for use and not requiring replacement. To show the sensitivity of water usage, calculations are also presented based upon 50 gallons of water used per person per day.

There would be a dramatic increase in the truck traffic within residential neighborhoods associated with hauling wastewater from the holding tanks. Advantages of the holding tank alternative include low initial cost and less involvement in day to day operations for the District. Holding tank operations could be contracted out similar to garbage collection. Construction of new homes would need to follow the zoning and sanitation codes of Walworth County.

## 4.3 Type II Improvements

Type II improvements, we evaluated four alternatives. Each alternative includes the construction of a wastewater collection and conveyance system to transport flow to remote, centralized locations for subsequent treatment and disposal. The collection systems consist of a network of gravity sewers, pumping stations, and pressurized force mains. The layout of the wastewater collection facilities will vary for each of the alternative Type II improvement programs discussed in the following subsections of this report. The details specific to each alternative are illustrated and discussed.

The four alternatives evaluated include:

***Alternative IIA – Treatment at Existing Regional WWTPs*** – Construction of the collection systems necessary to convey wastewater to any of the existing regional wastewater treatment plants surrounding Geneva Lake, including the Lake Geneva WWTP, the Fontana-Walworth WWTP, and the WALCOMET WWTP. The Linn Sanitary District would need to purchase treatment capacity at the existing plants to implement this alternative.

***Alternative IIB – Treatment at New Decentralized WWTPs*** – Construction of the collection systems necessary to convey wastewater to new decentralized wastewater treatment facilities. This alternative would require the Linn Sanitary District to construct, own, and operate the decentralized treatment facilities. It is envisioned that the decentralized plants would discharge to rapid infiltration basins similar to the operation of the existing Lake Geneva WWTP, and would, therefore, be required to meet groundwater quality standards.

***Alternative IIC – Treatment at a New Regional WWTP*** - Construction of the collection systems necessary to convey wastewater to a new regional wastewater treatment facility constructed, owned, and operated by the Linn Sanitary District. It is envisioned that the new regional plant would discharge to the Nippersink Creek, and would, therefore, be required to meet surface water quality standards.

***Alternative IID – Pumping to Community Holding Tanks*** - Construction of the collection systems necessary to convey wastewater to new decentralized, or community holding tanks. This alternative is similar to Alternate IIB, except wastewater would be hauled to some other facility for treatment and disposal.

4.3.1 ***Alternative IIA – Treatment at Existing Regional WWTPs*** - The Linn Sanitary District includes areas that are currently unsewered within the Walworth County Metropolitan Sewerage District (WALCOMET) sewer service area, the City of Lake Geneva sewer service area, and the Fontana-Walworth Water Pollution Control Commission (FWWPCC) sewer service area. The sewer service area delineations are shown on Exhibits J, K, and L respectively. This alternative involves the purchase of wastewater treatment capacity at the existing Regional WWTPs, and construction of the collection and conveyance facilities necessary to transport wastewater generated within the Linn Sanitary District to the existing treatment plants.

***Lake Geneva Service Area*** - The existing Lake Geneva WWTP currently operates at approximately 70 to 80 percent of its 1.7 million gallon per day (MGD) capacity. Subarea 5 of the Linn Sanitary District planning area is located within the Lake Geneva sewer service area. To fully analyze the southeastern region of the planning area, Subarea 6 was also considered for connection to the Lake Geneva WWTP. We project that Subarea 5 will generate approximately 48,000 gallons per day (gpd), and that Subarea 6 will generate approximately 38,000 gpd, for a total of 86,000 gpd. The currently unused capacity of the 1.7 MGD plant is 340,000 gpd. Therefore, the plant currently has available capacity to treat the 86,000 gpd from Subareas 5 and 6.

The Linn Sanitary District met with representatives of the City of Lake Geneva in early 1999, to explore the possibility of treating wastewater from the District planning area at the Lake Geneva WWTP. The City expressed their desire to retain the entire treatment capacity of their plant for growth within their corporate boundaries, and pointed out that an

existing City ordinance requires all property served by their sanitary sewers to be within the incorporated City limits.

A second meeting between the District and the City was held in late 1999, in an effort to determine if the City would accept wastewater from a much smaller area, consisting of 37 homes immediately adjacent to their City limits. Lake Geneva has not to date provided any clear indication that they would be willing to connect any portion of the District's planning area to their system.

***Fontana-Walworth Service Area*** – The existing FWWPCC WWTP currently operates at about 65 percent of its 1.7 MGD capacity. Subarea 9 of the Linn Sanitary District planning area is located within the FWWPCC sewer service area. To fully analyze the southwestern region of the planning area, portions of Subareas 7 and 8 were also considered for connection to the FWWPCC plant. We project that Subarea 7 will generate approximately 14,000 gpd, Subarea 8 approximately 21,000 gpd, and Subarea 9 approximately 44,000 gpd, for a total of 79,000 gpd. The currently unused capacity of the 1.7 MGD plant is 595,000 gpd. Therefore, the plant currently has available capacity to treat the 79,000 gpd from Subareas 7, 8, and 9.

The Linn Sanitary District met with representatives of the Village of Fontana to explore the possibility of discharging their wastewater to the Village's wastewater collection system tributary to the FWWPCC plant. The Village shares capacity in the FWWPCC plant with the Village of Walworth and Kikkoman Foods. Fontana's policy is to provide sewer service only to residents of the Village. Annexation to Fontana of the areas served would be required.

The District again met with representatives of Fontana in late 1999, in an effort to work with the Village on accepting wastewater from a much smaller area, consisting of approximately 150 homes adjacent to their Village limits along the lakefront. Fontana stated their desire to retain their ownership in the FWWPCC WWTP for the residents of the Village.

The Linn Sanitary District also met with representatives of the Village of Walworth. Walworth stated they do not have any reserve capacity available at the FWWPCC plant.

***Walworth County Metropolitan Sewerage District Area*** – The existing WALCOMET WWTP operates at about 70 percent of its 3.9 MGD capacity. Subarea 1 of the Linn Sanitary District planning area is located within the WALCOMET sewer service area. To fully analyze the northwestern region of the planning area, Subarea 2 was also considered for connection to WALCOMET. We project that Subarea 1 will generate approximately 44,000 gpd, and Subarea 2 approximately 27,000 gpd, for a total of 71,000 gpd. The currently unused capacity of the 3.9 MGD plant is 1.2 MGD. The existing WALCOMET WWTP has sufficient available capacity to treat the 71,000 gpd from Subareas 1 and 2. A copy of WALCOMET's response to our request for information is included in Appendix E.

The Linn Sanitary District met with representatives of the Village of Williams Bay to discuss the possibility of discharging their wastewater to the Village's wastewater collection system tributary to the WALCOMET plant. The Village stated that they are not willing to accept wastewater from the portion of the planning area currently included in the

WALCOMET sewer service area, and are not interested in annexation of any portions of Linn Township.

The Linn Sanitary District met with representatives of the Geneva National Sanitary District (GNSD) in late 1999, to discuss the possibility of discharging their wastewater to the GNSD's pumping station tributary to the WALCOMET WWTP. This pumping station is located along Highway 50 approximately 1 ½ miles northwest of the District boundaries. The GNSD pumping station was designed to accept wastewater from the Geneva National development as well as the Lake Como area. The Lake Como Sanitary District has since constructed a sanitary sewer system discharging directly to WALCOMET, thereby bypassing the GNSD pumping station. The GNSD is currently studying their system's capacity with respect to the anticipated development within the Town of Geneva. The Sunset Hills Subdivision is also included in the area being studied by the GNSD, as the Town of Geneva portion of the subdivision is tributary to the Lake Como watershed. The GNSD Board indicated that they would consider accepting wastewater from the Linn Sanitary District area if GNSD had reserve capacity over and above of their own needs.

***Wastewater Collection and Conveyance*** – The necessary wastewater collection and conveyance system for Alternative IIA includes over 20 miles of gravity sewers, wastewater pumping stations, force mains, grinder pumps, and low-pressure sewers. A preliminary layout of the wastewater collection and conveyance system with discharge to the existing regional wastewater treatment plants to serve specific areas of the Linn Sanitary District is shown on Exhibits B, C, and D. A detailed cost analysis for Alternative IIA is included in Appendix B.

Our cost analysis for the north shore area showed no substantial cost savings with discharging to the Village of Williams Bay wastewater collection system due to the upgrades required to increase the capacity of their conveyance system. The wastewater collection system preliminary design for the Lake Geneva sewer service area would discharge to the 18-inch interceptor sewer on South Street.

Our cost analysis reflects discharge to the Fontana wastewater collection along the lakefront for study Subarea 9 only. A 1994 letter from the Village Engineer was used as the basis for "off-site" cost estimates for the Village of Fontana. Estimates for the collection system including Subareas 7, 8, and 9, are based on the construction of a force main discharging to the 21-inch interceptor sewer in the Village of Walworth northwest of Oak Hill Road.

***Summary*** – Treatment of wastewater at the existing Regional WWTPs is technically attractive and is the approach preferred by the Wisconsin DNR and the SEWRPC. This alternative does not require the permitting of any new wastewater treatment facilities. This alternative also would not require the Linn Sanitary District to construct, own, and operate wastewater treatment facilities of their own. However, as described in the preceding paragraphs, it appears that implementation of this alternative for those portions of the planning area south of Geneva Lake will be politically difficult for the foreseeable future.

*4.3.2 **Alternative IIB - Treatment at New Decentralized WWTPs*** - Decentralized or "Community" wastewater treatment systems provide sewage collection, treatment, and disposal of relatively small volumes of wastewater for groups of homes located relatively close together. Decentralized wastewater treatment methods available include recirculating

sand or gravel filters, intermittent sand filters, small "package" wastewater treatment plants, sequencing batch reactors, and land application or spray irrigation type treatment systems.

Recirculating sand or gravel filters receive and treat effluent from a septic tank or tanks before the wastewater is discharged. The sand or gravel filter consists of a bed of granular material 2 to 3 feet deep with distribution piping to spread the wastewater over the filter beds and collection piping below the filters which discharge to a recirculation tank. Recirculation of effluent enhances the treatment effectiveness.

Intermittent sand filters also receive and treat effluent from a septic tank or tanks before the wastewater is discharged. The sand filter consists of a bed of granular material approximately 2 feet deep with distribution piping to intermittently spread the wastewater over the filter beds. The wastewater percolates through in a single pass and is collected in an underdrain and transported to a line for further treatment or discharge.

Small package wastewater treatment plants utilize the activated sludge process. The number of processes used and the complexity of the treatment system depends on the effluent water quality requirements. Effluent quality would be determined by method of disposal. Effluent discharged to a surface water stream would have different water quality requirements than effluent infiltrated back into the groudwater.

Land application or spray irrigation systems discharge treated and chlorinated effluent uniformly to the ground surface through a piping system. Final treatment is obtained through infiltration.

Any type of new wastewater treatment system would require approval and permitting from the Wisconsin DNR. Based upon our discussions with the Municipal Wastewater

Permitting Section staff, we eliminated recirculating/intermittent sand or gravel filters, and land application or spray irrigation type treatment systems from further consideration.

The Wisconsin DNR also indicated that any new activated sludge plant discharging to surface water streams would be required to discharge effluent outside of the Geneva Lake watershed. Because of the considerable cost to convey either the raw wastewater or the treated plant effluent from multiple plants beyond the limits of the watershed, we discarded this option at face value.

For the above reasons we evaluated the alternative of decentralized wastewater treatment plants discharging to rapid infiltration basins, similar to the existing Lake Geneva WWTP. Disposal of the treated effluent by infiltration provides the additional benefit of retaining the water drawn from the groundwater supply within the Geneva Lake watershed.

Effluent discharged to the groundwater table is required to meet the provisions of the Wisconsin Administrative Code, Section NR 140, which regulates groundwater quality standards and Section NR 206, which regulates land disposal of municipal and domestic wastewater. The driving force behind the specific treatment process selected for groundwater discharge is the requirement for total nitrogen removal. Sequencing batch reactors (SBRs) provide an efficient means of achieving total nitrogen removal using the nitrification/denitrification process.

A SBR operates similar to a conventional activated-sludge treatment process, except that several of the treatment processes are performed in sequence within a single tank. A photo of an SBR is shown in Figure 6. The treatment sequence for nitrification/denitrification includes 1. Fill, 2. Fill/Stir, 3. Aerobic Stir

(Aeration/Nitrification), 4. Anoxic Stir (Denitrification) , 5. Sedimentation/Clarification, 6. Decant, 7. Idle. A certain amount of sludge is wasted after each cycle. Dual tanks would be provided for operational flexibility, and to accommodate varying flow rates. The absorption pond would consist of multiple cells for flexibility in operation and to provide a rest period between dousing.

A detailed cost analysis of the decentralized wastewater treatment and collection system alternative is included in Appendix B. Due to poor soil conditions, and the probable ability to purchase capacity at the WALCOMET WWTP, decentralized wastewater treatment was not considered for the north shore area of the Linn Sanitary District. The cost analysis for Alternative IIB is based on treating wastewater generated north of Geneva Lake at an existing Regional WWTP, similar to Alternative IIA.

The decentralized wastewater treatment Alternative IIB includes a wastewater collection system similar the regional treatment alternatives, but includes three treatment sites. A diagram of the treatment process is shown on Exhibit E. A preliminary layout of the wastewater collection and conveyance system with discharge to decentralized wastewater treatment plants to serve specific areas along of the south shore of Geneva Lake is shown on Exhibits F and G.

The decentralized wastewater treatment alternative has the same wastewater collection system advantages listed above for the regional treatment system which assures all wastewater is collected and treated in a safe manner. The decentralized alternative does not require the additional costs to upgrade the existing "offsite" wastewater collection and treatment facilities owned by the Villages of Fontana or Walworth.

This alternative would require conditional use permits for the treatment plant sites. However, this alternative would provide the Sanitary District a greater degree of control over growth throughout the planning area. Another advantage of the decentralized treatment alternative is that annexation to the adjacent municipalities is not an issue.

*4.3.3 **Alternative IIC – Treatment at a New Regional WWTP*** - Graef, Anhalt, Schloemer & Associates completed a study for the Town of Linn in 1999 which investigated the costs associated of providing sanitary sewer service to that portion of the Linn Sanitary District along the south shore of Geneva Lake from the Village of Fontana to the City of Lake Geneva. That report recommended construction of a conventional wastewater collection system and a new regional wastewater treatment plant, along Willow Road east of Highway 120, discharging to the North Branch of Nippersink Creek.

The current Regional Water Quality Management Plan does not include a new wastewater treatment plant discharging to Nippersink Creek. The regional management plan must be amended to implement this alternative. In addition, the Wisconsin DNR has indicated hesitation to consider this plan, given the fact that sufficient wastewater treatment capacity currently exists at the three existing regional facilities. We have included this alternative in our analyses in response to the Town's report.

Our growth projections are significantly lower than those presented in the Graef, Anhalt, Schloemer report, which projects approximately 2,300 homes within the region of the Linn Sanitary District south of Geneva Lake. They project the need for a 0.5 MGD regional treatment plant.

Our analysis is based on the SEWRPC projections for the year 2020, or about 900 homes. Based on the SEWRPC projections, a new regional plant would only be required to have a capacity of about 0.17 MGD. For simplicity, our analysis is based on a 0.2 MGD plant.

If pursued, this alternative will most likely involve difficulties in obtaining approval from the Wisconsin DNR and SEWRPC. The District must also be prepared to address public opposition to issuing a conditional use permit for a fourth regional treatment plant in the Geneva Lake area.

Of all the alternatives considered, the construction of a new regional plant would in the end provide the greatest pressure for continued growth within the regions south of Geneva Lake.

A preliminary layout of the wastewater collection and conveyance system with discharge to a new regional wastewater treatment plant to serve specific areas within the south shore region of the Linn Sanitary District is shown on Exhibits H and I. A detailed cost analysis for Alternative IIC is included in Appendix B.

*4.3.4 **Alternative IID – Pumping to Community Holding Tanks*** – This alternative was conceived as a variation on Alternatives I and IIB. Similar to Alternative I, new wastewater treatment facilities would not be constructed. Wastewater would be held in storage tanks for subsequent treatment at a remote facility. Similar to Alternative IIB, wastewater collection facilities would be constructed to convey flow from specific neighborhoods to a central location for subsequent treatment and disposal.

The layout of the wastewater collection and conveyance system with discharge to regional holding tanks to serve specific areas within the south shore area of the Linn Sanitary District is the same as that of Alternative IIB. A detailed cost analysis for Alternative IID is included in Appendix B. The operation and maintenance costs are based the wastewater flow generated by the future population. The actual operation costs will be less in the early years of the planning period, and increase as the population increases.

Multiple holding tanks would be provided at each site for system redundancy and backup operations. Each tank would be sized to provide 2 days of storage based on the design population for a total storage capacity of 4 days under normal operating conditions. The holding tanks considered are similar to slurry storage tanks used for agricultural operations. The holding tanks would include covers and other components to control odors. The holding tanks would be located near collector roads or County highways due to the anticipated truck traffic generated by the operation. The holding tanks would discharge to tanker trucks for transport to a remote wastewater treatment plant or plants.

With an individual holding tank system (Alternative I) a significant amount of truck traffic would be experienced in residential areas. A community or regional type holding tank system has the benefit of moving the truck traffic out and away from the residential neighborhoods. This type of system could also be easily dismantled should sanitary sewer service become available from one or all of the existing regional wastewater treatment plants. This alternative would require conditional use permits for each site.

## 4.4 Cost Comparison

The capital and annual operation and maintenance costs for the five alternatives were compared. The detailed cost estimates for each alternative are included in Appendix B. The operation and maintenance costs for each alternative are included in Appendix C. A summary of the present worth cost comparison is presented in Table 3.

**Linn Sanitary District**
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**TABLE 3**

**Cost Comparison**

**Opinion of Probable Present Worth Cost ($1,000,000)**

| | Alternative I | Alternative IIA | Alternative IIB | Alternative IIC | Alternative IID |
|---|---|---|---|---|---|
| Capital Cost | $9.3 | $25.0 | $30.3 | $31.7 | $28.0 |
| Present Worth of Salvage Value | ($1.0) | ($2.1) | ($2.7) | ($2.7) | ($2.5) |
| Present Worth of O&M | $32.9 | $6.2 | $6.0 | $6.0 | $13.8 |
| Total Present Worth Cost | $41.2 | $29.1 | $33.6 | $35.0 | $39.3 |
| Number of Homes* | 1636 | 1292 | 1292 | 1292 | 1292 |
| **Present Worth Cost per Home** | **$25,200** | **$22,500** | **$26,000** | **$27,100** | **$30,400** |

* The number of homes shown for the alternatives including a collection system is based on the 2020 design population, the number of homes shown for the holding tank alternative is based on the number of existing septic systems in Areas 1, 2, and 5-9.

The present worth cost consists of the capital cost plus the present worth value of the operation and maintenance costs less the present worth of the salvage value. The present worth cost evaluation is based on an interest rate of 6.875% and a 20-year planning period. The interest rate was established by WDNR for facility planning reports. Alternative IIA is the most cost-effective alternative.

# 5. SELECTED PLAN

## 5.1 Introduction

This section describes the proposed wastewater collection, treatment and disposal improvements within the Linn Sanitary District planning area through the year 2020. This section also discusses the environmental impacts of the proposed improvements.

The direction taken by the District will obviously have a significant financial impact on some or all of the District's constituents. The use of on-site systems has and continues to be a method acceptable to the State for wastewater treatment and disposal. We recommend that the District undertake a comprehensive public awareness and hearing process to solicit public opinion. Residents must be made aware that the District is about to undertake an aggressive on-site system inspection and compliance enforcement program with a clear understanding of the ramifications for those homeowners having non-compliant systems.

Should the District receive a public response which endorses the construction of the collection systems necessary, we recommend that Alternative IIA be implemented as the cost-effective option for planning Subareas 1 and 2 north of Geneva Lake. For the planning Subareas south of Geneva Lake, we would recommend Alternative IIB be implemented as the cost-effective solution should future negotiations with the City of Lake Geneva and the Villages of Fontana and Walworth continue to prove unproductive.

The remainder of this section discusses the proposed improvements that would be required should public acceptance of the abandonment of the existing on-site systems in favor of system-wide wastewater collection and treatment be received.

*5.1.1 **North Shore Area*** – For the areas north of Geneva Lake, we recommend the construction of a wastewater collection system to convey wastewater from Subareas 1 and 2 to the Geneva National Sanitary District conveyance system for subsequent treatment and disposal at the existing WALCOMET WWTP.

For the remaining areas north of Geneva Lake (Subareas 3 and 4), we recommend that the District implement a septic system inspection and maintenance plan to ensure the proper operation and maintenance of existing septic systems, as well as the proper installation of new septic systems.

*5.1.2 **South Shore Area*** – For the areas south of Geneva Lake, the cost-effective system-wide alternative is construction of the necessary wastewater collection systems to convey wastewater from the planning area to the existing Lake Geneva and Fontana-Walworth WWPT's for treatment and disposal. The District may continue to pursue this option while other planning efforts proceed.

The next most cost-effective system-wide alternative is the construction of collection systems and treatment at decentralized wastewater treatment plants. The present worth cost of this alternative is only 3 percent more than the individual holding tank alterntive. This alternative provides many potential benefits such as lower operation and maintenance cost than that associated with holding tanks, and no additional truck traffic. This alternative will require a conditional use permit for the decentralized treatment plants from the Town of Linn and Walworth County.

The holding tank alternative is described above. A detailed description of the collection system for both the north and south shores, along with decentralized treatment facilities for the south shore, is described below.

## 5.2 Wastewater Collection System

The wastewater collection and conveyance system for Alternative IIB includes 21 miles of gravity sewer, 13 wastewater pumping stations, 10 miles of force main, 287 grinder pumps, and 7 miles of low pressure sewer. The system has been designed to collect wastewater from the concentrated areas of problematic on-site wastewater disposal systems. A preliminary layout of the wastewater collection and conveyance system to serve the north shore area is shown on Exhibit B. The collection system layout to serve the south shore area is shown on Exhibits F and G.

The sanitary sewer system components are sized based upon the year 2020 design population of the areas tributary to the wastewater collection system. The gravity collection system would consist of sewer mains, building services, and precast concrete manholes. Individual residences that cannot be served by gravity would be served by grinder pumps and low pressure sewers. A total of 13 sewage lift stations would be required to convey wastewater to the interceptor sewers or decentralized treatment plants. Small engine generators housed in fiberglass enclosures would be provided for each pumping station to provide continued operation during power failures.

Our opinion of probable capital costs for the wastewater collection and conveyance system is $25,010,000, including contingencies, engineering services, legal fees, and land acquisition.

## 5.3 Decentralized Wastewater Treatment System

Decentralized wastewater treatment systems must be located a minimum of 1,000 feet from any existing residential structure, as required by Walworth County Planning and Zoning, and would require applications for conditional use permits.

Sequencing batch reactor decentralized wastewater treatment systems would include rectangular cast-in-place concrete tanks. The tanks vary in size, depending on the design flow, and would be approximately 12 feet wide by 20 feet long by 17 feet high. Dual tanks would be provided to accommodate operational requirements. Bar screens would be provided for the raw sewage influent. The mechanical equipment consists of 2-7.5 HP aerator/mixer/decanters. Additional components consist of positive displacement blowers, coarse bubble diffusers, submersible sludge pumps, and integrated control systems. Sludge storage would be provided with a steel or concrete covered tank.

The infiltration basins would be located in areas of suitable soils. The basins would consist of multiple cells for flexibility in operation and to provide a rest period between dousing. The cells would range in size from 40 to 50 feet square. Access roads would be constructed between each cell for maintenance access as well as from the plant site to an adjacent roadway.

Electrical utility power would be extended to each treatment facility, and a back-up power generator would be provided for emergency operation.

Effluent pumping stations and force mains would be provided for discharge to the effluent disposal infiltration sites. The exact locations for the treatment sites and infiltration basins are yet to be determined. A schematic of the treatment process is shown on Exhibit E.

## 5.4 Environmental Considerations

*5.4.1 Wastewater Collection System* - Construction of a sanitary sewer system will have a significant positive environmental impact due to improvements in groundwater and surface water quality resulting from abandonment of the existing on-site wastewater disposal systems. The only long term detrimental impact resulting from a wastewater collection system is the electrical power consumption of the wastewater pumping stations. Consideration of the primary environmental corridors should be taken into account with respect to the density of any future development within the Sanitary District.

Some temporary adverse impacts resulting from the construction activities will occur. These include a modest increase in noise and air pollution. To minimize these effects, contractors will be required to limit the working hours and control the dust during construction activities.

Governmental agencies were contacted to obtain information regarding the environmental impacts resulting from the construction. Information from the State Historical Society indicates there are 12 locations within the study area of known archaeological remains, including 6 burial sites. There were no reports of structures that would be affected by construction. The installation of wastewater collection facilities rarely have the potential to affect historical structures and archaeological sites due to their location within road right of ways, which have been previously disturbed.

The Wisconsin DNR Bureau of Endangered Resources indicates that there are no recent occurrences of records of Endangered, Threatened, or Special Concern species within the project area. Their files do contain an older record of a special concern species near the

Northwestern Military Academy property. Installation of wastewater collection facilities rarely have the potential to affect endangered resources. The State Historical Society and Bureau of Endangered Resources will be contacted again after more definitive plans are available. A copy of the correspondence from the State Historical Society and Bureau of Endangered Resources is included in Appendix E.

*5.4.2. **Wastewater Treatment System*** - The exact site for each of the decentralized treatment facilities and infiltration basins has not been identified. The sites would be selected based upon County criteria, availability, cost, and environmental impacts. Much of the area available is agricultural fields, so the environmental impacts of the construction of wastewater treatment plants will only be temporary in nature from the increased noise and dust produced during the construction facilities. The only long term detrimental impact is the utilization of electric power for the treatment process. The beneficial impacts from the treatment plant construction include improvements in the groundwater and surface water quality in the Linn Sanitary District. The treatment plant effluent would be of a high quality, and therefore, not have any adverse environmental impacts.

Disposal of digested sludge on agricultural fields provides significant environmental benefits for agricultural lands by increasing the general organic content of the soil. Sludge also provides some fertilizer value, thus reducing the chemical fertilizer requirements. Digested sludge is low in odor, does not volatize to the atmosphere, and will not attract insects, rodents and other undesirable creatures. Temporary adverse environmental effects will occur during construction of the sludge digestion and storage facilities. Increased energy consumption for sludge digestion and storage prior to agricultural application is the only

long-term adverse impact. There are no other anticipated adverse impacts on the environment.

As noted above, the DNR Bureau of Endangered Resources indicates that there are no recent occurrences of records of Endangered, Threatened, or Special Concern species within the project area other than near the Northwestern Military Academy property. The State Historical Society indicated there are locations within the study area of known archaeological remains although there were no reports of structures that would be affected by construction. The State Historical Society and Bureau of Endangered Resources will be contacted again after treatment sites are selected.

*5.4.3* ***Environmental Impacts Summary*** - The environmental effects of the wastewater collection, treatment, and sludge disposal facilities for Alternative IIB are summarized in Table 4.

## Linn Sanitary District
## Facilities Planning Report

## TABLE 4

## Environmental Impacts Summary

| | Collection System | Treatment Plants | Sludge Disposal |
|---|---|---|---|
| Cultural Resources | N | N | N |
| Floodplains and Wetlands | + | + | N |
| Agricultural Lands | N | N | + |
| Wild and Scenic Rivers | N | N | N |
| Fish and Wildlife | + | + | N |
| Endangered Species | N | N | N |
| Air Quality | T | T | T |
| Water Quality and Uses | + | + | N |
| Noise, Odor, Aesthetics | T | T | T |
| Land Use | U | U | U |
| Energy Requirements | - | - | - |
| Recreational Opportunity | + | + | N |

Legend
+ = improvement
N = no effect
- = adverse effect
T = temporary adverse affect
U = unknown

## 6. FINANCIAL CONSIDERATIONS

Alternative I addresses wastewater treatment and disposal needs on an individual house by house basis. The District must adopt and enforce a rigorous inspection and maintenance program. Dwelling units that are determined to have failing and/or non-compliant systems would be forced to install the necessary improvements at the expense of the individual property owners. The total probable costs presented in Section 4 represent maximum costs, assuming that all of the existing on-site systems are replaced with holding tanks. The cost per household is accurate for those homes where holding tanks are in fact installed. Households having compliant systems would incur no additional cost.

Should a system-wide approach be implemented, the total cost for the improvements would be shared by all residents. The capital cost for a system-wide improvements program is expected to be financed through Clean Water Fund Loans from the Wisconsin DNR. It is expected that the decentralized wastewater treatment plants and most of the collection system improvements would be eligible for Clean Water Fund Loans. Cost incurred for serving individual buildings such as building services or grinder pumps (if purchased by homeowners) are ineligible. It is anticipated that funds for these improvements would be borrowed from local sources.

We anticipate that the project will meet the requirements of the 2/3 rule, which affects the loan interest rate. A subsidized interest rate is available to municipalities in which at least two-thirds of the initial flow will be for wastewater originating from pre-October 18, 1972, residences. The credit for working septic systems is not expected to apply to this project as the Linn Sanitary District was created before May 14, 1982.

Should the District apply for a Clean Water Fund Loan to cover the $30,300,000 capital cost (less ineligible costs) for Alternative IIB at a rate of 3.78%, the total annual loan repayment costs over a 20-year period would be $2,200,000. This would be recovered through connection charges and the balance of the cost assessed to properties within the District.

The projected annual operating and maintenance costs for Alternative IIB are $575,000. Currently there are approximately 1,100 users in the District in the areas proposed for construction of a wastewater collection system. The annual average charge per user would therefore be $525, and the average quarterly user charge $130.

In addition to the charges by the District, each user would incur costs to abandon their on-site system and to construct a service line from the house to the District's system. These private property costs are estimated at approximately $1,500. The anticipated costs for a typical user under Alternative IIB are list in Table 5.

**Linn Sanitary District**
**Facilities Planning Report**

**TABLE 5**

**Anticipated Costs for Typical Users**

| | |
|---|---|
| Private Property Costs | $1,500 |
| Connection Charges | $4,000 |
| Annual Assessment | $1,700 |
| Quarterly O&M Costs | $130 |

The up-front cost to the typical user would be approximately $5,500 with an annual cost of about $2,200 over the 20 year loan repayment period.

# Linn Sanitary District

## Facilities Planning Report Amendment

## June 2001


**Prepared by:**

**Baxter & Woodman, Inc.**
**Consulting Engineers**
**256 South Pine Street**
**Burlington, Wisconsin**
**262.763.7834**


BAXTER WOODMAN
*Consulting Engineers*

APPROVED 7/25/01

Project No. 010147

7-1

## FACILITIES PLANNING REPORT AMENDMENT

The Linn Sanitary District prepared a Facilities Planning Report in January of 2000. The purpose of this amendment to the January 2000 report is to describe the public opinion received from the Facilities Planning Report and the recommended action regarding alternatives for wastewater disposal within the District.

Wastewater treatment and disposal in the Linn Sanitary District is currently provided by on-site systems. The District has experienced problems with failing septic systems in specific areas of the District and dependence on the existing on-site wastewater disposal systems within these problem areas will result in additional septic system failures, degradation of groundwater quality, and deterioration of water quality in Geneva Lake. The Facilities Planning Report evaluated alternatives to continued reliance upon the on-site systems. The 2 types of alternatives for wastewater treatment and disposal presented were:

***Type I Improvements*** - Improvement programs which address wastewater treatment and disposal needs on an individual house by house basis. The District would adopt and enforce a rigorous inspection and maintenance program. Dwelling units that are determined to have failing and/or unacceptable systems would be encouraged to install the necessary improvements at the expense of the individual property owner. Some state and federal cost assistance may be available. This approach directly targets those individual homeowners whose inadequate systems pose a threat to groundwater and Geneva Lake water quality. Households having compliant systems would incur no additional cost.

***Type II Improvements*** - Improvement programs which address wastewater treatment and disposal needs on a District-wide or neighborhood by neighborhood basis. These programs would involve the elimination of the existing on-site systems, and construction of collection and pumping systems to convey wastewater to remote site(s) for treatment and ultimate disposal. The four alternatives analyzed for the Type II improvements were:

**Alternative IIA** – Treatment at Existing Regional WWTP's
**Alternative IIB** – Treatment at New Decentralized WWTP's
**Alternative IIC** – Treatment at a New Regional WWTP
**Alternative IID** – Pumping to Community Holding Tanks

The Facilities Planning Report stated that the direction taken by the District will obviously have a significant financial impact on some or all of the District's constituents. The use of on-site systems has and continues to be a method acceptable to the State for wastewater treatment and disposal. The report recommended that the District undertake a comprehensive public awareness and hearing process to solicit public opinion. Residents must be made aware that the District is about to undertake an aggressive on-site system inspection and maintenance program, with a clear understanding of their social responsibility for the repair and maintenance of their on-site wastewater disposal system.

The Facilities Planning Report recommended that if the District received a public response which endorsed Type II improvements, the construction of a wastewater collection system, that Alternative IIA be implemented as the cost-effective option for planning Subareas 1 and 2 north of Geneva Lake. For the planning Subareas south of Geneva Lake, the report recommended Alternative IIB be implemented as the cost-effective solution should future negotiations with the City of Lake Geneva and the Villages of Fontana and Walworth continue to prove unproductive.

During the summer of 2000 the Linn Sanitary District implemented a public awareness and hearing process to solicit public opinion regarding alternatives for wastewater disposal within the District. The District mailed 4 newsletters informing and explaining the results of the Facilities Planning Report to each landowner in the District. The newsletters also informed the residents that the District would begin an intensive inspection and enforcement program of the on-site wastewater disposal systems, which would affect those homeowners having non-compliant systems. The District held meetings with over 20 separate homeowners associations in the District and held public informational meetings on both the north and south shores of Geneva Lake to inform the residents of the Facilities Planning Report findings and recommendations. The public informational meetings were well attended with over 100 residents present at each. Numerous news articles were also published regarding the alternatives available and the advantages/disadvantages of each.

After an exhaustive public informational campaign, the District mailed a summary letter and Sanitary Opinion Survey to each landowner in the District. The Sanitary Opinion Survey had a 52% return rate of the 1914 surveys mailed, and had 61% returned from owners of improved parcels. The results regarding support of the Type II alternative for future wastewater treatment and disposal in the Linn Sanitary District can be found in Table A. The table shows the total number of respondents for each subdivision, the number and percentage of respondents supporting the Type II alternative, and the response percentage of all improved parcels within each subdivision.

Seventy-eight percent of the respondents supported the Type I alternative, which addresses wastewater disposal on an individual, house-by-house basis. When factoring in the non-respondents as favoring the Type I alternative, 89% of the landowners supported the Type I alternative. Support for the Type II alternative came from only a few small subdivisions, namely The Birches, and S.B. Chapin Subdivision, which had more than 50% of respondents supporting the Type II alternative. Support for the Type II alternative at the 30% level or above included Camp Sybil, Cisco Beach, Elgin Club, Oak Shores, and Rowena Park subdivisions.

***Implementation*** - Based upon the results of the Sanitary Opinion Survey, the District is in the process of implementing a septic system inspection and management program. This will ensure the proper operation and maintenance of the existing systems as well as the proper design and installation of new septic systems. The inspection and management program will include a visual inspection of each septic tank and leachfield or drywell to identify any malfunctioning systems. The District intends to inspect approximately 33 percent of the systems per year over the next 3 years. Subsequent to the initial inspections, the District will implement a maintenance schedule for the on-site systems, thereby dovetailing with the mailing of septic tank pumping reminders by Walworth County. When deficiencies are found during an inspection, the District will inform the owners of the need for corrective action.

Upon completion of inspections, the District will make the results available to the homeowners as soon as possible. Upon the completion of inspections within a subdivision or sub-area, a general summary of the inspection results will be completed and made available to the subdivision or sub-area residents. This summary would not include any specific names or lot numbers but would summarize the overall subdivision or sub-area inspection findings. This would give homeowners and subdivisions the opportunity to reconsider the best long-term sanitary waste management alternative not only on an individual basis but on a subdivision or District sub-area basis. If, upon revisiting the alternatives, the sub-area or subdivision feels that a wastewater collection system would be the desired alternative the District will approach the neighboring municipalities to explore the possibilities of purchasing conveyance and treatment capacity. This process would be initiated and driven by the residents of those interested areas.

# Linn Sanitary District

## Facilities Planning Report Amendment

### Table A

### Summary of 2000 Sanitary Opinion Survey

| Subdivision Name | Number of Respondents | Number of Type II | Type II Response % | Improved Parcels Response % |
|---|---|---|---|---|
| Unplatted Lands | 144 | 41 | 28% | 60% |
| Certified Survey Maps | 89 | 20 | 22% | 52% |
| Academy Estates | 10 | 2 | 20% | 77% |
| Alta Vista Estates | 5 | 0 | 0% | 56% |
| Ara Glen Estates | 2 | 0 | 0% | 40% |
| The Birches | 11 | 6 | 55% | 61% |
| The Birches 1st Addition | 21 | 4 | 19% | 48% |
| The Birches 2nd Addition | 11 | 2 | 18% | 69% |
| Bonnie Brae | 6 | 1 | 17% | 55% |
| Estates of Black Point Condos | 5 | 0 | 0% | 63% |
| Camp Sybil | 26 | 9 | 35% | 63% |
| Casa Sueno Condo | 1 | 1 | 100% | 100% |
| Ceylon Court Estates | 3 | 0 | 0% | 75% |
| S.B. Chapin | 5 | 3 | 60% | 38% |
| Cisco Beach | 98 | 34 | 35% | 69% |
| Bonnie Brae Condo | 1 | 0 | 0% | 33% |
| Chicago Club | 2 | 1 | 50% | 40% |
| Edgewater Terrace | 20 | 4 | 20% | 69% |
| Elgin Club | 11 | 5 | 45% | 52% |
| The Folly Sub | 1 | 0 | 0% | 14% |
| Forest Rest | 3 | 0 | 0% | 33% |
| Geneva Oaks | 14 | 1 | 7% | 70% |
| enevista | 21 | 2 | 10% | 50% |
| Lawrence Addition to Genevista | 16 | 2 | 13% | 64% |
| Hutchinson | 1 | 0 | 0% | 25% |
| Lake Geneva Beach | 60 | 15 | 25% | 83% |
| Lake Geneva Club | 12 | 2 | 17% | 38% |
| Lake Geneva Highlands | 46 | 7 | 15% | 54% |
| Lake Geneva Terrace | 14 | 1 | 7% | 93% |
| Lake View Park | 26 | 5 | 19% | 60% |
| The Lindens | 7 | 1 | 14% | 70% |
| Linwood | 2 | 2 | 100% | 40% |
| Linwood 1st Addition | 6 | 1 | 17% | 67% |
| Loramoor | 2 | 0 | 0% | 33% |
| Maple Hills | 33 | 3 | 9% | 89% |
| Northwestern Estates - Condo | 1 | 0 | 0% | 33% |
| Oak Shores | 11 | 5 | 45% | 55% |
| Odden Park | 8 | 1 | 13% | 80% |
| Paradise Vista | 8 | 1 | 13% | 62% |
| Robinson Hillside 1st Addition | 12 | 1 | 8% | 60% |
| Robinson Hillside 2nd Addition | 13 | 1 | 8% | 35% |
| Robinson Hillside 3rd Addition | 7 | 0 | 0% | 78% |
| Robinson Hillside | 18 | 4 | 22% | 64% |
| Rowena Park | 20 | 6 | 30% | 51% |
| Shore Haven | 28 | 4 | 14% | 70% |
| Sunset Hills | 40 | 0 | 0% | 83% |
| Sunset Hills Shores | 4 | 0 | 0% | 40% |
| Sylvan Trail | 8 | 1 | 13% | 89% |
| Trinke Estates | 23 | 7 | 30% | 66% |
| Wooddale | 60 | 11 | 18% | 59% |
| **Total** | **996** | **217** | **22%** | **61%** |