Linn Sanitary District

Town of Linn,

Walworth County, Wisconsin

Facilities Planning Report Amendment

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EXECUTIVE SUMMARY

The purpose of this study is to evaluate the current and future wastewater disposal needs of the Fontana-Walworth study area of the District and amend the cost-effective analysis completed in the Year 2000. The 540 acre Study Area extends from Basswood Drive west to the Village of Fontana and south from Geneva Lake to Highway B and contains approximately 265 homes.

Extensive efforts were conducted to establish the condition of the existing septic systems (POWTS), including detailed inspections conducted by the Linn Sanitary District. Approximately 19% of the systems were found to be adequate, 43% required minor repairs, and 16% of the systems were deemed to be illegal. Other factors that come into play in the evaluation of the sanitary disposal needs include the existing land use, population, topography, and soil conditions. The soils in the Study Area are predominantly loam soils, which have limitations for installing POWTS related to separation from seasonal high ground water, slow water movement through the soils, filtering capacity, and slope. These factors; illegal systems, density of existing development, lack of space for replacement systems, age of the existing systems, poorly drained soils, and steep slopes validate the need for improvements to the existing sanitary disposal system in the Study Area. Improvements are needed to eliminate human health hazards and/or to avoid degradation of surface water and groundwater quality.

With regard to future conditions, future land use and population is taken into account. From this information, wastewater flows and loadings can be projected. The total projected summertime peak residential population for the Study Area for the Year 2030 is 1,400. The average wastewater flow expected from the Study Area for the Year 2030 is more than 98,000 gallons per day, with a peak hourly flow rate of nearly 365,000 gallons per day.

Based on the information above, we conducted a cost-effective analysis of viable alternatives for wastewater treatment and disposal. The alternatives can generally be classified into two distinct categories:

- Type I improvements address wastewater treatment and disposal needs on an individual basis. The District would adopt and enforce a rigorous inspection program. Owners of illegal POWTS would be forced to repair or replace their systems with holding tanks at their own expense.

- Type II improvements address wastewater treatment and disposal needs on a regional basis. This program would eliminate the existing POWTS, and necessitate the construction of a collection system to convey wastewater to a treatment facility. The collection system would consist of gravity sewers, low pressure sewers, wastewater lift stations, and force mains to convey wastewater from homes to a treatment facility. Two Type II alternatives were considered. Type IIA improvements would require the construction of a collection

system to convey wastewater to the Village of Walworth with treatment at the existing (centralized) Fontana-Walworth Water Pollution Control Facility. Type IIB improvements would also include the construction of a collection system, but treatment would be provided at a proposed decentralized wastewater treatment facility owned and operated by the Linn Sanitary District.

In order to compare the alternatives we prepared a present worth cost (life-cycle cost) analysis of each alternative:

Alternative	Present Worth Cost per Home (over 20-years)	Monthly Loan Payments for Initial Construction Cost (20-yrs at 6%)
Type I – Holding Tanks	**$23,500**	**$57**
Type IIA – Sewer and Centralized Treatment	**$35,000**	**$236**
Type IIB – Sewer and Decentralized Treatment	**$38,000**	**$272**

Public meetings were held by the District to assess the opinions of the property owners on the alternatives. Based on the comments received and the cost-effective analysis, and the present political environment the District Commissioners chose to implement Type I improvements which addresses wastewater treatment and disposal needs on an individual house by house basis. This approach directly targets failing or inadequate POWTS that pose a threat to groundwater and Geneva Lake water quality. With this approach property owners with code compliant systems who maintain their systems regularly would not pay for a new collection system for others who neglected their systems and cannot replace them. To assure the protection of the groundwater quality the District is enforcing a rigorous POWTS inspection and maintenance program. Dwelling units that are determined to have failing and/or non-compliant systems are forced to make improvements to bring their POWTS into compliance with State and County codes.

1. INTRODUCTION

1.1 General

The Linn Sanitary District is located in the Town of Linn, in southern Walworth County, Wisconsin. Wastewater from homes in the District is treated by private on-site waste treatment systems (POWTS). The southwesterly portion of the Linn Sanitary District is within the Fontana-Walworth Water Pollution Control Facility - Sewer Service Area (SSA), the northwesterly portion of the District is within the Walworth County Metropolitan Sewerage District (WalCoMet) SSA, and the easterly portion of the Linn Sanitary District is within the City of Lake Geneva SSA.

1.2 Study, Purpose and Scope

The purpose of this study is to update the Linn Sanitary District Facilities Planning Report completed in the year 2000. Over the last few years the Fontana-Walworth Water Pollution Control Facility has been in the process of expanding their treatment capacity. Over the last few years, the Linn Sanitary District has also been evaluating the current and future wastewater disposal needs of the Fontana-Walworth SSA portion of the District.

The study area is part of a larger Facilities Planning Report completed for the entire Linn Sanitary District in January of 2000. The purposes of a facilities planning report update 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 the following major tasks:

Assessment of Current Situation – The existing conditions in the facilities planning area are evaluated, including the performance of the existing private on-site waste treatment systems.

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.

The scope of this study is to update the Year 2000 cost effective analysis of alternative wastewater collection and disposal facilities for the Fontana-Walworth Study Area of the Linn Sanitary District. Our analysis also includes collecting and evaluating information related to the condition of the existing POWTS.

1.3 Study Area

The specific area for this study is in the southwestern portion of the District. The area includes lands near the South Shore Club Condominiums (formerly the Northwestern Military Academy property) and extending from Basswood Drive west to the Village of Fontana, and south from Geneva Lake to County Highway B. The 540 acre Study Area is shown on Figure 1 and is comprised of 315 acres within the existing Fontana-Walworth SSA

portion of the Linn Sanitary District as well as an additional 225 acres of land extending south of the Fontana-Walworth SSA to County Highway B. The Study Area includes approximately 265 homes in the Oak Shores Subdivision, Lake Geneva Club Subdivision, Chicago Club Condominiums, Shore Haven Subdivision, Camp Sybil Subdivision, South Shore Club Condominium, Maple Hills Subdivision, Academy Estates Subdivision, and various Certified Survey Maps and unplatted parcels.

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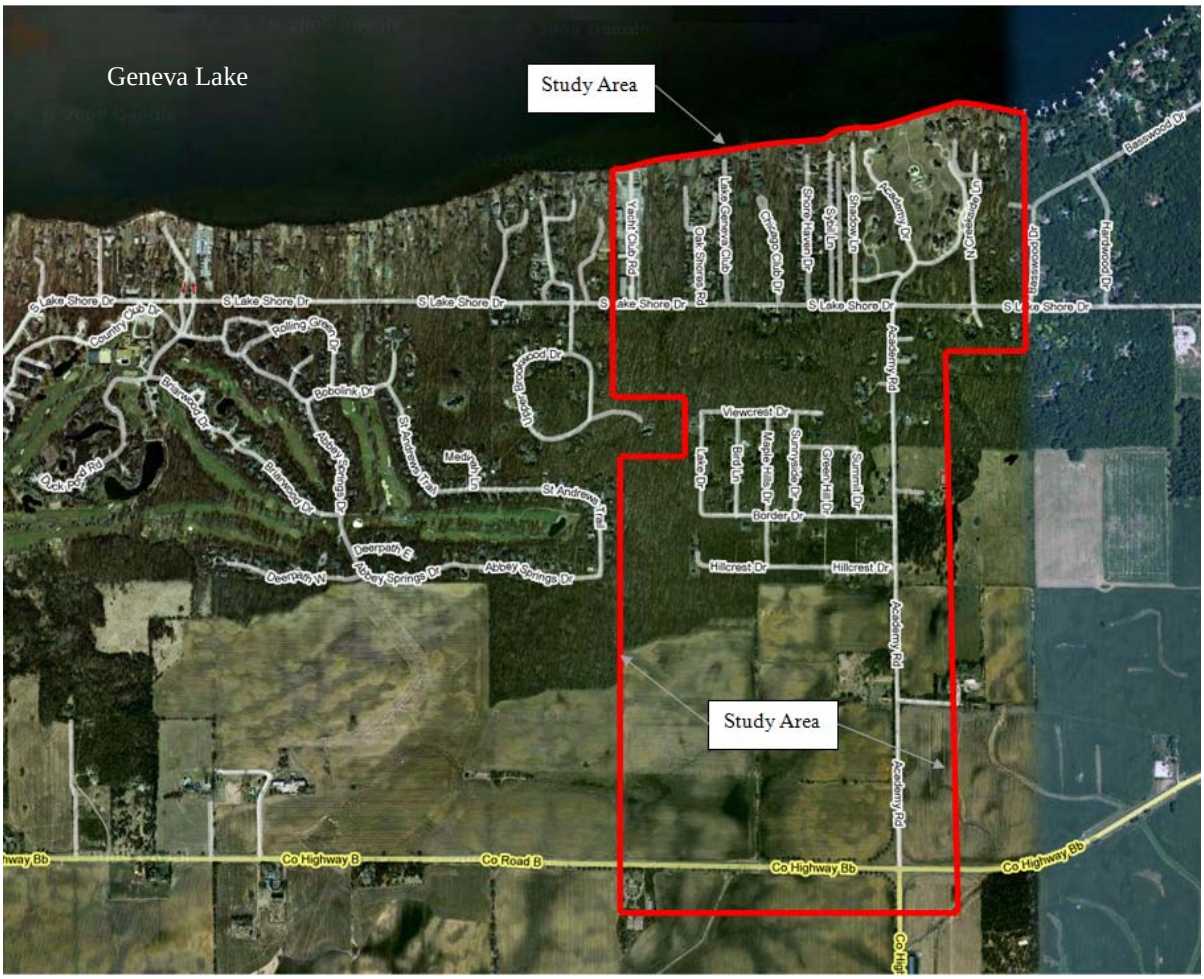
FIGURE 1

Study Area



2. OTHER STUDIES

2.1 General

A joint Town of Geneva / Linn Sanitary District Draft Facilities Planning Report was prepared in October of 2007. The study area for this joint report encompassed approximately 540 acres of the Town of Linn on Geneva Lake's north shore and 2,185 acres of the Town of Geneva on Lake Como's south shore. Wastewater treatment and disposal in this study area is currently provided by on-site systems. Continuing problems with failing septic systems in specific areas have been characterized by small lot sizes, poorly drained soils, steep slopes and high groundwater conditions. It was determined that 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 and Lake Como.

2.2 Town of Geneva / Linn Sanitary District Draft Facilities Plan – Alternatives Analysis

The joint study evaluated alternatives for continued reliance upon the on-site systems and the following alternatives were selected for inclusion in our cost-effectiveness analysis:

- **Alternative I** – Continued use of on-site systems and the installation of holding tanks for failed or illegal systems.
- **Alternative II** – Collection and Treatment at the WalCoMet Wastewater Treatment Plant (WWTP).

Various options for transporting wastewater to the WalCoMet system were also explored.

2.3 Town of Geneva / Linn Sanitary District Draft Facilities Plan – Opinion of Probable Cost

The opinion of probable cost and present worth cost analysis for each alternative, when applied on a planning area wide basis, was summarized as follows:

Wastewater Collection and Treatment Alternatives	Alternative I - Individual Holding Tanks	Alternative II – Wastewater Collection System
Construction Cost	$5,190,100	$18,132,600
Offsite Costs	$0	$1,954,500
Present Worth of Salvage Value	($660,200)	($2,258,000)
Present Worth of O&M	$16,770,400	$5,542,200
Total Present Worth Cost	$21,300,300	$23,371,300
Number of Homes	660	759
Present Worth Cost per Home	$32,300	$30,800

2.4 Town of Geneva / Linn Sanitary District Draft Facilities Plan – Selected Alternative

After public hearings were held to gauge homeowner interest, and in consideration of the selected alternative from the June 2001 Amendment to the Linn Sanitary District Facilities Planning Report, the District Commissioners chose to continue addressing wastewater treatment and disposal needs on an individual house-by-house basis in this portion of the District.

3. CURRENT CONDITIONS

3.1 Introduction

This section provides an overview of the limited Study Area within the Linn Sanitary District evaluated for the purposes of this Facilities Planning Report Amendment. Existing land use, population, topography, and soil conditions are discussed and the existing private on-site waste treatment systems are described.

Extensive efforts were conducted to establish the condition of the existing private on-site waste treatment systems, including the review of:

- Time of sale inspection reports.
- County Sanitarian records.
- District-wide homeowner questionnaire.
- Detailed inspection reports.
- Opinion of the County Sanitarian.

This data allowed us to identify deficiencies within the existing POWTS and determine where improvements are necessary to eliminate human health hazards and/or to avoid degrading the quality of the surface water and groundwater in the Geneva Lake watershed.

3.2 Regional Planning Considerations

The Fontana-Walworth Water Pollution Control Facility is currently in the process of expanding their wastewater treatment plant. In April of 2007, the Linn Sanitary District requested that additional areas be considered by the Fontana-Walworth Water Pollution Control Commission for attachment to the Fontana-Walworth SSA. The 225 acre area requested by the Linn Sanitary District for attachment to the Fontana-Walworth SSA extends

south of the existing Fontana-Walworth SSA of the Linn Sanitary District to County Highway B. The Linn Sanitary District's request to expand the SSA was not approved by the Fontana-Walworth Water Pollution Control Commission. See correspondence in Appendix A.

3.3 Land Use

The entire Linn Sanitary District encompasses an area of more than 4,000 acres, not including the area of Geneva Lake. The lake largely determines the land use and development in this area. The current land use in the Fontana-Walworth Study Area consists predominantly of residential lots with lot sizes varying widely from 4,000 square feet to 40 acres. 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. The majority of the houses in the Linn Sanitary District use POWTS for sewage treatment and disposal. The density of existing development impacts the ability to replace septic systems. Setbacks to existing structures, property lines, and wells limit the size of the areas available to replace a septic system. Portions of the Study Area are also within primary environmental corridors.

3.4 Population

The population of the community has remained relatively stable from 1970 through 2005. The 2005 population of the Study Area was approximately 530.

3.5 Topography

The topography of the Study Area is predominantly moderate to steep slopes with some low-lying flat topography along portions of the lakefront and south to County Highway B. The existing ground surface elevation ranges from 864 (lake level) to 1130 feet above sea level. The area south of South Shore Drive also has limitations for replacement of septic systems due to slopes exceeding 12%, which are unsuitable for on-site soil absorption systems.

3.6 Soil Conditions

A crucial component of adequate operation and maintenance of POWTS is the soils upon which they are constructed. 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. Miami loam and Casco loam soils are predominant in the Fontana-Walworth Study Area. The use of POWTS in areas of Miami and Casco soils have limitations on separation from seasonal high ground water, slow water movement through the soils, filtering capacity, and slope. The United States Department of Agriculture Soil Survey rated soils in the Study Area for soil absorption systems. Figure 2 summarizes the suitability of soils in the Study Area for POWTS. The areas classified as being somewhat limited for use of POWTS (yellow) was approximately 50% of the Study Area and the remaining 50% was classified as being very limited (red) for use of POWTS.

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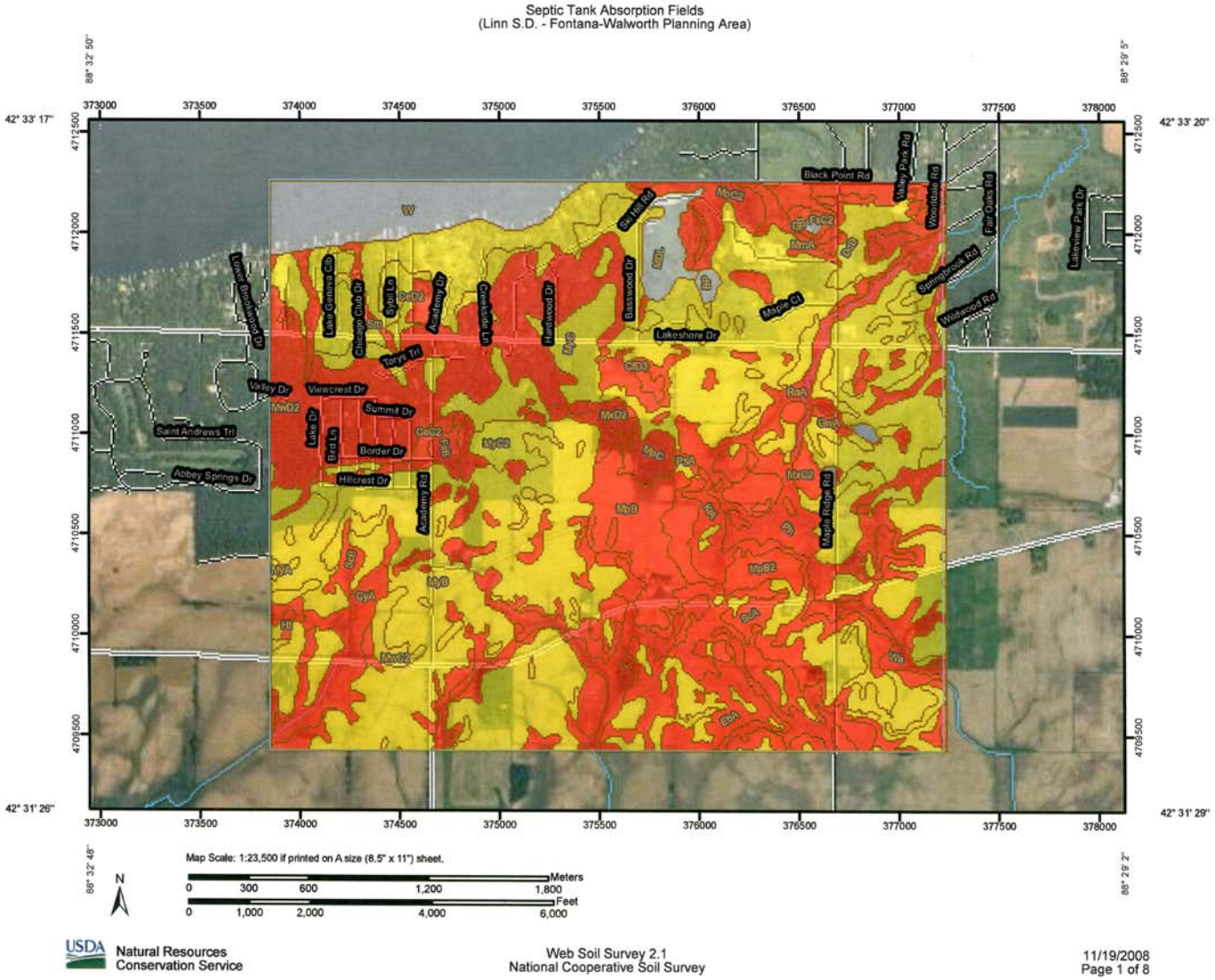
FIGURE 2

Soil Suitability



3.7 Sanitary Disposal Needs

A major task of a facility planning report is the collection and evaluation of information related to the condition of the existing private on-site waste treatment 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 compiling information and analysis of the Linn Sanitary District time of sale inspection reports, records of the Walworth County Sanitarian, Linn Sanitary District sanitary needs questionnaire, and the completion of detailed septic system inspections over a number of years by the District. An opinion of the condition of existing POWTS from the Walworth County Sanitarian was also obtained.

3.7.1 County Sanitarian Opinion – An August 23, 1999 letter from the Walworth County Department of Planning, Zoning, and Sanitation documented their prime areas of concern with respect to privately owned wastewater treatment systems in the Linn Sanitary District area. The County Sanitarian reported there are several areas within the Sanitary District that have had continuing problems with failing systems and that these areas commonly have small lot sizes, poorly drained soils and high groundwater. These conditions affect the amount of treatment the soil provides to wastewater discharged from a soil absorption field or drywell. The Fontana-Walworth Study Area was included in the areas of concern reported by the County Sanitarian. See Appendix A for County Sanitarian correspondence.

3.7.2 Linn Sanitary District Septic System Inspection Program – Over the last nine years the Linn Sanitary District has completed detailed inspections of the majority of the POWTS in the entire District. The results of the inspection program for the Fontana-Walworth Study Area show that slightly more than 60% of the systems were inspected. Of those inspected, only 19% were found to have adequately functioning systems. One property had liquid on the ground surface near the septic system, two showed evidence of past surface discharges, and seven systems had liquid in the vent pipes. Various other problems were found with the existing systems ranging from septic tanks that were not water tight to illegal systems such as cesspools. Sixty-five existing holding tanks were found in the planning area. According to the inspection results, minor repairs were required for 43% of the systems and 16% of the systems were deemed to be illegal. Wisconsin State law defines illegal systems as any POWTS comprised of cesspools, those which allow wastewater to discharge to the ground surface, those that have septic tanks that leak, or those that have drain fields with liquid in the vent pipe. A summary and the detailed data from the District-wide POWTS inspection program is shown in Appendix B.

3.7.3 Sanitary Disposal Needs Summary – These factors; illegal systems, reported failures, density of existing development, lack of space for replacement systems, age and design capacities of the existing systems, poorly drained soils, and steep slopes confirms that improvements area are necessary with the existing POWTS in the Study Area to eliminate human health hazards and/or to avoid degradation of surface water and groundwater quality.

4. FUTURE CONDITIONS

4.1 General

The preceding information presented in this report demonstrated the need for improvements to the existing POWTS in the Study Area and that continued reliance on deteriorated and failing POWTS may result in degradation of the groundwater quality. If steps to improve the wastewater disposal systems in this area are not taken, more POWTS failures will become evident. Sewage may be discharged to the ground surface due to septic field failures, which 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 wastewater (leachate) to the groundwater table. As this happens below ground, it is unseen, and, therefore, not a high priority. The discharge of leachate to the groundwater can affect wells used for drinking water or be discharged to the lake water affecting swimming beaches.

4.2 Population

Wastewater collection and treatment facilities are generally designed for anticipated needs of the next 20 years. Due to cost considerations, it is also somewhat impractical to attempt to provide for the much greater requirements of the population anticipated in more than 20 years. Predictions for the next 10 to 20 years are commonly made by extending the growth patterns of past years guided by economic factors affecting the region and land use planning.

4.2.1 SEWRPC Projections - Population growth projections were based on previously reported SEWRPC projections. SEWRPC projects a straight-line growth of 1.0 percent to 2.5 percent annually throughout the Town of Linn. Based on the information

supplied by SEWRPC, the full-time population in the District will continue to increase. As previously stated, the 2005 population for the Fontana-Walworth Sewer Service Area was approximately 530. Based on SEWRPC projections, the population is estimated to grow to 900 people by the Year 2030.

4.2.2 Future Land Use - The Linn Sanitary District sought direction from the Town of Linn Plan Commission with regard to future growth within the Study Area. The Plan Commission stated that any new growth in this area is planned for 1-acre lots for existing agricultural land and 5-acre lots within the environmental corridor. The Town of Linn Comprehensive Plan does not include any commercial/industrial development in this area, and as such, we did not include an allowance for those contributions in our projections.

4.2.3 Population Projections - The total projected summertime peak residential population for the Study Area for the Year 2030 is 1,400. Because of the uncertainties attached to predictions for growing communities, this estimated population may be reached before or after the predicted date. Therefore, the facilities recommended in this report should be considered as being designed for a specific population rather than for a specific year.

4.3 Projected Wastewater Flows and Waste Loads

4.3.1 Wastewater Flow Projections – Average wastewater flow projections were based on 70 gallons per capita per day in accordance with DNR 110.09 for communities of 5,000 or less. Lacking historical data, we assumed a per capita contribution of 100 gallons per capita per day for the peak month. This provides a peak month to annual average ratio of approximately 1.4 which is close to that currently experienced in the Village of Walworth. Peak hourly flow rates were based on a peaking factor of 3.7 in accordance with the ratio of

peak hourly flow to design average flow in the Recommended Standards for Wastewater Facilities of the Great Lakes – Upper Mississippi River. The average annual flow expected from the Study Area for the Year 2030 is 98,000 gallons per day. The peak hourly flow rate is projected at 364,000 gallons per day.

4.3.2 Wastewater Loading Projections – Wastewater loading projections were also completed for use by the Fontana-Walworth Water Pollution Control Facility, which is currently in the process of expanding their wastewater treatment plant. The average biochemical oxygen demand (BOD_5) and total suspended solids (TSS) loadings were based on 0.17 lbs per population equivalent (PE) and 0.20 lbs/PE, respectively. For the waste loading peak month computations, we assumed the higher per capita contributions allowed by DNR Code for communities with garbage grinders of 0.22 lbs/PE and 0.25 lbs/PE for BOD_5 and TSS, respectively. The average annual BOD_5 loading is projected to be 239 pounds per day and the average annual TSS loading is expected to be 281 lbs/day. The peak monthly BOD_5 loading is projected to be 309 lbs/day and the peak monthly TSS loading is expected to be 351 lbs/day.

5. EVALUATION OF ALTERNATIVES

5.1 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 Study Area. The alternatives presented herein can generally be classified into two distinct categories, including:

Type I Improvements **–** An improvement program which addresses 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 illegal POWTS would be forced to install the necessary improvements at the expense of the individual property owner.

Type II Improvements **–** An improvement program which addresses wastewater treatment and disposal needs on a regional area basis. This program would involve the elimination of the existing on-site systems, and construction of collection and pumping systems to convey wastewater to a facility for treatment and ultimate disposal.

5.2 Type I Improvements

For the Type I improvement programs, the District has two options. The first option is to continue the District's Septic System Inspection Program of the existing POWTS in the Study Area and force the abandonment of illegal 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 POWTS with individual household septage holding tanks. This option has a larger up-front capital cost than only replacing selected POWTS, but will completely eliminate the need, and cost, to continue the District's Septic System Inspection Program. To make an equivalent comparison with the Type II improvements where all systems are addressed, we have evaluated the costs associated with replacing all existing POWTS with individual holding tanks.

5.3 Type II Improvements

For the Type II improvements, four different alternatives were analyzed in the January 2000 Linn Sanitary District Facilities Planning Report. The alternatives included; 1. Treatment at Existing Regional WWTPs, 2. Treatment at New Decentralized WWTPs, 3. Treatment at a New Regional WWTP, and 4. Pumping to Community Holding Tanks.

For the purposes of this study update, two of the above alternatives were re-analyzed. Both the Type II alternatives evaluated included the construction of wastewater collection and conveyance systems to transport wastewater to a treatment facility. The collection systems consist of a network of gravity sewers and low pressure sewers, lift stations, and force mains. We analyzed two treatment options; Type IIA improvements would involve the treatment of wastewater at the Fontana-Walworth Water Pollution Control Facility west of the Village of Walworth. Type IIB improvements would entail the transport of wastewater to a new decentralized treatment facility with disposal into a large POWTS type seepage bed system.

5.3.1 Type IIA Wastewater Collection and Conveyance - The necessary wastewater collection and conveyance systems for the Type IIA improvements includes over 10 miles of gravity sewers, low pressure sewers, and force mains; and three lift stations. See Exhibits A1 - A3.

Low pressure sewers would be utilized to serve the existing development along the narrow streets in the lakefront portion of the planning area, north of South Lakeshore Drive. Low pressure sewer systems consists of an individual grinder pump at each residence whereby wastewater is pumped in pressurized pipes to the downstream system. The system would consist of low pressure sewers extending from the lakefront areas to a central lift station. Due to the extreme elevation differences and length of force main required, larger lift stations would be needed to pump wastewater to the Village of Walworth.

Gravity sewers would be installed along streets in the Maple Hills Subdivision. Gravity sewers consist of pipes and manholes that convey wastewater by gravity to downstream areas. Wastewater lift stations are required to lift (pump) wastewater in pressurized pipes to the next gravity sewer system. The system would consist of gravity sewers discharging to a wastewater lift station near the large holding tank for the South Shore Club Condominiums.

For the Type IIA improvements, lift stations, force mains, and gravity sewers would be needed to convey wastewater from the planning area south along Academy Road and west along County Highway B. Gravity sewers would extend along County Highway B, Cobblestone Road, School Road, and south along the east side of the Oak Knolls

Subdivision. Another lift station would pump up to Ridge Road where wastewater would travel by gravity through the Village of Walworth to an existing lift station on Main Street (Highway 14) near the south end of the Village.

The existing Village lift station on Main Street has duplex pumps with a capacity of 525 gpm which discharge to a 10-inch force main. The existing flow into this lift station averages approximately 125,000 gallons per day or 90 gpm. Based on the existing flow into this lift station and the proposed flow from the Linn Sanitary District, there appears to be sufficient capacity in the lift station to accommodate the additional flow. Future development will, of course, also use some of the excess capacity in the lift station. The existing Village force main has three to four times more capacity than the lift station, and should be sufficient for many years to come. The Village lift station and force main discharge to the Fontana-Walworth interceptor sewer along Beloit Road. Wastewater treatment would be provided by the Fontana-Walworth Water Pollution Control Facility.

5.3.2 Type IIB Wastewater Collection and Conveyance – The necessary wastewater collection system for the Type IIB improvements includes the same system of gravity sewers, low pressure sewers, force mains and lift stations within the service area as the Type IIA improvements. The ultimate treatment location is where the alternatives differ. Wastewater for the Type IIB improvements would be conveyed from the planning area south along Academy Road to a decentralized treatment facility.

5.3.3 Discharge to Village of Fontana – We also investigated the possibility of discharging wastewater from the planning area to the Village of Fontana wastewater

collection system. In 1994, the Fontana Village Engineer investigated the required improvements and costs for the Village of Fontana to convey wastewater from the Study Area to the Fontana-Walworth Water Pollution Control Facility. The cost, in 1994 dollars, was approximately $2.2 Million. Updating this cost to 2009 dollars would be approximately $3.5 Million for improvements to the Village of Fontana wastewater collection system necessary to convey wastewater from the Study Area to the Fontana-Walworth Water Pollution Control Facility. Discussions between the Linn Sanitary District and the Village of Fontana related to access to the Village sanitary sewer system were held but no progress was made.

5.4 Fontana-Walworth Water Pollution Control Facility

The Fontana-Walworth Water Pollution Control Commission is in the process of expanding or upgrading the wastewater treatment capabilities of the facility. The Linn Sanitary District and the Fontana-Walworth Water Pollution Control Commission held many meetings related to discharge of wastewater to the treatment facility. The discussions got to the point of negotiating a cost sharing arrangement wherein the Linn Sanitary District would pay approximately $800,000 for its share of the treatment plant capacity. Unfortunately, the parties have not yet been able to finalize an agreement on allowing wastewater from the Linn Sanitary District portion of the Fontana-Walworth SSA to discharge to the wastewater treatment plant.

5.5 Decentralized Treatment

A decentralized treatment alternative was re-analyzed for this amendment which included treatment of wastewater in sequencing batch reactors. Effluent would be discharged to a large "POWTS" type soil absorption field for additional treatment and disposal. Other components of the treatment system would include a digester, sludge storage, and effluent pumping station. The exact location of the decentralized treatment facility has yet to be determined, but the absorption field would need to be located in an area of adequate soils for this type of facility.

5.6 Cost Comparison

The alternatives analyzed require ongoing operation, maintenance, and equipment replacement costs that are not the same for each alternative. In order to account for the varying operation and maintenance costs of each alternative, we prepared a present worth cost (or life-cycle cost) analysis. This type of analysis takes into account the initial construction cost, annual operating and maintenance cost over a 20-year period, interest rates, and salvage value at the end of the project's useful life. Another way to describe a present worth cost analysis is a method of calculating how much money would need to be invested today to fund the project for a set period of time. The 5.125% interest rate is the current rate used by the Wisconsin Department of Natural Resources for present worth cost analysis. For the purposes of calculating salvage value in a present worth cost analysis, the life expectancy of structures and piping is typically set at 40 years and the life expectancy of equipment is typically set at 20 years.

5.6.1 Type I Improvements – In order to make an equivalent comparison with the Type II improvements where all systems are addressed, we have evaluated the costs for Type I improvements associated with replacing all existing POWTS with individual holding tanks. The anticipated cost for initial construction of holding tanks for all existing systems in the planning area is approximately $1.6 Million and the present worth cost, taking into account the operation and maintenance cost over a 20-year period, is approximately $4.7 Million. A detailed present worth cost analysis is shown in Appendix C and a summary of the present worth cost comparison for each alternative is presented in Table 5-1.

5.6.2 Type IIA Improvements – The anticipated cost for construction of a wastewater collection and conveyance system to service the existing development in the planning area with treatment at the Fontana-Walworth Water Pollution Control Facility is approximately $8.6 Million. The present worth cost of this alternative is approximately $9.3 Million. A detailed present worth cost analysis is shown in Appendix D and a summary of the present worth cost comparison for each alternative is presented in Table 5-1.

5.6.3 Type IIB Improvements – The anticipated cost for construction of a wastewater collection system to service the existing development in the planning area with treatment at a decentralized wastewater treatment facility is approximately $9.1 Million. The present worth cost of this alternative is approximately $10.1 Million. A detailed present worth cost analysis is shown in Appendix E and a summary of the present worth cost comparison for each alternative is presented in Table 5-1.

5.6.4 Cost Summary - The opinion of probable cost and present worth cost analysis for each alternative is summarized as follows:

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TABLE 5-1

Cost Comparison

Alternatives	**Type I**	**Type IIA**	**Type IIB**
Construction Cost	$1,574,076	$8,580,875	$9,135,600
Present Worth of O&M	$3,220,222	$1,582,517	$1,547,775
Present Worth of Salvage Value	(88,512)	(868,911)	(594,874)
Total Present Worth Cost	$4,705,786	$9,294,481	$10,088,501
Number of Homes	200	265	265
Approximate Construction Cost per Home	$8,000	$33,000	$35,000
Present Worth Cost per Home	$23,529	$35,074	$38,070

Based on the present worth cost analysis, Alternative I is the most cost-effective alternative.

5.7 Alternative Evaluation

Table 5-2 is a qualitative decision matrix outlining the relative merits of each option. Alternatives are rated against each other based upon a relative scale of one to four, with one indicating most favorable and four indicating least favorable. A discussion of each category follows.

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TABLE 5-2

Relative Merits Of Each Alternative

	Alternative I	Alternative IIA	Alternative IIB
Costs	2	4	4
Feasibility	2	4	4
Outside Constraints	2	4	3
Construction Impacts	2	4	3
Neighborhood Aesthetics	4	2	3
Lake Water Quality	3	1	2
Zoning Impacts	1	4	3
Home Value	4	1	1

- **Costs** – Based upon opinion of probable present worth costs.
- **Feasibility** – Based upon technical challenges of each alternative. Holding tanks are technically benign, requiring no specialized engineering. Both Type II alternatives require the design and construction of a wastewater collection system. The Type IIA system would require transporting the wastewater nearly 5 miles to the Village of Walworth, and the purchase of capacity at the Fontana-Walworth Water Pollution Control Facility. The Type IIB alternative would require the construction and operation of a treatment plant and large soil absorption system.
- **Outside Constraints** – Based upon the number of outside agencies which may place limitations upon the proposed alternative.
- **Construction Impacts** – Based upon which alternative will have the greatest impact upon the community at-large during construction.
- **Neighborhood Aesthetics** – Based upon how each alternative will affect appearance of the planning area. The holding tank option scores low due to the increase of septic truck traffic.
- **Lake Water Quality** – Based upon the potential for wastewater to impact the lake water quality. The alternatives with holding tanks scored lower because transition from septic system to holding tank normally occurs after septic system failure.

- **Zoning Impacts** – Areas planned for Type II improvements include a variety of zoning areas including A-1 and A-3 Agriculture, B-3 Business, C-2 and C-3 Conservation, and R-1 (Unsewered) Residential. Once these areas are planned for sanitary service, they could be rezoned as R-2 Residential into 15,000 square foot lots. Note, the Town of Linn Planning Commission Land Use Plan calls for new lots in the planning area to be 1-acre minimum with the exception of those areas included in primary environmental corridors, which would require 5-acre lots.
- **Home Value** – Based upon the affect each alternative potentially has upon home values.

6. THE SELECTED PLAN

6.1 General

Septic systems, like all engineered products, have a limited useful lifetime. The question is not if a septic system will need replacement but when. Failure for structural reasons (such as broken tanks or covers) can easily (but not necessarily inexpensively) be fixed by replacing the broken parts. If the absorption field fails, however, the options are limited. Replacement of the field is only feasible if there is adequate suitable land in which to locate a reserve drain field. Without adequate land, the homeowner is faced with the decision to either install an advanced treatment system (such as an aerobic treatment unit) or a holding tank. This is the situation that many homeowners in the study area have faced or will one day soon be facing due to small lot sizes and inadequate soil conditions.

The Linn Sanitary District has two basic alternatives for wastewater treatment and disposal within the planning area. Type I improvements would address wastewater treatment and disposal needs on an individual house by house basis and the District would enforce a rigorous inspection program requiring property owners to repair or replace illegal POWTS. Type II improvements would address wastewater treatment and disposal needs on a regional basis, which would include the elimination of the existing POWTS, and construction of a wastewater collection system to convey wastewater to a treatment facility.

6.2 Public Meetings

The District held several meetings with area property owners and attended many homeowner association meetings over the last few years to gauge the level of interest for the construction of a wastewater collection system. The feedback received at these meetings ranged from favorable responses in the westerly portions and lake front neighborhoods of the study area to less favorable responses from other areas.

6.3 Selected Alternative

After public meetings were held to gauge homeowner feedback, the District Commissioners chose to implement Type I improvements which addresses wastewater treatment and disposal needs on an individual house by house basis. This is the same approach that the Linn Sanitary District has been following for the remainder of the properties in the District.

This approach directly targets those individual homeowners whose inadequate systems pose a threat to groundwater and Geneva Lake water quality. This addresses the concern expressed by property owners with code compliant systems who maintain their systems regularly being asked to pay for a new collection system for others who neglected their systems and cannot replace them. Households having compliant systems incur no repair costs. This approach also addresses the concerns expressed about urban sprawl and development of 1/3 acre lots if sewer service became available.

In order to implement the selected alternative, the District has adopted and is enforcing a rigorous inspection and maintenance program. All POWTS in the District have been inspected over the last few years. Dwelling units that were determined to have failing

and/or non-compliant systems were sent a notice of non-compliance. System owners are asked to contact a licensed POWTS installer or plumber to discuss options available for the replacement or upgrading of existing POWTS to bring it into compliance with State and County codes. System owners who fail to obtain a permit to make the necessary repairs are turned over to the County Sanitarian for enforcement action.

In order to maintain and improve the groundwater quality in the area, the District will implement the following strategies:

- Initiate a 3-year maintenance and POWTS tank pumping program.
- Continue to work with Walworth County on POWTS code enforcement.
- Continue public education on POWTS maintenance.
- Review County data and other records on a 10-year basis to determine whether detailed POWTS inspections should be performed by the District.