Sanitary Survey
of Lake Como's South Shore

Town of Geneva
Lake Planning, Wastewater Management

Prepared For:

Town of Geneva
N3496 Como Road
Lake Geneva, WI 53147

January 2005

JN: 49034.00

Town of Geneva Lake Planning, Wastewater Management
Sanitary Survey of Lake Como's South Shore

Introduction

This report presents results of the sanitary survey of Lake Como's South Shore Drive neighborhood in the civil town of Geneva in Walworth County, Wisconsin (**Figure 1**). The survey was conducted for Town of Geneva in the interest of protecting water quality and property values.

Objective

The primary objective of the project is to assess the project area for evidence of failing on-site wastewater systems and potential for correcting failing systems within the project area. A secondary objective is to provide recommendations for cost-effective management alternatives for domestic wastewater treatment in the project area. The results are intended to provide a basis for a wastewater facilities plan to evaluate management and engineering options for wastewater problems and to guide the Town of Geneva.

Project Area

The project area contains 96 developed properties located along the shoreline between Lake Como and South Shore Drive. Its width varies from approximately 100 to 300 feet, and its length extends over a distance of 1.3 miles from the residential properties east of Schofield Road to the west end of West End Road (**Figure 1**). Many of the individual properties extend south of South Shore Drive over an abandoned railroad grade that parallels South Shore Drive and the lakeshore. The properties are developed with homes, cottages, and four commercial lodging establishments. The surface topography of the project area is gently sloping down to the north toward the lake and nearly level from east to west, and surface elevations are within a few feet of Lake Como's surface.

East of the project area are wetlands. To the west is a resort complex with its own wastewater collection system connected to a regional treatment plant, Walworth County Metropolitan Sewerage District (WalCoMet). South of the project area is low-density residential development and undeveloped lands on a north-facing slope that extends to State Highway 50, which roughly parallels South Shore Drive (**Figure 1**).

Development pressures are rising in the greater Lake Como area. Housing units in the town grew by 31 percent between 1990 and 2000. The Town of Geneva's approved land-use plan anticipates the rate of residential development to double over the next 10 years.

On the north shore of Lake Como, across the lake from the project area, is the unincorporated community of Como; its residents are organized as Lake Como Beach Property Owners Association, a private corporation with interests in the entire shoreline along the Como community. Nearby municipalities are Lake Geneva to the southeast and Williams Bay to the southwest.

Town of Geneva contracted Liesch Environmental Services, Inc. to assess the need for alternative wastewater treatment facilities for Lake Como's south shore. Assisting the Town and Liesch with the study was the Lake Como Lake Committee, an ad-hoc citizens' group that has been active in lake management efforts over the past 30 years. The Committee is composed mostly of south shore residents, who contributed to the study with extensive background knowledge and personal contact with residents of the project area.

Problem Statement

Domestic wastewater in the project area is managed by privately owned, individual on-site septic systems. These systems, when located on a low-lying lakeshore or when improperly managed, may fail to treat wastewater adequately and consequently release partially treated wastewater to groundwater and/or surface water.

There is concern that individual on-site septic systems at lake communities may face many challenges to adequate treatment, including insufficient treatment capacity for year-round homes converted from seasonal cottages on lots too small for adequate drainfields (new or replacement), older systems designed under outdated regulatory standards, insufficient depth of soil over shallow groundwater, increasing rates of domestic water use during high-use periods over weekends and vacations, high development densities, and infiltration of lake water into septic systems during periods of high lake levels and consequent seepage of partially treated wastewater to groundwater and surface water.

Replacement of failing septic systems may be hindered by small lot sizes, proximity to surface water, and shallow soils over groundwater. Many of the existing systems on South Shore Drive are conventional septic systems, some of which have been upgraded to current regulatory standards with mound systems and some with drainfields constructed on higher sites located on adjoining property across South Shore Drive from the residences. Many systems have been replaced with holding tanks, which may be expensive to maintain due to regular pumping and may reach capacity during periods of inclement weather under freezing conditions, possibly resulting in unsanitary domestic conditions and/or surface discharge of untreated wastewater.

Another component of the problem is the relatively remote location of the project area, which may render connection to the regional wastewater treatment system expensive considering the

relatively few properties in the project area. Town of Geneva officials and Lake Como Lake Committee personnel have explored this option in the past and determined that this solution may not be financially feasible, given the relatively small number of homes in the project area and a relatively high fee for sewer connection and/or easement across private property.

An alternative approach would be to promote intensive development of the entire south shore area from South Shore Drive southward to Highway 50, with an assumption that additional residential development would lower the project cost per household. This assumption would need careful evaluation to demonstrate that such development would not result in additional problems for the town government to overcome, including high rural development densities and increased costs for highway development, emergency services, utility infrastructure, and other community services.

Methods

The sanitary survey was introduced to south-shore property owners through the Lake Como Lake Committee's spring newsletter mailed in May 2004. Sanitary surveys developed from a format provided by Wisconsin Department of Natural Resources were mailed to all property owners with known addresses in the project area. A second mailing was sent to property owners that had not returned their surveys. The address list was based on the Lake Committee newsletter mailing list and updated with information from returned forms, Town of Geneva tax records, and Walworth County property records. Access permission forms were sent to all property owners that had returned surveys, with one initial mailing and a follow-up mailing. Telephone contacts were made with property owners as needed to respond to questions or concerns.

Field activities included site observations to confirm and/or supplement information provided in the sanitary surveys, measuring distances between selected surface features, and conducting soil testing to identify factors that would limit a property's capacity for adequate wastewater treatment.

During the course of the sanitary survey, the possibility of installing sewers along South Shore Drive became more feasible than previously anticipated. At the outset of the project, a sewer connection appeared to be prohibitively expensive, based on previous inquiries by Town of Geneva and Lake Como Lake Committee. In late 2003, a proposed expansion of an adjoining resort presented an opportunity for a sewer connection to an existing lift station and force main which would allow wastewater treatment at the regional wastewater treatment facility. This opportunity, and the extent of individual property information from surveys and/or access permission forms, led to a decision to forego plumbing-related inspection of septic systems in favor of collecting soils information from representative properties, with selections based on access permission and mapped soil types. The resulting soils information, together with other

on-site observations, including location of potable water wells, structures, and lot sizes may be sufficient to assess various alternatives for future wastewater treatment facilities. This approach may result in cost savings to the overall project when wastewater facility planning will include detailed analyses of each property.

A study has recently been completed by others to determine the capacity of a lift station and force main serving the adjoining resort and assess the potential for the existing sewer infrastructure to serve south shore homes. This type of study would have been a recommendation of this sanitary survey; as a result, the preliminary capacity study findings are incorporated into this report. The study's results were presented to Town of Geneva in autumn of 2004 and reported in detail in a local newspaper.

Results

Property Inventory

The property inventory contains 96 properties that have been keyed to a unique identification number assigned to each property and applied consistently to all inventories (**Table 1**).

An initial mailing of the sanitary survey to 96 properties resulted in approximately 60 responses. A second mailing to approximately 40 addresses netted eight more responses, for a survey response rate of 71 percent. Access permission forms were sent to all 68 survey respondents on two occasions, and 52 forms to allow access to individual properties for field activities were returned, for response rate of 76 percent of survey respondents (**Table 1**). Information received was entered into a spreadsheet keyed with a unique identification number that was randomly assigned to each property to ensure confidentiality of property-related information.

Residence Inventory

The residence inventory identifies the size, age, occupancy period, and year-round occupancy potential (**Table 2**). Reported construction dates for 49 houses ranged from 1890 to 2003 (a 51 percent response rate). One to three houses were built in each decade from the 1890s through the 1930s; four to six houses were built in each decade of the 1950s, 1960s, 1970s, and 1980s; eight in the 1990s; and six since 2000. Most of the reported purchase dates were in recent decades, with 21 of the 68 reported purchase dates in the 1970s and 1980s (31 percent) and 30 homes purchased since 1990 (44 percent). Seasonal occupancy was reported for 59 properties (65 percent) and year-round occupancy for 32 properties (35 percent). Winterized homes were reported by 55 of 68 respondents (80 percent). A correlation between age of house and occupancy period/potential is not evident.

Wastewater System Inventory

The wastewater system inventory includes type of system (conventional infiltration system, mound, holding tank, etc.), known or estimated age of the system, pump size, maintenance history, evidence of malfunction or failure, and setback distances from structures, lot lines, potable water wells, and surface water (**Table 3**).

Conventional systems consisting of septic tanks and infiltration systems totaled 43 of 91 properties reported, or 47 percent.

Holding tanks were reported on 34 properties, or 40 percent of reported and observed properties. Seasonal-use properties account for 20 of the holding tanks, and 10 of these houses are winterized. Year-round users account for 14 holding tanks; a total of 24 houses with holding tanks were reported to be winterized.

Six mounds, or 7 percent of all systems, were reported. Two properties reported seepage pits, and one had an outhouse. One property reported a septic tank and infiltration system, a seepage pit, and a holding tank. Nine properties did not report system type.

System locations were reported for 72 systems, with 15 of these systems located across (south of) South Shore Drive, 51 located between South Shore Drive and Lake Como, and two systems reported on both sides of the road. Potential mound sites on undeveloped land across the road from the homes was observed at approximately 24 properties, based solely on evidence of structures; however, properties were not measured for adequate surface area. Seven systems are located within separation distances specified by state regulatory codes for setbacks from homes, potable water wells, property lines, and/or surface water. Service lines for water and wastewater were not observed in the field.

Several property owners have expressed interest in improving their properties through redevelopment or remodeling and have inquired about the prospect of wastewater treatment improvements in the near future. As a result, improvements to existing systems and existing residences are pending further Town of Geneva action on wastewater treatment facilities.

Natural Resource Inventory

The natural resources inventory includes topography, soil types, bedrock depths, and groundwater conditions, based on soil surveys, geologic reports, site observations, interviews with agency staff, soil sampling, and a report entitled "Como Lake Feasibility Study" and conducted in 1976 and 1977 (**Table 4**).

Topography of the project area is gently sloping from the road down to the lake, or south to north, with an elevation change of approximately 5 to 6 feet from the lake up to the road and

another 5 feet from the road up to the former railroad grade located south of the road. From northeast to southwest, the land surface is nearly level, with minor variations throughout the project area and a moderate rise in the southwestern end.

Soil types in general are silt loam underlain by silty clay loam, clay loam, and clay, with evidence of shallow depths to groundwater in nearly all areas. Mapped soil types are Fox silt loam, Houghton muck, Matherton silt loam, Miami silt loam, Pella silt loam, and St. Charles silt loam. Wetland-type soils (Houghton, Matherton, and Pella) are located primarily in the east end and in a central area of the project. Groundwater has been reported at depths of 2 to 4 feet on several properties. Bedrock was not encountered at depths of less than three feet, during site activities.

Soil testing sites were selected to meet several criteria: representative of the various mapped soil types and elevations; completed survey form received; access permission granted; moderate spacing along the length of the project area; and at least one property with open land on the south side of South Shore Drive. A subcontractor, Private Sewage Consultants, Inc., provided a certified soil tester to conduct the soil tests. Data from the 13 properties selected on this basis were supplemented with information previously obtained. To test the soil, 14 borings were dug on the 13 properties to the depth of a limiting factor that would determine the site's suitability for a septic system. Limiting factors encountered during the soil test were presence of fill material and insufficient depth of subsoil over groundwater.

The soil profile was described in accordance with United States Department of Agriculture (USDA) methods, and the profile used as the basis for site recommendations.

- Five of the properties were recommended for holding tanks or experimental systems requiring site-specific interpretations, determinations, and variances under state regulatory codes;
- Six sites were recommended for holding tanks or on-site dispersal systems with pretreatment components;
- Three sites were recommended for mound systems; and
- No sites were recommended for conventional systems.

The property with two soil-test sites received a recommendation for a holding tank or experimental system for the site located between the road and lake and a recommendation for a holding tank or pretreatment system on the site located south of the road.

Suitability of soils for residential development with public sanitary sewer service in the project area is identified in the Town of Geneva land-use plan as ranging from "severe limitations" to

"moderate limitations" to "slight limitations" with nearly equal lengths of shoreline for all three categories. For conventional onsite sewage disposal, the project area is mapped as "unsuitable" and "undetermined" with a small area several hundred feet long mapped as "suitable" with nearly equal lengths of shoreline for the former two categories and a few hundred feet mapped under the "suitable" category. For mounds systems, mapping indicates "unsuitable" and "suitable" with approximately two-thirds of the shoreline map as "suitable" for mound systems without consideration for space limitations. Note that "suitable" in all instances is described as "having a high probability of meeting the criteria of Chapter ILHR 83..." which was the applicable regulatory code for mound disposal systems in 1997. In any case, the project area currently is developed for residential and commercial uses, and adequate wastewater treatment is needed.

Summary

Results of the sanitary survey of 96 properties along South Shore Drive indicated the physical conditions of at least 34 properties, or 40 percent, would not allow use of conventional on-site wastewater treatment systems at a cost-effective level of investment, given current use levels, both seasonally and year-round. Soil tests at selected sites that are representative of soil types mapped in the project area indicate that soil conditions on most properties prohibit on-site wastewater treatment without site-specific code variances, pretreatment technologies, and/or tank-type treatment devices, all of which typically are prohibitively expensive.

Land adequate for construction of mound systems also is a limiting factor in the project area in general, based on relatively small lots with existing structures and water wells occupying much of the available land. Site-specific observations would be needed to determine the potential for mound systems to be located on a given property. Pending detailed soil analysis, adequate land for mound systems may be available on the south side of the road for approximately 25 to 30 percent of properties in the project area. In addition to adequate soils, construction of mounds across the road from homes would require removal of vegetation, grading of existing surfaces including the former railroad bed, and piping and pumping of wastewater upgradient over relatively long distances.

Use of holding tanks may not be desirable due to recurrent costs for pumping and maintenance and due to inherent lack of reliability over the long term, especially when placed in saturated soil that causes steel tanks to deteriorate and release untreated wastewater to soil and groundwater. Holding tanks for seasonal users may be desirable due to low construction costs.

Wastewater improvement, remodeling, and/or redevelopment projects for several properties are pending further Town of Geneva action on wastewater treatment facilities.

Sewer Capacity Study

During the course of the sanitary survey, Town of Geneva undertook a concurrent study by others to determine the capacity of a lift station and force main serving an adjoining resort and to assess the potential for the existing infrastructure to serve south shore homes. This type of study would have been a recommendation of the sanitary survey; as a result, the capacity study findings serve as the next step in identifying wastewater treatment options. The study's results were presented to Town of Geneva in autumn of 2004. The following information is derived from a copy of the report provided by Baxter & Woodman (September 8, 2004) directly to Liesch.

The adjoining resort, Interlaken, is considering expanding its hotel rooms and villas with additional lodging facilities. The capacity study considered three options. In one option, the study report indicated that an existing lift station could accommodate Interlaken's needs by increasing the size of the lift station's two pump motors to 47 horsepower (minimum) and retaining the existing 6-inch discharge piping and standby generator.

A second option would accommodate the Interlaken expansion plus existing homes and businesses on the south shore (Schofield Road to West End Road). The existing lift station would need larger pumps (88-horsepower minimum), new 8-inch discharge piping (to fit the physical connection of the larger pumps), and a larger standby generator.

A third option would accommodate all of the above plus existing homes and businesses located between South Shore Drive and Highway 50 (Schofield Road to West End Road and Como Road). The existing lift station would need the same improvements as those required for the second option; that is, larger pumps (88-horsepower minimum), new 8-inch discharge piping, and a larger standby generator. The main difference between the second and third options is the cost of installing sewers throughout the area of low-density development between South Shore Drive and Highway 50, rather than installing sewers along South Shore Drive only.

A fourth option would install sewers and a new lift station to serve the South Shore Drive properties and bypass the existing Interlaken lift station to connect directly to an existing force main at a point beyond the Interlake lift station.

Recommendations

Based on results of the sanitary survey, Lake Como's south shore is recommended for wastewater facility planning to assess the project area for appropriate wastewater treatment systems.

The wastewater facility plan would consider the following elements and options:

- formation of a sanitary district to serve Lake Como's South Shore neighborhood, with the extent to be determined based upon the considerations outlined below;
- connection to the regional wastewater treatment and collection system serving only the existing extent of development on South Shore Drive plus a moderate growth factor to allow for infill and redevelopment of existing lots;
- connection to the regional wastewater treatment and collection system serving the entire area between the lake, Highway 50, Schofield Road, West End Road, and Como Road;
- conventional gravity or pressure wastewater collection system connected to the existing force main located at the southwest end of the lake;
- small-diameter pressure sewers using grinder pumps and/or septic tank effluent pumps as the motive force for connection to the regional treatment facility;
- on-site systems with municipal ownership and management;
- on-site systems consisting of existing code-compliant systems and new clustered systems to be located on higher ground south of South Shore Road or elsewhere as applicable;
- pretreatment components as applicable;
- other technologies available and applicable to the project; and
- anticipated project costs and funding sources.

Also recommended is notification to Wisconsin Department of Natural Resources that the Town of Geneva intends to apply for funding for a wastewater facility project in the coming fiscal year. To do so, an Intent To Apply (ITA) for funding under the Clean Water Fund Program and a Priority Evaluation and Ranking Form (PERF) must be submitted to WDNR by December 31, 2004.

Formation of a sanitary district or annexation to an existing district to administer wastewater treatment facilities in the project area is recommended. This task will require consideration of the appropriate extent of the project boundaries; for example, including the existing project area only, the entire area between the lake and Highway 50 from Schofield Road to Como Road and West End Road, or another extent within this general area. A state grant program is available for this purpose.

K:\4903400\TOG sanitary survey report.doc