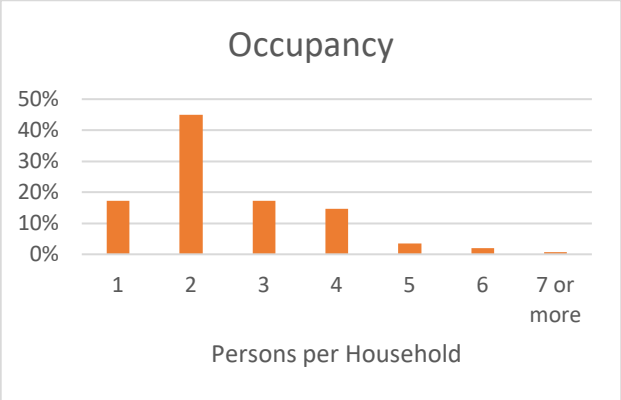
WPCA Brookfield, CT
53A COMMERCE ROAD, BROOKFIELD, CT 06804
(203) 775-7319 HTTPS://BROOKFIELDWPCA.ORG

Septic Survey
Candlewood Lake Watershed Properties – Brookfield, CT

There are 1371 properties in the Brookfield study area within the watershed of Candlewood Lake. Of these, approximately 70 are lots have an address only for tax purposes, leaving about 1300 improved properties eligible for the survey. The survey instrument can be viewed at https://brookfieldwpca.org/survey

The survey was active for four months from mid-November 2019 until mid-March 2020. It was sent out by mail with a self-addressed stamped reply envelope. The survey was also available online. A total of 575 unique submissions were received from improved properties—250 by mail and the remaining 325 electronically. That is a 42% return which pollsters consider very good. The results are statically significant allowing appropriate conclusions.



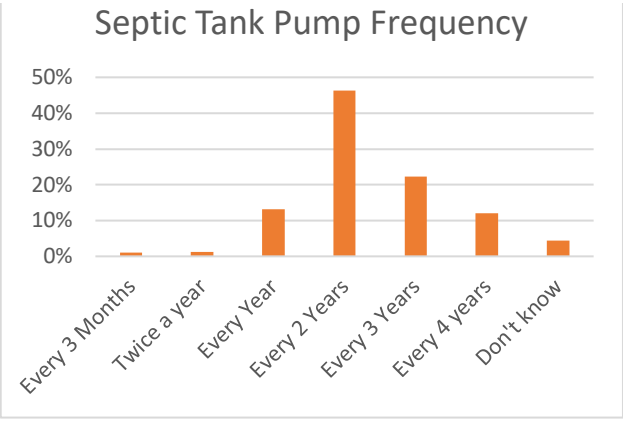
The survey showed that the occupancy of lake area properties is typically by two persons. The average is 2.4 persons per single family unit. The properties at 7+ are condos, hotel and group homes.

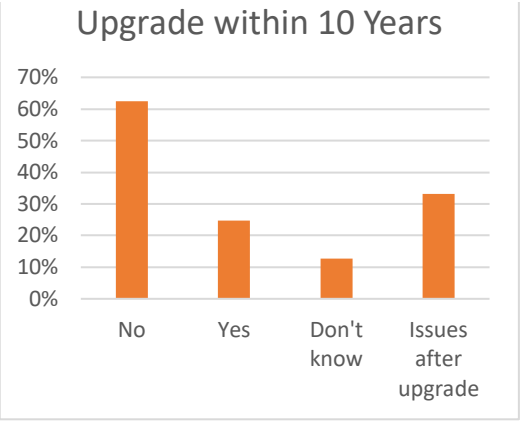
Of these properties 82% on the peninsula and 87% overall are occupied all four seasons. The remainder are used summer or two-seasons only. This is evidence of the transition from the use of properties from summer cottages back in the 50s, to year-round residences in the 90s. Currently the trend is to transition to high end residences in 2000s and beyond.

There was a question that asked: **Laundry or shower in a separate septic location?**

Of all respondents, over 15% indicated that they have a separate system for laundry. This is indicative of a significant inadequacy of soils to handle a septic system serving the remainder of the household. Separate systems have historically been added as a low-cost solution when the primary septic system capacity falls short.

The survey found that lightly less than half of all owners pump the septic system every other year. In general, septic systems are being serviced in appropriate frequency.

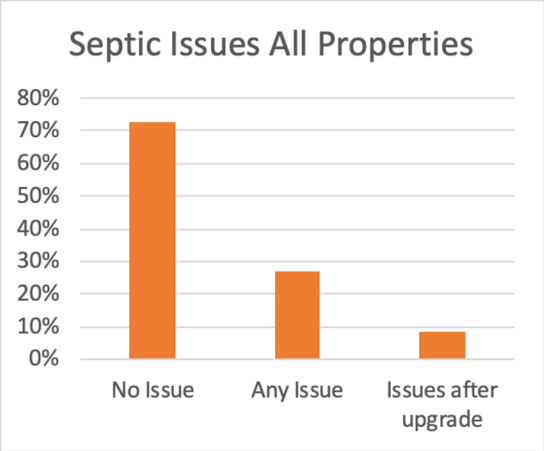


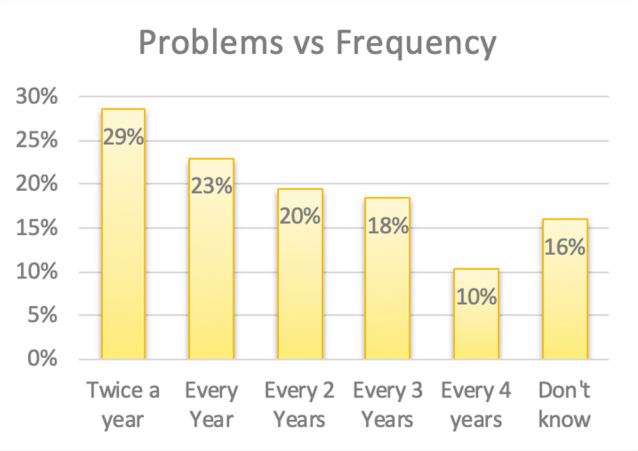


When queried if their septic system was upgraded within the last 10 years, one-quarter of the study area owners indicated **Yes**. And of those, more than 1/3 indicated there remain ongoing issues. This is a high rate of remediation. It also shows that septic repairs are often not effective due to low depth to rock and otherwise poor soil conditions for on-site wastewater treatment systems (OWTS).

Owners were asked if there were any issues with their system specifically with a history of slow drains, backups, smell, wetness, sewage on the surface or in a ditch and if the issues still exist. Over one-quarter, 27%, report one or more of these problems. This is a relatively high incidence of septic system issues for any jurisdiction.

Further, of those reporting septic system service due to a problem, one in three (33%) of those report an issue persists, that is 8% of the total septic system count.





It was interesting to correlate those reporting issues with the frequency of pumping. It indicates those that pump more frequently do so because it is needed.

Comments

At the presentation of the survey to property owners, it was promised the results would be assembled for statistical analysis only. That is the case and this is the report. But anecdotal feedback from the community was that some declined to participate because they did not want to indicate to the Town their septic system was troubled. If that is even partially true, then these results are optimistic. It is likely that a greater underlying wastewater problem than indicated by this survey.

One question that was not asked has to do with the observations of brown spots in the area of the septic drainfields. The system might not have slow drains, backups, smell, wetness, sewage on the surface or in a ditch, but brown spots indicate septic surface breakthrough distressing the lawn. That is observed on many properties.

Septic Technology Overview

A well-designed septic system will remove organic matter and eliminate bacteria. This is what it is designed to do. However, even if working properly, every septic system will still pass nutrients and what is referred to as “forever” chemicals. To what extent is this the issue?

The water supplies to the communities in the Candlewood Lake Brookfield watershed are provided by deep wells situated above the land where the community wastewater is serviced by septic systems. Part of the Clean Water Fund Study for Task 2 was to determine if there is septic influence in the drinking water. Drinking water contamination would also indicate if there is septic influence from ground water flow into the lake. Wells suppling Candlewood Shores and Arrowhead Point communities were tested.

It was found that the occurrence of e-coli and phosphorus was low. These contaminates are both generally removed by the soil as flow trickles down to the deep-water supply wells. However, that is not the case for nitrogen which is not bound by the soils. Levels of nitrogen approach and sometimes exceed the EPA actionable

limit of 10 ppm (parts per million). Of course, nitrogen from septic contamination is not only in the drinking water, but also a nutrient from septic systems feeding the Lake.

Another indicator is the finding of a persistent artificial sweetener in the water supply. Even more concerning is the presence of PFAS (polyfluoroalkyl substances) in the drinking water. These are considered "emerging" pollutants. Searching the Internet on "PFAS" will uncover a myriad of articles, papers and opinions. The response to PFAS contamination is determined by each state. So far, Connecticut has adopted the Federal EPA limits for a total PFAS allowed in drinking water. The EPA "lifetime" limit is 70 ppt (parts per trillion). That means someone can safely drink water with 70 ppt total PFAS all their life. Other states have set far more stringent limits at 10-20 ppt. At this writing Connecticut is still evaluating the issue. The wells in the Candlewood peninsula exceed the new lower limits adopted elsewhere. Testing shows PFAS contaminates are in both the deep well drinking water and the lake. See the data for the Candlewood peninsula taken from Appendix A1 of the Task 2 Report included below.

Summary and Conclusions

Task 2 of the Candlewood Lake Wastewater Management Plan shows there is clear evidence of contamination of the ground water from septic systems. For example, the drinking water is high in both nitrogen and PFAS. The tap water is also high in artificial sweetener Acesulfame K. This compound is not degraded in septic systems and can only come from septic discharge.

While phosphorus is normally retained by the soils, separate studies show that large rain events release both retained phosphorus and nitrogen into the lake. Limnologists, scientists that study biological, chemical, and physical features of lakes and other bodies of fresh water, agree that septic flow is a primary reason the quality of lakes generally decline due to the accumulation of nutrients.

Further, there is a high incidence of performance issues with septic systems in the form of slow drains, backups, smell, wetness, sewage on the surface or in a ditch. When problems are identified and septic systems serviced, about one in four continue to have issues. This is due to the geology of the peninsula—low depth to bedrock and soils that have poor drainage causing channeling of septage outflow.

No one argues that intercepting septic flow from entering the ground around the lake will not improve the lake. Candlewood is the largest lake in Connecticut and an important economic engine for Brookfield and the region. Like any other resource, the lake needs to be maintained.

Two stories:
Lake Kenosia. This is a small lake on the west side of Danbury. There is a trailer park adjacent to the lake that was on a septic system. In 2016 the area was put on the Danbury sewer system. In one year, Lake Kenosia turned from green to blue. The visual depth, that is the clarity, doubled.

Lake Hopatcong (huh-pat'-cong):
This is the largest lake in New Jersey. Last year (2019) the lake failed. The most likely cause is from decades of accumulated septic discharges in the heavily settled area around this popular lake. Many are large expensive properties in the watershed. News articles at the time reported that the algae bloom was so bad, officials warned against even touching the water. Vacation rentals cancelled, business shuttered with no customers, and homes with mortgages relying on rental income went into foreclosure. No one wishes this situation at Candlewood Lake.

Task 3 of the Wastewater Management Plan report recommends a sewer system be installed within the Brookfield peninsula. It also outlines a detailed sewer system plan to address the cleanup both the water supply and the lake.

The Candlewood Lake Brookfield Wastewater Management Study is partially sponsored by a Clean Water Fund Grant by Connecticut DEEP. For all the study reports see https://brookfieldwpca.org/candlewood.

DATA

A.1 Drinking Water Aquifer

Table 2-1 presents the results of water supply sampling with Table 2-2 presenting the drinking water quality data from the water suppliers annual reports. The Chain of Custodies and laboratory reports for the drinking water sampling program are presented in Appendix I.

Septic system influence is strongly suggested by the nitrate-N and PFOA/PFOS concentrations. While determining the amount of the water supplies that is wastewater derived is beyond the scope of this project, the phosphorus concentrations suggest very high levels of septic wastewater phosphorus removal by soils. In accordance with CT guidance, PFOA/PFOS was sampled for twice to confirm concentrations.

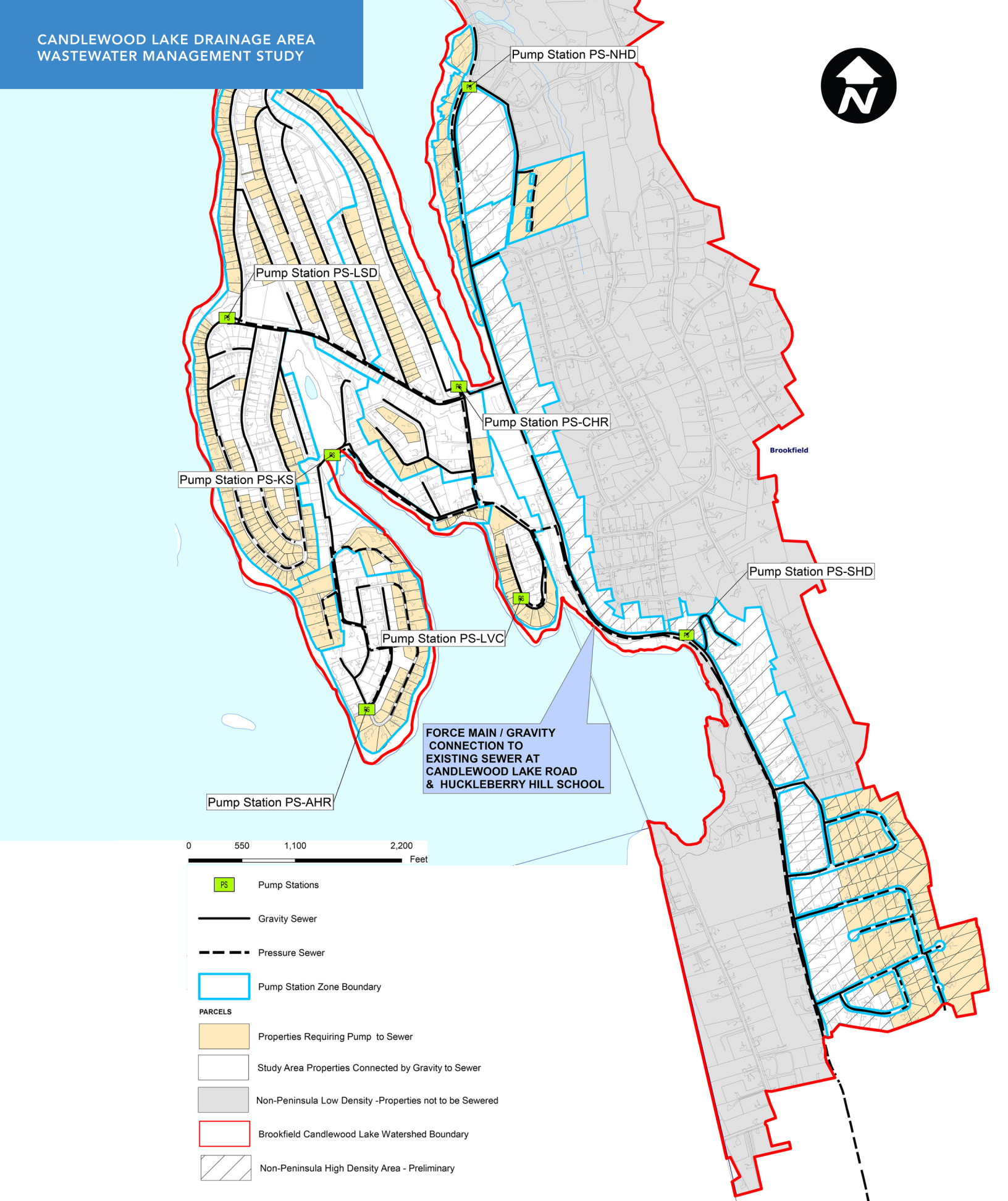
Table 2-1 Drinking Water Supply Quality Data

Candlewood Lake Water Supplies - Drinking Water Analysis								
Water Source / Utility			Candlewood Shores	Arrowhead	Aquarion Western	Lake		
Sampling Date			14-Aug-19	22-Aug-19	16-Sep-19	16-Sep-19	23-Dec-19	
	Units	RL				@ 76SLSD	@ 76SLSD	@ 74 NLSD
Alkalinity	mg/L as $CaCO_3$	2	166	180				
Chloride	mg/L	10	94	93			33.1	35.1
pH	SU		7.1	7.5				
Nitrate-N	mg/L	0.100	6.99	6.85			0.67	0.99
TP	mg/L	0.010	0.015	0.017				
ortho-P	mg/L	0.005	0.016	0.018			<0.01	<0.01
Boron [1]	mg/L	0.030	0.054	0.038	ND	ND	<0.05	<0.05
Acesulfame K [2]	ppt-ng/L	100	532	1,040	204	102		
Sucralose [3]	ppt-ng/L	1,000			1,900	ND		
Saccharin [3]	ppt-ng/L	100			ND	ND		
PFOA	ppt-ng/L	1.72	24.6	8.14				
PFOS	ppt-ng/L	1.72	28.3	5.73				
PFOA/PFOS Total	ppt-ng/L	1.72	52.9	13.87				
			04-Sep-19	04-Sep-19	04-Sep-19	04-Sep-19		
PFOA	ppt-ng/L	1.72	20.3	8.69	10.7	3.71		
PFOS	ppt-ng/L	1.72	24.7	7.5	13.1	2.14		
PFOA/PFOS Total	ppt-ng/L	1.72	45.0	16.19	23.8	5.85		
[1] Sampled 4 Sept 2019 [2] Level of Quantification (LOQ) ND=Non Detect								

Table 2-2 Study Area Water Supply Quality from Annual Reports

Water System		Nitrate (NO_3-N) Conc. (mg/L)		Sodium (Na) Conc. (mg/L)		Chloride (Cl) Conc. (mg/L)	
No.		MCL	Latest Actual	NL	Latest Actual	NL	Latest Actual
1	**Aquarion - Candlewood Acres**		0.7		16.2		7
2	**Aquarion of Western Brookfield**		3.5		53		53
3	**Arrowhead Point HO Ass'n**		7.9		24.8		100
4	**Candlewood Lake Club**		1.3		6.46		8.4
5	**Candlewood Orchards**	10	0	28	9.9	250	3.4
6	**Candlewood Shores Tax District**		7.5		31		31
7	**Food establishments on well -TNC**						
8	**Hickory Hills - Aquarion**		0.5		8.1		7.1
9	**Woodcreek Village Condo Ass'n**		0.7		18.7		129
	MCL = Maximum Contaminant Level						
	NL = State of Connecticut customer notification level. Elevated levels of sodium, coupled with dietary intake, can potentially affect those on a sodium-restricted diet.						

CANDLEWOOD LAKE DRAINAGE AREA
WASTEWATER MANAGEMENT STUDY



Prepared By:

Environmental Engineers/Consultants
LOMBARDO ASSOCIATES, INC.

Candlewood Lake Study Area Wastewater Management Plan

RECOMMENDED SEWER SYSTEM

Prepared For:
Brookfield Water Pollution Control Authority
53 Commerce Road,Unit #1
Brookfield, Connecticut 06804

Source: Town of Brookfield

Candlewood Lake Area Brookfield Survey

Survey results are assembled and collated by consultants Lombardo Associates, Inc. (LAI)

Brookfield Septic System Questionnaire

WPCA 53A Commerce Road, Unit 1

Brookfield Water Pollution Control Authority

Candlewood Lake Watershed Area Wastewater Management Study

A. General

Contact Person *

Property Address *

Brookfield, CT 06804

Phone Number

Area Code – Phone Number

Email *

example@example.com

B. Property Use

How many people live in this home?

How much is the house occupied?

Do you have a garbage disposal? *
- No
- Yes
- Yes, but never use

Is the area around the septic or drainfield wet? *
- Never
- Sometimes
- Often

How often do you pump your septic system? *

Does your laundry or shower discharge into a separate septic system or location? *
- No
- Yes
- Don't know

C. Septic System

Where is the septic system located? *
- Front of House
- Back of House
- Left side (when facing front of house)
- Right side (when facing front of house)
- Don't know

Where is the drain field located? *

- ○ Front of House
- ○ Back of House
- ○ Left side (when facing front of house)
- ○ Right side (when facing front of house)
- ○ Don't know

Have there been repairs/upgrades to your septic system in the last 10 years?

- ○ Yes
- ○ No
- ○ Don't know

If Yes above, describe repairs/upgrades and provide the dates

(The date can be the approximate year)

Within the last **5 years** have you had any of the following problems?

	Yes	Yes, rarely	No	Not sure
Slow drains	○	○	○	○
Sewage backing up into house	○	○	○	○
Bad smell near tank or drain field	○	○	○	○
Wet spots near tank or drain field	○	○	○	○
Sewage on or at the surface	○	○	○	○
Sewage flowing to ditch	○	○	○	○
Other problem, please specify	○	○	○	○

Do the problems indicated above still exist?

- ○ Yes
- ○ No
- ○ Sometimes
- ○ Not Applicable

Comment

Submit

The Brookfield Water Pollution Control Authority (WPCA) has commissioned a Wastewater Management Plan with a State Clean Water Fund grant for the watershed area in Brookfield that drains to Candlewood Lake. The Plan is to determine the public health and environmental impact of wastewater practices in the area and develop technically viable, cost-effective solutions to correct identified deficiencies. In particular, the Plan will assess the influence, if any, of wastewater on the water quality of Candlewood Lake on a property by property basis for all 1,500 properties in the Study Area. You want to be sure we have the most accurate information on each property. Project documents can be viewed online at https://brookfieldwpca.org/candlewood

Thank you, Nelson Malwitz, Chairman WPCA