PGOLID: Septic Screening Special Project 2006

There are many components that influence the water quality of a lake. The Minnesota Pollution Control Agency (MPCA) ranks septic systems as one of the top 4 influences of lake quality in the state. Systems that are installed and maintained correctly have positive effects on the environment by effectively treating waste. However, waste can escape systems that are not functioning correctly.

The current status of the septic systems on the Pelican Group Of Lakes is unknown. In order to acquire a better understanding of the status of septic systems within the improvement district, PGOLID approved funding of a special project in 2006. Funding was approved for the screening of 150 properties. Jordan Ornquist, PGOLID Lake Resource Coordinator, designed, implemented and managed the project.

A letter requesting voluntary participation was sent to all lakeshore property owners within the improvement district in June of 2006. Nearly 300 property owners responded, requesting that they be considered for the special project. 152 sites were chosen, based upon the project's goals and available funding, and property owners were notified in July. Twenty-five percent of the volunteered sites were chosen from the oldest holding tanks, 50% were chosen from the oldest septic tanks with drain fields, and 25% were chosen by a random selection of newer (10 years or less) septic tanks with drain fields.

As stated within the design of the program, each participant was given a unique ID number in order to keep personal identities and property information strictly confidential. Access to such information was limited to RMB Environmental Laboratories, Jordan Ornquist and A1 Septic. PGOLID Board members were excluded from access to the confidential property information. As initially designed, PGOLID was to receive the facts and findings of the project.

A1 Septic, a Minnesota state certified and licensed septic inspection company, was awarded the service contract to complete the septic compliance screening. On-site screening began in August and was completed on November 28th. Results were tallied and statistical analysis was completed to identify the current status of the district's septic systems that were surveyed and their effects on Pelican, Little Pelican, Fish, and Bass lakes.

It must be stated that the inspections completed by A1 Septic were for screening purposes alone, and must not be construed as being a complete certified inspection. The septic system screenings included, but were not limited to: tank inspection and probing, soil boring (when applicable), drainfield inspection (yard seepage and drainfield ponding), proper sizing, and potential impact to the water table. General information surveys were submitted by the participants and were used to identify usage and maintenance practices.

Thorough and accurately balanced studies such as this one will begin to assist PGOLID in understanding the potential impact on the Improvement District's water resources and assist the district in making better decisions to preserve the quality of its lakes and rivers.

Summary
The overall Facts and Findings of the study are summarized in the following tables.

Number of systems chosen for this study	**152**
Number of systems inspected	**137**
Number of systems not found	**15**
Number of systems replaced since last county inspection	**6**
Number of systems never pumped/cleaned	**5**

Survey Participants

Resident Status	
11%	Year-round
59%	Seasonal
30%	Weekend

System Types		
Qty	**% of Total**	
40	29 %	Holding Tanks from 1972-1997
65	48 %	Septic Systems from 1971-1986
32	23 %	Septic Systems from 1992-2006

Estimated Total Systems		
	Qty	**% of Total**
Incompliant	31	23 %
Impacting Pelican Waters	21	15 %
Insufficient Maintenance	100	73 %
Good Condition	38	26 %

Some systems had more than one reason for incompliance and/or insufficient maintenance and are listed separately under these statistics, which is why they do not add up to 100%.

Estimated Holding Tanks		
	Qty	% of Total
Incompliant	7	18 %
Impacting Pelican Waters	3	8 %
Insufficient Maintenance	28	70 %
Good Condition	13	33 %

Some tanks had more than one reason for incompliance and/or insufficient maintenance and are listed separately under these statistics, which is why they do not add up to 100%.

Estimated Septic Systems <1986		
	Qty	% of Total
Incompliant	19	29 %
Impacting Pelican Waters	14	22 %
Insufficient Maintenance	55	85 %
Good Condition	10	15 %

Some systems had more than one reason for incompliance and/or insufficient maintenance and are listed separately under these statistics, which is why they do not add up to 100%.

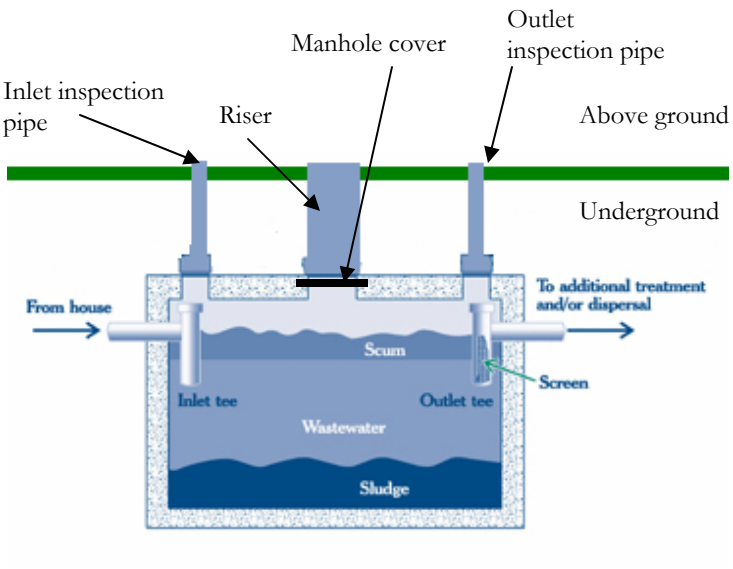
Estimated Septic Systems >1992		
	Qty	% of Total
Incompliant	5	16 %
Impacting Pelican Waters	4	13 %
Insufficient Maintenance	17	53 %
Good Condition	15	41 %

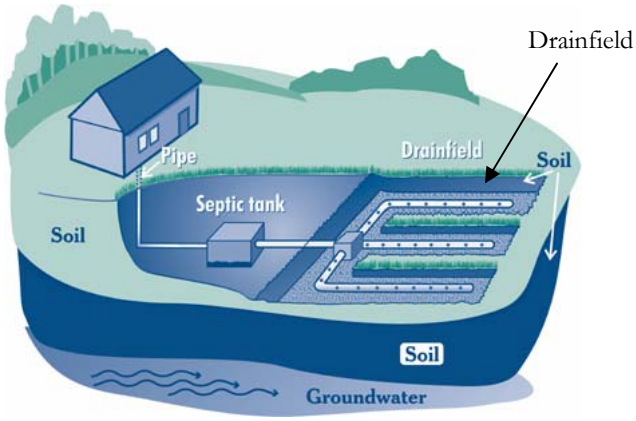
Some systems had more than one reason for incompliance and/or insufficient maintenance and are listed separately under these statistics, which is why they do not add up to 100%.

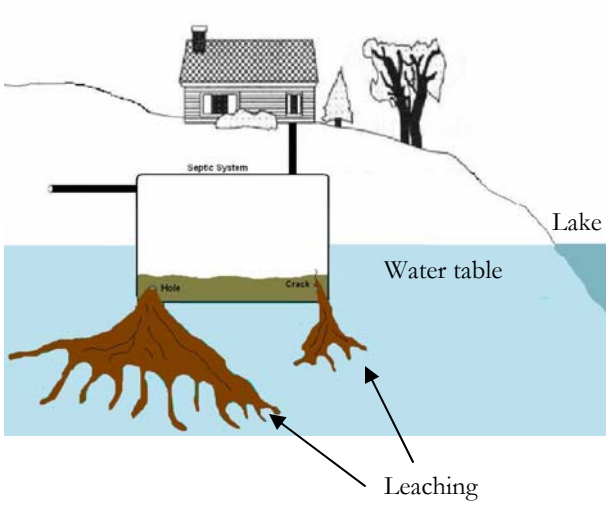
Reasons for incompliance

The survey components used throughout the project are identified in the following table. These keys were utilized as a tool to standardize the components used to classify a system into the four categories used for this study.

Reason Key	
leaching	Sewage is leaking into ground, lake, or water table without proper treatment
riser	Risers are not exposed, are damaged or are too small in diameter
outlet cap	Tank may not be capped, the result is heavy leaching when full, prevents backup in house
alarm	No tank alert system
overload	Tank or drainfield are overloaded, the result is backup and leaching
pumping	Tank is not pumped enough, or properly
chemical	Chemical or medication is damaging treatment of sewage
drainfield	Drainfield is not installed, maintained, or operating correctly
soil	Soil may be insufficiently treating sewage
back-flow	Sewage is running back into the tank from the drain field, the result could be overloading
tank	Septic holding tank is undersized, leaking, or hidden
sludge	Solid buildup in tank eventually causes overloading
set-back	Insufficient set back of sewage from a well or lake front







Septic and Holding Tank Best Management Practices

- Make sure the riser is exposed so the tank can be inspected and pumped properly through the manhole
- Make sure your tank has an alarm to warn you when it is so full that it could cause backup
- Pump your holding tank every few weeks and your septic tank every few years (see enclosed worksheet)
- Be conservative with your water usage

Septic System Drainfield Best Management Practices
(not applicable to holding tank)

- Make sure you have a drainfield that is not clogged and filtering correctly
- Do not irrigate your drainfield
- Do not drive on your drainfield or compact the soil, decreasing its filtering ability
- Make sure your drainfield is set back from the lake at least 50 feet
- Make sure no chemicals are killing the bacteria that recycle your waste in the drainfield (pesticides, bleaches, ammonias, paint, fuels and herbicides)

Lake Proximity Best Management Practices

- Make sure your septic or holding tank is set back at least 50 feet from the lake
- Regularly have your tank inspected for cracks or leaks that could be leaching sewage into the lake
- Make sure your tank is properly sized for your house

The specific reasons for incompliance, lake impact and best management practices are summarized in the following tables.

All Systems:

	Incompliant	%
drainfield	8	6%
tank	8	6%
soil	7	5%
leaching	6	4%
outlet cap	2	1%
overload	1	1%
pumping	1	1%
set-back	1	1%
riser	0	0%
alarm	0	0%
chemical	0	0%
back-flow	0	0%
sludge	0	0%

	Significant Lake Impact	%
leaching	9	7%
soil	4	3%
drainfield	3	2%
set-back	3	2%
overload	2	1%
tank	2	1%
riser	0	0%
outlet cap	0	0%
alarm	0	0%
pumping	0	0%
chemical	0	0%
back-flow	0	0%
sludge	0	0%

	Septic BMP	%
riser	51	37%
pumping	30	22%
drainfield	17	12%
tank	14	10%
alarm	11	8%
overload	4	3%
soil	3	2%
outlet cap	2	1%
sludge	2	1%
leaching	1	1%
chemical	1	1%
back-flow	1	1%
set-back	0	0%

Some tanks had more than one reason for incompliance and/or improper maintenance and are listed separately under these detailed statistics.

Holding Tanks:

	Incompliant	%
leaching	3	8%
tank	3	8%
outlet cap	2	5%
soil	1	3%
set-back	1	3%
riser	0	0%
alarm	0	0%
overload	0	0%
pumping	0	0%
chemical	0	0%
drainfield	0	0%
back-flow	0	0%
sludge	0	0%

	Significant Lake Impact	%
leaching	3	8%
riser	0	0%
outlet cap	0	0%
alarm	0	0%
overload	0	0%
pumping	0	0%
chemical	0	0%
drainfield	0	0%
soil	0	0%
back-flow	0	0%
tank	0	0%
sludge	0	0%
set-back	0	0%

	Septic BMP	%
riser	13	33%
alarm	10	25%
pumping	5	13%
tank	5	13%
outlet cap	2	5%
overload	1	3%
soil	1	3%
leaching	0	0%
chemical	0	0%
drainfield	0	0%
back-flow	0	0%
sludge	0	0%
set-back	0	0%

Some tanks had more than one reason for incompliance and/or improper maintenance and are listed separately under these detailed statistics.

For holding tanks, the reasons for incompliance were leaching, an undersized or hidden tank, a missing outlet cap, and insufficient setback from the lake. Leaching tanks were the main source of impact to Pelican Lake. Leaching means that sewage is leaking into the ground or lake without being treated. When sewage enters the lake it can carry with it harmful bacteria, which can make the immediate area unsafe for swimming. In addition, sewage adds phosphorus and

nitrogen to the lake, which causes algal blooms. Leaching tanks must be repaired or replaced to eliminate the impact to Pelican Lake. Holding tank capacity should be a minimum of 1,000 gallons or 400 gallons per bedroom, whichever is greatest. If holding tanks are hidden or not located, they are probably not being pumped, which could lead to overflow and/or leaching. If a holding tank is not capped, it could lead to leaching when the tank is full and backup into the house. The minimum setback for a holding tank should be 50 feet from the lake.

For holding tank Best Management Practices (BMP), risers were the most encountered problem. A riser is the column that allows one to access the manhole cover of the holding tank from above ground (see page 5). If the riser is not exposed, the tank cannot be properly inspected or pumped through the manhole cover. It is important not to confuse the riser with the inspection pipes. The riser is over 21 inches in diameter, while the inspection pipes are approximately 6 inches in diameter. We recommend checking your riser, and if there is no way to access the manhole cover of your holding tank, hire an appropriate company to dig a new hole to the manhole cover and install a riser.

Lack of holding tank alarms were another common problem. The alarm alerts the homeowner when the tank is dangerously full and needs immediate pumping to prevent backup into the house and/or leaching into the lake. Alarms can consist of buzzers and warning lights. Holding tanks need to be pumped often when used continuously. Refer to the enclosed worksheet for determining the frequency of pumping for your holding tank.

Septic Systems installed earlier than 1986:

	Incompliant	%
drainfield	5	8%
soil	5	8%
tank	5	8%
leaching	2	3%
pumping	1	2%
riser	0	0%
outlet cap	0	0%
alarm	0	0%
overload	0	0%
chemical	0	0%
back-flow	0	0%
sludge	0	0%
set-back	0	0%

	Significant Lake Impact	%
leaching	4	6%
soil	4	6%
set-back	3	5%
tank	2	3%
overload	1	2%
drainfield	1	2%
riser	0	0%
outlet cap	0	0%
alarm	0	0%
pumping	0	0%
chemical	0	0%
back-flow	0	0%
sludge	0	0%

	Septic BMP	%
pumping	19	29%
drainfield	9	14%
tank	8	12%
overload	2	3%
soil	2	3%
sludge	2	3%
leaching	1	2%
alarm	1	2%
back-flow	1	2%
riser	0	0%
outlet cap	0	0%
chemical	0	0%
set-back	0	0%

Some tanks had more than one reason for incompliance and/or improper maintenance and are listed separately under these detailed statistics.

Septic Systems installed after 1992:

	Incompliant	%
drainfield	3	9%
leaching	1	3%
overload	1	3%
soil	1	3%
riser	0	0%
outlet cap	0	0%
alarm	0	0%
pumping	0	0%
chemical	0	0%
back-flow	0	0%
tank	0	0%
sludge	0	0%
set-back	0	0%

	Significant Lake Impact	%
leaching	2	6%
drainfield	2	6%
overload	1	3%
riser	0	0%
outlet cap	0	0%
alarm	0	0%
pumping	0	0%
chemical	0	0%
soil	0	0%
back-flow	0	0%
tank	0	0%
sludge	0	0%
set-back	0	0%

	Septic BMP	%
riser	8	25%
drainfield	8	25%
pumping	6	19%
overload	1	3%
chemical	1	3%
tank	1	3%
leaching	0	0%
outlet cap	0	0%
alarm	0	0%
soil	0	0%
back-flow	0	0%
sludge	0	0%
set-back	0	0%

Some tanks had more than one reason for incompliance and/or improper maintenance and are listed separately under these detailed statistics.

For septic systems, the main reasons for incompliance were the drainfield, the soil, and the tank size. The drainfield and its soil are an important component of a working septic system. The drainfield is a series of pipes that pump the sewage into the soil (see page 5). The microbes in the soil are what breakdown the sewage so that it doesn't contaminate the groundwater or lake. When a drainfield is not installed properly, the sewage does not get fully treated. Some areas have insufficient soil for treating sewage. In this case, a mound needs to be constructed out of soil hauled in, or a holding tank can be used. Holding tanks don't have drainfields, but they need to be pumped much more often (as much as every week or two if used continuously) because they do not treat the sewage, they just store it.

Out of the septic systems installed earlier than 1986, 22% of them were impacting Pelican Lake water quality. Six percent of the septic systems installed after 1992 were impacting Pelican Lake water quality. The reasons for the impact were leaching, soil that is insufficiently treating the sewage, set-back from the lake of less than 50 feet, inadequate tank size, an overloaded tank and an improperly working drainfield. Leaching means that sewage is leaking into the ground or lake without being treated. When untreated sewage enters the lake it can carry with it harmful bacteria, which can make the immediate area unsafe for swimming. In addition, untreated sewage adds phosphorus and nitrogen to the lake, which causes algal blooms. Leaching tanks must be repaired or replaced to eliminate the impact to Pelican Lake.

For septic system Best Management Practices (BMP), pumping was the most encountered problem. Septic systems treat the sewage, but they still need to be pumped occasionally. See the enclosed worksheet to calculate your cleaning frequency. Never go more than 3 years without cleaning! In addition, the drainfield should not be irrigated. Watering the drainfield can wash the untreated sewage into the yard or lake, and can also saturate the soil in the drainfield so there

is less space in the soil for filtering the sewage. Drainfields should also not be driven on or compacted because that can decrease the soil's filtering ability.

Conclusions

In this study, 137 holding tanks and septic systems were inspected out of approximately 1,000 waste treatment systems in the Pelican Group of Lakes Improvement District. These inspections were voluntary and were for screening purposes alone, and must not be interpreted as being a complete certified inspection. Thirty-one (23%) holding tanks and septic systems were found to be incompliant and 21 (15%) were impacting the Pelican Group of Lakes water quality. While most of the systems were not impacting water quality, over half were improperly maintained. When your septic system is properly designed, installed, operated and maintained it will provide economical and effective sewage treatment. If you properly treat sewage today, future generations will not incur the costs of cleaning up the health or environmental problems that may have otherwise been created. Please see the enclosed brochures and worksheets for properly maintaining your septic system or holding tank.

Any questions regarding report findings and requests for results on your own property inspection should be directed to:

Moriya Rufer
PGOLID Lakes Resource Coordinator
c/o RMB Environmental Laboratories, Inc.
(218) 846-1465

Typical Ranges of Water Used (in gallons)

Action	Typical Use	Conservative Use	Ultra-Conservative Use
Toilet-flushing	6 (old standard)	1.5-3 (low-flow)	Composting toilet
Tub Bath	30 (1/2 filled)	15 (1/4) filled	Sponge Bath
Shower			
10 min	50 (5 gal/min)	25 (2.5 gal/min)	3 (camper style)
3 min	15 (5 gal/min)	7.5 (2.5 gal/min)	
Laundry - full load			
Top loading	50-60 (older models)	40 (newer models)	Landromat
Front loading	33 (older models)	17-28 (newer models)	
Dishwashing			
Machine	12-15 (old-reg cycle)	6-9 (new-reg cycle)	
Hand	16 (faucet rinse)	6 (basin rinse)	
Teeth-brushing	2 (faucet running)	1/8 (wet brush, brief rinse)	
Hand-washing	2 (faucet running)	1 (basin; brief rinse)	
Shaving	3-5 (faucet running)	1 (basin; brief rinse)	

Information from the Septic System Owner's Guide, University of Minnesota Extension Service

In the table above, typical water use means that no conservation efforts are being made. Conservative use means that the homeowners are making steps to limit water use such as installing a water-conserving shower head and a new washing machine. Just small efforts such as turning off the water while brushing your teeth and shaving can save water.

HOLDING TANKS: CLEANING FREQUENCY GUIDELINES

Enter the number of occurrences each week:		*Enter water use:*			
Showers (3 min):	_____ x	_____ gallons	=	_____	A
Showers (10 min):	_____ x	_____ gallons	=	_____	B
Tub Bath:	_____ x	_____ gallons	=	_____	C
Dishwashing (Machine):	_____ x	_____ gallons	=	_____	D
Dishwashing (Hand):	_____ x	_____ gallons	=	_____	E
Toilet-flushing:	_____ x	_____ gallons	=	_____	F
Teeth-brushing:	_____ x	_____ gallons	=	_____	G
Hand-washing:	_____ x	_____ gallons	=	_____	H
Shaving:	_____ x	_____ gallons	=	_____	I
		TOTAL OF A-I	=	_____	

The normal operating volume (NOV) is the liquid storage below the "time to pump" alarm level.

The NOV should be approximately 75% the holding tank capacity

Calculate your NOV:

	X	0.75	=	
Holding Tank Capacity				Normal Operating Volume (NOV)

	Divided by:		=	
TOTAL OF A-I		NOV		Number of weeks between cleanings

TYPICAL RANGES OF WATER USE – USE TO GET GALLONS FOR WORKSHEET ABOVE

Action	Typical Use (in gallons)	Conservative Use	Ultra-conservative Use
Toilet-flushing	6 (old standard)	1.5-3 (low-flow)	Composting toilet
Tub Bath	30 (1/2 filled)	15 (1/4 filled)	Sponge bath
Shower – 10 min	50 (5 gal/min)	25 (2.5 gal/min)	3 (camper style)
Shower – 3 min	15 (5 gal/min)	7.5 (2.5 gal/min)	
Laundry – Top loading	50-60 (older models)	40 (newer models)	Laundromat
Laundry – Front loading	33 (older models)	17-28 (newer models)	
Dishwashing - Machine	12-15 (old-reg cycle)	6-9 (new-reg cycle)	
Dishwashing - Hand	16 (faucet rinse)	6 (basin rinse)	
Teethbrushing	2 (faucet running)	1/8 (wet brush, brief rinse)	
Hand-washing	2 (faucet running)	1 (basin; brief rinse)	
Shaving	3-5 (faucet running)	1 (basin; brief rinse)	

SEPTIC SYSTEMS: CLEANING FREQUENCY GUIDELINES

EFFECTS		POINTS FOR EACH FACTOR
Enter 10 points for wastewater that enters the septic system for each of these appliances:	Water conditioning unit (water softener or iron filter)	_____
	Garbage disposal	_____
	Automatic clothes washer	_____
Enter 10 points if you have:	An in-home business (such as daycare, beauty shop)	_____
	More than 4 over-night guests at a time, several times per year	_____
	A laundry pattern of doing three or more loads/day	_____

Enter 10 points if your septic tank is smaller than indicated for the size of the house:	**HOUSE SIZE**	**TANK CAPACITY**	
	2-3 bedrooms	1000 gallons	_____
	4-5 bedrooms	1500 gallons	_____
	6-7 bedrooms	1750 gallons	_____
	8-9 bedrooms	2000 gallons	_____

Enter the points indicated if the last cleaning was:	**FREQUENCY**	**POINTS**	
	1-2 years ago	0	_____
	3-5 years ago	5	_____
	6-10 years ago	10	_____
	more than 10 years ago	12	_____

Enter the number of people for the house size and do the calculation.	**HOUSE SIZE**	**# OF PEOPLE**	**LOAD** (number can be negative)	
	2 bedroom	_____	- 3 = _____ x 3 =	_____
	3 bedroom	_____	- 4 = _____ x 3 =	_____
	4 bedroom	_____	- 5 = _____ x 3 =	_____
	5 bedroom	_____	- 6 = _____ x 3 =	_____
	6 bedroom	_____	- 7 = _____ x 3 =	_____
	7 bedroom	_____	- 8 = _____ x 3 =	_____

TOTAL EFFECTS _____

CREDITS		POINTS FOR EACH FACTOR
Enter 10 points if you:	Use a suds-saving or front-loading clothes washer, or do 4 or fewer loads of laundry spread throughout the week	_____
	Have two full-size septic tanks or one tank with 150% or more of the capacity required for your house	_____

Enter 5 points if you:		
	Use low-volume toilets (3 gallon or less per flush)	_____
	Have two or fewer people in the house and bathe fewer than five times per week	_____

TOTAL CREDITS _____

Enter your numbers in this equation to calculate how often your septic tank should be cleaned.

36 - [ ] + [ ] = [ ] **months between cleanings**

(effects number) (credits number)