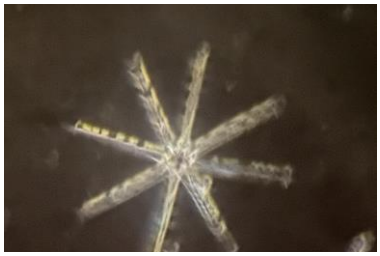
SOURCE WATER PROTECTION

Pilot study commissioned by FOCA

Image credits:
Josh Feron – aerial photo of lakes
Frank Johnson – photomicrograph of diatom



Diatom *Asterionella Formosa*. The health of the lakes is reflect in organisms such as this.

ABSTRACT

This report examines the sources of drinking water for properties around the Litte Silver and Rainbow Lakes and suggests a number of actions to be taken to protect them.

LSARL Property Owners Association 2026.

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Executive Summary

This document is a pilot source protection plan prepared to address significant drinking water threats in Little Silver and Rainbow Lakes, Tay Valley Township, Lanark County, ON. This plan has been prepared in accordance with the requirements of the *Clean Water Act, 2006* (Herein referred to as *'the Act'*).

The scope, purpose, and objectives of this plan can be found in Chapter 1. Chapters 2-4 provide the background to the source protection program and outlines contextual information relevant to understanding the threats described in Chapter 5. Chapter 6 details the areas of vulnerability and Chapter 7 makes recommendations for action, including that of developing a full and binding Source Water Protection Plan.

Key conclusions are that the lakes are over capacity; we have no formal monitoring protocol for either quantity or quality of well water, a vital resource; any diminution in the ability of the RVCA to do their job would be tragic and shortsighted; and our lake might easily see a tipping point in the next decade or so from any or all of the threats of runoff, temperature, climate change, excessive new development, or wildfire.

A number of appendices are included in this document. The first is a summary of a survey of property owners about their water sources and perceived challenges. Next are some comments extracted from our Lake Stewardship Plan (2017) about development. Appendix 3 details results of a Lake Capacity Model for the watershed and Appendix 4 describes salient issues from the hydrogeological survey made for the Township about Maberly Pines.

This plan is to be treated as a living, evolving document, that is frequently subject to amendments and updates to improve and adapt to new science and technical rules as they arise.

List of Acronyms

- BMP Best Management Practices
- CA Conservation Authority.
- CR County Road (CR #36 transects the watershed of LSARL).
- FOCA Federation of Ontario Cottagers' Associations.
- IPZ Input Protection Zone
- LA Lake Association.
- LPP Lake Partner Program of FOCA.
- LSARL Little Silver and Rainbow Lakes
- LSP Lake Stewardship Plan
- MECP Ministry of Environment, Conservation and Parks.
- MP Maberly Pines
- PO Property Owners.
- RVCA Rideau Valley Conservation Authority.
- SPP Source Protection Plan
- SWPP Source Water Protection Plan.
- TKN Total Kjeldahl Nitrogen: Nitrogen that is biologically available.
- TP Total Phosphates
- TVT Tay Valley Township.
- WHPA Well Head Protection Zone.
- WQI Water Quality Index

1 Introduction

Source Protection specifically considers the safety of drinking water. This section identifies the scope and purpose of the Little Silver and Rainbow Lakes Source Protection Plan, with additional consideration of the safety of the lake water for recreational uses.

1.1 Scope and purpose of this Source Water Protection Plan

This document describes a source water protection project (SWPP) for the properties in the subwatershed of Little Silver and Rainbow Lakes (LSARL) and includes consideration of the source water issues for the neighbouring subdivision of Maberly Pines which is the sole upstream component of the subwatershed.

This project, and the plan that ensues, endeavours to address the guidance provided in "Best Practices for Source Water Protection" released by the Ministry of Environment, Conservation and Parks (MECP). A thorough and practical guide may also be found on the FOCA website.

In support of these best practices, the MECP committed funding for several pilot projects to provide advice and support to property owners that do not have municipal drinking water systems, and consequently not covered in any municipal SPP. Under the aegis of the Federation of Ontario Cottagers' Associations, LSARL has developed this plan as part of a pilot project, along with three other lake associations.

1.2 Project Scope

This is a pilot project executed in consultation with FOCA to identify the challenges of Source Water Protection in rural settings. LSARL has engaged with its local community, municipal and other partners and used available data to describe and document the characteristics of the local drinking water systems and drinking water sources that serve the property owners around the lakes. This included:

- Identifying and mapping the Drinking Water Systems that serve the community and the Drinking Water Sources that supply water to those systems.
- Describing the local geographical and water contributing area (e.g., watershed), land uses, population served, any known drinking water concerns, as well as any other appropriate local information.
- Mapping Vulnerable Areas where Drinking Water Sources could be at risk from nearby activities and describing the approach used to delineate those areas.

- Assessing the vulnerability or sensitivity of the mapped Vulnerable Areas and documenting the approach used.
- Listing the activities, within the mapped Vulnerable Areas, that could pose a risk to the Drinking Water Sources and that are currently occurring or may reasonably occur in the future and, where possible, mapping their locations.
- Developing an Action Plan to identify realistic and feasible actions that the community can take to address activities within Vulnerable Areas that are a risk to the Drinking Water Sources.
- This Action Plan will then form the basis for a Source Protection Plan for the community of LSARL.

1.3 Source Protection Plan

The objective of a Source Protection Plan is to develop policies which will:

1) Identify the drinking water systems and their vulnerability;
2) Identify significant threats;
3) Produce a plan to reduce or eliminate these and future threats
4) To this scope of work may be added the following corollaries:
   a) Ensure that protections for recreational uses are included in the plan;
   b) And propose monitoring protocols to ensure future compliance.

2 Background

This section provides historical background and context to the remainder of the LSARL Source Protection Project and Plan development.

2.1 Drinking water protection in Ontario

After the tragic events of 2000 in Walkerton when an entire town's water supply was contaminated by agricultural runoff that introduced the bacteria *e. coli* at a deadly level, the Province of Ontario took action to ensure our drinking water is among the best protected in the world. The Walkerton Inquiry, led by Justice O'Connor made 121 recommendations on a wide range of areas related to protecting drinking water. This report was considered one of the finest examples of its kind, and the recommendations are now the building blocks of Ontario's drinking water protection framework, which includes a comprehensive drinking water protection framework from source to tap for municipal water systems.

Ontario now uses a multi-barrier approach to protect drinking water from source to tap. Following Justice O'Connor's first recommendation, the province developed watershed-

based source protection plans. This begins with safeguarding the surface and groundwater that supply municipal drinking water systems.

2.2 The *Ontario Clean Water Act 2006*

The *Ontario Clean Water Act, 2006,* ensures communities protect their drinking water supplies through prevention – by developing collaborative, watershed-based source protection plans that are locally driven and based on science. This is delivered through 19 multi-stakeholder source protection committees across the province representing business, public, municipal and indigenous interests. These committees have developed 38 local source protection plans that identify actions to protect sources of municipal residential drinking water systems. Together, these plans protect almost 450 municipal drinking water systems, an area where over 95% of Ontario's population live.

To address the needs of the nearly 3 million Ontarians who do not access drinking water from municipal systems, the Ministry of Environment, Conservation and Parks (MECP) released their *best practices for source water protection (Best Practices)*, which are intended to help manage the risks and identify actions that everyone can take to protect our drinking water sources.

2.3 Application of SPP to LSARL properties

This project is one of several pilots that uses the MECP funding to provide advice and support to people with non-municipal drinking water systems not included in a Source Protection Plan (SPP). As phase one of one such pilot, in 2024, the Federation of Ontario Cottagers' Associations (FOCA) and Dillon Consulting Limited worked with a member lake association on Crego Lake in the City of Kawartha Lakes, to develop a local "source protection plan" for the community residents. Building on this study, a second phase was launched with FOCA in 2025, to work with 3 interested communities on a volunteer basis to follow the Best Practices and apply them in a local context in their respective communities. The three lake communities were the Little Silver and Rainbow Lakes Property Owners' Association (Tay Valley Township), the Halls Hawk Lakes Property Owners Association (Algonquin Highlands) and the Lake Bernard Property Owners Association (Strong Township).

3 Description of Lake and Watershed

The two lakes Little Silver and Rainbow Lakes (LSARL) are located in Lanark County about 30km west of Perth, ON. The LSARL watershed resides within the Township of Tay Valley which has a permanent population of 5,925 (2021 census) and an estimated seasonal population of over 4,000 to give a combined total of over 10,000.

Using the survey data on the MECP SWP mapping, the following conclusions may be drawn for LSARL: (a) the entire Rideau Valley is considered a 'highly vulnerable aquifer', and (b) the lakes are in 'Intake Protection Zone 3'. IPZ 3 is considered as an area of least concern to the municipal water systems, but to focus on municipal water supply and exclude rural water users leaves a systematic gap which this plan is intended to close.

In this section we consider the topography, extent and content of the subwatershed that defines the water sources for LSARL.

3.1 Topography

The watershed is shown in the following figure, created using the Ontario Watershed Information Tool: LSL is fed from about 10 small streams and Rainbow Lake, Rainbow Lake is in turn fed from drainage from the rest of the watershed, including the area to the north west, locally known as Maberly Pines.

The statistics for the watershed are:

Area of watershed (km^2)	10.26
Area of lakes (km^2)	2.11
Area of wetlands (km^2)	0.52
Annual mean temp (°C)	6.40
Annual precipitation (mm)	940

Table 1 Statistics for LSARL

The approximate area of Little Silver lake is 86 ha (0.86 km^2), and that of Rainbow Lake is 14 ha ((0.14 km^2), so the balance of lake area in this section of the watershed is composed of the array of smaller lakes and ponds (many of which are visible in the cover aerial photograph of the watershed).

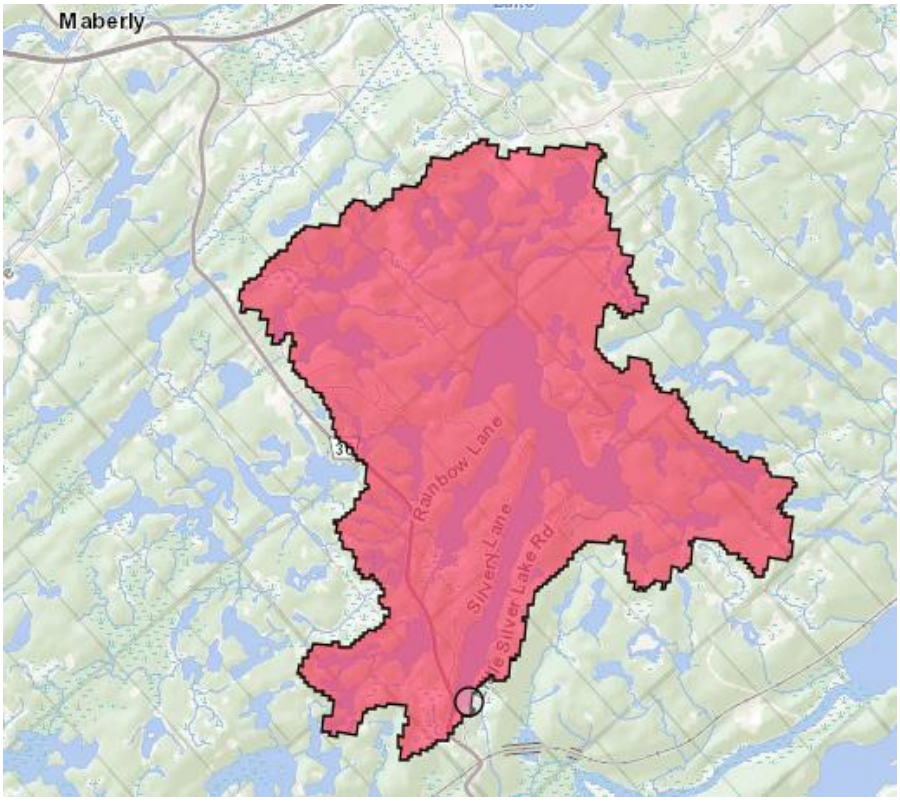


Figure 1 Area of LSARL watershed

3.2 Land Uses

Land uses within the watershed are depicted in the following map.

Zone R Residential

Zone RS Residential Seasonal

Zone RLS Residential Limited Services

There are extensive woodlots surrounding the lakes. Most are reserved for deer yards and used for hunting.

Specific Zoning conditions for residential lots are indicated by numbers after the zone, e.g. RLS-84 applies to one lot on the south shore of Rainbow Lake, etc.

There are no agricultural uses adjacent to this area, although there are two large properties that are zoned for this use. Both are currently used for hunting and fishing. The one paved County Road, CR#36, runs to the west of the area and runoff from winter salting may occur in the southern stretch of this road (about 2km). Both lakes have wetland areas at the end nearest the roads.

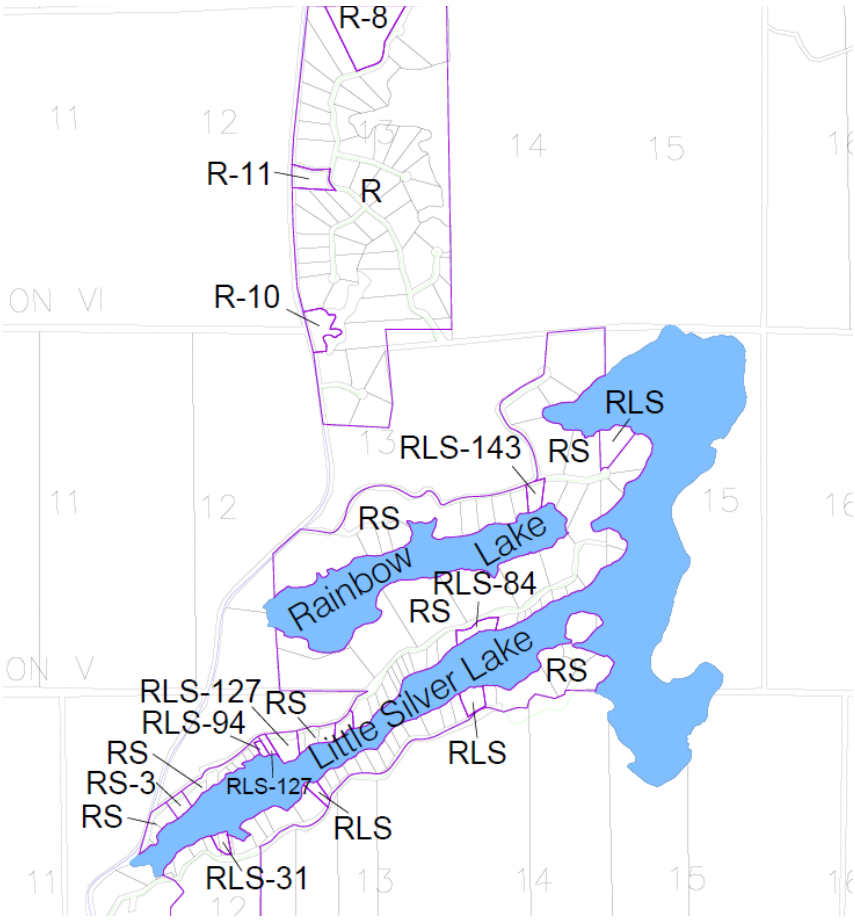


Figure 2 Land uses within the LSARL watershed

A final map for this section shows the vacant lots. Owing to a quirk in the Township by-laws, there are considerable impediments to development of these vacant lots. Opinions on whether this is a good thing depend on the ambitions of the owners and the attitudes of the neighbours and that of the Township.

The Township has been trying to resolve the issue of development in the subdivision of Maberly Pines for some years, and this effort continues with inducements such as the installation of electrical utility services and even paving the roads so that the maintenance can be assumed by the Township. This report will only consider the impact of such development on Source Water Protection.

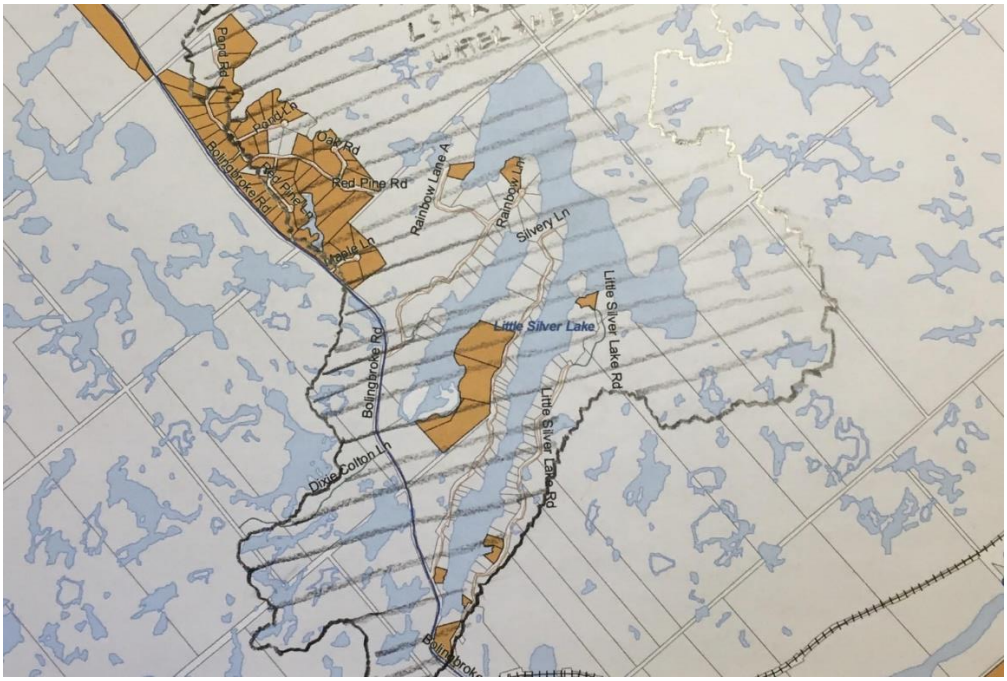


Figure 3 Vacant/ development lots in the LSARL Watershed

3.3 Geology and Hydrology

The context for this section may be taken from the following map of well locations in the watershed :

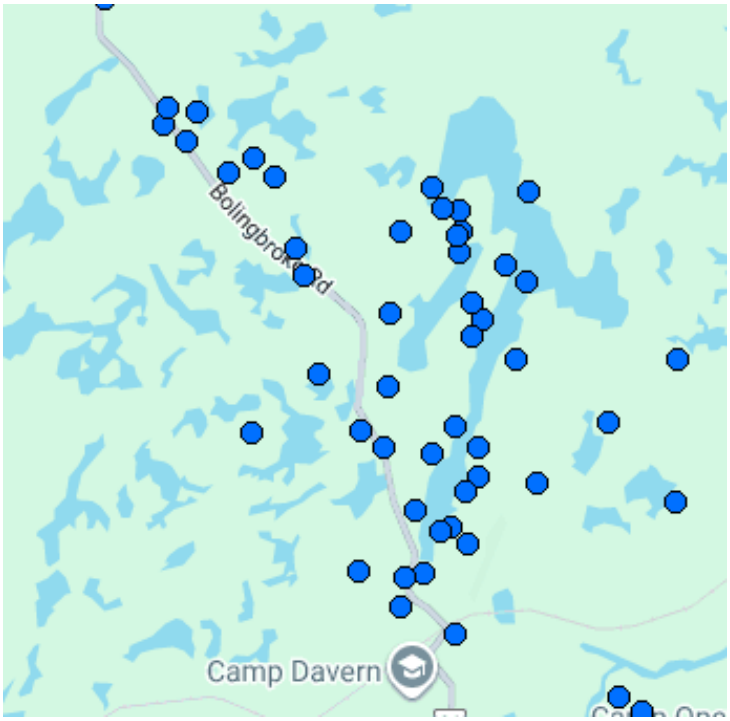


Figure 4 Well locations in the LSARL watershed

These are the wells as reported on the portal of the Ontario GIS map[1]. It is almost certain that this plot does not show the total number of wells around the lakes, and the survey data (to be considered later) gives a more accurate picture of what is actually being used for potable water.

Because this map of wells is not complete, then a Source Intake Map is difficult to construct. This will be considered in Section 6.10.

During the consideration of the development of Maberly Pines a Hydrogeological survey was commissioned by Tay Valley Township. A copy of the full report may be found here. Some reservations were expressed at the time about this report, but it provides a comprehensive review of the hydrogeology within the watershed that is likely to apply to all the area being considered.

The area is described in the report as

> "a glacial till ground moraine covering much of the area. The till was characterised as non-homogenous veneer of angular granitic pebbles and cobbles in a silty sand matrix that is discontinuous across the site. The most important water supply "aquifers' typically occur within the Precambrian bedrock. Permeability within this strata is controlled by fractures (i.e. flow is not considered to be with a 'porous media') and aquifer conditions are heterogenous… There is potential for interaction between the surface water features and the bedrock aquifer. Shallow ponds occur on and around the subdivision with several smaller ponds located amongst the undeveloped lots. A portion of the groundwater recharge at the site is probably from surface water. The ponds are situated at a higher elevations than water bearing fractures in bedrock as indicated by the water well records… The bedrock aquifer at the site is a 'hydro-stratigraphic fracture zone' within the Precambrian bedrock. The relatively unfractured upper bedrock unit provides a measure of protections for the deeper water bearing fracture zones, and potentially impedes the infiltration of potentially contaminated water from the surface and in the overburden unit. …The site is considered hydrogeologically sensitive due to the discontinuous and generally thin layer of soil cover. This has a limited ability to filter and prevent contaminants from entering groundwater recharge pathways. "

So there is "potential for interaction between surface water features and the bedrock aquifer". The main reservation expressed at the time was the capacity of the ground water for installation of a further 48 wells, and the eventual effect of leaching of septic systems into the rest of the watershed. As a result of this report the Township imposed restrictions on the type of septic systems that may be installed in this subdivision.

Further comments are provided in Appendix 9.4.

[1] Note that this link is sometimes a troublesome one to follow. An "incognito page" may have to be opened to work around the firewall, if indeed that is the problem.

4 Potable water supply

We now turn to the main focus of this report: the source of drinking water. A survey was carried out of the community and the results of this are summarised (and given in full in Appendix Y). We then consider the current monitoring efforts for the sources used.

4.1 Survey Results

In order to determine community uses of water, a survey was conducted during August/ September 2025. 120 property owners in the watershed were circulated and 67 responses received, all from LSARL and none from Maberly Pines. Development in the latter would be entirely reliant on well water, and at the moment only four properties in that subdivision have wells. The 67 responses received represents 79% of LSARL properties. Key findings were:

- All but one of the respondents lived on the shores of the LSARL.
- 36 were year-round and 31 were seasonal (This is probably biased since many of the non-respondents were seasonal).
- All the properties were residential.
- 78% of the properties had a well, all of which were drilled
- 75% of the properties used well water for drinking; 22% took water from the lake and 18% brought their water from a city supply.
- Lake water users often used water from cities or bottles for drinking.

Going further into the treatment and use of locally sourced water:

- 45% report some form of treatment, using a variety of methods including UV, filtration, reverse osmosis, salt softener and “iron blaster”
- 54% tested for bacteriological parameters using Public Health services.

4.2 Lake water

22% of properties said they took water from the lake, which is a significant number and could suggest that 20 or more properties rely on surface water. Several methods are reported for ensuring that the water is safe to drink, but this relies on the individual concerned to be diligent. In addition, this water is a key recreational resource and for both of these uses (drinking and recreation) merits further regular testing as a matter of public health.

4.2.1 Water quality monitoring

Water from Little Silver and Rainbow Lakes has been monitored for quality by the Rideau Valley Conservation Authority and the Lake Partnership Program (LPP) for many decades. Data have been consistent throughout, with no discernable trends. Key parameters of TP, TKN and *e coli* have always remained within the provincial guidelines for lake health and recreational safety. Despite this, the lake is only considered to be "fair" in the RVCA annual reports (e.g. page 8 of this document). The comment about this is that "nutrient levels are the main driver in a low WQI score, and domination by wetland, shallower depths with concomitant higher temperature and depleted oxygen levels in the summer months all contribute to this low score" (ibid, page 7).

Full data sets may be reviewed at https://www.rvca.ca/watershed-management/surface-water-quality and https://www.ontario.ca/page/map-lake-partner An illustration of the density of monitoring stations on our lakes for the LPP may be seen from the following figure:

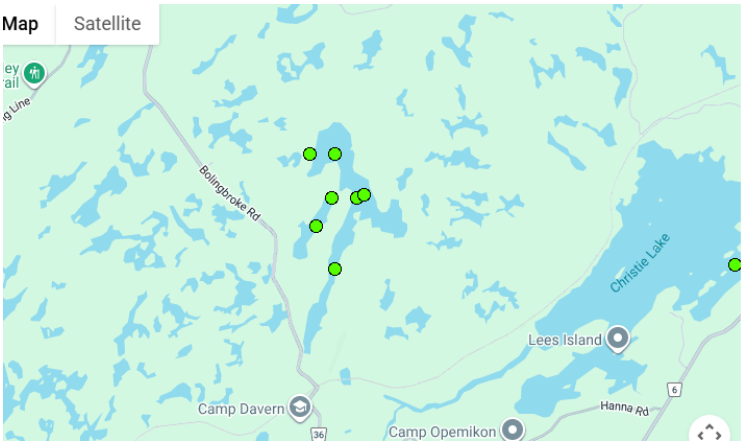


Figure 5 distribution of surface water sample sites

And this may be compared with the density of stations for groundwater monitoring (next section).

As FOCA warns: "regardless of historical conditions, it is never safe to drink untreated surface water". The cottages that use lake water either do not drink it or treat it with filters to remove all unwanted hazards. But for recreational use it is reassuring to note that there has been no sample for over 25 years that had bacteriological contamination from the pathogen *e. coli*.

4.3 Groundwater

As noted in the survey results, the majority of property owners around the lakes rely on well water, which in turn is drawn from the underlying aquifer. Here are a few

observations about the data we have, or do not have. A excellent report is provided by the RVCA again in their Groundwater and Hydrology review.

4.3.1 Well water monitoring

Data on the water in the aquifer is much more sparse. Here is the equivalent map for ground water monitoring stations:

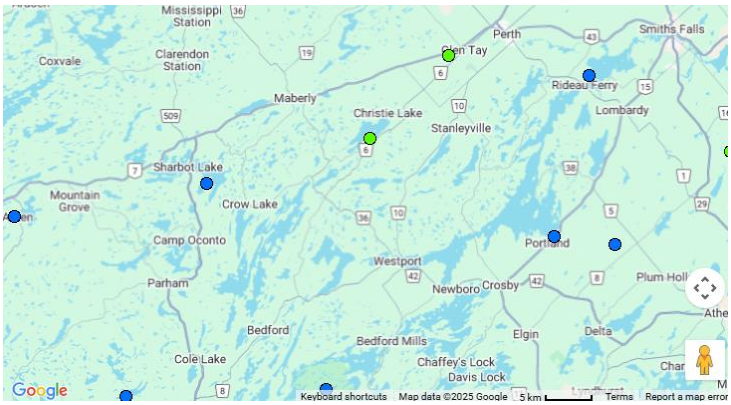


Figure 6 Distribution of ground water monitoring sites

Note the change of scale from the preceding image; and note that the nearest station, W0000252-1, for ground water monitoring is on the south shore of Christie Lake. Data from this station have been recorded for the past 16 years. In this plot the vertical axis is height above sea level in metres and the horizontal axis runs from January 2009 to December 2025, with samples approximately every hour. The trend of the data suggests that the level has been slowly decreasing (by about 3cm per year). Correspondence with the RVCA confirmed that a Mann Kendall non-parametric test of the trends showed seasonal declines, but no significant long-term decline. Seasonal variations of over 3m are seen.

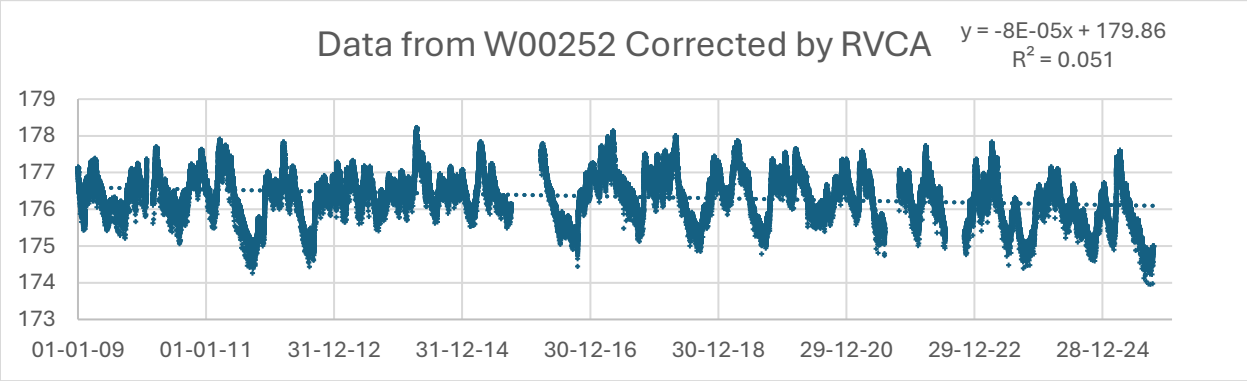


Figure 7 Level reported from Christie Lake W252

It should also be noted that at the time of writing (January 2026) there is a warning from the Conservation Authority that wells may be running dry, and emergency water sources have been provided by the Tay Valley Township .

There is no regular program of water quality testing for well water – as can be seen from the survey the data are dependent on the individual property owners. Also lacking is a consistent, calibrated, measure of the level of the water in the aquifer. When a well is dug some estimate of pumping rate is made, but usually no further measurements are reported. For a time this information was measured at one property on LSL, but the equipment necessary is expensive to buy, install, maintain and confirm integrity and calibration. In that instance the recording was maintained for about eight years.

5 Drinking water threats

5.1 Sources for drinking water for LSARL

The main source for drinking water is ground water, obtained from wells. A secondary source is the lakes themselves, especially Little Silver Lake.

Both lakes are also used for recreation, and standards for pollution need to be applied and monitored for that reason.

5.2 Drinking water quality threats

These include[2]:

- Contamination from surface water runoff.
- Leaching from adjacent septic beds.
- Age and efficiency of septic beds.
- Use of fertilisers and insecticides.
- Storage of fuel for heating and generators.
- Upstream contamination from adjacent subdivision.
- Salt ingress from County Road #36, which runs through the watershed to the west of the lakes.
- Possible use within the watershed or aquifer area for aggregate resources.
- Changes to the lake chemistry and its integrity as a result of climate change.

5.3 Drinking water quantity threats

The stability of the aquifer may be a concern. Complaints of wells drying up are becoming more frequent. Even the local Tay Valley Fire Department has had occasions when three of the four wells they rely on were dry.

[2] See Appendix 9.5 for a list of those mentioned by the Province of Ontario.

If the lakes become seriously anoxic then algae blooms could eliminate their use for recreation.

6 Vulnerability

The general area of vulnerability for the surface water of Little Silver and Rainbow Lakes is considered to be the subwatershed show in Figure *1*. The absence of comprehensive well position data, and the principal that the area of vulnerability around a well should at least include a 100m radius from each well, suggests that using the entire watershed extent is conservative and appropriate.

The area of vulnerability for the aquifer is much larger and more complex. Page 4 of the RVCA report indicates the extent. If we are to protect water sources for the foreseeable future then the effects of use within a wide area is needed. To quote the MECP:

> According to the Ministry of Environment Conservation and Parks in the 2025 Auditor General of Ontario special report on non-municipal drinking water, "…the science behind the protection of groundwater is fairly well established, whereas the protection of surface water is an emerging science. For that reason, the technical rules it used to classify threats to surface water that supply drinking water intakes are limiting and require an update to reflect new scientific data."
>
> "This is because the data and assumptions used in the scoring system to determine, in particular, the risk associated with a threat, are outdated. For example, some threats that could not be assessed as significant included the transport of petroleum products in a pipeline, the transport of hazardous substances across or in the vicinity of surface water, and the application of road salt and the storage of snow. "
>
> [Auditor General: Safety of Non-Municipal Drinking Water]

Using the MECP BMPs, and referencing similar interpretations utilized through the FOCA SWP Project 1.0 (*Crego Lake, 2024*) and the Mississippi Rideau 10-lake report (*2023*) a decision was made to articulate, using the best available information, the Wellhead Protection Zones (WHPA), as well as the Intake Protection Zones (IPZ) for surface water.

According to the Clean Water Act, the WHPA is generally considered to be 100m from the wellhead. Given the available (albeit limited) knowledge of the subsurface geology (based on the examination of well records) and the prevalent use of wells, a determination was made to delineate this distance (100m surrounding water wells) as the WHPA.

The delineation is based on the assumption of connectivity between the surface and ground waters, as used by the Lake Capacity Model and the Blumetric Report.

This mapping, however, is further restricted by the paucity of well records. Figure 4 Well locations in the LSARL watershed, almost certainly misses the majority of well locations.

The IPZ was determined to be the area within (120m) from the shoreline of the lake. Additionally, the area within 120m of the upstream contributing creeks were also included.

Paucity of well position data precludes more precise mapping – most of the properties are within 120m from the lake shore, within 120m of the nearest road, and highly connected to properties with Maberly Pines by the many streams which connect the two areas.

There is a level of uncertainty about the definitions of Wellhead Protection Area (WHPA) and Intake Protection Zone (IPZ) which requires expert interpretation of the technical rules as applied under the Clean Water Act. Conservative caution suggests that we should consider threats within the subwatershed, and monitor surface and groundwater with that in mind until such time as it is demonstrated not to be a threat..

6.1 Effects of Climate change

This is unknown at the moment. Possible changes include a collapse of the lake ecosystem precipitated by loss of the dimictic turnover.

Increased temperatures and high phosphate levels appear to be promoting weed growth.

Aquifer levels are known to be declining across the province. This watershed is no exception, and is considered "highly vulnerable".

Wildfires in the area could easily introduce considerable potash which will raise lake acidity and destroy the lake as we know it (as well as the environs). Wildfire prevalence is increasing rapidly, and the overall effect on lake ecosystems is highly complex. Every day brings new reports of climate induced disasters and urgent action is required at all levels to mitigate climate change.

6.2 Change of Conservation Authority

We have benefitted from the diligence of the RVCA for many years. Any changes, such as those proposed by the Province in Bill 68, will detract from the quality and continuity of data on which monitoring depends. This is widely considered to be an exceedingly serious threat, motivation entirely by profit for developers and devoid of sense.

6.3 Road resurfacing in general

Cottage roads in this area are all unpaved. A change to this would change the runoff, introduce heavy bitumen contamination to the water sources and increased sunlight absorption would contribute to the other changes anticipated from climate change.

6.4 Development plans for MP

Not only would ground water use increase, stressing the aquifer, but also the lake capacity would be seriously challenged.

6.5 Change of use for adjacent property

The watershed includes a large swathe of land on the west side of CR#36. This is zoned agricultural but is used as a hunting camp/ recreational facility. If this land were to revert to agricultural use then it may become a potential point source for runoff, and aquifer use within the watershed.

6.6 Groundwater monitoring

The near-total absence of level monitoring is a serious long-term threat. A cohesive strategy for quality monitoring is also highly desirable.

6.7 Protection of wetlands

25% of the area of the surface water is wetland. This plays a vital role in habitat and ecosystem protection and must be conserved.

6.8 Failing infrastructure

There are three critical infrastructures the failure of which could impact the source waters of the two lakes.

6.8.1. Minor Culverts

These exist for about six streams crossing the roads. Collapse or blockage of any of these could impact drainage and cause flooding which in turn may load the lakes with runoff and road material. Most of the roads are owned by the Township but are currently classed as "Unassumed" for maintenance.

6.8.2. Rainbow Weir

The concrete weir at the outflow of Rainbow Lake maintains the level of that lake and is the responsibility of the owner of the property on which it sits. Failure could reduce the lake to its preexisting condition as a swamp.

6.8.3. Little Silver Lake Culvert

The outflow of Little Silver Lake is taken through a 3 metre diameter culvert under the road, Little Silver Lake Road. Failure of that could dramatically affect lake level, quite apart from the inconvenience of access to properties on that road. Since the Township owns the road in which the culvert is situated it is liable for any damages which may ensue from failure. It has been suggested that the culvert is reaching the end of its life (about 50 years).

Clarity over responsibility and ownership, commitment to maintenance by the owners, and a schedule for inspection is suggested for each of these infrastructures.

6.9 New Quarry Development

A plan for aggregate resources development in the County was published in May 2025 by Lanark. At the moment there are no existing new licences within the LSARL watershed (see page 15 of the report), but the priority is given to such developments should they be justified. A development of this kind could seriously impact the aquifer, as the current case

in the adjacent township of Lanark Highlands has underlined (ref needed). For this reason it is noted that a licence exists for a quarry adjacent to CR #36, just south of the Camp Davern property.

6.10 Intake Protection Zone

Each well requires a protection area which needs to be maintained in the event of any development or modification. See introduction to this section for a discussion.

6.11 Wellhead vulnerability

Wellheads themselves are vulnerable to water inflow in the event of flooding or excess rainfall events.

7 Recommendations and Action Plan

7.1 Roles for Stakeholders

In the following we have identified the principal stakeholders with the following acronyms

- PO Property Owners;
- LA Lake Association;
- TVT Tay Valley Township;
- RVCA Conservation Authority
- LPP Lake Partner Program of FOCA
- FOCA Federation of Ontario Cottagers' Associations;
- MECP Ministry of Environment, Conservation and Parks.

There may be others that should be added to this list.

7.2 Lake Stewardship Plan revision

This is a valuable source document that requires revision from time to time. **LA**

7.3 Official Plan Review

This is done quinquennially by the Township. Input is required from all stakeholders.

TVT; PO; LA; CA; MECP

7.4 Lake water quality monitoring

Currently performed by the RVCA and LPP **RVCA; LPP**

This needs to be carefully monitored by property owners. **LA; TVT; FOCA**

7.5 Well Monitoring

In Ontario, wells regulation under the Ontario Water Resources Act sets out the obligations of the property owner under *Well Regulation 903*. Once a well has been constructed the well owner is responsible for ensuring that it is properly maintained. A *Well Aware* booklet has been compiled by Green Communities Canada and provides a wealth of information. Ontario Public Health offer Well Water Testing for Private Drinking Water.

> Should more be done to ensure owners are aware of their responsibility, and assist with monitoring and inspection on an annual basis? **PO**

7.5.1 Groundwater quality monitoring

Currently depends on property owners to look after their well. Should more be done? **PO**

7.5.2 Groundwater quantity monitoring

One site is measured by MECP. Many more are needed, preferably nearer to the locus of demand of the LSARL community. **MECP; PO**

7.5.3 Intake Protection Zone

Currently depends on property owners to look after their well. Should more be done? **PO**

7.5.4 Wellhead vulnerability

Currently depends on property owners to look after their well. Should more be done? **PO**

7.6 Septic system inspections

LSARL subscribes to the mandatory program for inspections which is supervised by the Township. Details of this program may be found in this reference: https://www.tayvalleytwp.ca/en/living-here/resources/23-04-25---Septic-System-Re-Inspection-Program.pdf. All systems are inspected on a multi-year schedule (10 years is suggested in the reference cited). A detailed background to septic system operation and maintenance may be found in this RCVA/FOCA publication. A two-page summary may be found in this FOCA Fact Sheet or the Ontario Onsite Wastewater Association Guide. **TVT; MECP**

7.7 Future development

As described in the section on development, there are many issues which impact water quality. These need to be continuously monitored. **LA; TVT**

7.8 Action Plan

The foregoing recommendations need to be combined into a cohesive Action Plan which will be the basis a formal Source Protection Plan for the subwatershed of LSARL. The SPP will require drafting then approval. It should consider establishing a Source Protection Authority under the aegis of the Conservation Authority. **FOCA, LA, PO**

8 Conclusions

Key conclusions thus far are that the lakes are over capacity in terms of the number of developed properties in the immediate watershed according to the Lakeshore Capacity Model; we have no formal monitoring protocol for either quantity or quality of well water, a vital resource; any diminution in the ability of the RVCA to do their job would be tragic and shortsighted; and our lake might easily see a tipping point in the next decade or so from any or all of the threats of runoff, excessive new development, temperature, climate change, or wildfire.

Source protection planning under the *Act* requires the development of three key deliverables: (a) terms of reference, (b) an assessment report, and (c) a source protection plan.

The terms of reference outline the work plan, timeline, and responsibilities for the development of the assessment report and source protection plan, as well as listing the drinking water systems that are within its scope. A Source Protection Plan for the watershed area of LSARL requires completion, public review, and approval by the Ministry of the Environment and Climate Change.

These actions are beyond the scope of the present project but represent its overall goal. The responsibility for the next steps falls between the Property Owners' Association; FOCA; MECP; RVCA and the Tay Valley Township.

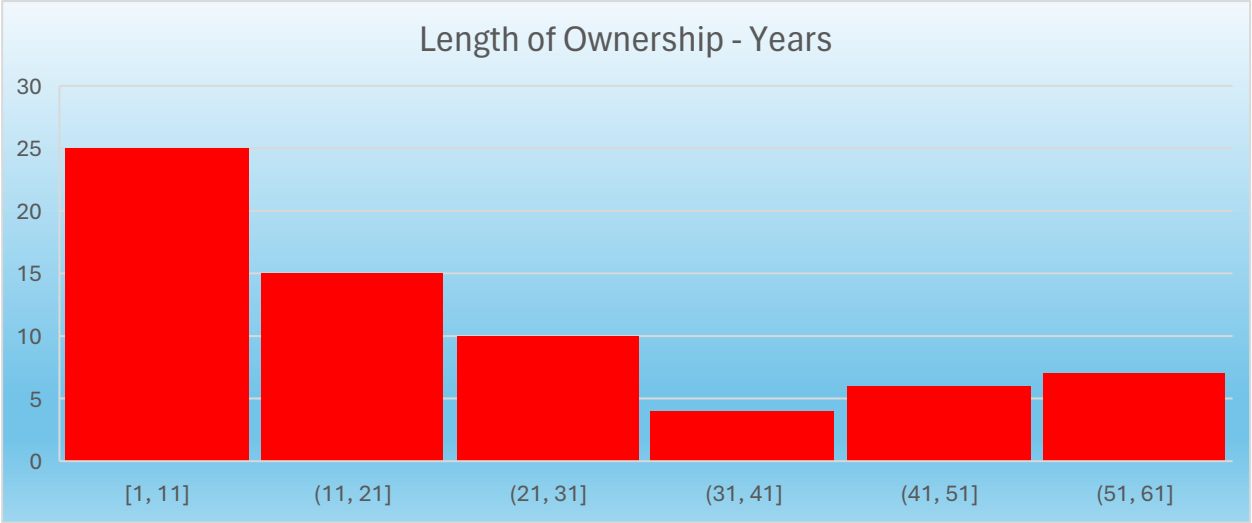
It is not clear at the moment which of these should take the lead, and identification of that responsibility should be the priority.

9 Appendices

9.1 Water source survey

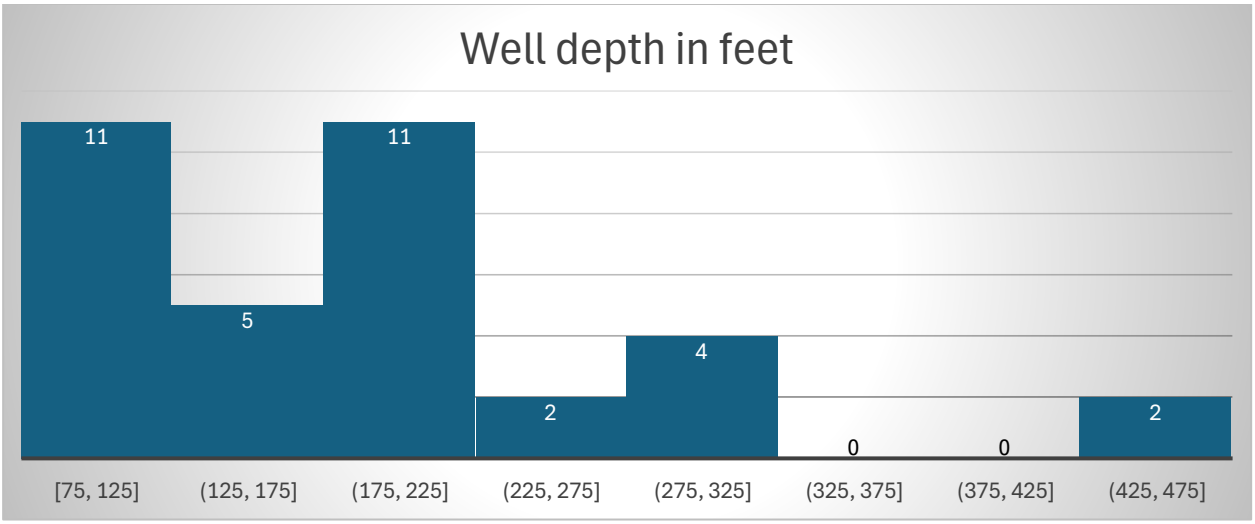
There were 67 responses to the survey (79% of LSARL properties). This is a summary of the responses to each question.

1. All but one of the respondents lived on the shores of Little Silver or Rainbow Lakes.
2. 36 were year-round and 31 were seasonal.
3. All the properties were residential
4. The length of ownership ranged from under a year to over fifty years. The distribution was as seen here:



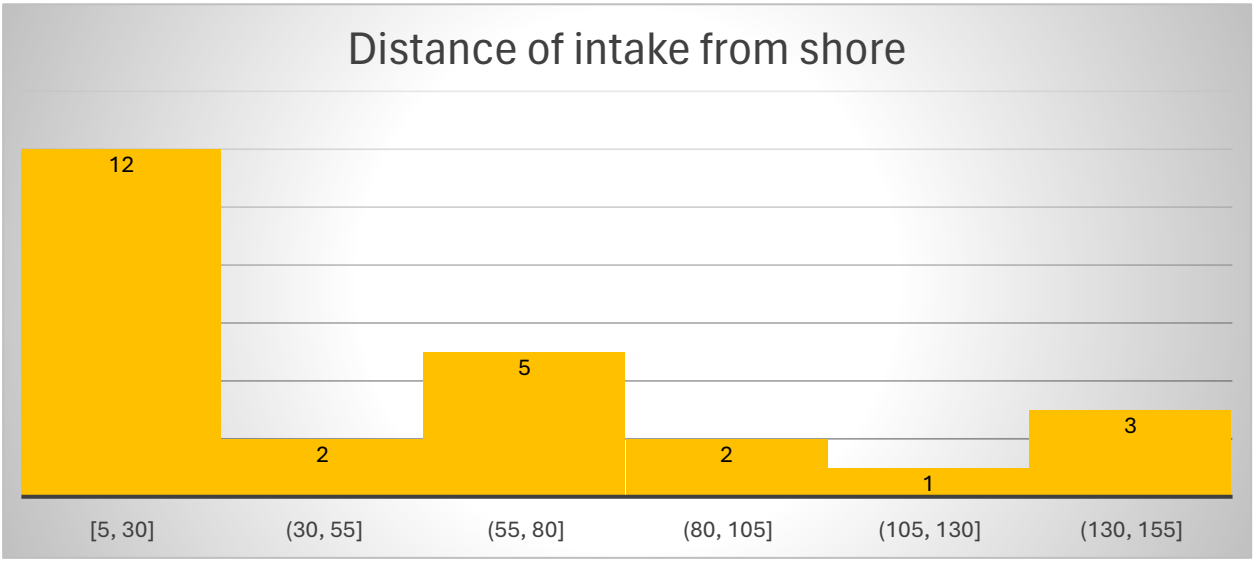
About half had been owned for less than 20 years.

5. Nearly 75% used well water; 22% took water from the lake and 18% brought water from the city or used bottled water. For some (usually those with lake water intake) there was a combination of water sources, with bottled or city water used for drinking.
6. 78% of the properties had a well, all of which are drilled.
7. Water use – this needs to be analysed in conjunction with Q6 and Q5, the water sources.
8. Drilled versus dug wells. All the wells around the lakes were drilled.
9. Well depth. Those that knew (or looked up) the depth of their well revealed data that were distributed as follows:



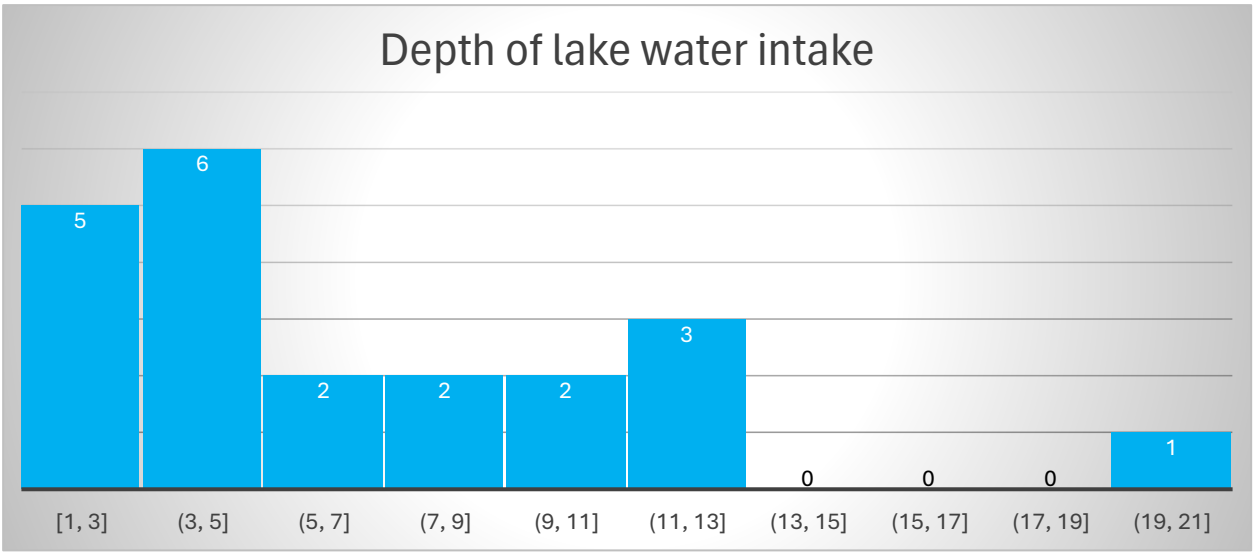
A median value around 200 feet, with a couple of wells over 450 feet. Wells in this area are typically drilled into the bedrock and the required depth is determined by the pumping rate.

10. Water quality issues. Only 48 responded to this question, and 98% of those had no issues. The remaining 1 experienced some issue in the spring.
11. The following questions were about lake water usage. 39% reported that surface (lake) water provided the source for their residence.
12. Use of this water: 74% responded that it was not used for drinking.
13. The distance from the shore of the lake water intake was distributed as follows:



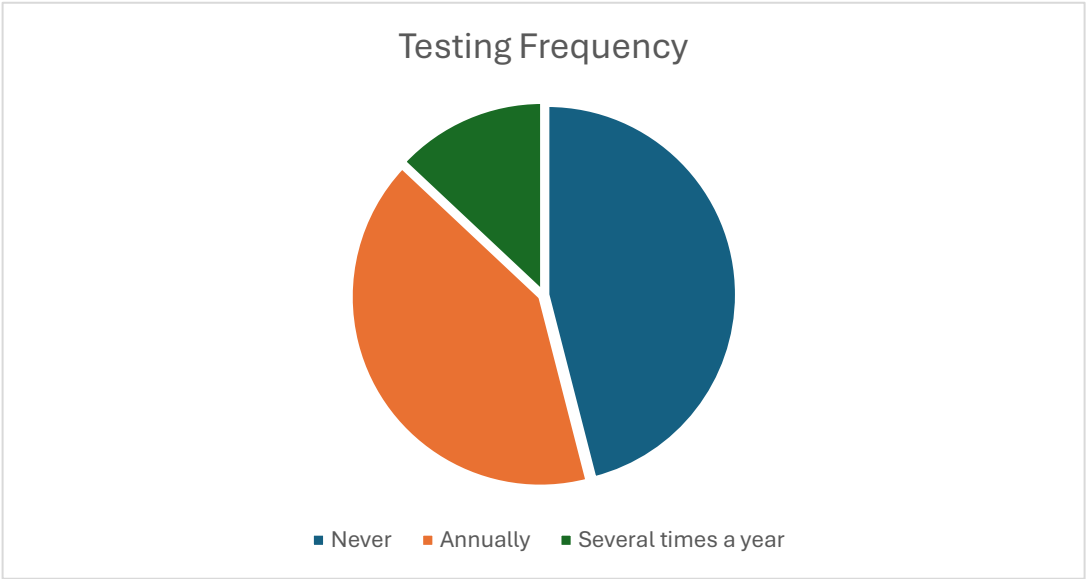
The data in these responses were a little questionable – inlet pipes stretching 140 feet from the shore are likely to be a hazard to boating. Most inlets around the lake appear to be within 30 feet from the shore.

14. Depth of intake below the surface.



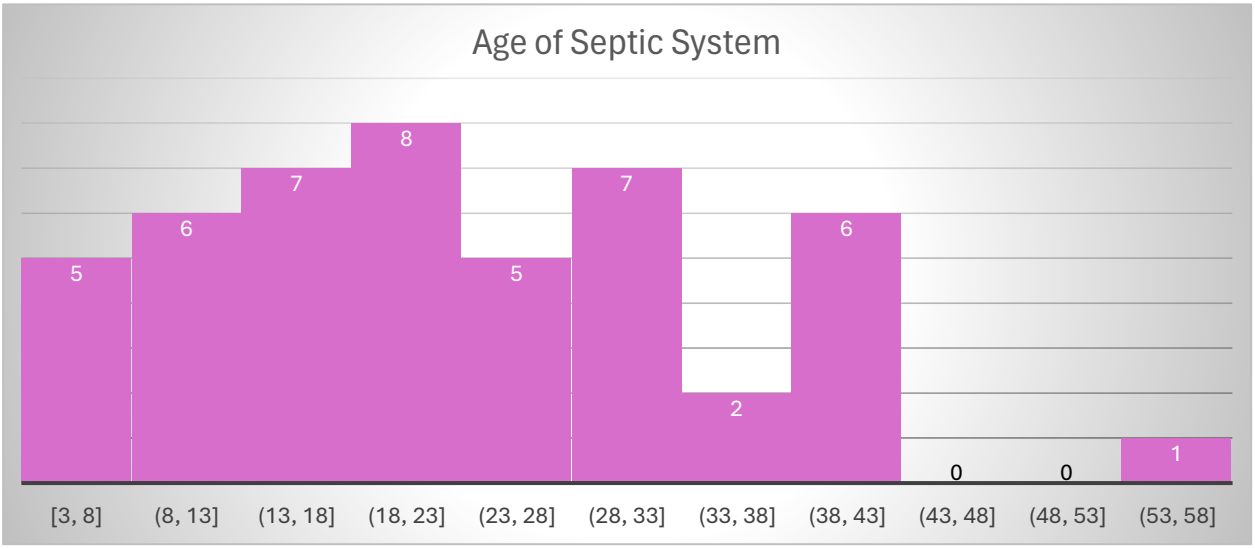
Here again there were some uncertain responses. The depth in most of the south basin is around 12 ft max, and so the deeper ones will have been lying on the bottom. Indeed most of the lake water inlets are probably arranged that way.

15. How is water treated? About 45% reported some form of treatment, although no distinction was made in the report between lake water and well water. (All lake water would have to be treated before drinking to remove algae etc). Those that did report treatment (27 in all) used a variety of methods including UV, filtration, Reverse Osmosis, salt softener, and “iron blaster”.
16. Testing for bacteriological parameters. 54% of respondents did so using Public Health services.
17. Frequency of testing. 41% test annually, 13% several times a year and 46% never



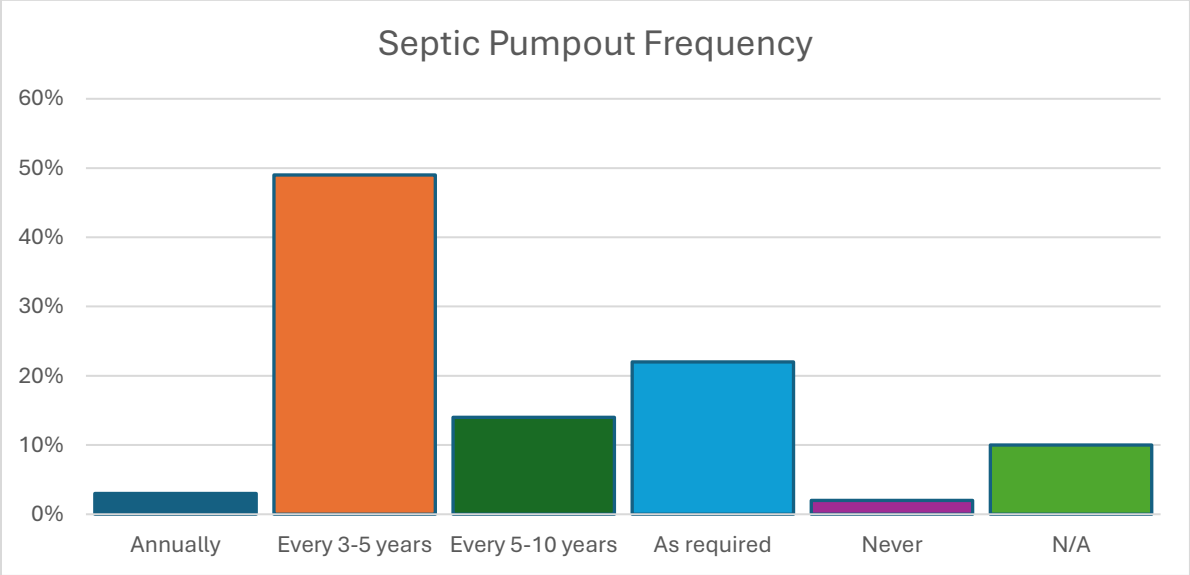
test.

18. Concerns about odour or taste. Out of 36 responses two reported a sulphur smell, two were unsure and the rest had no concerns.
19. Septic system questions. 92% reported that they had a septic system,
20. of which 67% did not have a holding tank.
21. And 33% have an outhouse.
22. The age of the septic system was distributed as follows:



(The horizontal axis is the age in years)
This indicates quite a range, with some likely to be approaching the end of life.
These lakes subscribe to the regular inspections of septic systems, organised by the Township.

23. Septic tank pumpout frequency. Quite a range here:



24. Fertiliser use. 8% responded that they did, 92% did not.
25. Heating. Wood (63%); Electric (57%); Propane (40%) and oil (5%). One reported use of a heat pump (which is presumably electric).

26. The age of the oil tank (for the three that used this source of heat)was reported to be 22 years in two instances and 3 years in the third. Annual inspections for insurance were made.
27. Distance of fuel and septic from the lake. 92% were 30m away, 5% within that limit from the lakeshore, and 3% were closer to the well.
28. Road salt. 93% did not use it.
29. Concerns with regard to future risk.
    a. No concerns (22)
    b. Unspecified concerns (9)
    c. Lake levels and milfoil weeds (2)
    d. Future development at Maberly Pines (10)
    e. Algae blooms, declining lake water quality (2)
    f. Water runoff (1)
    g. Climate change (2)
    h. Increasing number of motorized boats (1)
30. Sustainability.
    a. None (24)
    b. Unspecified (5)
    c. Aquifer stability (2)
    d. Maberly Pines (8)
31. Other concerns
    a. Cleaning out Eurasian Water Milfoil.
    b. Continue water supply monitoring.
    c. Suggested more frequent septic monitoring.
    d. Phosphate levels, but uncertain what can be done.
    e. Maberly Pines development and monitoring.
    f. Comparison with other lakes would be helpful.
    g. Education about protecting water quality.
    h. Does covering a road with “low-cost bitumen” impose a risk to water quality?
32. Current knowledge. 16 considered their knowledge to be “very good”; 28 thought they were “good” 14 considered themselves to be “a bit lacking” and 3 admitted to needing to know “a lot more”.

9.2 Lake Stewardship Plan – Development issues

Little Silver and Rainbow Lakes Property Owners Association published a Lake Stewardship Plan in 2018 (LSP). This has been incorporated into the Tay Valley Township Official Plan 2024 as Appendix D. Further to that, in the same year that the plan was submitted to the Township the Association also applied for and was accepted

to registration with the mandatory septic system inspection program. As a result, all septic systems are inspected on a regular schedule.

Several key elements of the Lake Stewardship Plan impinge on Source Water Protection. Despite the overall high density of residences on two small lakes, development thus far has evolved in such a manner as to have essentially created wilderness areas in key places around the lakes. These relatively large stretches of untouched shoreline, streams, wetlands and undisturbed land that allow the lake to regenerate itself. Citing page 26 of the LSP, the following three areas of concern were identified in 2018. The LSP goes on to develop further guidelines and strategies for the involvement of the LSARLPOA in the planning process. Most of the recommended actions on page 31of the LSP have been implemented. However “the LSP is intended to be just the beginning of the dialogue” about development around the lakes. The POA continues to be involved.

Areas of concern:

9.2.1 Undeveloped lots

Future development of these lots, even with the best of planning controls may:

- Contribute to the density and privacy issues, especially on the smaller plots
- Exacerbate density issues as new builds tend to be larger buildings
- Potentially add to the urbanised look of portions of the lakes
- Even with the installation of modern waste and water management systems, reduce overall the natural ground structure able to regenerate the lakes

Most of these concerns would also be applicable to larger lots as the physical structure of the property may limit where buildings, septic systems, docks, etc could be placed and could affect sightlines to neighbours.

9.2.2 Conversion from Seasonal (RS) to year-round (RLS) zoning

Initial development of LSARL in the 1960s and continued into the ‘70s and ‘80s resulted in a largely season cottage/ recreational community. These areas have gradually evolved over the years with conversion and modernization of some cottages to year-round residences. In general, this conversion is a good thing: older, inefficient septic systems get updated with newer, more efficient ones; improvement and year-round maintenance of cottage roads allow for safer and easier access by all property owners, as well as emergency vehicles should the need arise; a greater sense of community is achieved; the “neighbourhood watch” program is improved. However, if too much de-naturalisation of the property occurs and/or the “ribbon of life” at the shoreline is not maintained, the health of the lake may be negatively affected. Future development needs to comply with the many laws, setbacks, rules and regulations for such conversions.

9.2.3 Bordering undeveloped properties

There are several large tracts of land within the watershed that, if developed, would potentially and significantly impact the existing communities on the lakes. Such development would require the appropriate setbacks and septic systems. This includes the development in Maberly Pines, which has been considered in this report.

9.3 Lakeshore Capacity Modelling

An extract from the Lakeshore Capacity Model results is shown here:

Monitoring Data		
Years of spring TP data	20	
Average Measured TPso	12.00	µg/L
Measured vs. Predicted TPso	8.7	%
Is the model applicable?	y	
Over or under predicted?	over	

Modeling Results		
TPlake	12.38	µg/L
TPout	11.83	µg/L
TPso	13.04	µg/L
TPfuture	15.49	µg/L

Phosphorus Thresholds		
TPbk	7.81	µg/L
TPbk+40	10.93	µg/L
TPbk+50	11.71	µg/L
TPbk+60	12.49	µg/L

*if TPbk+40% < TPlake < TPbk+60% cell is orange
*if TPlake > TPbk+60% cell is red

No. of allowable residences to reach capacity:	
# Permanent OR	at capacity
# Extended seasonal OR	at capacity
# Seasonal cottages OR	at capacity

Loads		
Natural Load w/no development	107.84	kg/yr
Background + 50% Load	161.77	kg/yr
Current Load	170.93	kg/yr
Future Load	213.97	kg/yr

Outflow Loads		
Background Outflow Load	28.24	kg/yr
Current Outflow Load	44.77	kg/yr
Future Outflow Load	56.04	kg/yr

LSARL are situated at the top of the Rideau River watershed. This includes both the properties around the two lakes and a subdivision known as Maberly Pines. There are about 90 properties around the lakes, and a further 56 lots in Maberly Pines. The preponderance of the latter lots (48 of the total) are not yet developed, but the Township is trying hard to facilitate development by funding road improvements and electrical installation.

In 2022 a Lakeshore Capacity Model was performed in collaboration with the Ministry of Natural Resources and Forestry. The summary for Little Silver Lake was that the current load of Total Phosphates is 12.38 mg/L, according to the model. This is also the limit for Lakeshore Capacity. The future load, if all the vacant lots were developed, would be 15.49 mg/L. Detailed predictions are in the table above.

The outcome of this analysis was for the Township to impose a strict requirement for zero phosphate septic systems to be used. It is uncertain how well this policy has been implemented, nor whether it has implemented the recommendation for a ground water monitoring program as detailed in the next section.

9.4 Blumetric Hydrogeology Report and comments

During the consideration of the development of Maberly Pines a Hydrogeological survey was commissioned by Tay Valley Township. A copy of the full report may be found here. Discussion and quotations from the report are given in Section 4.3. The conclusion there is that water from MP subdivision will very probably work its way into the aquifer or downstream into the lakes. The LCM (previous section) confirmed the latter conclusion. One further reservation about the report was the capacity of the ground water for installation of a further 48 wells, and the eventual effect of leaching of septic systems into the rest of the watershed. It was felt at the time of the report's release that the testing method, which used a small number of existing wells, could not determine what would happen if all 56 lots were fully developed as year-round residences, all drawing on the aquifer.

The report did recommend however (page 31) that a database be initiated and maintained for the development by TVT that includes well records, pumping test data and well water quality analysis. The data should be reviewed by a licenced hydrogeologist on a biannual basis to ensure the ongoing sustainability of development on private wells with the subdivision.

It is not known whether this has been implemented by the Township.

9.5 Potential Threats to Drinking Water

A full list of potential threats identified by the Province of Ontario includes the following. Those in *italics* are considered in Section 5.2, and that section also lists a number of further threats that are specific to our community:

- The application of agricultural source material to land.
- The application of commercial fertilizer to land.
- The application of non-agricultural source material to land.
- *The application of pesticide to land.*
- *The application of road salt.*
- The establishment and operation of a liquid hydrocarbon pipeline
- *The establishment, operation or maintenance of a system that collects, stores, transmits, treats or disposes of sewage.*
- The establishment, operation or maintenance of a waste disposal site within the meaning of Part V of the Environmental Protection Act.
- The handling and storage of a dense non-aqueous phase liquid.
- The handling and storage of a dense non-aqueous phase liquid.
- The handling and storage of an organic solvent.
- The handling and storage of commercial fertilizer.
- The handling and storage of fuel.
- The handling and storage of non-agricultural source material.
- The handling and storage of pesticide.
- The handling and storage of road salt.
- The management of runoff that contains chemicals used in the de-icing of aircraft.
- The storage of agricultural source material.
- The storage of agricultural source material.
- The storage of snow.
- The use of land as livestock grazing or pasturing land, an outdoor confinement area or a farm-animal yard. O. Reg. 385/08, s. 3.