

Across the Causeway:

Exploring the Drinking Water System in Greenspond, NL

Introduction

The Town of Greenspond was incorporated in 1951. Greenspond is an island community that has been connected to the Northeast Coast of the Island of Newfoundland by causeway since 1982. Originally settled in the late 1600s, Greenspond is one of Newfoundland's oldest continually inhabited outport communities (White, 1996: 1). The town has retained a fish plant, and many of its residents are employed by the fishery. Greenspond's population was approximately 300 people as of 2011, and has been continually declining since 1996 when its population was 425. However, seasonal residents and tourists are increasingly attracted by the area's picturesque views and historic buildings. These demographic factors put unique demands on this small rural community's water system.



The Causeway Leading into Greenspond

Ever since the causeway was built to connect it to the mainland, Greenspond has primarily obtained its drinking water from the *Protected Public Water Supply Area* of Shambler's Cove Pond. Prior to this, residents used their own dug wells and a local catchment reservoir on the island. There is currently no backup water supply other than upriver ponds and headwaters that feed into Shambler's Cove.

Water is treated with chlorine gas and pumped from the supply at Shambler's Cove to each home in the town. This system was installed in segments from the mid-1980s to the early 1990s.

Source Water

Securing a reliable surface water source was a critical milestone for Greenspond's drinking water system. There is little human activity or development near Shambler's Cove other than the main road leading to the Greenspond causeway, 200 m away. The water supply area's topography and location protect it from issues facing many coastal communities (e.g. extreme weather, beavers, and salt water intrusion).

Water quantity, which had been a major challenge in the past, has not been an issue for Greenspond residents since the causeway was built in 1982. This key land link unlocked the ample water supplies of Shambler's Cove Pond.

Water quality, however, has been more challenging. Although water from Shambler's Cove Pond is generally considered to be of good quality, Greenspond has not been given a drinking water quality index rating for the last five years because of high Haloacetic Acids (HAAs) levels in its water supply (DOEC, 2014).

Chlorination disinfection by-products (DBPs), such as HAAs and Trihalomethanes (THMs), are chemical compounds that form when naturally occurring organic matter reacts with chlorine used to treat drinking water. In 2009 and 2010, Greenspond's water exceeded federally recommended levels of HAAs and THMs. Additionally, tests using the Langelier Index, which measures calcium carbonate buildup in a system, have often been positive (DOEC, 2014), indicating that the water could be corroding the distribution system's largely copper pipes.

That said, there have been relatively few boil water advisories (BWAs) in recent years (DOEC, 2014), and these are usually due to sporadic problems, such as sudden chlorine level drops or equipment malfunctions, rather than systemic issues like being unable to maintain sufficient chlorine residual levels.

Quantity is no problem. Our water is pumped across the causeway. The pond over there, well I won't say it is an endless supply, but in 27 years, we have never had a shortage. Now the condition of the water, it is only treated with chlorine. There is no filtration system, it is only pond water and chlorine and it is pumped right through to residents. We usually end up on a [BWA] at least once through the year. That could be because the chlorine levels are down, or there is a leak in the line...any number of things

– Municipal representative

Infrastructure

Drinking water infrastructure consists of fixed capital assets for public use and includes water treatment, storage, and distribution systems. Greenspond's drinking water is distributed via a piping system connected to each household. The system has a pump house approximately 50 m away from its protected surface supply, where it is disinfected using chlorine gas and then pumped 200 m to the causeway. In total, it runs for approximately 2 km, along the length of the causeway, until it reaches the main community on the southeast portion of the Greenspond Island.

The town proactively seeks to mitigate potential issues with its water supply and pump house by erecting clear signage around both and maintaining a backup pump and generator that is tested quarterly. The water system is primarily managed by two people: the Town Manager, who has 27 years experience, and a part-time Maintenance Worker.



The Pump House and Shambler's Cove Pond

There is a 6" line throughout the main line, so there are no complaints about low pressure or anything like that. I know that there are towns that have 10-12" lines with a population as little as 150 people, so the water is not really moving in the pipe and there is a good chance of sediment settling and that kind of thing. We looked at a cross-section of our line, year before last, and it was as clean then as it was when it was put in the ground. So, that's good.

– Municipal representative

Greenspond's fairly new drinking water system has generally had few infrastructural issues. Still, the town does face several challenges that are common in many rural NL communities.

First, chlorine disinfection itself can be onerous. Not only is it difficult to maintain appropriate chlorine concentrations when surface water conditions change, heavier chlorine use during these times can also exacerbate DBP problems. Furthermore, procuring chlorine in Greenspond can be very costly, especially since their distributor moved from Hare Bay (just over 56 km away), to St. John's (nearly 375 km away).

Second, there are also distribution challenges. The primary concerns here are dead ends, leaks, and cross connections. Dead ends occur when homes are a considerable distance from the main line and use low quantities of water. To keep water flowing through the system, the

line must be regularly flushed at connections to homes that are too far from the main line. Leaks, meanwhile, are an inevitable and an expensive consequence of aging infrastructure and acidic water. Finally, minor cross connections exist in many locations in the town, and there have been two isolated incidents of salt water entering the lines via the local fish plant. However, the risk of salt water intrusion is considered to be low as the drinking water system is above sea level, and the fish plant has assured the town that its past issues have been addressed.

Third, although efforts have been made to document the town's infrastructure in as-built drawings, succession planning remains a key challenge for Greenspond. Ensuring adequate training and knowledge transfer for the next Town Manager will be vitally important to the town's infrastructure operations and maintenance.

Efforts to improve infrastructure in Greenspond appear to be focussed on finding better leak detection measures. The town is aware that leak detection expertise exists within the provincial Department of Environment and Conservation (DOEC), and they will be exploring this further in the future.

Policy/Governance

Ensuring the safety of drinking water in Canada is a responsibility shared between federal, provincial, territorial, and municipal governments. In Canada, the responsibility for ensuring the safety of drinking water supplies is shared by the various levels of government. The principal responsibility of ensuring the safety of drinking water generally rests with the provinces and territories, while municipalities usually ensure the day-to-day operations of treatment facilities and distribution systems. Federally, Health Canada works in collaboration with the provinces and territories, through the Federal-Provincial-Territorial Committee on Drinking Water, to develop the Guidelines for Canadian Drinking Water Quality (GCDWQ).

The GCDWQ are published by Health Canada and used by all Canadian jurisdictions (provinces, territories and the federal government) as a basis to establish their own enforceable requirements for drinking water quality.

In Newfoundland and Labrador the provincial government is the main body responsible for the delivery of safe drinking water to the public. In order to meet its own guidelines these operations must follow four provincial acts: the *Municipalities Act*, the *Municipal Affairs Act*, the *Environmental Protection Act*, and the *Water Resources Act*, while abiding by the Canadian drinking water guidelines. Four provincial departments oversee public water systems via the Multi-Barrier Strategic Action Plan: DOEC, Department of Health and Community Services (DOHCS), Municipal and Intergovernmental Affairs (MIGA), and Service NL (SNL). Each department has specific roles in maintaining drinking water systems in the province, such as providing water testing, workshops, financial support, or water quality reports.

The *Municipalities Act* governs the Town of Greenspond. Under the Act, it is the responsibility of the municipality to operate the public water supply for its residents. Property owners in the community pay an annual water tax that has been set at a fixed amount of \$268.00 for several years. Furthermore, Greenspond has been successful in receiving capital works funding for water infrastructure installation. The community does not have a specific water management plan, but the Town Manager, who is also the chief water operator, attends council meetings and has up to date logs and reports. Although an Integrated Community Sustainability Plan was completed in 2009-10 (Town of Greenspond, 2010), it made few references to water issues and has seen limited use. A town plan is being developed that will likely consider how to address some the town's most critical water issues.

Public Perception, Awareness, and Demand

Year-round residents seem largely satisfied with the state of their drinking water and view the current system as a marked improvement over the patchwork one that existed before it. Water quality complaints almost exclusively come from seasonal summer residents. However, residents living closest to the causeway have experienced intermittent issues related to high chlorine concentrations in their water.

Some recurring themes can be seen. First, the primary issues identified by residents are chlorine taste and discolouration. Some residents dislike chlorine disinfection, and while they recognize it is necessary under the current system, they would prefer an alternative disinfection method.



Town of Greenspond

I'd rather the [town] didn't use chlorine. But what else are you going to use? UV is more expensive, but for the operators it's probably a lot safer. It's dangerous, handling chlorine. I filter my water, but I don't think it would do you any harm drinking right from the tap. Unless, well, when you are coming off the causeway there is quite a bit of chlorine there.

–Resident

Second, it is noteworthy that while a number of residents say they're satisfied with their water, many choose to buy personal filtration devices or bottled water from the local store due to

chlorine taste or potential health concerns. Finally, even though residents seem generally more aware of drinking water issues following the Walkerton Tragedy in 2000, it is difficult to gauge their awareness of their water quality and of DBPs in particular.

So as much as people are complaining now, and I mean, there was just as much in the water then as there is now. I guess years ago you weren't as up on everything that you are now.

– Resident/business owner

Residents seem comfortable approaching town management about issues, which suggests a generally positive relationship with their municipal government.

It's probably the mindset. I think that maybe people in rural Newfoundland have come not to expect the highest quality water, not that they should expect any less. But they have come used to not having the same standard of that clear, pristine water.

– Municipal representative

In sum, despite high DBP levels, residents see no immediate threats to their drinking water. This suggests that they are either unaware of this potential problem or are unconcerned by it. Municipal representatives, however, are well aware of these issues and publicly post water quality reports at the Town Hall. Yet there are no immediate plans to address DBPs with an advanced filtration system, as it is viewed as too expensive. The town views initiatives aimed at improving leak prevention, detection, and repairs as higher and more realistic priorities.

Conclusions and Future Directions

The current drinking water system is seen as a vast improvement over what existed before the causeway and link to the current supply at

Shambler's Cover was built. Compared to other rural communities in the region, the in-ground infrastructure is relatively new and well managed, even if regular repairs are needed (especially around curb stops). There have also been relatively few BWAs with reasonably short durations. Overall, the system seems well-suited to the community's size and demand.

Yet Greenspond still faces several potential challenges. Succession planning is crucial for when the current experienced Town Manager eventually leaves that position. And perhaps most concerning is the consistently high levels of DBPs in the water supply and the low priority this has been given by residents and the Town. Regardless of whether this is due to more pressing concerns, a lack of public awareness or concern, or scarce fiscal resources, DBPs remain a potential threat to the town's drinking water going forward.

Much progress has been made over the past several decades. Water quantity has improved significantly and continued employment through the fishery, along with more seasonal residents and the tourism industry, has boosted the tax base for water services. But Greenspond still faces the familiar rural issues of a declining and aging population. Ultimately, as one resident put it, achieving sustainable drinking water in Greenspond will likely be a function of balancing the budget and managing people's expectations of living in rural NL.

What is sustainable? I mean some people would say that we are not sustainable now, with 300 people. I went to meetings in Vancouver last year, with 300 people around the table. And I didn't have to [search] where Victoria BC was... But they were like "where the hell is Greenspond? Do people live in such a tiny community? And, why would you live there?" I guess it comes down to being content.

– Municipal representative



Town of Greenspond

Prepared by: Jerry Collins and Jen Daniels,
Memorial University, June 2014

To see the full case study report please visit the
*Exploring Solutions for Sustainable Rural
Drinking Water Systems* website:
http://nlwater.ruralresilience.ca/?page_id=17.

References

DOEC (Department of Environment and Conservation). (2014). *Water resources portal*. Retrieved from <http://maps.gov.nl.ca/water/>

Town of Greenspond. (2010). *Town of Greenspond Integrated Community Sustainability Plan 2009/10*.

White, Linda. (April 1996). *The Greenspond Letter*, 3(2), 1-28. Retrieved from <http://collections.mun.ca/PDFs/greenspond/April1996.pdf>