

## Community Water Treatment

Whether preparing water for use on either a private scale or a community scale, there are at least seven phases to be considered.

### 1. Establish and protect a good source of water

- This could be a stream, lake or pond, dug well, drilled well, rainwater catchment or even a saltwater source that can be desalinated or an atmospheric water generator that scavenges water from the air.

### 2. Connect the water to your treatment and distribution system

- Some sort of piping connection to carry the water from its collection site to treatment location.

### 3. Screen out large debris

- Prevent clogging or “blinding off” of the intake and supply lines.

### 4. Pretreatment

- *The purpose of pretreatment is to reduce particulate and organic matter that can clog filters, interfere with UV disinfection or create potentially harmful byproducts if chlorine is used.*
- This could be flocculation and sedimentation and/or filtration as required to reduce turbidity and colour to functional levels

### 5. Disinfection

- *The purpose of disinfection is to remove disease causing (pathogenic) microorganisms.*
- This could be micro- or ultra-filtration followed by UV, reverse osmosis, treatment with ozone or chlorine, or even filtration through a slow sand bio-filter.

### 6. Storage

- *The purpose of storage is to ensure adequate water for distribution in the event that demand exceeds processing rate.*
- Storage can occur before any treatment – for example in a lake, pond or other catchment basin or tank – or after pretreatment and/or disinfection in a tank or cistern or even after distribution in decentralized locations.
- Some forms of pretreatment and disinfection require interim storage, for example: sedimentation tanks following flocculation or storage tanks within a chlorine system to accommodate required treatment duration.
- If storage is taking place after disinfection, the storage must not have the potential to introduce new contamination.

### 7. Distribution

- Water has to be conveyed from treatment location to point of use.
- If distribution occurs after disinfection, the distribution system must not have the potential to introduce new contamination.
- It is relatively easy to prevent post-treatment contamination within a simple system, that conveys water over short distances such as within a home.
- It is much more difficult to prevent post-treatment contamination in larger systems over longer distances with larger pipes and many connections. (More detail on this later.)

## How does Pete's Lake system currently measure up?

Overall, we have a system that users are quite satisfied with, but the Island Health Authority is not.

The Drinking Water Protection Act and Regulations requires, at minimum, that we have effective water disinfection (step 5), which will also require pretreatment (step 6) due to the nature of our water source. The water must be pretreated and disinfected either centrally or by every user before use for drinking and food preparation.

Regardless of legislative requirements, there are a few things about our water system that might benefit from a tune up. The following is an assessment of some basic aspects of our system's stronger and weaker points. Parts that are shown with a **green background** represent those areas where we are doing very well, or at least quite well. Parts which require further examination and consideration – perhaps caution or decision to improve – are shown with an **amber background**.

### 1. Establish and protect a good source of water

Establish an adequate source of cleanable water.

- Hadley (Pete's) Lake drainage basin area is 116 hectares (287 acres).
- Lake area is 17 acres.
- Our water license permits withdrawal of up to 230,000 liters per day (about 3300 liters /connection).

#### **Watershed protection**

Minimize human access and impacts in the catchment basin.

- No habitation in catchment basin.
- Main road runs beside part of the lake.
- Watershed is somewhat protected from future development by riparian zone regulations.

Limit contamination from livestock and wild animals.

- There is currently no livestock kept in the watershed.
- Animals have a right to access the water preceding any rights we have.
- Both feral and wild animals and birds have free access to the lake.
- There is clear evidence of animal and bird activity around the lake.
- A dead sheep was removed from lake in late winter of 2019.

### 2. Connect the water to your treatment system

- Dual water intake lines are supported by a raft part way out into the lake.
- Additional water intake was established March 2019 to aid in flushing of lines.

### 3. Screen out large debris

- The inlets of the intake pipes are covered with mesh screen to exclude large debris.

### 4. Pretreatment and filtration

- No central pretreatment is currently done.
- Most users prefilter their water before household use.

### 5. Disinfection

- No central disinfection is currently done.
- Most users disinfect their water before use for drinking or food preparation.

## 6. Storage

- No storage (other than within the lake) currently exists (or is currently required).
- Users are encouraged to arrange storage of a minimum of 2 days' worth of water in case of system shut down.
- Users are encouraged to consider water storage and auxiliary equipment for fire suppression.

## 7. Distribution

- The distribution network is adequate for current needs when operating properly. Except in the event of the occasional airlock, blockage or line break, water is reliably delivered at adequate pressure and volume to all users.
- Periodic flushing of the lines reduces buildup of sediments and other particulate matter in the lines, maintaining full water flow capability.
- The distribution network runs across private property, crown land and sea bed. Access across these lands is not secured by any official permits, easements or rights of way.
- In the coldest part of the year, demand can be high when users leave taps running to prevent freezing of their incoming lines and household plumbing that runs through unheated spaces. Any centralized treatment system will need to be sized to accommodate this excess demand.
- There are many parts of the distribution system that become stagnant “dead ends” when users are absent. These may concentrate debris and even allow growth of some contaminants. Even if new piping were to be installed, this problem would still exist, so *distribution of potable water will inevitably require addition of a residual sanitizer such as chlorine.*
- There are no check valves in the system to prevent back-suction of private lines into the water mains. This could leave the network vulnerable to contamination from breaks or cracks in private lines allowing entry of fecally contaminated water if the line defect occurs near septic fields, pit toilets, composting or manure collection sites, gardens that have been fertilized with non-sterile manure or compost, etc.

***Look for more details in the upcoming section:  
Drinking Water Safety Part 8: The Rules***