

# Cambridge Water Department Source Water Quality Monitoring Program

## Primary Goal:

To ensure that the water withdrawn from Fresh Pond for treatment is as free as possible from contaminants, thereby minimizing the cost of treatment and protecting overall water quality. The program helps us:

- ✓ Monitor condition of source waters,
- ✓ Determine where, when, and how water quality conditions are changing,
- ✓ Identify actual and emerging problems,
- ✓ Evaluate the effectiveness of programs designed to prevent or remediate water quality problems,
- ✓ Ensure all standards and guidelines are being met,
- ✓ Provide for rapid response to real-time and emerging problems.

## How the City of Cambridge collects its water

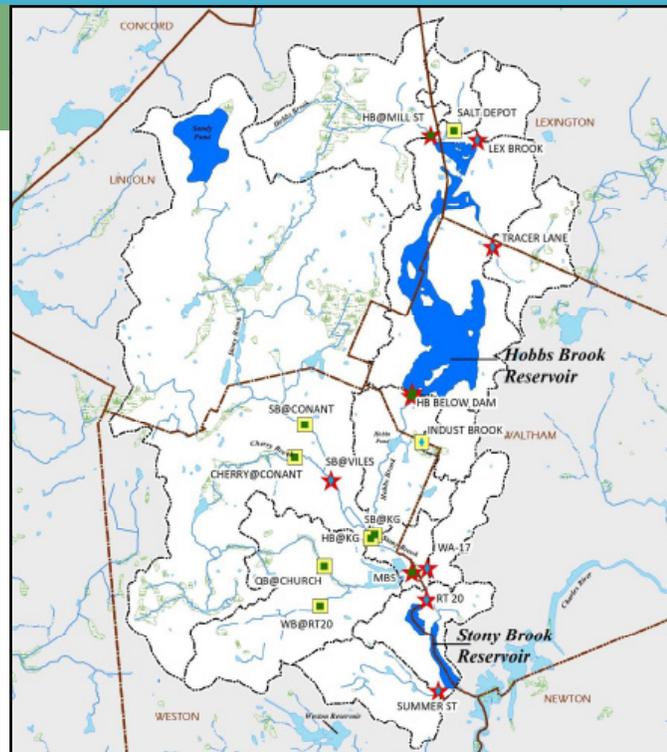
Cambridge drinking water is collected from our watershed: a region of land spreading across Lincoln, Lexington, Weston, and Waltham. Rainwater that falls within the boundaries of the watershed is carried through a series of tributaries that flow into the Hobbs Brook and Stony Brook Reservoirs. The larger reservoir, Hobbs Brook, serves as Cambridge's main source of water during the summer and fall. Water is released from the Hobbs Brook Dam into Hobbs Brook, which joins Stony Brook in Weston and travels to the Stony Brook Reservoir, located along the Weston-Waltham town line. From there, water flows by gravity through an underground conduit to Fresh Pond in Cambridge, where it is pumped into the Water Purification Facility for treatment. The finished (purified) water is pumped to the covered Payson Park reservoir in Belmont, from where it is gravity-fed to the residents and businesses of Cambridge, MA.

## Routine Dry Weather Sampling

CWD routinely collects dry weather (less than 0.1" of rain 72 hours prior) samples from all surface reservoirs and 12 primary tributary locations. Dry weather results represent stream conditions without the influence of precipitation and runoff (which can dilute or pollute water). Sites are targeted for sampling 6-8 times a year. CWD staff also collects samples from non-drinking water ponds at Fresh Pond Reservation 4 times a year.

Samples are collected using USGS clean-sampling protocols. The samples are analyzed by the state-certified CWD lab in-house and by certified subcontracted labs.

*In-situ* parameters (dissolved oxygen, temperature, specific conductance, pH, and oxidation-reduction potential) are measured at the time of sampling using a multi-parameter probe.



## What information is collected?

### Discharge

The rate of water passing through the tributary, measured with a velocity meter or estimated using the height of the water and the geometry of the stream channel.

### Specific Conductance

A measure of the ability of water to conduct electrical current, which indicates the presence of ions (such as sodium and chloride) in the water.

### Dissolved Oxygen

Oxygen is critical to supporting healthy fish and wildlife populations, as well as preventing nuisance metals and nutrients from releasing from sediments.

### Chlorophyll-a

Reservoirs and ponds only. Indicates the presence of algae.

### Total Organic Carbon

Used to quantify naturally-occurring organic matter. Removed during treatment to prevent disinfection byproducts from forming with chlorine.

### Phosphorus/Nitrogen

Nutrients that can increase algal production in reservoirs, measured as total phosphorus, nitrate/nitrite, ammonia, and total Kjeldahl nitrogen.

### Metals

Not considered health hazards at low concentrations, but an excess in water can lead to aesthetic issues. CWD routinely analyzes water samples for calcium, chloride, sodium, iron, manganese, and aluminum.

### E.coli

Found in the digestive systems of warm-blooded animals, this bacterial serotype is used as an indicator of sewage-related pathogens (from septic system failures or illegal sewage dumping).

Additional *in-situ* measurements taken: temperature, pH, oxidation-reduction potential, salinity, and total dissolved solids.

## Wet Weather Sampling

Stormwater runoff can introduce sediments, excess nutrients, bacteria, road-deicing materials, metals, oil, and grease to nearby waterbodies. In light of this, CWD targets stormwater sampling in primary tributary sites with more developed sub-watersheds after rain events.

Structural stormwater BMPs (best management practices), such as treatment wetlands and infiltration basins, can help reduce the amount of pollutants carried by stormwater runoff. CWD stormwater samples help target the tributaries that would benefit most from stormwater system improvements.

(For more information specific to the Cambridge Watershed, check out the USGS Scientific Investigations Report #2013-5039)



## Continuous Record Surface Water Monitoring

As part of a Joint-Funding Agreement with the US Geological Survey (USGS), USGS maintains a network of continuous (15-minute interval) monitoring stations throughout the Cambridge Watershed. CWD staff uses the real-time information to manage the surface supply system and to help guide management decisions. The stations measure stream and reservoir stage, discharge (eight sites), temperature, and specific conductance. Rainfall is recorded at the three reservoir stations, and wind speed and direction is measured at Stony Brook Reservoir.

One of our continuous monitoring stations, located just downstream of the Hobbs Brook Reservoir.



## Data Management

Water quality monitoring and quality-assurance data are entered into a CWD-maintained database that enables CWD to analyze, track, and report changes in water quality. Annual reports summarizing the data results are available on the CWD website.

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[www.cambridgema.gov/water](http://www.cambridgema.gov/water)

