



Operational Guideline for Manitoba Water Suppliers

Preparing for a Changing Climate

Purpose

This guideline has been developed to assist public and semi-public water suppliers prepare for the impacts of a changing climate, including the possibility of warmer temperatures, drought, extreme precipitation events, and flooding.

Impacts of a Changing Climate

A changing climate can have a range of impacts on Manitoba's water systems:

- Warmer temperatures leading to more severe, more frequent or earlier algal blooms, and possible impacts on invasive species like zebra mussels.
- Warmer raw water temperatures leading to increased biogrowth in pipes and tanks, increased fouling of membranes, loss of disinfectant residual, and increased disinfection by-product levels. Higher water temperatures may have beneficial effects on some treatment processes.
- Extreme precipitation leading to rapid run-off and infiltration that reduces water quality of both surface water and groundwater sources such as turbidity spikes and bacterial contamination.
- Extreme precipitation leading to flooding and erosion around water system infrastructure such as wells, water mains, reservoirs and treatment plants leading to integrity, cross-contamination and equipment failure concerns.

- Increased frequency of extreme events, such as multi-year droughts, resulting in lower water levels, a decrease in available source water supplies, deterioration of water quality, increased water use, and issues securing additional water supply capacity.
- Shifts in seasonal water availability and water quality patterns such as earlier snowmelts and longer, drier summers.
- Changing freeze/thaw patterns leading to more service connections freezing or having to be run continuously to prevent freezing.
- Increased storm frequency preventing trucked water delivery and wastewater removal services for homes relying on cisterns.
- Impacts to raw water quality (ex: increased mercury concentration) from forest fires and other land impacts.
- Longer survival rates for some environmental pathogens or new pathogens.

Preparing for Warmer Temperatures

- Consider how changes to freeze-thaw cycles might affect infrastructure, in particular, permafrost in the north.
- For surface water supplies, monitor for algal growth more frequently as blooms may happen earlier or change rapidly.
- Consider how to make infrastructure more resilient to zebra mussels including equipment and connections to allow chlorine to be fed at the intake.

Preparing for Drought Conditions

- Consult with local watershed or aquifer management groups about vulnerability of local water supplies to drought. Be familiar with your local municipal drought plan. Visit the Manitoba Drought Monitor for regular updates on water availability and drought conditions, such as stream flows, lake, reservoir, and groundwater levels. Contact drought@gov.mb.ca for more information.
- Look at options for a permanent or emergency backup supply including a backup well, a permanent or temporary interconnection with a nearby water system, or water hauling options.
- For surface water supplies, consider a raw water pond to store water when it is more available or of higher quality.
- Inspect intakes for sedimentation, zebra mussels and pipe integrity. Confirm intake infrastructure can continue to access water supplies during periods of low levels or flows.
- For groundwater supplies, talk to a licensed well driller about options for deepening a well, lowering the well pump or drilling a new well. Consult with the Groundwater Management Section on aquifer levels.
- Develop a water conservation program and bylaws with clear triggers for notifying water users. Develop staged water use restrictions based on drought severity (non-essential uses first). This will first require a general understanding of customer water consumption across all sectors and identification of critical facilities.
- Educate water users about water conservation and preparing for water shortages, particularly high water users and critical facilities.

- Set rates to promote water conservation but also ensure adequate funds if water usage drops.
- Keep good records. Conduct regular audits to identify water production, use and loss. Identify and repair leaks to increase efficiency.
- Consider unintended impacts from water conservation including the need to adjust reservoir settings, boost disinfectant residual levels, increase distribution flushing, or remind residents about the need to manage lead levels at the tap.
- Monitor local wildfire conditions.

Preparing for Extreme Precipitation

- When constructing new infrastructure including wells, pump stations, reservoirs and treatment plants, site the works above maximum flood levels.
- Install standby power for critical components, or have quick connections and portable generators available.
- When installing new wells or intakes, consider their depth or have multiple wells or intakes. Protect or reinforce wells and intakes from damage.
- Install pre-filters to deal with short but high turbidity spikes ahead of sensitive equipment such as membranes, UV units, anion exchange units or 1 micron absolute cartridge filters.
- For system using coagulation, consult with a chemical supplier on dealing with rapid swings in turbidity and natural organic matter (TOC).
- For surface water supplies, consider constructing a raw water pond to store water when it is more available or of higher quality.
- Fill reservoirs prior to storm events.

Preparing for Flood Conditions

- Inspect infrastructure for vulnerability to flooding. Improve drainage by mounding clay and maintaining grass cover. Raise wellheads. Ensure caps are watertight.
- Regularly check for infiltration into meter or valve chambers. Replace vulnerable installations with aboveground buildings.
- Maintain supplies for sandbagging wells or other critical components.
- Raise vulnerable equipment and instrumentation in water treatment plants and pump houses.
- Ensure storm drainage systems are maintained to direct water away from water system facilities and equipment.
- Install flap valves on reservoir overflows.
- Consider accessibility of infrastructure and the need to raise road levels to ensure access to intake structures or booster stations.
- Have a plan to ensure supply of critical chemical and parts can be maintained, and water samples can get to the laboratory if there is a rail or road closure.

Other General Advice

- Do research and talk to other water systems about ways to make water system less vulnerable to these events.
- Include these events in emergency response plans along with an up-to-date emergency contact list and an advisory notification plan in the case of a drinking water emergency.
- Increase monitoring of key water quality indicators such as disinfectant residual levels, turbidity, UVT and distribution pressures. Install online monitoring equipment and alarm systems.
- Carefully adjust chemical feeds and cleaning cycles.

- Keep a logbook of changes to treatment based on source water conditions such as temperature and turbidity.
- Maintain spare parts and chemicals.
- Have trained backup operators or set up agreements with nearby systems to cross-train and share operators.
- Regularly test emergency equipment and emergency plans, and train staff.
- Notify your Drinking Water Officer immediately if water system operation or water quality are affected.

Resources

Manitoba Climate Atlas

https://climateatlas.ca/sites/default/files/Manitoba-Report_FINAL_EN.pdf

Manitoba Drought Monitor

https://gov.mb.ca/water/drought_condition/index.html

Groundwater Management Section

https://gov.mb.ca/water/groundwater/wells_groundwater/index.html

US EPA Emergency Response for Drinking Water and Wastewater Utilities

<https://www.epa.gov/waterutilityresponse>

Office of Drinking Water

Regional [Drinking Water Officers](#) are available for operational and monitoring advice and to provide technical assistance.

After hours, please call the Environmental Emergency Response line at 204-944-4888 and ask for the on-call drinking water officer

For more information related to Manitoba's drinking water and how it is regulated visit: www.manitoba.ca/drinkingwater