

## Evaluated Water Treatment Technologies

**Objective: Improved Water Quality and Treatment Capabilities**

Treat Lake Ontario water using multiple processes to support community health ★

Improve taste and odour ● Increase protection for algae events ■

**Existing WSP**

Flocculation ★ Media filters ★ Chlorination ★ Existing

**Alternative 1**

DAF ★ Ozone ● Media filters ★ UV ★ Chlorination ★ New

**Alternative 2a**

DAF ★ UV-oxidation ● Media filters ★ Chlorination ★

**Alternative 2b**

DAF ★ UV-oxidation MGF Chlorination ★

**Alternative 3**

DAF ★ Media filters ★ Post-filter GAC contactors ● UV ★ Chlorination ★

**Alternative 4**

Membranes ★ Ozone ● Biological media filters ★ UV ★ Chlorination ★

Legend: DAF = Dissolved Air Flotation  
UV = Ultraviolet

GAC = Granular Activated Carbon  
MGF = Membrane Gravity Filtration

## Treatment Train Alternatives Evaluation

Criteria	Alt. 1	Alt. 2a	Alt. 2b	Alt. 3	Alt. 4
Social	▲	▬	▬	▬	▲
Environmental	▲	▲	▬	▬	▬
Process Performance	▲	▲	▲	▲	▲
Technical	▲	▲	▬	▲	▲
Cost	▲	▲	▬	▬	▬
Overall Ranking	1st	3rd	5th	4th	2nd

Legend: Alt. = Alternative

Moderate	Preferred	Most Preferred
▬	▲	▲

## Treatment Technology Definitions

### Pre-treatment

#### Dissolved Air Flotation (DAF)

- Tiny air bubbles attach to particles in the water and lift them to the surface
- Floated material is skimmed off the top and disposed of
- Ideal for removing algae and other lightweight particles (and pathogens) before filtration

#### Flocculation

- A chemical (like aluminum sulphate) is added with gentle mixing to help particles stick together to form larger particles (floc)
- The floc can then be removed by settling or filtering them out
- Some pathogens are also removed with the floc

#### High-rate Sedimentation

- A chemical (like aluminum sulphate) is added to help particles stick together forming floc
- Microscopic sand particles are also added to weigh down the floc and make them sink quickly
- Some pathogens are also removed with the floc
- Allows treatment in a smaller area

### Filtration

#### (Biological) Media Filters

- Water flows through layers of carbon-based media and sand
- Particles remaining from pre-treatment get trapped between the media grains
- Makes the water clearer in colour and removes more pathogens
- *Biological media filters* - naturally occurring bacteria can enhance T&O removal

#### Pressurized Membranes

- Pumps push pre-treated water through membranes (thin, hollow fibres with tiny pores)
- Makes the water clearer in colour and removes additional particles and pathogens

#### Membrane Gravity Filters (MGF)

- Gravity pushes water through membranes, without needing pumps
- Requires more area than pressurized membrane systems

### Taste and Odour

#### Ozone

- Ozone is generated onsite using oxygen and electricity
- It reacts strongly and quickly to break down compounds that cause earthy/musty taste and odour (T&O) in water
- Can be operated seasonally

#### Granular Activated Carbon (GAC) in Filters

- A top layer of GAC is added to media filters
- GAC removes the T&O-causing compounds as the water filters through

#### Post-filter GAC Contactors

- Tanks filled with only GAC provide a second stage of T&O removal after media filters or membranes
- Can be operated seasonally

#### UV-oxidation

- UV light combined with chemicals (like chlorine or hydrogen peroxide) break down T&O-causing compounds
- Can be operated seasonally

### Disinfection

#### UV Disinfection

- UV light damages pathogens so they cannot reproduce

#### Chlorination

- Liquid chlorine is added to kill pathogens
- A small amount of chlorine stays in the water to keep it safe as it travels through pipes to the consumer

### Project Team Contact Information

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