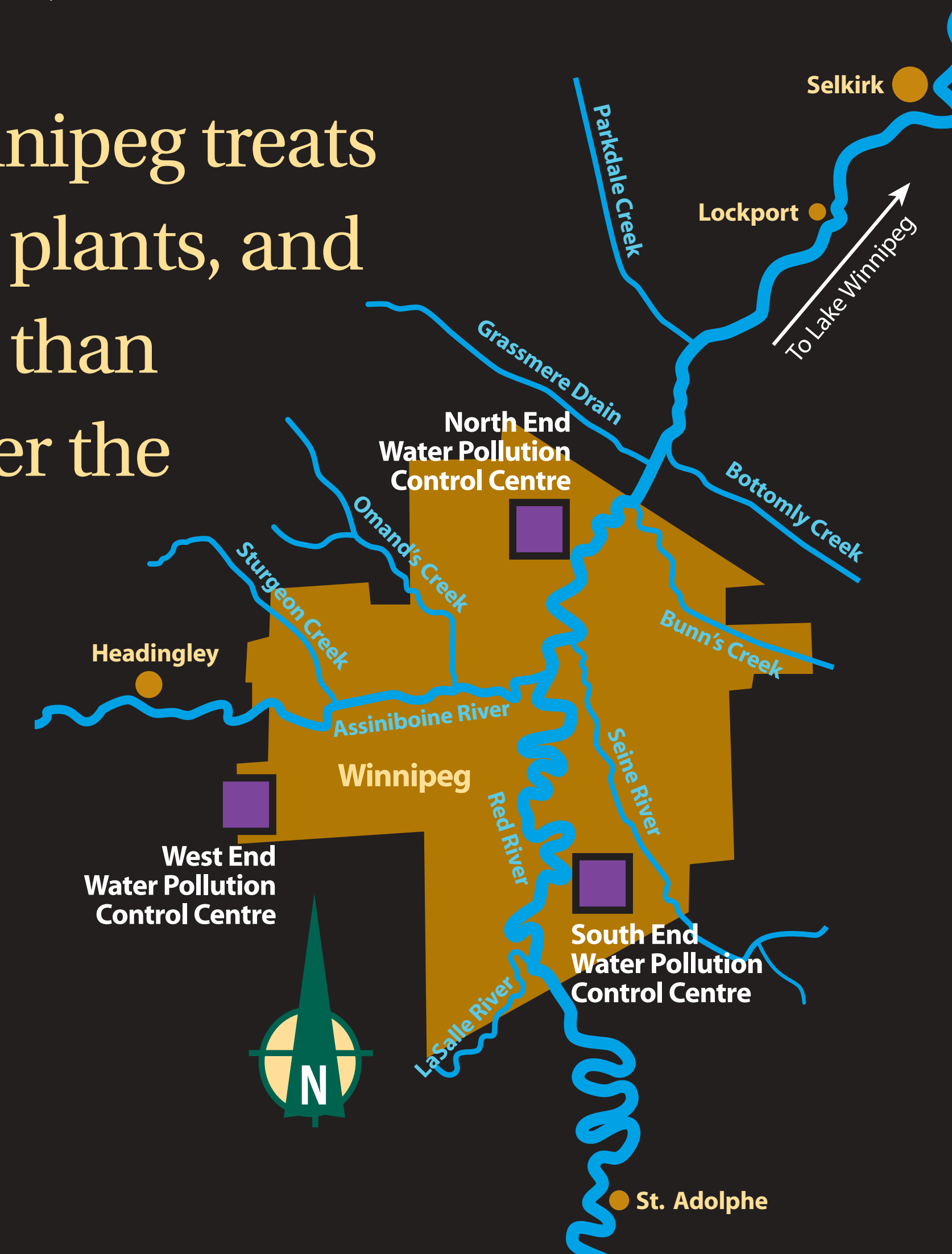


# A Plan to Improve Wastewater Treatment

## *Helping to Protect River Water Quality*

The quality of water in the Red River, the Assiniboine River, and Lake Winnipeg is affected by the way the City of Winnipeg collects and treats the sewage and land drainage produced by more than 600,000 residents.

The City of Winnipeg treats sewage at three plants, and has spent more than \$200 million over the last 20 years to expand and improve these facilities.





# Why Do We Need to Improve Wastewater Treatment?

- ▶ To protect the water quality in the rivers and Lake Winnipeg:
  - for fish and other aquatic life
  - for the recreation and enjoyment of residents, especially during the recreation season (May to September)
- ▶ To respond to provincial environmental regulations



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# What Does Our Plan Include and How Much Could It Cost?

Reducing combined sewer overflows.....	\$271 million
Reducing nutrients in effluent.....	\$181 million
Disinfecting effluent.....	\$18 million
Reducing ammonia .....	\$10 million

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Total \$480 million

- ▶ We can make the cost more affordable by spreading the improvements over the next 50 years.
- ▶ Even so, implementing the proposed plan will increase the cost of sewer services in the future.

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# Ammonia

## What is ammonia?

Ammonia:

- ▶ is a natural by-product of decomposing human and animal waste
- ▶ is in the treated wastewater we release to the rivers

## Why is ammonia a concern?

- ▶ In high amounts, ammonia can be harmful to fish and other aquatic life.
- ▶ 2 of Winnipeg's 3 treatment plants do not reduce ammonia in the wastewater enough to meet the proposed limit.



photo: In Fisherman Magazine, Brainerd MN

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# Ammonia

## What have we done about ammonia?

We have carried out a 4-year study to:

- ▶ find out the present levels of ammonia in the Red and Assiniboine Rivers
- ▶ find out the amount of ammonia discharged from our plants and its effect on local aquatic life
- ▶ identify an allowable limit for ammonia discharges from our treatment plants to protect the local aquatic life
- ▶ determine what we have to do to keep the ammonia levels under the limit

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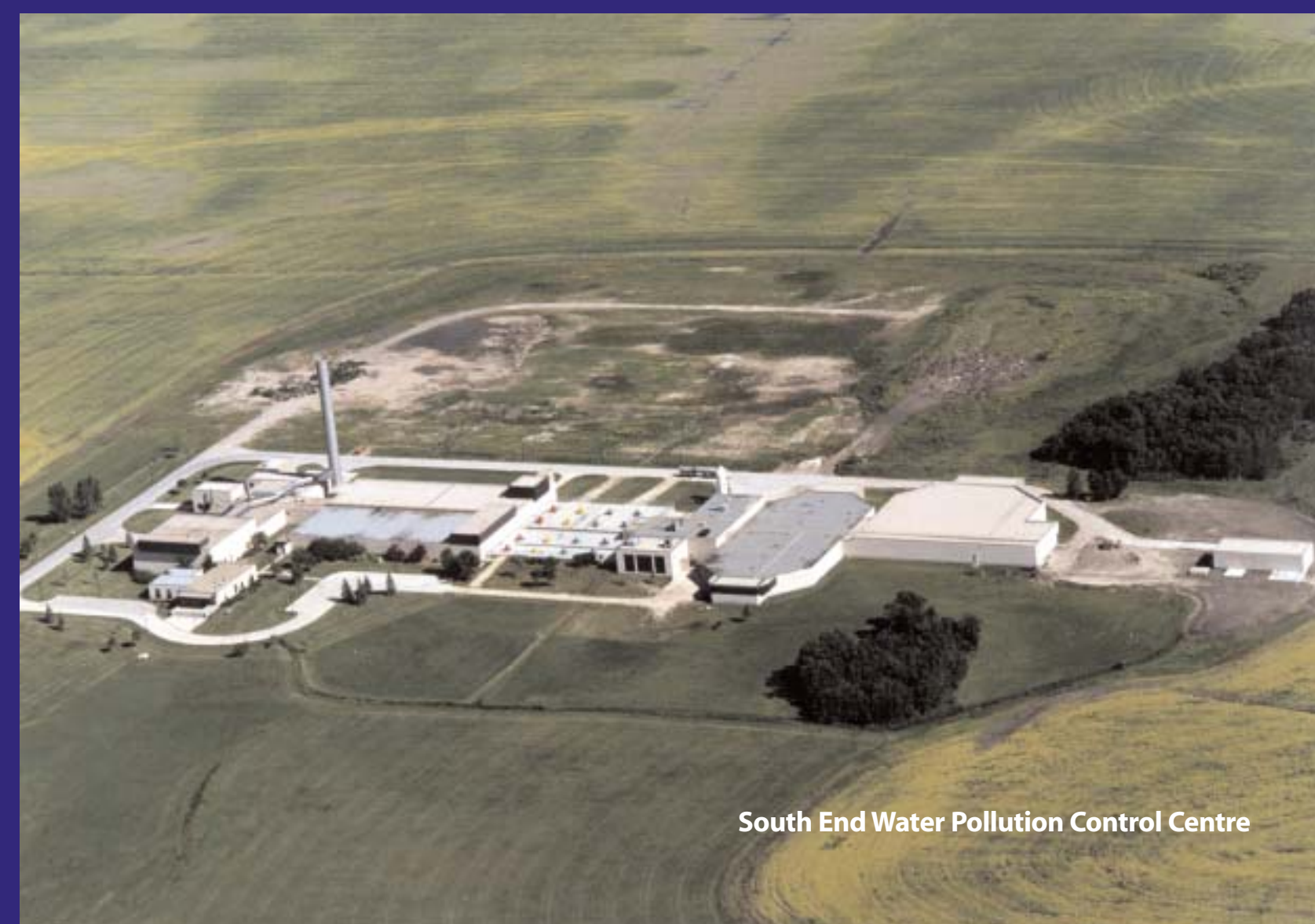




# Ammonia

## What do we propose to do about ammonia?

- ▶ Ask the province to adopt the allowable limit for ammonia we identified for our discharges, based on site-specific data.
- ▶ Reduce the ammonia discharges by 30% at the North End Water Pollution Control Centre by adding a new treatment process by 2005 at a cost of \$10 million.
- ▶ Review the need for additional treatment processes at the South End Water Pollution Control Centre within the next 10 years, as we expect increasing wastewater flows to the plant.
- ▶ Continue with the existing processes which reduce ammonia at the West End Water Pollution Control Centre.



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# Combined Sewer Overflows

## What are combined sewers?

Combined sewers are pipes that carry both wastewater (sewage from homes and businesses) and land drainage. During dry weather, all wastewater in the combined sewers is carried to the treatment plants.

- ▶ Combined sewers were built in older areas of the city between 1880 and 1960.
- ▶ There are 1,320 kilometres of combined sewers.

## What are combined sewer overflows?

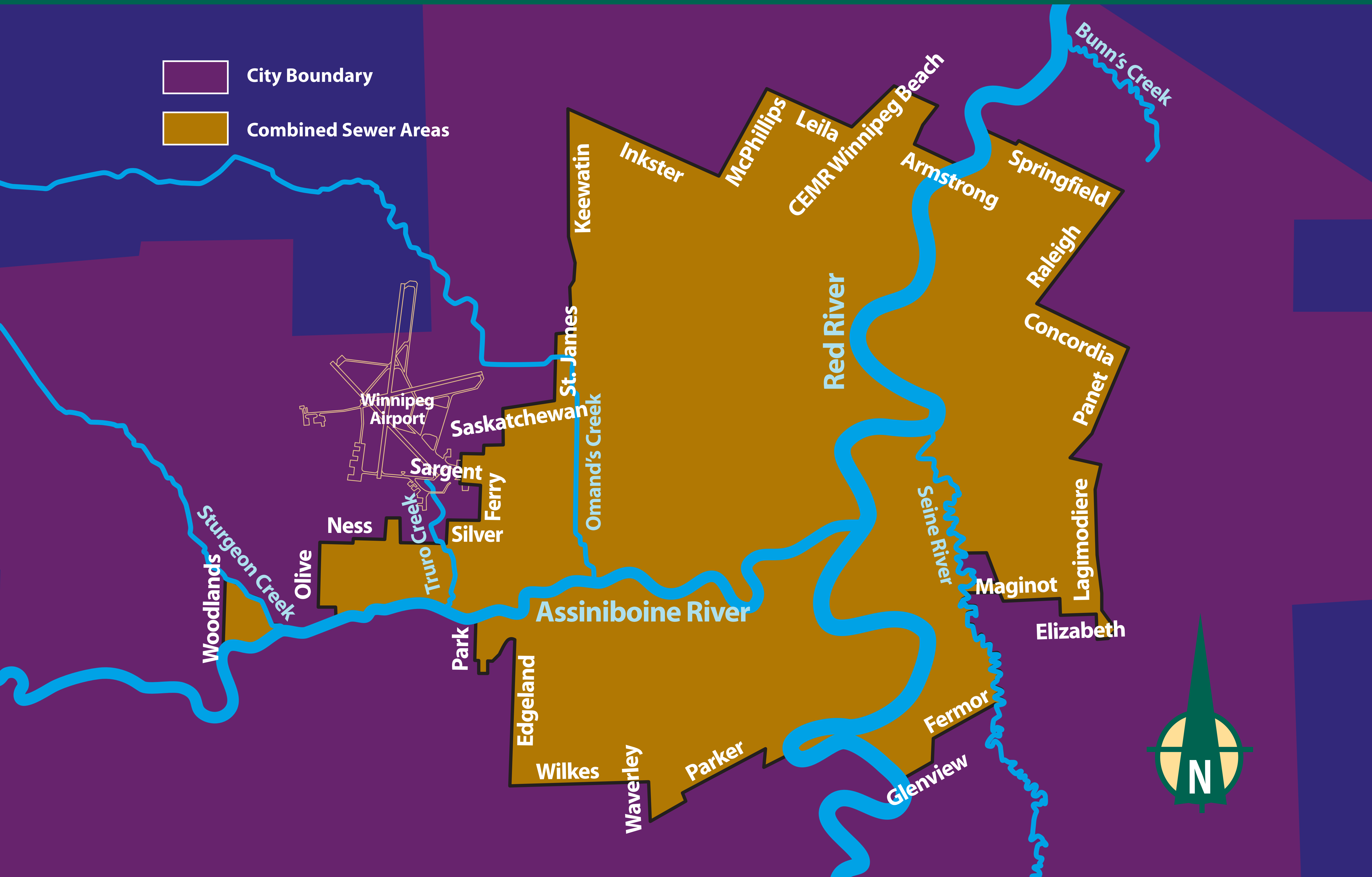
Combined sewer overflows (CSOs) can occur during rainstorms when the sewers cannot handle the heavy runoff. The sewage flows directly into the rivers without reaching the treatment plants.

- ▶ CSOs happen an average of 18 times a year during the recreation season (May 1 - Sept. 30).
- ▶ There are 76 locations where combined sewers can discharge into the rivers.

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# Combined Sewer System



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# Combined Sewer Overflows

Why do we need to reduce the number of CSOs?

Every time there is an overflow, there is a temporary increase in the river water of:

- ▶ bacteria and floating debris
- ▶ organic material, which slightly reduces the dissolved oxygen levels in the river, but not enough to harm aquatic life
- ▶ common urban pollutants from land drainage, such as oils, and lawn/garden fertilizers
- ▶ odour



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# Combined Sewer Overflows

## What have we done about CSOs?

We began a study in 1994 to:

- ▶ understand the effects of combined sewer overflows on river water quality
- ▶ develop options and costs to control combined sewer overflows

## What do we propose to do about CSOs?

We propose to structurally modify the combined sewer system to create temporary storage space. This improvement, which will take 45 - 50 years and cost about \$271 million, will:

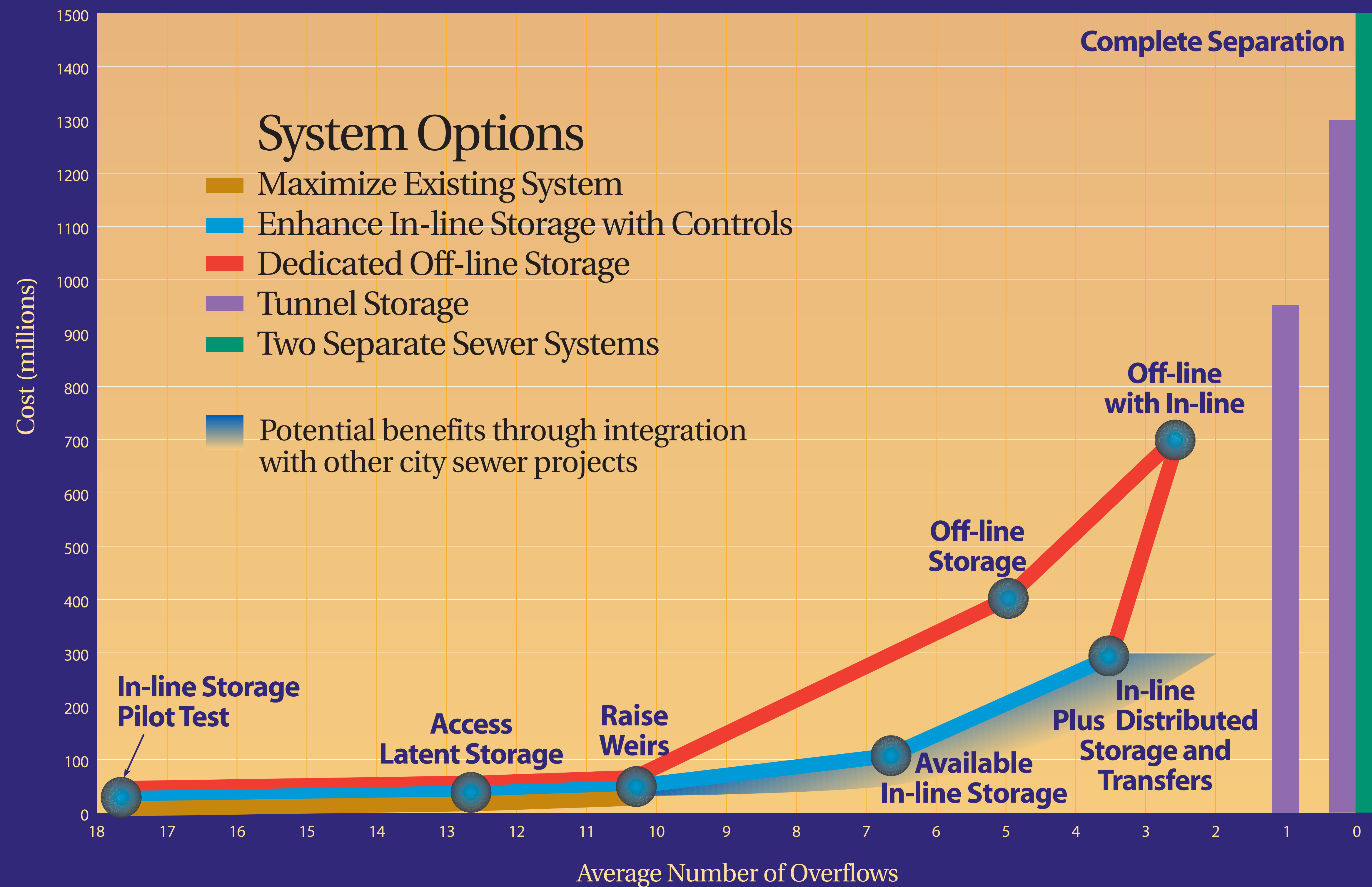
- ▶ collect and store the sewage until it can be pumped to the treatment plants
- ▶ reduce, on average, the overflows from 18 to a target of 4 during the recreation season (this target is based on US Environmental Protection Agency guidelines)

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# Cost Benefit Trade-Off



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# Effluent Disinfection

## What is effluent disinfection?

Effluent is treated wastewater that is released to the rivers. Effluent disinfection is a wastewater treatment process that kills enough bacteria to meet the limits set by the regulators for recreational use of the rivers.

## Do we have effluent disinfection at the treatment plants?

The South End and West End plants have effluent disinfection. The North End plant does not have effluent disinfection. As a result, the bacteria (fecal coliform) levels in the effluent are higher than they should be to meet provincial standards for recreational use of the rivers.

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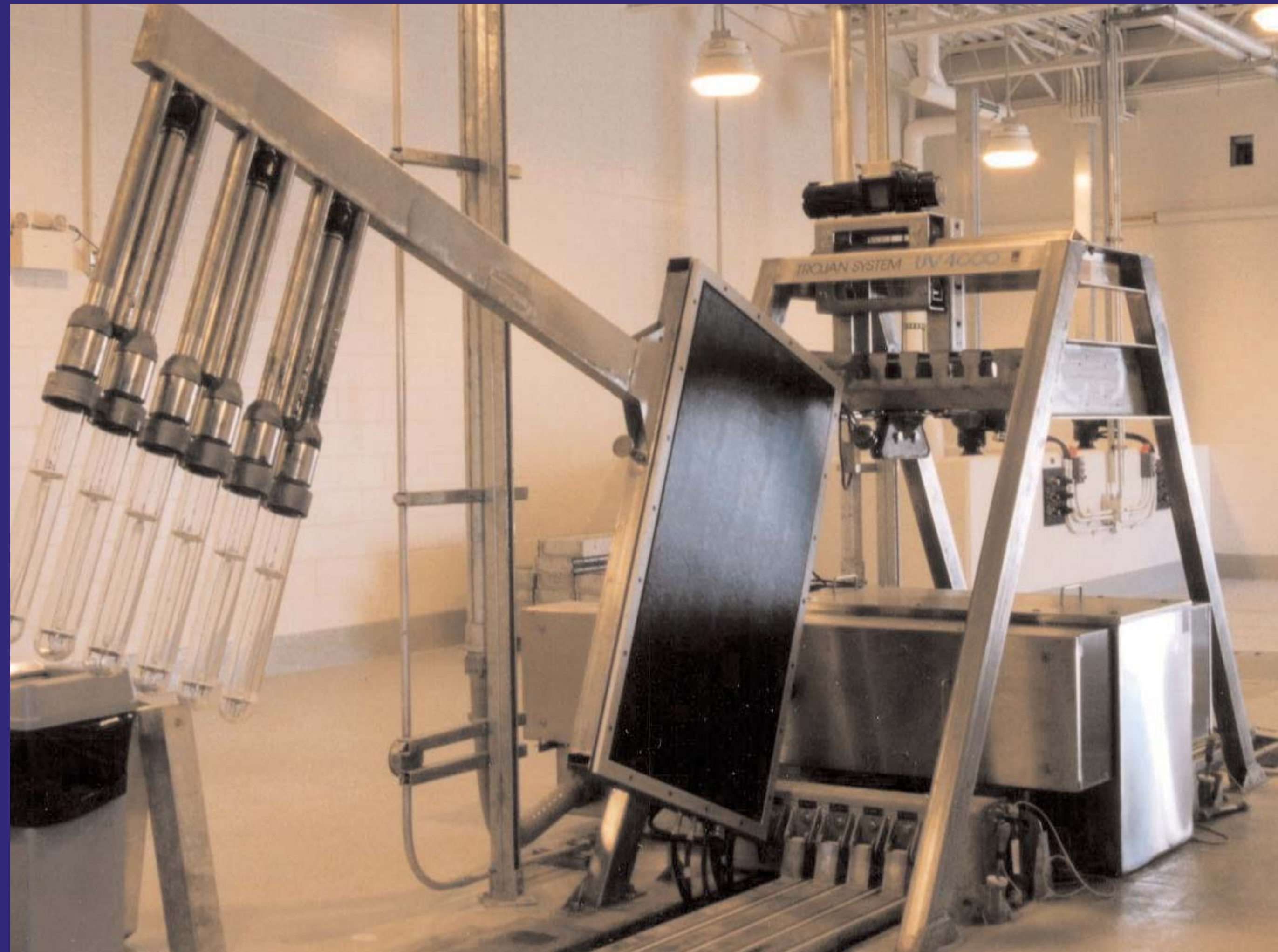




# Effluent Disinfection

What do we propose to do about effluent disinfection?

We will begin disinfecting the effluent at the North End plant in 2005, at a cost of \$15 million. The design of the facility will begin in 2003, and as part of that process, we will confirm that ultraviolet light is the most effective technology for disinfection. If improvements are required at the West End plant, the cost will be \$3 million.



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# Reliability of Our Wastewater Treatment Plants

What are we going to do to ensure that our wastewater treatment plants are more reliable?

We will:

- ▶ isolate the 3 pump wells at the North End plant in 2003 to prevent another plant shutdown similar to the one that occurred on September 16, 2002
- ▶ complete a 12-month analysis of all 3 plants by 2004 to determine if additional backup systems are needed to prevent untreated sewage from being released into the rivers

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# Nutrients in Effluent

## Which nutrients are a concern?

Nitrogen and phosphorus. These nutrients are in the treated wastewater (effluent) we release to the rivers.

## Why are these nutrients a concern?

High levels of nutrients in some rivers and lakes can cause excessive algae and weed growth, which may:

- ▶ lower water quality
- ▶ harm fish and other aquatic life because oxygen levels are reduced
- ▶ affect the appearance and recreational enjoyment of our rivers and lakes

Our treatment plants can only partially remove the nutrients nitrogen and phosphorus from the wastewater.

*Our effluent contributes only a portion of the nutrients to our local rivers.*

*Nitrogen and phosphorus get into rivers and lakes from many other sources, such as urban and rural runoff, and agricultural and industrial operations.*

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# Nutrients in Effluent

## What is being done?

The province is identifying all sources of nutrients in the prairie rivers and Lake Winnipeg, and studying their effects on water quality. They will develop an overall nutrient management plan, which will include public consultation. We are proposing that the province finish their study before asking us to control nutrients at our treatment plants.

\$181 million will be needed if the province requires us to add more nutrient control at our 3 wastewater treatment plants.

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