

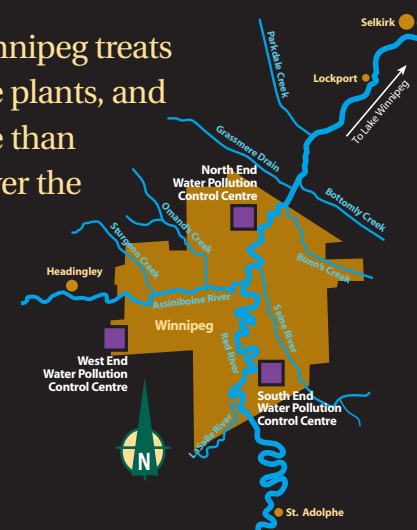
A Plan to Improve Wastewater Treatment

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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.

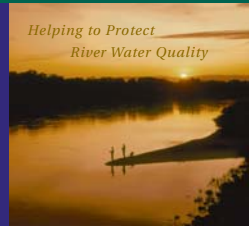


Why Do We Need to Improve Wastewater Treatment?

- ▶ To protect the water quality in the rivers and Lake Winnipeg:
 - for fish and other aquatic life
 - for the recreation and enjoyment of residents
- ▶ To respond to provincial environmental requirements



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

Capital Costs

Reducing combined sewer overflows	\$392 million
Reducing nutrients in effluent.....	\$273 million
Disinfecting effluent.....	\$18 million
Biosolids management.....	\$63 million
Other.....	\$5 million

Total \$751 million

There will also be operating and maintenance costs for new facilities.

- ▶ Implementing the proposed plan will increase the cost of sewer services in the future.
- ▶ The cost will be spread over the next 25 years.

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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 Lake Winnipeg cause excessive algae and weed growth, which:

- ▶ lowers water quality
- ▶ harms fish and other aquatic life because oxygen levels are reduced
- ▶ affects the appearance and recreational enjoyment of our rivers and lakes

Only a small portion of these nutrients comes from our effluent.

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 have developed an overall nutrient management plan.

What will the City do?

- ▶ We will incorporate state of the art biological nutrient removal (tertiary treatment) into the three existing plants.
 - ▶ As an immediate measure to reduce nutrients, centrate treatment at the North End plant will be completed by 2006.
 - ▶ The total cost of nutrient removal could be \$273 million.

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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, and most light rainfalls, 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 1,034 kilometres of combined sewers.

What are combined sewer overflows?



Combined sewer overflows (CSOs) can occur during heavy rainstorms when the sewers cannot handle the large amount of runoff. Some of the rain/wastewater mixture flows directly into the rivers without reaching the treatment plants.

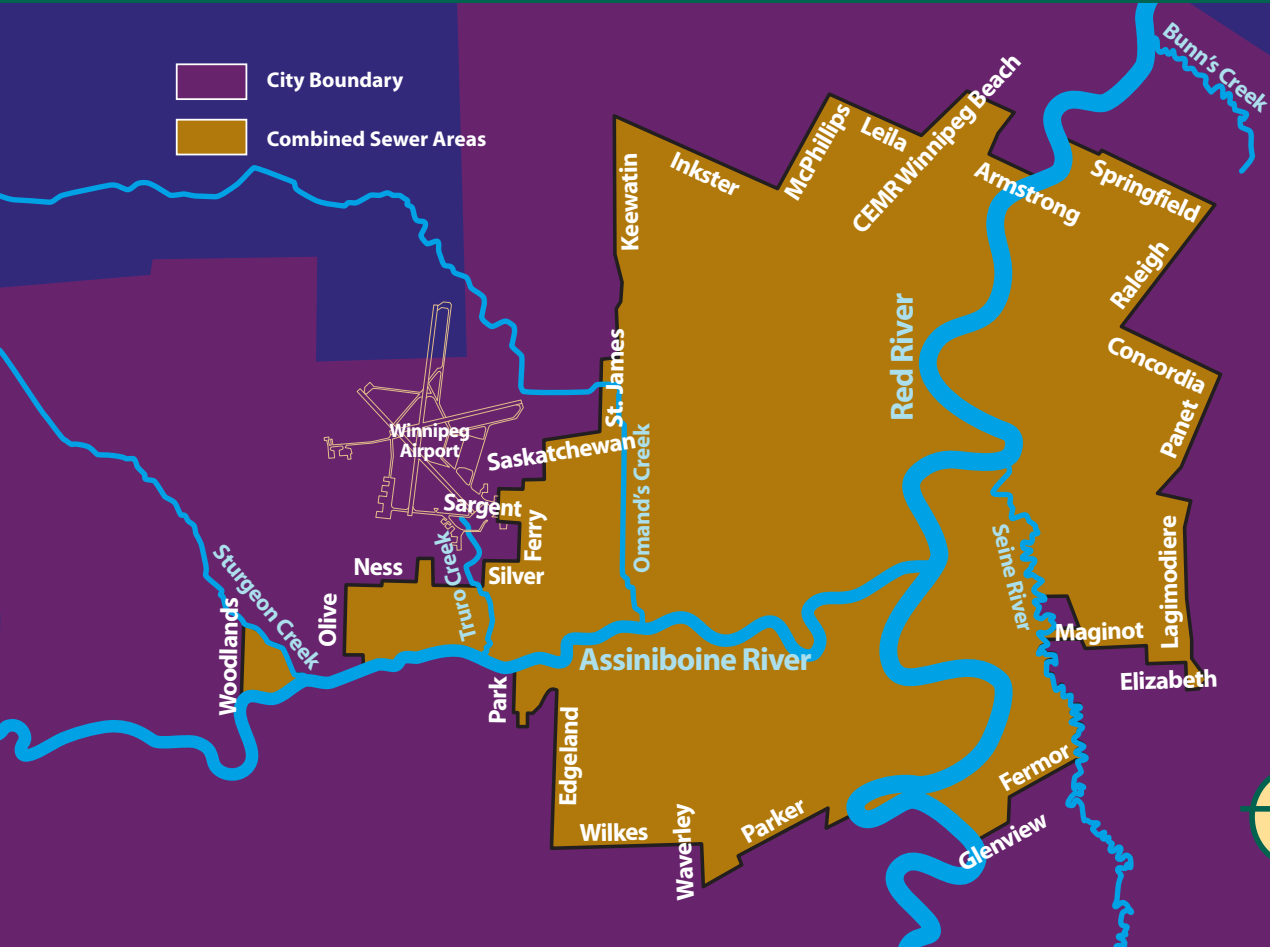
- ▶ CSOs happen an average of 18 times a year during the recreation season (May 1 - Sept. 30).
- ▶ There are 79 locations where combined sewers can discharge into the rivers.

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Combined Sewer System

-  City Boundary
-  Combined Sewer Areas



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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?

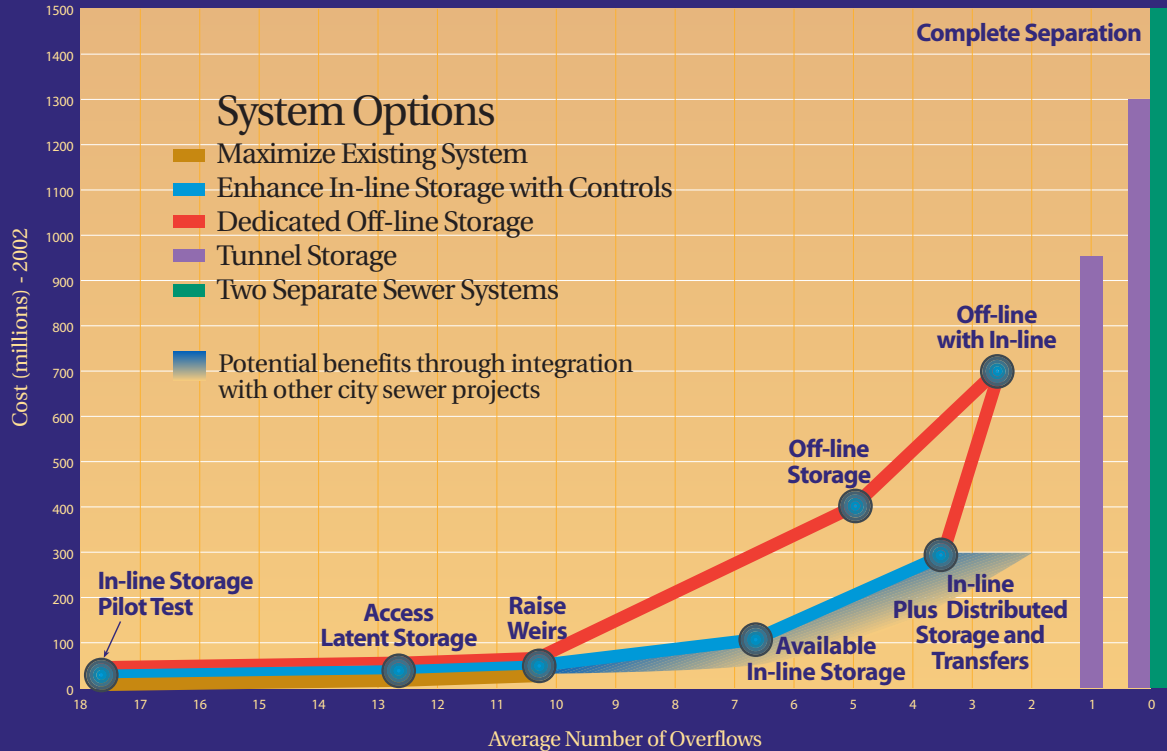
We propose to modify the structure of the combined sewer system to use existing pipe storage and add more when necessary. This improvement, which could take 25 years and cost about \$392 million, would:

- ▶ 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 specified by Manitoba Conservation)

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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 Province 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 and West End plants in 2006, at an estimated cost of \$18 million. Ultraviolet light is the most effective technology for disinfection.

A similar facility shown here has been operating at the South End plant since 1999.



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Reliability of Our Wastewater Treatment Plants

How can we ensure that our wastewater treatment plants are more reliable?

We have:

- ▶ isolated the 3 pump wells at the North End plant to prevent another plant shutdown similar to the one that occurred on September 16, 2002

We will:

- ▶ complete a 12-month analysis of all 3 plants in 2004 to determine if additional backup systems are needed to prevent untreated sewage from being released into the rivers

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Ammonia

What is ammonia?

Ammonia:

- ▶ is a natural by-product of decomposing human and animal waste
- ▶ is a form of nitrogen, a nutrient
- ▶ 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 do we propose to do about ammonia?

The nutrient removal processes being developed at all three plants to remove nitrogen and phosphorous will also remove ammonia.

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North End Water Pollution Control Centre



South End Water Pollution Control Centre



West End Water Pollution Control Centre