

BACKGROUND: The Kingston Pollution Control Plan

Many of the sewers in central Kingston were originally built in the 1800's and early 1900's, and flowed directly into Kingston's harbour and waterfront. There was no sewage treatment. These sewers were built as "combined" sewers; that is, they receive sewage flow from residences and businesses, as well as surface drainage from roadways and other surfaces.

In the 1950s, a comprehensive plan was developed to intercept these sewer drains by construction of a trunk sewer along the waterfront from Kingston Penitentiary, past City Hall and on to River Street on the shores of the Great Cataraqui River. These works included the Lake Front Trunk Interceptor Sewer, the sewage pumping station at River Street, and the sewage treatment plant at Ravensview. The interceptor sewer carries the flow to the River Street pumping station where it is pumped across the river and up the Barriefield hill. A gravity sewer pipe then carries the flow through CFB Kingston to the Ravensview sewage treatment plant.

In the late 1980's there was substantial concern about water pollution along the waterfront, particularly the posting of Richardson Beach as unsafe for swimming due to bacteria levels in the water. It was recognized that many of the water pollution concerns were due to occasional overflows from the sewer system in wet weather. As well, stormwater drainage from the urban area was an issue.

In 1989, the City of Kingston initiated the development of a comprehensive Pollution Control Plan to address water pollution issues and the capacity limitations of the sewage collection system.

The initial Pollution Control Plan was developed between 1989 and 1992. The project involved a number of activities including:

- Monitoring of discharges from the combined-sewer system as well as separate storm drain outlets that discharge to the Lake Ontario waterfront and the Inner Harbour
- Flow monitoring within the sewer system
- Monitoring of water quality along the Kingston waterfront in order to assess the impact of sewer overflows and storm discharges in wet weather
- Assessment of the sewer pipe network and sewage pumping station to identify capacity limitations and bottlenecks in the system
- Public consultation at three public open-house sessions

The PCP study led to a long-term strategy for dealing with water pollution problems along the waterfront. The 1992 PCP included a number of recommended infrastructure improvement projects to help address water pollution problems. Here is a summary of what the City has completed to date:

Pumping Station Improvements

- ◆ O'Kill Pumping Station (near KGH) upgrade completed in 1997
- ◆ Portsmouth Village PS upgrade completed in 2001

Sewer Capacity Improvements

- ◆ Four out of seven recommended projects have been completed.

Sewer Replacement and Local Sewer Separation Projects

- ◆ The 1992 PCP report included 31 recommended projects involving replacement of existing sewers and/or local separation of existing combined sewers.
- ◆ The City has completed 21 of the 31 recommended projects, and has partially completed three of the remaining 10 projects.

Combined-Sewer Overflow Measures

The 1992 PCP recommended the construction of a number of underground overflow storage tanks to deal with sewer overflows along the Lake Ontario waterfront from the vicinity of Collingwood Street to Clarence Street in the downtown core.

All of the facilities have been implemented, except the recommended overflow storage tank in vicinity of Collingwood Street. The implemented measures include:

- ◆ A large overflow storage facility (approx 6,000 m³) at Richardson Beach
- ◆ Small-scale overflow storage tanks (each about 100 m³) at West Street, Lower Union Street, Gore Street, Earl Street and William Street
- ◆ Overflow storage (approx 300 m³) at Clarence Street



Construction of underground storage as part of sewer reconstruction along Clarence Street, in 1999.

BACKGROUND: The Kingston Pollution Control Plan Update

A comprehensive review of the PCP was carried out in 2000. The update reviewed the progress made since 1992, and reviewed current priorities especially with respect to continuing the effort to reduce sewer overflows.

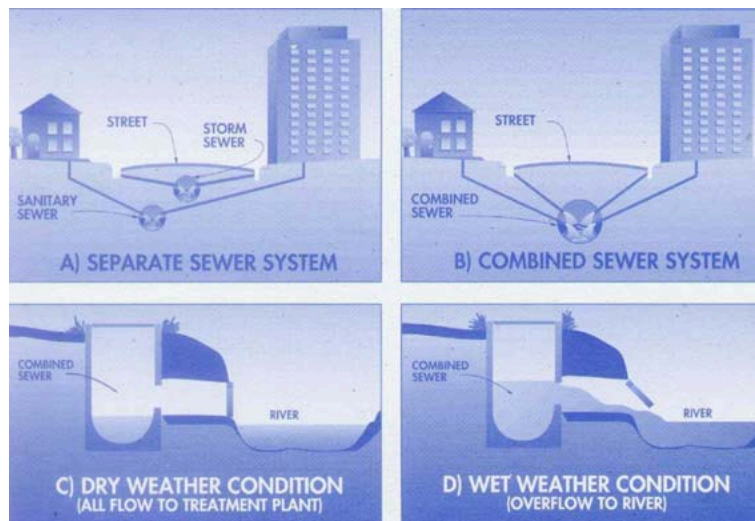
To address the sewer overflow issue, the 2000 PCP Update report recommended that

- ◆ Highest priority be placed on implementing the sewer overflow facility for the Collingwood Street area that was recommended in 1992
- ◆ High priority should also now be given to dealing with remaining sewer overflows along the Harbourfront Trunk Sewer through the downtown core area and northward along the Inner Harbour to River Street.
- ◆ Sewer overflows should be reduced to achieve, at a minimum, the requirements set out in the Ontario Ministry of Environment's Directive F-5-5, which had not been in place when the 1992 PCP was formulated.

Combined Sewers vs Separated Sewers

Sewer overflows occur in older urban areas served by **combined sewers**, so called because they receive both sewage waste and runoff from roads, roofs and other surfaces (stormwater).

Separate sewers for sewage waste and for stormwater serve newer urban areas



Why Do Sewers Overflow?

Sewer overflows occur mostly in older, combined-sewer systems. There are various reasons:

1. Combined sewers were built to receive sewage and surface drainage from roadways and other surfaces. Over time, these areas have increased, resulting in more runoff during rain events. During heavy rains, the sewers can become overloaded.
2. Many of the older combined sewers in Kingston downtown area are stone box sewers, constructed by cutting the sewer out of the bedrock. This means that these older sewers often receive substantial inflow from groundwater seepage, especially during the spring melt and after rainfall.
3. In some areas of the City, roof drains are connected to sanitary sewers, in spite of recommendations in engineering reports and subsequent Sewer Use Bylaws adopted by the City. During wet periods (especially the spring) this can cause overloading of the sewer pipes.
4. Separated sanitary sewers may also receive substantial inflow from water seepage through pipe joints and cracks in older pipe.

PROBLEM STATEMENT: SEWER OVERFLOWS

There remain various locations along the Harbourfront Trunk Sewer at which overflows to Lake Ontario or Inner Harbour occasionally occur. Overflow locations are shown in **FIGURE 1** and **FIGURE 3**.

The overflows are causing water pollution that is having adverse impacts on

- ◆ health and safety of using the waterfront for water-based recreation such as boating and swimming
- ◆ waterfront aesthetics
- ◆ ability of the waterfront and Inner Harbour to provide a healthy environment for aquatic life

OBJECTIVE

SUBSTANTIALLY REDUCE OR ELIMINATE OVERFLOWS FROM THE COMBINED SEWER OVERFLOW LOCATIONS SHOWN ON FIGURE 1 and FIGURE 3.

THE LONG-TERM GOAL IS ELIMINATION OF THESE OVERFLOW STRUCTURES.

THE IMMEDIATE GOAL IS, AT A MINIMUM, TO **MEET OR EXCEED THE CURRENT SEWER OVERFLOW CONTROL POLICY OF THE ONTARIO MINISTRY OF THE ENVIRONMENT (MOE)**.

The current MOE overflow control policy is set out in Ministry Directive "F-5-5", which in summary requires that: At least 90% of the wet-weather flow from all of the urban sewer area be captured and receive at least "primary sewage treatment" (as defined in F-5-5). For waterfront areas that are beach areas or potential beach areas (see F-5-5 for specific definition), permit no more than 2 overflows between June 1 and Sept 30. Total duration of those overflows is not to exceed 48 hours

ALTERNATIVE SOLUTIONS

These are the general options to consider:

DO NOTHING

- ◆ The "Do Nothing" option will obviously not solve the problem, will result in continued environmental impacts and will not comply with current regulations.

WET-WEATHER SEWER INFLOW REDUCTION by SOURCE CONTROL

- ◆ Modify the urban environment and local property drainage to substantially reduce the volume of surface runoff collected by the sewer system

SEWER SEPARATION WITH STORMWATER TREATMENT

- ◆ Replace the existing combined sewers with separated storm sewers and sanitary sewers. This will remove much of the wet-weather inflow from the combined sewers.
- ◆ The stormwater collected by the new storm sewer system will be polluted and must therefore be treated before it is discharged to the waterfront. Or measures must be taken within the urban drainage area to reduce stormwater pollution at the source.

INTERCEPT AND TREAT THE OVERFLOWS

- ◆ Keep the combined trunk sewers (do not build separated sewers), and pursue all practical measures to reduce wet-weather flows.
- ◆ At the overflows, construct new sewers and/or storage tanks to capture the overflows. The captured overflow would then be treated.