SEWER INFLOW REDUCTION by SOURCE CONTROL

To solve the sewer overflow problem, a substantial reduction in wet-weather inflow to the sewers would be needed. Could this be done "at the source" by modifying property drainage?

The downtown core is highly impervious. There is very little opportunity to reduce the amount of surface runoff. Good drainage of the area is essential to protect buildings and property.

In residential portions of the combined-sewer area, disconnecting the pipes from the sewer and directing roof drainage onto grassed areas can substantially reduce sewer inflows. But space is limited, and the drainage can very well end up on the roadway and in the sewer.

Over recent years, the City has pursued a program of disconnecting roof drains from the sewers, wherever practical. Within the older combined-sewer area, most roof drains have been disconnected. However, there remain some instances where disconnection is not feasible because of lack of space

There is minimal opportunity remaining within the combined-sewer area to reduce wet-weather sewer inflows by local drainage modifications.

SEWER SEPARATION WITH STORMWATER POLLUTION CONTROL

This option consists of replacing existing combined sewers with separated storm sewers and sanitary sewers. This solves the overflow problem by eliminating much of the wet-weather inflow to the older combined sewers. However, the stormwater collected by the new storm sewer system will be polluted. There are two options:

STORMWATER TREATMENT FACILITIES: This could include the construction of underground settling tanks, construction of settling ponds or small-scale constructed wetlands. Or specially designed oil/grit capture chambers can be installed at strategic locations within the storm sewer system.

A small stormwater settling pond. Constructing this type of facility along the waterfront may not be desirable because of loss of valuable public parkland

POLLUTANT SOURCE CONTROL: Much of the pollutant load carried by urban stormwater is washed off of roadways, driveways, parking lots and other hard surfaces. Source control strategies could include intensified street sweeping and clean out of sewer catchbasins. However, these programs may have limited effectiveness.

The City of Kingston has a street sweeping program that helps reduce wash-off into the sewer system

INTERCEPT AND TREAT THE OVERFLOWS

The intercept-and-treat option is as follows:

- Keep the combined trunk sewers (do not build separated sewers)
- Pursue all practical measures to reduce inflows to the combined sewers. Measures include disconnecting as many of the remaining connected building roof drains as is possible and replacing leaky sewers.

To control overflows, **construct a new interceptor sewer parallel to the existing Harbourfront Trunk Sewer, and/or one or more storage tanks to capture the overflows.**

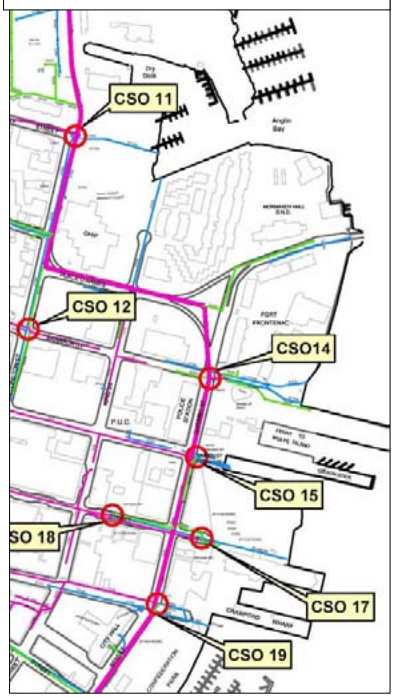
The captured overflow would then be treated. Treatment options are:

- **Centralized Treatment:** Pump captured overflow back into the existing trunk sewer system to send it to the Ravensview Sewage Treatment Plant.

- **Satellite Treatment Plants**: Construct small-scale sewage treatment plants at the overflows to treat at the point of capture and then discharge to the waterfront.

Various intercept-and-treat strategies have been considered.

A portion of the downtown sewer network. Rather than building separate storm sewers on all streets, an option is to build a new wet-weather interceptor parallel to the existing trunk sewer.



BROCK STREET TO RIVER STREET:

For overflows from Brock Street through the downtown core and northward to River Street, these concepts have been examined

NEW INTERCEPTOR SEWER with CENTRALIZED STORAGE and TREATMENT

Build a new wet-weather interceptor pipe and direct the flow to a centralized storage tank. The stored overflow would then be pumped back into the existing system for treatment at Ravensview Sewage Plant. Possible interceptor routes and tank locations are shown in **FIGURE 5**.

MULTIPLE UNDERGROUND STORAGE TANKS with CENTRALIZED TREATMENT

Build a number of underground storage tanks to capture overflows. Storage would then be pumped back into the existing system for treatment at Ravensview Sewage Plant. Various potential tank locations can be considered on municipally owned property including roadways, vacant municipal lots, or waterfront park areas such as Douglas Fluhrer Park.

Both of the above options have been considered with SATELLITE TREATMENT instead of CENTRALIZED TREATMENT at Ravensview.

KING STREET WEST (COLLINGWOOD STREET AREA):

For the overflow near the foot of Collingwood Street, the only feasible option for capturing the overflow is an **underground tank**. Again, treatment could be through pump back to the existing trunk sewer, or by satellite treatment at the tank site. **Figure 9** shows the concept for a tank along the waterfront.

This concept also provides the advantage that it could be designed to also capture and treat some **stormwater from separated storm sewers** that discharge to the lake in this area.

INITIAL SCREENING of the ALTERNATIVES

The DO NOTHING option is not acceptable.

WET-WEATHER SEWER INFLOW REDUCTION by SOURCE CONTROL is not enough

This option cannot alone solve the sewer overflow problem, as it is not feasible to substantially reduce wet-weather drainage flows from the combined-sewer area. However, the City and Utilities Kingston need to continue to pursue such measures as roof drain disconnection to ensure that all opportunities are made use of.

The following two options need to be analyzed and compared to arrive at a preferred alternative solution for the sewer overflow problem

SEWER SEPARATION WITH STORMWATER POLLUTION CONTROL

INTERCEPT AND TREAT THE OVERFLOWS
construct new interceptor and / or storage tanks to capture the overflows

EVALUATION CRITERIA

1	**TOTAL COST**	Initial capital costs plus annual costs over an appropriate life cycle
2	**ENVIRONMENTAL BENEFIT**	Reduction in total pollutant load discharged along the Lake Ontario waterfront and Inner harbour
3	**TECHNICAL AND OPERATIONAL COMPLEXITY**	How technically complex is the alternative to operate and maintain year to year?
4	**INFRASTRUCTURE INTEGRATION**	How well does the alternative integrate with other infrastructure and planning initiatives within the new City of Kingston?
5	**ADAPTABILITY**	Ability of the alternative to incorporate new sewage treatment technologies in the future.
6	**SOCIO-ECONOMIC IMPACTS**	Local economic benefits from the project; expected level of disruption to local residents and businesses during project construction
7	**ENVIRONMENTAL RISKS**	Possibility of encountering and exposing contaminated subsurface materials during construction
8	**WATERFRONT AREAS AND NATURAL FEATURES**	Potential for loss of waterfront parkland or natural environmental features
9	**LOCAL ARCHAEOLOGICAL HERITAGE**	Impacts on local heritage resources and archaeologically significant areas.