Chapter 14

City of Toronto Experience: the Process of Environmental Approval for the Western Beaches Storage Tunnel

Wayne Green

The City of Toronto's sewer system, parts of which date back to the mid 1800's was originally developed as a combined system, carrying both sanitary and storm flows. As the City rapidly expanded in the early half of the century, the capacity of the combined sewer system was quickly exceeded and basement flooding became a recurring problem.

To solve this problem, the City constructed approximately 680 km of storm sewers in the mid 1960's which separated approximately 70% of the road drainage from the combined sewer system. The combined sewer system which exists throughout the City today, however, continues to pick up sanitary flow and storm runoff from homes and buildings constructed prior to 1965, as well as storm drainage from the remaining 30% of the roadways which have not been separated.

Naturally, during periods of heavy rainfall, the capacity of the combined sewers and interceptor sewers are exceeded, resulting in the excess combined flows discharging directly to the receiving rivers and Lake Ontario.

The Ontario Ministry of Environment investigated the impact of these combined sewer overflows (CSO) and storm outfalls in a 1990 Wet Weather Outfall Study for the Toronto waterfront and determined that the 24 combined sewer overflows and the 29 stormwater outfalls (Figure 14.1) discharge approximately five million cubic metres of flow annually into the City's waterfront from May to October and contribute approximately 1,700 metric tonnes of total

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Figure 14.1 City of Toronto sewer outlets.

suspended solids and 6,650 metric tonnes of chemical oxygen demand to the near shore waters, along with concentrations of phosphorous, lead, zinc, aluminium and iron (Metropolitan Toronto Waterfront Wet Weather Outfall Study Phase II, August 1995).

In total, these outfalls severely impact the recreational use of the Toronto waterfront and result in frequent *unsuitable for swimming* beach posting by the Medical Officer of Health.

To solve this problem, the City undertook a Sewer System Master Plan (SSMP) in 1990 with the objective of virtually eliminating the pollutant loadings associated with combined sewer overflows and the control and treatment of stormwater runoff where required.

Virtual elimination of CSO in the context of the SSMP was defined as reducing CSO to an average of one overflow or less per year for the Western Beaches or, alternatively, reducing the average total annual volume of CSO discharging to the Western Beaches by more than 90%. The City chose this criteria which exceeds the Provincial Guidelines for CSO discharges due to the extensive parkland system and swimming beaches along this section of the shoreline.

14.1 Recommended Scheme

The SSMP examined several alternative solutions to solve the CSO and pollutant loading problems, including: the complete separation of storm and sanitary systems on private property and on the remaining 30% of the roads not previously separated; a combination of end of pipe storage tanks and tunnels; and a solution involving a number of near surface storage tanks distributed throughout the sewer system.

The recommended solution under the SSMP includes a combination of sedimentation ponds, tanks and a continuous storage tunnel. The essential elements recommended (see Figure 14.2) are as follows:

- two CSO storage tanks for the Eastern Beaches area;
- marshland habitats and settling ponds in the Grenadier Pond and Humber River areas;
- several swirl concentrators at specific outfall locations along the Don River and Humber River;
- a 5.5 m to 8.0 m diameter (end of pipe) storage tunnel extending 10 km from Parkside Drive in the Western Beaches area to Coxwell Avenue; and
- a second 3 km long storage tunnel is also recommended to extend north along the Don River to the City limits.

Figure 14.2 City of Toronto sewer system master plan.

A total of 92 storm and 47 combined sewer outfalls are planned to be intercepted by these storage/treatment facilities.

The SSMP improvements are broken down into approximately fifteen component projects prioritized over a 25-year implementation period and have a total cost of approximately \$370 million (1996 Cdn\$).

Thus far, the first priority projects under the SSMP have been completed including two detention tanks to intercept two CSO and six stormwater outfalls which previously discharged directly into the Eastern Beaches swimming area. These tanks provide approximately 10,300 m³ of storage and have significantly improved the near-shore water quality for these beaches to meet or exceed the Ministry Guidelines. Further, the construction of a 2,400 m³ open sedimentation pond for stormwater treatment entering Grenadier Pond commenced in February of 1996 and will be completed by mid-summer of 1996.

In addition to the SSMP recommendations, City Council have approved several non-structural alternatives that are complementary to the SSMP initiatives. These include a voluntary downspout disconnection program, the use of porous pavements, a pilot program for the use of rain barrels, and soak pits. Council requested that these methods be evaluated and incorporated into the SSMP to the greatest extent possible (Figure 14.3).

Figure 14.3 Non-structural alternatives for stormwater separation.

14.2 Western Beaches Tunnel

Although work is well underway on using non-structural alternatives and several stormwater diversion and treatment methods, it is important to realize that due to surface and soil conditions as well as the voluntary participation rates by the public, these initiatives are limited in the amount of stormwater which can be removed from the sewer systems. The City's stormwater model predicts that the current City's non-structural programs will reduce the total annual volume of CSO and storm runoff by approximately 15%, however, the remaining 85% of CSO and stormwater which the City's stormwater model estimates to be 2.7 million m³ annually will continue to impact the near-shore waters along the Western Beaches. Clearly, therefore, the Western Beaches Tunnel is needed in order to meet the objective of one discharge per year or a reduction of 90% of the annual CSO volume.

The first phase of the Western Beaches tunnel system will extend along Lake Shore Boulevard 4 km from Parkside Drive on the west to Strachan Avenue on the east (Figure 14.4). This section of tunnel will be 5.5 m diameter, have a storage capacity of 95,000 m³ and intercept and store the flows from eight combined sewer outfalls and two storm outfalls which currently discharge into the Western Beaches. The initial operation of the tunnel will result in flows being stored in the tunnel for approximately 24 hours to allow the sludge to settle, after which the clarified water will be pumped through an ultra violet disinfection chamber to the Lake and the sludge will be pumped to the mid-Toronto Interceptor Sewer for treatment at the Main Sewage Treatment Plant. The estimated total cost of this project is \$57 million (1996 Cdn\$). Ultimately, it is planned to treat the entire contents of the tunnel at a future Metro wet weather treatment facility.

The tunnel was designed to reduce the CSO overflow volume to Lake Ontario from approximately 2.7 million cubic meters to 0.2 million cubic meters or a reduction of 91% and the number of overflows from an average of 80 occasions to two occasions per season (April to November).

14.3 Approval Process for the Tunnel Project

14.3.1 Class Environmental Assessment (EA) Process

The City decided to process each component project of the SSMP through a Class Environmental Study process. This process which is referred to as the "Class Environmental Assessment for Municipal Road, Water and Wastewater Projects", was approved in June 1993 under the Environmental Assessment Act for various types of municipal infrastructure projects. The Western Beaches

Figure 14.4 Western Beaches tunnel route (4 km).

project was considered as a Schedule 'C' project under the Class process. The Class Environmental Study process requires the proponent (municipality) to define the problem(s), investigate in consultation with the public alternative solutions to the problem(s), and determine the preferred solution(s).

The Class Environmental Assessment process combined with the comprehensive review of alternatives carried out under the SSMP reconfirmed the end-of-pipe tunnel as the preferred solution for control and treatment of water pollutants discharging to the Western Beaches. The results of the Class EA process was summarized in an Environmental Study Report and filed with the City Clerk, local library, the Ministry of the Environment and Energy and local citizens groups for the mandatory 45-day appeal period.

14.3.2 Bump-up Requests

Notwithstanding the approximately three years of the SSMP process and Class EA study process, a total of fourteen objections were filed with the previous Minister of the Environment and Energy requesting a bump-up to a full Environmental Assessment.

The major objections to the tunnel solution related to the approval of the tunnel in advance of the approval and siting of a wet weather treatment facility by Metropolitan Toronto, the transfer of sludge collected in the tunnel from the west side of the City to the east side for treatment and the desire on the part of interest groups to use natural non-structural systems exclusively to deal with the CSO problems, e.g. downspout disconnections, stormwater infiltration, water conservation, rain barrels, cleaning of street surfaces and catch basins, best management practices, etc.

14.3.3 Environmental Assessment Advisory Committee Review

The Minister of Environment and Energy appointed an Environmental Assessment Advisory Committee (EAAC), to review the objections and advise the Ministry on the environmental significance of the unresolved issues between the objectors and the City. To assess the unresolved issues, EAAC conducted a series of meetings with the objectors, City staff, project consultants and Metro staff. EAAC's report to the Minister recommended a conditional approval of the project. However, notwithstanding the commitment on the part of the City and Metro to meet most of the conditions, the Minister chose to grant the bump-up request for a full environmental assessment.

14.3.4 Exemption Order

The current Ministry of the Environment and Energy, following a request from City Council, subsequently reassessed the environmental benefits of the tunnel project and recognizing Metro's support for the project and the City's

ongoing commitment to divert the maximum amount of stormwater possible through such programs as the downspout disconnection and porous pavement programs, have drafted an Exemption Order for Cabinet's consideration, who on December 20, 1995 approved the project. Preliminary engineering work is now underway and a Design/Build proposal call is planned for early in 1997 with construction to commence in mid 1997.

14.4 Conclusions

Experience on this project has shown that, notwithstanding the preparation and filing of a complete and well-documented Environmental Study report and the efforts and research undertaken throughout the Sewer System Master Planning process, additional efforts may have proven beneficial. Involvement of interested community groups and citizens both during the planning process and throughout the Class EA Study, should be more aggressively sought.

This may involve establishing community liaison groups and possibly the use of community bulletin boards or newsletters to explain and inform the public of the objectives and merits of the alternative solutions and ultimately the preferred tunnel solution.

The possible additional costs and time associated with this approach may be offset in reducing the number of, or expeditiously resolving, bump-up requests if they occur in the final stages of the EA process.

Also, once community liaison groups are established at the Class EA stage, these same groups can prove to be effective construction liaison groups to mitigate construction impacts.

This suggested broad-based, aggressive community involvement not only ensures the project concerns and issues are dealt with early in the process but also may bring forward community groups and individuals who are in support of the project objectives, who might otherwise be silent observers. If bump-up requests occur later in the EA process, this support may demonstrate a better community balance for the project.

Finally the cost and timing of the planning and Class EA process for a project of this type should not be underestimated. For example, the Class EA process on this project began in October 1991 and the cost, thus far, including the initial SSMP process has exceeded Cdn \$1 million.