Quinte West Waterfront Regeneration Plan

APPENDIX C

STORMWATER TREATMENT/ WETLAND ENHANCEMENT CONCEPT PLAN

December, 2000

Prepared by:
Lower Trent Conservation

The Quinte West Waterfront
--clean, green, diverse, healthy--a natural edge for the City!
QUINTE WEST
WATERFRONT REGENERATION PLAN

APPENDIX C

Stormwater Treatment/
Wetland Enhancement
Concept Plan

Prepared by:

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LOWER TRENT CONSERVATION
December, 2000
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STORMWATER TREATMENT/WETLAND ENHANCEMENT PROJECT
–CONCEPT PLAN

PROPOSED CONCEPT
A combined stormwater sewer and sanitary sewer overflow outlet empties into a drainage ditch just to the south of Flindall Street (east of the Water Pollution Control Plant) (see Figure 1). The ditch flows directly to the Bay of Quinte, carrying stormwater contaminants, and potentially sewage, in overflow conditions. This condition contributes to poor water quality in the Bay. Adjacent to the drainage ditch is a remnant coastal wetland which has an excess of accumulated sediment and is currently choked with purple loosestrife (Photo 1). There is no direct surface water connection with the Bay, except for the drainage ditch.

The drainage ditch and the wetland are located on public lands that are connected with Centennial Park. This presents an opportunity to undertake an environmental enhancement project that would result in improved water quality entering the Bay, wetland habitat improvements, improved aesthetics and an opportunity for public education and recreation. This can be accomplished by constructing a stormwater treatment system in conjunction with a wetland enhancement project.

The preferred approach is to first treat the wastewater in a permanent stormwater treatment facility and allow the water to flow through into an enhanced wetland before entering the Bay. Treatment of the water in the stormwater pond prior to it entering the wetland would help to isolate the treatment component of the works for future maintenance considerations.

Figure 2 depicts a plan view of the proposal. The discharge or outfall location from the underground pipe system could be moved to the west, where the elevation is lower. If the outfall were moved to this location, the effluent could drain naturally into this lower area and into the proposed pond. While this is the preferred option, it would also be acceptable to retain the existing outlet and direct the flow westerly into the proposed treatment pond.

Treatment Pond
The treatment pond design would include a combination of a permanent pool of standing water and shallow depth wetlands to produce a pond-marsh system (see Figure 3). A deeper pool or forebay would be located at the outfall or inlet to the treatment area. This forebay area pretreats the stormwater by reducing velocity and trapping coarse sediments. Water would then flow over a submerged berm or spillway to the marsh system. A serpentine path would be created through the wetland with an average depth of one half metre with an adjacent shallow marsh. Water depths would be influenced by the fluctuations in Bay of Quinte water levels.

The bottom elevation of the deep marsh would be at an elevation of approximately 74.0 metres to ensure that a pool remains during low water levels in the Bay of Quinte. The diversity of depth zones and a dense wetland plant community would facilitate nutrient uptake and contribute to overall aesthetics.
Quinte West Waterfront Regeneration Plan

Figure 1 Location of Proposed Treatment System/Wetland Enhancement Project

Produced by Lower Trent Conservation under licence with the Ontario Ministry of Natural Resources. Copyright. Queen's Printer, 2000.

LEGEND

- roads
- project location
- watercourses
- natural vegetation
FIGURE 2

CONCEPT DESIGN
FOR PROJECT AREA

Base Map Source:
FDRP maps

Possible outfall location
Stormwater treatment area
Open water
Marsh transition area

Average depth 1.5 metres
Average depth 2 metres
FIGURE 3
CONCEPTUAL DESIGN OF POND/WETLAND TREATMENT AREA

Adapted from T. Schuler, Design of Stormwater Wetland Systems, 1992
Habitat Enhancement Area
The treated water would flow from the stormwater treatment cell to the habitat enhancement area. This habitat enhancement area would cover approximately 6000 sq. m. with a diversity of depth zones. A channel would wind through the wetland, and eventually out to the Bay.

Since it will be necessary to excavate portions of the remnant wetland to route stormwater through it, the disturbed areas can be replanted with a dense mixture of native species. Nurturing the establishment of the native species will assist in efforts to prevent the reestablishment of purple loosestrife in the wetland. In areas that do not need to be disturbed, purple loosestrife should be harvested manually, and replaced by native plantings as deemed necessary. The establishment of native vegetation in the habitat enhancement area will help to further improve water quality, enhance wildlife habitat, and improve aesthetics.

Incorporation of Snow Dump Runoff
The municipal snow dump for the urban area of Quinte West is located adjacent to the proposed treatment pond and habitat enhancement area. Due to the proximity of this site to the city core, the cost of obtaining a suitable new site, and approval constraints for a new facility, it is likely that the snow dump will have to be incorporated into the Waterfront Regeneration Plan. It appears that drainage from the snow dump area is to the north and northwest, away from the bay. Thus, it appears that there is an opportunity to direct the runoff to the stormwater treatment pond and wetland with only minor regrading necessary.

If runoff from the snow dump is to be re-routed through the treatment pond and enhanced wetland, some additional considerations will have to be included in the plan to accommodate this design modification. Due to road salt and sand residue present in the collected snow, runoff from this site will be highly saline and contain a high concentration of suspended sediments. Thus, all of the vegetation planted in the stormwater lagoon and in the accompanying wetland will have to be highly tolerant to saline conditions. Secondly, the stormwater ponds may have to be dredged periodically to remove accumulated sediments. It is unlikely that the dredgate will be usable as fill due to the high salt content, and will have to be removed and discarded off site. As well, the surface of the snow dump area should be re-vegetated with a vigorous turf mixture consisting of salt resistant grasses and clovers. This will help increase local infiltration and will allow for some of the sediments to be trapped on site. Finally, runoff volumes from the snow dump, as well as from the stormwater outfall, will have to be considered when the volume of the stormwater facility is calculated and the final plans are prepared. In an average year, 6900 m$^3$ of snow are deposited at the snow dump site by the City, which translates into roughly 690 m$^3$ of surface runoff. Fortunately, the contributions of the snow dump may be relatively minor, as this volume of runoff would be released gradually from the melting snow pack.

Trail, Interpretive Signs & Educational Component
A trail could extend from Centennial Park around the stormwater pond and wetland, adding greater diversity to the park experience and providing educational benefits (Figure 4, Photo 2). Strategically placed interpretive signs, describing the benefits of stormwater management and wetlands, would help to increase public awareness of these important environmental issues. To this end, the City may want to consider constructing a viewing tower adjacent to the stormwater lagoon and enhanced wetland. Additional educational benefits and wildlife viewing
CONSTRUCTED WETLAND FOR STORMWATER REMEDIATION
AND NATURE STUDY

EXISTING CONDITIONS

The entire remediation process can be illustrated and incorporated for educational purposes. Well-designed constructed wetland systems can provide a wide range of habitat and environmental features within a compact site, all close to urban and residential areas and the Waterfront Trail.

PROPOSED CONDITIONS

The proposed constructed wetland will conduct city runoff and snowmelt meltwater through a series of pools and channels, where the water will settle, clarify and cool. Aquatic plants will transfer excess nutrients into organic material for the food chain.

Note: Coloured original on file with City of Quinte West
opportunities would be provided by the tower, which could also be accompanied by a floating boardwalk through the area and additional interpretive signs.

In the vicinity of the snow dump area, the Waterfront Trail should be constructed on a terrace excavated mid-slope on the existing waterfront. The excavated material, combined with some additional clean fill can be used to form a berm along the edge of the snow dump. Planting native upland species on the berm, along with revegetating the side slopes adjacent to the new pathway with native grasses and shrubs, will provide physical and visual separation between the snow dump and the trail.

ESTIMATED COSTS FOR STORMWATER TREATMENT/WETLAND ENHANCEMENT PROJECT

<table>
<thead>
<tr>
<th>Project Component</th>
<th>Amount</th>
<th>Unit Cost</th>
<th>Cost of Component</th>
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<tbody>
<tr>
<td>Soils Testing</td>
<td></td>
<td></td>
<td>$3500.00</td>
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<tr>
<td>Preparation of Detailed Plans (including agency review and Class Environmental Assessment)</td>
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<td>$5000.00</td>
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<tr>
<td>Temporary Access Road</td>
<td>110 m</td>
<td>@$25.00/metre</td>
<td>$2,750.00</td>
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<td>Earth Excavation for swm pond &amp; wetland* (excavation, trucking, disposal of fill at another location within 10 km)</td>
<td>10,000 m³</td>
<td>@ $6.00/m³</td>
<td>$60,000.00</td>
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<tr>
<td>Landscaping (grading, shaping, berms, plantings)</td>
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<td></td>
<td>$17,000.00</td>
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<td>Trails (stone chip, 1.5m wide)</td>
<td>500m</td>
<td>@15.00/m</td>
<td>$7500.00</td>
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<td>Signage (design and construction)</td>
<td>2 large</td>
<td>@$1500 each</td>
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<tr>
<td></td>
<td>5 small</td>
<td>@$650 each</td>
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<td>Sub-Total</td>
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<td>Project Management &amp; Contingency (10%)</td>
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<td>TOTAL</td>
<td></td>
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<td>$112,200.00</td>
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<td>Viewing Tower-Optional (Includes floating boardwalk features)</td>
<td></td>
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<td>$23,000.00 (Optional)</td>
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*costs could be reduced if some of the fill could be sold, taken away for free, or used on site.
CONSIDERATIONS

Environmental Assessment (EA)
The municipality would be the proponent for this project, and as such, this project would require an Environmental Assessment under the Municipal Engineers Association Class EA for Municipal Water and Wastewater Projects (June 1993). A stormwater detention pond may proceed as a "Schedule B" project. For Schedule B projects the proponent is required to undertake a screening process involving mandatory contact with directly affected public and relevant government agencies. Costs for this process would be included in the Preparation of Detailed Plans.

Public Safety
Safety issues are often a concern around stormwater ponds. Construction and planting of the wetland can be implemented to assist with deterring unaware individuals from accessing deeper water areas. Gentle slopes within transition areas from upland to wetland would reduce the risk of sudden drop-offs and shrubbery could act as a physical barrier at strategic locations. Sides of the pond and wetland would be sloped gradually to reduce the risks. Fencing should be avoided if possible, as it would detract from the aesthetics of pond.

Detailed Plans
Detailed site grading plans would need to be prepared to provide construction details and identify costs.

POTENTIAL FUNDING PARTNERS
• City of Quinte West (funding may be available through the Stormwater Cash-in-Lieu Program)
• Great Lakes Sustainability Fund

ALTERNATIVE OPTION
Another option would be to separate the stormwater outflow from the wetland. The effluent water would be treated in a stormwater pond and then flow through the existing ditch to the Bay. The wetland area would be deepened and enhanced with native vegetation, but stormwater would not be routed through it.

Advantages of this option include:
• any concerns of encouraging wildlife to an area that is contaminated would be alleviated.
• the stormwater pond and the wetland can both be completed, the work could be phased, or one facility could be chosen over the other to reduce costs.

Disadvantages of this option include:
• the water will not receive as much treatment before it is released to the Bay
• the wetland will not be subject to frequent water exchange if flows from the stormwater pond bypass portions of the wetland
Photo 1: The remnant Lake Ontario coastal wetland currently has an excess of accumulated sediment, is choked with purple loosestrife, and is only connected to the Bay by a drainage ditch.

Photo 2: Constructed wetlands associated with treatment ponds provide a more naturalized approach to stormwater management. The Nauwatin Shores stormwater management facility (shown) is located in the Township of Haldimand.