

Earl Bales Pond

Stormwater Management Facility and Water Supply System

Submission
for the

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CANADIAN CONSULTING
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Award category:
WATER RESOURCES

Submitting firm:
MMM GROUP LIMITED



Project Highlights

Earl Bales Pond

Summary

The Earl Bales Park Stormwater Management Facility and Water Supply System is the first in a series of City of Toronto projects aimed at tackling the long-running human and environmental health problem of uncontrolled and untreated stormwater runoff from historic development areas. The design team took a comprehensive and innovative approach to addressing non-point water quality impacts for a large urban area that will serve as a landmark for excellence for upcoming stormwater management projects.

MMM designed and implemented a fully detailed plan for the construction and commissioning of one of the largest stormwater retrofit pond facilities in an urban setting in North America. The largest such project in Ontario to date, the pond will provide a significant reduction in sediment, bacterial, and excess nutrient loadings to the Don River, and eventually to Lake Ontario, enhancing fish habitat, and reducing the taking of river water for human purposes.

Various original and innovative aspects of the project make it unique; in fact, less than 1% of similar ponds incorporate one or more of these features and focus on the stewardship and treatment of historic pollution sources.

This project fosters behavioural and attitude change by providing a demonstrable and scalable rainwater harvesting system to illustrate the environmental benefits of alternative water sourcing for public uses, such as golf course irrigation and snow-making; and implementing many public amenities such as pond interior walkways and aesthetic retaining walls and observation platforms to create an urban oasis for the community.

The project is designed to remove particulate matter such as Total Suspended Solids and related absorbed excess nutrients from raw stormwater discharges by settling, enhancing overall water quality of flow by displacing these pollutants from the Don River. The pond collects this flow via runoff from the approximate area encompassed by a 550 ha area from approximately Downsview Airport to Bathurst Street, and Steeles Avenue to the 401 in the City of Toronto. This facility provides a measurable reduction in sediment, bacterial and excess nutrient loadings to the Don River and eventually to Lake Ontario, enhancing fish habitat and reducing the taking of river water for human purposes. In addition, the pond will provide 45 million litres of treated stormwater to replace the Don River as a water source for irrigation and snow-making

Earl Bales Pond cont'd

Summary

in the nearby Don Valley Golf Course and Earl Bales Park ski hill, respectively. This feature allows for less overall disruption to the Don River by removing the water intakes.

The design team held three Public Information Centres to involve local residents and the interested public in the proposed design. Additional site walks were held with focused community groups and environmentally oriented non-governmental organizations at the planning stages to explain the project intent and facilitate wide public acceptance. Numerous written comments from the public in support of the project were received as a result of this process. Public suggestions were also incorporated into the final plan, such as the idea to expand the pond further into the golf course to achieve the required pond volume.

Furthermore, the pond is designed as an outdoor laboratory to provide feedback on pond water quality improvement performance, flow rates and benefits of large-scale rainwater harvesting. These features will extend the science of water quality improvements to other needed areas.

Over time, the project will build up a significant set of data on pond performance from the included sampling huts at the inlet and outlet areas. The data collected will include information on Total Suspended Solids removal, E. coli dieoff, nitrogen and phosphorus uptake, etc.

Community benefits extending from the project include an accessible, open-water-based park amenity in an underutilized corner of Earl Bales Park, a golf-course-based water feature and reliable alternative water supplies for non-potable public uses. Other benefits include local improvements to public spaces by reducing erosive damage in adjacent ravines used as hiking trails and urban wildlife habitat. Economic benefits include reduced expenditures on future maintenance activities for ravine, watercourse and ultimately, Lake Ontario restoration by removing the source of the damaging events. These public features also foster an attitude shift toward positive environmental stewardship by integrating environmental improvement into daily activities in public spaces. Interpretive signing to be positioned at strategic locations will expand on these themes for the casual user or visitor.

Full Project Description

Earl Bales Pond

Overview


The Earl Bales Park Stormwater Management Facility and Water Supply System is the first in a series of City of Toronto projects aimed at tackling the long-running human and environmental health problem of uncontrolled and untreated stormwater runoff from historic development areas. The design team took a comprehensive and innovative approach to addressing non-point water quality impacts for a large urban area that will serve as a landmark for excellence for upcoming stormwater management projects.

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This project fosters behavioural and attitude change by providing a demonstrable and scalable rainwater harvesting system to illustrate the environmental benefits of alternative water sourcing for public uses, such as golf course irrigation and snow-making; and implementing many public amenities such as pond interior walkways and aesthetic retaining walls and observation platforms to create an urban oasis for the community.

The pond essentially takes a resource previously considered a waste product to be disposed of, captures it, treats it, and makes it available for beneficial human uses.



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Goals and Achievements

Objective	Solution	Achievement
<i>Water Quality Improvement</i>	Stormwater treatment pond with an associated permanent pool	Enhanced level water quality improvement of previously untreated storm sewer discharges that were a major source of sediment and excess nutrients in the Don River
<i>Erosion Control</i>	Divert flow from ravines to pond	Runoff from a 25 mm event captured and released slowly back to watercourse over a 24-hour period, removing erosive energies in the ravines
<i>Large-Scale Water Reuse</i>	Non-potable water supply system	Two-season, large-scale water users within range of the pond, allowing for a beneficial use of captured storm sewer discharge
<i>Park Integration</i>	Walkways in pond area	Raised walkways through pond, aesthetic viewsheds, increased waterfowl presence, and the observation platform, are all connected to an existing trail system in the park



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Complexity

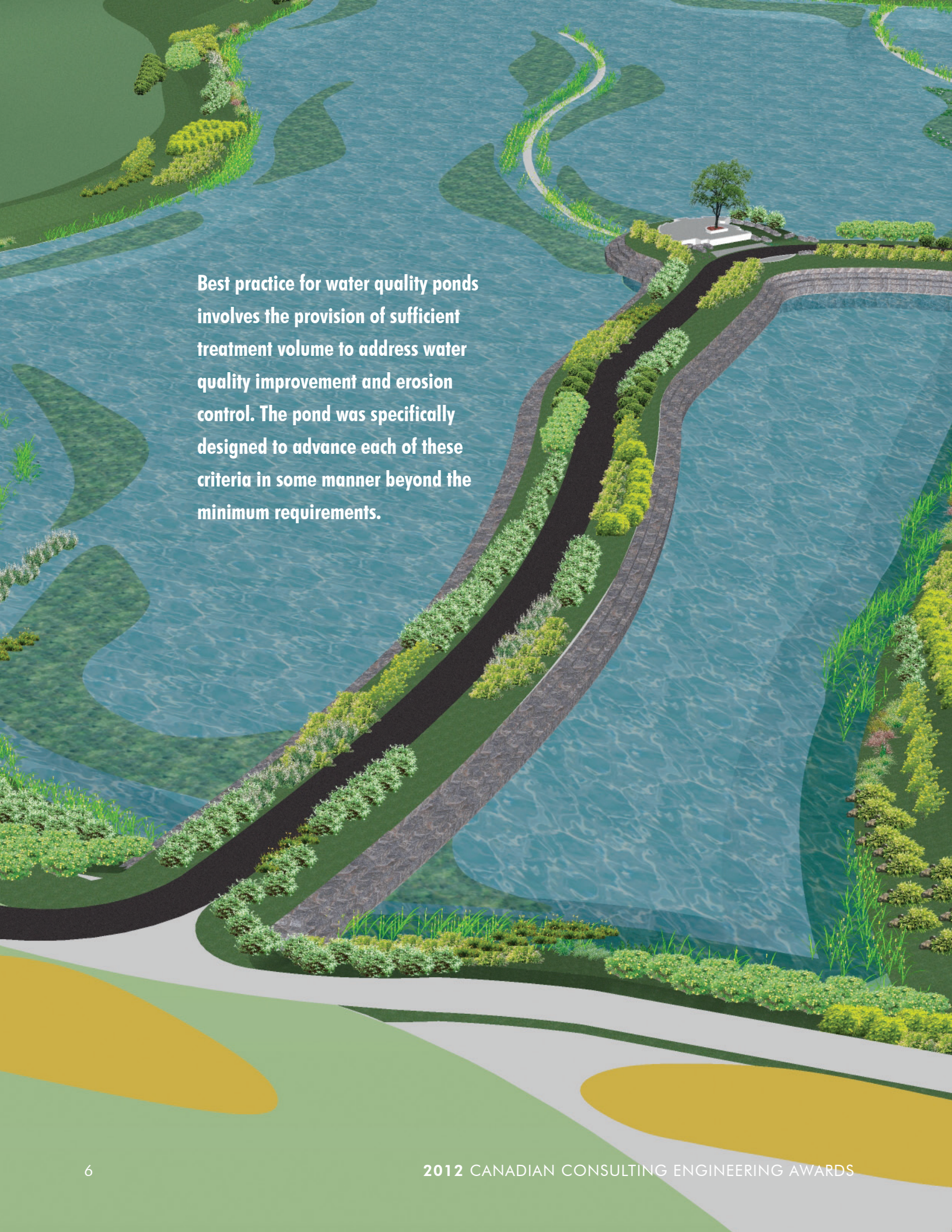
The project is designed to remove particulate matter such as Total Suspended Solids and related absorbed excess nutrients from raw stormwater discharges by settling, enhancing overall water quality of flow by displacing these pollutants from the Don River. The pond collects this flow via runoff from the approximate area encompassed by a 550 ha area from approximately Downsview Airport to Bathurst Street, and Steeles Avenue to the 401 in the City of Toronto. This facility provides a measurable reduction in sediment, bacterial and excess nutrient loadings to the Don River and eventually to Lake Ontario, enhancing fish habitat and reducing the taking of river water for human purposes. In addition, the pond will provide 45 million litres of treated stormwater to replace the Don River as a water source for irrigation and snow-making in the nearby Don Valley Golf Course and Earl Bales Park ski hill, respectively. This feature allows for less overall disruption to the Don River by removing the water intakes.

The final project phase will be complete in the next two years. At that point, the storm outfalls from neighbouring ravines will be connected to the trunk storm sewer, allowing for a reduced valley flow during intense storm events and reduced valley erosion.

The stormwater management plan for the Earl Bales Stormwater Management Facility and Water Supply System was completed in 2007 under the Municipal Class Environmental Assessment process. The design team held three Public Information Centres to involve local residents and the interested public in the proposed design. Additional site walks were held with focused community groups and environmentally oriented non-governmental organizations at the planning stages to explain the project intent and facilitate wide public acceptance. Numerous written comments from the public in support of the project were received as a result of this process. Public suggestions were also incorporated into the final plan, such as the idea to expand the pond further into the golf course to achieve the required pond volume.

Furthermore, the pond is designed as an outdoor laboratory to provide feedback on pond water quality improvement performance, flow rates and benefits of large-scale rainwater harvesting. These features will extend the science of water quality improvements to other needed areas.

Over time, the project will build up a significant set of data on pond performance from the included sampling huts at the inlet and outlet areas. The data collected will include information on Total Suspended Solids removal, E. coli dieoff, nitrogen and phosphorus uptake, etc.

An aerial photograph of a water quality pond. The pond is a large, irregularly shaped body of blue water. In the center, there is a small, circular island with a single tree and a small white structure. The banks of the pond are lined with a dense row of green and yellow shrubs and trees. The water is clear and blue, with some green vegetation visible in the shallows. The overall scene is a well-maintained water feature.

Best practice for water quality ponds involves the provision of sufficient treatment volume to address water quality improvement and erosion control. The pond was specifically designed to advance each of these criteria in some manner beyond the minimum requirements.

Innovation and Originality


The Earl Bales Stormwater Management Facility and Water Supply System went beyond the basic goal of dealing with, and cleansing, the stormwater runoff from a large urban area. The project included several key innovations that will become benchmarks for future projects of this nature.

These innovations included preventing erosion in a nearby ravine, using water for non-potable uses (such as irrigation and snowmaking), and creating a public and wildlife feature. These functions are not normally included in stormwater pond designs as the government only requires a narrow focus of features; water quality improvement and erosion control. In fact, it is estimated that less than 1% of stormwater ponds include these types of features.

Various original and innovative aspects of the project include early stakeholder partnering during the initial project scoping phases, and public outreach to facilitate the expansion of the facility beyond the strict property lines. This allows for sufficient facility scale for maximized water quality treatment and additional benefits such as cut/fill balancing to keep excavated material on-site, which improves the project's overall carbon footprint (by requiring less off-site trucking). The strategic placement of the pond facility near a popular golf course and ski hill allowed for early identification of the facility for a year-round rainwater harvesting operation due to the opposite seasonal operation of the golf course and ski hill. In addition, the project has implemented many public amenities such as pond interior walkways, aesthetic retaining walls and observation platforms to create an urban oasis for the community in this previously under-used public area.

Best practice for water quality ponds involves the provision of sufficient treatment volume to address water quality improvement and erosion control. The pond was specifically designed to advance each of these criteria in some manner beyond the minimum requirements. For instance, the original project area could only provide room for 'normal' level water quality treatment, but through early stakeholder partnering with the golf course, sufficient area was obtained to provide 'enhanced' level treatment (both terms are defined by the Ministry of the Environment and relate to the level of Total Suspended Solids removal from the pond, 70 and 80%, respectively).

Once the preliminary design of the water reuse system was configured, a natural extension of the principle allowed the Earl Bales Park ski hill to be identified as an additional water user, as they had a similar issue with the Don River as their snow-making water supply, and they were approached to be a project partner. After the golf course was signed on as a project partner, their lands were identified as a receiver of the excavated soil from the pond area, which would avoid the need for off-site trucking and the increased emissions and carbon footprint associated with it. In exchange for their acceptance of the excavated soil, the fairway adjacent to the pond would be reconfigured and lengthened as a benefit for the golf course's patrons.

An aerial photograph showing a large, curved water feature. The water is contained within a stone-lined channel. A paved walkway with wooden railings runs along the edge of the water. The surrounding area is wooded with bare trees, suggesting a late autumn or winter setting. The water is calm, reflecting the sky and the surrounding landscape.

Community benefits extending from the project include an accessible, open-water-based park amenity in an underutilized corner of Earl Bales Park, a golf-course-based water feature and reliable alternative water supplies for non-potable public uses.

Social, Economic, and Environmental Benefits

The Earl Bales Stormwater Management Facility and Water Supply System provides a variety of social and economic benefits to the surrounding community as well as improvements to the natural environment.

Community benefits extending from the project include an accessible, open-water-based park amenity in an underutilized corner of Earl Bales Park, a golf-course-based water feature and reliable alternative water supplies for non-potable public uses. Other benefits include local improvements to public spaces by reducing erosive damage in adjacent ravines used as hiking trails and urban wildlife habitat. Economic benefits include reduced expenditures on future maintenance activities for ravine, watercourse and ultimately, Lake Ontario restoration by removing the source of the damaging events.

Major functions such as water treatment and particulate settling are designed to operate in a fully passive manner, requiring no energy inputs or active daily management. Secondary functions such as the rainwater harvesting systems and infrequent maintenance requirements require some energy inputs, but these are independent of the primary functions and can occur while the primary functions remain online. The project's benefits will be realized for decades to come.

The Earl Bales Park Stormwater Pond and Water Supply project fosters behavioural change by providing a demonstrable and scalable rainwater harvesting system to illustrate to other municipalities and the development industry, the environmental benefits of alternative water sourcing for public uses, such as golf course irrigation

and snow-making. In addition, the facility has been designed as an aesthetically pleasing, open-water facility, with an enlarged public presence as a design feature to attract pedestrian traffic and public use. This fosters an attitude shift toward positive environmental stewardship by integrating environmental improvement into daily activities in public spaces. Interpretive signing to be positioned at strategic locations will expand on these themes for the casual user or visitor.

The project demonstrates the responsible use of public land to achieve collective benefits by applying creative stewardship principles, integrating common and well-understood processes with innovative ideas, such as season-complementary rainwater harvesting, and dual uses for single water main pipes to provide a large and easily accessible example of positive approaches to the remediation of current environmental impacts. The principles applied here are easily scalable to smaller or larger facilities in similar settings, and many design features will provide feedback on operational characteristics, providing key input for future applications. While some of the secondary features may not directly transfer due to the unique location of the project, virtually all of the primary functions can be replicated in other areas with similar configurations of pipe outfalls in public lands.

From an economic perspective, the project team recognized the benefits of these added features and immediately found clever basic and advanced design modifications (such as grading (basic) and pump house configurations (advanced) to incorporate them without exceeding budgets.



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Social, Economic, and Environmental Benefits cont'd

For instance, the water main delivering well water under pressure to the golf course (during salty periods in the spring and early summer when pond water can't be used) is used under gravity to deliver pond water to the ski hill during winter. This feature is unusual outside of this facility. This would normally require double systems with significant added expense, which was avoided in this project.

A testament to the importance and quality of this project to the local area is found in the comments submitted to the City from one of the residents who lives near the pond: "I would like to say, now that the project is nearing completion, what a fabulous job everyone involved in it did, from the designers and planners, engineers, landscapers, workers and others! The fact that it integrates esthetic beauty with functionality is a tribute to all of you and your vision! I am very proud to live in a city which considers one as important as the other. Please pass this on with my congratulations and thanks."

Overall, the project demonstrates an increased stewardship role by the group to address sources of non-point water quality impacts from stormwater runoff from a large urban area. It does this in a sustainable fashion by taking a previously underutilized public space and installing pollutant removal and treatment functions, with year-round rain and snow melt harvesting ability, while respecting and enhancing the public's continued recreational use of the area.

