THE TORONTO AND REGION CONSERVATION AUTHORITY

INDEX TO

SUSTAINABLE COMMUNITIES BOARD #3/07

Friday, November 2, 2007

THE TORONTO AND REGION CONSERVATION AUTHORITY

MEETING OF THE SUSTAINABLE COMMUNITIES BOARD #3/07
November 2, 2007

The Sustainable Communities Board Meeting #3/07, was held in the South Theatre, Black Creek Pioneer Village, on Friday, November 2, 2007. The Chair Suzan Hall, called the meeting to order at 11:25 a.m..

PRESENT

Laurie Bruce	Member
Suzan Hall	Chair
Jack Heath	Member
Colleen Jordan	Member
Linda Pabst	Vice Chair
Reenga Mathivanan	Member
Gerri Lynn O'Connor	Chair, Authority
John Sprovieri	Member

ABSENT

Glenn De Baeremaeker	Member
Glenn Mason	Member

RES.#E16/07 - MINUTES

Moved by: Linda Pabst
Seconded by: Colleen Jordan

THAT the Minutes of Meeting #2/07, held on September 7, 2007, be approved.

CARRIED

PRESENTATIONS

(a) A presentation by Dave Hallman, Managing Principal, Transportation, Stantec Consulting, in regard to item 7.1 - Heart Lake Road Stormwater Management Plan.

RES.#E17/07 - PRESENTATIONS

Moved by: Linda Pabst
Seconded by: Colleen Jordan

THAT above-noted presentation (a) be heard and received.

CARRIED

SECTION I - ITEMS FOR AUTHORITY ACTION

RES.#E18/07 - HEART LAKE ROAD STORMWATER MANAGEMENT POND
To provide information regarding the Heart Lake Road Stormwater Management Pond permit application.

Moved by: Linda Pabst
Seconded by: Colleen Jordan

THE BOARD RECOMMENDS TO THE AUTHORITY THAT staff be directed to proceed with the review and permitting of the Mayfield Road improvements and Heart Lake Stormwater (SWM) pond in accordance with the staff report dated October 11, 2007.

CARRIED

BACKGROUND

The Environmental Study Report (ESR) for the Mayfield Road Environmental Assessment (EA) was filed in November, 2002. The report discussed improvements along Mayfield Road from Hurontario Street to Heart Lake Road. As part of the proposed road works a SWM pond was proposed on the southwest corner of Heart Lake Road and Mayfield Road.

Toronto and Region Conservation Authority (TRCA) staff received the permit application and preliminary design submission for the proposed works along Mayfield Road (east of Kennedy Road to Heart Lake Road) on January 28, 2005. Staff met with the Regional Municipality of Peel (hereafter the Region of Peel) and the project consultant on April 14, 2005 to discuss TRCA's technical, property and land management concerns related to the proposed location of the SWM pond. Staff explained that further studies were required to assess the most appropriate location of the SWM pond due to the sensitivities of the natural heritage features in the area and the proposed location of the SWM pond relative to Teapot Lake.

Staff received the Mayfield Road Stormwater Pond Review on July 15, 2005 and the Hydrogeological Assessment on July 20, 2005. The submission was in support of the Region of Peel's permit application and included a review based on the *MTRCA Staff Review, Use of Authority Owned Lands for Stormwater Management Facilities Guidelines*, dated January 18, 1993. Further to the review of the submission, staff advised that the reports did not adequately demonstrate that the proposed location for the SWM facility was the only technically feasible location. Staff requested that the SWM Pond Location Evaluation Matrix presented in the submission be revisited and further analysis be provided based on technical issues, a review of the draft Heart Lake Master Plan and in consideration of the *Greening Our Watersheds: Revitalization Strategies for Etobicoke and Mimico Creeks*. On April 6, 2006, staff received an updated SWM Pond Location Evaluation Matrix after which time it was concluded that the SWM pond on the southwest corner of Heart Lake Road and Mayfield Road would be acceptable based on conditions outlined and finalized in a letter dated September 6, 2006.

Road Widening and Stormwater Management Pond
As a result of the proposed Mayfield Road widening to 4 lanes, a SWM pond is required to treat the stormwater runoff. As one of the conditions of the September 6, 2006 letter, staff requested that the Region of Peel design an innovative SWM facility that would complement the landscape and existing environment. The proposed SWM pond was to be designed in such a way that it would be integrated with the existing landscape and resemble a wetland feature. It will be constructed with a clay liner and will be planted with a variety of deciduous and coniferous trees, native shrubs and submergent and emergent plants. A pedestrian trail will be constructed along the northern limit of the pond from the southwest corner of Mayfield Road and Heart Lake Road west to an access road. Interpretive signage will be located on the southwest corner to highlight some of the features of the pond.

Archaeology
For any proposed work on TRCA lands, an archaeological investigation must be undertaken by TRCA Archaeologists. A Stages 1 to 3 archaeological investigation was completed on TRCA-owned lands for the proposed road widening and SWM pond, and a Stage 4 investigation was completed in June, 2007 for a section just south of Mayfield Road, within the area of the proposed SWM pond. Artifacts from the Late Paleo-Indian and early to late Archaic periods were recorded including a variety of scrapers, drills and points. This excavation was conducted with the participation of descendant Aboriginal peoples. As recommended by one of the descendant representatives, this site has been named the 'Stopover' because it reflects the fact that this campsite was reused for short periods of time over the millennia. Representatives of the descendants participated with the excavation works and conducted a 'smudging ceremony' on site to honour their ancestors.

The earliest artifacts found at the Stopover site date back at least 9,000 years. These Early Archaic peoples likely descended in Ontario from the Paleo-Indian peoples who were the first human occupants of southern Ontario following the last ice age. The Early Archaic period was similar to that of the Late Paleo-Indian period. However, the Early Archaic period had a greater diversity of animals and plant life. Small family groups would have lived a nomadic life and would have travelled throughout the watershed as different foods became seasonally available, and beyond the watershed at times for specific non-local resources such as tool stone. They perfected ways to fashion large, intricately flaked stone spear points which were used for hunting various animals such as caribou, beaver, bears and deer. This is the most thoroughly documented Early Archaic site found in the Etobicoke Creek watershed and is of great significance to this area.

Later occupations at the site date to approximately 3,000 to 6,000 years ago. A distinguishing feature of the Middle and Late Archaic periods was the production of extremely durable ground and polished stone tools which may have been used for heavy woodworking or as weights for spear-throwers and fishing nets. Differing styles of similar artifacts were discovered throughout southern Ontario suggesting that groups were beginning to adapt in different ways and were starting to experiment with new technologies.

Teapot Lake is located south of the proposed SWM pond, within Heart Lake Conservation Area. Teapot Lake is a small meromictic lake in which the bottom layer of the water never mixes with the upper layer. It is also unusual in that the bottom waters are devoid of life and rarely, if ever, receive oxygen. As a result, pollen and artifacts in the lake do not decay. The lake is exceptional in that it contains a continuous record of climate change spanning the last 12,000 years. High resolution analysis of these sediments can be used to obtain information on magnitude, frequency and trends in climate change and land use change. There are also very few meromictic lakes in Eastern Canada and therefore it is of extreme importance that this lake is protected and appropriately studied.

Phasing of Work

Due to the presence of peat deposits along Mayfield Road, the Region of Peel is proceeding with these works in two phases. Phase 1 work (CFN 39514) was conditionally approved by the Executive Committee on August 10, 2007 for work involving:

- clearing and grubbing along Mayfield Road from approximately the Ogada Wilderness Centre Entrance to Heart Lake Road;
- construction of a 1200 millimetre (mm) diameter culvert under Mayfield Road;
- construction of a 400 mm diameter and a 600 mm diameter watermain along the south side of Mayfield Road;
- construction of storm sewers and a headwall along the east side of Heart Lake Road at the storm sewer outlet;
- construction of temporary surcharge berms, culverts and rip rap ditches along Mayfield Road within the limits of the peat deposits to allow for road drainage through the berms.

The Phase 2 work (CFN 36212) was conditionally approved by the Executive Committee on October 12, 2007 for work involving:

- widening Mayfield Road;
- removal of the surcharge berms;
- construction of a SWM pond on the southwest corner of Heart Lake Road and Mayfield Road;
- installation of monitoring wells;
- restoration of the study area.

Compensation

In order to compensate for the use of TRCA-owned lands, the Region of Peel has committed to the following:

- Acquisition of Lands – TRCA will be acquiring a piece of land from the Region of Peel located on the south side of Mayfield Road. The acquisition of this land would partially compensate for the permanent easement that will be secured by the Region of Peel through the TRCA Conservation Lands and Property Services section for the construction of the SWM pond.
- Watermain Connection – The Region of Peel will provide a municipal water connection to the TRCA rental property located on Heart Lake Road, near Mayfield Road.

- Surface and Groundwater Monitoring – The Region of Peel has committed to installing 3 groundwater monitoring wells within locations to be determined by TRCA staff between the SWM pond and Teapot Lake. The Region of Peel has also committed to a contribution of $50,000 to be used towards a 5 year groundwater monitoring program that will be directed by TRCA staff and will be coordinated in partnership with Carleton University students. This analysis will help to provide a better understanding of the hydrology and hydrogeology of the Teapot Lake to help ensure protection of the rare feature.
- Off-Site Plantings – The Region of Peel has committed to a contribution of $40,000 to be used towards restoration plantings which will take place within the headwaters of the Etobicoke Creek watershed.

DETAILS OF WORK TO BE DONE
The TRCA permit has been issued for Phase 1 and work is expected to commence in late October, 2007. The TRCA permit for the Phase 2 works will be issued in the near future, once revised plans have been received and outstanding technical concerns addressed.

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Date: October 11, 2007

RES.#E19/07 - NET ENVIRONMENTAL GAIN
York Region. Receipt of staff report on the mechanisms for implementing net environmental gain practices in York Region's planning and development processes.

Moved by: Linda Pabst
Seconded by: Laurie Bruce

THE BOARD RECOMMENDS TO THE AUTHORITY THAT WHEREAS Toronto and Region Conservation Authority (TRCA) staff has been working with York Region on numerous projects and programs to ensure that net environmental gains are achieved, since the Ministry of Environment's approval of the 16th Avenue Phase II York Durham Sewage System project in 2005;

WHEREAS TRCA staff has developed a service delivery partnership with York Region which has facilitated quality working relationships with York Region staff on environmental assessment and permit related projects and their implementation;

AND WHEREAS TRCA staff continue to work with York Region in the development of their growth plan, infrastructure master plans and sustainability strategy to ensure that net environmental gain is included as an integral component of planning and development;

THEREFORE LET IT BE RESOLVED THAT staff be directed to report to the Authority once the final 16th Avenue Environmental Improvements Initiative, Southeast Collector Environmental Enhancement Plan and Duffins Water Pollution Control Plant (WPCP) Greening and Biodiversity Plan, have been developed;

AND FURTHER THAT the Regional Municipality of York be requested to make a presentation to the Authority once their sustainability strategy is finalized.

CARRIED

BACKGROUND

In 2005, staff provided updates to the Authority regarding the design and implementation of the York Durham Sewage System (YDSS) 16th Avenue Phase II project. As directed by the Authority, staff has continued its involvement throughout the implementation of this project. At Authority Meeting #8/05, held on October 28, 2005, Resolution #A240/05 was approved as follows:

> *AND FURTHER THAT staff report back to the Sustainable Communities Board in 2006 with a detailed presentation regarding mechanisms for implementing net environmental gain practices in York Region's planning and development processes.*

Since October 2005, staff has participated on various committees, working groups and teams regarding mechanisms for implementing net gain practices in York Region. These mechanisms include:

- 16th Avenue Environmental Improvements Initiative;
- YDSS projects;
- YDSS mitigation and monitoring;
- Environmental Assessment (EA) service delivery;
- Growth Plan and infrastructure master plans;
- Sustainability Strategy and other initiatives.

Both individually and collectively, these mechanisms will facilitate net gain achievements in York Region. Details of each are provided in the following report.

16th Avenue Environmental Improvements Initiative

On October 4, 2004, the Minister of the Environment issued a number of conditions for approval of the YDSS 16th Avenue Phase II EA in response to a request for a Part II Order. One of these conditions was for York Region to develop and implement an aquatic habitat improvement plan. In response, York Region formed the 16th Avenue Environmental Improvements Initiative Stakeholder Working Group (SWG) to plan a series of environmental improvements for the Rouge River watershed. At the September 2007 meeting the working group defined their goal which is *to improve the natural system around 16th Avenue and to leave a positive legacy so that the state of the Rouge River Watershed is in a better condition than it was prior to construction*.

The SWG includes representatives from TRCA, the Town of Markham, 16th Avenue Trunk Sewer Project Community Liaison Committee, Rouge Park Alliance, Friends of the Rouge Watershed, Ontario Streams, the Ministry of Natural Resources and the Regional Municipality of York. To date, two meetings have been held during which the SWG has developed draft goals and objectives for project selection and development of the 16th Avenue Environmental Improvements Initiative.

In selecting key projects, both public and private lands will be considered; partnership funding will be sought; relevant planning policies and guidelines will be considered; existing data and studies completed by others will be used; and they will work within the context of the Rouge Park and Rouge North management plans.

Projects selected must meet some of the following objectives:

- provide for increased stream baseflow;
- provide for improved run-off quality and quantity control;
- provide for enhanced aquatic health/fish habitat (i.e., for brook trout and redside dace);
- provide for riparian cover;
- identify and protect recharge areas and discharge areas.

The goals and objectives are to be finalized over the coming months and implementation is expected to begin in 2008. It is likely that many of these projects will require an Ontario Regulation 166/06 permit, or a letter of advice issued on behalf of Fisheries and Oceans Canada. Staff will report back to the Authority once the final plan has been developed.

YDSS Projects

In accordance with the YDSS master plan, a number of projects are in various stages of planning or implementation. Based on the 16th Avenue example, each of these projects includes provisions for net environmental gain.

Southeast Collector Individual Environmental Assessment (IEA)

As part of the Southeast Collector (SEC) IEA, York Region has developed an Ecological Working Group to provide input into ecological and hydrological enhancement opportunities within the area of the SEC IEA. The working group will propose an Environmental Enhancement Plan to be used as a vehicle to enhance ecological, hydrological, recreational, infrastructure and cultural heritage values for the SEC IEA. TRCA is a member of the working group. Staff will report back to the Authority once the final plan has been developed.

Duffins Water Pollution Control Plant (WPCP)

Construction of the Stage 3 Expansion has been initiated. Ontario Regulation 166/06 permits have been issued. It has been agreed by TRCA staff and the regions of York and Durham that restoration and enhancements to the site would be incorporated into the overall project and not through the individual permits. As such, a partnership with TRCA's Restoration Services section has been developed and TRCA is working with the regions to design and construct a new wetland and berming system that meets the standards of other waterfront projects. TRCA is also working with the regions and the City of Pickering to develop the "Greening and Biodiversity Plan". Through the implementation of this plan, a net environmental enhancement will be achieved. Staff will report back to the Authority once the final plan has been developed.

Interceptor Sewer

York Region's goal in constructing the YDSS Interceptor Sewer project was to reduce the amount of dewatering required. To do this they chose to use earth pressure balance (EPB) tunnelling and groundwater isolation sealed shaft technologies. To date dewatering has averaged approximately 5 L/sec of maintenance pumping of the process water for the tunnelling operation, rainwater and some groundwater seepage. It should be noted that the 16th Avenue YDSS project Permit To Take Water (PTTW) issued by the Ministry of the Environment (MOE) permitted York Region to take up to a maximum of 850 L/sec. The PTTW for the YDSS 19th Interceptor project permits water taking up to a maximum of 55 L/sec. In the event that York Region is required to pump at the maximum rate, they have developed a comprehensive Environmental Management Plan (EMP). Comprehensive monitoring is ongoing, and mitigation techniques are readily employable if required to address any dewatering issues.

9th Line - Phase 2

This project is complete. The pipe was constructed through a shallow medium, and shallow groundwater monitoring data confirmed full recovery of the shallow groundwater system. Impacts from the project construction were monitored and adequately mitigated in accordance with the approved EMP. Monthly monitoring reports were provided to the attention of the YDSS Coordinator for subsequent review. Environmental monitoring was conducted until the last shallow piezometer demonstrated full recovery. Monitoring of all sensitive features that were identified in the EMP was sustained over all project stages and it was confirmed that no surficial impact was caused by project dewatering.

Bathurst Street Collector/Langstaff Road Trunk Sewer

This project is currently being constructed in accordance with the approved Dewatering Environmental and Ecological Impact Assessment which serves as the Environmental Management Plan. No groundwater dewatering has occurred to date with the use of sealed technology for shaft construction and EPB technology for tunnelling construction and there have been no impacts from this activity.

West Rainbow Creek Trunk Sewer Upgrade

As part of the detailed design for the West Rainbow Creek Trunk Sewer Upgrade project York Region is acquiring a permanent easement from TRCA for the construction of an access route to their YDSS sewer through the former Thackeray Landfill site, located north of Steeles Avenue between Kipling Avenue and Islington Avenue in the City of Vaughan. Staff is negotiating the use of this access route as part of the multi-use trail system York Region is proposing in their draft Pedestrian and Cycling Master Plan Study. The location, alignment and details on the type of trail and where it would connect to north of Highway 407 need further discussion with TRCA and all other stakeholders. The Region is also considering constructing a maintenance access bridge to provide a permanent access route on both sides of the river, which could also be used as a trail linkage. Although details of a permanent access route with a permanent bridge structure would still need to be reviewed and approved by TRCA under Ontario Regulation 166/06, TRCA staff is of the opinion that this would be a valuable connection to the trail network within the Humber River watershed.

Nobleton Sewage Works

Through detailed design of the Community of Nobleton sewage works, an artificial wetland will be created at the Sewage Treatment Plant (STP) outlet from a portion of an existing oxbow adjacent to the Humber River. The purpose of the artificial wetland is for the final polishing of effluent from the proposed STP prior to discharge into the Humber River. Increased concentrations of phosphorus available for plant growth (known as bio-available phosphorus) can have negative impacts on a river system as plants rely on phosphorus for their growth and if too much phosphorus is available in a system, too many plants can grow causing an imbalance to the ecological function of a river system. During the summer plant growth season, the period when an excess of bio-available phosphorous would have the greatest impact on the Humber River, this constructed wetland will provide water quality benefits, and a functional benefit in phosphorous control at the STP. Additional water quality benefits of the wetland will include a reduction in ammonia and nitrogenous oxygen demand during the summer months. This wetland was proposed at the request of TRCA in exchange for using TRCA-owned lands. It is not a requirement by the Ministry of Environment. Additional enhancement planting has been incorporated into the detailed design for the project area.

YDSS Mitigation and Monitoring

Since 2005, comprehensive monitoring plans have been developed to facilitate implementation of each YDSS project. Monitoring is completed on a continual basis, and reports are submitted to agency staff on weekly, monthly or bi-monthly intervals. The monitoring plans have been approved by TRCA, Fisheries and Oceans Canada (DFO), Ministry of Natural Resources (MNR) and MOE as part of their respective permitting processes. In order to facilitate a timely review of the information, TRCA has hired a coordinator to review these documents, conduct site visits, liaise with York Region and their staff and contractors on a regular basis, liaise with agency staff, and provide advice to senior management of TRCA, DFO and MNR. MOE completes its own review through a separate process. Opportunities to provide environmental enhancements on site are included in the respective Ontario 166/06 permit approvals or negotiated on site as part of the adaptive mitigation process. Funding for this position has been provided through a partnership agreement with York Region.

EA Service Delivery

Under a signed agreement between York Region and TRCA, detailed Service Delivery Standards (SDS) are in place for TRCA to review environmental assessment projects in a comprehensive and streamlined manner. York Region provides complete submissions, and TRCA provides application review, meetings, and issuance of comment letters and permits, as per the timelines set out in the SDS. The SDS were developed to incorporate the review of environmental assessment applications, Ontario Regulation 166/06 permit applications and to effectively monitor project implementation on active construction sites by TRCA Enforcement staff. With these standards in place York Region is able to address TRCA issues effectively without holding up targeted timelines for implementation of their projects. In addition, TRCA staff is able to effectively negotiate net environmental gains in each EA project through effective project management and a more integrated environmental review which deals with system based impacts. These gains are noted in the respective permit reports to the Executive Committee. Funding for the additional TRCA staff required to facilitate the review has been provided by York Region.

Growth Plan and Infrastructure Master Plans

York Region is currently in the process of updating its growth plan to conform to the *Clean Water Act, 2006*, *Places to Grow* and the *Greenbelt Plan.* The draft Growth Plan has determined which communities are to grow, as well targeting communities that will intensify in order to meet the provincial growth management objectives and regional requirements. The water and wastewater, transportation and pedestrian and cycling master plans will be developed to ensure that the infill and new development growth areas can be effectively serviced while maintaining the environmental integrity of the region.

The master plans will include analyses of several land use alternatives, making recommendations regarding the impact on infrastructure, thus impacting community development. The watershed management, water management and cultural and natural heritage management are being reviewed, as are climate change, energy efficiency and communication.

There are opportunities to integrate net environmental gain strategies into the master planning process. Through participation on the technical advisory committees for the respective master plan studies, staff has advocated that York Region include requirements for ensuring that opportunities for net environmental gain are included in each of the respective projects to offset some of the negative environmental impacts that are anticipated if such growth is not mitigated. Recommendations for appropriate mitigation are provided in the draft Humber, Rouge and Don watershed plans.

Sustainability Strategy and Other Initiatives

Another condition for approval of the YDSS 16th Avenue Phase II EA in response to a request for a Part II Order was the Minister of the Environment's requirement that York Region develop a sustainability strategy. The strategy is to set the direction for all regional planning initiatives, including the infrastructure master plans and land use development. Once the sustainability strategy, and growth and master plans are completed, they will be incorporated into the updated regional official plan.

In September 2005, Regional Council endorsed the establishment and work plan of the *Towards Sustainability in York Region (TSYR) Advisory Group*. The Sustainability Strategy will inform and improve all the regional policies, initiatives and operations, including *Planning for Tomorrow*, *Vision 2026* and the *Regional Official Plan*, *Housing Strategy*, *Economic Strategy*, *Sustainable Infrastructure Strategy* and the *Human Services Strategy*. The committee has endorsed a preliminary draft strategy, and public consultation is scheduled for this fall. Once complete, staff will report back to the Authority.

DETAILS OF WORK TO BE DONE

- Brian Denney, Chief Administrative Officer, TRCA, will continue to be involved as a member of the *Towards Sustainability in York Region (TSYR) Advisory Group* related to the Sustainability Strategy and will report back to the Authority when the plan is complete.
- Beth Williston, Manager, Environmental Assessments, TRCA, will continue to be involved in the technical advisory committees for the Water and Wastewater Master Plan Update, Transportation Master Plan Update and the Pedestrian and Cycling Master Plan Study and she will continue her involvement as a member of the Stakeholder Advisory Committees for all York Region projects where applicable (e.g., Southeast Collector IEA).

- Gord MacPherson, Manager, Restoration Projects and Maria Parish or Laura Del Giudice, Planning Ecology Supervisors, TRCA, will continue involvement in the YDSS 16th Avenue Stakeholder Working Group, Southeast Collector Ecological Working Group and the Duffins WPCP Greening and Biodiversity Plan, and will report back to the Authority when the respective plans and initiatives are complete.
- Tamara Kondrachova, YDSS Coordinator, TRCA, will continue to review EMP and design for all YDSS projects to ensure EMP implementation by conducting site visits, reviewing monitoring data and liaising with DFO, MNR and York Region's consultants and contractors.
- The TRCA EA team in Planning and Development will continue to work with TRCA Ecology, Restoration Services and Watershed Management staff to review EA submissions and Ontario Regulation 166/06 permit applications in accordance with the service delivery standards and agreements with York Region.

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RES.#E20/07 - GREEN ROOF ECONOMIC ANALYSIS FOR THE GREATER TORONTO AREA

Final report summarizing findings of Green Roof Economic Analysis conducted under the Sustainable Technologies Evaluation Program.

Moved by: Linda Pabst
Seconded by: Laurie Bruce

THE BOARD RECOMMENDS TO THE AUTHORITY THAT the report entitled 'An Economic Analysis of Green Roofs: Evaluating the costs and savings to building owners and developers in Toronto and surrounding regions' be received;

AND FURTHER THAT staff be directed to disseminate study findings to municipal staff, the development industry and other agencies through technology transfer seminars and a posting on the Sustainable Technologies Evaluation Program (STEP) website.

CARRIED

BACKGROUND

The environmental and social benefits of urban greenspaces have been well documented by researchers around the world. These benefits have helped spur the development of new and innovative ways of increasing green cover in built up areas where land costs are at a premium. Roof greening is one technique that has emerged as a promising solution to the urban greenspace issue. Within the Greater Toronto Area (GTA), significant progress has been made in the areas of green roof research and policy development, with a focus on the public benefits that this technology can provide. Despite this progress, building owners remain reluctant to build green roofs. Part of this reluctance is due to concerns that green roofs require higher capital and maintenance costs than conventional roofs without the demonstration of offsetting benefits to the proponent.

The main objective of the Toronto and Region Conservation Authority (TRCA) green roof study under the Sustainable Technologies Evaluation Program (STEP) was to estimate the dollar value life cycle costs (LCC) and savings associated with building and owning a green roof in the GTA. Costs related to structural modifications, materials and labour for installation, and long-term maintenance were discussed for both new and retrofit installations. Sources of cost and savings data include published research, product supplier quotations and completed green roof project budgets.

Cost information for local green roofs was collected through a survey distributed to individuals with knowledge of, or access to, green roof cost data. Survey respondents consisted of green roof suppliers and installers, building managers or their representatives and architects. Telephone interviews to obtain cost estimates of products currently on the market were conducted with representatives from several major Canadian companies that supply and/or install green roofs. All interviewees were asked to provide a per square foot cost range for their green roof systems, as well as a saturated weight. The weights helped to inform a discussion of the structural implications of building new and retrofit green roofs.

Data obtained from industry surveying was entered into a spreadsheet database to facilitate price comparisons, identify trends and determine averages. Information not available through surveying was estimated based on literature sources and key informant interviews. Data from surveys and other information sources were used as inputs to a LCC tool developed by the Athena Sustainable Materials Institute (ASMI). Cost analyses were conducted for a green and conventional roof on a model one storey office building in Waterloo, Ontario. The data sources, assumptions and input values were clearly defined. The relative importance of individual inputs on LCC was determined through alternative scenario analysis.

Key study findings from *An Economic Analysis of Green Roofs: Evaluating the costs and savings to building owners and developers in Toronto and surrounding regions* include the following:

- The per ft^2 installed capital costs of extensive green roof systems in the GTA averaged $11, with a range between $6 and $19.
- Key factors influencing green roof capital costs included the size and complexity of the installation, special features such as edging, walking paths, safety fencing, local availability of materials and the need for structural modifications to increase load-bearing capacity on the roof.
- Only one of the 18 green roofs surveyed required structural modifications. The cost of these modifications represented 29% of the total cost of the green roof.
- LCC of a conventional roof were found to be between 36 and 39% lower than that of an extensive green roof.
- Alternative scenario analyses showed that the LCC differential between conventional and green roofs was most affected by factors that impact capital or replacement costs. These factors include: (i) roof membrane longevity; (ii) market transformation; and (iii) discount rates. Variations in annual costs and savings associated with maintenance and energy use reduction did not have a strong impact on the LCC.
- Based on LCC results from this study, a direct financial incentive of $4 - $7 /$ft^2$ would be required in order to make green roofs an attractive option in the GTA and spur market growth.

- Providing an incentive higher than $8/ft^2 could stunt market growth by allowing suppliers to keep costs high.

The report identifies several areas in need of further research. Perhaps the most important of these relates to green roofs on industrial buildings. There are very few examples of green roofs on industrial buildings in Canada. As a result, none were included in the surveys conducted as part of this study. A key barrier to adoption of green roofs by industrial building owners and developers relates to the need of structural modifications. The report recommends that research be conducted on innovative strategies (e.g. weight transferring structures, creative green roof design) aimed at reducing the requirement for structural modifications on new and retrofit industrial buildings (e.g. weight transferring structures). Without cost effective examples of green roofs on large industrial buildings in Canada, uptake of green roofs by industrial building owners and developers will likely remain low.

An Economic Analysis of Green Roofs: Evaluating the costs and savings to building owners and developers in Toronto and surrounding regions is available for download from the STEP website at www.sustainabletechnologies.ca. Hard copies will also be made available upon request.

FINANCIAL DETAILS
The total cost for this project was $30,500. Financial contributions were provided by:

● Orlando Corporation	$10,000
● City of Mississauga	$3,000
● Toronto and Region Remedial Action Plan (RAP)	$10,000
● Fisheries and Oceans Canada	$2,500
● Great Lakes Sustainability Fund	$5,000

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Date: October 15, 2007

RES.#E21/07 - RENEWABLE ENERGY DISCUSSION PAPER
Progress Report. Receipt of the progress report on the Renewable Energy Discussion Paper: Developing the Business Case for Renewable Energy Technologies.

Moved by: Linda Pabst
Seconded by: Laurie Bruce

THE BOARD RECOMMENDS TO THE AUTHORITY THAT staff be directed to proceed with the preparation of a renewable energy discussion paper, including developing the Business Case for Renewable Energy Technologies, through a partnership with University of Toronto as set out in the report dated October 23, 2007.

CARRIED

BACKGROUND

Historically, one of the most significant barriers to market adoption of renewable energy technologies is the lack of a good business case for their implementation. As a result, the case for renewable energy has generally been dominated by the moral argument that 'its the right thing to do' as one of the ways to reduce greenhouse gas emissions and combat climate change. Although the moral argument is compelling for many people, it does not have broad market appeal. As a result, it is not likely to have a significant impact on the market for renewable energy technologies. In recent years the situation has changed; advancements in renewable energy technology, the rising costs of oil, gas and electricity, incentives, standard offer contracts for renewable electricity, emissions trading markets and the desire of corporations to associate themselves with 'green' as a means to attract and maintain consumers are changing the business case for renewables.

Experts in the renewable energy sector have indicated that there is a significant amount of misinformation or misunderstanding of the business case for renewable energy. Often generalizations on the 'pay-back-period' for renewable energy installations are passed around by word-of-mouth and are taken as fact. In many cases these generalizations are based on actual case studies, but the information was not meant to be broadly used as a general rule-of-thumb.

Instead, these general rules are important tools to generate interest and help people understand how and where best to apply resources toward more detailed feasibility studies or implementation. However, the context for these general rules is often lost and thus how applicable the rule is to a specific audience or set of circumstances cannot be determined without undertaking a feasibility study. The lack of good general information on the business case for renewable energy is thought to be a significant barrier to the uptake of renewable energy technologies.

The purpose of this project is to articulate the business case for a key set of renewable energy technologies and target audiences in a manner that allows better understanding of the economic benefits of investments in renewable energy. The project will consider business cases for target audiences (homeowners, small and medium businesses, large businesses, institutions and investors) and specific renewable energy technologies (solar photovoltaic (PV), geothermal, solar thermal [air and water] and wind).

DETAILS OF WORK TO BE DONE

TRCA has entered into a partnership with the University of Toronto to undertake this project. The research is being conducted by Dr. Kennedy, Professor of Civil Engineering, through graduate student David Bristow. To guide the project, a steering committee has been formed consisting of industry and municipal representatives including the City of Toronto, Regional Municipality of Peel, zerofootprint, Conserval Engineering, Mondial Energy and Solera Sustainable Energies. One additional industry participant representing wind technologies will shortly be added. The steering committee will meet periodically to guide the research and to conduct broader industry consultations on the results. The results of the research will be released in stages between September, 2007 and September, 2009. The research will progress from a broad scan of existing or emerging renewable energy technologies, applicable in different sectors (residential, commercial, industrial), to a detailed, risk-based economic analysis of the most promising technologies for Ontario markets. The approach is expected to involve the following steps:

1. Literature Review
   Renewable energy technologies are developing at a rapid pace worldwide. There is substantial academic and non-academic literature assessing their progress. The initial step in this project will be to undertake a broad scan of the literature to compare the cost and rates of progress for a range of renewable energy technologies.

2. Industry Consultation
   Renewable energy technologies are already available in Ontario markets today. Consultation with businesses who have either supplied renewable energy technologies in Ontario, or who use renewable energy, should provide insights into the current technology costs in Ontario. Moreover, industry consultation may provide an indication of which sectors (residential, commercial and industrial) are most economically viable for different renewable energy technologies. The consultation with Ontario industries may involve a form of survey or a number of case studies. The aim will be to identify a narrower set of technologies for further detailed study.

3. Technological Analysis
   The technologies chosen for further study will be described in technical detail identifying key attributes of their design. The point of this analysis is to show that cost-effective use of the technology will depend on site specific conditions (e.g., building orientation in the case of PV, subsurface thermal conductivity for geothermal heat pumps or wind speeds for turbines). There are also existing and emerging design choices for any given technology (e.g., type of PV cell).

4. Forecasting Future Price of Energy using Existing Technologies
   Much of the uncertainty in assessing the business case for renewable technologies relates to future prices of energy using existing technologies. Forecasting the future prices of electricity and natural gas in Ontario is by no means easy (nor scientific). The approach taken in this paper may be to review existing studies and/or conduct expert interviews (e.g., using a Delphi technique). Many potential factors may influence the future price of energy in Ontario such as resource availability, population growth, industry change, government and private sector investments in infrastructure, and policies relating to climate change. It is hoped that the paper would achieve amongst the readership an understanding of which factors could have the most significant impacts on energy prices, establish approximate best estimates and upper/lower bounds on future Ontario energy prices based on expert opinion.

5. Economic Analysis
   The final stage of the research is to produce measures of economic return for the selected renewable energy technologies in different sectors and under different design conditions. This would be done for an Ontario context and would aim to produce measures of expected pay-back periods and internal rates of return. Tables of these measures have been produced for grid-connected PV systems by Talavera *et al.* (2007), though not specifically for Ontario markets. It is proposed that the paper go beyond these measures and take a risk-based approach to assessing economic returns which incorporates the uncertainty in future energy prices (established in step 4). The results will show how investments in renewable energy technologies compare to other investment alternatives on a graph of risk versus average expected return.

RATIONALE

The results of this study will be used to develop marketing materials for each of the target audiences addressed in the project. These marketing materials will be incorporated into a variety of existing and new outreach programs to help increase the uptake of renewable energy technologies.

FINANCIAL DETAILS

The total cost to support a Masters in Engineering student at the University of Toronto for two years is approximately $47,000. Toronto and Region Conservation Authority (TRCA) is providing $12,700 of these funds from the Peel Climate Change funds and will partner with Professor Kennedy with proposals to interested organizations for an additional $12,700. The award of this contract was approved by TRCA's Chief Administrative Officer on May 2, 2007, as per the specifications of the Purchasing Policy. The remaining $18,600 will be provided by the University of Toronto through teaching assistant opportunities for the student.

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Date: October 23, 2007

RES.#E22/07 - **ECOOFFICE PILOT PROJECT**
Progress Report. Receipt of progress report on development of EcoOffices program at five Toronto and Region Conservation Authority office locations.

Moved by: Colleen Jordan
Seconded by: Laurie Bruce

THE BOARD RECOMMENDS TO THE AUTHORITY THAT staff be directed to proceed with the implementation of an EcoOffices program at Toronto and Region Conservation Authority's (TRCA) Head Office, Downsview Office, Boyd Office, Restoration Services Centre and the Eastville Office.

CARRIED

BACKGROUND
At Authority Meeting #8/06, held on October 27, 2006, Resolution #A255/06 was approved as follows:

THAT the EcoSchools model (5 Step Process) for managing environmental sustainability be adapted for use, under the Toronto and Region Conservation Authority (TRCA) Sustainability Management System (SMS), at TRCA's administrative offices;

THAT the adapted program be called EcoOffices, and be initiated as a pilot project at the Boyd Office, Restoration Services Centre, Head Office and Downsview Office beginning in the fall of 2006;

THAT EcoTeams be convened at each site;

THAT the Coordinator, SMS lead the pilot project, with support from TRCA education staff, to facilitate its integration with the SMS and corporate EcoSchools program;

THAT the EcoSchools Steering Committee be advised and consulted throughout the TRCA pilot project for consideration of its possible application at their school board offices;

THAT staff develop an internal certification process to recognize office efforts;

AND FURTHER THAT staff report in 2007 on results of the EcoOffice pilot project.

RATIONALE
At the conclusion of the first year of Ontario EcoSchools certification at TRCA facilities in 2006, it was determined that the EcoSchools protocols and processes would be helpful in furthering TRCA efforts to operate more sustainably at its various office facilities. In particular, the EcoSchools model excelled at involving and empowering the 'grassroots' element of an organization in facilitating change. Furthermore, EcoSchools processes, protocols and areas of focus tend to mesh more closely with typical office operations than environmental management systems such as International Standards Organization (ISO) 14000, which were designed primarily for industrial operations. Considering this, staff were directed to develop the 'EcoOffice' program, an adaptation of the EcoSchools Program to address TRCA office sustainability issues.

Head Office and Downsview Office
EcoOffices, like EcoSchools, institutes an annual 5 step cycle:

Step 1. Establish the EcoOffice Teams.
Step 2. Conduct the EcoReview.
Step 3. Identify priorities and develop the action plan using an office improvement plan template.
Step 4. Implement the action plan.
Step 5. Monitor and evaluate progress.

EcoOffice Teams were set up for Head Office and Downsview Office in February, 2007. The Head Office team had 8 members while the Downsview Office had 9 members. As much as possible, the EcoOffice teams were comprised of representatives from all departments housed at each office.

To date, each team has met at least 6 times. Initially, team members were trained by TRCA's Coordinator, SMS (Sustainability Management System) on the EcoOffices program, which was adapted with permission from the Ontario EcoSchools program. After introductory training, the teams proceeded to conduct the initial EcoReview for their office (Step 2). The EcoReview is a baseline report that details what sustainability focused programs and/or operations/procedures are underway at present.

Once the EcoReviews were completed and approved by the EcoOffice Teams as a whole, action plans were drafted using the results of the EcoReviews.

The action plans, as drafted, are quite ambitious and progressive. Generally, the actions targeted for 2007/08 are investigative and/or communications oriented.

Boyd Office, Restoration Services Centre and Eastville Office
EcoOffice Teams have also been established at the Boyd Office, Restoration Services Centre and Eastville Office in Scarborough. A joint EcoOffice Team covers the Boyd Office and Restoration Services Centre. Due to the relative size of these offices and the demands of the spring and summer outdoor work season, these teams have not yet conducted EcoReviews or completed action plans. These are expected shortly and both offices have expressed an interest in achieving EcoOffices certification in 2008.

Highlights of the Action Plans
The action plans include such efforts as:
- investigating heating and cooling settings for improvements in energy savings;
- promoting and educating staff on waste that can be recycled, paper reduction techniques, teleconferencing and proper composting;
- investigating moving to paperless timesheets;
- investigating opportunities to relocate staff within offices to address temperature concerns;
- investigate improved sustainability practices on smog days such as further cooling/heating adjustments or alternative work location scenarios (to reduce traffic);
- promoting turning off computers and shutting down unnecessary lighting;
- reviewing lighting requirements and opportunities for de-lighting;

- training of EcoOffice Team;
- drafting plans for shading office buildings; and
- investigating move to Forest Stewardship Council certified paper.

DETAILS OF WORK TO BE DONE

Head Office and Downsview Office EcoOffice Teams will enact the approved action plans. In March, each EcoOffice Team will complete a second EcoReview to measure progress in areas of sustainability such as energy reduction, waste reduction, greening of fleets and procurement. The EcoOffice Teams will maintain a file that includes a report indicating the status of their action plans, the grades assigned in their final EcoReviews and copies of all meeting minutes, promotional materials, etc.. A TRCA EcoOffices certification team will be appointed to review each office submission. Successful offices will be declared EcoOffices and will receive certification of same. Upon certification, visual materials for posting at public locations in the office will be provided.

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TERMINATION

ON MOTION, the meeting terminated at 11:50 a.m., on Friday, November 2, 2007.

Suzan Hall
Chair

Brian Denney
Chief Administrative Officer

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