



# Corporate Report

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**DATE:** September 28, 2004

**TO:** Planning and Development Committee  
Meeting Date: October 18, 2004

**FROM:** Edward R. Sajecki  
Commissioner of Planning and Building

**SUBJECT:** **Green Roofs**

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**ORIGIN:** Planning and Building Department

**BACKGROUND:** This report is in response to a request from Councillor Mullin's office to report to Planning and Development Committee on green roofs.

**COMMENTS:** Definition of Green Roofs:

A green roof is a contained green space on top of a human-made structure and is an extension of the existing roof, not potted plants (sometimes called roof gardens). Green roofs consist of the following layers:

- a special water proof and root repellent membrane;
- a drainage system;
- filter cloth;
- a lightweight growing medium (soil); and
- plants.

Types of Green Roofs:

- intensive, extensive or semi-extensive;
- accessible or inaccessible;
- incorporated into the design of new buildings or added to an existing roof provided that the structure can accommodate it.
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Intensive green roofs have a soil depth of 15 cm (5.9 in.) or more, usually provide a park-like setting with public access and require regular maintenance. Extensive green roofs have a soil depth of less than 15 cm (5.9 in.), are low weight, low cost, require minimal maintenance and normally are not accessible to the public.

Benefits of Green Roofs – public and private

Ecological Benefits:

- stormwater management – reduce stormwater runoff, improve stormwater quality and temperature;
- climate moderation – reduce Urban Heat Island Effect;
- improved air quality – absorb heat, filter air, produce oxygen, reduce smog;
- create wildlife habitat and biodiversity; and
- energy conservation.

Economic Benefits:

- prolonging roof life and offers roof protection;
- energy savings – provides building insulation;
- noise reduction – sound insulation;
- added property value;
- enhanced corporate image;
- proven return on investment through savings in heating and cooling costs, as well as, roof maintenance; and
- create jobs.

**Social Benefits:**

- enhance overall quality of life – improve human health and well-being due to additional oxygen, air filtration, humidity control, horticultural therapy;
- improve urban aesthetics and provide sense of space - convert unappealing hard surface roofs into natural landscapes;
- provide additional recreational spaces – parks, nature preserves, community gardens, social meeting spaces, green spaces to look upon;
- possibility for urban agricultural – growing food locally; and
- ties into Smart Growth strategies – Healthy Cities, enhances infill development.

**Costs, Payback and Incentives:**

Depending on the type of green roof, it may cost twice as much as a conventional roof. The payback to the building owner results from reduced energy costs, lower heating and cooling costs and less maintenance. The overall social benefits are tremendous.

Some governments throughout North America and Europe provide incentives to promote green roofs on private buildings including: financial support programs, fee reduction, density bonusing and zoning.

In Canada, there are government programs available for research and promotion of green roofs through: Commercial Building Incentive Program, Industrial Building Incentive Program, Green Municipal Enabling Fund and EcoAction.

**Building Code:**

The Ontario Building Code does not address green roofs specifically. However, the Building Code does require that the design of the structure be able to accommodate the load of the additional layers and that drainage be adequately addressed.

Municipal Examples:

For centuries, roofs have been used for growing plants, but the emergence of a green roof industry is fairly recent. Green roofs have been popular in Europe for over 40 years, however, in North America it is a relatively new concept. The vast majority of green roofs are found on government and institutional buildings, but there are also many examples on private buildings. Many cities in North America have demonstration sites for green roofs and have policies and incentive programs in place encouraging green roofs. In the United States, cities such as Chicago, Portland, New York, Dearborn and Seattle have city ordinances and have green roofs on some municipal buildings. In Canada, cities such as Toronto, Waterloo, Vancouver, Kitchener, Guelph and Winnipeg have demonstration green roofs.

The City of Toronto supports and encourages green roofs in their Official Plan. Under their Natural Environment section of the Official Plan, policy #17 states: "Innovative energy producing options, green industry and green building designs and construction practices will be supported and encouraged in building renovation and redevelopment through: f) the development of innovative green spaces such as green roofs, and designs that will reduce the urban heat island effect." Other examples encouraged by the policy relate to: reduction of stormwater flows, water conservation and efficiency, waste reduction and recycling, renewable energy systems and advanced energy-efficient technologies.

In addition, the City of Toronto has two committees dedicated to environmental issues. One is the Round Table on the Environment, which is an advisory committee, and the other is an Interdepartmental Task Force, which coordinates common interests, both of which, amongst other environmental issues, deals with green roofs.

Research:

There are several research projects underway in Canada regarding green roofs. Various stakeholders provide funding and in-kind support for these projects, such as:

- Canada Mortgage and Housing Corporation
- Environment Canada
- National Research Council Canada
- Ministry of Environment
- Toronto and Region Conservation Authority
- Canadian Federation of Municipalities
- Ontario Power Generation
- universities and colleges
- municipalities
- Green Roofs for Healthy Cities
- private sector

Toronto has received funding through the Green Municipal Enabling Funds to explore the feasibility of green roofs in the City of Toronto, namely: what are the real benefits to the City; cost/benefit analysis; and investing in green roofs through grants, fees, etc. The study will serve as a template to other municipalities to assess the benefits of green roofs. The results of the study are anticipated to be released in the spring of 2005.

The City of Waterloo is presently conducting a green roofs feasibility study to evaluate a number of municipally-owned properties for their suitability for a green roof.

Environment Canada is doing a project to model the urban heat island effect in Toronto. Included in the model is green roof technology.

Green Roofs for Healthy Cities is a network of public and private organizations whose mission is “to develop a multi-million dollar market for green roof infrastructure products and services in cities across North America in order to take full advantage of the multiple benefits of these proven technologies”. They are conducting a study in Toronto to determine the viability of different plant species and a range of extensive and intensive

applications in the Canadian climate. They are also monitoring the stormwater runoff from the Eastview Community Centre green roof in Toronto to assess the effectiveness of green roofs as a stormwater management option.

Food Share Toronto is exploring the design of rooftop growing systems for commercial food production.

The Rooftop Garden Consortium in Ottawa is researching the benefits and durability of rooftop garden technology in Canadian climates and sensitivities to climate variability. They are developing a model to predict the performance and benefits of green roofs in different Canadian cities.

Greenroof Systems Consortium is a public-private sector partnership whose members include Toronto and Region Conservation Authority, Seneca College, York University, Greenland International Consulting Inc. and Sustainable Development and Monitoring Inc. They have a project underway which will showcase new and existing technologies for the purpose of promoting sustainable development in Southern Ontario and elsewhere.

Staff could arrange a presentation at Planning and Development Committee on the status of the research, if required.

**CONCLUSION:**

Green roof technology is one aspect of green building design which provides benefits to air quality, stormwater management, health and well being, climate moderation, wildlife habitat and energy conservation. Many municipalities in North America have demonstration sites on municipally owned buildings and promote green roof technology in building design. There is considerable research underway which is exploring the feasibility of green roof technology in Southern Ontario.

**RECOMMENDATION:** That the report titled "Green Roofs", dated September 28, 2004, from the Commissioner of Planning and Building, be received for information and further that staff monitor the research on green roof technology and report to Planning and Development Committee on a regular basis.

*Original Signed By:*

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Edward R. Sajecki  
Commissioner of Planning and Building