Agenda Item # Page #

7 40

TO:	CHAIR AND MEMBERS ENVIRONMENT AND TRANSPORTATION COMMITTEE MEETING ON JUNE 21, 2010
FROM:	DAVID A. LECKIE, P.ENG. DIRECTOR, ROADS & TRANSPORTATION ENVIRONMENTAL & ENGINEERING SERVICES
SUBJECT	UFORE PROJECT SUMMARY AND URBAN FOREST STRATEGY UPDATE '

RECOMMENDATION

That on the recommendation of the Director of Roads & Transportation, Environmental & Engineering Services:

(a) That the draft technical report of the results of the Urban Forest Effects (UFORE) analysis, **BE RECEIVED** (attached as Appendix A);
(b) That the draft technical report **BE REFERRED** to TFAC for comment;
(c) That the technical report and TFAC comments serve as the basis for the development of an Strategic Urban Forest Master Plan

PREVIOUS REPORTS PERTINENT TO THIS MATTER

- ETC Report Urban Forest Effects (UFORE) Model and Update of Urban Tree Inventory, November 26, 2007
- Planning Committee Report Tree Cover Statistics May 8, 2006

BACKGROUND

Purpose:

This report serves as a key milestone in the development of a strategic plan for London's urban forest. It highlights some key findings and recommendations of the UFORE study and provides general direction for the development of London's Strategic Urban Forest Master Plan.

Context:

Over 80% of Canadians and 90% of Londoners live in urban areas and we all live in the *Forest City*. There is a new and growing awareness of the value of trees and the urban forest. This shift in attitude from trees being liabilities to being assets, and a recognition of trees as green infrastructure and a public utility, is a relatively new concept.

So what is the urban forest? It is a system of plant and animal communities made up of woody plants and other vegetation in and around settled areas. It is an ecosystem that is highly influenced by planning decisions and characterized by human action and movement and alteration of landscape features. The urban forest can be considered a continuum of trees that ranges from individual trees in planters in our downtown core or boulevards to backyard trees, to treed areas in parks such as Victoria Park to more natural wooded areas such as the Warbler Woods Environmentally Sensitive Area, to more spread out woodlots interspersed in our agricultural areas. .

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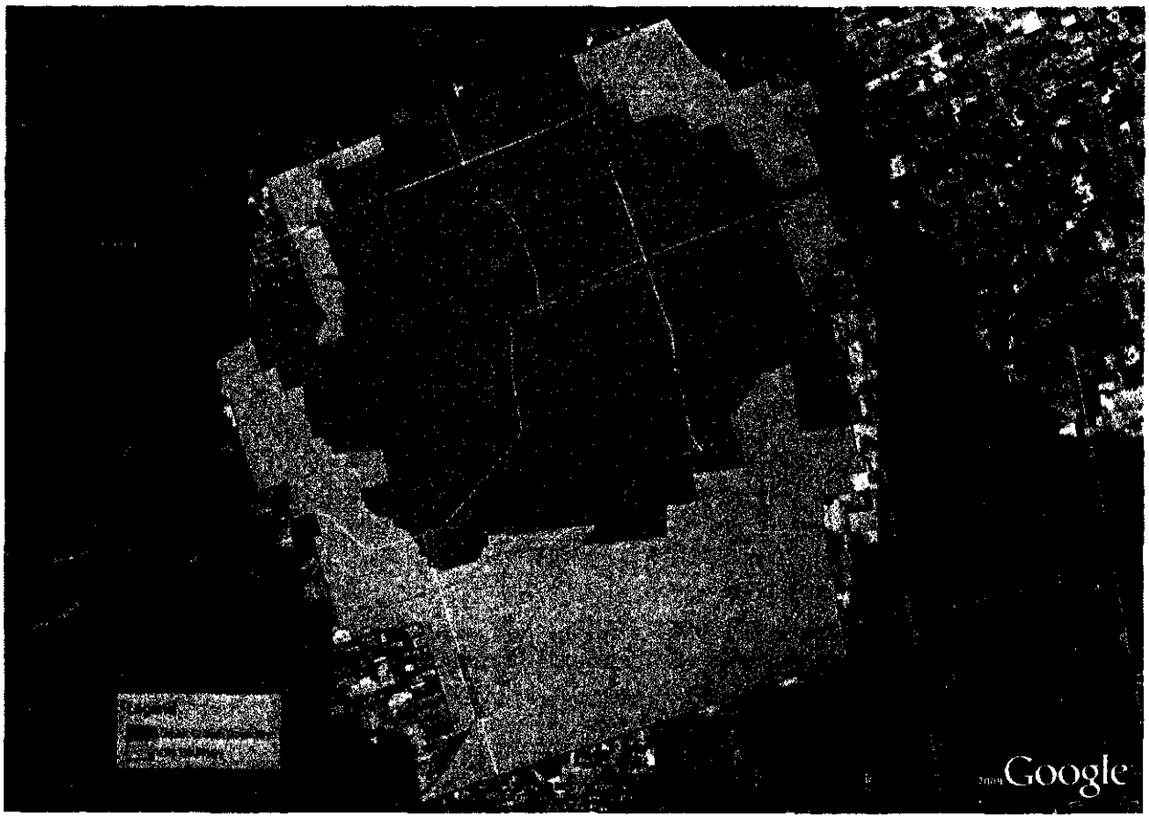
London's urban forest is currently defined as the area within the Urban Growth Boundary (UGB). The trees and forests in the rural areas outside the Urban Growth Boundary also provide essential environmental and other benefits but were outside the scope of the UFORE analysis.

The project included establishing 383 sample plots (compared to the minimum of 200 plots) to ensure a high level of confidence from the field results. To estimate the leaf cover we utilized high resolution infrared aerial photography and a computer interpretation of the corresponding photos to map out the canopy. In order to confirm the computer analysis, 29,500 dots were generated on the delineated canopy plots and were visually confirmed by human observation. This estimation also exceeds the level of precision produced by the standard UFORE protocol and produced the most comprehensive and accurate estimate of leaf cover to date. We can produce reasonably accurate statistics and maps for large areas but the mapping is suitable for use at macro scales such as land use types or neighbourhoods like Wortley and Old North, but not at the block or backyard level.



The City of London is now among a select group of municipalities across the globe that has implemented a UFORE analysis to quantify its structure, structural and environmental values. Without knowing what we have we cannot adequately manage it to meet our current needs or those of our descendents. The Strategic Urban Forest Master Plan (the Plan) is the critical element in professionally managing this asset and issues.

The first step in the development of the Plan was the completion of the UFORE analysis. This analysis is a snap-shot in time of our urban forest. The analysis can serve as the scientific basis for the development of the Plan which will include a vision for our forest and examine management options in support of the Official Plan and to determine the direction, size and

scope of the urban forestry program for the next 20 years. The Plan will support the adoption of public policies, regulations, and incentives to maintain and improve our green infrastructure. It will allow the development of 5-year program management goals, annual operational plans. and identify associated budgets. Council direction will be sought on the ultimate strategy to follow. The structure (species, number of trees, distribution and health) of the urban forest and the leaf cover determine the ecological benefits and the structural value.

The Right Tree In The Right Place will maximize the benefits.

Discussion:

The Executive Summary of the draft UFORE technical report is appended hereto as Appendix 'A'. A copy of the full draft report is being made available to Council Members directly. It should be noted that the technical components of the draft report are essentially complete and further editing for clarity, appearance and structure will be undertaken prior to issuance of the final report. This Standing Committee report serves to summarize the draft technical report. While there has been considerable a interest in verifying what London's "urban tree canopy" is, relative to the proportion of land area with leaf cover, the technical report goes well beyond that to address such parameters as:

- Leaf cover by defined land uses
- Variety of species present (noting that the top 2 species are invasive and ornamental)
- Health of the inventory
- Maturity/Size of the inventory
- Benefits in filtering air pollutants
- Benefits in reducing energy for residential cooling
- Vulnerability to pests or disease
- Replacement costs.

In order to understand the findings, some key concepts must be put into their proper context:

1) All the values are in Canadian dollars, not American. The change rate used at the time of the analysis was $1CND=$0.80USD.

2) Urban leaf cover is the proportion (%) of the ground surface within the Urban Growth Area that is covered by leaves when viewed from above. It is independent of tree species and is estimated from analyzing aerial photography. The leaf cover consists of the crowns of individual trees or clumps on boulevards, back yards, in parks, trees within wooded areas and shrubs. A portion of the urban leaf cover includes woodlands.

   The composition of the leaf cover is just as important as the estimated value when it is used for making management decisions.

   Leaf cover estimates alone must be used with caution because they do not account for:
   1. geographic distribution or carrying capacity (Where might trees provide the highest benefits and where is there capacity for creating more cover?)
   2. canopy tree species composition, age classes, size, health (Is there high proportion of large healthy shade trees compared to smaller ornamental trees?)
   3. long term tree population dynamics (How will these trees be affected by insects, disease, old age or site alteration?)

   American Forests recommends municipalities should have an average 40% leaf cover across all land use types with 50% in suburban residential zones, 25% in residential zones and 15% in central business districts.

3) Woodland cover refers to the total area (ha) or percentage of area that is classified as a woodland. The City of London Official Plan defines a woodland as "complex ecosystems of different tree species, shrubs, ground vegetation and soil complexes that provide

habitat for many plants and animals. Woodland is a general term which collectively refers to areas occupied by trees, treed areas, woodlots and forested areas." Woodland includes treed areas such as managed woodlots, naturally wooded parklands, plantations, wooded open space, Environmental Review lands, river and tributary corridors, forested wetlands, or Environmentally Significant Areas. It does not include boulevard trees, trees in private yards and park areas that are included in the estimation of urban leaf cover.

An area that is classed as "woodland" often has a leaf cover that is less than 100% because of gaps in the tree canopy caused by natural or man-made openings.

The May 6th 2006 Report to Planning Committee identified the percent of area classified as woodlands in the City. These included: 7.3% within the UGB, 8.4% outside the UGB and 7.8% average for the City.

Environment Canada and MNR recommend 30% as a desirable woodland cover percentage to maintain the ecological functions and integrity of the woodlands across the landscape.

Some Key Findings

Urban Forest Structure

1) We have 4.4 million +/- 11% individual trees.

2) The leaf cover within the Urban Growth Boundary is 24.7% +/- 1%.

   It is significantly influenced by land use type. Parks/natural areas and low density residential land use areas have the highest % leaf cover while commercial and industrial land use types have the lowest.

   When the total area of each land use type is taken into consideration, low density residential contributes 41% of the total leaf cover.

3) Approximately 87% of all the trees are in parks, natural areas and low density residential land use areas.

4) Most of our trees are healthy
   78% are good to excellent 11% are poor to fair 11% are dead.

5) The 3 most common tree species by are **buckthorn, eastern white cedar and sugar maple**.

6) We identified 126 different species. Approximately 50% of all our trees are native to Ontario.

7) The 3 tree species that have the most leaf area are **Norway maple, sugar maple and black walnut**.

8) At chest height, 77.5% of trees are less than 15 cm (6 inches) in diameter. Most of these are our most common species like buckthorn, cedar, hawthorn and other ornamental species which cannot grow much bigger.

Urban Forest Functions and Value

1) **Carbon Storage**

   Carbon storage is an important way that trees influence global climate change.

London's 4.4 million trees can be considered a **carbon bank storing 360,000 tonnes of carbon**.

Over their lifetime, they have removed 1.3 million tonnes of carbon dioxide (CO_2) from the atmosphere.

Artificial removal of that much carbon from the air has a **value of $10.3 million**.

2) Carbon Sequestration and Reduction of Greenhouse Gasses

This **carbon bank grows by 12,500 tonnes per year** by converting 45,800 tonnes of CO_2, one of the major greenhouse gasses.

The value of removing this much CO_2 is **$355,000 per year**.

3) Air Quality and Pollution Control

Poor air quality caused by pollution can lead to human health problems, smog and damage to ecosystem processes. Trees remove air pollution by trapping the particles on their tissues, directly absorbing gasses, and reducing hydrocarbon emissions and ozone formation.

Our trees **remove 370 tonnes of air pollutants each year**.

This **removal value is $4.5 million per year**

4) Energy Use and Conservation

Trees are nature's air conditioners. They reduce air temperature by providing shade, giving off moisture and altering wind speed.

As for air conditioning residential homes, **energy savings, valued at $1.7 million**, are 'made in the shade' annually.

This avoids generating an additional 3,200 tonnes of carbon emissions per year and produces a corresponding saving of **$92,500** of carbon removal costs.

5) Structural or Replacement Value

One method by which urban forests are valued is by recognizing trees as physical assets and "infrastructure" and to base their value on the species, size, health, location and cost to replace the tree with the largest available tree of the same species (structural value). The structural value of an urban forest tends to increase with a rise in the number and size of healthy trees.

The structural value, including the replacement cost with acceptable tree species, of our 4.4 million trees is **$1.5 billion**.

Silver maple, Norway maple, northern white cedar, sugar maple and white ash have the highest structural value.

The annual income from the trees is $6.65 million when the foregoing environmental filtering and energy saving impacts are totaled.

Potential Insect and Disease Impacts

The impact of four exotic species were analyzed.

Emerald ash borer (EAB) was first discovered in London in 2006. This insect has the potential to affect 10% of all our live trees, thus reducing the structural value by $130 million and reducing the leaf cover to 22.9%.

Asian longhorned beetle (ALHB) bores into and kills a wide range of tree species. Although it has not been identified in London, it has been found in the Toronto/Vaughan area where the most seriously infested stands were treated. It has the potential to affect 41% of our live trees and reduce the structural value by $1.1 billion.

Gypsy moth is a defoliator that feeds on many species. By eating the leaves, it weakens the trees. It can kill trees if the outbreak conditions last for several years. Large outbreaks were identified in 1998 and 2007. It can infest 13% of our live tree population and result in a loss of $303 million in structural value.

Dutch elm disease has devastated one of our most important native tree species. Many of the elm trees identified in this study were already dead. This disease threatens approximately 0.8 % of the live trees resulting in a potential loss of $8 million.

Some Management Challenges:

1) Forest health affects all the structural and functional values. Our forest management, maintenance and insect control efforts to date focus mostly on the boulevard trees and in manicured parks. This accounts for only a small portion of all the trees in the City.

2) Predominance of short lived, small sized trees: Individually they provide fewer environmental benefits than large stature trees like sugar maple and they take up potential space that could be used to establish larger trees. Buckthorn is also invasive and can threaten the existence and growth of native tree and other plant species in natural areas.

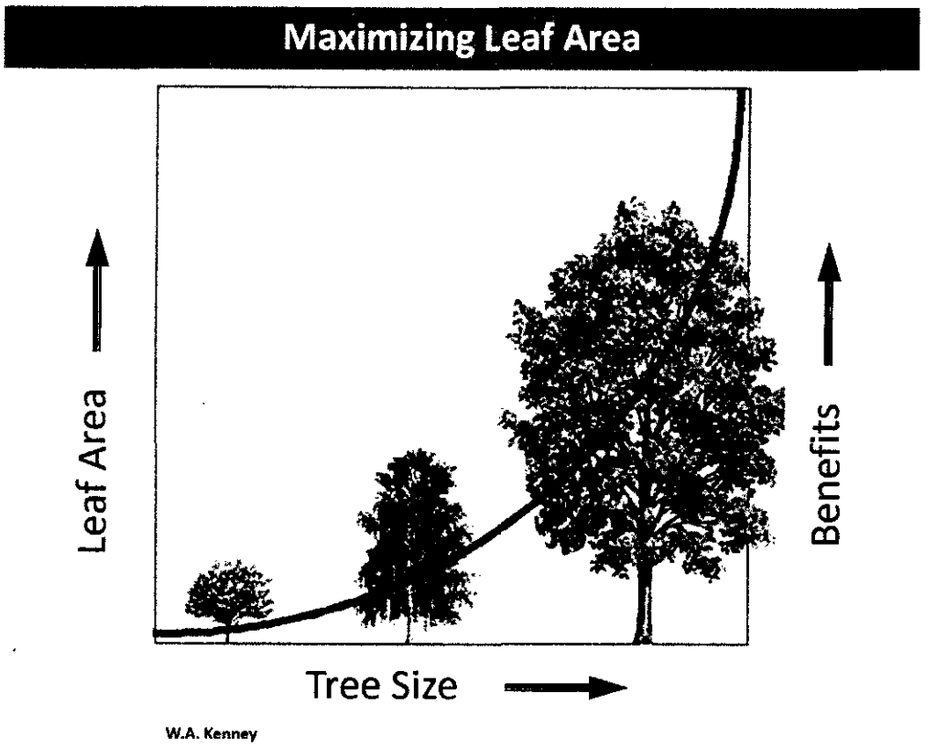
3) Aging trees and grey infrastructure in the older parts of London: Although the street tree population accounts for only 2% of the total trees, many of them are some of the most prominent City-owned trees, both in the terms of size and location. The need to maintain and protect these trees in order to retain their environmental and social contributions must be balanced with the need to replace the aging sewers and water lines.

4) This analysis provides an overview of our tree inventory. The detailed street and park tree inventory which is used for program planning and operations is incomplete and needs to be updated.

5) Current ordinances, urban, and construction design standards make it difficult to maintain woodland integrity and maintain, plan for and establish large stature shade tree species both on public and private property. The result is an increasingly smaller and younger urban forest with fewer trees that will produce fewer environmental benefits than we currently enjoy.

Trees are part of the physical framework of our City, just like roads and buildings. This project has quantified the environmental benefits and value attributed to this "green infrastructure" for the first time. They make our city more livable and increase in value over time unlike grey infrastructure.

When it comes to environmental benefits and structural value of trees – Size Does Matter. Replacing a large silver maple with a small ornamental is not a 1 for 1 replacement of values either for today or for the future.



The structure (species, number of trees, distribution & health) of the urban forest and the leaf cover determine the ecological benefits and the structural value. **The Right Tree In The Right Place** will maximize the benefits.

Where to From Here?

This analysis is a snapshot in time that allows us to understand our urban forest and to begin managing and growing this asset. The proposed Strategic Urban Forest Master Plan is developed in support of the Official Plan.

The next steps include:

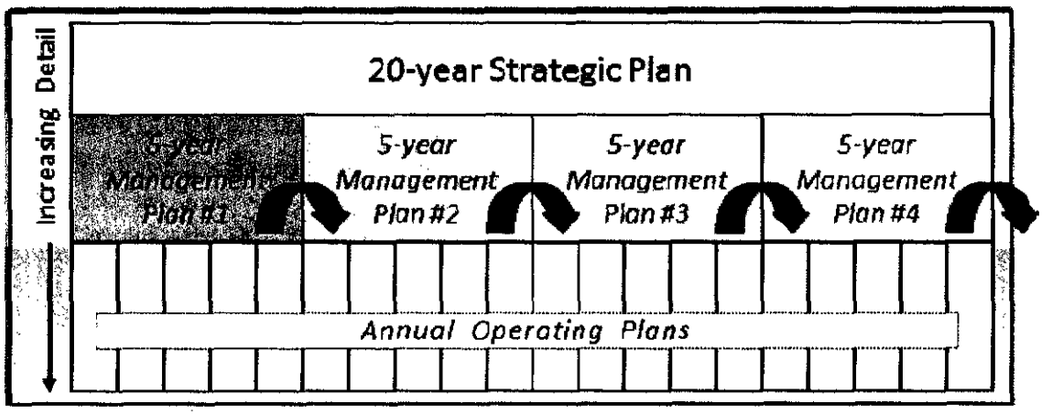
- Council's consideration of amending the Official Plan to recognize the urban forest and wooded areas outside the UGB as assets and as part of the City's green infrastructure
- Council's consideration of beginning the development of the Strategic Urban Forest Master Plan in 2010 based on the recommendations of the UFORE analysis. The completion date is anticipated in spring 2011 and will be dependent on staff and consultant resource availability.

The key component of the Plan is the development of leaf and woodland cover goals for the City. The following table identifies adopted leaf cover targets from some Ontario municipalities. London needs to develop our leaf cover targets based on our own vision, geography, land use patterns, management objectives and constraints.

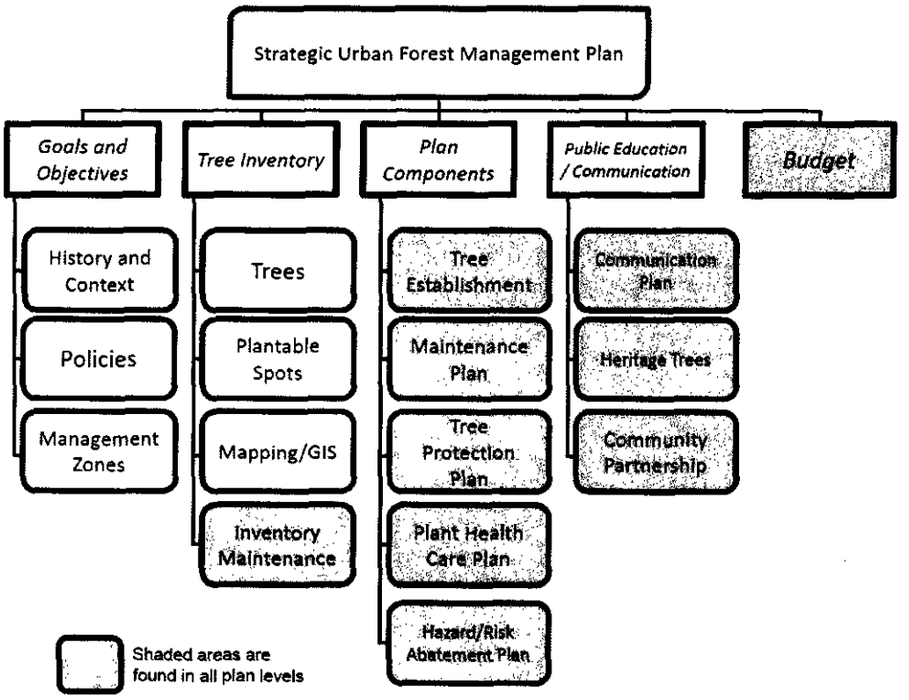
Municipality	Current Leaf Cover Target	Adopted Target
Brantford		40% over entire City
Guelph	30%	"the highest tree canopy percentage among comparable municipalities"
Oakville	29%	40% town-wide
Richmond Hill	17%	25%
Toronto	17%	34% by 2050
Vaughan		40%

Agenda Item # 7 Page # 47

The Plan has a 20-year framework and is supported by a series of 5-year program management plans and annual operating plans.



The Plan contains many components, with several of the components being common in all plan levels.



A forthcoming staff report will serve to scope the undertaking of the urban forest master planning phase. The development of the Plan will be contracted. There are very few consultants that have completed this type of plan. There is money available within the current approved capital budget for the UFORE project and tree inventory to begin the development of the strategy within this fiscal year.

Public education and consultation are anticipated in the development and implementation of the Plan. The Tree and Forests Advisory Committee (TFAC) is anticipated to be a key stakeholder in the development of the Plan.

Our urban forest affects the planning and operations across many departments and stakeholder groups. An interdepartmental approach will be required during development and implementation of the Plan.

Agenda Item # 7 Page # 48

Acknowledgements:

- TFAC for supporting this project from the inception, providing insight, advice, comments and recommendations throughout the project
- UTRCA as a Partner in this project, especially Tara Tchir, Chris Harrington, Eleanor Heagy and Steve Sauder and the field staff for all their efforts coordinating and completing the planning, field work and technical report writing. They were key to making this project a success
- USDA Forest Service as a Partner, especially Dave Nowak and Bob Hoehn, for completing the analysis, training field staff, and assisting with the interpretation of results
- UWO as a partner, especially Dr. Jinfei Wang and Brad Lehrbass, for the leaf cover mapping portion of the project
- OMNR as a partner. especially Ian Smythe, for the work with the photography infrared mapping portion of the project
- COL staff including Andrew Macpherson, Bonnie Bergsma and Mark Boulger (Planning and Development), Pat Donnelly, Jamie Skimming, John Parsons (EESD), John Bontje, Dean Thompson (Finance and Corporate Services), Glynis Tucker (Corporate Communications)
- The many residents and businesses across the City who participated in the project by allowing us access to their properties in order to establish the sample plots

This report was prepared with the assistance of David Leckie, Director, Roads and Transportation.

PREPARED BY:	RECOMMENDED BY:
IVAN LISTAR, R.P.F. **URBAN FORESTER** **EESD TRANSPORTATION AND ROADSIDE OPERATIONS**	**DAVID A. LECKIE, P.ENG.** **DIRECTOR, ROADS & TRANSPORTATION**

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Cc: TFAC
Pat McNally
John Parsons
John Fleming
Andrew Macpherson