Universal Law of Location as a Land Use Planning Decision Tool: Analysis of Ottawa Mayor's Pledge to Plant 1,000,000 Trees

Dr. Barry Wellar, CM
Professor Emeritus, University of Ottawa
President, Information Research Board
wellar.barry@gmail.com
https://wellar.ca/informationresearch/

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A. Case Study Objective

The objective of this case study is to begin the process of testing the Universal Law of Location as a land use planning and transportation planning decision tool. (Universal Law of Location Supported by GIS as a Best Practice Element in Land Use Planning and Transportation Planning Decision Systems)

The first test case is in the land use planning domain and involves the 2022 municipal campaign pledge of mayoral candidate Mark Sutcliffe and now-mayor Mark Sutcliffe, City of Ottawa, to achieve 1,000,000 tree plantings in the current term of office (2022-2026).

By way of context and precedent, ReForest London (Ontario) for example, launched a Million Tree Challenge in January 2005. (https://milliontrees.ca/leaderboard#thisyear)

After 19+ years, approximately 510,000 trees have been planted in London, widely known as the "Forest City" because of the massive extent of its tree canopy which is now in the vicinity of four million trees.

Adding approximately 25,000 trees per year for almost 20 years is a significant civic achievement, but that rate of tree-planting actually pales in comparison to target of 1,000,000 in four years in the Sutcliffe pledge.

The focus of our interest, therefore, is learning where and how Sutcliffe and council are going to plant 250,000 trees per year for four years in Ottawa.

The criterion of utility with its focus on "practical use" is selected for the first test to assess the value of the Universal Law of Location as a land use planning decision tool. Synonyms of the concept of utility include accountability, applicability, benefit, effectiveness, efficiency, functionality, pertinence, practicality, relevance, suitability, use, and usefulness.

The fundamental point in choosing this route is that if the Universal Law of Location satisfies the utility condition, and many to most of the synonyms of utility, then the Law is likely to be of value to planners, municipal politicians, and citizens.

And, conversely, if the Universal Law of Location is not found to satisfy the utility condition, and many to most of the synonyms of utility, then the Law is not likely to be of value to planners, municipal politicians, or citizens.

Following from the discussion in Universal Law of Location Supported by GIS as a Best Practice Element in Land Use Planning and Transportation Planning Decision Systems, the test for assessing the utility of the Universal Law of Location as a land use planning tool is whether:

1. It contributes to enhancing data and evidence for data-driven and evidence-based decisions about where to locate trees and how to monitor tree-planting activities.

2. It contributes terms of reference for data-driven or evidence-based studies to support decisions about where to locate trees and how to monitor tree-planting activities.

Comments about data, evidence, and terms of reference for studies are presented in sections B, C, and D. However, the focus of the report and communications to City of Ottawa officials is on where the trees are to be planted, so the focus of the validation test is on section D. Geographical Considerations Affecting Decisions about Planting 1,000,000 Trees in Four Years within the City of Ottawa.

Section E then discusses the materials in sections B, C, and D in terms of political realities affecting political considerations, financial considerations, and geographical considerations.

With those background and context materials in place, section F assesses the utility of the Universal Law of Location as a land use planning decision tool regarding the matter of where to plant 1,000,000 trees in four years somewhere within the City of Ottawa.

B. Political Considerations Affecting Decisions about Planting 1,000,000 Trees in Four Years within the City of Ottawa

Five political considerations are briefly discussed to illustrate the nature of the tree-planting decision agenda that could be facing Ottawa's municipal politicians this term.

1. Climate change adaptation/mitigation

The pertinence of "climate change" to this research into tree planting is indicated by the 285,000,000 web page results produced by Google for the search term "climate change and trees".

To begin, there is a major difference between climate change time and municipal politicians' election cycle time that that needs to be explicitly recognized as part of the decision process.

On the one hand, the long-term hand, which stretches over centuries or millennia depending upon the process under observation, climate change is currently a relatively slow and not always obvious mix of processes. As a result, questions about how to adapt to or mitigate the effects of those processes – extreme heat waves, hurricanes,

tornadoes, cyclones, ice storms, snowstorms, droughts, floods, fires, melting permafrost – are in the early research stages in many cases and locales. **(1)**

And, on the other hand, the short-term hand, municipal politicians are elected to four-year terms.

As a result, political efforts to adapt to or mitigate the effects of climate change processes do not lead to the kinds of short-term, obvious results that garner citizens' support and, hence, action by politicians.

Trees, as a case in point, have relatively little to show for themselves in height or crown (spread) after eight years of growth, or two terms for municipal politicians.

As illustrated in Figures 1a, 1b, 1c, 1d,1e, 1f, 1g, and 1h, due to the length of time to reach even half-full size, none of these trees which are popular in the Ottawa area would give a two-term municipal politician much in the way of bragging rights for vote-gaining purposes.

Consequently, decisions about where and when which species are planted deserve evidence-based consideration at the best practices level.

Figure 1a. Red Maple: Features

Years to Maturity: 50-100

Height (m): 15-25

Crown Diameter (m): 10-20

Figure 1b. Silver Maple: Features

Years to Maturity: 50-100

Height (m): 15-25

Crown Diameter (m): 15-20

Figure 1c. Sugar Maple: Features

Years to Maturity: 75-125

Height (m): 15-25

Crown Diameter (m): 15-20

Figure 1d. Eastern White Pine: Features

Years to Maturity: 75-125

Height (m): 20-35

Crown Diameter (m): 10-25

Figure 1e. Blue Spruce: Features

Years to Maturity: 50-100

Height (m): 15-25

Crown Diameter (m): 5-10

Figure 1f. Horse Chestnut: Features

Years to Maturity: 75-125

Height (m): 15-25

Crown Diameter (m): 15-20

Figure 1g. Yellow Birch: Features

Years to Maturity: 75-125

Height (m): 15-25

Crown Diameter (m): 15-20

Figure 1h. White Oak: Features

Years to Maturity: 100-150

Height (m): 15-25

Crown Diameter (m): 15-30

2. GIS-based Ranking System to Allocate Land Uses from Highest and Best to Lowest and Worst Locations for Tree-planting

The land area inside the current City of Ottawa boundary is about 2,800 square kilometres or 2,800,000,000 square metres. Table 1 provides the numbers of square metres needed to accommodate trees with crown radii common to many parts of Ottawa.

Table 1. Numbers of m^2 needed to accommodate 1,000,000 mature trees with crowns of several illustrative radii

Tree Crown radii (m)	Tree Crown Coverage (m^2)	Canopy Coverage (m^2)
3.0	28.3	28,300,000
4.0	50.2	50,240,000
5.0	78.5	78,500,000
6.5	132. 7	132,700,000
7.5	176.6	176,600,000
8.0	201.0	201,000,000

As indicated by Table 1, planting 1,000,000 trees is likely to require somewhere between 28,300,000m^2 and 201,000,000m^2 of land surface to accommodate the crowns. The following comments put those numbers in context regarding the pledged tree-planting portion of Ottawa's total area of 2,800,000,000 square metres.

The Universal Law of Location in its statement that something is everywhere includes things such as residential, commercial, institutional, sports, industrial, agricultural, military, recreational, and other structures, as well as such entities as roads, bridges, sidewalks, quarries, floodplains, wetlands, parks, golf courses, parking lots, driveways, farmlands, storm sewers, sanitary sewers, solid waste disposal sites, ditches, power cables, signal lights, stop signs, LRT lines, and rights-of way which are already occupying many of those square metres.

The question therefore arises as to whether a decision tool such as a GIS-based ranking system to allocate land uses to slots from highest and best to lowest and worst locations for tree-planting will be used to systematically decide where the 1,000,000 trees are to be planted.

3. Choosing among competing interests for urban land uses and urban land use locations

Decisions about choosing among competing interests for urban land uses and urban land use locations include dealing with competition between public interests and private interests, and competition within those sets of interests for favourable decisions regarding land use and land use location decisions.

There are many methodological reports in the literature on how this can be done **(2)**. However, given Ottawa councils' weak decision record over the past two decades questions arise, such as "Can the pledged planting of 1,000,000 trees in a council term of four years be presented to citizens in ways that can withstand critical public review?"

I hasten to note that there are those who believe that methodologically designed inquiries of municipal issues are a waste of time. Their position is that politicians' decisions are based on what developers tell them to do, because politics is all about money **(3)**.

However, the Universal Law of Location states that something is already everywhere, so it seems to follow that if developers are not in charge, then politicians will put in place a GIS-based capability to systematically and transparently make decisions about whether trees should replace or displace uses which are where they are for previously adopted planning and zoning reasons.

4. Urban planning objectives of tree-planting

Trees are subjects of conversation at city halls for a variety of reasons including climate change adaptation and mitigation, flood control, soil stabilization, cooling at transit stops, sidewalk shade, wind breaks, snow breaks, provision of animal habitat, and traffic calming. With the potential of 1,000,000 trees at their disposal, and a narrow tree-planting timeframe of four years to do the deed, citizens will no doubt have great interest in learning where and when trees are to be planted to serve which planning objectives.

5. Incorporating a Zero-Sum Condition in the Official Plan

Trees occupy space under, on, and above the Earth's surface within the boundary of Ottawa, and the boundary of any city.

When a tree goes into the ground in a tree-planting program, something which is already there or nearby under, on, or above the Earth's surface is removed, replaced, enhanced, compromised, etc., which is the essence of a zero-sum game, condition, constraint, etc.

That is, trees occupy 3-D space under, on, and above the Earth's surface. Consequently, whatever amount of space under, on, and above the Earth's surface which is taken by the tree from planting through to maturity until demise and removal must be done at the "expense" of whatever already occupies the 3-D space which is to be occupied by the tree, or, in the Ottawa case, the 1,000,000 trees pledged by now-Mayor Mark Sutcliffe.

As shown in Table 1, planting 1,000,000 trees affects somewhere between 28,300,000m^2 and 201,000,000m^2 of land surface needed to accommodate crowns, which is a substantial amount of urban land to be converted from other land uses to space for trees.

At present, Ottawa's Official Plan does not appear to refer to a zero-sum condition or strategy to guide land use allocation decisions.

However, questions arise as to why that is not the case given the boundaries that constrain expansion and limit development options over time and space.

Further, there is the matter of the increasing costs that arise when land use development mistakes are made and need to be amended years later **(4)**.

A zero-sum approach when properly executed, beginning with the pilot stage phase of a research project, provides a transparency and accountability framework which can

significantly improve regard for the Universal Law of Location which states that something is everywhere under, on, and above the Earth's surface.

C. Financial Considerations Affecting Decisions about Planting 1,000,000 Trees in Four Years within the City of Ottawa

The overriding financial consideration affecting Ottawa at this time is the pledge by mayoral candidate Sutcliffe and now Mayor Sutcliffe to limit property tax increases to 2.5% for the first two years of 2022-2026 term.

Sutcliffe and council kept that pledge, even though it was heavily criticized during the election campaign, as well during the first year of this term and again during the second year.

In summary the criticism is that for more than a decade Ottawa mayors and councillors kept taxes overly low in order to get elected. As a result, core infrastructure and services (roads, sidewalks, public housing, sanitary and storm sewers, snow removal, pothole filling, transit, etc.) fell into disrepair and worsened year by year.

Consequently, as revealed by applying the Universal Law of Location, the Sutcliffe pledge does not bode well for tree-planting activities, because the City of Ottawa is in dire financial straits and trees are not a free good.

That is, depending upon tree species, tree size, tree planting schedules, weather, and numerous other conditions, the financial hit for buying, transporting, planting, and maintaining 1,000,000 trees in the 2022-2026 term could run in the range of $350-$500 per tree, for an overall total in the vicinity of $350,000,000 to $500,000,000 to be added to the property tax bill over four years.

D. Geographical Considerations Affecting Decisions about Planting 1,000,000 Trees in Four Years within the City of Ottawa

The adage that "The devil is in the details" comes to mind as one of the ways to express the utility of the Universal Law of Location when referring to 1,000,000 trees, and their 3-dimensional aspects under, on, and above the Earth's surface within the city's boundary.

Trees occupy space under, on, and above the Earth's surface, so geographical considerations in this Universal Law of Location case study are 3-dimensional, but with a twist.

That is, each of the three primary components, roots, trunks, and crowns are 3-dimensional, and each of those primary components has its own effect on the natural and built environments where trees are planted.

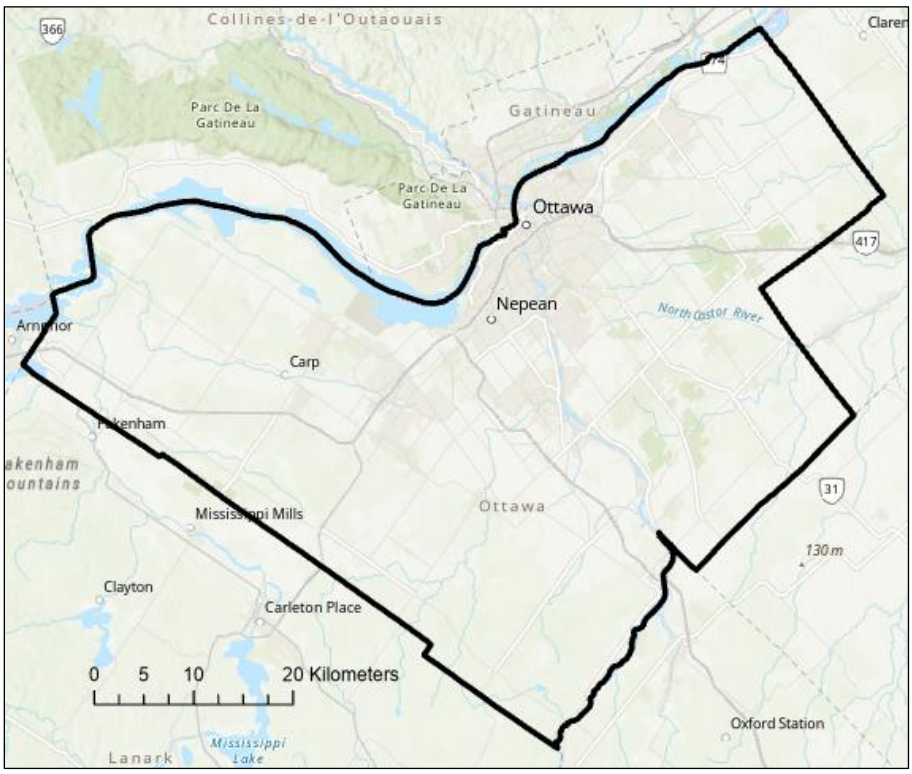
In this case study, which is at the pilot study phase of methodologically designed research, consideration is limited to the crown aspect, and the amount of space required to plant 1,000,000 trees and maintain them through to maturity.

For discussion purposes we use a tree crown diameter of 13 metres, and crown coverage for 1,000,000 trees at 132.7m^2 per mature tree is 132,700,000m^2 (See figure 1 for more numbers).

Planted in a straight line 1,000,000 trees with crown diameters of 13m would stretch out 13,000,000m or 13,000km.

Figure 2 is a map of Ottawa, and the current length of the boundary of Ottawa is approximately 275,000 metres, or 275 kilometres **(5)**.

Figure 2. Map, City of Ottawa, Showing the Boundary as of October 2024*



*1,000,000 trees with 13m crown/spread diameters planted to be edge-to-edge at maturity would overlay the current City of Ottawa boundary 47 times.

The 1,000,000 trees in the Sutcliffe pledge would overlay the current boundary 47 times.

For those who have not had empirical experience with a million of anything, including trees, figure 2 which shows the extent of the current Ottawa boundary, may assist in communicating the magnitude of the tree-planting initiative that Sutcliffe called for in his campaign pledge.

And for those who prefer an areal example rather than a linear example, using the dimensions of three popular area landmarks may be instructive.

The space covered by 1,000,000 trees growing to crowns with diameters of 13 metres at maturity is equivalent to:

1. 8400 NHL ice surfaces(158m^2);

2. 2227 CFL fields (596m^2); and,

3. 3317 times the four-hectare (40,000m^2) plot of land at Lebreton Flats near Parliament Hill that the NCC recently sold to the Ottawa Senators, ostensibly to build an arena and associated developments. **(6)**

At the observation level, there appear to be significant geographical barriers to the number and species of trees that can be planted within the City of Ottawa's current boundary.

It is therefore good policy and planning research to ascertain where and how 1,000,000 trees can be planted within the current boundary in this council term and, as per the zero-sum condition, which current land uses at what locations are to be replaced, displaced, terminated, adjusted, modified, etc. to accommodate the trees.

Those political, financial, and geographical considerations point to asking Mayor Sutcliffe, councillors, and staff about the present and future political, program, and operational standing of the 1,000,000-tree pledge. **(7)**

While there are many implications to associate with their responses to questions about the present and future standing of the pledge, of particular interest to this report is the regard shown by elected and appointed officials to the matter of where 1,000,000 trees are to be planted this term of office.

And by extension, their responses also provide an indication of expressed regard for the Universal Law of Location which states that something is already everywhere under, on, and above the Earth's surface.

E. Political Realities Affecting Decisions about Planting 1,000,000 Trees in Four Years within the City of Ottawa

Pledging by wannabe politicians during election campaign time is one thing, acting on a pledge upon becoming a politician is often quite something else. This section reports on findings as to whether actions have been taken regarding the pledge which was made during the municipal election campaign in 2022 by mayoral candidate and now-mayor Mark Sutcliffe.

Correspondence included communications at the staff level in the event that pledge actions were a matter of record that I could not locate, and then correspondence moved to the political level, as follows:

1. Martha Copestake, R.P.F., Senior Forester – Planning Natural Systems and Rural Affairs, Planning, Real Estate and Economic Development, City of Ottawa.

2. Mayor Mark Sutcliffe, City of Ottawa.

3. City of Ottawa Councillors Bradley, Brockington, Brown, Carr, Curry, Darouze, Desroches, Devine, Dudas, Hill, Hubley, Gower, Johnson, Kavanaugh, Kelly, King, Kitts, Leiper, Lo, Luloff, Menard, Plante, Tierney, and Troster.

Exhibit A presents the email to Senior Forester Copestake. By the date of the email, council had completed its first year, and the intent of the email was to ascertain the numbers and locations of Sutcliffe-driven tree plantings achieved in year one, and Sutcliffe-driven plans about numbers and locations for years two, three, and four. Related interests were to examine the data for spatial and temporal patterns, and to assess any GIS application(s) in terms of the state of practice.

Exhibit A. Request for links to numeric-based tables, graphics, and maps showing inventory of City of Ottawa tree plantings since the start of the current council's term of office

From: wellar.barry@gmail.com <wellar.barry@gmail.com>
Sent: November 23, 2023 7:30 PM
To: Copestake, Martha <Martha.Copestake@ottawa.ca>
Cc: George A. Neville <george.neville@ncf.ca>; 'doug arnold' <douglasarnold@sympatico.ca>; 'Ecology Ottawa' <info@ecologyottawa.ca>; 'Horizon Ottawa' <info@horizonottawa.ca>; wellar.barry@gmail.com; Capital Ward <CapitalWard@ottawa.ca>; Johnson, Laine <laine.johnson@ottawa.ca>
Subject: Numeric-based tables, graphics, and maps showing inventory of City of Ottawa tree plantings since the start of the current council's term of office.

Ms. Copestake,

Re: Finding numeric-based tables, graphics, and maps showing inventory of City of Ottawa tree plantings since the start of the current council's term of office.

I have been unsuccessful in this regard, and request that you provide the links to productions containing tables, graphics, and maps showing the numbers, timeframes, and locations of tree plantings during year one (2022-2023) of the term of the current council, and the scheduled numbers, timeframes, and locations of plantings in the remaining three years (2023-2024, 2024-2025, and 2025-2026) to meet the objective of 1,000,000 trees being planted by the City of Ottawa as called for by Mayor Mark Sutcliffe and noted in various Urban Forest Management Plan (UFMP) productions.

Thank you.

Dr. Barry Wellar, C.M.
Professor Emeritus, U of Ottawa
President, Information Research Board (IRB) Inc.
133 Ridgefield Cresent
Nepean ON K2H 6T4
CANADA

Exhibit B. Response from Senior Forester Copestake

From: Copestake, Martha <Martha.Copestake@ottawa.ca>
Sent: Monday, November 27, 2023 3:28 PM
To: wellar.barry@gmail.com
Cc: George A. Neville <george.neville@ncf.ca>; 'doug arnold' <douglasarnold@sympatico.ca>; 'Ecology Ottawa' <info@ecologyottawa.ca>; 'Horizon Ottawa' <info@horizonottawa.ca>; Capital Ward <CapitalWard@ottawa.ca>; Johnson, Laine <laine.johnson@ottawa.ca>; Schwets, Tracey-Lee <Tracey.Schwets@ottawa.ca>; Stow, Nick <Nick.Stow@ottawa.ca>
Subject: RE: Numeric-based tables, graphics, and maps showing inventory of City of Ottawa tree plantings since the start of the current council's term of office.

Dr. Wellar,

Thank you for your email. The City plants trees through a number of different programs and mechanisms, including voluntary partnership programs such as Green Acres and Trees in Trust. We compile aggregate tree planting numbers, but we do not currently maintain a central, spatial database of tree planting. Furthermore, it is not possible to

predict which landowners and homeowners may subscribe to the City's partnership programs in future years. The priority project for Phase 2 of the Urban Forest Management Plan is a Tree Planting Strategy. This work will involve re-evaluating how and where the City plants trees to achieve its goals, namely to increase canopy cover in the areas of the City that need it the most. Staff will be launching a public consultation for the Tree Planting Strategy in early 2024.

Thank you,

Martha Copestake, R.P.F.
Senior Forester – Planning
Natural Systems and Rural Affairs
Planning, Real Estate and Economic Development
City of Ottawa
613.580.2424 ext. 17922
ottawa.ca/urbanforest
ottawa.ca/treebylaw

Comment. No mention is made of the Sutcliffe pledge to plant 1,000,000 trees in four years, no links are provided to direct examination of tree-planting files, no mention is made of resource allocations or re-allocations to support tree-planting programs, and there does not appear to be any GIS support to monitor where the trees are planted or to identify the locations of future plantings which would also reveal changes to landscapes and land uses in many if not all of Ottawa's 24 wards.

In the seeming absence of an operational relationship between Sutcliffe's pledge and the City of Ottawa's tree planting programs, Exhibit C presents the communication to Sutcliffe in search of information about actions taken to plant 1,000,000 trees in four years.

Exhibit C. Request to Ottawa Mayor Mark Sutcliffe for links to documentation on the design of the monitoring system, its operational features, and the counts of tree plantings to date

From: wellar.barry@gmail.com <wellar.barry@gmail.com>
Sent: Tuesday, February 20, 2024 8:56 PM
To: Mark Sutcliffe <Mark.Sutcliffe@ottawa.ca>
Cc: 'George A. Neville ' <george.neville@ncf.ca>; 'doug arnold' <douglasarnold@sympatico.ca>; 'Ecology Ottawa' <info@ecologyottawa.ca>; 'Horizon Ottawa' <info@horizonottawa.ca>; 'Capital Ward' <CapitalWard@ottawa.ca>; 'Johnson, Laine' <laine.johnson@ottawa.ca>; 'Schwets, Tracey-Lee' <Tracey.Schwets@ottawa.ca>; 'Stow, Nick' <Nick.Stow@ottawa.ca>; 'Copestake,

Martha' <Martha.Copestake@ottawa.ca>; wellar.barry@gmail.com; Allan Hubley <Allan.Hubley@ottawa.ca>; Ariel Troster <Ariel.Troster@ottawa.ca>; Catherine Kitts <Catherine.Kitts@ottawa.ca>; Cathy Curry <Cathy.Curry@ottawa.ca>; Clarke Kelly <Clarke.Kelly@ottawa.ca>; David Brown <Ward21@ottawa.ca>; David Hill <david.Hill@ottawa.ca>; George Darouze <George.Darouze@ottawa.ca>; Glen Gower <Glen.Gower@ottawa.ca>; Jeff Leiper <Jeff.Leiper@ottawa.ca>; Jessica Bradley <Jessica.Bradley@ottawa.ca>; Laura Dudas <Laura.Dudas@ottawa.ca>; Marty Carr <Marty.Carr@ottawa.ca>; Matt Luloff <Matt.Luloff@ottawa.ca>; Rawlson King <rideaurockcliffeward@ottawa.ca>; Riley Brockington <Riley.Brockington@ottawa.ca>; Sean Devine <Sean.Devine@ottawa.ca>; Stephanie Plante <stephanie.plante@ottawa.ca>; Steve Desroches <Steve.Desroches@ottawa.ca>; Theresa Kavanaugh <BayWard@ottawa.ca>; Tim Tierney <Tim.Tierney@ottawa.ca>; Wilson Lo <Wilson.Lo@ottawa.ca>
Subject: RE: Numeric-based tables, graphics, and maps showing inventory of City of Ottawa tree plantings since the start of the current council's term of office.

Mayor Mark Sutcliffe,

As per the following production, on November 23, 2023, I made an inquiry regarding City of Ottawa tree plantings since the start of the current council's term of office.

Your election campaign pledge to plant one million (1,000,000) trees during the 2022-2026 municipal term prompted no end of curiosity on my part as to where and when the plantings would occur, and the design of the inventory system to monitor progress.

I therefore look forward to receiving the link(s) to documentation on the design of the monitoring system, its operational features, and the counts of tree plantings to date.

Finally, since I have been unsuccessful in locating information on duty councillors, I would appreciate your assistance in learning which members of council have committee responsibilities to implement your million-tree pledge. To possibly expedite communications, councillors are included among those copied.

Thank you.

Dr. Barry Wellar, C.M.
Professor Emeritus, U of Ottawa
President, Information Research Board (IRB) Inc.
133 Ridgefield Cresent
Nepean ON K2H 6T4
CANADA

Exhibit D. Response from Mayor Mark Sutcliffe to request for links to documentation on the design of the monitoring system, its operational features, and the counts of tree plantings to date

No response was received from Mayor Sutcliffe.

Comment. The lack of response caused some reviewers to recall earlier reports on "cone of silence" issues involving Ottawa council members, and the "tremendous priority" comment made by Sutcliffe about his purported regard for transparency and accountability **(8)**.

In my experience of dealing with politicians at all levels of government in multiple countries, they set modesty aside and take advantage of opportunities whenever they can to demonstrate to voters, the media, and other politicians that they have the answers to questions, the solutions to problems, the means to ends, the salve to ease concerns, etc., etc. Until Sutcliffe demonstrates otherwise, it is reasonable to take as given that there is no documentation on the design of the tree-planting monitoring system, including its operational features, nor are there counts of tree-plantings achieved to date which can be attributed to his "watch".

However, in the spirit of measure twice, cut once, Sutcliffe was again asked about his tree pledge in a letter published June 21, 2024, in the Ottawa Citizen under the heading "Why didn't mayor's tree plan take root?"

There was no communication to me from Sutcliffe, and to my knowledge there was no media comment from Sutcliffe.

In the continuing absence of a response from Sutcliffe an email was sent to each of Ottawa's 24 ward councillors. It is of course best practice for research design reasons that Sutcliffe himself account for his pledge. However, since he did not respond, best practice research is not available, and that means contacting the city's other municipal politicians, namely, councillors.

As for councillors' stake in this matter it is significant, and more significant for some than others. In general terms, one million tree plantings in four years leads to such ballpark figures as:

> 42,000 total plantings per ward;
> 10,500 annual plantings per ward; and,
> 1,500 monthly plantings per ward (seven-month planting season). **(9)**

And then there are questions about matters such as the species and/or mix of species to be planted, the ages and/or sizes of trees to be planted, where the plantings are to be

located, when the plantings are to occur, what is displaced to make space for the trees, as well as funding amounts and priorities for purchases, plantings, and maintenance.

Exhibit E. Request to Ottawa councillors Bradley, Brockington, Brown, Carr, Curry, Darouze, Desroches, Devine, Dudas, Hill, Hubley, Gower, Johnson, Kavanaugh, Kelly, King, Kitts, Leiper, Lo, Luloff, Menard, Plante, Tierney, and Troster to inform me of communications regarding the pledge by then-candidate and now-Mayor Mark Sutcliffe to plant 1,000,000 trees this term of office

The email to Councillor Bradley is used for illustrative purposes.

From: wellar.barry@gmail.com <wellar.barry@gmail.com>
Sent: Wednesday, August 28, 2024 4:28 PM
To: Jessica Bradley <Jessica.Bradley@ottawa.ca>
Cc: George A. Neville <george.neville@ncf.ca>; 'doug arnold' <douglasarnold@sympatico.ca>; 'Ecology Ottawa' <info@ecologyottawa.ca>; 'Horizon Ottawa' <info@horizonottawa.ca>; Martha.Copestake@ottawa.ca; wellar.barry@gmail.com
Subject: Your communications regarding the pledge by then-candidate and now-Mayor Mark Sutcliffe to plant 1,000,000 trees this term of office

Dear Councillor Bradley,

This is a follow-up email to you regarding the February 20, 2024, email to Mayor Mark Sutcliffe in which you are copied, "Subject: Numeric-based tables, graphics, and maps showing inventory of City of Ottawa tree plantings since the start of the current council's term of office."

By way of context, two Information Research Board reports are in progress regarding the Sutcliffe pledge of planting 1,000,000 trees during this term of office. The first report which will be posted in the next several weeks introduces the Universal Law of Location, and the second report which is scheduled for posting by the end of September is a case study examination of the pledge by Sutcliffe.

The purpose of this communication is to ask whether you as an individual member of council, or as a member of a committee or of council as a whole, are on record (City of Ottawa docs, newsletter, broadcast media item, social media item, etc.) since the beginning of this term for one or more questions, comments, concerns, issues, votes, decisions, position statements, communications, meeting minutes, committee reports, or other productions regarding the matter of where of the 1,000,000 tree plantings are to be located.

And, if you are on record, a related purpose of this communication is to ask you to provide the link(s) to any production(s) for possible inclusion in the forthcoming IRB report.

For your convenience, the complete communication of February 20, 2024, follows, including the exchange with Martha Copestake, R.P.F, Senior Forester – Planning, Natural Systems and Rural Affairs, Planning, Real Estate and Economic Development. City of Ottawa.

In my experience this request should involve a file search of less than 10 minutes which suggests a response date of September 5. However, to accommodate the preparation of a detailed response including multiple links, I am pleased to extend the due date to September 10, 2024

Thank you.

Dr. Barry Wellar, C.M.
Professor Emeritus, U of Ottawa
President, Information Research Board (IRB) Inc.
133 Ridgefield Cresent
Nepean ON K2H 6T4
CANADA

Comment.

Councillors fall into three groups

1. In **bold**, councillors who used the automatic reply function, and did not address the email communication presented in Exhibit D: Bradley, Brockington, Brown, Carr, Curry, **Darouze**, Desroches, Devine, Dudas, Hill, **Hubley**, **Gowe**r, Johnson, Kavanaugh, Kelly, King, Kitts, Leiper, Lo, Luloff, **Menard**, **Plante**, Tierney, and **Troster.**

2. In **bold**, councillors who did not reply to the email communication presented in Exhibit D: **Bradley**, Brockington, **Brown**, **Carr**, Curry, Darouze, **Desroches**, Devine, **Dudas**, **Hill**, Hubley, Gower, **Johnson**, **Kavanaugh**, **Kelly**, **King**, **Kitts**, **Leiper**, **Lo**, Luloff, Menard, Plante, Tierney, and Troster.

3. In **bold**, councillors who responded to the email communication presented in Exhibit D: Bradley, **Brockington**, Brown, Carr, **Curry**, Darouze, Desroches, **Devine**, Dudas, Hill, Hubley, Gower, Johnson, Kavanaugh, Kelly, King, Kitts, Leiper, Lo, **Luloff**, Menard, Plante, Tierney, and Troster.

In the absence of evidence to the contrary, twenty councillors – Bradley, Brown, Carr, Darouze, Desroches, Dudas, Hill, Hubley, Gower, Johnson, Kavanaugh, Kelly, King, Kitts, Leiper, Lo, Menard, Plante, Tierney, and Troster – are not on public record regarding the matter of where the 1,000,000 tree plantings pledged by then-candidate and now-Mayor Mark Sutcliffe are to be located.

The remaining four councillors – Brockington, Curry, Devine, and Luloff – affirmed that they too are not on public record regarding the matter of where the 1,000,000 tree plantings pledged by then-candidate and now-Mayor Mark Sutcliffe are to be located.

However, they did respond to the communication, and for reasons of courtesy on my part, and transparency, and accountability on all our parts, their responses are included in the report.

Exhibit F. Response from Councillor Riley Brockington

From: Brockington, Riley <Riley.Brockington@ottawa.ca>
Sent: Wednesday, August 28, 2024, 9:18 PM
To: wellar.barry@gmail.com
Subject: RE: Your communications regarding the pledge by then-candidate and now-Mayor Mark Sutcliffe to plant 1,000,000 trees this term of office

Good evening,

Every budget season, in particular, I ask about tree planting, but I can not recall if I have pursued another member's campaign promise. I may have asked but I can't remember.

I have more recently focused my attention on the Trees in Trust program and increasing ward targets for the tree canopy.

Riley Brockington

Comment. Thanks to Councillor Brockington for his response. Sutcliffe's 1,000,000 tree pledge amounts to 42,000 tree plantings per ward over four years, which breaks down to 10,500 plantings per year and 1,500 plantings per month during a 7-month planning season.

And, of course, if no Sutcliffe plantings occurred in year one, then the numbers go up accordingly. I have no information about the science behind Sutcliffe's number, but if it is data-driven then it is a puzzle as to why he did not include it in a response and inform citizens and councillors about his impression of ward targets.

Exhibit F. Response from Councillor Cathy Curry

From: Curry, Cathy <cathy.curry@ottawa.ca>
Sent: Thursday, August 29, 2024 11:16 AM
To: wellar.barry@gmail.com
Subject: Re: Your communications regarding the pledge by then-candidate and now-Mayor Mark Sutcliffe to plant 1,000,000 trees this term of office

Thanks for the question, Dr. Wellar. I don't think I am on record for specifically asking about the pledge by the mayor. I try to encourage all residents of Kanata to ask for a tree to be planted on the right of ways in front of their houses and to look for places in parks etc. that might be good locations as we need to plant more trees to meet our tree canopy target and City staff ask us to encourage residents in this way as well. Also, I like to encourage the Kanata North community associations or neighbourhood groups to work with City staff or Tree Canada to do more mass plantings. I know that two different groups identified two different locations in Kanata North (during my tenure) and they planted 200+ trees in each spot working with staff and Tree Canada.

In my personal opinion, I think the mayor's goal is laudable but challenging. We can certainly ask more about this when at Environment Committee? I am wondering, though, if you are trying to get more trees planted or just trying to criticize the mayor? Why do you ask?

Cathy

Cathy Curry (she, her/elle)
Councillor, Ward 4 – Kanata North
cathy.curry@ottawa.ca
kanatanorth.ca
613-580-2474 Ext. 17004
613-816-4717

Comment. Thanks to Councillor Curry for her response. It is informative to learn about 200+ trees going in at two locations in Ward 4. The Sutcliffe number call for 10,500 tree plantings per year per ward, so 2x200+ is a step in the right direction with many more steps yet to be taken to meet the Sutcliffe challenge. As to the why of my research, that is explained at the beginning of this report. And a deeper explanation associated with the discovery of the Universal Law of Location that something is everywhere below, on, and above the Earth's surface may be found in Universal Law of Location Supported by GIS as a Best Practice Element in Land Use Planning and Transportation Planning Decision Systems.

Finally, you were copied on the email of February 20, 2024, to Mayor Sutcliffe, with the subject title, "Numeric-based tables, graphics, and maps showing inventory of City of Ottawa tree plantings since the start of the current council's term of office." If the tables. graphics, and maps had been provided the requested materials would have been incorporated into the design of a GIS application.

Sutcliffe did not respond, hence the communication to councillors to learn if anyone is on record regarding the pledge and, in particular, informing citizens about where the 1,000,000 trees are to be planted.

Exhibit G. Response from Councillor Sean Devine

From: Devine, Sean <sean.devine@ottawa.ca>
Sent: Wednesday, August 28, 2024 5:43 PM
To: wellar.barry@gmail.com
Subject: RE: Your communications regarding the pledge by then-candidate and now-Mayor Mark Sutcliffe to plant 1,000,000 trees this term of office

Hi Barry,

If this is your question…

The purpose of this communication is to ask whether you as an individual member of council, or as a member of a committee or of council as a whole, are on record (City of Ottawa docs, newsletter, broadcast media item, social media item, etc.) since the beginning of this term for one or more questions, comments, concerns, issues, votes, decisions, position statements, communications, meeting minutes, committee reports, or other productions regarding the matter of where of the 1,000,000 tree plantings are to be located.

…then I don't honestly know the answer. I know that I've spoken at Environment & Climate Change Committee about trees, and about the City's various plans for trees, including the planning of trees, but I've got no idea whether or not the comments/questions I made/posed were in specific relation to Mayor Sutcliffe's campaign promise.

Thanks,

Sean

Comment. Thanks to Councillor DeVine for his response. As the records show, trees are a subject of conversation at Ottawa city hall for a variety of reasons including

climate change mitigation, flood control, soil stabilization, cooling at transit stops, sidewalk shade, windbreaks, and traffic calming.

Perhaps my communication will stir memories and some councillor may recall going on record to ask about the 1,000,000 trees and where is the money to pay for them.

Exhibit H. Response from Councillor Matt Luloff

From: Luloff, Matt <Matt.Luloff@ottawa.ca>
Sent: Wednesday, August 28, 2024 8:46 PM
To: wellar.barry@gmail.com
Subject: Re: Your communications regarding the pledge by then-candidate and now-Mayor Mark Sutcliffe to plant 1,000,000 trees this term of office

Hello Dr. Wellar,

I have concentrated on working with Forestry and Stage 2 teams on the planting of trees promised as part of the 'two trees to be planted for every one cut' policy of the Stage 2 LRT contract and on the replacement of damaged or dying trees in my ward, both of which fall outside of your query. I have also been proponent of the trees in trust program in my communications with my residents. This program, as I'm sure you are very familiar, offers a tree on the right of way in front of private property where one is desired and where feasible.

Please let me know if I can provide any further information and I will do my best to accommodate your request by your deadline.

I hope you are doing well.

M

Comment. Thanks to Councillor Luloff for his response. Presumably Sutcliffe knew about the tree programs already in place prior to making his pledge, which to my mind means that the 1,000,000 tree-plantings to which he refers are over and above what was already in play, in the pipeline, and budgeted for by previous councils.

In reference to where trees might be planted Councillor Luloff uses the qualifiers "where one is desired" and "where one is feasible", and those qualifiers make it very clear that private property owners dictate whether city trees are planted on private property. In the case of private property the owners have much to say about what goes where, and any politician who does not appreciate that fact of property ownership might be well advised to carefully read Universal Law of Location Supported by GIS as a Best Practice Element in Land Use Planning and Transportation Planning Decision Systems.

Table 2 provides a wrap-up of section D and a lead-in to section E by presenting the subjects of communications to City of Ottawa staff and politicians, and comments on their responses, regarding the pledge made by mayoral candidate and now-Mayor Mark Sutcliffe to plant 1,000,000 trees in this term of office.

Table 2. Email Subject Headings and Comments on Responses Regarding Pledge to Plant 1,000,000 Trees in the 2022-2026 Term of Ottice

Email Subject Heading	Comment
Communication to Senior Forester Martha Copestake requesting numeric-based tables, graphics, and maps showing inventory of City of Ottawa tree plantings since the start of the current council's term of office.	No mention is made of Sutcliffe's pledge to plant 1,000,000 trees in four years, no links are provided to direct examination of tree-planting files, no mention is made of resource allocations or re-allocations to support tree-planting programs, and there does not appear to be any GIS support to monitor where the trees are planted or to identify the locations of future plantings which would also reveal changes to landscapes and land uses in many if not all of Ottawa's 24 wards.
Request to Ottawa Mayor Mark Sutcliffe for links to documentation on the design of the monitoring system, its operational features, and the counts of tree plantings to date.	No response was received from Mayor Sutcliffe. In the absence of word to the contrary it is taken as given that there is no documentation on the design of the tree planting monitoring system, including its operational features, nor are there counts of tree plantings achieved to date which can be attributed to Sutcliffe's pledge or "watch".
Request to Ottawa councillors Bradley, Brockington, Brown, Carr, Curry, Darouze, Desroches, Devine, Dudas, Hill, Hubley, Gower, Johnson, Kavanaugh, Kelly, King, Kitts, Leiper, Lo, Luloff, Menard, Plante, Tierney, and Troster to inform me of communications regarding the pledge by then-candidate and now-Mayor Mark Sutcliffe to plant 1,000,000 trees this term of office.	No councillor affirmed that as an individual member of council, or as a member of a committee of council, he or she is on record (City of Ottawa docs, newsletter, broadcast media item, social media item, etc.) since the beginning of this term for one or more questions, comments, concerns, issues, votes, decisions, position statements, communications, meeting minutes, committee reports, or other productions regarding the matter of where of the 1,000,000 tree plantings are to be located.

The bottom line regarding communications with City of Ottawa staff and politicians about the standing of Sutcliffe's pledge to plant 1,000,000 trees this term of office (2022-2026) is that they uncovered no data or plans about generating data to support data-driven decisions, no evidence or plans about generating evidence to support evidence-based decisions as to where the 1,000,000 are to be planted, and no directives about how the tree-planting program is to be monitored.

In section F we recall materials in sections B, C, and D which could assist City of Ottawa politicians and staff make data-driven and evidence-based decisions and study choices about where to locate trees and how to monitor tree-planting activities.

F. Assessing the Utility of the Universal Law of Location as a Land use Planning Decision Tool

The basis of assessing the utility of the Universal Law of Location as a land use planning tool is whether:

1. It contributes data and evidence for data-driven and evidence-based decisions by Ottawa's municipal politicians.

2. It contributes terms of reference for data-driven or evidence-based studies to support decisions about where to locate trees and how to monitor tree-planting activities.

Comments about data, evidence, and terms of reference for studies have already been presented in sections B, C, and D, and selected items are recalled from each section. However, the focus of the report and communications to City of Ottawa officials are on the matter of where the trees are to be planted, so the focus of the validation test is on section D. Geographical Considerations Affecting Decisions about Planting 1,000,000 Trees in Four Years within the City of Ottawa.

Section F pulls those materials together to ascertain whether the bundle of findings can be deemed sufficient to validate the utility of the Universal Law of Location as a land use planning decision tool.

From Section B, Political Considerations

1. Climate change adaptation/mitigation

Trees as a climate change adaptation/mitigation agent can take 5-8 elections or more to grow to maturity. The Universal Law of Location emphasizes that since something is everywhere, decisions about where and when which species are planted deserve evidence-based consideration at the best practices level. One condition to be met to

achieve optimal effectiveness is taking into account the uses that are being displaced or replaced by trees.

2. Using GIS to allocate land uses from highest and best to lowest and worst locations for tree-planting

Due to pressures for allocating land to other uses (e.g., housing, roads) the Universal Law of Location affirms that given Ottawa's land area of 2,800,000,000m^2, dozens of land uses that manifest themselves under, on, and above the Earth's surface, many, many thousands of parcels, and some 80% of the city's records having a spatial aspect, it is necessary that a high-end GIS capability support decisions about where to best plant 1,000,000 trees and how to best monitor a tree-planting program.

3. Choosing among competing interests for urban land uses and urban land use locations

Citizens expect that politicians' decisions are made in the public interest, and that there are no sweetheart deals for developer friends and other financial supporters in matters involving land use designations in the Official Plan and zoning by-laws.

Key to achieving that obligation is highest regard for transparency of and accountability for the disposition of all property within the city's boundary.

The Universal Law of Location that something is everywhere under, on, and above the Earth's surface within the city boundary informs politicians and citizens as to the geographic scope of competing interests for land resources.

4. Linking where trees are planted with urban planning objectives

The Official Plan presents the land use planning objectives of the City of Ottawa. Tree plantings are a land use that occurs under, on, and above the Earth`s surface, so as part of statements about planning objectives it is required that the Official Plan report on where planting 1,000,000 trees is to occur to serve Official Plan objectives.

Since something is already everywhere due to previous planning objectives, it follows from the Universal Law of Location that planting 1,000,000 trees means updating planning objectives, as well as land use maps and whatever other maps represent entities under, on, and above the Earth's surface within the boundary of the City of Ottawa.

5. Applying Zero-Sum Logic to the Universal Law of Location

The Universal Law of Location states that something is everywhere under, on, and above the Earth's surface.

Applying zero-sum logic to the Universal Law of Location has numerous implications for land use planning. The following examples are illustrative of zero-sum relationships which are encountered in land use planning and land use decision-making. In the interests of ease of explanation, discussion is limited to changes which are on the surface. **(10)**

- If a shopping centre is located on prime agricultural land, then the land use designated commercial is increased and the body of prime agricultural land is decreased accordingly.
- If a four-lane road is carved out of a forest, then the land use designated transportation is increased, and the body of land use designated forest is decreased accordingly.
- If a wetland is drained and the land becomes occupied by a housing subdivision, then lands designated wetland are decreased and lands designated residential are increased accordingly.
- If greenspace is rezoned industrial, then lands designated greenspace are decreased and lands designated industrial are increased accordingly.
- If recreation land – golf course – is rezoned to urban forest, then the body of recreation lands is decreased, and lands designated urban forest are increased accordingly.
- If 1,000,000 trees are planted in the name of urban forest land use, then the body of land which accommodates the additions to forest cover is increased, and the body of land serving other uses is decreased accordingly.

As stated, combining the Universal Law of Location with zero-sum logic explicitly and succinctly demonstrates that prudent land use planning and responsible land use decision-making take into account both the trees that are being planted, and the lands that are changed to accommodate the trees.

From Section C, Financial Considerations

Planting and maintenance costs involving 1,000,000 trees is a multi-million-dollar enterprise, which puts great emphasis on matters of transparency and accountability so that politicians and citizens know the where, when, and amounts being spent on tree-planting by ward, by neighbourhood, etc., and whether revenues are lost so that trees can be planted. **(11)**

The Universal Law of Location which states that something is everywhere under, on, and above the Earth's surface provides the rationale for the detailed financial

accounting of how all land under, on, and above the Earth's surface within the city's boundary is being used. As demonstrated, tree-planting is a very instructive model for such documentation.

From Section D, Geographical Considerations

The Universal Law of Location which states that something is everywhere under, on, and above the Earth's surface provides the rationale for detailed spatial accounting of where trees are already located, as well as other land uses. Data on where trees are located and could be located can be used to make informed decisions about future tree-planting locations, as well as provide data/information about changes to other land uses as a result of accommodating tree-plantings.

Questions about where trees could be planted are prompted by the Universal Law of Location which informs that something is already located under, on, and above the Earth's surface where trees could potentially be planted. And the corollary that follows from previous planning and zoning actions is the need for spatial mapping of all entities under, on, and above the Earth's surface within the city boundary which could accommodate future tree plantings.

Further, in the core spirit of planning, and having all due regard for best practices, the Universal Law of Location prompts questions about where trees should be planted, with sections A, D, and G providing examples of goals, objectives, and criteria considered in policy, planning, and operations deliberations about tree-planting activities.

The Universal Law of Location therefore serves as a constant caution to forego the notion that trees can be plunked in the ground in a helter-skelter manner but, due to limited available space as well as political and financial considerations, they should be planted where they best serve the interests of current and future residents of Ottawa.

Moreover, geographic considerations imbedded in the Universal Law of Location lend themselves to textual, numeric, and graphic representations of where trees ae located, and their characteristics from planting through to maturity. The Universal Law of Location therefore makes a substantive case for a robust suite of tree-planting GIS applications to support data-driven and evidence-based land use policy and planning deliberations and decisions.

Finally, from an empirical perspective there is the matter of sharing tree-planting experiences among land use planners, arborists, conservationists, and other professionals and researchers from Ottawa and elsewhere.

And, in a related vein, it is anticipated that circulation of this report in the GIS community, with emphasis on contacts with members of the Geospatial Professional

Network and BeSpatial Ontario **(12)**, will contribute significant amounts of documentation on using GIS software and applications to support tree-planting activities and decisions at the municipal and regional land use planning levels.

G. Conclusion

The test for assessing the utility of the Universal Law of Location as a land use planning tool is whether:

> A. It contributes to enhancing data and evidence for data-driven and evidence-based decisions about where to locate trees and how to monitor tree-planting activities.
>
> B. It contributes terms of reference for data-driven or evidence-based studies to support decisions about where to locate trees and how to monitor tree-planting activities.

The respective contributions of the two measures of utility are summarized as follows.

First, regarding contribution A, the Universal Law of Location states that something is everywhere under, on, and above the Earth's surface. It therefore follows from the Law that if data-based decisions are to be made by municipal politicians or planners about where things are to be located, or could be located, or should be located, then one critical dataset needed for whatever tree-planting actions are undertaken are data describing the entities and their locations which are potentially subject to tree-planting activities.

If the City of Ottawa is already acquiring and using data on entities and locations under, on, and above the Earth's surface within the city boundary where trees could be planted, the contribution of the Universal Law of Location is to support that thought and the actions taken to achieve that thought.

And, if that is not the case, then the contribution of the Universal Law of Location is to put that thought before municipal politicians. That is, if city politicians profess to make data-driven and evidence-based decisions, then they must have the data and evidence to achieve those ends.

The term "universal" and the phrase "something is everywhere under, on, and above the Earth's surface" contribute to elaborating what is involved in this GIS mapping task.

Either way, the Universal Law of Location contributes to enhancing the bodies of data and evidence for data-driven and evidence-based decisions about the entities and locations affected by planting 1,000,000 trees in this term of office.

Second, regarding contribution B and the research studies domain, overriding challenges in the methodological design of scientific pilot studies, pre-test studies, trial run studies, exploratory studies, confirmatory studies, and other studies include ensuring that research questions and problem statements specify:

- Directions about the ends to be served by the study.
- Relationships to be explored and/or confirmed.
- Data to be collected for analysis, synthesis, or other purposes.
- The means by which data are collected and subjected to analysis, synthesis, and other procedures.

Methodologically designed applied research studies share all those design characteristics but add an operational aspect. That is, there may be one or many clients for the research product.

In this case there are three primary clients, that is, municipal politicians, planners and other staff, and citizens, Secondary clients include academics who combine client-driven and curiosity-driven research.

Contributions in the report to terms of reference for data-driven or evidence-based studies to support decisions about where to locate trees and how to monitor tree-planting activities include suggested applied research studies on such topics as:

- Climate change adaptation and mediation.
- GIS-based ranking system to allocate land uses from highest and best to lowest and worst locations for tree-planting.
- Choosing among competing interests for urban land uses and urban land use locations.
- Urban planning objectives of tree-planting.
- Incorporating a Zero-Sum Condition in the Official Plan.
- Full costing of the financial hit to buy, transport, plant, and maintain 1,000,000 trees in the 2022-2026 term.
- Documenting the 3-dimensional aspect of geographical barriers to tree-planting.
- Applying the zero-sum condition to ascertain which current land uses, at what locations are to be replaced, displaced, terminated, adjusted, modified, etc. to accommodate the trees.
- Mapping the locations of land uses and entities to be replaced, displaced, terminated, etc., by tree-planting activities.

The summary comment, therefore, is that the Universal Law of Location demonstrated its utility as a land use planning tool by its contributions to:

A. Enhancing data and evidence for data-driven and evidence-based decisions about where to locate trees and how to monitor tree-planting activities. And,

B. Proposing terms of reference for data-driven or evidence-based studies to support decisions about where to locate trees and how to monitor tree-planting activities.

H. Notes

1. Time in matters involving climate change was often referred to in centuries just several decades ago. In recent years it has becomes more common to see refences to climate changes in matters of decades. As a case in point, news stories in the 1970s and 1980s that were cited In Doomsday Map productions in the 1990s (e.g., https://wellar.ca/wellarconsulting/RotaryPresentation.pdf; https://www.wellar.ca/wellarconsulting/EsriGISRetroCOLL_PaperDDM_FINAL.pdf) were collapsing the climate change timeframe from more than a century to much less than a century, and now it is common to see references to relatively significant changes within decades.

2. An invited paper prepared by Wellar and Garrison for a joint meeting of the 2009 International Conference Canadian Operational Research Society/Institute for Operations Research and the Management Sciences (CORS/INFORMS) provides a detailed list of decision methods and techniques. https://users.encs.concordia.ca/~awasthi/CORSINFORMS2009/CORS-INFORMS%202009_Dr%20Wellar_PPT.pdf.

3. The influence that developers have on politicians has been the subject of heated discussion in many and perhaps most municipalities across Canada. However, not to be outdone the Ontario provincial government of Doug Ford became involved in the so-called Greenbelt fiasco, whereby developer friends of the government were widely seen to be given favourable treatment as a result of land use plan and zoning changes. That multi-billion dollar matter is now under investigation by the Royal Canadian Mounted Police. A Google search using the phrase "developer politician ties to ford government" takes the reader to numerous reports on that and other developer-politician stories.

4. The City of Ottawa is very familiar with the increasing costs that arise when land use development mistakes are made and need to be amended, as well as with the increasing costs that arise when transportation facility mistakes are made and need to

be amended. A report on applying zero-sum in transportation in on the IRB research agenda.

5. Thanks are given to City Manager Wendy Stephanson and to Randal Rodger, Program Manager of Geospatial Analytics, Technology, and Solutions for the boundary number.

6. Communications from NCC officials referred to a site of 10 acres which is an Imperial measure. A federal agency not using metric when selling/leasing federal land strikes me as odd, to the point of suspecting an unspoken agenda.

7. It appears fair to say that it would have been prudent for councillors to have asked pointed questions among themselves about the tree-planting pledge long before the outset of the Universal Law of Location research project. Had that happened this case study research would have proceeded at a much higher analytical level.

8. The "cone of silence" phrase refers to situations at Ottawa city hall when a majority of council led by mayors appear to take a vow of silence and do not respond to inquiries from citizens. In a media scrum Mayor Mark Sutcliffe expressed that matters of transparency and accountability are of "tremendous priority" to him. For in-depth discussion of the two situations see for example Interim Report 28. Implications of the "New Gang" of Non-Respondent Councillors Ignoring Calls to Improve Trust, Transparency, Accountability, and Public Access to Public Records; Interim Report 27. Implications of the "Old Gang" of Non-Respondent Councillors Ignoring Calls to Improve Trust, Transparency, Accountability, and Public Access to Public Records; Interim Report 26. Events Between Survey #1 and Survey #2 Which Could Affect City of Ottawa Politicians' Respect for Trust, Transparency, and Accountability, or Citizens' Access to Public Records; Interim Report 25. City of Ottawa Mayor and Councillors, 2022-2026: Do You Agree that Citizens Are Entitled to Free, Easy, Timely, and Direct Online Access to the Public Records Held by the City of Ottawa? Survey #2; Interim Report 21. Nomination for the 2020 Code of Silence Award: City of Ottawa Supporting Evidence – Media Stories That Indicate a Code of Silence Has Been Adopted by Members of Council; Interim Report 20. Nomination for the 2020 Code of Silence Award: City of Ottawa Supporting Evidence – Communications to Mayor and Councillors that Received 'The Silent Treatment'; Interim Report 19. Nomination for the 2020 Code of Silence Award: City of Ottawa Supporting Evidence – Reports from the Pilot Study Chronicling the Use of Transparency and Accountability as Political Buzzwords, and as Drivers Ensuring the Standard of Access to Public Records in Canada is Best Practice; Interim Report 18. Invoking the Code of Conduct to Publicly Oblige City of Ottawa Politicians to Demonstrate Due Regard for Transparency and Accountability

9. Obviously the annual and monthly numbers shift if there are planting delays due to weather, staffing, resources, availability of trees for planting, and especially if nothing is done in year one and year two, which appears to be the case.

10. Zero-sum outcomes also apply to under-surface and above- surface land use changes.

11. The benefits of planting 1,000,000 trees do not appear to have been detailed to date by now-Mayor Sutcliffe.

12. Geospatial Professional Network (formerly URISA) and BeSpatial Ontario are two organizations which have members who are engaged in a wide mix of GIS applications dealing with entities which are under and/or on and/or above the Earth's surface. Based on my experience with their members I expect that there will be pick-up on the tree-planting theme, in part because it is an excellent topic to use in association with zero-sum concepts, as well as discussions about know to present geospatial issues to the public, as well as politicians, non-GIS municipal staff, and journalists.

Acknowledgements

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- Dr. Owen Clarkin, Chair, Conservation Committee, and Vice-President, Ottawa Field-Naturalists' Club, for providing the numbers describing the trees in figure 1a to figure1h, and to Dr. Erwin Dreessen, Ecology Ottawa, for suggesting Dr. Clarkin for this task.