CITY OF SURREY

2016

SHADE TREE MANAGEMENT PLAN

SHADE TREE
MANAGEMENT PLAN

TABLE OF CONTENTS

CITY OF SURREY

MESSAGE FROM THE MAYOR

Surrey is known for its abundant parks, natural habitats and its commitment to sustainability. This commitment is documented in the City's Sustainability Charter, a progressive, overarching policy that establishes a 50-year vision for a sustainable community. Included in this Charter is direction for the protection, preservation and enhancement of Surrey's existing natural resources.

Surrey's shade trees, as critical components of the City's natural resources, contribute significantly to the overall livability of the City. Trees improve air quality, reduce heat, provide for wildlife, mitigate energy costs, beautify our communities, reduce storm water impacts, and are linked to improved health of residents.

This Shade Tree Management Plan will help to foster healthy ecosystems, and preserve our natural, living heritage; with its long-term vision for stewardship of Surrey's living environment, the Plan will maintain and protect our trees for the health and enjoyment of generations to come.

Sincerely,

Linda Hepner, Mayor
City of Surrey


12947

EXECUTIVE SUMMARY

Trees have numerous social, environmental, and economic benefits that contribute to improved quality of life for residents and visitors. Trees beautify our neighbourhoods, mitigate heating and cooling costs, reduce storm water impacts, improve air and water quality, increase commercial activity, and are linked to improved health of people. In the face of a changing climate evidenced by rising temperatures, longer more intense drought, and more frequent and damaging storms, the need to plant and manage a resilient inventory of shade trees has never been greater.

This Shade Tree Management Plan 2016 – 2036 (the Plan) provides a blueprint for the planning, design, development, and maintenance of the City of Surrey's public property shade trees located in its parks and along its streets. The Plan has been developed as a living document with recommended plan updates every five years within a 20-year Strategic Management Plan framework.

The Plan's purpose is to provide direction for sustainable public property shade tree management, including a clear, meaningful, and achievable framework to plan, develop, maintain, and enhance street, park, and civic property shade trees over the long-term. It will act as a guide for various Departments, including the Planning and Development Department, the Engineering Department, and the Parks, Recreation and Culture Department. The Plan does not include forest stand trees, as the management of forests is covered under the City's Natural Area Management Plan. Also, while there are numerous parallels with shade tree management principles, the City's two arboreta (located within Redwood Park and Green Timbers Park) and the City's heritage trees are managed through separate City documents, policies, and procedures.

The Plan relies on a variety of existing City plans and policies for its underlying support and general direction. The Official Community Plan, Sustainability Charter, Parks Recreation & Culture Strategic Plan, Ecosystem Management Study, and Biodiversity Conservation Strategy all provide justification for the need to proactively and progressively plan, develop, and maintain the City's shade tree inventory.

The City of Surrey currently follows a well-developed shade tree management program for the planting and maintenance of street and park trees. The City began planting street trees in 1977 and instituted an inventory database at that time. This database has evolved into GIS-based inventory that provides a platform from which to launch comprehensive tree management activities. Maintenance and management programs include watering, pruning, root management, soil management, pest management, storm response, hazard tree assessment and abatement, and tree debris management.

As of 2016, the City has over 75,000 street trees and 21,000 park trees aside from its natural forests. Presently, approximately 5,000 shade trees are planted each year. The proactive management approach that the City has taken, with a focus on scheduled maintenance work, results in efficient use of resources and has resulted in, and will continue to result in, reduced costs; enhanced environmental, social, and economic benefits; and safer trees leading to improved public safety derived from healthy, mature trees.

A recent analysis demonstrates that for every $1.00 spent on the costs of planting, maintaining, and managing shade trees in Surrey, $3.18 in benefits is realized in the form of energy savings, carbon sequestration, air quality improvements, storm water retention, property value increases, and other benefits. As the City's street and park shade tree inventory expands and matures, this benefit to cost ratio is expected to increase.

Continued focus on scheduled maintenance programs, community engagement and stewardship programs, and risk management programs are necessary for the City to optimize the net benefit of its shade trees in the coming decades. In particular, efforts to increase soil volume for shade trees at the time of planting and efforts to increase the involvement of urban forestry personnel in early planning stages for projects throughout the City are essential in the development of a shade tree inventory that enhances public safety and public health and well being for the long term.

VISION

Street and park shade trees are essential components of the environmental, social, and economic fabric of the City of Surrey. The City conserves its existing shade trees and invests in the growth and long-term management of its street, park, and civic property shade trees. Surrey's residents and businesses value the benefits of a shade tree urban forest that is diverse, healthy, and abundant throughout the civic properties, parks, and streets of the City. Residents recognize the vital role that the City's shade trees play in contributing to a healthy and safe environment for people. The City of Surrey's street, park, and civic property shade tree management program exemplifies sound and innovative management practices, cultivates community engagement and stewardship, and is recognized nationally as a centre for excellence in urban forestry by other jurisdictions.

GOALS

THE PLAN HAS FOUR PRIMARY GOALS:

1. **Protect, enhance, and increase the number of the City's shade trees.**
2. **Manage the City's shade trees to achieve conservation goals defined in the Sustainability Charter, Climate Adaptation Strategy, and Biodiversity Conservation Strategy.**
3. **Develop and maintain strong community engagement, stewardship, and education programs that encourage support for the City's shade trees.**
4. **Carry out best management practices for shade tree health and risk management in the interest of public safety and public health benefits.**

ACTION PLAN

The Action Plan is outlined in the Table below. Each entry is a measurable action item and/or objective intended to meet one of the four above-noted primary goals.

1	Protect, enhance, and increase the number of the City's shade tree	Implementation Timeframe & Frequency
a.	Review the effectiveness of Tree Cutting Bylaw 5835 for City Trees.	Q4 2017 5-year Review
b.	Plant the maximum number of street trees possible in every new development in accordance with Surrey's Parks Standard Construction Documents	Q4 2016 Annual Review
c.	Plant the maximum number of park trees possible in every new park in accordance with Surrey's Parks Standard Construction Documents	Q4 2016 Annual Review
d.	Plant trees within and adjacent to each new park parking lot to achieve 60% tree canopy cover over parking lots	Q4 2016 5-year Review
e.	Plant 1,000 street trees per year over the next 10 years in existing neighbourhoods where there is a canopy cover deficit to help achieve 5% of total City canopy cover by 2034	Q4 2026 Annual Review
f.	Plant 500 park trees per year over the next 10 years in existing parks where there is a canopy cover deficit to help achieve 1.5% of total City canopy cover by 2034	Q4 2026 Annual Review
g.	Carry out canopy cover review every 5 years using available tools (eg – i-Tree) to monitor progress towards achieving canopy cover targets	Q4 2021 5-year Review
h.	Monitor and enforce public property tree protection during park, subdivision, and in-fill lot development to reduce post-construction tree mortality	Q4 2016 Annual Review
i.	Meet annually with Park Landscape Operations and Development Services teams to remind workers how to avoid damaging trees during landscape maintenance and construction operations and how to prepare sites to optimize future tree health.	Q4 2016 Annual Review
j.	Meet annually with Engineering Operations staff to facilitate communication with urban forestry whenever a City tree may be impacted by their activities	Q4 2016 Annual Review
k.	Meet annually with Planning and Development staff to facilitate communication with urban forestry whenever a City tree may be impacted by proposed developments	Q4 2016 Annual Review
l.	Meet annually with Engineering Design and Construction and Transportation staff to facilitate communication with urban forestry whenever a City tree may be impacted by their activities	Q4 2016 Annual Review
m.	Meet bi-annually with Development Advisory Committee to discuss protection of trees on parkland adjacent to proposed developments and to discuss methods that can be implemented to optimize tree health.	Q4 2016 Annual Review
n.	Explore opportunities and methods to calculate tree canopy volume.	Q4 2018

A timeframe for implementation of each action is recommended based on consideration of the impact and achievability of the action item. Many items are easily achieved and therefore have a short timeline recommended for implementation. Others are not as easily achieved and/or have low impact; therefore they have a longer recommended implementation timeline.

2	**Manage the City's shade trees to achieve conservation goals defined in the Sustainability Charter, Climate Adaptation Strategy, and Biodiversity Conservation Strategy.**	**Implementation Timeframe & Frequency**
a.	Implement soil volume enhancing design techniques (such as soil cells, soil trenches, root paths, or structural soil) where minimum soil volumes cannot be provided	Q4 2016 Annual Review
b.	Plant trees in planting pits that are 2.5 times the diameter of the root ball, have sides sloped at least 45 degrees away from the tree, and amend the soil with high quality soil at 25% of total volume of existing soil	Q1 2017 (street trees) Q1 2018 (park trees)
c.	Select tree species and planting stock from provenances that will be well adapted to Surrey's future climate projections	Q4 2026 Annual Review
d.	Plant fewer maple trees on streets until a 20% genus and 10% species mix is achieved for greater species diversity.	Q4 2016
e.	Plant fewer western red cedar trees in parks until a 20% genus and 10% species mix is achieved for greater species diversity.	Q4 2016 Annual Review
f.	Plant medium to long lived street and park trees to achieve life span distribution of 85% medium to long lived tree species to maximize tree related benefits and reduce end of life cycle replacement costs	Q4 2016 5-year Review
g.	Plant street trees to achieve size class distribution of 15% small sized trees, 70% medium sized trees, and 15% large sized trees	Q4 2016 5-year Review
h.	Plant park trees to achieve size class distribution of 5% small sized trees, 40% medium sized trees, and 55% large sized trees	Q4 2016 5-year Review
i.	Carry out an analysis of available hyper-spectral and LIDAR data to determine whether the data can be used to reliably identify poor quality planting sites that require enhanced maintenance or renovation to ensure tree survival	Q4 2016
j.	Meet annually with Engineering Operations staff to facilitate communication with urban forestry whenever a City tree may be impacted by their activities	Q4 2017 5-year Review
k.	Evaluate and reprioritize park tree replacement planting practices to increase park tree replacements above current levels	Q3 2016
l.	Review the opportunity to establish the City of Surrey as a regional center for Urban Forest research by investing in street and park tree management initiatives and developing partnerships with key institutions	Q4 2018

3	**Develop and maintain strong community engagement, stewardship, and education programs that encourage support for the City's shade trees.**	**Implementation Timeframe & Frequency**
a.	Encourage residents to water shade trees by increasing the number of water bags delivered to residents by 10% each year for the next 5 years	Q2 2016 Annual Review
b.	Develop and implement "Great Trees in Surrey" web application	Q1 2016
c.	Re-introduce the Great Tree Hunt and highlight each successful nomination in the "Great Trees in Surrey" web application	Q1 2017
d.	Evaluate the community's interest in forming and participating in an advisory group that would assist the City in the management of shade trees	Q4 2016
e.	Utilize existing public engagement tools (eg – City Speaks) to facilitate public comment on the management of shade trees	Q1 2016
f.	Carry out analysis of the benefits of the City's shade trees every 5 years using available tools (eg – i-Tree) and communicate this information to the public via the City's website, social media tools, and print media	Q4 2021 5-year Review
g.	Plant at least 200 shade trees per year through community shade tree planting opportunities	Q4 2016 Annual Review
h.	Review tree sponsorship program and make recommendations for improvement.	Q4 2017
i.	Increase public education and awareness of the importance of City shade trees through public outreach, event attendance, and media engagement	Q2 2016 Annual Review

4	Carry out best management practices for shade tree health and risk management in the interest of public safety and public health benefits	Implementation Timeframe & Frequency
a.	Prune street trees every 3 years for the first 3 cycles, then prune every 5 years thereafter	Q4 2016 Annual Review
b.	Prune park trees every 4 years for the first 3 cycles, then prune every 10 years thereafter	Q4 2016 Annual Review
c.	Carry out post-construction soil testing and improvements (if necessary) around retained street and park trees to relieve soil compaction and increase tree survival	Q4 2026 Annual Review
d.	Develop and implement tree root management policy, guidelines, and procedures	Q1 2018
e.	Carry out tree risk assessment and abatement work every 5 years for high use parks and high use areas within parks.	Q4 2017 5-year Review
f.	Respond to shade tree service requests according to established priority ratings and ensure that current response-time delays are communicated to callers at time of contact	Q4 2016 Annual Review
g.	Respond to shade tree service requests immediately for emergency requests, within 10 working days for normal requests during normal call volume periods, and within 20 working days for normal requests during high call volume periods	Q4 2016 Annual Review
h.	Update the existing Storm Response Plan in consultation with other appropriate City departments and sections and communicate the updated plan to appropriate City departments and sections	Q4 2018
i.	Review the data currently collected for each tree and determine if other key attributes ought to be collected.	Q4 2017 Annual Review
j.	Develop and implement a long-term Integrated Pest Management Plan for street and park shade trees	Q4 2017
k.	Provide information to Council that will assist Council in making decisions related to the City's shade trees	Q4 2016
l.	Carry out a comprehensive review of strategies for the management of 'non-inventoried' street trees	Q2 2017
m.	Meet annually with urban forestry leaders from around the region to discuss common challenges, review emerging issues, and explore opportunities for collaborative research initiatives	Q4 2016
n.	Water shade trees during drought periods to maximize survival in order to protect the City's investment in shade trees	Q3 2016 Annual Review
o.	Develop and implement critical root zone management policy, guidelines, and procedures	Q4 2018
p.	Finalize the draft Tree Hazard Management Policy.	Q2 2017

TIMING

The ShadeTree Management Plan (the Plan) is a living document with recommended plan updates every five (5) years within a 20 year Strategic Management Plan framework.

BENEFITS OF TREES

Environmental Benefits:

- Carbon sequestration and reduced CO2 emissions
- Improved air and water quality
- Filtration of overland and subsurface contaminants
- Flood and storm water mitigation
- Reduction of urban heat island
- Erosion protection and soil conservation
- Shade and wind protection
- Weather and climate moderation
- Wildlife habitat and increased biodiversity

Economic Benefits:

- Increased tourism opportunities
- Reduced heating/cooling costs
- Increased property values and property tax revenue
- Reduced treatment loads and infrastructure requirements for storm water management
- Longer lifespan and reduced maintenance for shaded pavement
- Lower wastewater treatment costs due to natural filtration
- Increased commercial activity (more shoppers, longer and more frequent trips)
- Cleaner water to support fisheries due to natural filtration, erosion control, and slower run-off during storm events.

Social Benefits:

- Recreation/education opportunities
- Provide spiritual connection to nature
- Community stewardship
- Enhance neighbourhood quality and character (aesthetics, walkability, traffic calming, noise reduction)
- Spatial definition of public space and streetscapes
- Greater work productivity and job satisfaction
- Health benefits/reduced stress/ shelter from cancer-causing UV/ filtering particulate matter and absorbing noxious gases
- Improved student performance
- Increased public safety

NET BENEFIT OF TREES

In 2013, Surrey spent approximately $4,288,000 on the management of street and park shade trees. These costs were applied to an i-Tree Streets analysis using 2013 street and park shade tree inventory data. The resulting benefit to cost ratio of Surrey's street and park shade trees is 3.18 to 1. This ratio demonstrates that for every $1.00 spent on the costs of planting, maintaining, and managing shade trees in Surrey, $3.18 in benefits is realized in the form of energy savings, carbon sequestration, air quality improvements, storm water retention, property value increases, and other benefits listed in the table on the following page.

As the City's street and park shade tree inventory expands and matures, this benefit to cost ratio is expected to increase.

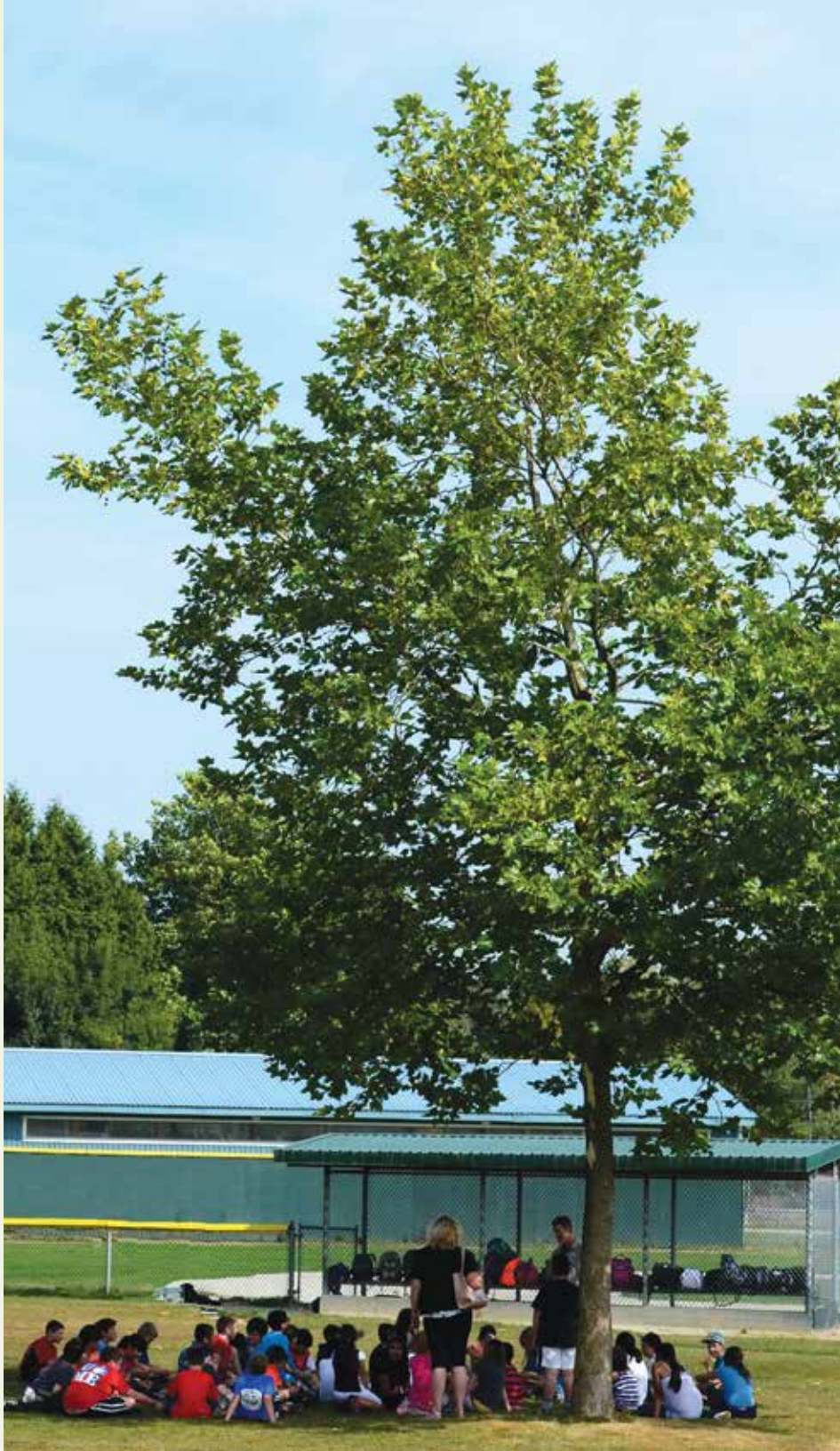
The following table summarizes the total dollar values and the dollar values per tree for the services provided by Surrey's street and park shade trees based on 2013 inventory data.

TABLE 2 Total net benefits output from i-Tree Streets for all street and park shade trees

Benefits	Total ($)	$/tree
Energy	$155,791	$1.76
CO^2	$45,523	$0.51
Air Quality	$86,502	$0.98
Storm water	$1,094,879	$12.35
Aesthetic/Other	$12,264,439	$138.28
Total Benefits ($)	$13,647,133	$153.87
Total Costs	$4,288,146	$48.35
Net Benefits	$9,358,987	$105.52
Benefit-cost ratio	3.18	n/a

TOTAL VALUE OF SURREY'S SHADE TREES

Based upon the i-Tree Streets analysis, the total replacement value for Surrey's street and park shade trees (as of 2013) is approximately $156,392,000.



TREE CANOPY COVER

Canopy cover is a percentage measure of the foliar area of trees (as viewed from above) within a given area. Measuring canopy cover and setting canopy cover targets for a City is a primary method of setting high level tree provision goals. The extent of a City's canopy cover is considered to be an indicator of the ecological well-being of a city. Surrey's street and park tree canopy cover was calculated using iTree Canopy software. For for the purposes of these calculations, the Agricultural Land Reserve (ALR) was excluded from the total area of land in the City because the ALR is not urban and tree canopy cover targets are not expected nor established for this land.

Current canopy cover for inventoried street trees is estimated to be **256 hectares** and canopy cover for an estimated 26,000 non-inventoried trees on City streets is estimated to be **96 hectares** (averaging 37 m2/tree). At maturity, these street trees will provide an estimated canopy cover of **769 hectares** (approximately 81 m2/tree). This area represents approximately 4.5% of developed land in the City.

Current canopy cover for park shade trees is estimated to be **90 hectares** (averaging 45 m2/tree).

At maturity, these park trees will have an estimated canopy cover of **164 hectares** (averaging 82 m2/tree). This area represents approximately 1.2% of developed land in the City.

In total, current street and park shade trees canopy cover represents an estimated 5.7% of developed land in the City. As the City continues to develop, the percentage of canopy cover provided by street and park shade trees can be increased in a number of ways including:

- Planting new street trees in older neighbourhoods
- Planting new park trees in existing parks
- Planting the largest tree possible at maturity in each planting location
- Planting new street and park trees in newly developed neighbourhoods

In total, current street and park shade trees canopy cover represents an estimated 5.7% of developed land in the City.

TREE CANOPY VOLUME

Canopy cover is the most common metric used to measure the extent of an urban forest. Another, less used measure of the extent of an urban forest is canopy volume. Canopy volume measures the size of the urban forest canopy in three dimensions. That is, the height of trees is calculated and computed in conjunction with typical canopy cover measurements.

Canopy volume may prove to be a valuable metric in determining the value of the urban forest because it can provide greater detail in approximating the overall size of the urban forest canopy. For example, in traditional canopy cover calculations, trees with a broad canopy contribute greatly to the total canopy cover even if they are relatively small trees in terms of height. And in traditional canopy cover calculations, trees with a columnar canopy contribute in only a minor way to the total canopy cover even if they are very tall trees. Therefore, canopy volume calculations would provide a more complete measure of the total size of the urban forest canopy and therefore a more complete measure of the benefits and services of the urban forest to its community.

The significance of measuring canopy volume over canopy cover will be particularly important in urban centres where tight space restrictions among buildings and infrastructure dictate that columnar trees are the most practical option for planting trees.

TREE POPULATION COMPOSITION

A healthy urban forest and its overall environmental value are derived, in large part, from its diversity. An urban forest with a composition of trees that has a wide range of ages, species, life spans, and mature sizes will result in an enhanced benefit-cost ratio for the City and supports the City's Green Infrastructure Network as described in the Biodiversity Conservation Strategy.

AGE DIVERSITY

Surrey's street and park tree inventory has been, and will continue to be, planted in concert with the build out of the City which will take place over a period of decades. The first street tree was planted in 1977 and the majority of initial plantings will likely continue well into the middle of this century. Park trees have been planted since the 1960's and planting has increased steadily since the late 1970's. In addition, mature remnant native trees, such as Douglas-fir, have been retained during development and new park development. All of these factors will result in a healthy range and distribution of tree age classes that are young, mature, and old for both street tree and park tree populations.

SURREY'S STREET AND PARK TREE INVENTORY HAS BEEN, AND WILL CONTINUE TO BE, PLANTED IN CONCERT WITH THE BUILD OUT OF THE CITY WHICH WILL TAKE PLACE OVER A PERIOD OF DECADES.

SPECIES DIVERSITY

Planting a wide range of tree species introduces genetic variety into the street and park shade tree population.

Risk of pest and/or disease outbreaks that contribute directly to higher maintenance costs and/or catastrophic loss is greater for street and park shade tree populations that have few tree species than it is for those populations with many tree species. The City's park and shade tree inventory currently has:

- Acer (maple) at 25.5% of the street shade tree inventory
- Thuja plicata (western red cedar) at 19% of the park shade tree inventory

A balanced ratio of a maximum of 30% of any one family, 20% of any one genus, and 10% of any one species or cultivar is recommended.

LIFE SPAN DISTRIBUTION

In an ideal world, only long lived trees such as oak trees would be planted as part of a shade and park tree population. Due to an array of planning and design criteria this is not always possible and perhaps not always even ideal. There may be occasions when the need is to plant a fast growing, short-lived tree species in order to achieve immediate effect. Also, there may be occasions when the tree planting location must be altered in the short term and the tree needs to be removed or relocated. This may occur in some street tree median planting sites where future road development will dictate the need to remove the median and trees to make way for transit lanes.

Urban forest planners can closely manage tree species diversity in order to ensure the street and park tree population has a reasonable life span distribution.

Managing species diversity will subsequently result in a tree population that has diverse life-span expectancy. The majority of trees in a population should be medium to long lived trees in order to maximize their benefits and delay life cycle replacement costs.

SIZE CLASS DISTRIBUTION

Ecological benefits generally correlate with the size of the tree. Large and medium sized trees intercept more water and pollutants, sequester more carbon, block more wind, and provide more shade than small sized trees. Therefore, the benefits of canopy cover can be achieved more effectively by planting medium and large sized trees, rather than smaller trees.

Pragmatically, it is challenging to provide roots and canopy space in urban street environments for large sized trees. Due to the many competing needs and requirements in a street environment, the majority of streetscapes can only accommodate the planting of medium sized trees. In some situations, planting only small sized trees is possible. Shortfall in available soil volume or restricted canopy space (i.e. overhead wires) often dictates the need to plant small sized trees.

In order to maximize the benefits derived from medium to large sized trees, thoughtful tree-sensitive space planning, construction standards, specifications and techniques can be employed, as outlined further on in this Plan, that will allow for a majority of medium and large sized street and park trees to be planted.

INVENTORY DATABASE

A comprehensive and accurate computerized database of the City's street and park shade trees is essential in order to make informed management decisions. This information provides City staff with important baseline data that allows managers to plan effectively, anticipate future needs, and allocate appropriate resources. The current inventory resides within the City's Geographic Information System (GIS) and work management system. From time to time, errors and/or omissions are noted and City staff work diligently to make corrections in a timely manner. It is planned that the practice of inventorying 100% of newly planted trees prior to the commencement of spring/summer maintenance programs (e.g. watering) be continued. The inventory is also available to the public through the City's online map tool, COSMOS.

CLIMATE ADAPTATION

Surrey's Climate Adaptation Strategy was developed to ensure our long-term resilience and prepare for climate change impacts. The Adaptation Strategy builds on existing policies and initiatives and will help the City anticipate and respond to changes in flood management and drainage; infrastructure; ecosystems and natural areas; urban trees and landscaping; human health and safety; and agriculture and food security.

The Climate Adaptation Strategy acknowledges that there will be an increase in tree mortality and change in urban forest composition due to an increase in temperature, decrease in summer precipitation, increase in winter precipitation, and the introduction of tree pathogens associated with warmer climates. Increased tree mortality will have a direct effect on public safety (tree failures), the local economy (lower property values), ecological functioning (loss of habitat and loss of green infrastructure), and costs to manage the urban forest (increased maintenance and replanting).

A critical aspect to the climate change process is that the very high rate of climate change will be characterized by the following:

1. Relatively fast and high tree mortality;
2. Relatively slow determination of what trees may be suitable and able to adapt to the changing climate that, in itself is difficult to predict; and
3. Relatively slow reestablishment of the urban forest; trees take decades to reach mature size.

As per the above, trees will die relatively rapidly and their reestablishment will be relatively slow resulting in a substantial loss in tree canopy cover and benefits derived from the urban forests.

Due to climate change, further and substantial stresses will be placed on trees in an urban environment where trees are already under abnormal stress. For instance, urban trees will adapt much better to climate change if good soil quality and appropriate soil volumes are installed to provide for adequate soil moisture during droughts and more rooting area to enable trees to withstand high wind events. Also, well designed and constructed drainage systems that will positively act to move excess rainfall will deal more effectively with the increased frequency of heavy rain events in the winter. Moreover, a diverse population of trees will suffer fewer losses than a tree population that has a high number of one genus (>20%) that may not adapt well to, or survive, during climate change.

CLIMATE MITIGATION

The results of the benefit-cost analysis found earlier in this Plan will change substantially in the future as the average temperatures increase in the summer and more precipitation is experienced in the winter. The benefits that trees provide in mitigating energy consumption will increase since trees cast shade, cool the urban environment, and reduce the reliance on air conditioning. As well, trees and the soils within which they are planted, have a positive influence on storm water management and, with increased rainfall in the winter, the benefits derived from trees will increase. Parked cars emit more hydrocarbons in the summer due to higher temperatures that lead to gas vapours, such as ground level ozone, and so the value of the shade provided by trees and the resulting cooling of the urban environment will reduce the levels of air pollution.

The importance and benefits associated with shade trees in the City of Surrey will increase substantially as climate change continues because trees effectively and directly buffer temperature extremes, reduce pollution associated with higher temperatures, and have a positive influence on storm water management.

GROWTH SPACE

In urban environments, planners strive to provide for the wide range of environmental, social, and economic values that a community identifies as important to its character and functioning. The community planning process is typified by ongoing collaboration and, ultimately, compromise in order to meet as many of the values in a given location as possible.

Like many cities, Surrey is well intentioned in developing an urban forest that results in neighbourhoods, streets, and parks that are adorned with beautiful trees that provide an array of benefits. And like most other cities, Surrey is unable to fully deliver on that goal mainly due to physical space limitations and competition for that space. Simply put, a large sized tree, with a canopy diameter of 14-18 meters, will not fit into an urban space where the street tree is located 1 meter from the road and 5 meters from the building front.

Like many cities, Surrey is well intentioned in developing an urban forest that results in neighbourhoods, streets, and parks that are adorned with beautiful trees that provide an array of benefits.

Focusing efforts on providing adequate space for trees, and planting the correctly sized tree in the available space, will result in substantially reduced costs associated with infrastructure damage caused by trunk buttress flare and root expansion. Moreover, it will reduce the incidence of trees uprooting and failing that is more common with trees that are 'wedged' into spaces too small for adequate root growth and anchoring. The City's *Park Standard Construction Document* provides Boulevard Tree Planting Standards that deal with potential infrastructure conflicts by specifying minimum planting distances from utilities, minimum required soil volume, and spacing distances between trees.

The City should focus on providing adequate space for the planting of, primarily, medium sized trees in streetscapes and medium to large sized trees in parks. Adopting this general approach will result in environmental benefits and provide a baseline from which to start when attempting to provide space in street and park locations.

Creative approaches are necessary in order to accommodate the root, buttress, and canopy space requirements of trees. It should be noted that, when fitting trees into urban environments, it is the canopy of the tree that can be reasonably manipulated to fit the space (i.e. through ongoing directional pruning) and the roots can sometimes be manipulated (pruned) but the buttress of the tree cannot be manipulated at all. Generally, space conflicts are much greater in streetscapes compared to parks.

The following elements of design will create additional space for trees.

- Wider boulevards are necessary to provide adequate opportunities to plant medium- and large-sized street trees. Efforts should be made to maintain a minimum boulevard width of 3 metres wherever possible in order to provide adequate space for street trees, while recognizing site constraints and that there may be exceptional circumstances. Such efforts may include enlarging the road allowance, reducing the lane width, reducing sidewalk width, or moving or eliminating sidewalks altogether on one side of the street.
- Curving sidewalks at planting intervals and creating curb 'pop outs' strategically along the street can provide additional space. Different boulevard configurations and street calming features can also accommodate street trees. These include roundabouts, raised medians, and intersection bulbs/chokers.

The following are a few suggestions for construction techniques that create space for trees.

- Engineered options are available to allow root growth under the pavement. These include bridging pavement, flexible pavers (recycled rubber), concrete alternatives (asphalt, mulch, and gravel), lowered planting sites, structural soils, porous surfaces, the use of soil cells underneath hardscapes, and the use of compacted coarse gravel under pavement surfaces. Reinforcing pavement is also an option to resist breakage and displacement.
- Root barriers can be used to restrict and redirect growth laterally or downwards, away from hardscape features. Linear barriers are recommended where possible, particularly in soils that restrict downward root growth. Roots can also be directed using subsurface materials to areas that have additional soil volume to support tree growth.

CREATIVE APPROACHES ARE NECESSARY IN ORDER TO ACCOMMODATE THE ROOT, BUTTRESS, AND CANOPY SPACE REQUIREMENTS OF TREES.

At the present time there are a number of City documents that contain some of the necessary standards, specifications, strategies, and guidelines that assist in the planning, design, and development processes that affect the sustainability of trees. For example:

- The *Parks Standard Construction Document* has several references throughout the document and contains information that ought to be referenced in the City of Surrey Engineering Department Supplementary Master Municipal Construction Document since the information is pertinent to roads, not parks. This includes the Boulevard Tree Planting Standards, root barrier, and structural soil specifications etc.
- The *Parks Standard Construction Document* references tree standards and specifications throughout the document and it would be better to locate them in one section.

Development of a Park Design Guidelines document is currently in progress. It is anticipated that this document will provide park planners and developers with the information necessary to consider proper spacing for trees and for future growth of trees.Hard infrastructure is often placed too close to trees causing eventual damage from root growth.

A number of creative planning, design, development, and construction techniques for tree welfare, such as those mentioned above are not found in other city documents and therefore are infrequently utilized. Actions identified in the Plan, including meetings and communicating between various City departments, are aimed at increasing the use of these techniques to enhance shade tree performance.

SOIL QUALITY AND VOLUME

The most important design criteria to ensure the optimal cost benefit derived from shade trees is the provision of adequate soil quality and volumes. Between 80% and 90% of tree health issues, particularly for young to maturing trees, is a result of 'below ground' issues which means more soil volume equates to larger, healthier trees and less tree decline and mortality.

The City generally provides good quality and adequate soil volumes for street trees located in arterial road medians. However, soil quality and, particularly, soil volumes could be improved for street trees planted in residential, commercial, or industrial development projects and for shade trees planted in Parks. Soil volume recommendations are:

- for large trees, 30 m3 (20 m3 if soil is shared by two or more trees)
- for medium trees, 20 m3 (15 m3 if soil is shared by two ore more trees)
- for small trees, 15 m3 (10 m3 if soil is shared by two or more trees)

Current tree planting specifications require, at minimum:

- tree pit diameter 600mm greater than the diameter of the root ball,
- scarified sides of the tree pit, and
- fill material amended 25% by volume with good quality soil.

Larger tree pits that are 2.5 times the diameter of the root ball and have sides sloped at least 45 degrees away from the tree are recommended.

TREE MAINTENANCE

The unique conditions and values associated with the urban environment require regular and intensive tree management. Regular maintenance maintains tree health and reduces mortality rates; thereby increasing the benefit cost ratio. Regular maintenance better manages risks associated with trees by implementing pruning programs that ensure the structural integrity of trees, thereby addressing public safety. Maintenance also prevents damage to adjacent infrastructure and private property.

To ensure the sustainability of the Urban Forest, shade trees must be proactively maintained with cost effective, regular, and comprehensive maintenance activities.

WATERING

With onset of climate change, and hotter, drier summers, the need to water trees more frequently will increase significantly. Over the last ten years the City has already seen a substantial increase in the need to water trees in order to prevent them from dying.

With the widespread use of residential water metres and increased City programs aimed at encouraging water conservation, the willingness of Surrey residents to water street trees on road allowances has decreased considerably. Staff report that they have received feedback from residents who refuse to water a City street tree due to the cost of water consumption that is charged to the resident even though the cost to water the tree is less than $3.00 per year. Staff also report that residential street tree mortality rates increased due to lack of water being applied to the trees which then necessitated the inclusion of residential street trees in the City's annual watering program.

Manual tree watering programs are carried out to ensure that young trees have sufficient water to survive during prolonged periods of drought when available soil moisture is low. The City of Surrey has established that watering young trees is the highest priority in its maintenance management program for trees.

The City's shade tree watering program begins each year when soil moisture readings reach a pre-determined threshold. Generally, the program runs from approximately mid-May to the end of September, however, current trends demonstrate that the number of weeks of required watering is increasing. Watering program length varies each year depending on drought conditions and the age of the tree. For example, over the 5-year period from 2008 to 2013, newly planted trees were watered an average of 14 weeks and 1-year old trees were watered an average of 12.6 weeks while 5 and 6 year old trees were watered an average of 5.8 weeks.

PRUNING

One of the most important tree maintenance activities is pruning which has multiple objectives such as ensuring structural integrity, eliminating conflicts with adjacent infrastructure and services, risk management, and generally ensuring tree health and longevity. Studies have shown that regular and cyclical pruning of trees is effective at meeting these objectives. These pruning programs also result in a cost effective and efficient delivery of services particularly with respect to street trees growing adjacent to residences, supporting the City's objective of providing excellent customer service.

The City's scheduled pruning program for inventoried trees is based on the age of each tree. Street trees are pruned at ages 3, 6, 9, 14, 19, and every 5 years thereafter. Park trees are pruned at ages 4, 8, 12, 19, 29, and every 10 years thereafter. Tree condition is assessed at each pruning visit including the canopy and scaffold branches, the trunk, and the root collar (to assess for girdling roots).

The City also carries out demand pruning when necessary to minimize conflict with adjacent infrastructure and to abate tree risk concerns.

From time to time, private property owners may contact the City to request pruning to a shade tree on City property. A City arborist will review the request and may agree to carry out pruning. In some cases, pruning may not be carried out (for example, if the scheduled pruning for the tree is scheduled within the year, demand pruning will not be carried out). In other cases, pruning may be carried out by the City at the City's expense (for example, if the tree is an inventoried tree and a branch is hanging below the City's pruning specifications for height clearance above a sidewalk, road, or driveway). In still other cases, pruning may be carried out by the City at the private property owner's expense. (For example, pruning that is deemed aesthetic in nature or pruning that is requested for a non-inventoried tree.

ROOT MANAGEMENT

Root management is a common and much needed activity in urban environments. Root management is carried out to mitigate the potential for damage by tree roots to hard surfaces and infrastructure commonly found in the urban environment. Surrey's shade trees are relatively young and the incidence and cost of root related issues is expected to grow significantly and exponentially over the next twenty years. Planning, design, and development with forethought to the future can significantly reduce the incidence of root and infrastructure damage and repair costs.

Surrey's root management procedures provide a consistent approach for managing reported issues or concerns. City arborists carry out root assessments when a property owner reports a concern to the City. Subsequent root pruning, top dressing, and/or root barrier installation work may be prescribed to address the concern where feasible without destabilizing the tree.

PEST MANAGEMENT

The City of Surrey's Integrated Pest Management (IPM) Policy requires that the management of trees adopts an integrated approach to managing pests that uses cultural, biological, and chemical methods to pest management. Further, Surrey's Pesticide Use Control By-law, 2010, No. 17160 controls the use of pesticides on City lands and on private lands zoned for single family or multiple unit residential uses.

Following the guidelines set out in the IPM Policy and within the terms of the Pesticide Use Control Bylaw, the City has implemented activities to deal with tree pest related issues. The majority of the work is related to responding to demand service request for street trees though the City has implemented some proactive monitoring and undertaken some preventive insect control.

With a maturing tree population and the risk of alien invasive insect introduction, it is timely that the City undertake development and implementation of a formal Integrated Pest Management Plan that determines pest management priorities, identifies preventative measures and thresholds for action, identifies preferred control measures, sets out response activities, provides recommendations and strategies to enhance communication, and develops improved understanding with the public.

TREE REMOVAL AND REPLACEMENT

Tree mortality in urban environments is usually relatively high due to adverse growing conditions including poor soil quality and volumes, compacted soils, too dry or too wet sites, vandalism, and mechanical damage from mowing equipment and other vehicles. The vast majority of tree mortality is from abiotic causes such as mechanical damage or drought rather than biotic causes such as insects and diseases. Utilizing best management practices for planning, design, development, and maintenance effectively lowers the rate of tree mortality and extends the life expectancy of trees.

The majority of tree mortality occurs in the first six years after planting when trees are most susceptible to vandalism or dying due to lack of water, substandard soil conditions, and/or mechanical damage.

For example, more than 20% of all removals were due to lack of water and mechanical damage. So this information is used to guide maintenance program adjustments, if necessary.

THE MOST IMPORTANT DESIGN CRITERIA TO ENSURE THE OPTIMAL COST BENEFIT DERIVED FROM SHADE TREES IS THE PROVISION OF ADEQUATE SOIL QUALITY AND VOLUMES.

When alternate ways and means to avoid the removal of a tree have been fully and reasonably considered for implementation, the City understands that shade trees may need to be removed from City property upon request.

The City of Surrey Parks, Recreation and Culture Department's Tree Removal Policy provides guidance to City staff with respect to requests for the removal of trees located on City property.

The general principles defined in the Tree Removal Policy include:

- In all cases, the relative value and benefit of the tree will be considered when determining a course of action.
- Public interest and benefit will generally outweigh private interest and benefit.
- When an individual, or group of individuals, are the primary beneficiaries from the city-approved removal of a tree, and there is no general public benefit or interest in the removal, the beneficiaries of the removal will pay the cost of the tree removal and compensatory planting.
- The intention is to retain trees that are healthy and functioning normally.
- A tree may not be removed when nuisance issues are reported, such as: too much shade; leaf drop; branch drop; substance dripping from the trees; presence of insects; release of pollen
- Reasonable efforts should be made to move the tree rather than remove the tree.

When a tree is removed from City property, the City strives to plant a replacement tree during the following planting season.

SERVICE REQUEST RESPONSE

The number of service requests to which Urban Forestry staff respond has increased dramatically over the last number of years. Over the 10-year period from 2004 to 2013, street tree service request calls increased by more than 95% from 1,886 to 3,679. Call volumes have continued to increase annually. During normal call volume periods, staff are generally able to respond to service requests within 10 working days. During periods of high call volume, however, the response period can be longer than 20 working days for non-emergency calls.

Staff recognize that these long response delays are an issue and have implemented strategies to deal with customer expectations including working with Call Centre staff to advise residents of current response delays; pulling staff off of preventive maintenance programs to assist with service request response; contracting out service request response for certain programs; and triaging calls for priority based on a number of factors that include risk and public profile of the location where the tree request originates from.

SOIL MANAGEMENT

Soil management, for the purposes of this plan, refers to activities such as maintaining bark mulch tree wells, fertilization, and preventing and relieving compaction in and around existing trees. Provision of good quality soils, adequate soil volume, and management of the tree root crown and root soil interface are very important in reducing tree mortality.

Soil compaction is a major cause of tree mortality and poor health in urban areas. Further, mechanical damage to young trees by mowing and trimming equipment is one of the primary causes of tree mortality in parks spaces. The City has implemented an annual tree base maintenance program in which bark mulch, rubber mat, or finely crushed rock gravel is installed around the base of young trees to mitigate and/or prevent some of the above impacts. However, mechanical damage by mowing equipment remains an all too common occurrence.

TREE PROTECTION

The City has initiated a wide range of education and information initiatives to inform residents that it is illegal to prune and/or damage City trees. For instance, the City places notices and four page inserts into local newspapers, hires students to go door to door, and when the City prunes a street tree they inform the resident that the pruning has taken place and that the resident is not permitted to do so themselves. Despite these efforts accidental and purposeful damage occurs to City trees and accounts for about 5% of tree mortality.

Tree Cutting on City Lands and Boulevards By-law No. 5835 should be reviewed since the By-law could be updated to be more effective for City staff. Although it currently functions to indicate that it is illegal to damage City trees, there are other more senior statutes and laws that more adequately accomplish this.

Existing trees on development sites can be exposed to a variety of impacts, many unintentional. To prevent unintentional negative impacts, the City has developed written standards, specifications, and guidelines for items such as minimum requirements for soil volume, root pruning specifications, limits of approach for machinery, and barrier fence specifications. These are found in documents such as the Parks Construction Standard document and the Park Design Guidelines.

There are guidelines and specifications for the protection of trees during planning and development that, if adhered to, will result in tree protection that best ensures the preservation of shade trees. However, more checks and balances are required, particularly on civic and park sites, through the planning and development phases to ensure the preservation of shade trees.

Landscape maintenance activities, particularly mowing of grass areas of medians, boulevards, and parks is of substantial concern. Equipment operators frequently damage tree trunks (e.g. - stripping bark with line trimmers or damaging trunks with mowers) to the point where the tree struggles to survive and may die. Efforts to minimize this damage include the installation of plastic guards around the base of newly planted trees; the installation of mulch wells around the base of trees; regular training and reminders to City and contractor mowing and trim crews; and educational information provided to the public through the website, newspapers, and flyers distributed at environmentally-themed events.

The City has initiated processes to provide enhanced protection to trees. For example, the 'Great Tree Hunt' is an ongoing program that encourages the public to nominate trees. The City then evaluates these trees using a certain criteria. The trees that meet the minimum 'greatness' requirement are commemorated as heritage trees and then, in some cases, added to Schedule B of Tree Protection By-law 16100, as Significant Trees. Only Mayor and Council can permit the removal of a Significant Tree and a permit is required to prune the tree if it is on private property. To date, hundreds of trees have been protected, the majority of which are on public property and are under an enhanced tree maintenance management program. More than a decade has passed since the City last promoted the Great Tree Hunt.

TREE DEBRIS MANAGEMENT

Tree management programs generate a considerable volume of debris including leaves, branches, and logs. Currently, the Parks Division reuses or recycles all tree debris in a variety of ways. Leaves in parks are usually mulched into lawns or spread into adjacent garden beds or natural areas. Alternatively, as a last resort, the leaves are transported to the central parks works yard and then transported to a location outside the City, currently in Richmond, where the leaves are composted to produce soil. Engineering Operations reports that virtually all leaves collected from City streets are also composted to produce soil. Wood chip debris produced during tree pruning or removal is reused as mulch in natural area restoration projects or in large shade tree wells, or it is provided to private property owners in need of wood chips. Seldom is there a need to transport the chips to be recycled into soil. Whole logs are often cut into rounds and used as firewood. Sometimes whole logs are milled into dimensional lumber, transported to be sold as timber, or chipped and composted into soil.

The City's Sustainability Charter sets out to maximize recycling and reuse, to innovate and expand the City's waste and recycling programs, and to use extensive composting as a waste management tool. The management of solid waste in the City is the mandate of the Engineering Department and the development and implementation of an organic waste biofuel processing facility within the City is underway. There may be opportunities to supply wood chips from City shade tree management operations to this facility.


STOP

NON-INVENTORIED TREES

Non-inventoried trees are native, remnant, and/or homeowner planted trees that are located on City road allowances and/or parks and are not currently included in the City's formal inventory of shade trees.

A critical aspect of the City's shade tree management is to meet or exceed overall tree canopy cover goals and conduct planting and maintenance programs to attain the goals. For this Plan, determining the current and future canopy cover for the City required the development of an estimate of the number and size of non-inventoried trees. According to the calculations, the non-inventoried tree population plays an important role in attaining that canopy cover goal. If the non-inventoried trees were inventoried and included in the City's proactive maintenance management program for street trees, the street tree canopy cover would be more accurately and reliably determined. This, in turn, would more accurately inform and assist decision makers with respect to planning to develop the City's urban forest, including allocation of resources, setting urban forest management priorities, and understanding the condition and potential future of this important aspect of the City's green infrastructure.

STREET TREES

The City refers to native, remnant, and/or home-owner planted trees that are located on City road allowances as "non-inventoried" street trees. Due to their location on City property these trees are effectively City-owned even though a resident may have planted the tree or the tree may have grown naturally from seed.

While non-inventoried street trees are City-owned and managed, non-inventoried street trees are maintained at a lower service level than inventoried street trees. At the present time, the City's service level for non-inventoried street trees is restricted exclusively to tree risk assessment upon request and subsequent work is carried out only if the risk of tree failure meets or exceeds existing City standards.

Should a resident request pruning or other work to a non-inventoried tree, the City may agree to carry out the work, however the work will be carried out by the City at the resident's expense.

Non-inventoried street trees are protected by the same laws and bylaws that protect inventoried street trees. If a resident is found to have damaged a non-inventoried street tree, the City will seek compensation for the damage from the resident.

PARK TREES

The City refers to trees that are located in Parks that may have been missed from the inventory process or self-seeded and naturally grown (these are often found along perimeter fence lines) as “non-inventoried” park trees.

When non-inventoried park trees are identified, City staff evaluate whether or not the tree should be included in the inventory. Generally, if the tree is in poor condition, a high risk of failure, or growing in an inappropriate location (e.g. – too close to a fence or other structure), the tree is removed and opportunities to plant new trees in the area are explored. If the tree is good condition and located in an appropriate location, the tree in brought into the inventory database for ongoing maintenance and management.

RISK MANAGEMENT

The City has a comprehensive tree maintenance program for the majority of its shade trees growing on road allowances (with the exception of non-inventoried trees described above) and for all of its inventoried park shade trees. During the pruning cycle the trees are inspected for likelihood of failure and the cycle is every 10 years for mature park and every 5 years for mature street shade trees. When the City receives a request to inspect a potentially hazardous shade tree, City arborists inspect the tree for risk of failure.

The 5 year interval for street trees is a reasonable time frame and will result in the majority of structural issues being addressed in a timely manner. In turn, this will result in relatively few failures for these trees. Since implementing the 5-year pruning rotation the City reports a considerable reduction in tree failures.

The 10 year interval for park trees may not be sufficient to address structural issues in a timely manner and may result in increased tree failures. However, this is mitigated by the fact that the general occupancy of parks and the corresponding risk of injury or damage from park shade tree failures are considerably lower than that for street trees because there is more frequent human occupancy in the vicinity of street trees than park trees. As well, since Parks Division staff carry out other work in parks, it is generally likely that the more obvious tree defects would be reported in the 10 year pruning interval.

Tree risk management and inspection for the thousands of non-inventoried street trees is carried out on a demand basis (i.e. - when the City receives a service request).

CREATIVE APPROACHES ARE NECESSARY IN ORDER TO ACCOMMODATE THE ROOT, BUTTRESS, AND CANOPY SPACE REQUIREMENTS OF TREES.

STORM RESPONSE

Storms can have an enormous impact on trees and infrastructure. The clearing of trees and branches after a storm provides faster access for first responders, line repair crews, and other emergency services personnel.

A successful, large scale response requires thorough pre-planning, coordination between contractors, utilities, and government authorities, open lines of communication, established chains of command, and flexibility as workloads and conditions change.

The City's Urban Forestry and Environmental Programs section has developed a storm response plan for the City's street and park shade trees and its forested areas. The current plan was last updated in 2007 and is focused on Urban Forestry's role in windstorm response. The plan continues to be valid and is reviewed after major storm events to ensure best practices are in place.

INTRA/INTER-DEPARTMENTAL COLLABORATION

Effective tree management requires collaboration between and within all relevant City departments, primarily Parks, Recreation and Culture, Engineering, and Planning and Development. Communication between departments is essential to improve delivery of service, allocate staff and resources efficiently, reduce waste and overlap, and increase the benefits derived from trees.

Collaboration will improve if management objectives are articulated and understood by all departments. This begins in the initial planning stages where opportunities to achieve multiple objectives through strategic planting should be explored at the outset. For example, trees should be considered an essential part of the infrastructure framework, rather than a stand-alone component. The Biodiversity Conservation Strategy highlights the essential role that trees play in the matrix of the City's Green Infrastructure Network.


SURREY
WELCOME

REGIONAL CONTEXT

The City of Surrey cooperates with other municipalities to achieve regional planning goals. The 1996 Livable Region Strategic Plan (LRSP) and successive 2010 Regional Growth Strategy (RGS) are two examples. Although not explicitly identified in these two documents, urban forest management is critical to meeting regional objectives for air and water quality, natural areas protection, recreation, and development of compact, livable, and healthy communities. Street and park shade trees play an important role in all of these.

Urban Forestry and Environmental Programs staff currently liaise with other urban forest professionals in cities and municipalities throughout the region. When Surrey's Urban Forestry staff is confronted with new challenges, consulting counterparts in other cities is important to learn how others have handled similar challenges.

The City of Surrey is ideally positioned to establish itself as a regional center for Urban Forest research due to its diversity of forest ecosystems, tree species, and development patterns.

ENGAGEMENT

PUBLIC EDUCATION, AWARENESS, AND STEWARDSHIP

The maintenance management and planting of public property trees is greatly enhanced through education, awareness, and stewardship (volunteer) programs. Benefits include reduction in damage and maintenance costs, increase in health and condition of the trees, as well as development of a sense of community within neighbourhoods.

Since the majority of street trees are planted adjacent to residential properties, virtually within the perceived 'yard' space of residences, there are opportunities for residents to both negatively and positively impact the trees. It is not uncommon for trees to be damaged by injury to the base of the tree via lawn mowing equipment, or by residents who attempt to prune the City tree in an effort to form the tree (often reduce the size) to their liking. However, many residents can and do take an interest in assisting with the growth of the trees by watering or maintaining a mulched tree well at the base of the tree.

Many Surrey residents are unaware of the need to assist with the watering of tree and lack the technical understanding about sound tree care such as the amount of water required to sustain the tree at varying times of the year. As well, there is a need for the City to clearly and regularly inform residents of the need to avoid damaging trees since many residents don't understand the outcome of their actions with respect to careless mowing and improper pruning.

Tree planting and maintenance programs that involve the public bring neighbourhoods together to enhance their street or park. The opportunity to plant trees in their neighbourhood may be the first time that neighbours meet one another. Although volunteer tree planting programs do not result in direct cost reduction in terms of planting the tree, these programs tend to create a sense of stewardship and connection with the tree so that the volunteers are more interested in the long term care of the tree. In addition, it provides an opportunity to deliver positive tree care messages to residents.

Tree planting and maintenance programs that involve the public bring neighbourhoods together to enhance their street or park.

The City has recognized the value derived from publishing information and education materials that inform residents of proper tree care practices. The City regularly produces multiple media pieces including brochures and multi-page newspaper inserts. As well, the City partners with non-profit groups to employ students who canvas homes door to door and speak with individual residents about the do's and don'ts with respect to street trees located adjacent to their property. Recently the City has initiated a volunteer 'Tree Team' that assists with education and information dissemination.

The City conducts a wide range of programs and events that provide the public with the opportunity to plants trees. Tree planting programs such as Releaf, Arbor Day, and National Tree Day bring the community together to improve neighbourhoods and parks.

PUBLIC ADVISORY AND ADVOCACY

At the present time there is strong community support for the planting and maintenance of shade trees. The City has affirmed its support for the provision and management of trees through a wide range of documents and funding sources. An example of one such document is the tree removal policy that requires careful evaluation of the tree and the issue at hand before a public property tree is removed.

As the City's street trees mature and attain their maximum growth potential, the various issues related to their impact on the public will grow exponentially. There is every reason to expect that more and more requests for tree removal will occur as the impacts from trees, such as leaf litter, insect nuisance, and root issues, cause concern for residents and businesses alike.

Although the tree removal policy was adopted to reflect the importance of trees and essentially protect the trees from casual removal, the policy is still subject to interpretation and the sentiment of the day. The decision to retain or remove a tree can be a complex process, fraught with value based discussions and the rights and needs of individuals in comparison to the broader community and, therefore, sometimes deserving of review by a broader audience.

Many important aspects of a City's service delivery are assisted with governance through advisory or advocacy committees and associations such as the Outdoor Sport Advisory Committee, Arts Council, Fraser Valley Heritage Rail Society, Surrey Historical Society, Green Timbers Heritage Society, Sunnyside Acres Heritage Society, and Surrey Board of Trade. These groups advocate for worthwhile endeavors and advise the City, providing a much needed balance, essential information, and discussion that results in a better community.

The institutionalization of a tree advocacy or advisory group can add value to the management of trees in the City. Similar to the Outdoor Sport Advisory Committee, this group could review tree related issues and act as a 'sounding board' for the City administration. Essentially, the group could, through issue analysis, further refine the interpretation of the tree removal policy and advise the City on the best course of action. The composition of the advisory committee would need to reflect the various interests and cultural diversity of the City.

Alternatively, an advocacy group could be formed that would function in a capacity similar to the Fraser Valley Heritage Rail Society that has a mission to restore and operate an interurban railway. Similarly, a tree advocacy group could have a mission to preserve, protect, and enhance the City's shade trees. The group could raise funds, conduct events and partner with the City and other groups to plant trees. A group such as this could provide an important voice and perhaps balance to various decision making processes.

RESEARCH

The Canadian Urban Forest Network (CANUFNET) was established in 2004 to support development of a Canadian Urban Forest Strategy. Surrey is a member organization of its provincial subsidiary, the BC Urban Forest Network. CANUFNET's mandate supports Canada's National Forest Strategy (also developed in 2004) which advocates for Urban Forestry and Public Engagement in Sustainability as one of its eight strategic themes. Some of the CANUFNET's key recommendations are to determine research capacity, needs, and priorities.

The CANUFNET also recommends establishing a national Urban Forest Research Centre. This could be modeled on the USDA's Urban Ecosystems and Social Dynamics Program, Urban Ecosystem Processes Team (formerly the Center for Urban Forest Research), which demonstrates the types of capabilities, programs, and research that can be provided.

The City of Surrey is ideally positioned to establish itself as a regional center for Urban Forest research due to its diversity of forest ecosystems, tree species, and development patterns. This would distinguish the City as a leader in urban forestry, while helping to expand knowledge of Urban Forest management. Research partnerships with university, government, and private institutions should be pursued to build support for this endeavor.

The City of Surrey is engaged in urban forestry research projects in collaboration with the University of British Columbia, Faculty of Forestry and also with the British Columbia Institute of Technology.

ACKNOWLEDGEMENTS

The City of Surrey would like to thank all those who have contributed to the Shade Tree Management Plan. This document would not have been possible without the guidance, direction, and feedback received from numerous City staff from the Parks, Recreation and Culture, Planning and Development, and Engineering Departments. In addition, the City wishes to thank Diamond Head Consulting Ltd. for their shade tree data analysis contributions in the early stages of the project.

Design, layout and production provided by the City of Surrey - Marketing & Communications | Prepared by the Parks Division

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