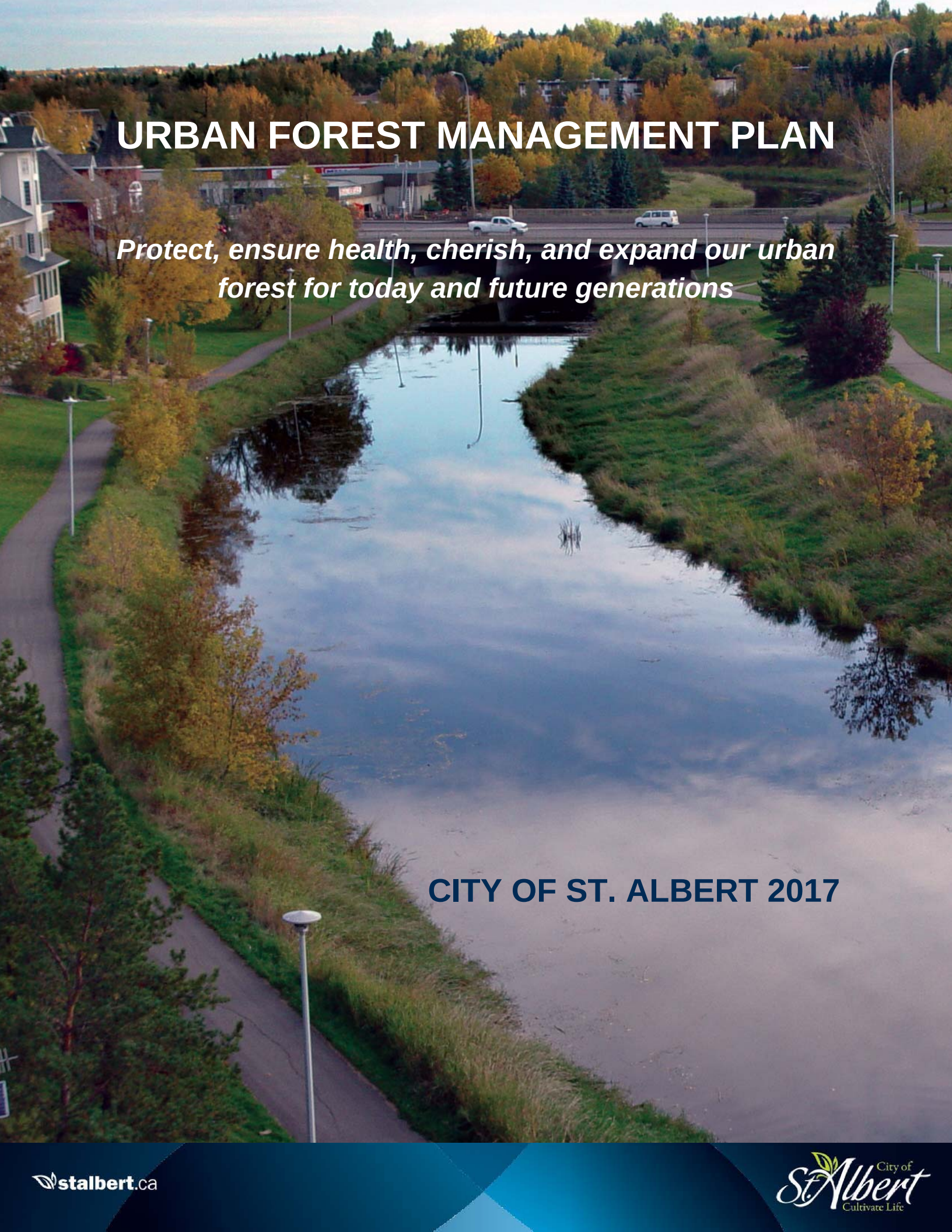


URBAN FOREST MANAGEMENT PLAN

Protect, ensure health, cherish, and expand our urban forest for today and future generations

CITY OF ST. ALBERT 2017

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EXECUTIVE SUMMARY

The City of St. Albert has always been closely connected to its natural setting. The Sturgeon River valley, where settlement began, remains the City's iconic and natural centre consisting of recreation spaces surrounded by urban forest. The Red Willow Trail system winds through this river valley and out to neighbourhoods, connecting residents with park areas. The parks, green spaces, and natural areas are part of our community identity. Effective, sustainable management of these assets will ensure they continue to serve the community for generations.

St. Albert's Urban Forest Management Plan (UFMP) will sustainably manage and enhance our diverse urban forest. The plan provides strategic direction for our entire urban forest, including all trees within city limits – whether planted, naturally occurring, or accidentally seeded. Trees in parks, natural areas, the river valley, ravines, roadways, and roof-top gardens, as well as on commercial, residential, and private lands, are all part of the urban forest and within the scope of this plan.

Collectively, St. Albert's trees represent an irreplaceable asset. Unlike grey infrastructure (hard structures such as sidewalks and roads), trees increase in value over time. The urban forest also makes a quantifiable contribution to the long-term livability of our city. The St. Albert urban forest is essential to community health and well being, providing economic, environmental, and ecological benefits.

The vision - *"Protect, ensure health, cherish, and expand our urban forest for today and future generations."* - recognizes that the urban forest we plant today will be the urban forest of the future.

Goals of the UFMP include:

1. Develop and maintain strong community-wide support for the urban forest by increasing awareness among City staff, local landowners, and residents about the benefits and services provided by the urban forest and how to care for it.

   Outcome: Passionate and knowledgeable staff, landowners, and residents

2. Design and manage the urban forest to maximize watershed health, biodiversity, and conservation of sensitive ecosystems to support the recommendations of the Natural Areas Management Plan.

   Outcome: Healthy, thriving, and connected ecosystems

3. Protect, enhance, and expand St. Albert's urban forest by:

   - increasing urban forest cover to optimal levels in neighbourhoods currently exhibiting low canopy cover (levels to be determined);

   - continuing a vigorous street-tree replacement program (minimum 1 to 1);

- creating opportunities to retain and enhance the urban forest;
- developing urban forest guidelines specific to different land uses;
- ensuring all development, internal and external, follow up-to-date engineering standards; and
- ensuring engineering standards are adaptable so that all vegetation can thrive and reach its full potential (site specific, on approval by City).

Outcome: Right trees in the right places, reaching their full potential

4. Transition the City from a reactive to a proactive urban forest management approach by implementing policies and management practices for maintaining and protecting existing trees and planting new trees.

   Outcome: Effective resource allocation and sustainable canopy cover

Current efforts include:

- establishing a five-year maintenance cycle for all public trees;
- realigning of existing organizational structure to define a 'trees' specific and UFMP task specific crew (w/o benefit of supervisor position to manage daily operational tasks),
- beginning a comprehensive, GIS-based tree inventory, building on data captured in 2008;
- replacing and planting new trees (Canopy Enhancement Charter, 2016-2018);
- naturalization and other planting events;
- following proactive pest and disease management practices;
- collaborating with other departments on projects to reduce conflicts between trees and other infrastructure;
- working with regional partners for advice and to share results;
- ensuring that all tree work is performed under the direction of Certified Arborists or Registered Professional Foresters;
- creating partnerships with the community.

Canopy Cover

Many communities are establishing targets for tree-canopy cover as part of their efforts to secure the long-term future of their urban forests. Tree-canopy cover is the amount and distribution of leaf area in a community and is a useful way to assess an urban forest. As canopy cover increases, so do the benefits afforded by leaf area: climate control and energy savings;

improvement of air, soil, and water quality; mitigation of storm-water runoff; reduction of greenhouse gas carbon dioxide; provision of wildlife habitat; and increased real estate value and community vitality (Maco and McPherson, 2002). St. Albert's current overall canopy cover is approximately 13 per cent which includes fully developed, developing and undeveloped lands.

While St. Albert is currently at 13% (a value that will remain our minimum canopy cover), a target of 20% within 20 years is very realistic with the existing trees that are currently in the inventory. Achieving this target requires existing trees be retained, maintained and allowed to mature, and that trees lost are replaced.

As the St. Albert boundary may change over time with undeveloped lands becoming part of the municipality (therefore temporarily reducing the canopy cover percent), a more practical way to assess canopy cover and associated targets may be through land use. Dividing St. Albert into 3 simple land use categories – residential, commercial, industrial – and developing targets for those land uses is a more realistic method to analyze canopy cover.

Proposed Canopy Cover Target by Land Use

Land Use	Cover (current)	Cover (goal)
Residential	15.8%	25%
Industrial	5.8%	10%
Commercial	14.4%	15%
Entire City (all land uses)	13%	20%

Future challenges and opportunities to be considered include:

1. comprehensive measurement and assessment of urban forest
2. proper maintenance on current tree inventory
3. planting in locations to ensure maximum benefits, increase canopy cover
4. focusing on young tree care
5. minimizing tree root conflict with grey infrastructure
6. adapting to climate change
7. incorporating food production into the urban forest
8. maintaining biodiversity and habitat
9. managing for new invasive species
10. managing for public safety

Recommendations

Recommendations consider the current and future urban forest, achievable by short, medium or long term timelines.

1	Canopy Cover
A	Establish a minimum target for canopy cover.
B	Establish a canopy cover goal (percent), by 2037, based on land use.
C	Establish a canopy cover goal (percent), by 2037, overall for entire city boundary.

2	Investment in Maintaining the Current Urban Forest
A	Sustain ongoing maintenance, on a predictable and repeatable cycle.
B	Provide regular reports to Council on progress of measurable urban forest objectives.
C	Continue involvement in regional and provincial tree care organizations.

3	Investments in Staff Time and Resources
A	Recruit and train qualified staff, equip staff with necessary tools for planning and management purposes. Classify an FTE as UFMP supervisor to manage daily operational tasks allowing manager to coordinate mid and long-term activities.

4	Investments in Enhancing the Urban Forest Asset
A	Continue purchasing new plant stock for boulevard and park lands, as well as for the design and construction of any special infrastructure to support these trees, such as soil vaults or soil cells.
B	Review landscape plans (both design and as-built).
C	Develop and implement new procedures and approaches, revise building and development guidelines and requirements, update engineering standards, and address urban forest considerations in community and functional planning initiatives.
D	Increase investment in community outreach and communication.
E	Develop a tree risk management policy defining responsibilities, thresholds for tree removal.
F	Develop educational programs to expand resident awareness of the urban forest.
G	Establish best standards for tree maintenance, tree planting, and tree establishment.
H	Explore inclusion of urban forest or its components as tangible capital asset.
I	Establish tree-protection standards during urban development.
J	Establish punitive penalties for tree removal or tree injury by developers, such as issuing fines and requiring trees be replaced at a minimum of a 2:1 ratio.
K	Require developers to pay for tree removal, replacement, and establishment.
L	Require new technologies to be applied during tree development.
M	Enhance coordination between departmental programs to share best practices.
N	Refine planning tools and methods that further enable: • detailed urban forest analysis for proactive maintenance planning; • identification of environmental priorities for management, canopy gaps, and planting opportunities; and • use of defined performance measures.
O	Increase canopy cover and the reasonable distribution of tree canopy;
P	Increase biodiversity of trees and other vegetation, and reducing non-native invasive species.

Q	Adjust the uneven distribution of tree sizes by increasing the number of mid- to large-sized trees.
R	Use accepted industry analysis programs to value benefits and costs associated with urban forest.
S	Create residential subdivision plans identifying opportunities for additional planting.

The Urban Forest Management Plan is a living document that provides strategies and actions to help us wisely manage the urban forest. The next step is to develop an implementation plan to ensure that St. Albert continues to have a diverse and sustainable urban forest able to enhance the wellbeing and quality of life of its citizens.

The implementation plan will focus on the strategies and action plans outlined in the UFMP, identifying system indicators, responsible parties, timelines, and budget requirements.

With adoption of this document as a planning tool to create an effective implementation plan for Council's detailed review and approval, staff at the City of St. Albert can continue to ensure that both the community and staff ***"Protect, ensure health, cherish, and expand our urban forest for today and future generations."***

A healthy, diverse urban forest is an irreplaceable asset that contributes to St. Albert's long-term livability and Botanical Arts City image. This resource provides direct tangible environmental, ecological, economic, and social benefits by improving our air quality, reducing energy consumption, keeping soil from eroding, and conserving water resources. With careful stewardship, these benefits can continue for generations.

1 ST. ALBERT'S URBAN FOREST

1.1 Introduction

1.1.1 Purpose

The Urban Forest Management Plan (UFMP) guides the long term strategic planning for managing the urban forest throughout St. Albert. It gives direction to assist the city and its residents, both now and in the future, to sustain and grow its urban forest. This document is part of the city's ongoing efforts to strengthen its commitment to managing and enhancing St. Albert's urban forest.



1.1.2 Definition - Urban Forest

An urban forest consists of all vegetation, including trees, shrubs, and grasses, in a municipality's boundary. The vegetation can be naturally occurring or planted and exist on private and public property. Examples include trees along streets, parks, ravines, and natural areas, vegetation in the river valley, landscaped open spaces associated with buildings, cemeteries, and roof tops, and commercial and industrial lands.

1.1.3 Evolution of St. Albert's Urban Forest

The City of St. Albert has always been closely connected to its natural setting. The Sturgeon River valley, where settlement began, remains the city's iconic and natural centre and a focal area for recreation. The Red Willow Trail system winds through this river valley and out to neighbourhoods, connecting residents with park areas. The parks, green spaces, and natural areas are part of our community identity. Trees and treed areas play an important role for residents. In community satisfaction surveys, parks, green spaces, and river and trail systems consistently have been identified as one of the top factors contributing to a high quality of life in St. Albert (Banister, 2014). In addition, more than 90 per cent of residents expressed satisfaction with the outdoor recreation areas, parks, and trail system. These surveys show the high regard residents hold for the presence, proximity, and accessibility of the city's green spaces and natural areas, as well as the desire to see this perpetuated.

The Community Vision, Cultivating Our Future (2015) report contains a vision statement directly linked to the urban forest:

> *"We protect, embrace and treasure our deeply rooted connections with the natural environment through championing environmental action."*

These values have also been embedded in many more of St. Albert's guiding plans, bylaws, and policies. The City's foundational plan, the Municipal Development Plan 2007 (updated in 2013), explicitly addresses the value of our natural assets in this vision statement:

> *"St. Albert is an inclusive, family-oriented community that values its natural, cultural, historical and recreational amenities. Our community secures the safety and well-being of its people through controlled growth, innovation and dynamic leadership."*

This sentiment is emphasized in the 2014 Environmental Master Plan, which includes a goal to:

> *"Preserve and manage trees, parks and natural areas, and a commitment to maintaining a healthy natural environment and ensuring its sustainability for future generations."*

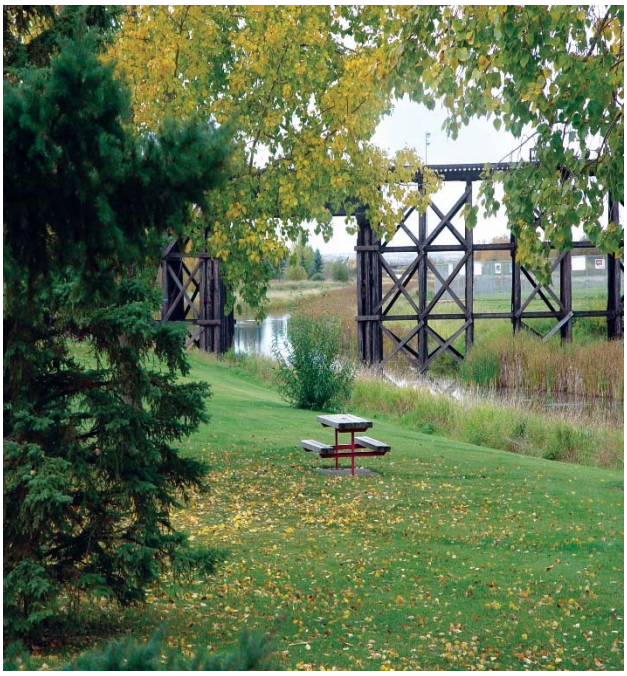
The urban forest is also linked to recommendations in the Recreation Master Plan (2012), specifically:

> *"Opportunities for all to interact with and experience nature."*

In 2014, St. Albert City Council approved the Urban Forest Management Policy (Appendix A). This policy sets the city on the path of effective urban forest management with the Urban Forest Management Plan being one of the outcomes.

> *The Urban Forest Management Policy provides a framework for the consistent protection, management and sustainability of the city's Urban Forest. It also preserves and enhances St. Albert's tree canopy that consists of a beautiful, healthy and diverse tree population.*
>
> *The next key step to supporting this Policy will be the development of an Urban Forest Management Plan. City Administration in collaboration with the Environmental Advisory Committee anticipates beginning the development of this long-term strategic plan in 2015.*

St. Albert's urban forest has evolved quite dramatically from its beginnings 150 years ago. Boundaries have changed, land use has changed, and the urban forest has changed in response to these broader changes in the city. Today's urban forest includes remnants of native vegetation, mature and semi-mature residential trees, municipal beautification efforts around buildings, parks, and roadways, and more recent plantings associated with new development.



Most formal urban-forest planning is restricted to the city's treed boulevards and parks, which are a small fraction of the urban forest and tend to focus on aesthetics and, more recently, natural area management. While the presence of the forest has political and community support, there has been no coherent strategy to guide the development of urban-forest planning.

Many Canadian municipalities have similar challenges and have created urban forest management plans, strategies, or mandates. This includes Edmonton, Calgary, Red Deer, and Strathcona County. Appendix B lists Canadian municipalities that have guiding principles for their urban forests. Currently, more than 80 per cent of Canadians live in urban areas (Statistics Canada). This trend is expected to continue. St. Albert's population will continue to rise over the next several decades. To ensure St. Albert remains one of the best places to live in Canada (Money sense Magazine, 2014), the size and health of its urban forest must be sustainable.

St. Albert's Urban Forest Management Plan will sustainably manage and enhance our diverse urban forest so that it will continue to serve this community for generations. The plan provides strategic direction for our entire urban forest, including all trees within City limits – whether planted, naturally occurring, or accidentally seeded. Trees in parks, natural areas, the river valley, ravines, roadways, and roof-top gardens, and other public properties are all part of the urban forest and within the scope of this plan.

Collectively, St. Albert's trees represent an irreplaceable asset. Unlike grey infrastructure (hard structures such as sidewalks and roads), trees increase in value over time. The urban forest also makes a quantifiable contribution to the long-term livability of our city. Using the United States Department of Agriculture and Forest Service modelling program iTree, City staff will measure and quantify the urban forest's ability to clean the air, reduce storm-water runoff, and sequester carbon.

1.2 Vision and Goals

This document sets out a vision, guiding principles, goals, and a series of actions for progressively improving the quality and quantity of St. Albert's urban forest so that all who live, work, and play in the city can continue to derive the full range of benefits that the urban forest provides. The future sustainability and expansion of the urban forest will require the support of the entire community.

1.2.1 Vision Statement

Building on the City of St. Albert Strategic Plan, the Urban Forest Management Plan long-term vision recognizes that the urban forest we plant today will be the urban forest of that future.

> *"Protect, ensure health, cherish, and expand our urban forest for today and future generations."*

Guiding principles and goals are detailed in Section 4.

2 BENEFITS OF AN URBAN FOREST

It is well documented that urban forests provide significant environmental and community benefits, and thanks to evolving research tools, trees are being increasingly recognized as valuable municipal assets. If properly managed, an urban forest can support a variety of environmental functions, provide a range of economic benefits, and make significant contributions to human health and community well-being (City of Toronto, 2013). Well-maintained trees and landscaped business districts have been shown to encourage consumer purchases and attract increased residential, commercial, and public investments (Wolf, 2004).

2.1 Environmental and Ecological Benefits

St. Albert's environment and ecology greatly benefit from its urban forest. The monetary value of these benefits will be determined after a comprehensive tree inventory is completed.

Some of the benefits of St. Albert's urban forest include:

- Mitigating the effects of climate change by sequestering and storing carbon and releasing oxygen for people to breathe.
- Helping with storm-water management by stabilizing steep slopes and controlling erosion by taking up water through their roots. Vegetation also improves surface-water quality. All of this reduces damage from storm-water runoff by absorbing rainfall or delaying its flow into drainage areas. These benefits are particularly relevant in our ravine areas.
- Providing essential habitats and corridors for wildlife movement for a wide range of resident and migratory species of wildlife.
- Providing habitats for hundreds of native plant species.
- Reducing the heat-island effect that occurs because of land-surface modification during development.
- Improving air quality by filtering dust and absorbing ozone, carbon monoxide, sulphur dioxide, nitrogen oxides, airborne ammonia, and heavy metals. The volume of this filtration will be calculated after a comprehensive tree inventory is completed.

- Improving water quality by shading streams, lowering water temperature, and filtering pollution that would otherwise enter the river.

- Moderating temperatures and reducing the energy needed for heating and cooling.

2.2 Human Health and Community Benefits

In addition to the environmental and ecological benefits, the urban forest is critical to the health of our community by linking our residents to their natural environment. Large urban centres are subject to high levels of pollution, which can create and aggravate health issues, such as respiratory illnesses and severe allergies.



Trees and green spaces have been specifically linked to better health in urban residents. Studies in various locations in the United States and Great Britain found that children from green neighbourhoods were less likely to gain weight and had lower asthma rates than their counterparts in less green neighbourhoods (Liu et al., 2007). In Great Britain, health disparities between high- and low-income populations were less among families who lived in neighbourhoods with green surroundings.

Some of the many health benefits from a community's urban forest and open spaces include:

- Lowering blood pressure and cholesterol levels, increasing survival rates of heart attacks, reducing recovery times from surgery, and reducing minor medical complaints (Toronto Health, 2011).

- Improving concentration, lowering stress, and enhancing mental development and creativity (Dannenberg et al., 2011).

- Reducing crime by revitalizing neighbourhoods, encouraging better neighbour relationships, and reducing aggressive behaviour (Kuo and Sullivan, 2001).

- Increasing physical activity by making walking and cycling routes aesthetically pleasing. Physical activity has been clearly linked to a decreased risk of chronic diseases, such as colon cancer, type 2 diabetes, osteoporosis, and heart disease. Studies have demonstrated that

people walk and cycle more if routes have less air pollution (more trees), are convenient, and safe (Marshall et al., 2009).

- Reducing exposure to ultraviolet (UV) rays by offering shade and absorbing up to 95 per cent of UV radiation (Tree Canada, 2008). Over-exposure to the UV radiation in sunlight increases the risk of skin cancer, cataracts, and premature skin aging and wrinkling. Skin cancer is the most common cancer diagnosed in Canadians, yet it is largely preventable. Children are at greater risk of UV radiation over-exposure because they generally spend more time outdoors and have more sensitive skin than adults.

- Providing aesthetic value and improving quality of life by creating a sense of privacy and adding character to surroundings. Urban forests also promote environmental responsibility and ethical behaviour, and they have been shown to reduce traffic speeds.

2.3 Economic Benefits

It is no coincidence that some of the areas of highest property value in the city are associated with ravines and other treed, green spaces. Research has shown that appraised property values of homes adjacent to parks and open spaces are typically higher than those of comparable properties elsewhere (Anderson and Cordell, 1988).

The benefits of trees in commercial areas are also well documented. For example, one study showed that rental rates were about seven per cent higher for commercial office properties with quality landscaping, which included trees (Crompton, 2004). Other studies have shown that consumers claim they are willing to pay more for products in downtown shopping areas containing trees versus comparable districts without trees (Wolf, 2009).

In addition to increasing property values, trees provide other economic benefits, including:

- Reducing outdoor temperatures, providing shade, and cooling buildings. Large urban centres get hotter and retain heat longer during heat waves because the heat is absorbed and stored in concrete and pavement.

- Reducing cooling costs in the summer and heating costs in the winter (particularly coniferous trees) if the trees are at least 6 m tall and within 18 m of a residential or small building. These direct savings are linked to shading, windbreak effects, and local microclimate moderation (TRCA, 2009).

- Supporting the function and extending the life of grey infrastructure in urban areas.

- Attracting and maintaining businesses and tourism and contributing to economic stability as well as community spirit and pride. This supports the City of St. Albert's brand as the Botanical Arts City.

2.4 Increasing Urban Forest Benefits to the Community

2.4.1 Optimal Functionality

Trees are planted for many reasons. Today, trees are valued for a wider range of functions and benefits than in years past, but many of the current treed environments are not working to their full potential. In addition, new infrastructure and changing land uses result in greater conflict, particularly with public trees. The City's challenge is to foster the design and development of highly productive treed environments that minimize conflict, nuisance, and risk.

Treed environments should be designed thoughtfully to provide a combination of ecological and landscape functions and benefits. In addition to being well integrated with the built environment, key criteria should include connectivity with other greenspaces, patch size, and biological complexity. The planting of larger growing tree species with native plant communities should be encouraged wherever practical. Poplar species, although not appropriate where values at risk exist, are fast growing, large canopy trees that, when in the right place, produce many benefits.

Examples of treed environments optimized for functionality include:

- Boulevards or sidewalks with appropriate soil volumes, minimal compaction, and minimal conflicts with utilities, such as the new plantings along St. Anne Street.
- Parking lots with soil cells and pervious pavers to support more and larger shade trees and enhanced rainwater infiltration (e.g., Citygreen soil cells in an Edmonton parking lot, Botanic Park).
- Riparian areas that are restored and re-vegetated to improve stream quality.
- Sensitive ecosystems that are managed to reduce invasive species and recover species at risk.
- Natural areas that are restored, expanded, and connected to other areas with high natural values.
- City-owned properties that are reclaimed as urban parkland or community gardens with intensive food production including fruit and nut trees (Heritage Park site).
- Park areas that are modified to support more trees, greater biodiversity, and different-use opportunities for residents.
- Street boulevards and medians that are re-stocked with larger and more resilient trees where space allows.



- Commercial landscapes that are made more productive by incorporating more native plants and greater ecosystem complexity.
- Treed areas within public, commercial, and residential landscapes that are connected and well maintained to form ribbons of greenspace.

2.4.2 Food Production

With the renewed interest in locally produced food and issues around food security, there is greater pressure to ensure that public spaces are scrutinized for their potential to provide space and opportunities to produce fruits and vegetables. Due to the high number of people renting or living in multi-unit buildings that lack access to land, the demand for community gardens exceeds supply. Currently, there is only one public community garden space, two on private lands (churches), and a food forest though other opportunities are being explored, such as community gardens at fire halls.

Many trees and shrubs could be planted for food production, such as apple trees and berry bushes. Public Works staff members have been planting some nut trees such as horse chestnuts and walnuts.

Although fruit and nut trees on public land can provide many benefits, they also present challenges. For instance, fruit and nut trees on boulevards may create hazards through falling fruit or nuts damaging vehicles, and harvesting may present safety issues. In addition, if fruits are not harvested, animals such as coyotes and pests such as wasps may be attracted to the area and create a safety issue for residents. However, on quieter streets, there may be opportunities to work with neighbourhood groups and to create community events that celebrate the harvest.

Another option may be to offer structured agreements with organized community groups to grow food-producing trees and edible landscapes in City parks or on unused public land, potentially as part of a Partners in Parks or similar program. Regardless of where food-bearing trees are planted on public lands (boulevards, parks, or other public spaces), the questions of ownership of product and responsibility for tree maintenance need to be resolved. These will require additional staff time and resources to manage, but they could be explored in consultation with neighbourhoods, community groups, and local businesses.



2.4.3 Biodiversity and Habitat

As cities develop and land parcels are increasingly subdivided, larger patches of tree cover become fragmented. Their ecological complexity and value are reduced, and wildlife habitat and

biodiversity values decline. Genetic diversity is also affected as the normal patterns of genetic transmission across the landscape are interrupted. Over time, this simplification diminishes the resilience of the landscape to change (City of Victoria, 2013). St. Albert contains many small patches of urban forest that contain some or all the components of important wildlife habitats.

Several strategies can support local biodiversity. One is to have larger patches of habitat, (such as the Red Willow Trail system and Big Lake), that can support a diversity of species. A second is to create connections between these habitat patches to foster the safe passage of smaller species and the genetic transmission of native flora. The Natural Areas Management Plan has suggestions on how the city can determine its habitat restoration priorities and the landscape attributes and opportunities needed to achieve these.

There are several opportunities to enhance habitat corridors in St. Albert. Engineering standards specify how trails should be built, the access distances, and seating areas. Generous greenspace along these corridors will support active public transportation and a reduced greenhouse gas footprint, as well as increasing habitat and biodiversity potential.

Boulevards, storm water management facilities, and properties adjacent to parkland natural areas can be strategically enhanced to create ecosystem corridors and connections throughout the city as part of the Red Willow Trail system.

2.4.4 Invasive Species

Invasive, non-native species—both plants and animals—are one of the greatest threats to the integrity of natural ecosystems. Invasive species are an issue in many of St. Albert's parks and natural areas. Invasive plants of concern are those categorized as prohibited noxious and noxious by the Province of Alberta. These include Canada thistle, tansy, flowering rush, and burdock, all of which can take over natural areas and reduce the natural habitats and food sources for native plants and animals.

The City of St. Albert has a proactive approach to the management of invasive plants. Public Works staff members regularly remove invasive species as they find them on public lands, and they offer advice and encouragement to homeowners to remove them from private property. The city organizes Weed Warrior events with volunteers who remove large infestations of invasive plants. St. Albert is also part of the Alberta Invasive Species Council, an organization that works with municipalities to share ideas and address the issues (www.abinvasives.ca).



St. Albert is known for its natural parkland and tree-lined streetscapes. The threats to the health of this urban forest are ever changing due to environmental and man-made stresses. The varying weather and moisture conditions, as well as the competition for water and nutrient resources, have added stresses that make the tree population at risk to diseases and insect pests. Global-scale economies can transport foreign disease and pest problems to our community rapidly.

The loss of a tree species to the community can be a landscape-changing crisis. Diversifying our tree species will lessen the effect on the community, both visually and financially.

The best, proactive approach to maintain tree health includes:

- Monitoring and rapid response to issues.
- Scheduling inspections by skilled persons.
- Trapping and monitoring known threats.

Healthy trees look better and are less vulnerable to disease and pests.

A coordinated, regional approach has been protecting the region's green infrastructure for Dutch elm disease and other insects. The provincial STOPDED society promotes the protection of trees at risk through cooperation and education. St. Albert is an active member in the society and coordinates other initiatives to address other infestations.

3 ST. ALBERT'S CURRENT URBAN FOREST

A desirable urban forest is about quality as much as quantity. It contains a diversity of high quality, productive treed environments, distributed throughout a community. A high quality and productive urban forest is one that, while abundant, makes room for and supports the broad range of values, needs, and functions within a city like St. Albert. The urban forest character and density will vary by neighbourhood and land-use type, reflect local growing conditions, and will provide many different functions and benefits for all species that live there.

3.1 Current Initiatives

1. Establishing a five-year pruning cycle for all public trees (Appendix D).
2. Beginning a comprehensive, GIS-based tree inventory, building on data captured in 2008.
3. Replacing trees (missing trees program) and planting new trees (Canopy Enhancement Charter, 2016-2018).
4. Removing vegetation encroaching onto private lands where vegetation is hazardous or causing interference.
5. Naturalization and planting events such as Arbor Day, Clean and Green River Fest, and community group plantings.
6. Following proactive pest and disease management practices.
7. Collaborating with other departments on projects to reduce conflicts between trees and other infrastructure.
8. Collaborating with the Environment Department to support the Natural Areas Management Plan.
9. Advocating changes to development standards to benefit plant health.
10. Supporting training and networking opportunities for staff with provincial counterparts.
11. Working with provincial and regional partners, such as the Society to Prevent Dutch Elm Disease (STOPDED) and the International Society of Arboriculture (ISA) for advice and to share results.
12. Using the Members of the Canadian Urban Forest Network forum to seek advice and share results with municipal forest managers in Canada.
13. Ensuring that all tree work is performed under the direction of Certified Arborists.
14. Consulting with the River Edge Enhancement Project team, the Grey Nuns White Spruce Park working team, the Big Lake Environment Support Society (BLESS), and the Environmental Advisory Committee (EAC).
15. Creating partnerships with the community, such as the use of some public lands for food production (food forest at the Heritage Park), grants that encourage creating and enhancing greenways (EAC grants), and community involvement in planting events and invasive-species removal events.

3.2 Urban Forest Canopy

Many communities are establishing targets for tree-canopy cover, which is the amount and distribution of leaf area, as part of their efforts to secure the long-term future of their urban forests (Table 1). It is a useful way to assess an urban forest and is the driving force behind an urban forest's ability to produce benefits for a community. As canopy cover increases, so do the benefits afforded by leaf area: climate control and energy savings; improvement of air, soil, and water quality; mitigation of storm-water runoff; reduction of greenhouse gas carbon dioxide; provision of wildlife habitat; and increased real estate value and community vitality (Maco and McPherson, 2002).

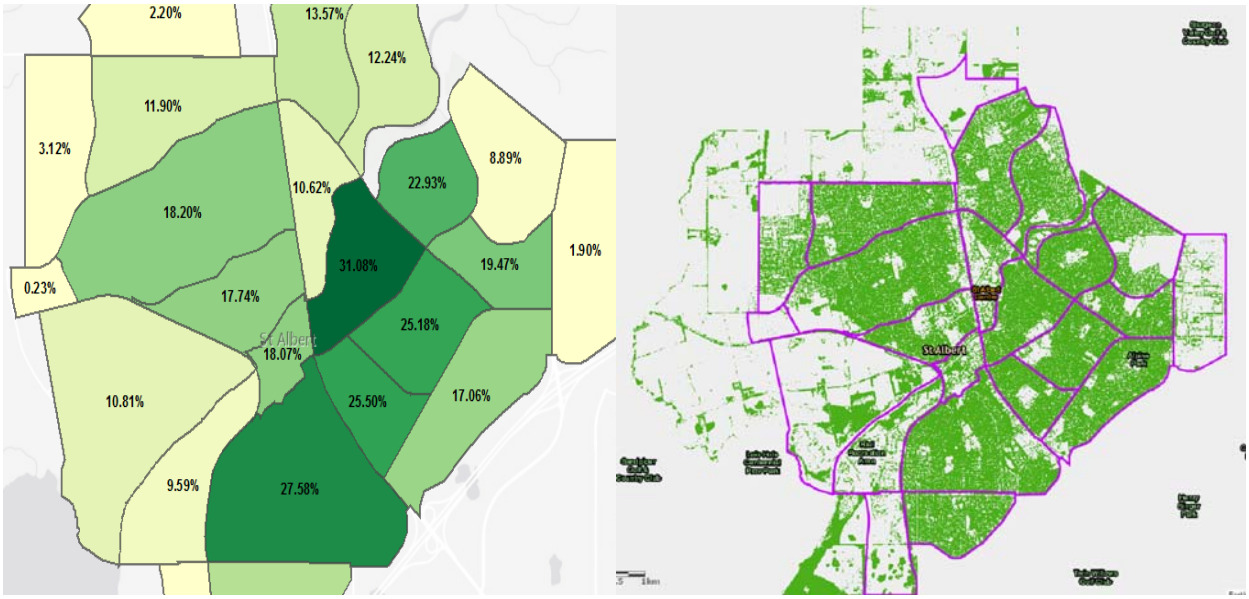


FIGURE 1 St. Albert estimated canopy cover using LIDAR imagery (2015). Darker green represents neighborhoods with greater canopy cover.

Although tree-canopy cover targets are generally considered to be a positive step forward, care must be exercised. Such targets must be achievable and sustainable. It is important when developing canopy targets that the public values them and that policy priorities are considered. Also, canopy coverage is not the lone indicator of an urban forests health or sustainability. Values can fluctuate due to such things as land being acquired or lost, development occurring, land use changes, significant weather events or age related mortality.

A 2015 study of tree-canopy coverage in St. Albert, using LIDAR data (Figure 5), shows that the canopy cover ranges from a low of 0.23 per cent in the new development of Ville Giroux to a high of 31 per cent in the Braeside subdivision (Table 1). Most established residential neighbourhoods have a tree cover ranging from 12 to 28 per cent, whereas the light-industrial area of Campbell has less than 2 per cent tree-canopy cover.

TABLE 1 Estimated canopy cover in St. Albert neighbourhoods

Neighbourhood	Cover (2015)
Akinsdale	17.06%
Braeside	31.08%
Campbell	1.90%
Deer Ridge	11.90%
Downtown	18.07%
Erin Ridge	13.57%
Forest Lawn	25.18%
Grandin	27.58%
Inglewood	10.62%
Jensen Lakes	2.20%
Kingswood	8.89%
Lacombe Park	18.20%
Mission	17.74%
North Ridge	3.12%
Oakmont	12.24%
Pineview	19.47%
Riel	9.59%
Riverside	10.81%
Sturgeon Heights	25.50%
Ville Giroux	0.23%
Woodlands	22.93%
Overall average	**13%**

This disparity in urban forest cover among neighbourhoods occurs because large trees tend to proliferate where there is the green space to support them. The neighbourhoods with the highest percentage of tree cover tend to be characterized by parks and open space or large, traditional, single-family residential properties, with mature treed boulevards. Areas with low cover tend to be more highly urbanized, have smaller lot sizes, have less green space, and have more impervious cover. Land use has a significant influence on urban-forest cover.

3.2.1 Optimal Canopy Cover

St. Albert's overall canopy cover is about 13 per cent, including recently acquired undeveloped lands on the western boundary. As noted earlier, however, this cover is not evenly distributed across the City. Some neighbourhoods (such as Kingswood, North Ridge, and Jensen Lakes) have less than 10 per cent canopy cover.



In areas where there are significant amounts of tree cover, it will be challenging to maintain these levels in the short- to mid-term. This is because a significant fraction of St. Albert's urban forest is believed to be mature or over mature. (True age distribution will be calculated after a comprehensive inventory is completed.) This applies to street trees in older subdivisions.

As this aging trend progresses, older trees will be replaced with younger specimens at an accelerated rate. This will result in a temporary reduction in canopy levels, increasing as the new trees mature. In response to this challenge, the city has increased its street-tree replanting program (missing trees program). Planting empty tree sites on boulevards is one of the easiest ways to maintain tree cover, diversify the age structure and species, and increase the resilience of the urban forest.

In residential neighbourhoods, challenges to maintaining canopy cover occur as smaller, older homes are replaced with new, larger homes that occupy a larger footprint on the lot, or as larger lots are subdivided and then built upon (infill). These trends often result in the removal of highly productive, mature trees (both private and public) and the available greenspace to support them. Before development permits are granted, the presence of public trees on the site, and their contribution to the urban forest, need to be evaluated, Infill homes are important to increase residential densities but these developments need to accommodate the mature public trees nearby.

TABLE 2 Comparisons of other communities' canopy-cover targets

City	Cover (current)	Cover (goal)
St. Albert, AB	13% (2015)	20% (2037)
Strathcona County, AB	21% (2011)	To be determined
Lethbridge, AB	19% (1990)	25%
Red Deer, AB	Incomplete	Undetermined
Edmonton, AB	10% (2009)	20% (2019-24)
Calgary, AB	7% (1997)	20% (2033-43)
Toronto, ON	20% (2005)	30%–40% (2055)

Although tree-canopy cover targets are generally considered to be a positive step forward, care must be exercised to ensure such targets are achievable and sustainable.

Land use is the most influential factor in canopy cover. American Forests (a non-profit conservation organization in the United States that promotes healthy forests and urban tree planting) has developed guidelines that can be used as starting points for communities to set their own goals. Those targets are typically based on the community's unique mix of climate, geography, land use patterns, resource structure and community attitudes. The general guidelines proposed by American Forests are average tree cover counting all zones: 40%, suburban residential zones: 50%, urban residential zones: 25% and business/commercial: 15%. These actual targets have been recognized by many Canadian municipalities as un-realistic however, as a general guideline, provide a good starting point. While St. Albert is currently at 13%, a target of 20% within 20 years is very realistic with the existing trees that are currently in the inventory. Achieving this target requires existing trees be retained, maintained and allowed to mature, and that trees lost are replaced.

As the St. Albert boundary may change over time with undeveloped lands becoming part of the municipality (therefore temporarily reducing the canopy cover percent), a more practical way to assess canopy cover and associated targets may be through land use. Dividing St. Albert into 3 simple land use categories – residential, commercial, industrial – and developing targets for those land uses is a more realistic method to analyze canopy cover.

TABLE 3 Proposed Canopy Cover Targets by Land Use

Land Use	Cover (current)	Cover (goal)
Residential	15.8%	25%
Industrial	5.8%	10%
Commercial	14.4%	15%
Entire City (all land uses)	13%	20%

3.3 Challenges of Managing the Urban Forest

The urban environment can present many arboricultural challenges, such as limited root and canopy space, poor soil quality, deficiency or excess of water and light (sometimes due to changes in land use), heat, pollution, and mechanical and chemical damage to trees. Other types of stress include automobile exhaust, constraining hardscapes, building foundations, and physical damage (Pickett et al., 2008).

Management challenges for St. Albert's urban forest include maintaining a tree and natural areas inventory, available planting site inventory, quantifying and maximizing the benefits of trees, minimizing costs, obtaining and maintaining public support and funding, and establishing laws and policies for trees on public land.

3.3.1 Sustaining and Enhancing the Urban Forest

It is assumed that residents of St. Albert, although not officially surveyed, would favour maintaining the current extent of St. Albert's urban forest and expand and enhance it where possible. The benefits associated with the urban forest tend to increase with its abundance—if it is appropriately located, well managed, and does not undermine other values important to the community, such as safety, sunlight, aesthetics, or significant views.

3.3.2 Space for the Future Urban Forest

Natural forests are dynamic systems. Disturbance from fire, windstorms, landslides, and large pest outbreaks are common and serve to increase the diversity and resilience of these systems. Urban forests, like the urban communities in which they grow, are similarly dynamic—change is constantly being thrust upon them. Unlike natural forests, however, urban forests require human intervention to ensure that they adapt to changing urban environments in a productive and sustainable fashion.

The population of St. Albert is estimated to grow to over 90,000 people in 20 years. Most of these people will purchase houses in newer subdivisions, like Riverside and Jensen Lakes, where lot sizes are small and houses take up a significant portion of the lots. Finding space for significant amounts of urban forest within these neighbourhoods will be a challenge, and the private tree contribution to the urban forest from these lots will be lessened.

Although shrub beds and entrance features with small trees and shrubs make important contributions, these will not achieve the same level of benefits that large, mature trees provide. Urban planners, developers, and designers should be encouraged to find ways to incorporate large-canopy trees into these settings, allowing appropriate room for growth.

There are some opportunities for additional plantings in parks. Many parks already have high levels of tree canopy (such as Braeside Ravine) or are spaces that should remain lightly treed to

allow for spontaneous use by residents (Lion's Park). Storm-water management ponds have much available space and will receive increased trees in the future.

Many boulevards are already well treed, with limited space for additional vegetation. In fact, some streets are over planted, and canopies from neighbouring trees will battle for sunlight and potentially negatively affect other trees. Spaces for new street trees are limited by the intensive use of underground space, for sewers and cables, and overhead space for power lines and street lighting.

3.3.3 Age Distribution

A sustainable urban forest should have a healthy distribution of ages so that younger trees are constantly replacing older ones. St. Albert manages more than 55,000 trees on public lands (estimated, to be confirmed after a comprehensive inventory is completed). Many of these are mature and replacement is expected in the next 20-40 years. This is a problem in older neighbourhoods where the street-tree population was established at the same time as the development, meaning it is evenly aged. This challenge extends to private lands as well. As trees planted in residential yards mature or as different owners with different visions move in, trees may be removed, resulting in a significant loss to the canopy.

The distribution of ages within a tree population influences present and future costs as well as the flow of benefits. An uneven-aged population enables maintenance costs to be uniformly predicted over many years and assures continuity in overall tree-canopy cover. An ideal public tree population has an imbalanced age distribution, with higher percentages of young trees than mature trees to minimize fluctuations in functional benefits over time. As trees mature and begin to decline, a tree population skewed towards young to maturing trees will ensure that a flow of benefits continue to exist.

As older trees are removed, there is an opportunity to replace them with a mix of faster and slower growing species, helping to ensure a future urban forest that has a greater structural mix of both tree sizes and life spans. It also provides an opportunity to plant the right tree in the right place, enhancing the productivity and value of the urban forest while reducing nuisance and risk.



3.3.4 Tree Health and Condition

It is not surprising that many urban trees have a much shorter life span than their forest counterparts; trees in urban environments live in challenging conditions. Spaces for productive root growth are limited underground by sewers and pipelines, on the ground by driveways and entrances, and above the ground by overhead wires and street lighting.

Impervious surfaces—roads, sidewalks, and compacted soils—make it hard for water to reach the root system. Trees are also damaged by humans using vehicles, mowers, and inappropriate pruning. The tree inventory data that is currently being collected is also capturing the condition of the tree, categorizing trees into poor, fair, good, and excellent condition ratings. This information determines the maintenance requirements of each tree and ensures public safety.

3.3.5 Tree Diversity

A healthy urban forest has a healthy range of trees from different families, genera, and species, as well as diversity in tree size and growth rates. A boulevard with a single species of trees is vulnerable to pests and diseases that rapidly transfer from one tree to the next. Diverse tree species from different genera and families enhance the resilience of the urban forest and contribute to the overall biodiversity of the city's landscape. Species diversity will be determined after a comprehensive inventory is completed although visual observations indicate that St. Albert has a tremendous amount of diversity. A widely accepted rule is that no single species should represent more than 10 per cent of the total population, no single genus more than 20 per cent, and no single family more than 30 per cent (Clark et al., 1997).

3.3.6 Site and Growing Conditions

Trees require a sufficient volume of healthy soil to reach their potential size and lifespan, typically 20 m3 for a single tree and 30 m3 for two trees (Urban and Bassuk, 2013). This can be a challenge in urban environments, where many trees fail to reach a productive size and die prematurely, such as is the case for the trees located along some of the sidewalks downtown. In these cases, the time and expense of planting and caring for the tree is unproductive. In addition, many benefits are lost if the tree never reaches its full size.

There are ways to design and construct environments that can support trees to maturity, even under the most adverse conditions. Although these efforts require more time and money in site preparation, this investment is returned many-fold over time. It is less expensive to plant a tree well and have it last for 40 or more years, than it is to repeatedly plant trees that fail to grow to maturity. The 'vaults' that contain some of the downtown trees lack soil volume and many do not drain properly. Engineered products exist that maintain soil volume and are engineered to allow for sidewalks and roads to be built over top. The new re-alignment along St. Anne Street uses these products under the sidewalks. These products can also be used for infill development where an additional driveway is required and public trees are present.

When soil volume is not a limiting factor, species selection is crucial. Selecting appropriate plant stock should include species that will be:

- Optimally sized at maturity.
- Hardy within St. Albert's present and projected future climate.
- Tolerant of wind.
- Tolerant of longer, drier summers.
- Resilient to pests and diseases.
- Healthy, well-formed, and defect-free nursery stock.
- Non-invasive species.

Site conditions and functional requirements play a key role in selecting the best type of tree.

3.3.7 Effects of Climate Change

Changes to local weather patterns associated with ongoing global climate warming will adversely affect some trees—particularly those susceptible to drought stress. The trees planted today will probably face different climates at maturity, and trees, shrubs, and other vegetation that have been good planting choices in the past may not be good choices in the future.

Trees will need to be able to cope with drought (unless irrigation is provided). The City of St. Albert waters its trees for the first two growing seasons after planting and any further moisture is provided naturally. Local and provincial nurseries are trying to adapt to this potential future climate by producing drought-tolerant stock, which the City of St. Albert uses for some of the new plantings. However, if only very drought-resistant species were to be planted, this would limit the biodiversity of the urban forest and increase its vulnerability to pests and diseases.



Many cultural techniques enhance growing sites to retain more soil moisture (such as enhancing soil volume, texture, and mulching), thereby increasing the range of supported cultivars. All newly planted public trees have a ring of mulch around the base to hold moisture and protect the stem from mowers and weed whips.

3.3.8 Pests, Diseases and Biodiversity



Globalization and climate change increase the risk of potentially catastrophic outbreaks of exotic pests and diseases. Without endemic predators or tree stock with genetic resistance, a new bug or disease can spread and devastate a tree species or population. The confirmed presence of 'listed' species can result in federal orders to destroy large areas of trees to control the infestation and prevent spreading. Such could be the case with the emerald ash borer, Asian long-horned beetle, or gypsy moth.

Pro-active monitoring, maintenance, and management are essential. City staff monitor all existing public trees and those in new developments. Appendix C lists many of the pests and diseases that are being currently managed and threats for future infestations. The City of St. Albert has been proactive in addressing this risk. An Integrated Pest Management (IPM) Plan has been in place since 2011 and has developed the management approach.

The IPM Plan uses a combination of techniques to suppress pests, including:

- Planning and managing ecosystems to prevent organisms from becoming pests.
- Identifying potential pest problems.
- Monitoring populations of pests and beneficial organisms, pest damage, and environmental conditions.
- Using injury thresholds in making treatment decisions.
- Reducing pest populations to acceptable levels using strategies that may include a combination of biological, physical, cultural, mechanical, behavioural, and chemical controls.
- Evaluating the effectiveness of treatments.

When it is considered beneficial to retain or plant more vulnerable species or varieties, the International Society of Arboriculture proposes the following strategies:

- Be strategic about where to use plantings and reduce overall reliance in favour of more resilient ornamental species and varieties.

- Practice good planting and early tree care, including the recruitment and training of certified personnel.

- Aim for a diversity of age classes, as insects will often target older and weaker trees (note, however, that these older trees also provide important wildlife habitat, so they should not be removed without good reason).

- Use the most robust varieties available and select healthy stock.
- Invest in good site preparation, early tree care, and use supplemental irrigation, mulching, and integrated pest management, as needed.

3.4 The Urban Forest in the Context of Place

Place influences the quantity of the urban forest and the quality or character of those treed environments. For example, treed boulevards beautify our roads and contribute important aesthetic and green infrastructure benefits, but their simplified understorey of turf and concrete (designed for a safe operating environment for automotive and pedestrian movement) limit their biodiversity potential.

Conversely, natural areas (historically parks) with their larger patch sizes, native plant communities, and more complex understoreys, support higher levels of biodiversity—in fact, it is one of their most valued functions. When treed environments are well placed, designed, and managed, they can make a significant contribution to the feel and the functionality of the urban settings in which they grow. The following introduces some of the typical treed environments found in different urban settings around the city.

3.4.1 Public Facilities, Institutions, Parks, and Open Spaces

These areas include open spaces, recreational facilities, public parks, schools, public institutions, and community facilities, including municipal government buildings and their grounds. Street trees are also addressed in this section.



These public and private spaces provide a variety of opportunities for increasing biodiversity. Some of this is already occurring in parks, where the Envoronmental Services Department works with volunteers to expand natural areas. These areas also offer the best opportunities for planting and growing large-canopy trees, some of which is being accomplished with the Canopy Enhancement Charter. All new plantings need to conform to CPTED (Crime Prevention Through Environmental Design) principles to ensure public safety is always a priority. Parks with significant natural areas, such as areas near Big Lake, provide the best habitat and biodiversity concentrations within the city. Beyond their natural values, St. Albert's large, treed

parks provide significant aesthetic, recreational, and economic benefits (as a tourist attraction) to the city, and help maintain watershed health. Other parks are more open in nature and include sports fields and open, spontaneous-use spaces. Many parks are already well treed. New tree planting could focus on species and age diversity, ensuring that the urban forest is climate-adapted and perhaps finding some appropriate spaces for fruit and nut trees as part of local food production.

St. Albert has a significant street-tree program. Many streets in residential areas are planted with large shade trees, whereas others are stocked with smaller, ornamental varieties. A street-tree inventory from 2008 identified almost 55,000 trees. When street trees must be removed for safety reasons, there is an opportunity to replant with a greater diversity of species and to ensure that they are placed where the potential nuisance is minimal. A breakdown of species will be determined after a comprehensive tree inventory is completed.

3.4.2 Traditional Residential

In older, single-family residential areas, such as Braeside and Grandin, trees are a defining characteristic, exemplified by large elms, ashes, and maples. These neighbourhoods are characterized by larger front and rear yards with ample space for trees. The high proportion of large trees and more complex structural composition contribute to higher property values, as well as shading, rainwater management, and noise buffering. They contribute to St. Albert's biodiversity, in part because of reasonable connectivity with adjacent residential yards into larger neighbourhood blocks of green spaces and streets lined with large-canopied shade trees.

3.4.3 Urban Residential Areas

Urban residential areas consist primarily of multi-unit residential dwellings, including single family, duplex, townhouse, and low-rise apartment buildings. These areas have less space for larger trees and have more impervious cover than traditional residential areas, and the canopy cover is less contiguous. Treed boulevards are a significant contributor to the urban forest in these locations. Urban residential landscapes tend to favour smaller, more ornamental trees and shrubs with a mulch, shrub, or turf understorey, although some open-grown shade trees and conifers may also be present.

3.4.4 Urban Villages

Urban villages consist of low-rise to mid-rise, mixed-use buildings and multi-unit residential apartments close to commercial services. Much of St. Albert's growth in the coming years will focus on urban villages, such as the Jensen Lakes development. Innovative design and planning solutions will be required to ensure that these urban centres are developed with a healthy and productive green infrastructure. Planned growth means that these areas will be subject to increasing densification, which will affect the abundance and the types of treed environments within them.

3.4.5 Commercial Centres

Commercial centres consist of large retail areas and nearby, multi-unit residential apartments (Erin Ridge North). These areas typically include ornamental trees and shrubs with few spaces for large trees. Nonetheless, trees in large parking lots play an important role in shading cars and their occupants. In addition, incorporating more trees into parking areas will enhance the aesthetic, climate adaptation, storm-water management, and watershed conservation values.



3.4.6 Downtown

The urban core has the highest density and greatest mix of uses in the city, including civic and institutional facilities of regional and provincial importance, primary retail, entertainment, office, and commercial uses, and residential apartments. The downtown core features large buildings, busy roads and sidewalks, and complex underground infrastructure, often leaving little room for trees. Street trees emerge from sidewalk grates and have vault structures under the sidewalk containing soil. In this area, it will be essential to provide sufficient un-compacted soils (perhaps through soil cells or above-ground planters) and soil volume to grow a mature tree. The new development downtown has addressed some of this, and further advances will be made as sidewalks are redeveloped. Millennium Park is also adding treed environments of greater interest and functionality to the downtown area.

3.4.7 Technical and Industrial Lands

Technical (employment) and industrial lands typically include large amounts of impervious surfaces with buildings and parking lots such as those found in Campbell and Riel Industrial Parks. Existing treed environments tend to consist of either single landscape specimens surrounded by asphalt or concrete, or isolated patches of trees and vegetation. As industrial areas develop and redevelop, there are opportunities to incorporate high-functioning tree cover into these areas.

3.5 Heritage Trees

In 2008, the Heritage Tree Foundation of Canada published a book titled Heritage Trees of Alberta which documented 350 trees across Alberta that were of particular interest. There are 3 public locations within St Albert featured in this book (Appendix F):

- Grey Nuns White Spruce Park (forest stand).
- Founders` Walk (5 mature northwest poplar).
- Lacombe Lake Park walkway (Manitoba maple, destroyed in storm).

These locations are monitored regularly, trees maintained as required. The Grey Nuns White Spruce Park was originally identified during the heritage tree search in 2008, the significance of which resulted in the forest being designated a Municipal Historic Resource (City of St. Albert Bylaw 31/2011). This forest is also governed by the Grey Nuns White Spruce Management Plan. Other heritage trees located in the City are maintained privately such as those located at the St. Albert Botanical Garden. Where heritage trees are located on private property, the City provides education and advice to the land owner to maintain and appreciate the significance of these trees.

Heritage tree preservation is an ‘expression of community identity and pride’ as referenced in section 15 of the Municipal Development Plan for the City of St. Albert.

4 URBAN FOREST OF TOMORROW

4.1 Guiding Principles and Goals

The vision – ***“Protect, ensure health, cherish, and expand our urban forest for today and future generations”*** - was identified in Section 1 and has supporting principles and goals.

4.1.1 Guiding Principles

1. St. Albert’s urban forest, a major component of its green infrastructure, is a valued and shared resource, and there is a shared desire to improve and expand it.

2. Improvement and expansion of the urban forest requires the municipal government, its residents, and other local stakeholders to work together.

3. The right tree must be planted in the right place.

4. Proper plant health care must be practised for each tree to reach its full potential.

5. St. Albert's urban forest must include a high diversity of native and non-invasive species to improve its resilience to various types of stress, including climate change, pests, diseases, and urban development.



6. Tree protection and replacement must be priority considerations during urban development and intensification. This must be reflected in city standards and policies.

7. St. Albert's trees must be maintained in a healthy and safe condition through ongoing risk management practices and by promoting and using innovation, science, research, best management practices, proper plant health care, and an integrated pest management approach.

8. This plan is a living document that adapts and changes management practices to new information and new circumstances and embraces innovative approaches.

4.1.2 Goals

1. Develop and maintain strong community-wide support for the urban forest by increasing awareness among City staff, local landowners, and residents about the benefits and services provided by the urban forest and how to care for it.
   Outcome: Passionate and knowledgeable staff, landowners, and residents.

2. Protect, enhance, and expand St. Albert's urban forest by:

   a. Increasing urban forest cover to optimal levels in neighbourhoods currently exhibiting low canopy cover (levels to be determined).
   b. Continuing a vigorous street-tree replacement program.
   c. Creating opportunities to retain and enhance the urban forest.
   d. Developing urban forest guidelines specific to different land uses.
   e. Ensuring all development (internal and external), follow engineering standards.
   f. Ensuring engineering standards are flexible so that all vegetation can thrive and reach its full potential.

   Outcome: Right trees in the right places, reaching their full potential.

3. Design and manage the urban forest to maximize watershed health, biodiversity, and conservation of sensitive ecosystems to support the recommendations of the Natural Areas Management Plan.
   Outcome: Healthy, thriving, and connected ecosystems.

4. Transition the city from a reactive to a proactive urban forest management approach by implementing policies and management practices for maintaining and protecting existing trees and planting new trees.
   Outcome: Effective resource allocation and sustainable canopy cover.

4.2 Improving Urban Forest Management

Improving urban forest management is fundamental to the success of the city's broader urban forest strategy. Collaborating with other departments to plan and manage an urban forest as a coherent and strategic resource is a new concept for many cities, including the City of St. Albert.

Historically, tree management in regards to maintenance has been the purview of the Public Works Department, but a broad range of the city's planning and operations activities affect the urban forest. St. Albert is broadening departmental involvement and collaboration with the potential for all city departments to support this effort in their role of integrating citywide sustainability initiatives. The city could consider a dedicated staff position to coordinate the implementation of the UFMP and to work with the multiple departments and community partners, as needed.

4.2.1 Measurement and Assessment

Effective management of any resource begins with good measurement. Establishing metrics and benchmarks for the current extent, structure, and health of the urban forest, as well as estimating the magnitude of ecological services it provides to the city, is a key first step towards the effective planning and future management of this resource.

Like most cities, the City of St. Albert has implemented a digital Geographic Information System (GIS) to assist in the integrated planning, management, and maintenance of its hard assets (such as roads, sewers, and streetlights). This is also the best platform for mapping the city's urban forest. An advantage of GIS is that staff can easily see how the various types of treed environments interact with other City assets and systems.

In 2008, a public tree inventory collected species and location information but not size or health. This inventory has not been consistently updated with replacement trees. Therefore, we do not know the true quantity of trees, their age, or health. Currently, (starting 2016) a detailed inventory program is building on the information collected in 2008 and now includes measurements of



diameter, canopy spread, condition, and structural risk rating. As well, presence of insect or disease and other types of stress are being captured. This information will be entered into software and enable staff to describe the urban forest, plan effective maintenance schedules and quantify the benefits the city receives from the forest. This information also describes the age of the forest in an area which allows for effective planting plans to be developed and maintain consistent canopy cover.

The USDA Forest Service has developed i-Tree; a free, state-of-the-art, peer-reviewed software suite of tools for measuring and assessing an urban forest and the environmental services it provides (www.itreetools.org). i-Tree helps communities strengthen their urban forest management and advocacy efforts by quantifying the structure of community trees and the benefits that trees provide. By understanding the local, tangible ecosystem services that trees provide, i-Tree users can link urban forest management activities with environmental quality and community livability. St. Albert`s tree inventory data, once collection is complete, will be entered into this software. City of Edmonton, City of Calgary and Strathcona County have all used this software to analyze the urban forest in their respective communities.

4.2.2 Young Tree Care

Maintaining public trees over their entire life cycle can be expensive. This expense can be significantly reduced by fostering healthy trees with sound architecture in their formative years– when they are smaller and relatively inexpensive to maintain. This is how the city (and the community) will get the largest return on its investment in street trees. Early care includes sourcing healthy, well-formed stock, good planting practices and plant husbandry, and periodic, developmental pruning during the first two decades of a tree's life. Early structural pruning promotes well-formed and structurally resilient trees that require significantly less maintenance during the middle and end stages of their life cycles (when they are more expensive to maintain) (Matheny and Clark, 2008). The current pruning program treats all trees as equal and has them all on a 5-year rotation. Effective young tree care will be increased if young trees are pruned two times within the 5-year cycle. Public Works arborists are increasing young tree pruning, particularly during the winter months when structure is easier to assess, to meet the desired pruning schedule.

4.2.3 Tree-Root Areas in Sidewalk Environments

Grates are often used around trees in sidewalk environments, evident in downtown St. Albert. These are an expensive capital and maintenance cost. Some cities, such as New York, are moving away from using grates entirely. Alternatives to grates include (Urban, 2008):

- Underground soil vaults with raised or retained tree planters, properly drained and with appropriate soil volume and stability.
- Stable ground cover or mulch with a guard-rail enclosure that functions as a bicycle lock-up.
- Assembling individual street trees into larger urban groves of trees within a dedicated planting area.
- Using various surfaces that are permeable for water and not affected by utility repair (Toronto is experimenting with this option).

4.2.4 Conflicts with Road Rights-of-Way

Road rights-of-way must accommodate an abundance of infrastructure, above and below ground, such as roadways and sidewalks, curbs and gutters, storm water and sewer infrastructure, underground utilities, street furniture (benches, bike racks, planters, signs, garbage cans), street and traffic lights, overhead power lines, trees, turf, and irrigation. Boulevard trees sometimes conflict with this infrastructure. Maintaining, replacing, or adding new services or infrastructure to these boulevard environments, once trees have matured, is a complex, delicate, and often expensive procedure. In addition, catch basins, sight lines, sidewalks, and driveway ramps must be maintained from the effects of tree roots and litter. During heavy rainfall, blocked drains can result in water that backs up, flooding roads and basements. Tree roots can grow into sewer and storm drains, cracking pipes and requiring costly replacement. Roots lift and damage sidewalks, making travel harder for people with mobility challenges and incurring cost to repair and replace the damage.

These conflicts with trees represent a significant operational and budgetary challenge for Public Works staff. Although these conflicts may never be resolved entirely, there are opportunities for reducing their scale:

- Integrate the planning and design of future tree plantings in the broader infrastructure planning and design process for boulevard environments on a block-by-block basis.

- For new developments, rationalize the routing or alignment of underground utilities in a more consolidated footprint, including external utility providers.

- Insist that external utility providers (e.g., phone, cable, gas, and power) provide rigorous ‘as-built’ survey data for input into the City’s GIS and Asset Management System.

- For trees close to the end of their safe and useful life, replace with new trees and shrubs in locations that will minimize future conflicts. When prioritizing tree removal and replacement, infrastructure conflicts should receive explicit consideration (right tree, right place principle).

- Consider options that keep roots away from underground infrastructure, such as barriers that separate tree roots from underground services. In highly built areas, planting environments can be elevated above underground services in large contiguous vaults. Soil cells, although initially more expensive, support longer-lived trees that are less likely to create conflict with underground infrastructure and serve double-duty as part of a broader rainwater detention system. This saves replacement plantings in the future.

- Where trees conflict with street lighting, consider moving the street light or using an alternative method of street lighting, such as ground-level or low-level fixtures, in ways that meet national lighting standards.

- Where leaf fall creates issues with blocked drains, consider evergreen species as a replacement option.

- For very congested treed boulevards, consider a pilot project to motivate local residents to 'host' a boulevard tree within their front yard setback, providing the tree with more room to grow and eliminating conflicts with city infrastructure. (This option will evoke some legal and maintenance issues that would need to be weighed as part of a broader consideration of its associated costs and benefits). When this congestion occurs next to a wider, public buffer strip, consider planting only on the buffer to eliminate canopy conflict and lack of soil volume on the boulevard.



4.2.5 Public Safety

Poorly managed treed areas can create hang-out areas where anti-social or criminal activities can occur. Poorly lit, densely vegetated areas can be a concern if they encroach or block sightlines to residences, pathways, playgrounds, or other public and private areas where security of person and property is a concern.

Crime Prevention Through Environmental Design guidelines assist communities in reducing these risks. If overdone, however, the landscape can become denuded or unnecessarily simplified. Best practices include:

- Ensuring a visual separation between a low shrub layer and the bottom tier of tree branches.
- Setting heavily vegetated areas back from buildings.
- Installing adequate landscape lighting.
- Managing vegetation on a regular cycle.

Landscaping designs do incorporate CPTED principles and open communication with RCMP and Municipal Enforcement identifies any problem areas.

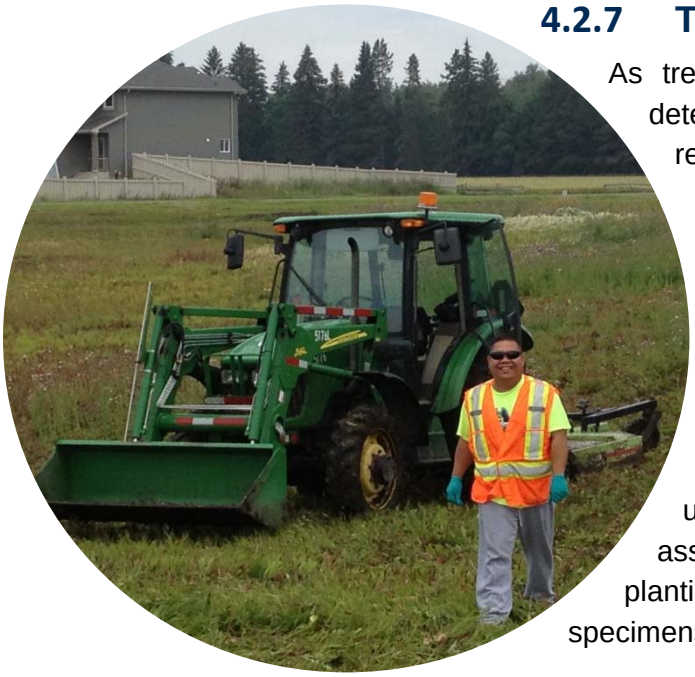
Wildfire is not considered a high risk in urban areas like St. Albert, where most city parks are managed for fuel load on the forest floor and the principles of FireSmart are followed (www.firesmartcanada.ca). In addition, the many users of St. Albert's parks will quickly report fires to nearby first responders. There are some native stands which have an abundance of dead material stacked in the understory and these need to be addressed during the 5-year maintenance cycle.

4.2.6 Tree Risk Management

The Public Works Department is responsible for tree risk management of the city's boulevards and parks. However, there is currently no written Tree Risk Management policy, and the city has yet to undertake a comprehensive tree risk assessment of its public trees. A systematic tree risk-management approach would:

- Develop a tree risk-management policy for the city.
- Ensure that staff is certified in tree risk assessment.
- Post current tree risk-management standards in the Public Works Department and ensure that program staff is familiar with them.
- Identify those parts of St. Albert most vulnerable to the results of tree failures (such as school grounds, ravine areas, and arterial roads), and make these areas the highest priority for tree risk assessment.
- Undertake a comprehensive tree risk assessment of the city's street trees.
- Act promptly to abate risk for trees designated as being at extreme or high risk.
- Develop abatement procedures that recognize and balance the benefits of mature trees (such as heritage and wildlife values), as well as the risk.
- Evaluate the ongoing effectiveness of the program and adapt accordingly.

The Certified Tree Risk Assessor's course, adopted by the International Society of Arboriculture, addresses many of these steps. Currently, Public Works has two staff with certification and two others who have been trained.



4.2.7 Tree Removals on Public Lands

As trees become over-mature, their condition deteriorates. Eventually, steps are required to reduce the risk of tree failure. Sometimes, the only option is to replace the tree. This can be politically challenging when the tree is very prominent or highly valued by the community.

A clear approach reduces the number of crisis-driven or conflict-based encounters by ensuring that people are consulted and understand the rationale for removing assumed-significant trees. Replacement tree planting should be expedited with large-caliper specimens, when appropriate for the space.

4.2.8 Tree Removals on Private Lands

The City of St. Albert does not regulate the cutting of trees on private lands. Some municipalities have enacted tree preservation bylaws that require a permit for the landowner to remove a tree on private property. Bylaws limiting what can be done on private property can be controversial, and currently no municipality in Alberta has such a bylaw, although St. Albert explored this in 2006 and Edmonton is considering one. The City of Calgary explored a bylaw a few years ago, and decided that resources would be better allocated to educate and promote trees rather than restrict homeowners.

Many municipalities in British Columbia and Ontario have a tree preservation bylaw, in some respect, which provides management of trees on private property. These municipalities have faced many challenges with their implementation. If St. Albert decides to create a bylaw, there are many examples across Canada to assist.

Private trees typically make up 60 – 80 percent of a municipality's canopy cover percentage but the municipality has no control over the canopy`s existence or health. Educating residents on the contribution on private trees is crucial.

4.2.9 Recognizing the Urban Forest as a Tangible Asset

Cities using urban forest assets more intensively as green infrastructure have an incentive to see these treed environments recognized as tangible capital assets. (Currently, public sector accounting guidelines classify trees along with animals as biological assets, not tangible capital assets).

Increasing the asset status of municipal tree stock that functions as green infrastructure has several advantages:

- More seamless integration into the city's asset management system.
- Better access to infrastructure funding from senior levels of government for urban forestry initiatives.
- More effective resource management planning.

The City of St. Albert could work with other cities to have at least the public component of the urban forest recognized as a tangible capital asset in the Public Sector Accounting Handbook.

The city could develop realistic accounting metrics for it's natural capital and increase compensation or replacement values for protected trees that are cut down accordingly. A fully mature tree in good health and productively located is potentially worth many thousands of dollars, as is the land on which it grows.

4.2.10 Making the Most of Available Resources

Several opportunities can make better use of existing resources.

- Existing tree maintenance resources should prioritize early tree care. A relatively small investment in early tree care will produce stronger, hardier, and better formed trees at maturity, extending the life of the tree and reducing maintenance costs at maturity.

- The principle of *right tree, right place* will maximize benefits and reduce conflicts and maintenance costs over the lifespan of the tree. This includes favouring the planting of larger growing tree species, wherever practical, as these return an exponentially greater magnitude of green infrastructure benefits than their smaller ornamental counterparts.

- As the city becomes a denser environment, investments in the preparation of sustainable growing environments for urban trees will pay dividends. This may include engineered planting vaults with large, contiguous volumes of soil, use of modular soil cells, porous pavement, or other best practices. This investment will result in fewer conflicts with other infrastructure and produce healthy, productive, and long-lived trees of mature size. The longer life cycle of these trees and enhanced benefits may mean that the capital cost over the life of the asset is actually less than current approaches and will generate greater returns.

- Public spaces can be designed to work harder. For instance, public greenways can be modified to function as both active transportation and ecosystem corridors, linking people and nature throughout St. Albert.

4.2.11 Seeking New Opportunities for Resourcing



Budgets should account for the entire life cycle of new urban forest assets. Each tree added to the City's inventory should be matched by an associated increase in the operating fund to maintain that tree. Similarly, when a tree is removed, the budget could be reduced. However, it is hoped that most public trees that are removed would be replaced by at least one young tree in the same location or a different one depending on conditions.

To sustain the urban forest, trees and the land sustaining them that are lost in one part of the city will need to be replaced elsewhere. The distribution of tomorrow's urban forest will likely be different than today's. The city could consider a capital fund for the acquisition and restoration of lands growing the urban forest.

- Improved data management and baseline information (using GIS) will enable more strategic management of the urban forest, including better resource allocation.

- Tree Canada has numerous programs to support urban forest growth, which can be pursued. An effect on resources will occur and will have to be considered.

- Homeowners can support the urban forest on their land. The city could assist homeowners who host trees considered to be of extraordinary public value, such as trees designated *significant* or *heritage*. The city could perhaps help maintain the trees on the behalf of homeowners. This would require additional resources and potentially create issues accessing private property. In-depth discussion would be required before implementing this.

4.2.12 Working with the Development Community

Developers have a positive role to play in helping St. Albert achieve its goals of expanding and enhancing the urban forest. At the same time, they are often the target of public protest when large stands of trees are proposed for removal for new development.

Although urban development can pose a challenge to mature tree retention and the conservation of viable green space on private lands, it also presents opportunities for urban forest renewal and

enhancement. These include developing treed environments that work harder, enhance, and support other policy objectives (such as on-site rainwater management, energy conservation, contact with nature, and place-making) and conflict less with other infrastructure or site programming.

Responding effectively to these challenges and opportunities requires effective leadership from the city and cooperation and innovation from the development and design communities. Many of the mechanisms required to effect better outcomes for the urban forest on private property can be influenced by city decisions. These include developing clear policy objectives for the urban forest and translating these into local-area plans and place-specific guidelines, targets, standards, and best practices. Provided these objectives are clear and the mechanisms for implementing them are legal, practical, and fair, there is every reason to expect that the development community will do its part to achieve them. Greater support from the development community requires communicating expectations early in the permit-application process, providing clarity on performance outcomes, and improving the consistency and predictability with which tree issues are dealt with during all stages of the development process.

Sometimes a disconnect between what is communicated by some developers in the public consultation process of a permit application and what is eventually built results in public dissatisfaction or anger. Better outcomes can be generated by tying project commitments to permit conditions, ensuring effective compliance mechanisms (adequate bonding, inspections, and communication) and holding registered professionals accountable to the standards of their professions.

Landscape-plan checking by the city—both of design and as-built drawings—is recommended, as are post-construction deficiency reports from relevant design consultants (e.g., arborists and landscape architects).

Tree Canada's (a national, corporately sponsored organization) mission is to "bolster Canada's urban forests." It created the Canadian Urban Forest Network (www.cufn.ca) that enables municipalities to share strategies to deal with the many challenges that all communities face. Much can be learned from others who have had successes and failures in different management initiatives and strategies.

5 IMPLEMENTATION

The Urban Forest Management Plan is a living document that provides strategies and actions to help us wisely manage the urban forest. The next step is to develop an implementation plan to ensure that St. Albert continues to have a diverse and sustainable urban forest able to enhance the wellbeing and quality of life of its citizens.

The implementation plan will focus on the strategies and action plans outlined in the UFMP, identifying system indicators, responsible parties, timelines, and budget requirements. The Operations Manager Parks and Open Spaces will create and carry out the implementation plan

in collaboration with the project partners responsible for each action. Some steps within this implementation plan are located in Appendix E which will be regularly updated as information is gathered. Various City departments will have roles and responsibilities with regard to implementing this plan. In some cases, management actions will be implemented as part of day-to-day operations while others may take multiple years. With adoption of this document as a planning tool to create an effective implementation plan for council's detailed review and approval, staff at the City of St. Albert can continue to ensure that both the community and staff ***"Protect, ensure health, cherish, and expand our urban forest for today and future generations."***

A healthy, diverse urban forest is an irreplaceable asset that contributes to St. Albert's long-term livability and Botanical Arts image. This resource provides direct tangible, environmental, ecological, economic, and social benefits by improving our air quality, reducing energy consumption, keeping soil from eroding, and conserving water resources. With careful stewardship, these benefits can continue for generations (City of Edmonton, 2012).



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APPENDIX A Urban Forest Management Policy

C-IS-04

City of St. Albert

CITY COUNCIL POLICY

Urban Forest Management

AUTHORITY	APPROVED	Res. No. mm dd	REVISED	Res. No. mm dd
City Council				C544-2014 12 01

Purpose

To establish a framework for the consistent protection, management, and sustainability of the City's urban forest for future generations.

Policy

Consistent with its brand identity, the City considers the Urban Forest an important asset that enhances the quality of life for the community.

The City shall ensure the Urban Forest is properly managed through implementation of an Urban Forest Management Plan that aligns with other City bylaws, policies, community long term plans, programs, and the Municipal Engineering Standards.

Definitions

"City" means the City of St. Albert.

"City Owned Property" means a parcel of land including any buildings, structures, and devices, or where the context so requires, a chattel owned by the City or for which the City has assumed responsibility. Examples include natural and park areas, road right of ways, and City facility grounds.

"City Trees" means all trees on City owned property.

"Heritage Trees" means trees identified in the Heritage Trees of Alberta (2008).

“Natural Area” means land or water dominated by native vegetation in naturally occurring patterns. Such areas could include grasslands, forests, wetlands, or riparian areas but does not include parks.

“Naturalization” means an alternative landscape management technique; natural processes of growth and change are less restricted and the landscape is allowed to become more natural than ornamental by restricting mowing and by planting native vegetation found locally on similar landscapes.

“Park Area” means any City owned lands, developed and managed by the City and designated as City Parks or City Playgrounds. This does not include parks or playgrounds under the ownership or authority of area School Divisions or other private property.

“Private Trees” means all trees located on land that is not City owned property.

“Tree Canopy” means the uppermost layer in a forest, formed by the crowns of the trees in the urban forest. The tree canopy is typically represented by the percentage of ground area covered in a defined area.

“Tree Diversity” means a range of tree species and ages which support a healthy urban forest.

“Urban Forest” means the trees and associated vegetation located within City limits, whether planted or naturally occurring within both private and public property. Examples include trees and associated vegetation in parks, natural/naturalized areas, the river valley, ravines, trails, and roadways.

“Urban Forest Management Plan” means a long term strategic plan for managing the urban forest in the City of St. Albert.

Responsibilities

1. Council shall review and consider the budget to ensure this policy is resourced appropriately as proposed by the City Manager.

2. The City Manager or delegate is responsible that this policy is applied effectively through an urban forest management plan and associated administrative policies, standards, procedures, and practices.

Standards

1. Urban Forest

    a. The City shall undertake a variety of programs in support of an Urban Forest Management Plan that are consistent with other applicable plans, bylaws, standards,

and programs. The City shall ensure these are supported through the respective annual operating or capital budgets as approved by Council.

b. The City Manager shall report to Council on an annual basis the progress and status of the Urban Forest including City tree related programs, inventory, and general health.

c. The City shall carry out industry standard practices for the determination of tree canopy percentage within City boundaries. Through an Urban Forest Management Plan, the City shall establish minimum tree canopy percentage to maintain and also set future tree canopy target percentages to support the growth and sustainability of the urban forest.

d. The City shall recognize that the overall tree canopy in St. Albert includes all private and City trees

2. City Trees

a. City trees shall be planted in accordance with the Municipal Engineering Standards.

b. The City shall maintain an inventory of City Trees which include tree quantities by species and condition. This inventory will be updated annually by including trees planted in new developments, new plantings, relocates, removals, and replacements. The inventory of trees located within natural areas shall be determined by area estimation or other determination at the discretion of the City Manager.

c. Normally, the City shall avoid removal (cutting down or termination) of City trees unless it is necessary to do so in support of this policy, bylaws, safety reasons, pest infestation, diseases, or other City programs. Administrative Procedures shall include a formal and consistent process for the assessment and potential termination of a tree.

d. The City shall undertake reasonable and timely steps to notify adjacent property owners directly affected by planting or removal of trees on City property.

3. Private Trees

a. The City shall provide public information to promote the planting, care, and health of private trees in support of preserving and enhancing the urban forest.

4. Heritage Trees and Official Flora

a. The City shall, where possible, protect and maintain heritage trees located in St. Albert recognizing their historical significance.

b. The City shall establish and maintain a designated location showcasing the official flora of the City as defined by Council Policy C-CC-09 City Emblems and Symbols.

Cross-References: Dutch Elm Disease Bylaw 5/98; Policy C-CC-09, City Emblems and Symbols; Policy C-EUS-01, Environmental; Parks and Open Spaces Management Plan (2007), Public Works Long Term Department Plan (2009), Municipal Engineering Standards (2013), Environmental Master Plan (2014), Heritage Trees of Alberta (2008)

APPENDIX B Other Canadian Municipalities with Urban Forest Mandates

Province	City/Town/ District	Date of UF plan (if app)	URLS
New Brunswick	Fredericton	2016	UF plan: http://www.fredericton.ca/en/environment/resources/2016Jun02ForestryManagementPlan.pd f
New Brunswick	Moncton	Complete	City site: http://www.moncton.ca/Residents/Online_Services/Tree_Planting_Program.htm
New Brunswick	Edmunston		City site: http://edmundston.ca/en/services-aux-citoyens/travaux-publics-etenvironnement
Nfld and Labrador	St. John's	2006	UF plan: http://www.stjohns.ca/sites/default/files/files/publication/St.John%27%20Urban%20Forest%20Master%20Plan.pdf
Nova Scotia	Halifax	2013	UF Plan: http://halifax.ca/property/UFMP/documents/SecondEditionHRMUFMP.pdf
Nova Scotia	Truro		City site: http://www.truro.ca/urban-tree-planting.html
Prince Edward Island	Charlottetown		City site: http://www.City.charlottetown.pe.ca/urbanbeautificationandforestry2.php
Ontario	Ajax	2011	UF plan: http://www.ajax.ca/en/insidetownhall/resources/UFMP-14-Dec-2010-Final-with-Appendices.pdf
Ontario	Barrie	2013	UF plan: http://www.barrie.ca/Living/Environment/Documents/URBAN%20FOREST%20STRATEGY%20DOCUMENT.pdf
Ontario	Burlington	2010	UF plan: https://www.burlington.ca/en/services-foryou/resources/Forestry%20Operations/Urban_Forestry_Master_Plan.pdf
Ontario	London	2014	http://www.london.ca/residents/Environment/Trees-Forests/Pages/UrbanForest-Strategy.aspx
Ontario	Toronto	2012	UF Plan: http://www1.toronto.ca/City%20Of%20Toronto/Parks%20Forestry%20&%20Recreation/Urban%20Forestry/Files/pdf/B/backgroundfile-55258.pdf
Ontario	Oakville	2012	UF plan: http://www.oakville.ca/assets/general%20-%20residents/NOUFSMP14Sept2012.pdf
Manitoba	Winnipeg		City site: http://winnipeg.ca/publicworks/parksOpenSpace/UrbanForestry/default.stm
Sask.	Saskatoon		City site: https://www.saskatoon.ca/services-residents/housing-property/yardgarden/trees
Sask.	Regina	2000	UF plan: http://www.regina.ca/opencms/export/sites/regina.ca/residents/parks/.media/pdf/regina_urban_forest_management_strat_report.pdf
Alberta	Calgary		City site: http://www.calgary.ca/CSPS/Parks/Pages/Planning-andOperations/Tree-Management/Tree-care.aspx
Alberta	Edmonton	2012	City site: http://www.edmonton.ca/residential_neighbourhoods/gardens_lawns_trees/tre es-urban-forestry.aspx
British Columbia	Surrey	2016	Shade Tree Management Plan: http://www.surrey.ca/files/Shade%20Tree%20Management%20Plan%20final.pdf
British Columbia	Vancouver	2014	UF plan: http://vancouver.ca/files/cov/Urban-Forest-Strategy-Draft.pdf

Province	City/Town/ District	Date of UF plan (if app)	URLS
British Columbia	Nanaimo	2010	UF plan: http://www.nanaimo.ca/assets/Departments/Parks~Rec~Culture/Publications~and~Forms/urbanforestmanagement.pdf
British Columbia	Kelowna	2011	UF plan: http://apps.kelowna.ca/CityPage/Docs/PDFs/Parks/Urban%20Forestry/City_of_Kelowna_Urban_Forest_Strategy.pdf
British Columbia	Kamloops	2015	UF strategy: http://www.kamloops.ca/trees/pdfs/UrbanForestManagementStrategy-Draft.pdf
British Columbia	Victoria	2013	UF plan: http://www.victoria.ca/assets/Departments/Parks~Rec~Culture/Parks/Documents/Urban%20Forest%20Master%20Plan%202013%20Final%20Approved.pdf

APPENDIX C List of Pests and Diseases

Table C1 Abiotic Stress Disorders (comprehensive list)

Soil moisture extremes	Soil volumes	Soil compaction
Salt and de-icer damage	Nutrient deficiency	Lightning
Improper pruning, planting, and mulching	Vehicle collisions	Wind and storm damage
Girdling roots, baskets, and wires	Transplanting	Herbicides and chemicals
Climate and temperature extremes		

Table C2 Biotic Stress Disorders

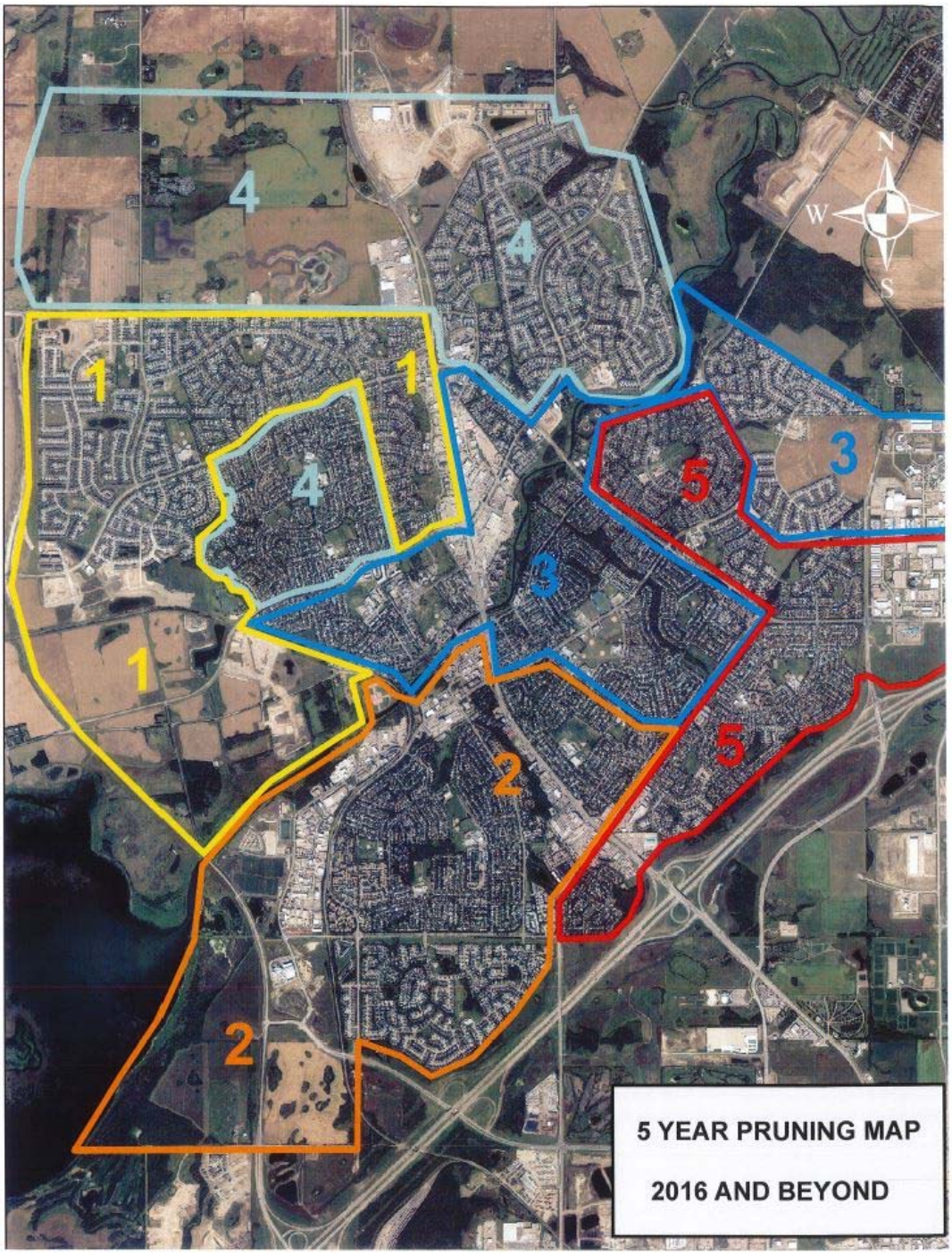
Disease	Species Affected	Effect	Location
Dutch elm disease	Elm species	Lethal (6 months) and can spread rapidly with vector availability	Saskatchewan
Black knot of *prunus*	Cherries, mayday, chokecherries	Aesthetic leading to removal	Edmonton region
Dothiorella wilt	Elm species	Aesthetic leading to removal	Edmonton region
Sudden oak death	Oak species	Lethal and can spread rapidly	U.S.
Fire blight	Pears, apples, crab apples, hawthorns, cotoneaster	Lethal	Edmonton region
Bronze leaf of poplars	Swedish columnar poplar, Tower poplar, aspen	Lethal(3-5yrs)	Edmonton region
Ash anthracnose	Ash species	Aesthetic leading to declined tree health	Edmonton region
White pine blister rust	Whitebark pine, Limber pine, Eastern white pine	Lethal	Alberta

Table C3 Insects

Insect	Species Affected	Effect	Location
Mountain pine beetle	Pine species	Lethal, vector of blue stain fungus	Edmonton region
Cottony psyllid	Black ash	Lethal	Edmonton region
Emerald ash borer	Ash species	Lethal	Great Lakes region
Asian long-horned beetle	All hardwoods	Lethal	Toronto and eastern U.S.
Sirex wood wasp	Pine species	Lethal	Ontario
Brown spruce longhorn beetle	Firs, larches, tamaracks, pines, spruces	Lethal	Nova Scotia

Insect	Species Affected	Effect	Location
Western ash bark beetle	Ash species	Structurally damaging	Edmonton region
Smaller European elm beetle Native elm beetle Banded elm beetle Red elm weevil	Elm species Elm, willow species	Vectors of Dutch elm disease	Edmonton region Saskatchewan Edmonton region
Bronze birch borer	Birch species	Structurally damaging	Edmonton region
Gypsy moth	All hardwoods	Defoliator	Eastern Canada
Forest tent caterpillar	All hardwoods	Defoliator	Edmonton region
Satin moth	Poplar, willow	Defoliator	Edmonton region
Spider mites	Spruce species	Aesthetically damaging	Edmonton region
Aphids	All trees	Nuisance	Edmonton region
Ash leaf cone roller	Ash species	Nuisance	Edmonton region
Pine shoot beetle	Pine species	Aesthetically damaging	Eastern North America
Birch Leafminer	Birch species	Aesthetically damaging	Edmonton region
Willow leaf miner	Willow species	Aesthetically damaging	Edmonton region
Tarnished ash plant Bug	Ash species	Aesthetically damaging	Edmonton region
Spruce budworm	Spruce	Defoliator	Edmonton region
White pine terminal weevil	Spruce	Defoliator	Edmonton region
Oak gall wasp family	Oak species	Aesthetically damaging	Edmonton region
Sawfly family	Spruce, larch, ash	Defoliator	Edmonton region
Poplar borer	Poplar species	Structurally damaging	Edmonton region
Scale species	All species	Aesthetically damaging	Edmonton region

APPENDIX D Proposed Pruning Cycle


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5 YEAR PRUNING MAP
2016 AND BEYOND

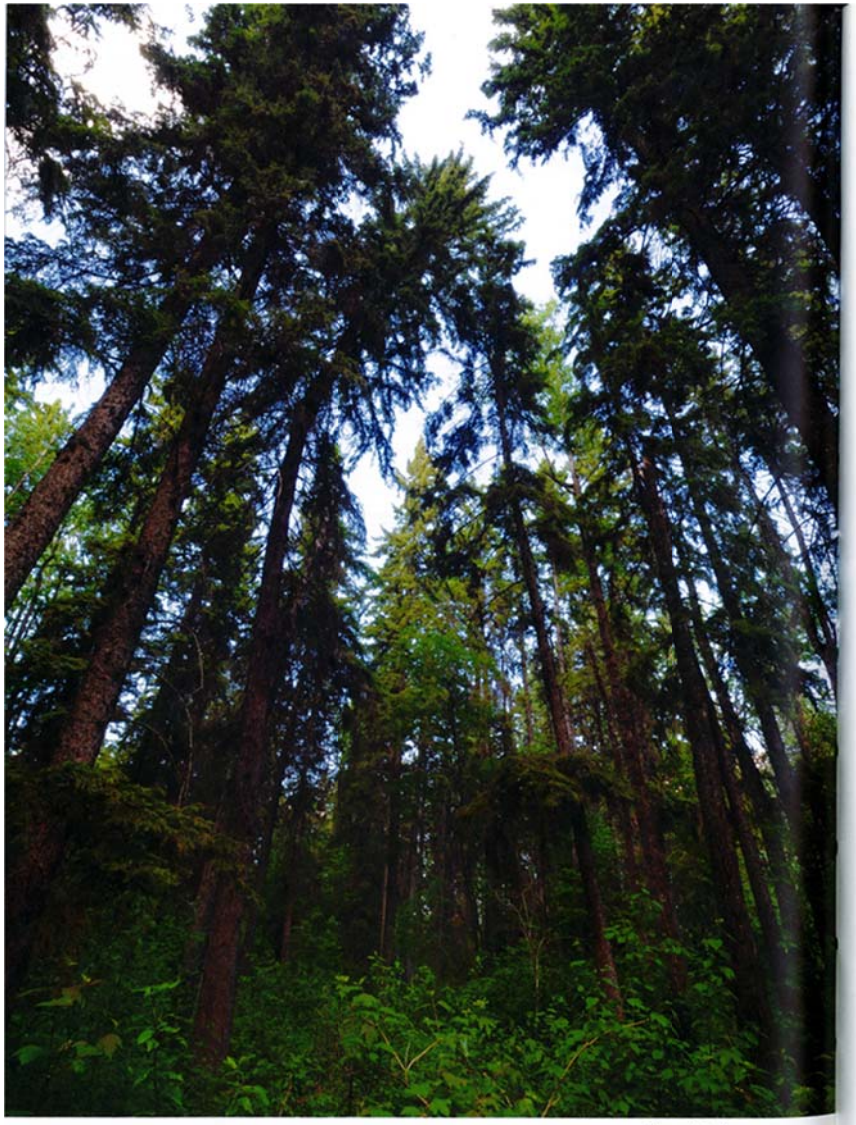
APPENDIX E Recommendations

	Recommended Action Item	Timeline			Status
		Short 1-3 yrs	Medium 3-6 yrs	Long 6-15 yrs	
1	**Canopy Cover**				
A	Establish a minimum target for canopy cover	X			Recommend 13%
B	Establish a canopy cover goal (percent) based on land use	X			See Section 3.2
C	Establish overall canopy cover goal (percent) by 2037	X			Recommend 20%,
2	**Investment in Maintaining the Current Urban Forest**				
A	Sustain ongoing maintenance, on a predictable and repeatable cycle, of the existing urban forest on public land and its associated environment throughout its life cycle.		X		Partial funding currently in base budget, 5-year pruning cycle in process
B	Provide regular reports to Council on progress of measurable urban forest objectives, as outlined in the Urban Forest Management Policy. City staff already report annually on the number of trees planted vs. trees removed on public land.	X			To be determined
C	Continue involvement in regional and provincial tree care organizations to research potential pest/disease impacts and best management practices	X			Organizations such as STOPDED, ISA, Canadian Urban Forest Network
3	**Investments in Staff Time and Resources**				
A	Hire a dedicated urban forestry supervisor	X			Operating business case currently being drafted
B	Perform ongoing recruitment and training of qualified urban forestry personnel who can work productively to a high standard, minimum ISA Certified Arborists.		X		2 of 3 arborist positions identified in Long Term Service Plan have been filled
C	Invest in technology, associated training, and staff time to survey, map, measure, and assess urban forest attributes and values for planning and management purposes		X		Initiated in 2016, ongoing
4					

	Investments in Enhancing the Urban Forest Asset				
A	Review landscape plans (both design and as-built) so they adhere to engineering standards but are adaptable when appropriate for forest health.		X		Collaborate with Planning and Engineering
B	Secure capital funds to continue purchasing new plant stock for boulevard and park lands, as well as for the design and construction of any special infrastructure to support these trees, such as soil vaults or soil cells.	X			Operating business cases will be developed
C	Develop and implement new procedures and approaches, revise building and development guidelines and requirements, update engineering standards, and address urban forest considerations in community and functional planning initiatives.			X	Collaborate with Planning and Engineering
D	Increase investment in community outreach and communication.		X		Work with departments that currently engage the community
E	Develop a tree risk management policy defining responsibilities, thresholds for tree removal		X		Policy development to be determined
F	Develop educational programs to expand resident awareness of the urban forest.	X			Work with departments that currently engage the community
G	Establish best standards for tree maintenance, tree planting, and tree establishment.		X		Collaborate with Planning and Engineering
H	Explore inclusion of urban forest or its components as tangible capital assets				Collaborate with Finance and regional partners
I	Establish tree-protection standards during urban development, both internally managed and externally managed projects.	X			Collaborate with Planning and Engineering
J	Establish punitive penalties for tree removal or tree injury by developers, such as issuing fines and requiring trees be replaced at a minimum of a 2:1 ratio.			X	Collaborate with Planning and Engineering
K	Require developers to pay for tree removal, replacement, and establishment.		X		Collaborate with Planning and Engineering
L	Require new technologies be applied during tree development (e.g., soil cells), when possible, in lieu of tree removal.		X		Collaborate with Planning and Engineering

M	Enhance coordination between departmental programs to share best practices.		X		All departments
N	Refine planning tools and methods that further enable: • detailed urban forest analysis for proactive maintenance planning; • identification of environmental priorities for management, canopy gaps, and planting opportunities; and • use of defined performance measures.		X		Collaborate with Planning and Engineering and Environmental Services
O	Increase biodiversity of trees and other vegetation, and reducing non-native invasive species			X	
P	Increase canopy cover and the reasonable distribution of tree canopy;			X	
Q	Adjust the uneven distribution of tree sizes by increasing the number of mid- to large-sized trees			X	
R	Use accepted industry analysis programs to value benefits and costs associated with urban forest		X		Benefits/cost analysis using programs such as iTree
S	Create residential subdivision plans identifying opportunities for additional planting and areas where underplanting should be considered		X		Inventory in progress to determine age structure

APPENDIX F St. Albert Entries into the Heritage Trees of Alberta Publication



Photos: Chris Olsen

St. Albert Spruce Forest

By Peter Murphy

The valley of the historic Sturgeon River lies in the "Boreal Forest–Grassland" region, characterized by a mixture of open prairies and groves of aspen, poplar and spruce forest. The "Spruce Forest" in St. Albert is a natural remnant that has escaped fire for about 170 years, part of more extensive, pre-settlement spruce forests in the region. When one of the oldest trees blew down in 2002, its tree rings showed that it had started life in 1841!

The region has seen much history: from artist Paul Kane, to buffalo hunters, to Father Albert Lacombe, who built his first church from spruce logs cut along the river.

A notation on an 1882 map describing the area around the Spruce Forest as "brush" suggests that a forest fire had passed through, perhaps in the 1830s. Spruce seedlings must have found it difficult to survive and grow in competition with the abundant grass, shrubs and poplar that would have sprouted immediately after the fire—confirmed by the very narrow growth rings in the old spruce's first thirty years. Eventually though, the spruce would overtake the poplars and take advantage of full sunlight. Now, spruce dominates the forest, with scattered poplar and a rich mixture of plants within it.

These spruce trees would have been too small for logs and lumber during St. Albert's early days; so they had the opportunity to grow into this wonderful old-growth forest habitat. The City of St. Albert has dedicated it as a park. It should still be there with its surviving 170-year-old spruce trees when St. Albert celebrates its 150th Anniversary in 2011.

ST. ALBERT SPRUCE FOREST

Forest

Species: White Spruce *(Picea glauca)*

Location: The Spruce Forest Red Willow Park - at Hogan Road (off Meadowview Drive)

City: St. Albert

Planted By: Naturalized

Year: Circa 1840

Age: 170 years



Founders' Walk

By Peter Murphy

Oblate missionary Albert Lacombe founded St. Albert Mission in 1861. The original settlers were largely Métis farmers who took advantage of the excellent soil. They were soon joined by others, including French-speaking settlers from eastern Canada, and the St. Albert community grew steadily around the Mission.

In 1911, Father Alphonse Jan proposed a National Park on Mission Hill to recognize what the pioneering missionaries had done "for the material benefit of the people and for the national good of Western Canada". Although a national park was not created, his idea led to the approval, in 1928, of a Memorial Park.

Volunteers under the direction of Father Jules Bidault renovated the original 1861 log chapel. A statue of Father Lacombe, donated by his friend and Calgary businessman Pat Burns, was placed at the site of the original log church at the top of the hill. The Canadian National Railway contributed gravel for a lane leading to it from the river, and donations of over $10,000 were raised from across Canada for the project. Poplar trees were planted on both sides of the lane in the spring of 1930 to form a boulevard and spruce trees were added over the next few decades.

In 1988, the St. Albert Historical Society dedicated the lane as The Founders' Walk and the City transplanted additional spruce trees from its nursery to commemorate families that had settled before 1890. These trees are identified with brass plaques inscribed with the family names.

The Founders' Walk remains clearly identified by the five still-surviving original poplars and well-established spruce trees.

FOUNDERS' WALK

Species: Northwest Poplar (*Populus jackii* 'Northwest')

Location: Mission Park Madonna Dr – east of Little White School House

City: St. Albert

Height: 25m; 82'

Circum: 2.6m; 8'6"

Canopy Spread: 20m; 65'7"

Planted By: Father Alphonse Jan

Year: 1928

Age: 80 years



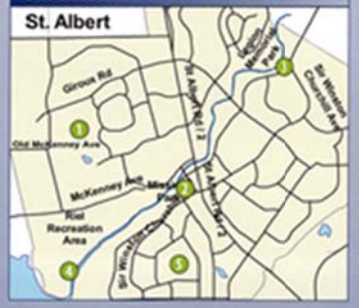




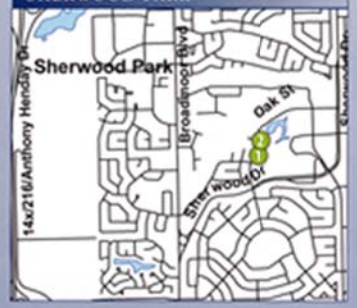


Edmonton & Area Maps Continued

St. Albert



Sherwood Park



Tofield

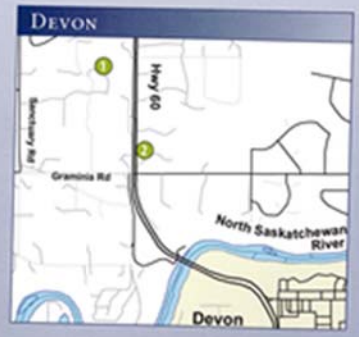


Leduc



Please do not enter private property. View tree(s) from public pathway. Permission must be obtained when entering school, golf course & private institutional grounds.

Devon



#	Location Name	Common name	Scientific Name	Address
	St Albert			
1	Red Willow Trail	Manitoba Maple	Acer negundo	Lacombe Lake Park west of Lindbergh Cr.
2	Founders Walk	Northwest Poplar	Populus jackii 'Northwest'	Mission Park @ Madonna Dr
3	St. Albert Botanical Garden	White Spruce	Picea glauca	265 Sturgeon Road
4	White Spruce Forest	White Spruce	Picea glauca	Between Hogan Road & Big Lake
5	Entwined Birch	Paper Birch	Betula papyrifera	#1 Grantham Place
	Sherwood Park			
1		Russian Olive	Elaeagnus angustifolia	2004 Oak Street
2		Silver Maple	Acer saccharinum	2014 Oak Street
	Tofield			
1	McCauley Tree	Scots Pine	Pinus sylvestris	4904 - 54 Avenue
	Leduc			
1	St. David's United Church	Laurel Leaf Willow	Salix pentandra	4614 - 48 Street
	Devon			
1	Clifford E. Lee Sanctuary Survival Tree	Jack Pine	Pinus banksiana	Hwy 60 & Woodbend Rd
2	Devonian Botanic Garden (DBG)	Various species		Hwy 60 & Rge Rd 263
2	DBG Dwarf Pine	Lodgepole Pine	Pinus contorta latifolia	Hwy 60 & Rge Rd 263