

Regional Municipality of Wood Buffalo

Urban Forest Strategy



REGIONAL MUNICIPALITY
OF **WOOD BUFFALO**

LEES
+
ASSOCIATES



Arbor-Pro Tree Consulting Ltd.

Regional Municipality of Wood Buffalo
Urban Forest Strategy
Final Report

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During the course of this project, RMWB facilitated community engagement through a public survey and trade show events. Thank you to those members of the public who responded to the survey and participated in these events.

EXECUTIVE SUMMARY

This Urban Forest Strategy provides strategic direction for managing and enhancing the environmental, social, and economic benefits of the urban forest. As the first document of its kind for the Regional Municipality of Wood Buffalo, it lays out a vision for the future, core principles, strategic objectives, and recommendations that will be implemented over the next 20 years. While primarily focused on the Urban Service Area of Fort McMurray, the core principles and information presented is applicable throughout the Regional Municipality of Wood Buffalo.

The urban forest is a critical factor in human health and well-being, affecting the overall quality of life in communities. The benefits of an urban forest contribute significantly to making the Urban Service Area and the RMWB a more livable and sustainable region. Some of the most beneficial aspects of the urban forest include reduced energy costs and increased property value for home owners, stormwater runoff reduction resulting in lower infrastructure costs, quality of life benefits such as cleaner air and the psychological and physical benefits of living near green space.

While providing substantial benefits to the community, there are also significant threats and challenges related to protecting, managing, and enhancing the urban forest. The RMWB is no stranger to wildfire. The 2016 Horse River Wildfire, which encompassed an area of over 589,000 hectares caused the evacuation of almost 88,000 people and consumed 1,595 buildings and structures. As a result, a key challenge is protecting homes and the community, particularly by adopting FireSmart practices, while valuing trees and enhancing their benefits to the community. Other challenges and threats included issues related to urban development; the challenge of northern communities, the impacts of climate change, and barriers to proactive management of the urban forest.

This Strategy was developed collaboratively with input from staff, stakeholders, and the public, that represents a diversity of concerns, values and interests. Other influences on this plan included field visits, policy context review, and identification of best practices. Sections 1-3 provide the context, background research, inventory, and analysis, as well as identifying the vision, principles and strategic objectives. Section 4 is the action plan, which outlines recommendations under the themes of planning, managing, growing, caring for, and supporting the urban forest.

The implementation of this strategy will be pursued over the next 20 years and will be addressed and considered by the RMWB Council through the annual operating and capital budget process, with balanced consideration for all other RMWB budget priorities. The recommendations on the following pages are identified as high priorities. A list of all recommendations, in order of priority, is provided and further explained in Section 5 – Implementation Plan.

URBAN FOREST

All trees, vegetation, watersheds and wildlife in a community. Tree-lined roadways, open green spaces, undeveloped forests, parks and private commercial lands are all part of the urban forest.

URBAN FORESTRY

Urban forestry is the planning for, and management of trees (individually and collectively) in urban settings or developed areas. Urban forestry advocates the role of trees as a critical component of the urban environment.

HIGH PRIORITY RECOMMENDATIONS FOR RMWB

Recommendation	Explanation
Integrate FireSmart principles in the planning, management, and care of the urban forest.	Incorporate relevant principles of FireSmart into the 5-Year Urban Forest Management Plans and Annual Operating Plans.
Develop an Urban Forest Management Plan every five years.	5-year management plans are needed to outline priority actions arising from this Urban Forest Strategy. The development of the management plan should include public engagement, integrated planning, and cross-departmental coordination. It is also an opportunity to build community knowledge of the urban forest and forest management issues.
Develop Urban Forest Annual Operations Plans to direct the development of work plans based on the Urban Forest Management Plan and this Urban Forest Strategy.	A process for development of an Urban Forest Annual Operations Plan is required. This will strengthen the annual budget planning process. Through the development of the Annual Operations Plan, staff will have the opportunity to identify opportunities and gaps related to implementing the Urban Forest Strategy and Urban Forest 5-Year Management Plans.
Develop and implement a Tree Bylaw that includes such aspects as tree loss, damage and vandalism, tree asset value evaluation guidelines, and tree protection.	A comprehensive Tree Bylaw is essential to the efficient and effective management of the urban forest. However, as the process for changing a bylaw can be onerous, sufficient discussions and consultation should be conducted to ensure it will meet the needs of the RMWB in the long-term. An outline of typical topics covered by a bylaw is provided in Appendix A.
With an objective to reduce wildfire behavior potential, use the guiding principles of the FireSmart program to reduce the threat of a community level wildfire within the Birchwood Trails/Conn Creek community reserve.	Integration of FireSmart in the planning, maintenance and care of woodlots, woodlands, and natural stands is essential. For example, fuelwood reduction is a primary goal for reducing the threat of a community level wildfire within the Birchwood Trails/Conn Creek community reserve. A mechanical chipper can process slash into chips that are then spread over the ground.
The use of landscape mulches should be limited to composted wood chip mulch, in accordance to FireSmart/FireWise program research, to a depth of no greater than 80 mm to 100 mm (3 to 4 inches). Composted wood chip mulch should not be used within 1.5 m (5-feet) of a home, dwelling or other fire combustible structure.	Chipped slash decomposes more rapidly and will present little fire danger (as long as chips are not spread too thickly). These wood chips act as mulch to hold soil moisture, stimulate plant growth and prevent erosion on slopes. These wood chips must not be spread too thickly: a depth of 80 mm to 100 mm (3 to 4 inches) is the maximum that is recommended.

Establish an Urban Forestry Working Group and review staffing resources for the urban forestry program administration and management.	Urban forest management in larger Alberta cities is usually conducted using the model of joint municipal and contracted service provision. An Urban Forestry Working Group can be tasked with reviewing existing staff resources and consider reprioritization or realignment of duties, temporary assignment of staff to special projects, or utilization of staff working groups.
Develop a Tree Inventory for existing trees and implement a policy and procedures for collecting tree inventory data for any trees accepted by the RMWB through the development process.	Establishing a strong baseline of data is critical for developing management plans and operational plans for the urban forest as a whole, as well as for individual trees. Trees are an important asset for the RMWB and should be tracked and managed with an understanding of their value to the community.
Initiate a formalized and continuing elm bark beetle monitoring program with the assistance of the Society to Prevent Dutch Elm Disease or STOPDED.	The monitoring for Dutch Elm Disease (<i>Ophiostoma ulmi</i> or <i>Ophiostoma novo-ulmi</i>), an extremely virulent fungal species, must be conducted annually. Monitoring for these beetles is imperative for the preservation of elm trees in both the RMWB and the Province of Alberta, thereby protecting this valuable urban forest resource. The Society to Prevent Dutch Elm Disease (STOPDED) actively monitors for elm tree bark beetles that transmit DED. This is at no cost to Alberta municipalities.
Train staff in proactive visual monitoring and assessment of the urban forest for pests and diseases.	Non-native and invasive insects, particularly the Asian long-horned beetle and emerald ash borer, require a strategy of diligent, proactive, and reactive approaches to urban forest management should their presence be discovered. Therefore, staff training is vital for the proactive visual monitoring and assessment of the Urban Service Area of Fort McMurray's urban forest and natural tree stands.
Update the Engineering Servicing Standards and Development Procedures, Landscaping Section 10.0 (p. 10-1 to 10-55 or p. 405- p. 495).	RMWB currently has landscaping standards outlined in the RMWB Engineering Servicing Standards and Development Procedures (December 2016). These provide general minimum requirements for landscape development. Adjustments to this document are recommended to ensure alignment with this Urban Forest Strategy. See Appendix C for recommended updates.
Consider the development of a Tree Protection Policy for all RMWB owned trees and for protection standards during development.	The protection of trees during construction activities or site development is more effective in maintaining urban forest benefits than planting new trees. Furthermore, it is usually less costly. The RMWB is in need of a tree bylaw and regulations specifically tailored to its needs and requirements, and available for use by residents, site plan applicants, developers, contractors, municipal staff and others involved in urban forestry.
Develop an interdepartmental committee to increase cross-departmental communications regarding urban forest issues.	Collaboration within Public Works, Engineering, Planning and other departments within the RMWB, especially within the Urban Service Area of Fort McMurray is very important. A small interdepartmental and intradepartmental committee may be one way to liaise within the municipality's working groups. Coordination with FireSmart representatives is also recommended. The process of developing 5-Year Management Plans and the Annual Operations Plans could prompt meetings of this interdepartmental committee, in addition to project-specific coordination needs.

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Appendix A- Additional Information

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- Nursery Stock, Size and Quality
- Tree Bylaw Typical Sections
- Tree Inventory
- Tree Planting on Public Lands

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1 Introduction

Located in the northeast corner of Alberta, the Regional Municipality of Wood Buffalo (RMWB) is among Canada's largest municipalities by area, the vast majority of which is pristine wilderness. Its unique municipal structures allow urban and rural communities to coexist in a single municipal government.¹ The Regional Municipality of Wood Buffalo covers an area over 63,000 square kilometres with a population of with a total permanent population of 78,832 (Municipal Census, 2018). Propelled by the growth of the oil sands sector, the RMWB has undergone transformative growth from a small oil town to an internationally recognized municipality. Within the RMWB, the Fort McMurray Urban Service Area (USA) accounts for a majority of the permanent population at 75,615 people (Municipal Census, 2018).

As the region has grown, so has the need for strategic direction to provide approaches and implementable actions to guide future development and service delivery. Building on a legacy of hard work, innovation, and big spirit, the Municipality is seeking to embrace technological advances, and best and “next” practices in the delivery of its urban forest services.

The RMWBs urban forest is a vital part of the region's character, spirit and vibrancy. The Municipality's urban forest is an important contributor to quality of life in the region, playing a role in the physical health, social, economic, environmental, and well-being of the region's communities. Building on related planning initiatives, it is critical to plan ahead for a healthy, sustainable and dynamic urban forest that maximizes benefits for all RMWB residents for future generations.



The RMWB's trees and forests are a vital part of the region's character, spirit, and vibrancy.

1.1 CONTEXT

The Urban Service Area of Fort McMurray is within Canada's boreal region and the surrounding landscape is primarily covered by boreal forests. White spruce, trembling aspen, balsam poplar and birch are the most prominent native trees with black spruce and tamarack occurring in poorly drained areas. Jack pine occurs on the dry sandy sites. Within the urban environment, the majority of the non-native tree species include Colorado spruce, green ash and American elm. The Urban Service Area itself has a current tree canopy cover of approximately 25 percent, which is highlighted by many important assets such as the Birchwood Trails, MacDonald Island and Horse Pasture Park. These are key recreational areas which have significant naturalized tree cover.

In 2016, the Horse River Wildfire impacted a vast area in and around the RMWBs communities. A key aspect of this strategy is integrating lessons learned from the wildfire into the planning and management of the urban forest and the wildland-urban interface (WUI) and, specifically, integration of the FireSmart program recommendations.

1.2 THE PURPOSE OF THE STRATEGY

The purpose of the Urban Forest Strategy is to establish the overall goals and objectives of the Regional Municipality of Wood Buffalo's urban forestry efforts within the Urban Service Area of Fort McMurray and rural communities. However, the core principles and information presented is applicable throughout the Regional Municipality of Wood Buffalo. This strategy builds on other municipal plans and policy documents and input from staff and the community to provide a common vision for the future of the urban forest. The Urban Forest Strategy has been developed alongside the Parks Master Plan to ensure the two documents support each other.

The purpose of the Urban Forest Strategy is to:

- Establish the role and benefits of trees as part of the urban environment
- Develop an urban forest vision and core principles that can apply to entire region including the rural communities
- Identify existing conditions and potential opportunities for enhancement of the urban forest
- Identify best practices for administration and management of the urban forestry tree program
- Identify ways to coordinate policies, practices, and procedures for all tree-related activities undertaken by the RMWB, including the implementation of the FireSmart program
- Develop an action plan that includes a prioritized list of strategies for current and future urban forestry service delivery, including strategies for wildfire mitigation and forest hazard reduction

URBAN FOREST

- All trees, vegetation, watersheds and wildlife in a community; tree-lined roadways, open green spaces, undeveloped forests, parks and private commercial lands are all part of the urban forest.

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- Urban forestry is the planning for, and management of, trees (individually and collectively) in urban settings or developed areas. Urban forestry advocates the role of trees as a critical component of the urban environment.

1.3 METHODOLOGY

The Urban Forest Strategy was developed through the following six phase process:



Figure 1. Project Phases and Timeline

The Urban Forest Strategy process included staff interviews and workshops, field visits, background research, inventory and analysis, and significant engagement with RMWB staff. In addition, the RMWB led an engagement process with the general public in the urban and rural service areas.

1.3.1 STAFF INTERVIEWS AND WORKSHOPS

Early in the process a series of workshops and interviews were held with RMWB staff, with over 15 individuals from the Parks Services team participating. Meetings were used to identify issues such as challenges and opportunities within the urban forest.

These meetings included:

- Project Steering Committee Meetings
- Toolbox Workshops with Urban Forest Staff
- Field Tours with Supervisors and Staff

For a summary of staff input see Section 3: Engagement- What We Heard.



Figure 2. Key components in the development of the Urban Forest Strategy

1.3.2 FIELD INVENTORY AND ANALYSIS

The consulting team conducted field visits with Parks Urban Forestry staff and a representative of the Recovery Task Force to assess Fort McMurray’s existing urban forest areas. The focus of the visits was to develop an understanding of the range and types of urban trees and forests and to identify key opportunities and constraints.

1.3.3 COMMUNITY ENGAGEMENT

RMWB staff conducted a combined public engagement program to gather input and feedback on both the Urban Forest Strategy and the Parks Master Plan. Engagement activities included a project webpage, a public survey, a press release, and trade show information booths.

For a summary of community engagement input see Section 3: Engagement – What We Heard.

1.4 RELATED PLANS AND POLICIES

1.4.1 POLICY CONTEXT

This Urban Forest Strategy aligns with Provincial and Regional level plans and policies and is meant to further those initiatives through its recommendations. The actions outlined in this plan will influence the development and/or revision of more detailed plans, policies, and strategies, such as the Engineering Servicing Standards.



Field tours with RMWB Parks staff. Left: natural stands impacted by the wildfire in Beacon Hill neighbourhood. Right: trees recently planted in a centre median.

This planning initiative focused on trees and urban forests within the RMWBs Fort McMurray Urban Service Area. However, these core principles and this information can be applicable throughout the rural areas of RMWB. In the terms of managing the urban forests within the municipality, other plans have only provided limited guidance and direction. The Urban Forest Strategy is a plan that provides the planning and policy context that examines the urban forest holistically, providing information, tools, and the strategies needed to protect, enhance, and grow the urban forest.

1.4.2 RELATIONSHIPS TO OTHER PLANS

The following plans were reviewed to ensure the Urban Forest Strategy is aligned with current and ongoing RMWB planning initiatives.

- Parks Master Plan (2018) - The Urban Forest Strategy was developed in conjunction with the Parks Master Plan, as the two plans share many core values, principles and strategies. The close relationship of these two plans underscores the municipality's commitment to green spaces and vegetation within its communities.

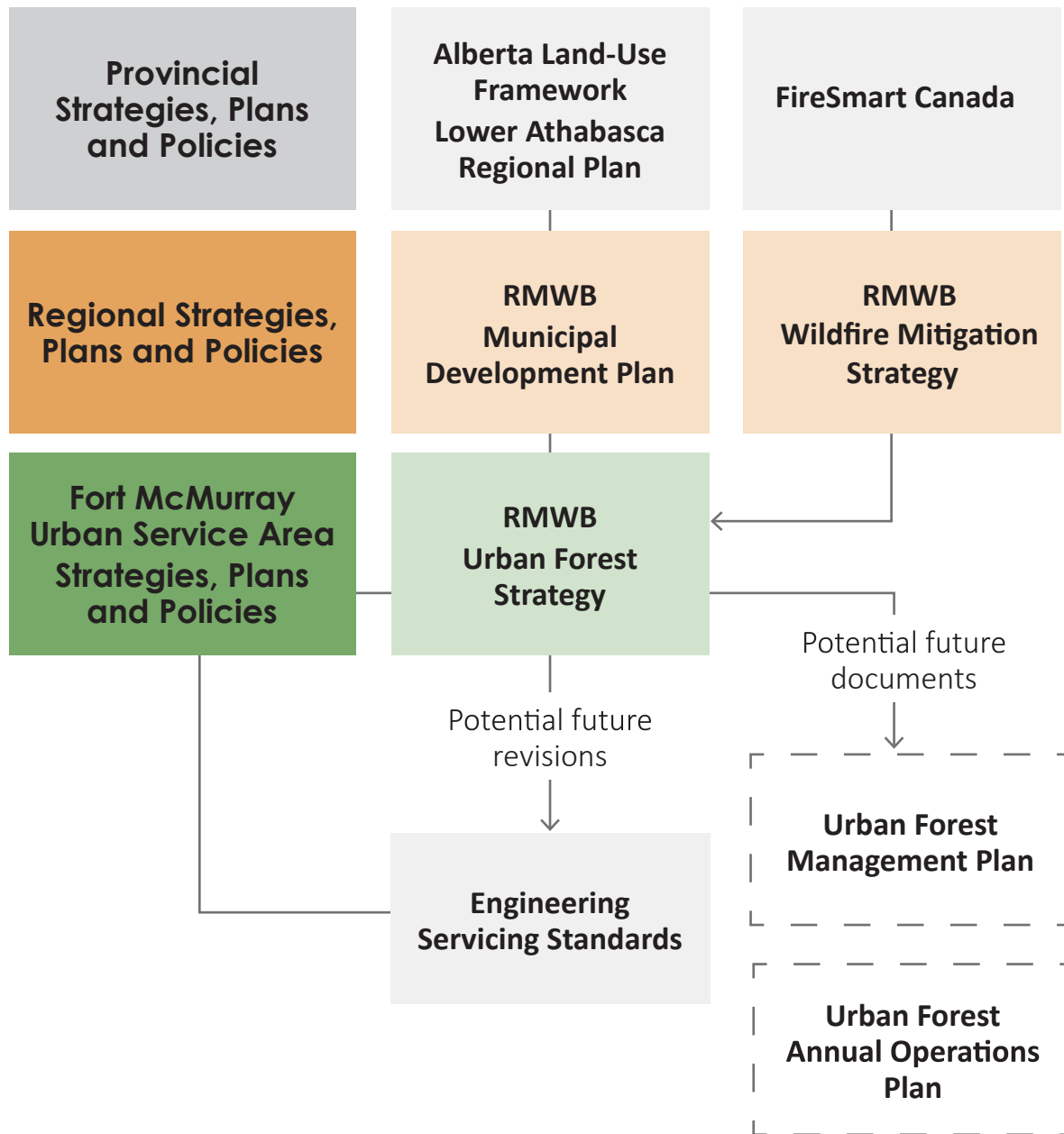


Figure 3. Plans and Policies Context

- Wildfire Mitigation Strategy (2017) – Based on FireSmart Canada, a national program, this document provides practical and operational wildland-urban interface risk management strategies to reduce the threat of wildfire to development in the RMWB service areas. There are several relevant issues, opportunities, and recommendations that have been integrated in the Urban Forest Strategy.
- Post-Fire Wildfire Hazard Assessment (2016) – This document identifies post-wildfire green islands within and adjacent to developed areas, and related wildfire threat. Implementation strategies for hazard reduction outlined in this document are relevant to the Urban Forest Strategy.
- Municipal Development Plan (2011) – This document (MDP) outlines a vision and plan for managing growth and building sustainable communities. It is used to guide short and long-term decision making at the Regional Municipality of Wood Buffalo and conforms to the requirements of the Municipal Government Act of the Province of Alberta. This Urban Forest Strategy aligns with the vision, principles and strategies that are outlined in the MDP.
- Strategic Plan 2018-2021 – This plan was approved by the Council of the Regional Municipality of Wood Buffalo in January 2018. The Strategic Plan addresses the steps the Municipality will take over the next three years to address the vision and goals of the longer-term Municipal Development Plan (MDP). The goals and strategies align with one or more of the strategies from the MDP. 3
- Engineering Servicing Standards (2016)- This document provides procedures and standards on the development of land and the construction of public infrastructure. Of particular relevance are the Landscape and Park Development Standards (Section 10) that outline general minimum requirements for landscaping, street trees and other tree planting. Some of the recommendations in this Urban Forest Strategy relate to updating the Engineering Servicing Standards to improve outcomes for the urban forest.
- Municipal Government Act, Chapter M-26 (October 2017) - This legislation defines how municipalities function, develop land, and raise funds for services. In other words, it is the guide to how Alberta municipalities operate. It includes the “over-arching” rules for land use planning, how land is developed, planning decisions and appeals, and environmental considerations. It also defines the role of municipal councils and municipal administrations.

FIRESMART

FireSmart is living with and managing for wildfire. FireSmart helps prepare and protect homes and communities from the threat of wildfires while balancing their benefits to the landscape. It is a shared responsibility from home owners, industry and government.

1.5 STUDY AREA

The focus of this Urban Forest Strategy is the Fort McMurray Urban Service Area, which is home to approximately 75,000 people. However, the urban forestry vision and core principles outlined in this strategy can apply to the entire region, including the rural areas. Urban forestry within the Fort McMurray Urban Service Area includes forests on public lands, such as park trees and street trees. Trees on private lands contribute to the overall structure of the urban forest, but are outside the scope of this report. While most of the current urban forest is found in the current Urban Service Area, the intent is that newer areas will develop with more trees in the public landscape.

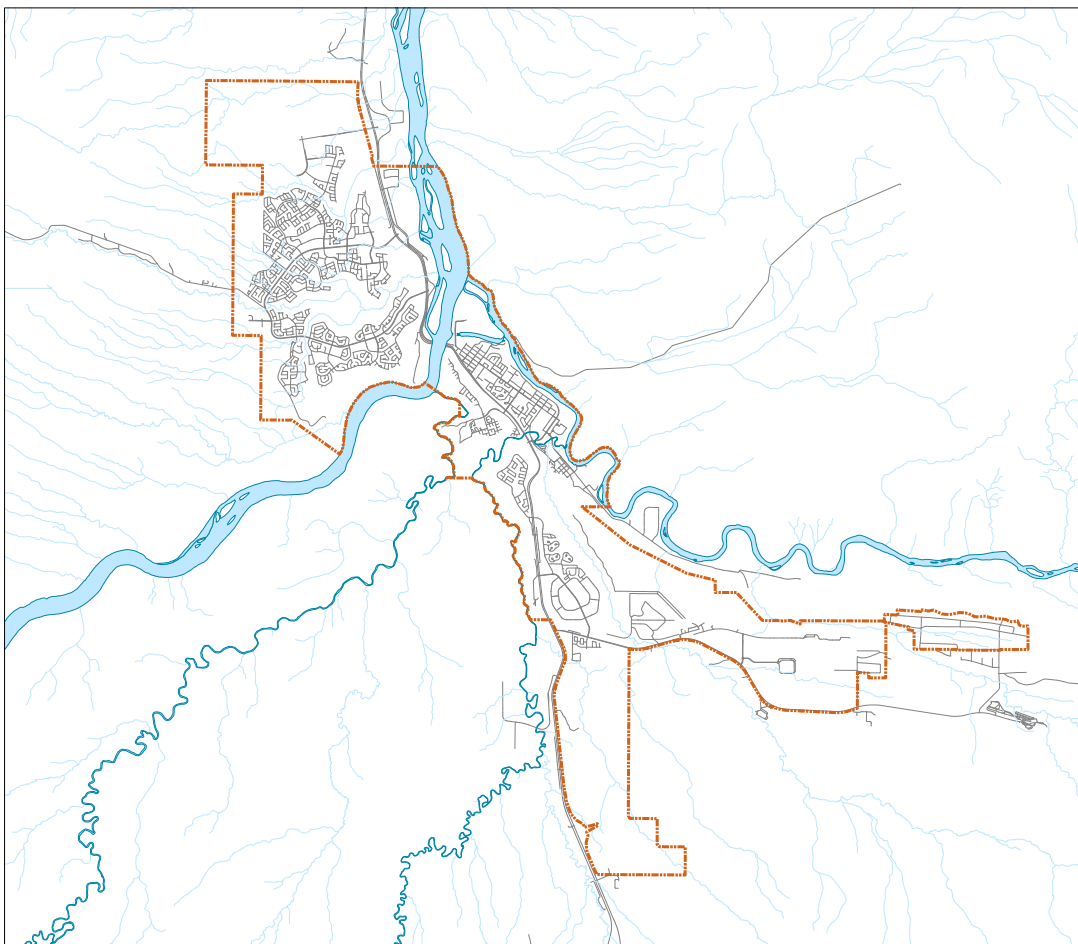
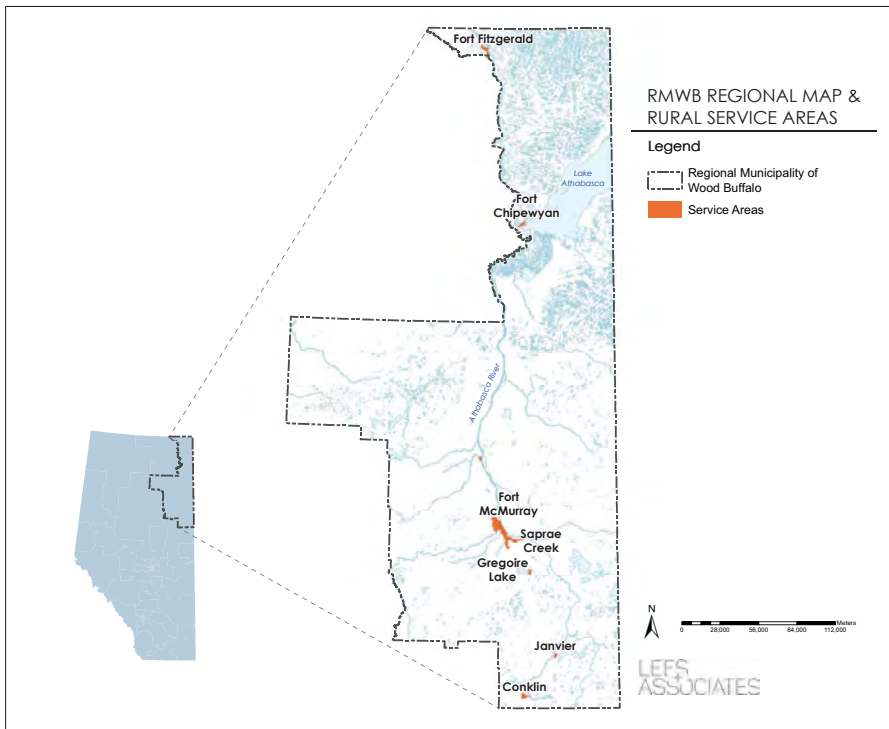


Figure 4. Primary Study Area - Fort McMurray Urban Service Area

Urban forestry services have been provided in the Urban Service Area of Fort McMurray since 2005 in response to service requests from residents and the challenges posed by the rate of development and growth. Planning and management of much of the natural forest or forest protection area outside of the Urban Service Area is under the jurisdiction of the Province.

1.6 THE VALUE OF FORT MCMURRAY'S URBAN FOREST

Historically, trees were often included in local plans primarily as beautification elements. Today, many planners have realized that trees play a much greater role in the urban environment. The urban forest is a critical factor in human health and well-being, affecting the overall quality of life in communities. The benefits of an urban forest contribute significantly to making the Urban Service Area and the RMWB a more livable and sustainable region. The geography of Fort McMurray, with its many rivers, streams and wet soils, makes possible an abundance of urban green spaces.

Trees increase in value from the time they are planted until they mature. Many studies have been done on the value of public trees. New York City's ground breaking study on tree values demonstrated the average value per tree, per year, is in the vicinity of \$200, and the city's entire annual benefit value is \$122 million based on stormwater intercepted, energy conserved, air pollutants removed, and carbon dioxide reduced.⁴ The additional benefits of improved quality of life and the contribution to the beauty and character of the community further bring the value of urban trees and forests far beyond that.

To the individual, these savings are small, but to the region or its communities' reductions of these expenses are often in the thousands of dollars. The following benefits of urban forests and their impact on a municipality's bottom line, in terms of environment, economic, and social benefits, needs to be emphasized on an ongoing basis.

1.6.1 ENVIRONMENTAL BENEFITS



CLEANING THE AIR

Air pollution, such as ozone (O₃), dust and other particulate matter, is a serious health threat to many city dwellers, causing coughing, headaches, respiratory and heart disease, and cancer. Impaired health results in increased social costs for medical care, greater absenteeism, and reduced longevity. Trees are sometimes called the “lungs of our cities,” as they can remove contaminants from the air by binding airborne pollutants to leaf and bark surfaces.⁵

THE VALUE OF MATURE TREES

Supporting urban trees to achieve maturity provides the community with environmental, economic and social benefits. For example, the period of maximum benefit of a Green Ash or Elm tree is between 60 and 300 years. A single mature tree can lift up to 100 gallons of water out of the ground and discharge it into the air in a day.⁶ Mature trees may also benefit wildlife by providing quality habitat.

IMPROVING WATER QUALITY THROUGH RUNOFF INTERVENTION

Storm water discharges into water bodies can be managed to improve water quality. Community programs can identify which best management practices (BMP's) will be implemented to reduce pollutant discharge. Healthy trees with large leaves and rough surfaces can intercept and reduce the amount of runoff loading local receiving waters.

Trees can intercept between seven percent (7%) and twenty-two percent (22%) of storm water runoff from impermeable surfaces. Trees control runoff at the source by intercepting and storing rainfall, reducing runoff volumes and erosion of watercourses, as well as delaying the onset of peak flows. For every five percent (5%) of tree cover added to a community, storm water runoff is reduced by approximately two percent (2%).

Trees reduce topsoil erosion and prevent harmful land pollutants that are contained in the soil from getting into our waterways and slowing down water run-off. This helps to ensure that groundwater supplies are continually being replenished.

Rainfall that is stored temporarily on leaf and bark surfaces is called interception. Intercepted water evaporates, drips from leaf surfaces, and flows down stem surfaces to the ground. Saturation generally occurs after 2.5 ml to 5 ml (1 to 2 inches) of rain has fallen.

Rainfall interception by large trees is a relatively inexpensive first line of defense in the battle to control nonpoint-source pollution when compared with more expensive solutions like retention basins. Trees intercept a portion of rainfall that evaporates and never reaches the ground. Some rainfall runs to the ground along branches and some falls through gaps or drips off leaves and branches. Transpiration increases soil moisture storage potential.

BENEFITS TO URBAN CLIMATE, HEAT ISLAND EFFECT, AND CARBON SEQUESTRATION

Community heat islands that are warmer (1.5 to 5.5 degrees Celsius or 3 to 10 degrees Fahrenheit) than surrounding countryside exist because of decreased wind, increased high density surfaces, and heat generated from human associated activities, all of which requires additional energy expenditures to off-set. Trees can be successfully used to mitigate heat islands. Trees reduce temperatures by shading surfaces, dissipating heat through evaporation, and controlling air movement responsible for advected heat.ⁱ

Furthermore, urban forests play an important role in mitigating the effects of climate change through the storage and sequestration of carbon. As trees grow, they naturally remove carbon from the atmosphere and store it within their woody tissues. For example, the City of Toronto has estimated that each mature tree sequesters approximately 1,100 kg of carbon. Furthermore, each year an additional 46 kg of carbon can be sequestered by these City of Toronto trees.⁷ Likewise, this same benefit accrues to the citizens of Fort McMurray.

ⁱAdvection heat transfer is the movement of heat that is confined to the horizontal plane. This type of heat transfer is powered by an outside force, such as wind or currents as it moves horizontally into systems that are hotter or colder, heat is transferred.

REDUCING ENERGY USAGE

Sixty-five percent (65%) of heat generated in full sunlight on a tree is dissipated by active evaporation from leaf surfaces. There is a seventeen percent (17%) reduction in building cooling by active evaporation by trees. A house lot of 810 m² (8,700 ft. sq.) or 19.5 m x 41 m (64 ft. x 136 ft.) with only a vegetation coverage of thirty percent (30%) will dissipate as much heat as two running central air conditioners.

REDUCING SUNLIGHT EXPOSURE (UV RADIATION) AND EXTREME HEAT

Trees assist in light scattering and thereby reducing light intensity. This also modifies the predominant wavelengths on a site. Trees block and reflect both sunlight and artificial lights to minimize eye strain. They can frame lighted areas for architectural emphasis, safety, and visibility.

1.6.2 ECONOMIC BENEFITS



INCREASING PROPERTY VALUES

Large, mature street trees are found to be the most important indicator of attractiveness in a community. Appraised property values of homes that are adjacent to parks and open spaces are typically eight percent (8%) to twenty percent (20%) higher than those of comparable properties elsewhere. Furthermore, property values increase five percent (5%) to fifteen percent (15%) when compared to properties without trees (depends on species, maturity, quantity and location).

STIMULATING ECONOMIC ACTIVITY

Shoppers stay longer in plazas that have trees. Furthermore, they are willing to pay up to eleven percent (11%) more for products purchased in shops along tree-lined streets than they would pay for the same item in a barren setting. Additionally, the quality of products was perceived as being better in shopping districts having trees versus those with barren sidewalks.

REDUCING ENERGY COSTS

Trees save heating and cooling energy by shading buildings, lowering summertime temperatures, and reducing wind speeds. Secondary benefits from energy conservation are reduced water consumption and pollutant emissions by power plants. By reducing demand for electricity, trees reduce emissions of air pollutants at power plants, as well as their use of water in cooling towers. These avoided emissions can be comparable to annual pollutant uptake rates for a mature tree.

Trees with open crowns during the winter are “solar-friendly” because they do not block sunlight. Deciduous trees’ leaves generally drop early in the fall and their new leaves form late in the spring.

REDUCING PROPERTY CRIMES IN RESIDENTIAL AREAS

Person and property crimes can be reduced by the implementation of Crime Prevention through Environmental Design or CPTED. CPTED includes the physical, social, and productive use of space that leads to both crime and loss prevention, thereby improving the quality of life. This is accomplished by how well the physical design supports the intended function and the definition of desired behaviors. The strategic

placement, care, and pruning of trees and other vegetation can affect key safety considerations such as ensuring visual surveillance corridors and reducing blind spots and hiding places. Healthy trees and well maintained landscapes can also contribute to improved use of public spaces, which inherently contributes to an overall sense of safety.

1.6.3 SOCIAL (HUMAN HEALTH) BENEFITS



IMPROVING PHYSICAL AND MENTAL HEALTH AND WELL-BEING

People feel more comfortable and at ease when in shaded, open areas of trees as compared to areas of hardscapes and non-living things. People also prefer locating areas of social interactions in calming, beautiful, and nature-dominated areas.

Trees and people are psychologically linked by culture, socialization, and co-adaptive history. They can reduce stress and mitigate the psychological precursors to crime such as irritability, inattentiveness and impulsive behavior.

For example, one study found that patients who had a view of a wooded landscaped scene recovered more quickly from abdominal surgery, required less pain medication, and had fewer complications than those who had a view of a brick wall.⁸ Another study found that office workers with a landscape view experienced less job pressure and greater job satisfaction than colleagues with no view or a view of buildings.⁹

Healthy forests mean healthy communities. Public safety can be affected by the health of the forest. A healthy urban forest mitigates impacts of extreme weather and wildfire events. Ensuring the health and maintenance of urban forests ensures a healthy and safe community.

1.7 VISION FOR THE URBAN FOREST

Residents, both new and established, of the Urban Service Area of the RMWB enjoy a high quality of life in a healthy, vibrant, and prosperous community. One of the most important contributors to this high quality of life is its urban forest. The RMWB values its urban forest. Trees are essential components of the environmental, social, and economic fabric of its urban areas. If not managed properly, trees can also pose a serious risk to communities from wildfire, windfall, and damage resulting from structural tree defects such as failing limbs. The urban forest vision and the statements of core urban forest values apply to both the Urban Service Area of Fort McMurray and the rural service areas within hamlet boundaries.

VISION

The Regional Municipality of Wood Buffalo's urban forest is a valued amenity that provides environmental, economic, social, and health benefits to its community. The RMWB recognizes the value of this community asset as well as the risks associated in its planning and day-to-day operations. This urban forest asset is sustained by the RMWB as it works towards proactive management and strives for protection, enhanced stewardship and partnership support of its urban forest.

1.8 CORE URBAN FORESTRY PRINCIPLES

The following principles are core to the management of the RMWBs urban forest and are intended to guide its implementation. It is important to note that many of these principles refer to the application of and support for FireSmart program and initiatives within the community. These principles include:

- Develop a better understanding of the urban forest to support its effective management for enhancement, safety and risk mitigation
- Plant the right tree in the right place and identify tree species that are resistant to wildfires and likely to be tolerant of climate change
- Plant trees with adequate soil volume and quality
- Reduce conflict between trees and infrastructure
- Reduce the spread of invasive species
- Implement proactive tree management to achieve a healthier urban forest, a more livable community, hazard reduction, wildfire risk mitigation and reduced urban forest management costs
- Recognize trees as essential municipal green infrastructure to ensure that they are planned for, maintained, protected, and replaced as required
- Implement an active and adaptive management approach to ensure an effective response to new challenges, implement new techniques, and benefit from developments within the field of urban forestry, especially with regards to wildfire risk mitigation and urban forest hazard reduction
- Engage the local community in stewardship and support of the urban forest to achieve the vision and objectives of this strategy, including FireSmart program awareness and implementation

1.9 STRATEGIC OBJECTIVES

The RMWB seeks to achieve the following objectives through the implementation of this Urban Forest Strategy within the Urban Service Area over the next 20 years:

- Allocate adequate resources that can be dedicated to the monitoring, maintenance and planning of its urban forest.
- Increase the proportion of proactive urban forest management and at the same time reduce the amount of resources that are necessitated by reactive management.
- Acknowledge the importance of the urban forest in future strategic planning documents, and create and implement policies that support its protection and enhancement.
- Acknowledge the guiding principles as articulated in the FireSmart program, integrating and incorporating best practices into the management of the urban forest as well as natural stands.
- Expand the knowledge base about current conditions of the RMWBs urban forest.
- Support maintenance and operations guidelines that promote the health and safety of the urban forest while observing the major principles as dictated by the FireSmart program.

- Increase awareness among RMWB residents, staff and representatives about the wide range of benefits provided by the urban forest, and about how to manage it to ensure its long-term sustainability, including public education regarding FireSmart program and initiatives.
- Expand stewardship initiatives, increase community engagement, and develop more partnerships that support the urban forest.



Mature trees in Lions Community Park



Mature trees at Sapræ Community Park



New plantings at Thickwood Heights Community Garden



Planting along trails in Dickensfield

2 UNDERSTANDING THE URBAN FOREST

This section describes current urban forest in terms of the overall threats and challenges, in general terms.

2.1 THREATS AND CHALLENGES TO FORT MCMURRAY'S URBAN FOREST

2.1.1 WILDFIRES & FIRESMART



The *wildland-urban interface* is any area where industrial or agricultural installations, recreational developments, or homes are mingled with flammable natural vegetation. FireSmart aims to help protect homes and communities from the threat of wildfire while balancing the benefits of wildfire on the landscape.¹⁰ It is based on the best available scientific information and is the result of an Alberta-based coalition of professionals representing national, provincial, and municipal associations and government departments responsible for emergency services, land-use planning, and forest and resource research and management.¹¹

The Regional Municipality of Wood Buffalo is no stranger to wildfire and it is important to acknowledge the region's history with fire in order to move forward. Previously in this region, a wildfire in 1995 and then again in 2002 threatened various RMWB communities.¹² However, neither of these wildfires were on the same scale as the May 2016 Horse River Wildfire, which finally encompassed an area of over 589,000 ha, caused the evacuation of almost 88,000 people, and consumed 1,595 buildings and structures.¹³

Effective prevention for wildfires and structural fires can safeguard lives, property and beloved urban natural areas. To protect against wildfires that are common in the region, the Regional Municipality of Wood Buffalo has initiated FireSmart principles and will promote FireSmart communities, designed in accordance with wildfire prevention best practices.¹⁴ Examples of FireSmart practices include: pruning low hanging tree branches, removing and thinning trees, and clearing dead plant material in areas within close proximity to buildings and infrastructure to reduce the risk of fire ignition and spreading. Implementing FireSmart practices not only protects homes and communities, but is also beneficial to the health of the urban forest and natural forest stands. Some examples of the many benefits of FireSmart applications include: reducing

damage and intensity of fire on urban trees, reduced vulnerability of trees to disease through the removal of diseased trees and supporting valuable habitat through various FireSmart forest management methods.

A post-fire Wildfire Hazard Assessment was completed by Montane Forest Management Ltd. for the Regional Municipality of Wood Buffalo in late May 2016. The primary purpose of this Wildfire Hazard Assessment was to identify post-fire green islands within and adjacent to developed areas within the RMWB.¹⁵ Furthermore, it identified the wildfire threat to developments from those green islands. Subsequently, a Wildfire Mitigation Strategy was produced by Montane Forest Management Ltd, for the RMWB in 2017.

2.1.2 MOVING TOWARDS PROACTIVE PRACTICES



There are a number of factors that limit the ability to effectively manage an urban forest. The development of this Urban Forest Strategy provides a valuable opportunity to move from reactive maintenance and management of the urban forest to a pro-active approach. This approach to urban forestry will yield greater benefits for both RMWB residents and the environment. Pursuing this pathway is more efficient and cost-effective than reactive urban forest management practices. It will help to identify and provide direction for the integration of different policies to the stakeholders of RMWBs urban forest. The application of FireSmart principles now and in the future plays a role in implementing a proactive approach to managing the urban forest. This strategy also provides the ground-work for a Tree Protection Bylaw, Tree Policy-Regulations, and an Urban Forest Management Planning document.

2.1.3 TREE LONGEVITY



A less healthy urban forest results in shorter-lived trees, is costlier to maintain, and yields fewer benefits to RMWB residents. Tree longevity is affected by initial placement, adequate soil volume, proper planting, adequate establishment, care, tree watering and ongoing maintenance. Trees must be pruned, removed and replaced more frequently when they are not well-established and cared for. As trees become older and larger, the tree canopy benefits increase, but the tree related risks may also increase if these factors are not mitigated. FireSmart principles can be applied, such as strategic reduction of the tree canopy in priority areas, to reduce risks associated with large tree canopy and promote the health and longevity of urban forests.

2.1.4 TREE PEST AND DISEASE MANAGEMENT



The effective management of pests and pathogens is vital to maintaining a healthy urban forest. Urban forest pests primarily include insects which feed on trees, while pathogens are diseases (primarily fungal), which may affect individual trees or entire populations.



In the past, the RMWB has intervened with spray programs to mitigate the effects of spruce budworm (*Choristoneura fumiferana*) and forest tent caterpillar (*Malacosoma disstria*). However, the RMWB has not suffered significant pest or disease outbreaks that have threatened the survival of its urban forest, requiring any significant intervention. Furthermore, future interventions in the natural cycles of pest infestations must be carefully considered, using a science-based approach of Integrated Pest Management (IPM).

The RMWBs urban trees that have been infested with fungal decay pathogens have been either pruned or removed. Removal of trees for pest management purposes may also support implementation of FireSmart practices as pest management can be linked to tree removal and thinning in high wildfire risk areas, benefiting forest health as well as acting as a preventative forest management practice to reduce risk and impacts of wildfire.

2.1.5 IMPACTS FROM DEVELOPMENT



Despite the recent down-turn in the energy sector and the Horse River Wildfire in 2016, the RMWB and the Urban Service Area of Fort McMurray are expected to experience rapid population growth in the near future. This growth will increase the demand for housing and increase development pressure, potentially impacting existing natural forest areas, street trees and park trees as development and infrastructure projects occur.

The expectations of a growing population also can affect Fort McMurray's trees. The high use of salt on roadways, sidewalks, and pathways in the wintertime damages boulevards and severely impacts trees and shrubs. Furthermore, urban renewal projects can impact trees and shrubs in the vicinity of construction, thereby increasing the utilization of scarce urban forestry resources that are required to monitor and scrutinize these construction projects for impacts to Fort McMurray's parks and urban forest.

While the urban forestry unit used to inspect trees prior to take-over in newly tree planted developments, it does not do so at the current time. Resources are required to ensure that the acceptance of well-formed, healthy, disease-free trees that have been properly planted, and inventoried. This would also give the urban forestry unit an opportunity to schedule the initial "take-over" maintenance of the trees that have been newly added to its inventory.

2.1.6 CLIMATE CHANGE



Predicting the specific effects of climate change is next to impossible. However, some of the observable effects of climate change have been known for some time. They include: shrinking glaciers, river and lake ice breaking up earlier in the spring, shifting plant and animal ranges, trees flowering sooner, and drought and heat waves. Furthermore, weather events and fires have become more frequent and severe. Precipitation patterns, hardiness zones, and maximum wintertime temperatures have also changed in the past fifteen years.^{15, 16, 17, 18}

We are also experiencing outbreaks of new pests as a result of our climatic uncertainty. This may lead to an overall decline in the urban forest health. This may also result in greater susceptibility to disease, vulnerability to wildfire and other impacts. Therefore, proactive measures are needed to improve forest health now in order to help mitigate these potential impacts.

The Urban Service Area of Fort McMurray has a northern climate with limited plant hardiness zone. This can further exacerbate the effects of new pests, and the availability of suitable plant material to address the community's unique needs.

2.2 TREE INVENTORY AND ASSET MANAGEMENT

While many municipalities maintain inventories of a wide variety of their fleet vehicles or facilities, very few maintain an inventory of their green infrastructure, including municipally-owned trees. A typical tree inventory system identifies trees within a given area. It provides an assessed range of characteristics such as location, size, health, condition, and maintenance requirements. A comprehensive tree inventory and management system can track, prioritize, and plan maintenance activities, a useful tool that assists in the management of an urban forest. An inventory and asset management system will:

- Assist in the understanding of the composition of the urban forest: Combining tree attributes, tree species, size, and age data with spatial data, allowing urban forest managers to assess the urban forest structures, improve planning and implementation of tree establishment, tree maintenance and urban forest health.
- Improve urban forest maintenance: A detailed tree inventory can enable urban forest managers to assess priority-based maintenance in a proactive manner. A tree inventory will help determine the maintenance requirements of each tree. This will promote public safety by ensuring a proper maintenance regime and encouraging tree health. Tree species based pest management strategies and FireSmart principles can also be determined through these assessments.
- Improve public education and outreach: A tree inventory can act as a focus for communication, highlighting the significance of individual tree species and potential threats or challenges, educating the public about their urban forest.
- Conduct an inventory and assessment of natural stands to inform planning and implementation of FireSmart principles and other management and maintenance requirements. Inventory should include an overview of the health, condition, size, species composition, and proximity to neighbourhoods, urban areas, or community infrastructure.



Public education and outreach can assist with tree inventory and maintenance

2.2.1 EXISTING TREE INVENTORY

While some RMWB staff have anecdotal knowledge of a portion of the Urban Service Areas' trees, no formal inventory of municipally owned street or park trees has been established. From both staff interviews and from informal observations, the majority of the street tree population is made up of young, small trees. If maintained at optimal health and provided with adequate growing space, the street tree population is expected to grow and increase the range of urban forest benefits over time.

The inventory of mature trees, as represented by street trees and park trees, are primarily located in the older, more established areas. These trees are only now providing maximum benefits to their surrounding communities and neighbourhoods. Mature trees will continue to provide significant benefits if ongoing efforts are made to maintain and improve overall tree health and reduce the susceptibility to wildfire.

2.2.2 NEW TREE INVENTORY

New trees are being planted, adding to the inventory of trees requiring care and maintenance by RMWB urban forestry staff. This may occur through the development process, planting of trees in parks by RMWB Parks' staff, and replacement of trees that have been removed. The number of trees planted in a given year depends on available resources and upon the scope of capital projects, such as park redevelopment and road reconstruction, that is being undertaken. However, there is no formal process of documenting the addition of trees to the inventory.

2.3 CANOPY COVER ASSESSMENT

Many communities have been establishing tree canopy cover targets as an effort to project the long-term future of their urban forests. A common method to describe the extent of the urban forest is to measure the amount of canopy cover provided by trees. Canopy cover is a two-dimensional measurement of the horizontal surface area of the urban forest as seen from a "birds-eye" view or perspective. While it is a popular tool because it is readily understood, it cannot relay the other important aspects of an urban forest, such as species diversity, structure, size, age ranges, or condition. It also cannot provide other tangible metrics such as level of maintenance, or the level of community engagement.

Canopy cover measures can provide a tangible metric. However, canopy cover measures can also present problems because some jurisdictions use the canopy cover percentage as a comparative metric to assess the success of their urban forestry programs in relationship to other comparable jurisdictions. Setting overly ambitious canopy cover targets can direct urban forest management resources toward tree planting at the expense of other equally important strategic initiatives such as maintenance and monitoring. Therefore, it should be used with caution. Targets should also be realistic in terms of appropriate canopy cover within the FireSmart context.

The Horse River Wildfire (May-July 2016) had a significant impact on Fort McMurray's urban forest. Following the fire, removal of additional treed areas for the safety of Fort McMurray residents further reduced the canopy cover.

2.3.1 CANOPY COVER ESTIMATE METHODOLOGY

An analysis was conducted to determine the approximate tree canopy percentage within the Fort McMurray Urban Service Area using a methodology based on the iTree Canopy tool (<https://canopy.itreetools.org/>).

- A set of 200 randomly generated sample points was created in the digital mapping program ArcGIS. A map showing the location of the sample points is provided in Figure 5.
- The sample points were overlayed on the most recent orthophotos, which showed areas affected by the 2016 wildfire.

- For each sample point, a designation as “tree” or “not tree” for both the pre- and post-wildfire condition was recorded.
- The percent of the sample points identified as “tree” represent the overall percent of the tree canopy in the study area.
- The results of this analysis can be assumed to be accurate within +/-7% at the 95% confidence interval (i.e. 95 times out of 100).

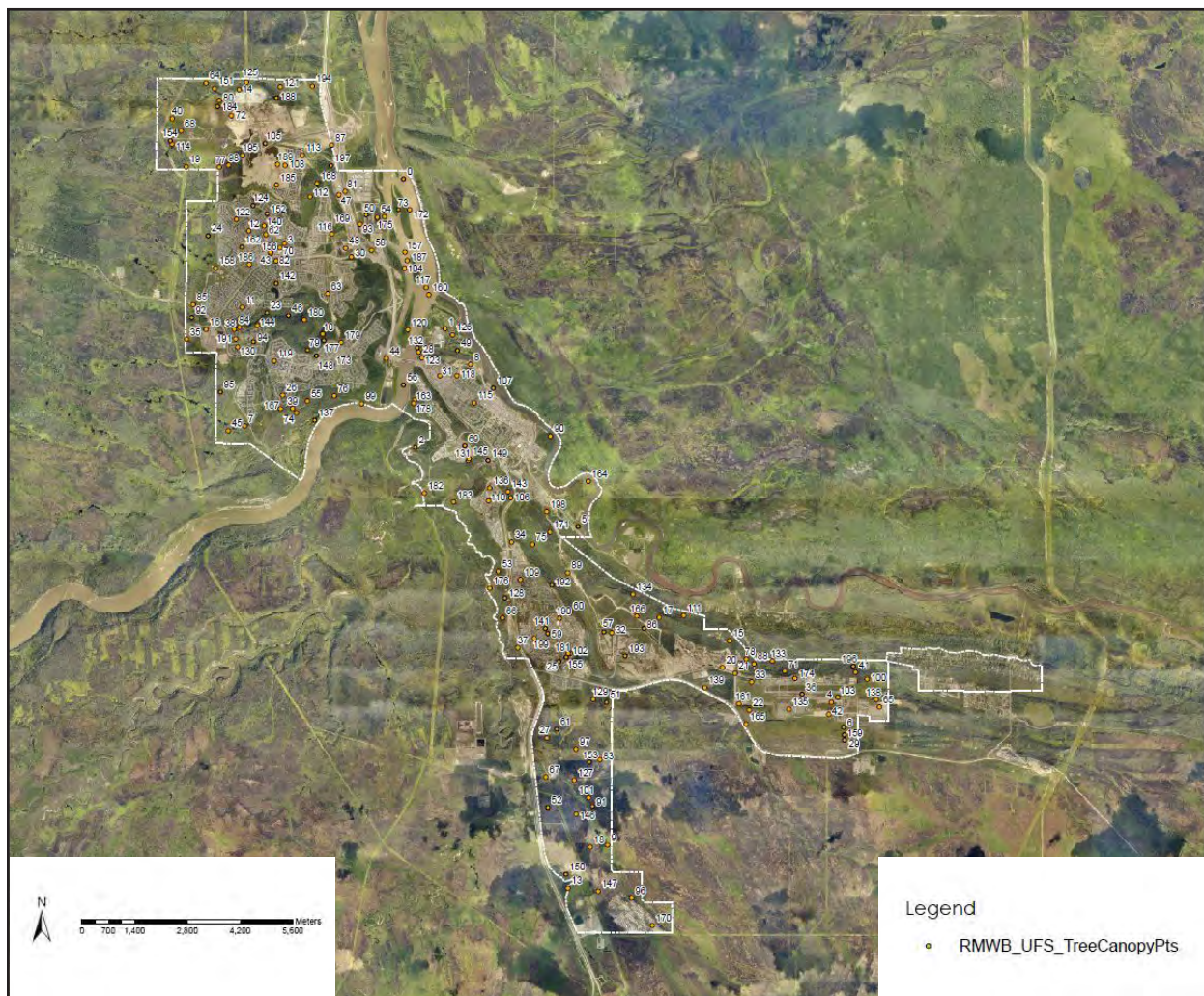


Figure 5. Canopy Cover Sample Locations

Fort McMurray's overall post-wildfire canopy cover is at twenty-five percent (25%). This includes the undeveloped lands that surround Fort McMurray on the south and the western Urban Service Area boundaries. Implementation of FireSmart principles and actions will help reduce future loss of canopy cover due to wildfire. The following table provides a comparison of existing canopy covers in other communities and targets and goals for their future. It must be emphasized that tree-canopy targets are generally considered to be a positive step forward. However, these future target goals should be both realistically achievable and sustainable.

What can be achieved is a factor of ecoregion, population density, land use, and the form of development. In Fort McMurray, the form of development is resulting in a stark contrast between the vacant lands, which tend to be forested, and developed areas which may be completely cleared and only replanted with street trees.

2.3.2 WHAT IS AN APPROPRIATE TARGET FOR THE FORT MCMURRAY URBAN SERVICE AREA?

As stated in the table above, there is not an established goal for canopy cover within the Fort McMurray Urban Service Area (Fort McMurray). A municipality's aspirations for canopy cover usually draw from community values; however, targets need to balance aspirations with what is achievable and sustainable. Tree planting is only the start of the investment needed to increase and care for the urban forest. There is likely to be a natural increase in canopy cover over the next decade, based on the fact that many trees in developed areas are less than 15 years old and that the forest areas damaged by the Horse River Fire will recover. However, urban trees are often subjected to harsh conditions such as small soil volumes, higher temperatures due to adjacent pavement, and impacts from winter maintenance (salt and sand). Further study and evaluation is needed to help determine appropriate canopy cover goals. More detailed analysis would look at projected canopy loss and gain, using averages from existing resources to set achievable targets by land use/zoning.

There are other important considerations related to canopy cover that should be considered as well. The form of development is a critical factor, as fragmentation reduces the value of the urban forest canopy. The urban forest, including natural stands, will be healthier and will provide more benefits if there are a series of large and small patches and corridors that form a connected, cohesive network connecting important natural areas such as creeks, ponds, wetlands, and large tracts of natural forest stands.

Forest edges require higher levels of maintenance than forest interiors. As development carves into natural stands, there are collateral losses resulting from newly exposed trees that grew in an interior forest setting. Forest edges have higher rates of windfall, for example, and there is an increased likelihood of invasive species infesting natural ecosystems.

Table 1: Urban Service Area Tree Canopy Analysis - Pre and Post 2016 Horse River Wildfire

Pre 2016 Wildfire	
Total number of sampled points	200
Total number of points classified as tree	81
PRE-WILDFIRE Tree Canopy Estimate	41% tree canopy cover
Post 2016 Wildfire	
Total number of sampled points	200
Total number of points classified as tree	48
POST-WILDFIRE Tree Canopy Estimate	25% tree canopy cover

Table 2: Comparison of Canopy Cover and Canopy Targets with Other Communities

City or Municipality	Current Canopy Cover	Canopy Cover Goal
Fort McMurray	25% (2017)	To be determined
St. Albert	13% (2015)	20% (2037)
Strathcona County (Sherwood Park)	21% (2011)	To be determined
Lethbridge	19% (1990)	25%
Edmonton	10% (2009)	20% (2019-2024)
Calgary	7% (1997)	20% (2033-2043)
Toronto, ON	20% (2005)	30% to 40% (2055)

2.4 URBAN FOREST TYPOLOGIES

The following typologies describe the typical settings in which trees are found within the Fort McMurray Urban Service Area. They are helpful in defining aesthetic and canopy cover goals, and maintenance regimes. Typologies can also help to inform planning and design in interface zones to mitigate wildfire impacts.

2.4.1 STREET TREES

Streets with curb-boulevard-sidewalk-boulevard-private property

- Single row of boulevard trees can be planted
- Green streets with generous setback space that can allow for double row of trees to be planted
- Trees within 5m of the road are susceptible to damage from winter maintenance regimes
- Dense tree placement and excess vegetation could pose potential wildfire risks along evacuation routes

Streets with curb-boulevard-sidewalk-private property or frontage

- Single row of boulevard trees can be planted, or
- NO row of boulevard trees are to be planted because of limited soil volume or because of limited area for canopy spread

Main streets, for example downtown sidewalk plantings with hard landscape treatments

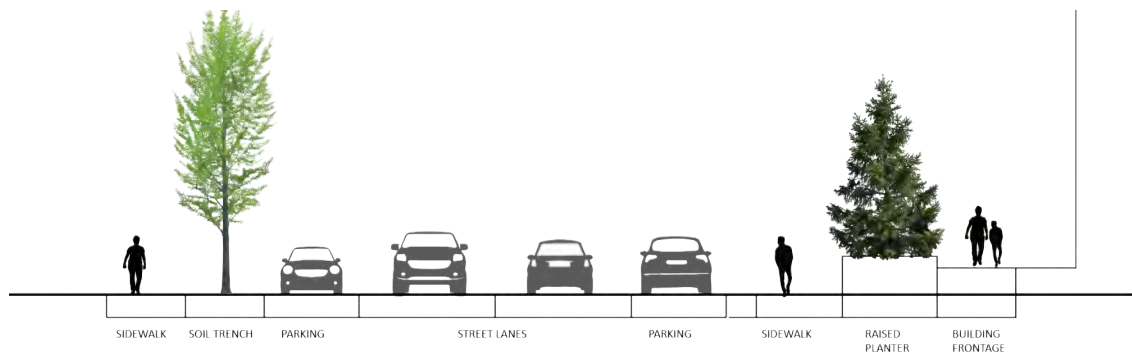
- Must have continuous soil trench from tree-to-tree (structural soils can be used or framed cells)
- Must have ability to water trees
- Could utilize raised planters
- Must consider winter maintenance regime and application of road salts
- Must consider wildfire vulnerability and risk along main roads and evacuation routes

Centre Medians

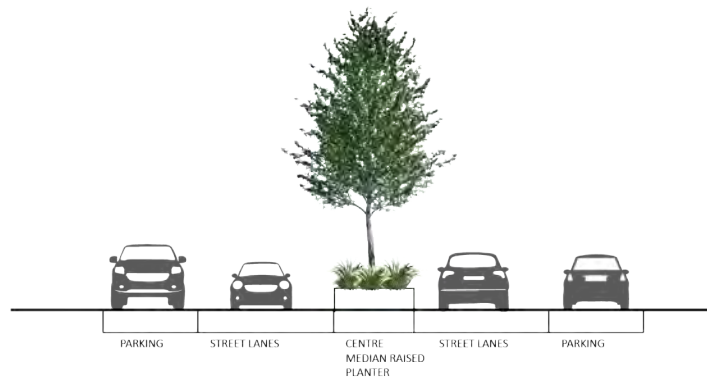
- Must have continuous soil trenching
- Must have the ability to water trees
- Could utilize raised planters



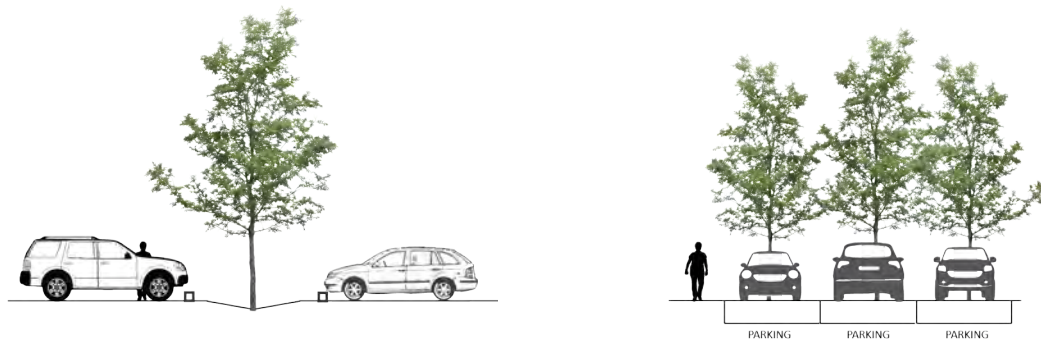
Double street tree planting along private property



Main street with soil trench and raised planter



Raised planter in centre median



Trees planted in parking areas

2.4.2 PARK SITES



Neighbourhood parks

- Include some open lawn area
- Typically have sufficient space to grow trees to mature size
- Can incorporate ornamental or native species
- Can include environmentally sensitive areas or small patches of native ecosystems
- Passive recreation and unstructured active recreation



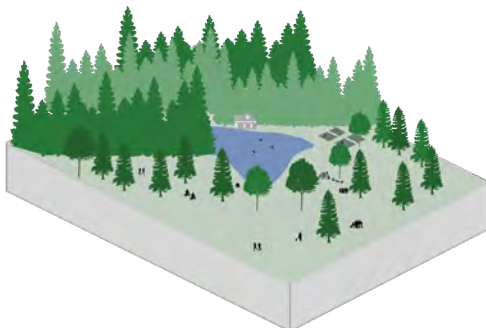
Community parks or Elementary and Junior High School grounds (2.4 ha - 5.0 ha)

- Include significant open space with limited trees
- Typically have some areas that may support the growth of trees to mature size (i.e. seating areas, perimeter of the site, ornamental landscaping)
- Typically do not include environmentally sensitive areas
- May include a natural play area with large shade trees



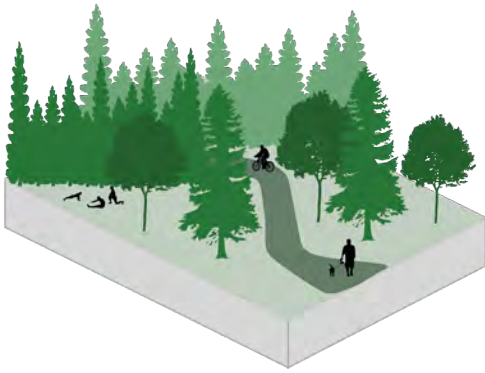
District park or High School grounds (5.5 ha to 20 ha)

- Include significant open space and sports fields with limited trees
- Typically have some areas that may support the growth of trees to mature size (i.e. seating areas, perimeter of the site, ornamental landscaping)
- Typically do not include environmentally sensitive areas



Regional parks (20 ha or greater)

- May include some areas with limited trees (open space and sports fields)
- Typically have sufficient space to grow trees to mature size
- Trees form a key part of the park's amenities and aesthetic character
- May include significant environmentally sensitive areas or native forests



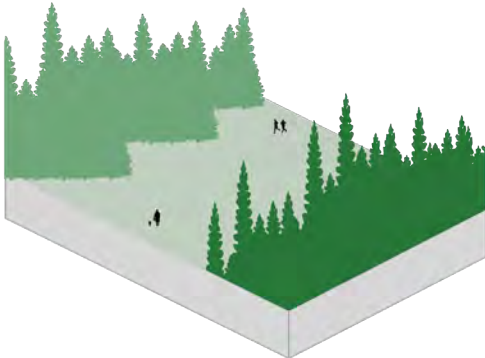
Natural Areas

- Primarily comprising significant environmentally sensitive areas, native forests and high quality ecosystems



Greenways or linear parks (minimum width of 20 m or 0.2 ha)

- Should include space for at least one row of trees with sufficient space to grow to mature size
- May include ornamental species or native species
- May incorporate linear natural areas such as creeks and riparian areas



Fire Breaks

- Tree removal and vegetation management relative to the wildland-urban interface.



Private trees

- Trees planted on privately owned land such as residential lots. Should incorporate FireSmart principles in the management of trees and forests on private property

Mixed Use Developments

- Trees planted on developments such as condominium communities and commercial areas.



Parking lots

- Trees planted in parking areas
- May be planted to mitigate the “heat island” effect and stormwater runoff
- May be planted for aesthetic benefits
- Must consider winter maintenance regime and application of road salts

3 ENGAGEMENT WHAT WE HEARD

3 ENGAGEMENT – WHAT WE HEARD

3.1 STAFF INPUT – KEY THEMES

Engagement with RMWB staff identified key areas that need to be considered and addressed in order to enable improvements in urban forestry services and outcomes. These included:

- Find ways to improve service and outcomes by identifying priorities that will yield the greatest benefits and improve efficiency
- Address the issues and opportunities identified through the FireSmart Program
- Provide strategies around hazard tree risk management, disease and pest management, pruning, and other maintenance and tree health issues
- Provide recommendations for policies, bylaws, guidelines and programs that are needed to integrate urban forestry best practices
- Review and revise the Engineering Servicing Standards to achieve better tree establishment, growth, and health outcomes
- Review operational budgets to better align with the desired sustainable level of service and outcomes
- Provide recommendations to improve the public's understanding of the values of urban trees

3.2 PUBLIC AND STAKEHOLDER INPUT – KEY THEMES

A combined public survey for the Urban Forest Strategy and the Parks Master Plan was conducted by RMWB staff in the fall of 2017. Hard copies of the survey were available for residents to fill out from September 21-23 at the Fall Trade Show & Market and at rmwb.ca from September 21-November 30. There were 723 unique responses, and highlights from the survey are outlined below.

- Survey responses showed the greatest support for tree development in parks and greenspaces (40%), followed by along residential streets (37%) and along major corridors (28%).
- Respondents indicated that they would like the Urban Forest Strategy to address the protection and maintenance of already established natural species (60%), development of new treed greenspaces (51%), and outline suggested tree and shrub species for use (48% and 38% respectively).
- Respondents identified hazardous tree removal as the most important municipal tree service (53%), followed closely by FireSmart (49%) and home tree assessments to deal with tree health issues (41%).
- 81% of respondents support the development and implementation of a Tree Protection Bylaw on public property.

Overall comments related to urban forestry included:

- More shade
- Replacement of pre-fire conditions
- Better fiscal management by RMWB
- Education seminars for public regarding tree maintenance
- Positive comments towards RMWB efforts
- Positive and negative comments towards FireSmart activities
- Proactive fighting of pests and diseases (black knot, etc.)
- More information required on impacts of tree protection bylaw
- RMWB should have landscape architects and arborists on staff

Top three municipal tree services identified by respondents:

- 1. Hazardous tree removal**
- 2. FireSmart**
- 3. Home tree assessments for tree health**

All of these services relate to the application of FireSmart principles within the community.



Staff Engagement Workshop

4 URBAN FOREST ACTION PLAN

4 URBAN FOREST ACTION PLAN

This section contains recommendations and strategies for realizing the vision, principles and objectives, and reflects the understanding of the current state of the urban forest in the RMWB. It also responds to issues and priorities identified by staff and the public. The Action Plan is divided into 5 subsections, including: Plan the Urban Forest; Manage the Urban Forest; Grow the Urban Forest; Care for the Urban Forest; and Support the Urban Forest.

4.1 PLAN THE URBAN FOREST

It is being recognized in communities across North America that a healthy urban forest is important for the health of the community. Municipalities are increasingly acknowledging the urban forest as a critical component of urban infrastructure, providing planning direction at all levels which supports its protection, renewal, and incorporation within the urban matrix. The following actions are recommended to ensure that the RMWB has the policies, bylaws, guidelines, and planning documents needed to effectively pursue a healthy urban forest.

4.1.1 MANAGEMENT AND ANNUAL OPERATING PLANS

Recommendation: Develop an Urban Forest Management Plan every five years.

Five year management plans are needed to outline priority actions arising from this Urban Forest Strategy. The development of the management plan should include public engagement to ensure that it addresses the concerns and priorities of the community; it also offers an opportunity to build community knowledge of urban forest management issues. Wildfire prevention should be included in the Urban Forestry Strategy,

highlighting FireSmart principles, applications and strategies for wildfire prevention within the urban forest context. The process of developing the Urban Forest Management Plan should also include items such as integrated planning and cross-departmental coordination.

Recommendation: Develop Urban Forest Annual Operations Plans to direct the development of work plans based on the Urban Forest Management Plan and this Urban Forest Strategy.

A process for development of an Urban Forest Annual Operations Plan is required. This will strengthen the annual budget planning process. Through the development of the Annual Operations Plan, staff will have the opportunity to identify opportunities and gaps related to implementing the Urban Forest Strategy and Urban Forest 5-Year Management Plans. This plan should also address and prioritize the implementation of FireSmart projects and initiatives.

4.1.2 BYLAWS, POLICIES AND GUIDELINES

Recommendation: Develop a Tree Bylaw that includes such aspects as tree loss, damage and vandalism, tree asset value evaluation guidelines, and tree protection.

A comprehensive tree bylaw is essential to the efficient and effective management of the urban forest. However, as the process for changing a bylaw can be onerous, sufficient discussions and consultation should be conducted to ensure it will meet the needs of the RMWB in the long-term. An outline of typical topics covered by a bylaw is provided in Appendix A.

Recommendation: Update the Engineering Servicing Standards and Development Procedures, Landscaping Section 10.0 (p. 10-1 to 10-55 or p. 405 - p. 495).

RMWB currently has landscaping standards outlined in the RMWB Engineering Servicing Standards and Development Procedures (December 2016). These provide general minimum requirements for the landscape development of public open spaces, parks, playgrounds, sports fields, boulevards, buffer strips, amenity areas, utility lots, walkways, medians, public service land, including other open space and/or recreation facilities. Adjustments to this document are recommended to ensure alignment with this Urban Forest Strategy. For example, Section 10.1.5 does not identify that a sign-off by a representative of Urban Forestry is required when plantings are being inspected and accepted into Urban Forestry's inventory. Furthermore and as an example, tree planting specifications should reference Urban Forestry's documents or guidelines. Recommended updates to the Landscaping Section of the Engineering Servicing Standards and Development Procedures document is provided in Appendix C.

Recommendation: Develop a Tree Policy to provide guidelines and standard for tree planting, management and maintenance, and acceptance by third parties.

In addition to updating the Engineering Servicing Standards, there is a need for additional information and detail to inform tree planting and growth. This should take form of a Tree Policy. This policy should include guidelines and standards regarding priority maintenance policy, species selection, diversity, nursery stock, size, quality, planting, mulch, density and spacing. This policy should also contain procedures for signing off for the acceptance of trees and shrubs that have been planted by third parties. The policy may

also include additional guidelines and resources to inform decision making related to climate change and extreme weather events, heritage trees, and urban forest storm response planning.

Additional information regarding species selection, diversity and nursery stock is provided in Appendix A.

Recommendation: Create a Tree Reserve Fund as per Municipal Tree Policy (Council Approved Fiscal Policy).

To maintain and grow the urban forest, ongoing funding to support the existing urban forest inventory, as well as to support future tree planting, is needed. A Tree Reserve Fund would collect money for tree losses for use in future replacements, tree maintenance and plant health care. It could also be used to fund tree planting in parks or other public spaces.

4.1.3 INTEGRATED PLANNING

Recommendation: Recognize the value and functions of the Urban Forest in the relevant Municipality's strategies, policies, and plans.

As the Municipality's strategies, policies and plans are reviewed and updated, the Urban Forestry Strategy and subsequent plans and policies should be considered and incorporated.

Recommendation: Establish an active management system that includes scheduled evaluations and updates to policies and practices.

In addition to increasing regular conversations and coordination, the process of developing the Annual Operations Plans and 5-Year Management Plans provides a regularly scheduled opportunity to conduct thorough cross-departmental coordination of policies and practices. This process should ensure the integration of FireSmart principles within the management system. An interdepartmental committee is also recommended in Section 4.2 to increase communication between RMWB departments.

4.1.4 WILDLAND-URBAN INTERFACE (WUI) AND FIRESMART

Recommendation: Integrate FireSmart principles in the planning, management, and care of the urban forest.

Incorporate relevant principles of FireSmart into the 5-Year Urban Forest Management Plans and Annual Operating Plans. For example, include FireSmart principles to guide location, species and maintenance of street trees which will help to shape the long-term planning and management of the urban forest. Provide training and information for staff and the public about FireSmart program and principles to raise awareness of the program and allow it to be better integrated into the planning process and public awareness. For example, promote and support annual FireSmart public education events (FireSmart Day) and activities within the community.

Recommendation: With an objective to reduce wildfire behavior potential, use the guiding principles of the FireSmart program to reduce the threat of a community level wildfire within the Birchwood Trails/Conn Creek community reserve natural forested areas.^{19, 20}

Wildland-urban interface areas exist wherever homes and businesses are built among trees and other combustible vegetation. There are interface communities all over Canada, in both remote rural locations and in urban centres. In Alberta, the Wildland-urban interface zones are neither completely built up, nor completely undisturbed. The Urban Service Area of Fort McMurray is an example of this wildland-urban interface.

The advantages of interface living have resulted in a significant population growth in the wildland-urban interface areas. These areas offer natural scenic beauty and a more relaxed lifestyle. As such, it is an area that if not properly protected, can act as the means of transmission of wildfires from pristine rural areas into heavily populated urban zones, or vice versa.

The wildland-urban interface fire problem stems from two different sources of fire and their impact on the community. Fires can move from forest, bush, or grassland areas into the community or from the community into adjacent wildlands.

Integration of FireSmart in the planning, maintenance and care of woodlots, woodlands, and natural stands is essential. For example, fuel wood reduction is a primary goal for reducing the threat of a community level wildfire within the Birchwood Trails/Conn Creek community reserve. A mechanical chipper can process slash into chips that are then spread over the ground.

Recommendation: Limit the use of landscape mulches to composted wood chip mulch, in accordance to FireSmart/FireWise program research, to a depth of no greater than 80 mm to 100 mm (3 to 4-inches). Composted wood chip mulch should not be used within 1.5 m (5-feet) of a home, dwelling or other fire combustible structure.

Chipped slash decomposes more rapidly and will present little fire danger (as long as chips are not spread too thickly). These wood chips act as mulch to hold soil moisture, stimulate plant growth and prevent erosion on slopes. These wood chips must not be spread too thickly: a depth of 80 mm to 100 mm (3 to 4-inches) is the maximum that is recommended.^{19, 20} This was added as a recently developed best practice.



Fire Break

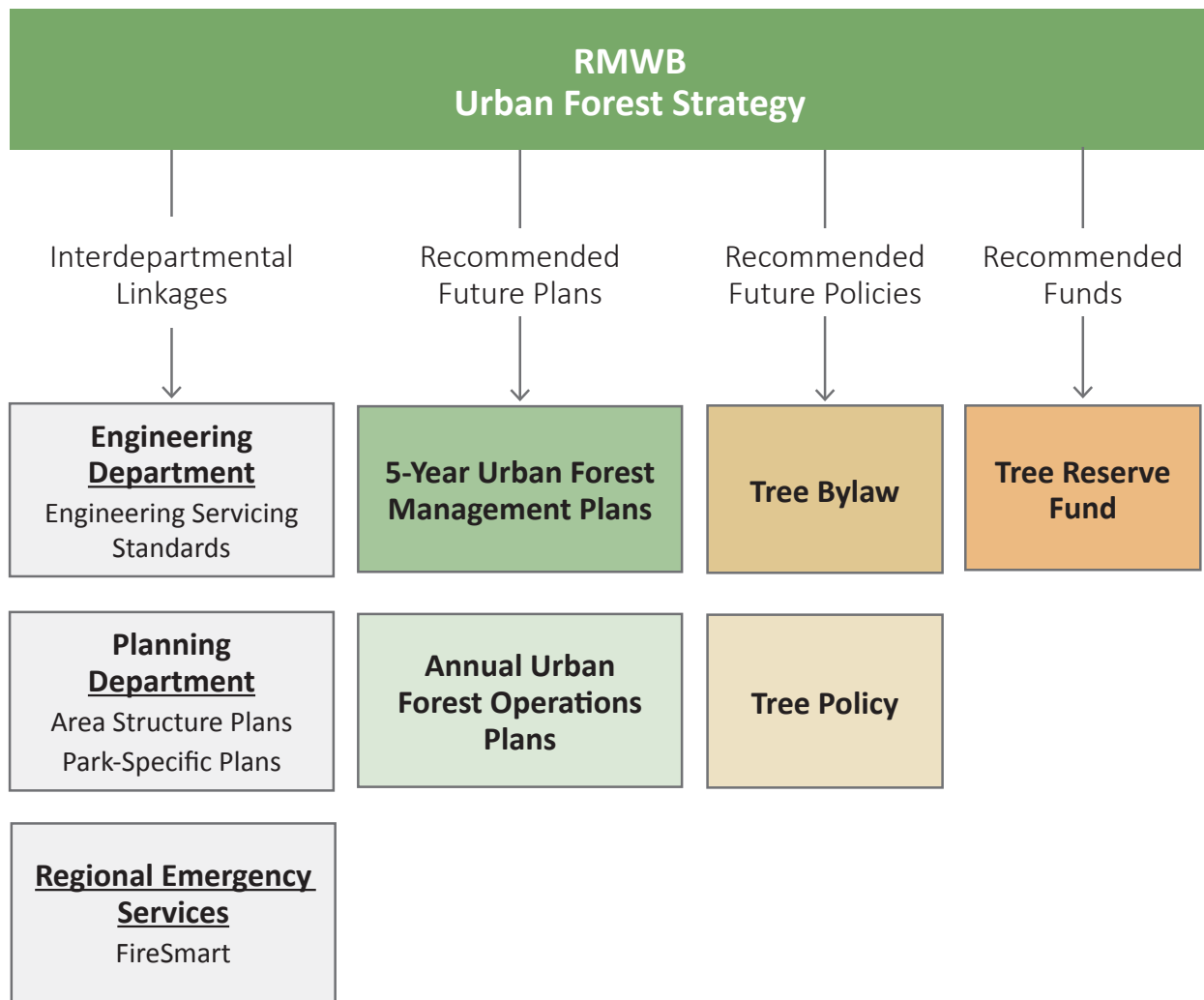


Figure 6. Plan the Urban Forest: Recommended Plans and Policy Context

4.2 MANAGE THE URBAN FOREST

While policies, bylaws, guidelines, and planning documents are important foundational component to have in place, it is also essential to consider what further details and management tools are needed. This section includes recommendations regarding how the municipality manages the urban forest in terms of program administration, coordination among departments, and the inventory and tracking of the urban forest.

4.2.1 PROGRAM ADMINISTRATION

Recommendation: Establish an Urban Forestry Working Group and review staffing resources for the urban forestry program administration and management.

An Urban Forestry Working Group made up of RMWB Staff can be tasked with reviewing existing staff resources and consider reprioritization or realignment of duties, secondment of staff to special projects, or utilization of staff working groups. They would also take on development of five year annual operations plans. Urban forest management in larger Alberta cities is usually conducted using the model of joint municipal and contracted service provision. This model is applied in cities such as Lethbridge, Medicine Hat, Calgary, St. Albert, Edmonton, Jasper and Red Deer. These municipalities maintain a core staff, which is essential for continuity and to maintain a high quality of planning and management. The key variable is the relative distribution of specific operations between contractors and staff. In most examples, municipal staff and contractors share the tasks of routine maintenance such as pruning and tree removals. Planting is often conducted as part of capital projects and development, with additional infill planting or removal projects undertaken by the municipality or contractors by tender.

4.2.2 INTERDEPARTMENTAL AND INTRADEPARTMENTAL COLLABORATION

Recommendation: Develop an interdepartmental committee to increase cross-departmental communications regarding urban forest issues.

Collaboration within Public Works, Engineering, Planning and other departments, or their sections, within the Regional Municipality of Wood Buffalo, especially within the Urban Service Area of Fort McMurray is very important. Coordination with FireSmart program representatives is also recommended. A small interdepartmental and intradepartmental committee may be one way to liaise within the municipality's working groups. The process of developing the 5-Year Management Plans and the Annual Operations Plans could prompt meetings of this interdepartmental committee, in addition to project-specific coordination needs.

4.2.3 TREE INVENTORY

Recommendation: Develop a Tree Inventory for existing trees and implement a policy and procedures for collecting tree inventory data for any trees accepted by the RMWB through the development process.

Establishing a strong baseline of data is critical for developing management plans and operational plans for the urban forest as a whole, as well as for individual trees. Trees are an important asset for the RMWB and should be tracked and managed with an understanding of their value to the community. In addition

to creating an inventory for existing trees, guidelines should be developed to ensure that any new trees, natural stands, or woodlands are incorporated into the inventory as part of the development process. Additional information regarding typical attributes of a Tree Inventory are provided in Appendix A.

4.2.4 ASSET MANAGEMENT

Recommendation: Implement a Tree Asset Management System.

Trees are an investment that yields substantial benefits for the municipality's residents. As with other assets, trees require ongoing management and maintenance to maximize those benefits. They also require replacement over time, depending on the species, location, and plant health factors. Tracking of FireSmart projects and initiatives should be incorporated in the Tree Asset Management System.

Recommendation: Implement an Urban Forestry Equipment Inventory and Asset Management System.

Inventory existing equipment and determine life-cycle replacement costs and timelines to inform budget planning for replacements. Identify gaps in the existing equipment inventory relative to the Urban Forest Management Plan and Annual Operations Plans.

An equipment inventory goes hand-in-hand with the tree inventory and the Annual Operations Plans. In order to effectively implement management and maintenance actions, the right equipment is needed. This equipment provides benefits to the municipality by enabling urban forestry staff to improve tree health so that the urban forest yields the maximum benefits to the community. Quality equipment also provides the means for urban forest risks to be managed and mitigated, promoting public and worker safety. Anticipating future purchases and replacement of existing equipment is essential for fiscal planning.

4.2.5 HERITAGE TREES

Recommendation: Investigate the criteria for the identification of heritage trees and explore the potential for a Heritage Tree Register.

Heritage trees refer to trees of particular interest by virtue of such qualities such as age, size, shape, special interest, location, or history. These trees may include individual trees, clumps, groves, shelter belts, tree gardens, arboretums, and sites of botanical or ecological interest.⁽²¹⁾ Heritage trees contribute to the character of the RMWB. They are often unique or rare examples of native or ornamental specimens, and some have stories connecting to significant historic events or local ecology.

Until it blew down, an example of a Heritage Tree was the MacDonald Island spruce tree that was located on MacDonald Island at the junction of the Clearwater and Athabasca rivers in Fort McMurray. This tree was identified and documented and noted in the 2008 publication of the [Heritage Trees of Alberta](#).²¹ Heritage trees give examples of tangible history to the citizenry of RMWB.

4.2.6 MAKING THE TERMINOLOGY CONSISTENT

Recommendation: Utilize the glossary within this Urban Forest Strategy to standardize terminology throughout planning, management and operations relating to the urban forest.

Terminology used in an urban forestry setting should be consistent. For example, all trees and shrubs should be identified to the species level using their common and botanical names (scientific nomenclature). Definitions and terminology relating to FireSmart should be included. Furthermore, varieties and cultivars should be noted. Terms such as “monoculture”, “cultivar”, and “clone” are defined in Appendix B: Glossary.

4.3 GROW THE URBAN FOREST

The actions in this section identify the key components for establishment and growth of a healthy, safe urban forest based on best practices.

4.3.1 TREE ESTABLISHMENT – NEW DEVELOPMENTS, INFILL, TREE REPLACEMENTS AND CAPITAL PROJECTS

Recommendation: Develop guidelines and recommendations for selecting a tree for planting on public lands.

Selecting a tree that will thrive in a given set of site conditions is the key to long-term tree survival and reduced maintenance. Often an overlooked aspect of tree selection is the reality is that the top five causes of tree death result from things people do. Soil compaction, under-watering, over-watering, vandalism, and planting the wrong tree account for more tree deaths than all insects and disease related tree deaths combined. Consideration of FireSmart principles relating to planting of new trees will inform guidelines. Public health and safety is another important benefit of improving the health of the urban forest. Diseased and poorly planted trees can pose a serious risk to the health and safety of the community. Providing guidelines for proper planting of public trees encourages the growth of a healthy urban forest, resulting in reduced safety risk and a healthier communities. See Appendix A for additional information on key considerations.

Recommendation: Implement a policy and procedure for 1) input from the Urban Forestry team during the development approval process and 2) acceptance of all plant material in new developments and redevelopments.

Where planting on public land is proposed, there should be input from the Urban Forestry team prior to approval of development plans. A comprehensive tree and shrub establishment and maintenance program should be completed before acceptance of all plant materials in new developments, redevelopments, and capital projects. Following completion of the establishment and maintenance period, inspection of tree and shrub plantings by a trained urban forestry representative should be required as part of the acceptance of all plant material. This process would apply to all street trees, trees along public rights-of-way, and in parklands for all developments, capital projects, and redevelopments because the municipality will be responsible for the long term management and maintenance of those plants. See Section 4.4 for additional information.

Recommendation: Establish a “no net loss” policy for municipal lands to encourage retention of existing trees and to ensure the replacement of trees that have been removed for any capital project.

Trees that have been removed for any capital projects within the municipality should be replaced. The cost for replacement should be incorporated into the capital project’s budget and/or addressed through the use of Letters of Credit which protect against damage to public infrastructure. RMWB will need to determine what is appropriate and fair, but at a minimum, it must include the replacement costs, including the plant material, labour, and the establishment period maintenance costs.

4.4 CARE FOR THE URBAN FOREST

Caring for the urban forest ensures that investments made in trees yield the maximum benefits for residents. Healthy, well-maintained trees need to be replaced less frequently, provide better habitat and canopy cover, pose lower risks, and contribute significantly to the beauty of the municipality. Unhealthy, neglected trees may pose a risk to public health and safety. Ensuring proper maintenance of new and mature trees encourages the growth of a healthy urban forest and supports healthy and safe communities. This section makes recommendations around maintenance, risk management, tree protection, and addressing plant healthcare, pests and disease.

4.4.1 URBAN TREE MAINTENANCE

Recommendation: Develop maintenance guidelines specifically for mature trees.

Mature trees have different maintenance requirements than newly planted, young, or juvenile trees. For example, the removal of more than twenty percent (20%) of live wood should not be considered in any one growing season. Additionally, large pruning cuts should be avoided. In the Urban Service Area of Fort McMurray, maintenance guidelines for mitigating the effects of road salt on mature boulevard trees are required.

Recommendation: Develop maintenance guidelines specifically for newly planted and young trees.

A tree with an established first-rate structure can continue as part of the landscaped area for many more years than trees that have not been properly pruned with reliable branch structure and scaffolding. Therefore, young, newly planted trees should be “trained” or pruned to promote a good foundation for mechanical structure. During the first years after planting, pruning can be conducted from the ground with the investment of few resources. Furthermore, proactive structural pruning provides a good foundation for a tree’s mechanical structure.

Recommendation: Establish and implement an appropriate Level of Service for all publicly-owned street and boulevard trees.

This Level of Service would be based on best management practices and industry standards and would include pruning cycles that are appropriate for specific species.

4.4.2 TREE RISK MANAGEMENT

Recommendation: Develop a Tree Risk Management Policy.

Tree risk assessment and mitigation are becoming increasingly recognized as a critical component of urban forest management. The key to effective tree risk management lies in an operational policy that coordinates inspection, mitigation, and proactive planning (including FireSmart initiatives). This will improve safety and reduce risk, uncertainty, and liability. A tree risk management policy will set minimum standards for risk assessment and documentation in order to mitigate liabilities. This will result in the consistency of assessment. However, sustained resources for these inspections is recommended for the long-term.

Key components of an effective risk management policy must include a framing scope for the risk management policy, the determination and acceptable risk, minimum levels of training, and qualifications of the assessors, frequency of assessment, and record keeping. A comprehensive risk management policy will also include the protocols for post-storm and post-fire emergency response.

4.4.3 TREE PROTECTION

Recommendation: Develop a Tree Protection Bylaw for all RMWB owned trees and for protection standards during development.

The protection of trees during construction activities or during site development is more effective in maintaining the urban forest benefits than planting new trees. Furthermore, it is usually less costly. The RMWB is in need of a tree bylaw and regulations specifically tailored to its needs and requirements. This bylaw should include regulations, standards, and specifications regarding the protection and management of its urban forest. These detailed references should be available for residents, site plan applicants, developers, contractors, municipal staff and others involved in urban forestry.



Example of tree protection during construction

4.4.4 PLANT HEALTH CARE (PHC)

Recommendation: Adopt a Plant Health Care approach to improve the health of the urban forest and to manage pests, disease and other issues.

Plant health care or PHC is the coordinated approach to managing pests, diseases, and invasive species, improving soil quality and soil-rooting volume. Strategies include reducing the above and below ground competition for space and resources, which will promote good tree health, form, and structure. Healthy trees result in reduced wildfire risk and increased public safety. Trees in urban areas are increasingly susceptible to pests and diseases because of the many stresses that they face. Stressed trees are also more prone to structural problems. This is compounded by inadequate cultural practice and length intervals between inspection and maintenance.

Within a PHC framework, Integrated Pest Management (IPM) methodologies can be used to assess and control pest populations through a combination of early detection, cultural practices and pesticides. Effective management of pest and disease pathogens is vital in maintaining a healthy urban forest. Urban

forest pests include insects that feed on particular trees, and pathogens are diseases that can affect individual tree species or entire populations of trees.

From time to time certain diseases may infest trees with a particular pathogen that can be easily managed by pruning or removing the individual tree affected. Insect pest infestations do not generally become a significant issue to warrant whole-scale intervention.

An example of this is the spruce budworm (*Choristoneura fumiferana*) infestation of the Birchwood recreational trail system. The spruce budworm infestation was allowed to “burn itself out.” However, this created additional canopy-crown level fuels that could have exacerbated the situation if this stand had been ignited by flying embers from the 2016 Horse River wildfire.



Spruce budworm infestation

Recommendation: Initiate a formalized and continuing Elm Bark Beetle monitoring program with the assistance of the Society to Prevent Dutch Elm Disease (STOPDED).

The monitoring for Dutch Elm Disease (*Ophiostoma ulmi* or *Ophiostoma novo-ulmi* (an extremely virulent fungal species) must be conducted annually. The Society to Prevent Dutch Elm Disease or STOPDED is a non-profit organization whose mandate is to preserve and protect Alberta’s elm trees from Dutch Elm Disease (DED). Through its partnerships, STOPDED actively monitors for elm tree bark beetles that transmit DED. This is at no cost to Alberta municipalities.



Dutch Elm Disease

Monitoring for these beetles is imperative for the preservation of elm trees in both the RMWB and the Province of Alberta, thereby protecting this valuable urban forest resource. Consequently, it is important that a strong partnership link between the RMWB and STOPDED be established and maintained. This monitoring program’s costs are negligible to the RMWB with only the assignment of an Urban Forestry arborist to coordinate the receiving, placement, and return of the beetle pheromone trap for STOPDED’s analysis.

Recommendation: Train staff in proactive visual monitoring and assessment of the urban forest for pests and diseases.

The Asian long-horned beetles (*Anoplophora glabripennis*) were discovered in several Ontario cities in September 2003. This insect, native to China and the Korean Peninsula, is believed to have entered North America through solid wood packaging materials such as crates and pallets.



Tree infected with Asian long-horned beetles

Asian long-horned beetles attack healthy trees such as maple, poplar, birch, willow and elm. Because this beetle could kill trees and has no known natural enemies in this country, it represented a serious threat to Canada's natural and urban forests. It has the potential to lead to widespread tree loss in the urban landscape.

The Emerald ash borer (EAB) (*Agrilus planipennis*) is an Asian species native to China, Japan, Taiwan, Korea, Mongolia and the Russian Far East. In 2002, the beetle was detected for the first time in North America. It is a non-native invasive wood-boring insect which has continued to cause widespread mortality to ash (genus *Fraxinus*) trees across eastern North America since its discovery. As of December 2017, the EAB has been discovered as far west as Winnipeg, Manitoba.

Both of these non-native and invasive insects require a strategy of diligent, proactive, and reactive approaches to urban forest management should their presence be discovered. Therefore, staff training is vital for the proactive visual monitoring and assessment of the Urban Service Area of Fort McMurray's urban forest and natural tree stands.

4.5 SUPPORT THE URBAN FOREST

While major cities with larger urban forestry departments can offer the broadest range of information and services, smaller to medium-sized municipalities need to find creative ways to engage their communities with their limited resources and budgets. However, even volunteer-based activities require some resources to coordinate and implement. Therefore, more partnerships with local groups, who may be best able to secure funding and coordinate activities, is recommended.

Recommendation: Develop partnerships with local groups to develop volunteer-based activities such as a Tree Donation Program or a Tree Planting Program.

- Develop a local Tree Volunteer Database and/or Network: The connections between the local residents or organizations interested in tree-related stewardship need to be improved.
- Continue to Support Community Plantings and Annual Tree-Related Events: Arbor Day as well as site-specific Community Planting events should be promoted and undertaken. Efforts should be made to engage local schools and youth groups wherever possible.
- Consider incentives such as annual sapling giveaways to replace damaged trees, etc.
- Continue to support the "Communities in Bloom" engagement.

Recommendation: Develop information and outreach components on the RMWB Website.

It is recommended that the RMWB develop a "Forestry" or "Urban Forestry" section on RMWBs website that includes tree-related information as well as links and resources for the FireSmart program. Key messages and resources should be aimed at the general public, but also developers and contractors. The website should include information about:

- The value of the urban forest and its associated health, ecological, economic, and social benefits, for example, highlighting tree health as a benefit of FireSmart applications

-
- The role of RMWB's urban service area of Fort McMurray in forest management, including who to contact for boulevard and park tree issues
 - Information on processes, policies, and procedures related to public trees
 - Opportunities for residents to support urban forest sustainability (watering new trees in their boulevards, how to plant and maintain trees on their property), including integration of various FireSmart principles for private property
 - Promotion of sponsored or endorsed events both past and upcoming, related to urban forestry (Arbor Day activities, community tree planting events)
 - Links to potential funders of community urban forestry programs and relevant external resources for both education and stewardship (International Society of Arboriculture, Tree Canada, STOPDED, Alberta's Invasive Plant Council, etc.)

Recommendation: Develop a variety of outreach and education programs to enhance public understanding of the value and care of trees.

To enhance public understanding of the value and care of trees, it is recommended that the RMWB:

- Publish an insert on the value of trees, proper tree care, the challenges to sustaining trees in an urban environment, and other topics, in a local community or news publication;
- Pilot a community outreach initiative for use of gator bags and volunteer watering of newly planted trees;
- Develop or circulate flyers or pamphlets to be available at local community centres, libraries, and municipal centres;
- Recognize local citizens or groups that are actively involved in urban forest stewardship;
- Support initiatives to educate the public about FireSmart program and principles, and,
- Hold a community open house and/or workshop, educating people about Fort McMurray's first Urban Forest Strategy, and find out how the area might be better able to inform and engage those interested and identify people who would like to get involved in sustaining their urban forest.

Recommendation: Pursue partnerships with various agencies and organizations to expand the Urban Forest outreach and Stewardship throughout the RMWB.

While this document is focused primarily on the urban service area of Fort McMurray, adaptation and communication of key aspects of this strategy should extend throughout the RMWB. For example, coordination and collaboration with the FireSmart initiatives, outreach programs and stewardship activities.



Scout youth volunteers are educated in forest ecology and help plant the urban forest



Volunteer groups participating in urban forest stewardship

5 IMPLEMENTATION

5 IMPLEMENTATION

The linkage of the Urban Forest Strategy to the FireSmart program is essential.

Planning is the key to effective management of any program. The more complex the program, the more important it is to have an effective plan. Good plans can make the difference between cost-effective, proactive management and costly “knee-jerk” or crisis management.

The Urban Forest Strategy is a living document that provides an approach to establishing both focus and direction. It provides the framework for program implementation and a basis for consistent decision making. The implementation of this strategy should be undertaken as part of the over-arching Parks Master Plan.

This Urban Forest Strategy comes alive with input from residents, organizations, businesses, municipal staff, and elected officials. It is important for its integration with other comprehensive community or municipal plans. The linkage of the Urban Forest Strategy to the FireSmart program is essential. Several recommendations highlighted in this report refer or relate to the FireSmart program and principles. Acknowledging the connection between the Urban Forest Strategy and the FireSmart program will lead to a more comprehensive approach to planning, maintenance and growth of the urban forest.

As the Regional Municipality of Wood Buffalo grows, the increased demand for housing will put pressure on infrastructure. This includes its green infrastructure, such as trees, parks, and natural areas.

While there are no direct financial impacts as a result of the Urban Forest Strategy, the implementation of this strategy will be addressed and considered by the RMWB Council through the annual operating and capital budget process, with balanced consideration for all other RMWB budget priorities.

The recommendations of the Urban Forest Strategy are outlined in the following table, in order of priority.



The Birchwood Trails are an important open space asset within the urban service area.

Table 3: Recommendations by Priority

Recommendation		Priority
1	Integrate FireSmart principles in the planning, management, and care of the urban forest.	High
2	Develop an Urban Forest Management Plan every five years.	High
3	Develop Urban Forest Annual Operations Plans on an annual basis to direct the development of work plans based on the Urban Forest Management Plan and this Urban Forest Strategy.	High
4	Develop and implement a Tree Bylaw that includes such aspects as tree loss, damage and vandalism, tree asset value evaluation guidelines, and tree protection.	High
5	With an objective to reduce wildfire behavior potential, use the guiding principles of the FireSmart program to reduce the threat of a community level wildfire within the Birchwood Trails/ Conn Creek community reserve.	High
6	The use of landscape mulches should be limited to composted wood chip mulch, in accordance to FireSmart/FireWise program research, to a depth of no greater than 80 mm to 100 mm (3 to 4-inches). Composted wood chip mulch should not be used within 1.5 m (5-feet) of a home, dwelling or other fire combustible structure.	High
7	Establish an Urban Forestry Working Group and review staffing resources for the urban forestry program administration and management.	High
8	Develop a Tree Inventory for existing trees and implement a policy and procedures for collecting tree inventory data for any trees accepted by the RMWB through the development process.	High
9	Initiate a <u>formalized and continuing</u> elm bark beetle monitoring program with the assistance of the Society to Prevent Dutch Elm Disease or STOPDED.	High
10	Train staff in proactive visual monitoring and assessment of the urban forest for pests and diseases.	High
11	Update the Engineering Servicing Standards and Development Procedures, Landscaping Section 10.0 (p. 10-1 to 10-55 or p. 405- p. 495). See Appendix C for recommended updates.	High
12	Consider the development of a Tree Protection Policy for all RMWB owned trees and for protection standards during development.	High

13	Develop an interdepartmental committee to increase cross-departmental communications regarding urban forest issues.	High
14	Develop a Tree Policy.	Medium
15	Create a Tree Reserve Fund as per a Municipal Tree Policy (Council Approved Fiscal Policy).	Medium
16	Recognize the value and functions of the Urban Forest in the relevant Municipality's strategies, policies, and plans.	Medium
17	Establish an active management system that includes scheduled evaluations and updates to policies and practices.	Medium
18	Implement a Tree Asset Management System.	Medium
19	Implement an Urban Forestry Equipment Inventory and Asset Management System	Medium
20	Utilize the glossary within this Urban Forest Strategy to standardize terminology throughout planning, management and operations relating to the urban forest.	Medium
21	Develop guidelines and recommendations for selecting a tree for planting on public lands.	Medium
22	Implement a policy and procedure for 1) input from the Urban Forestry team during the development approval process and 2) acceptance of all plant material in new developments and redevelopments.	Medium
23	Establish a "no net loss" policy for municipal lands to encourage retention of existing trees and to ensure the replacement of trees that have been removed for any capital project.	Medium
24	Develop maintenance guidelines specifically for mature trees.	Medium
25	Develop maintenance guidelines specifically for newly planted and young trees.	Medium
26	Establish and implement an appropriate Level of Service for all publicly-owned street and boulevard trees.	Medium
27	Develop a Tree Risk Management Policy.	Medium
28	Adopt a Plant Health Care approach to improve the health of the urban forest and to manage pests, disease, wildfire risk and other issues.	Medium
29	Investigate the criteria for the identification of heritage trees and explore the potential for a Heritage Tree Register.	Medium
30	Develop partnerships with local groups to develop volunteer-based activities such as a Tree Donation Program or a Tree Planting Program.	Low
31	Develop information and outreach components on the RMWB Website.	Low
32	Develop a variety of outreach and education programs to enhance public understanding of the value and care of trees.	Low
33	Pursue partnerships with various agencies and organizations to expand the Urban Forest outreach and Stewardship throughout the RMWB.	Low

6 CONCLUSION

The RMWB Parks Services Branch should be commended for commissioning this Urban Forest Strategy and seeking to understand the issues and opportunities provided by their Urban Forestry unit and the urban forest of the urban service area of Fort McMurray.

From the interviews, analysis, and documents that were reviewed by the Urban Forest Strategy Team, there is ample evidence which suggests that the good efforts by the people involved in Fort McMurray's Urban Forestry unit should be mentioned for their continual attempts to bring structure to the practice of urban forestry. The FireSmart program should be recognized for providing principles and guidance for managing and planning urban forests for the safety and wellbeing of communities in the future. It will take vision and a long-term commitment by all decision-makers, along with strong relationships between the municipal government, its communities, and its employees to protect, enhance and grow the RMWBs urban forest.

The Urban Forest Strategy Team would like to thank the numerous people who provided their information, thoughts, and opinions. The development and implementation of an Urban Forest Strategy is timely as it responds to the numerous challenges impacting the RMWBs street, park, and natural forest trees, now and in the coming years. This strategy will help to address the many potential challenges to the health and sustainability of the RMWB's urban forests.



Fort McMurray Aerial (GoogleEarth 2018)

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APPENDIX A

Species Selection and Diversity

The selection of the appropriate species or planting “the right tree in the right place” in an urban setting can be challenging. Furthermore, a broader diversity of tree and shrubs is needed to guard against the possibility of large-scale devastation by both native and introduced insect pests and diseases. Therefore, the RMWB needs to establish a preferred species diversity strategy for parks and residential sites based upon the number of trees to be planted in each type of site.

While a common guideline for tree diversity specifies no more than 10 percent of any species, this may not be feasible in the RMWB given the limited number of tree species that are hardy enough to withstand the climate, let alone the additional impacts of an urban setting. However, the RMWB can support the trees it plants and increase diversity through the following strategies:

- **Plant Hardiness Zone:** Natural Resources Canada revised plant hardiness zones based on 1981-2010 data; RMWB Urban Forestry staff should keep abreast of further changes. The current plant hardiness zone is 3a.
- **Park Trees:** Marginal species may not be suitable for street trees, but they may be able to survive if given favorable conditions such as a park setting with the right hydrologic and soil regime. Therefore, blanket statements about plant hardiness should be used with caution. Continue to test species that are marginally hardy, as these species may become preferable as the climate shifts. Consider planting schemes in parks that mimic natural stand species diversity, including understory species.
- **Street Trees:** Species suitable for street trees are the most restrictive, given the harsh conditions of limited soil volume, limited water sources, and impacts from road salt and winter maintenance. To expand the potential range of species will require increased distances/setbacks or protection from roadways and increased soil volumes, at a minimum. Avoid planting numerous continuous blocks or neighbourhoods with the same species, as it increases the risk of mortality due to pest and disease infestations and spread.

Nursery Stock, Size and Quality

Supported by both technical literature and common observation, larger-caliper nursery stock is more difficult to successfully establish than smaller trees planted in the same growing environment. This is mostly due to the proportionally higher loss of root mass in larger nursery stock, especially in “balled and burlapped” (B & B) planting material. Track the survival rates of different size and type of nursery stock, and incorporate the findings into RMWB policies.

Larger nursery stock is sometimes preferred because it is more resilient to vandalism. Larger planting stock can also more readily utilize the higher quality and less compacted soils that are found in parks and open spaces.

Tree Bylaw Typical Sections

Based on best practices across numerous municipalities, a tree bylaws often include the following aspects:

- Tree loss and asset assessment
 - Whole tree loss
 - Partial tree loss
 - Damage & vandalism
 - Tree evaluation guidelines
- Tree planting, pruning, and removal on public property
- Tree protection and Tree protection plans
 - Infrastructure repair or replacement
 - Construction
 - Development, re-development, and infill
 - Mature neighbourhoods

Tree Inventory

To create an inventory as an effective urban forest management tool, it should include, at minimum, the following attributes:

- Location attributes (coordinates, municipal address, object ID, etc.)
- Tree species (common and scientific binomial nomenclature)
- Size (at least dbh, preferably also height class and canopy width)
- Condition (structure) rating
- Condition as a vigour or health rating
- Text-based pest, disease or damage assessment (if required)
- Text or code-based maintenance recommendation(s) (if required)
- Maintenance priority rating(s)

Table A: Attributes for Different Levels of Tree Inventory

Attribute	Basic	Good	Best
Location	Municipal address	Aerial photo points	Coordinates on municipal GIS system
Location description		X	X
Species	X	X	X
Diameter (dbh)	X	X	X
Crown diameter			X

Attribute	Basic	Good	Best
Crown height			X
Tree height			X
Tree age class		X	X
Condition	Scale	Scale	Scale by tree part
Pest/pathogen ID			X
Maintenance recommendations		X	X
Work priority		X	X
Risk assessment		Level I (visual)	Formal Level I & II risk rating
Conflicts (infrastructure)	Yes/No	Descriptive	Descriptive or code
Growth space (roots/crown)		X	X
Comments	X	X	X
Data management	Computerized	Computerized	GIS & asset mgmt. system
Inventoried locations	Street trees	Street and park trees	Street, park and woodlands

Tree Planting on Public Lands

Consider the following when selecting a tree for planting:

- Soil conditions;
- Exposure (sun and wind);
- Drainage;
- Space constraints;
- Hardiness zone;
- Human activity; and,
- Insect and disease susceptibility.

APPENDIX B – GLOSSARY OF TERMS

Arborist	A specialist in the cultivation and care of trees and shrubs, including tree surgery, the diagnosis, treatment, and prevention of tree diseases, and the control of pests.
Arborist (ISA Certified Arborist)	Professional designation through the American National Standards Institute for trained Arborists.
Best Management Practices (BMP)	These are the best-available, industry recognized courses of action, in consideration of the benefits and limitations, based on scientific research and current knowledge.
Branch	An outgrowing shoot, stem or twig that grows from the main stem or trunk.
Caliper	Trunk diameter is measured 6 inches (15 cm) from the flare; if the caliper is greater than 4 inches (10 cm), the measurement is taken at 12 inches (30 cm) from the flare.
Caliper ⁱ (ANSI Z60.1-2014)	The diameter measurement of the stem or trunk of nursery stock. The location of the measurement depends on the plant type. For fruit trees, small fruits, understock, and seedling trees and shrubs, caliper measurement shall be taken at the root collar or at other points expressly described in ANSI Z60.1. For all other nursery stock, caliper measurement is taken six inches above the ground level for field grown stock and from the soil line for container grown stock, which should be at or near the top of the root flare, and six inches above the root flare for bare root plants, up to and including the four-inch caliper size interval (i.e. from four inches (4-inches) up to, but not including, four and a half inches (4½-inches)). If the caliper measured at six inches is four and one-half inches or more, the caliper shall be measured at 12 inches above the ground level, soil line, or root flare, as appropriate. [also see Diameter Breast Height]
Caliper Measurement ⁱⁱ	The caliper measurement is used and only applies if the tree's stem is ≤ 40 mm (4 cm or 1½ in).ⁱⁱⁱ The <u>caliper</u> measurement is taken or measured at 15 cm (6-inches) above the ground if a tree's trunk or stem diameter is ≤ 100 mm (10 cm or 4-inches). The <u>caliper</u> measurement is taken or measured at 30 cm (12-inches) above the ground if the tree's trunk or stem diameter is ≥ 100 mm (10 cm or 4-inches). Caliper measurements are described in 2 mm increments to 10 mm. Caliper measurements are described in 5 mm increments from 10 mm to 30 mm. Caliper is designated as follows: • in 2 mm increments to 10 mm • in 5 mm increments from 10 mm to 50 mm

	• in 10 mm increments from 50 mm to 100 mm • in 25 mm increments above 100 mm^{iv}
canopy	A layer or multiple layers of branches and foliage at the top or crown of a tree.
clone	A clone is an asexually produced organism or plant of absolute genetic uniformity or genetically identical from root tip to apical meristem.
community	A particular area, place, or group of people with common interests living in a particular area that often share a sense of place, situated in a given geographical area.
community-level	Lands within the community boundary. This is a term that can be used in FireSmart to delineate the difference between a community-level area and a landscape-level area.
crown	The portion of a tree beginning at the lowest main scaffold branch extending to the top of the tree. On younger trees, the crown may be comprised of temporary branches. Crown can also be described as the upper portion of a tree, consisting of all the stems, limbs, and branches extending from the main trunk.
cultivar	A named plant selection from which identical or nearly identical plants can be produced, usually by grafting, vegetative propagation, or cloning. A grafted cultivar is genetically uniform above the ground. It is likely that all trees of a given cultivar will possess the same degree of resistance or susceptibility to biotic or abiotic influences. ^v
DBH or diameter-breast-height	Diameter at breast height is the diameter of the tree's main stem or trunk as measured at breast height 1.2 m (4-feet) above ground level. It is used for tree valuations and/or assessments.^{vi} DBH can be from 1.2 m to 1.37 m (4 to 4.5-feet from the ground level). NOTE: The USA uses a dbh of 1.37 m or 4.5 feet.^{vii}
Dutch Elm Disease (D.E.D.)	A fatal fungal disease vectored by the smaller European elm bark beetle (<i>Scolytus multistriatus</i>) and possibly the banded elm bark beetle (<i>Scolytus schevyrewi</i>).
FireSmart	FireSmart is living with and managing for wildfire. FireSmart helps protect homes and communities from the threat of wildfire while balancing the benefits of wildfire on the landscape by preparing for the threat of wildfire. It is a shared responsibility from home owners, industry and government.
FireWise	FireWise is a USA program, a counterpart to the Canadian FireSmart program, that encourages local solutions for safety by involving homeowners in taking individual responsibility for preparing their homes from the risk of wildfire. FireWise is a collaborative approach that connects all those who play a role in wildfire education, planning, and action with comprehensive resources teaching people how to adapt to living with wildfire and encourages neighbors to work together and take action now to prevent losses.^{viii}

flare, root flare, trunk flare, or root crown	The base of a tree where the trunk flares out to meet the main roots.
footnotes	Reference notes placed at the foot, or bottom, of the page.
growth habit	The mode or rate of growth, general shape, mature size, and branching structure of a plant, without training or pruning, including the changes which take place seasonally during its life cycle (e.g., deciduous, flowering, fruiting, etc.).
habit	The manner of natural or nursery formed growth, consistent with specific species; e.g. whether tall, dwarf, spreading, trailing, columnar, open, or tree, shrub or herb.
heat island effect	The effect of an asphalt or cement area or structure that absorbs and retains heat in excess of the ambient air temperature.
height	Unless otherwise specified, the vertical distance between the collar or ground line and the top of the stem, measured in the plant's natural position. Techniques for proper measurement are determined by the particular growth habit of the plant, and may not always extend to the tip of the stem.
I.S.A.	International Society of Arboriculture.
Integrated Pest Management (IPM)	A method of controlling pests by combining biological, cultural, mechanical, physical, and/or chemical management strategies.
landscape	There are several definitions of what constitutes a landscape, depending on context. (noun) The visible features of an area of land or a section of scenery, usually extensive, that can be seen from a single viewpoint. (verb) To improve the appearance of an area of land by planting trees, shrubs, or grass, or altering the contours of the ground.
landscape level	A FireSmart term that includes all lands that extend outward from the community boundary approximately 2 kilometers. Landscape can also be in reference to the landforms of a region in the aggregate.
leader	A dominant stem or limb that leads away from other main stems or limbs.
medium	Material plants may be grown in. This can include a mixture of two or more ingredients such as soil, peat moss, perlite, ground bark, etc. in a container that the plant has been grown.
mitigation	An action taken to alleviate potential adverse effects. Also, commonly used to mean compensation for damage done.

mulch	A material that is spread or sometimes sprayed on the soil surface to reduce weed growth, to retain soil moisture and to moderate temperature extremes, to prevent damage from lawn maintenance equipment, to reduce erosion or soil splattering onto adjacent surfaces, to improve soil quality through its eventual decomposition and/or to improve the aesthetic appearance of the landscape. Mulch can be composed of chipped, ground, or shredded organic material such as bark, wood, or recycled paper. It can also be of unmodified organic material such as seed hulls. Organic fiber blankets or mats can also act as mulch.
native forests	A natural area that is dominated by native trees in naturally occurring patterns.
natural areas	Land or water dominated by native vegetation in naturally occurring patterns. Such areas could include grasslands, forests, wetlands, peat lands, or riparian areas. Areas such as groomed parks, sports fields and schoolyards are not natural areas.
natural stand	A stand of trees that is a naturalized area that is dominated by native trees in naturally occurring patterns.
naturalization	This is an alternative landscape management technique whereby natural processes of vegetation growth and change are less restricted and the landscape is allowed to become more natural than ornamental by restricting mowing and/or by planting native vegetation found locally on similar landscapes.
Non-Government Organization (NGO)	A legally constituted organization that operates independently from any government.
nursery stock	Plants grown in or obtained from a nursery, both woody and herbaceous, including roots, crowns, bulbs, corms, and tubers, produced for transplanting. “Nursery Stock” are plants which have been propagated, lined out and grown to promote growth and root development to enable full recovery after transplanting.
objective	Mission, purpose, or standard that can be reasonably achieved within the expected timeframe and with the available resources.
ornamental or landscape tree	A tree introduced into the landscape for its visual impact due to aesthetic characteristics such as flowers, texture, form and shape.
park area	This is any RMWB owned lands, developed, and managed by the municipality
pest	An organism capable of causing material damage. Forest pests include invertebrates, noxious fungi, bacteria and viruses.
private trees	These are all trees located on land that is not owned or property of the RMWB.
public spaces	Lands held by government organizations for use by the public. Uses may include athletic, sports and other physical activity as well as historical, natural science, cultural, social and intellectual activities, experiences or programs.
revegetation	The process of replanting and rebuilding the soil of disturbed land.

root collar	The flared area at the tree trunk base where the roots and the trunk come together; root crown.
root crown	The area where the main roots join the plant stem, usually at or near ground level; root collar.
root flare	The lower area of a tree trunk where the roots visibly begin to flare out from the base of the trunk.
root pruning	The systematic pruning of roots of nursery plants growing in the field to stimulate branching of roots and the production of fibrous roots. Root pruning is also used prior to and in the aid of transplanting trees.
root pruning	The process of pre-digging or cultivating near the root ball to increase the density of root development within the final ball.
root stock	A plant on which a variety or species is grafted or budded which is used to support and or influence the growth habit of the variety. The root stock on which a plant is grafted or budded should be indicated.
spread	A term used to indicate the horizontal width of a shrub or the crown of a tree. Techniques for proper measurement are determined by the particular growth habit of the plant, and may not always be the maximum distance between any two branch tips.
stress	An unfavorable deviation from normal. The action on a body of any system of balanced forces whereby strain or deformation results. In arboriculture, this is the adverse alteration of tree health by abiotic or biotic factors.
succession	Predictable and orderly changes in the composition or structure of the ecological community of trees.
temporary branch	A small branch that is temporarily retained along the lower trunk of young trees.
thinning	The practice of pruning through the selective removal of branches or trees to provide light or air penetration or to lighten the weight of the remaining branches.
tree	A woody perennial plant that grows to a height of at least 4.5 meters (15-feet).
tree diversity	A healthy variety of age and species within and supports a healthy urban forest.
tree inventory	The gathering of accurate information on the health and diversity of a community forest.
tree preservation	The protection of specific trees or an area, group or woodland from intentional damage or destruction.
trunk	The main stem of a tree, beginning at the flare and ending at the lowest main scaffold branch. That portion of a stem or stems of a tree below the lowest branch.
urban forest	The trees and associated vegetation located within an urban environment, whether planted or naturally occurring. Trees and associated vegetation found in parks,

	natural or naturalized areas, the river valley, ravines, roadways, private yards, roof tops, commercial and industrial lands are all part of the urban forest.
urban forestry annual operating plan	This is a annual plan which outlines, details, and directs the day-to-day activities of urban forestry section. The annual plan will include plans for planting, pruning, removals, inspections, and the maintenance of the urban forest’s inventory. Initially, the annual plan will need to address priorities but will eventually be focused on the proactive management objectives. AOP’s are essential in being able to project budget requirements for all aspects of maintaining the urban forest.
urban forest management plan	This is a five-year management plan that outlines the broad operational objectives for this period. The urban forest management plan is essential in developing the Annual Operating Plans (AOP). Successive 5-year urban forest management plans will be based on a review of the successes and challenges of the preceding urban forest management plans.
urban forest management strategy	An Urban Forest Management Strategy is a guiding document that outlines a Regional Municipality of Wood Buffalo approach to plan, care, and enhance the urban forest in the urban service area of Fort MacMurray during the next twenty (20) years. An UFMS includes discussions on all the key subjects of urban forestry, including best practices for care and management. It can also provide an understanding of the existing resources and practices to manage the urban forest. NOTE: these core principles and information are similarly applicable throughout the RMWB.
urban forest sustainability	Management of the urban forest using stewardship principles to meet the social, economic and environmental needs of present and future generations. Special considerations include health and wellness; soil, air and water quality, and wildlife habitat.
urban forester	A person responsible for the management of the naturally occurring and planted trees and associated plants in an urban environment or area.
urban forestry	The management of naturally occurring and planted trees and associated plants in urban areas.
urban heat island	The phenomenon of urban areas, cities, or towns having air temperatures warmer than the adjacent rural areas.
Vision	Aspirational description identifying what an organization would like to achieve or accomplish in the mid- or longer future; serves as a clear guide for choosing current and future courses of action.
Wildland-Urban Interface (WUI)	Wildland-Urban Interface is described as an area where urban structures and lifestyle meets forested areas and environments that are prone to wildfire. It exists wherever homes and businesses are built among trees and other combustible vegetation.

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- ⁱ American National Standards Institute. American Standard for Nursery Stock. ANSI Z60.1-2014. Columbus, OH. 2014. 109 p.
- ⁱⁱ Canadian Nursery Landscape Association (C.N.L.A.). Canadian Standards for Nursery Stock, 8th Ed. Milton, ON: CNLA. 2006. 39 p.
- ⁱⁱⁱ Canadian Nursery Landscape Association (C.N.L.A.). Canadian Standards for Nursery Stock, 8th Ed. Milton, ON: CNLA. 2006. 39 p.
- ^{iv} Canadian Nursery Landscape Association (C.N.L.A.). Canadian Standards for Nursery Stock, 8th Ed. Milton, ON: CNLA. 2006. 39 p. (pg. 19-20)
- ^v Santamour, Frank S., Jr. "Trees for Urban Planting: Diversity Uniformity, and Common Sense." U.S. Department of Agriculture: U.S. National Arboretum Agricultural Research Service. DC. 2002. 10 p.
- ^{vi} Guidelines for Evaluation of Trees. City of Edmonton. Edmonton, AB. March 2, 2015. 3 p.
- ^{vii} Helms, John A., Ed. The Dictionary of Forestry. The Society of American Foresters. Bethesda, Maryland. 1998. 210 p.
- ^{viii} <https://www.nfpa.org/Public-Education/By-topic/Wildfire/Firewise-USA>

APPENDIX C

Engineering Servicing Standards and Development Procedures Review

Definitions	Add UFS definitions, including: urban forestry, urban forest, urban forest management strategy, canopy/canopy cover, DBH, tree preservation, FireSmart, mulch, tree caliper, root flare.
2.5.3, #3	Refer to UFS among the other reference documents.
10.1.5	Identify that a sign-off by a representative of Urban Forestry is required when plantings are being inspected and accepted into Urban Forestry's inventory.
10.2.2	Include note to consult an urban forestry professional for sign-off or inspection regarding tree protection.
10.3.1	Soil guidelines to indicate conditions specific to tree planting (soil volume and quality).
10.4.6	Update mulch specifications to include recommendation from UFS: <i>Limit the use of landscape mulches to composted wood chip mulch, in accordance to FireSmart/FireWise program research, to a depth of no greater than 80 mm to 100 mm (3 to 4-inches). Composted wood chip mulch should not be used within 1.5 m (5-feet) of a home, dwelling or other fire combustible structure.</i>
10.4.7 #1	Reference to 10.8.3, should read 10.9.3 for Tree and Shrub Maintenance
10.4.9	Add a FireSmart column to the plant list to identify which plants are FireSmart recommended. Revise plant list: provide guidance on strategic and safe placement of plants indicated as to "avoid" by FireSmart such as Juniperus spp., Picea pungens, Pinus spp.
10.8.2	Outline winter maintenance standards which limit impact of salt on trees and vegetation.

10.9.3.6 Maintenance guidelines should reflect UFS recommendation to ***Develop maintenance guidelines specifically for mature trees.*** Mature trees have different maintenance requirements than newly planted, young, or juvenile trees. For example, the removal of more than twenty percent (20%) of live wood should not be considered in any one growing season. Additionally, large pruning cuts should be avoided. In the Urban Service Area of Fort McMurray, maintenance guidelines for mitigating the effects of road salt on mature boulevard trees are required.

10.9.3.6 Maintenance guidelines should reflect UFS recommendation to ***Develop maintenance guidelines specifically for newly planted and young trees.*** A tree with an established first-rate structure can continue as part of the landscaped area for many more years than trees that have not been properly pruned with reliable branch structure and scaffolding. Therefore, young, newly planted trees should be “trained” or pruned to promote a good foundation for mechanical structure. During the first years after planting, pruning can be conducted from the ground with the investment of few resources. Furthermore, proactive structural pruning provides a good foundation for a tree’s mechanical structure.

10.9.3.6 Update mulch note to include wording from UFS (see note for 10.4.6).

Drawing 10-500 and 10.4.4 Tree planting specifications should reference Urban Forest Strategy document and/or guidelines as a note: “Refer to...”

4-100 Series drawings Include considerations for salt impact on trees and protection of trees located along roadways. Include reference to UFS for more information.