



**CITY OF FORT SASKATCHEWAN
COMMITTEE OF THE WHOLE
AGENDA**

Tuesday, March 19, 2024, 2:00 P.M.

Council Chambers - City Hall

Pages

1. Call to Order and Land Acknowledgement

Deputy Mayor Makin

2. Approval of Minutes

2.1 Approval of February 20, 2024 Committee of the Whole Meeting Minutes

1

3. Delegations

Those individuals in attendance at the meeting will be provided with an opportunity to address Council regarding an item on the agenda, with the exception of those items for which a Public Hearing is required or has been held. Each individual will be allowed a maximum of five (5) minutes.

4. Urban Forest Protection and Enhancement Plan Update

4

Brenna Kelly | Richard Gagnon | Camille Lefrancois, Manager of Environmental Planning, Diamond Head Consulting (virtual)

5. Snow Melt and Materials Handling Site Feasibility

101

Grant Schaffer

6. Councillor Inquiries

7. Confidential Closed Session

To discuss matters that fall within one of the exceptions to disclosure in Division 2 of Part 1 of the Freedom of Information and Protection of Privacy Act (FOIP).

7.1 City Manager Update, FOIP Section 24(1)(a), Advice from Officials (advice, proposals, recommendations for or by a public body)

8. Adjournment



CITY OF FORT SASKATCHEWAN MINUTES
COMMITTEE OF THE WHOLE

Tuesday, February 20, 2024, 2:00 p.m.
Council Chambers - City Hall

In Attendance:

Members of Committee of the Whole:

Deputy Mayor Birgit Blizzard

Mayor Gale Katchur

Councillor Lisa Makin

Councillor Gordon Harris

Councillor Patrick Noyen

Councillor Brian Kelly (attended remotely via Webex)

Councillor Jibs Abitoye (attended remotely via Webex)

Administration:

Troy Fleming, City Manager (*arrived at 3:37 p.m.*)

Janel Smith-Duguid, General Manager, Infrastructure & Planning Services

Andrew Kaiser, Director, Legislative Services

Grant Shaffer, Director, Fleet, Facilities & Engineering

Jacob Battenfelder, Legislative Officer, Legislative Services

1. Call to Order and Land Acknowledgement

Deputy Mayor Blizzard called the February 20, 2024 Committee of the Whole Meeting to order at 2:00 p.m. and acknowledged that the City of Fort Saskatchewan is located within Treaty 6 Territory and Métis Nation of Alberta District 11; the ancestral and traditional territory of the Nehiyawak, Dene, Blackfoot, Saulteaux, Nakota Sioux, and Métis. We acknowledge the many First Nations, Métis and Inuit whose footsteps have marked these lands for generations. It is because of our treaty relationship that we can live, work, and play on Treaty 6 Territory.

2. Approval of Minutes of October 17, 2023 Committee of the Whole Meeting

R021-24

MOVED BY Mayor Katchur that the minutes of the October 17, 2023 Committee of the Whole meeting be adopted as presented.

In Favour (7): Deputy Mayor Blizzard, Mayor Katchur, Councillor Makin, Councillor Harris, Councillor Noyen, Councillor Kelly, and Councillor Abitoye

CARRIED UNANIMOUSLY

3. Delegations

None.

4. Presentations

4.1 Nutrien

Cory Wald, SHE&S Manger, and Dr. Connie Nichol were in attendance to provide the Committee of the Whole with information pertaining to current afforestation projects, initiatives, and operations taking place at the Fort Saskatchewan Nutrien facility.

4.2 River Valley Alliance

Kristine Archibald, Executive Director, River Valley Alliance was in attendance to provide the Committee of the Whole with information pertaining to 2024-2026 strategic priorities and upcoming potential capital projects.

Deputy Mayor Blizzard called a recess at 3:10 p.m.

The Committee of the Whole Meeting reconvened at 3:15 p.m.

5. Neighbourhood Rehabilitation Report

Grant Shaffer, Director, Fleet, Facilities & Engineering was in attendance to provide the Committee of the Whole an overview of the findings of the Neighbourhood Rehabilitation Asset Management Plan.

6. Councillor Inquiries

Committee of the Whole Members were given the opportunity to ask questions and provide concerns and comments.

7. Confidential Closed Session

R022-24

MOVED BY Councillor Makin that Committee of the Whole move to closed session at 3:56 p.m. to discuss the following items:

- a) **City Manager Update**, FOIP Section 24(1)(a), Advice from Officials (advice, proposals, recommendations for or by a public body)
- b) **Land Sale Public Utility Lots - Information Report**, FOIP Section 16(1), Harmful to Business Interests of a Third Party

In Favour (7): Deputy Mayor Blizzard, Mayor Katchur, Councillor Makin, Councillor Harris, Councillor Noyen, Councillor Kelly, and Councillor Abitoye

CARRIED UNANIMOUSLY

R023-24

MOVED BY Councillor Noyen that Committee of the Whole return to open session at 4:42 p.m.

In Favour (7): Deputy Mayor Blizzard, Mayor Katchur, Councillor Makin, Councillor Harris, Councillor Noyen, Councillor Kelly, and Councillor Abitoye

CARRIED UNANIMOUSLY

8. Adjournment

The Committee of the Whole meeting of February 20, 2024 adjourned at 4:42 p.m.

Deputy Mayor

Director, Legislative Services



CITY OF
FORT SASKATCHEWAN

**Information Report
Committee of the Whole_Mar19_2024**

Urban Forest Protection and Enhancement Plan - First Draft

Purpose:

The purpose of this report is to provide Committee of the Whole with an update on the development of the Urban Forest Protection and Enhancement Plan and to receive feedback on the first draft of the Plan.

Background:

On January 29, 2021, Council adopted [Our Fort. Our Future: The City of Fort Saskatchewan's Municipal Development Plan \(MDP\)](#). An objective within the Natural Systems, Green Infrastructure, and Natural Resource Extraction section is to ensure green infrastructure is protected and increased. A medium-term implementation item within the MDP is the development of an Urban Forestry Protection Plan.

On June 28, 2022, Council adopted [The City of Fort Saskatchewan Strategic Plan 2023-2026](#). A strategic initiative within the Environmental Stewardship and Climate Change Readiness strategic goal is to “prepare an Urban Forest Protection and Enhancement Plan to further improve and add to existing assets while also preventing unnecessary or premature loss”.

On [September 13, 2022](#), Council approved the development of the Urban Forest Protection and Enhancement Plan, conditional to federal funding. The approved budget is \$250,000, in which \$220,000 is funded by a federal grant through the 2 Billion Trees program.

On [September 19, 2023](#), Council was presented with the findings from Phase I of the project, which included a policy and procedure review, a preliminary technical analysis, and the results from public engagement efforts.

Summary Analysis:

The first draft of the Urban Forest Protection and Enhancement Plan is now complete and ready for review. Updates on the work completed to date have been prepared for Council's consideration and feedback.

The objective of the Plan is to create a strategy to manage and enhance the City's urban forest inventory. Specific objectives include:

1. Research and develop baseline data, including a review of best practices;
2. Audit the current inventory of tree assets and address any gaps;
3. Recommend strategies to protect, replace, and introduce assets;
4. Develop policies and management plans, based upon the recommendations; and
5. Develop a public education campaign to promote protection practices.

**Urban Forest Protection and Enhancement Plan - First Draft
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Phase I of the plan was presented to Council in September of 2023, and focused on a policy and procedure review, a preliminary technical analysis, and the results from public engagement efforts.

Phase II of the plan began in September of 2023 and focused on the development of the Urban Forest Protection and Enhancement Plan. The plan recommends strategies to protect, replace and introduce tree assets and policies. Future management plans will consider and incorporate the Plan's recommendations. The Plan also sets a vision, targets, goals, and an implementation plan that will guide the way we manage our urban forest into the future.

The Urban Forest Plan addresses issues and management strategies in both urban and natural areas in the city, describes the current state of each of these areas, and provides details about the existing assets. The current state of the urban forest was analyzed and is used as a baseline to set priorities for management. The historical, biophysical and policy context was also assessed and is outlined in this plan.

A vision for Fort Saskatchewan's urban forest was developed using input from engagement participants. This vision states:

"Fort Saskatchewan's resilient and expansive urban forest supports community well-being, enhances biodiversity, and seamlessly weaves nature into every neighbourhood. Our community plants, nurtures, and grows the urban forest with guidance from the seven sacred teachings of wisdom, courage, respect, honesty, truth, humility, and love from the nehiyawak and other Indigenous cultures."

This vision is supported by five goals:

1. Protect and grow urban trees for an equitable access to lush, tree-lined neighbourhoods;
2. Protect and restore natural areas to protect their cultural and historical importance, enhance their ecological value, and provide community access to the City's valued green spaces;
3. Manage the City's urban forest in accordance with best practices;
4. Partner with community members and organizations for urban forest management; and
5. Monitor performance and adapt to changing circumstances.

The Municipal Development Plan (MDP) defined a goal to increase canopy cover by 10%. Achieving this target will require approximately 66,040 new trees be planted within the City's boundaries, or approximately 1,650 new trees annually. Of this amount, the Urban Forest Plan recommends around 300 trees be planted in City parks.

The Urban Forest Plan also includes an Action Plan (Section 7.0), which provides strategic steps and initiatives that can be taken to align the future of the urban forest with the vision and goals within the Urban Forest Plan. These include short-, medium- and long-term recommendations. The recommendations includes:

- updating current bylaws;
- creating new policies;
- revising standards and processes;
- developing new management plans; and
- providing public education.

The draft Urban Forest Protection and Enhancement Plan is provided in Appendix A.

Financial Implications:

Implementing some of the recommendations within the Urban Forest Plan will have financial implications in future years. The Action Plan provides details on future cost impacts. These will be brought forward for Council's consideration as part of regular budget processes.

Internal/External Impacts:

The implementation of the Urban Forest Plan will impact the Public Works (Parks Services), Corporate Communications, Planning and Development, and Fleet, Facilities, and Engineering departments.

Diversity Impacts:

This project brings together knowledge from multiple City departments, the Indigenous community, community groups, and industry to capture. The diverse perspectives have been woven into the plan.

Indigenous and public engagement plans were developed and implemented to ensure inclusion through a diversity of activities. Engagement activities included *keewokaywin* visits¹, meetings with interested parties, public open house sessions, a webinar, an online survey and mapping activity, as well as booths at City festivals/events and public spaces such as recreation centres, the library and popular City parks/destinations.

A communications plan was developed with the Corporate Communications department, which included social media posts, radio and newspaper advertising, and posters.

Plans/Standards/Legislation:

The development of an Urban Forest Protection and Enhancement Plan is an implementation item within the MDP. The MDP also includes policy regarding the need to protect and increase green infrastructure:

Policy 7.3.9 Evaluate the urban forest and, where appropriate, protect the urban forest through the incorporation of existing tree stands into parks and open spaces of new neighborhood.

Policy 7.3.15 Develop and implement an Urban Forestry Protection Plan to ensure the City's tree canopy is protected, maintained, renewed and expended over time.

The City's Strategic Plan outlines a strategic initiative to prepare an Urban Forest Protection and Enhancement Plan to further improve and add to existing assets while also preventing unnecessary or premature loss.

City's Strategic Plan:

Goal - Environmental Stewardship (a commitment is in place to using our resources wisely and implement sustainable best practices).

¹ The Visiting Way – an Indigenous research methodology grounded in Cree and Metis ways of knowing and being.

**Urban Forest Protection and Enhancement Plan - First Draft
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Next Steps:

Following receipt of all of feedback, the Urban Forest Plan will be updated and completed in the second quarter of 2024.

The final draft of the plan will include a full planting plan, which will be used by Parks Services to determine locations and species of future tree plantings.

Public education materials will also be developed in the second quarter of 2024. The material will be used by Parks Services to inform residents on the topics of interest related to the protection and enhancement of our urban forests.

Attachments:

1. Appendix A – Urban Forest Protection and Enhancement Plan First Draft
2. Appendix B – A Seed is an Idea, and an Idea is a Seed – Indigenous Traditional Knowledge

Prepared by:	Brenna Kelly Project Coordinator, Public Works	Date: February 27, 2024
Approved by:	Jenelle Hart Parks Services Manager, Public Works	Date: March 5, 2024
Approved by:	Richard Gagnon Director, Public Works	Date: March 5, 2024
Approved by:	Janel Smith-Duguid General Manager, Infrastructure & Planning Services	Date: March 6, 2024
Approved by:	Troy Fleming City Manager	Date: March 8, 2024

URBAN FOREST PROTECTION AND ENHANCEMENT PLAN

March 2024



CITY OF
FORT SASKATCHEWAN
ALBERTA

ACKNOWLEDGEMENTS

The City of Fort Saskatchewan is located on Treaty 6 territory and Métis Nation of Alberta District 11; the ancestral and traditional territory of the Nehiyawak, Dene, Blackfoot, Sauteaux, Nakota Sioux, and Métis. We acknowledge that our forests have been protected and cared for by Indigenous Peoples for millennia, and we extend our gratitude to those who have shared their knowledge of the natural environment with us as we've worked on the Urban Forest Protection and Enhancement Plan. As we share the findings of this report, we endeavour to embody a spirit of respect and appreciation for the urban forest and the community it supports.

Acknowledgement is also given to the project team in the City of Fort Saskatchewan Public Works Department, Diamond Head Consulting Ltd., Modus Planning + Design, pipikwan pêhtâkwan, and Kathryn G. Lennon for their work and dedication to the development of the Plan, as well as all of City Council, Administration, stakeholders, and the many residents that contributed their insights to the Urban Forest Plan.



Kathryn G. Lennon
Consulting



EXECUTIVE SUMMARY

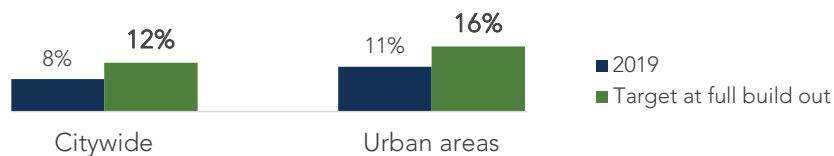
Fort Saskatchewan's Urban Forest Protection and Enhancement Plan (the Urban Forest Plan) will guide the City's management of the urban forest. The urban forest, made up of planted and naturally occurring trees, vegetation, and soils, is an important community asset, from forests growing along the river valley to street and yard trees.

The urban forest plan builds on extensive work already underway in the municipality and seeks to leverage opportunities to improve tree protection, planting, and stewardship while addressing challenges such as managing pests and diseases and improving growing conditions for urban trees. The plan takes an additional step towards *etuaptmumk* (Two-Eyed Seeing), the gift of integrating Indigenous ways of knowing with Western ways of knowing.

A FEW FACTS ABOUT FORT SASKATCHEWAN'S URBAN FOREST:

- Fort Saskatchewan and the surrounding area was known by the nehiyawak (Cree) people as *waskwayâhtikispatinaw* (birch hills) due to the many birch trees that were present in the land prior to colonization
- As of 2019:
 - 8% of the City and 11% of the urban area was covered by tree canopy
 - much of Fort Saskatchewan's natural areas are short young forests dominated by deciduous trees
 - the City manages over 15,000 urban trees planted along its streets and in its parks.

CANOPY TARGETS:



VISION:

Fort Saskatchewan's resilient and expansive urban forest supports community well-being, enhances biodiversity, and seamlessly weaves nature into every neighbourhood. Our community plants, nurtures, and grows the urban forest with guidance from the seven sacred teachings of wisdom, courage, respect, honesty, truth, humility, and love from the nehiyawak and other Indigenous cultures.



"A seed is an idea, and an idea is a seed."

– Elder Roy Bear, Chief of the Siksika Nation, sharing wisdom about the potential for the Urban Forest Plan to support not only tree planting but also to nurture and grow the urban forest with the community.

- GOAL 1.** Protect and grow urban trees for an equitable access to lush, tree-lined neighbourhoods
- GOAL 2.** Protect and restore natural areas to protect their cultural and historical importance, enhance their ecological value, and provide community access to the City's valued green spaces
- GOAL 3.** Manage the City's urban forest in accordance with best practices
- GOAL 4.** Partner with community members and organizations for urban forest management
- GOAL 5.** Monitor performance and adapt to changing circumstances.

ACTIONS:

The plan includes **43 actions** to achieve the urban forest vision. The following are highlighted as 'big moves' towards achieving the plan's vision:

- Develop a planting plan to guide City tree planting (action 3F) and prioritize City tree planting in areas with lower tree equity and vacant planting sites (action 3A)
- Explore ways to improve food security with parks landscaping in partnership with schools, food banks, or other interested community organizations (action 8B)
- Develop education materials about urban forestry to enhance community's knowledge about and support stewardship of Fort Saskatchewan's urban forest (action 9A)
- Develop an urban forest stewardship program that integrates community and school events, programs like adopt-a-tree, and activities to familiarize the community with the urban forest (action 9B).

The plan also supports many actions that are already in progress or have been initiated by the City, such as improvements to soil inspection in new subdivisions (action 2B), maintenance of the City's street and park trees (actions 3B, 6A, 6D), tree species trials to adapt to the changing climate, the historical impact assessment for Turner Park (action 4B), or pursuit of grant funding for urban forest initiative (action 7A).



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SECTION 1.0

INTRODUCTION

Fort Saskatchewan's urban forest and green spaces are an important community feature. Residents highly value the urban forest, from the extensive forest and green space along the river valley to tree-lined streets in the city's older neighbourhoods. The urban forest provides important benefits to connect with nature, recreate and make neighbourhoods more livable.

Fort Saskatchewan's Urban Forest Protection and Enhancement Plan (the Urban Forest Plan) recognises the importance of the city's urban forest, benchmarks its current conditions, and identifies the challenges it faces, and community values it needs to respond to. The plan sets a vision, target, goals, and implementation plan to guide urban forest management for the coming years.

The Urban Forest Plan contains the following sections:

Introduction – describes the purpose of the plan.

What is the urban forest – defines the urban forest, why it matters, and who manages it.

The urban forest through time – provides the historical context rooted in Indigenous knowledge and connection with the land and the recent history of the City's urban forest program.

The urban forest today – benchmarking of the current state of the urban forest in Fort Saskatchewan and the City's urban forest program.

The urban forest of the future – a description of the major urban forest challenges, vision for the urban forest of the future, and a supporting canopy cover target.

Community values – describes key community values gathered through community and Indigenous engagement for this project.

The urban forest of the future – the plan's vision for Fort Saskatchewan's future urban forest, the goals set out to achieve it and the challenges and opportunities they respond to, and a supporting canopy cover target to monitor implementation success.

The action plan – a detailed implementation that builds on the goal to provide strategies and actions and their respective priorities, costs, and responsibilities for implementation.



Etuaptmumk, or Two-Eyed Seeing is a concept developed by Mi'kmaw Elder Albert Marshall to describe the gift of seeing and integrating multiple perspectives¹. It refers to the gift of seeing the Indigenous ways of knowing with one eye and the Western ways of knowing with the other eye and integrating them to achieve beneficial outcomes.

As part of the engagement conducted to inform the development of this plan, Indigenous engagement was led by pipikwan pêhtâkwan to identify important Indigenous history and cultural significant areas; learn what Indigenous experts identify as high value in an urban forest plan; learn the vision Indigenous community members have for the urban forest; collect traditional knowledge to inform the Plan; and build relationships with Indigenous participants.

In an effort to practice etuaptmumk, traditional knowledge gathered through the Indigenous engagement and summarized in full in pipikwan pêhtâkwan's **"'A Seed is an Idea, and an Idea is a Seed' – Traditional Indigenous Knowledge"** report is integrated throughout this plan. The content is marked in green and with a braiding icon for easy reference.

The power of action¹

Elder Roy Bear, Chief of Siksika Nation, said that the Plan in Fort Saskatchewan has so much potential because **"a seed is an idea, and an idea is a seed"**. The work that will go into this plan needs to be more than planting new trees, it must be nurtured and grow with the community.

ani to pisi, in siksikaitsipowahsin (Blackfoot language) is a phrase that teaches us about the spiderweb; our traditional knowledge of the original instructions on how we work together. There are similar nehiyawak (Cree) words that have similar teachings. To follow those instructions, we must recognize that every action we take has the power to vibrate through the web and talk to all other societies. No changes in the Plan will ever happen in isolation, everything is connected.



See this icon?

This symbol, and the colour green, will be used throughout the report to highlight content where we braid together Indigenous ways with Western ways of knowing. The two ropes embody the 'Two-Eyed Seeing' concept, while the braid symbolizes the integration of the different perspectives.

¹ Content taken from pipikwan pêhtâkwan (2023): "'A Seed is an Idea, and an Idea is a Seed' – Traditional Indigenous Knowledge" report.

SECTION 2.0

WHAT IS THE URBAN FOREST



This section provides a brief overview of what we describe as the urban forest, how its various components are managed, and its value.

2.1 URBAN FOREST DEFINITION

The urban forest is comprised of planted and naturally occurring trees, vegetation, and soil located on public and private lands along roads, in parks, open spaces, private yards, and natural areas, including the river valley (**Figure 1**).

Urban forests encompass the places where people reside, work, recreate, travel, make purchases, and socialize. The urban forest serves as the intersection between local ecosystems and urban landscapes. Native trees and plants in the city's natural areas provide an important community asset and essential habitat for our fauna and flora. Urban trees create wildlife corridors linking

pockets of natural habitat across the city's urban areas and provide important benefits to residents and visitors. While an individual tree may provide shade for a family outing, an entire urban forest has the capacity to mitigate the urban heat island effect, offering cooling benefits to numerous residences or businesses during summer heatwaves.

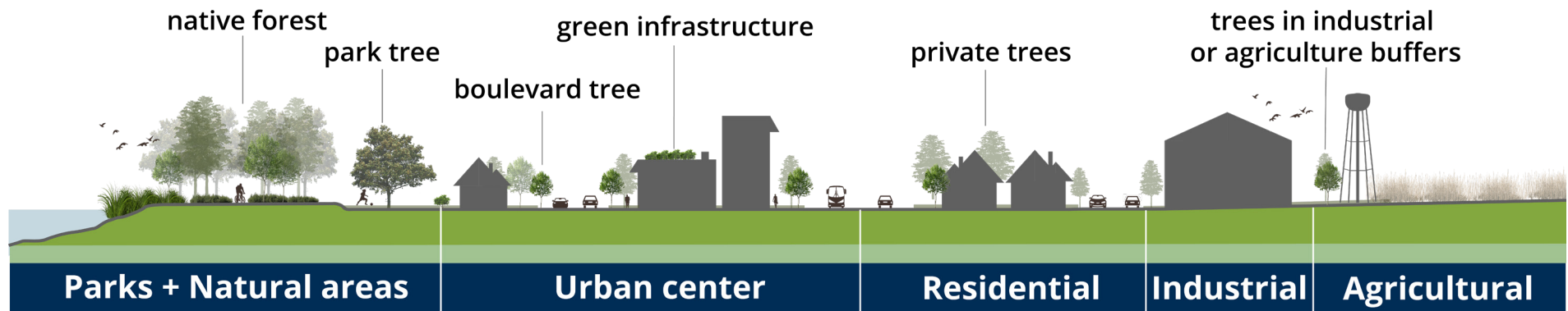


Figure 1. Component of Fort Saskatchewan's urban forest.

2.2 SEVEN SACRED TEACHINGS IN THE NEHIYAWAK AND OTHER INDIGENOUS CULTURES²



Figure 2. Seven layers of food forest in the nehiyawak culture and other Indigenous cultures (graphic credit: pipikwan pêhtâkwan).

² Content adapted from pipikwan pêhtâkwan (2023): “‘A Seed is an Idea, and an Idea is a Seed’ – Traditional Indigenous Knowledge” report.

There are seven sacred teachings in the nehiyawak culture, and other Indigenous cultures. The seven layers of a food forest are directly aligned with the seven sacred teachings. The trees, or standing people as referred in nehiyawak culture, share knowledge with humans and impart this guidance on us. The teachings from the seven layers of food forest offer a different perspective on how to describe the urban forest and our relationship to it.

The Canopy of **Wisdom**

The oldest layer of a canopy are the biggest standing people and they protect all the other plants and animals: The walnut, the chestnut, the beech nut, and the maple trees. We learn wisdom from them. The walnut is shaped like the human brain. Western knowledge is coming to know what Indigenous knowledge always has: walnuts are great nutrition for the mind.

The Canopy of **Courage**

The next tallest layer of the standing people are the fruit trees: Cherry, apple, plum, saskatoons. Fruit trees are challenged by harsh winters, drought, or even storms. Although they may be fragile, they share their fruits which shows courage to us. We learn to not hide our gifts, even when the environment may be scary.

The Canopy of Respect

The next layer in the food forest is the berry layer, or bushes: Blueberry, raspberry, haskap, and gooseberries. Berry bushes are self-fertilizing and self-propagating. They grow together amongst each other. They come in different shapes, colours, tastes and yet they grow in harmony together. We learn to respect and how we can co-exist with one another, and the other societies from this layer.

The Canopy of Honesty

The next layer is the food that grows right above the ground: Squash, pumpkins, lettuce, and cucumbers. There is honesty about these foods, they are trusted and nutritious. They show when they are ready to be eaten and there is an honesty about that willingness to be shared.

The Canopy of Truth

The next layer is found on the surface of the ground. These are our medicines: fungi, sweetgrass, sage and the strawberry. While the strawberry is a fruit, it is a sacred berry for Indigenous people, referred to as the heart berry. The strawberry represents the earth. Unlike any other fruit, the strawberry seeds are on the surface of the fruit, just as humans occupy the surface of the earth.

The Canopy of Humility

The canopy that grows just under the surface are important vegetables: potatoes, carrots, and turnips. They are not evident from the surface as much as the other layers. We often have to dig them up, on our hands and knees. This layer teaches us humility. Many of the foods that grow in this layer grow best in companionship with others; they may not be successful just anywhere.

The Canopy of Love

The last layer is the vines and creepers. They explore the forest areas and embrace other plants. They are an important layer that often provides access for animals from the ground to higher areas for safety. From this layer we learn love.



2.3 MANAGEMENT OF THE URBAN FOREST

The City of Fort Saskatchewan oversees the management of trees in city parks and along streets, while property owners or land managers are responsible for tree management on private land. The City uses different management approaches for the following two types of tree assets: urban trees and trees in natural areas.

Figure 3 provides an overview of how management differs for these two types of trees when it comes to planting, maintenance, protection and stewardship activities. The Urban Forest Plan addresses the issues and management strategies associated with these urban forest assets.



Figure 3. Urban forest asset types in Fort Saskatchewan.

2.3.1 TREES IN NATURAL AREAS

Trees in natural areas are generally managed as a stand rather than individually. Trees either self-seed or regenerate themselves. Maintenance is usually limited to dealing with risk and clearance along trails and forest edges, or the management of forest health concerns such as pests and invasive species or restoration of native plants and trees.

2.3.2 TREES IN URBAN AREAS

Trees in urban areas are often planted individually to showcase their attributes like size, colours, texture and form. These trees are generally managed as individual assets that, like other human-built City infrastructure, provide services and require management. Trees in urban areas often require more management efforts compared to those in natural areas. They are planted individually

because of space limitations and their proximity to buildings and structures, which restrict their access to soil and water. Due to the harsher growing conditions, urban trees are not always native species, tend to be planted at a larger size than in natural areas to facilitate their establishment, and usually require some watering and pruning.

Unlike traditional engineered assets, trees appreciate in value as they mature so long as proper care is given in the early establishment years of a tree. **Figure 4** provides an overview of the costs and benefits of urban trees from the time of planting. Costs are higher in early years, while they provide most benefits once they reach maturity. To maximize its return on investment, Fort Saskatchewan needs to ensure that the right trees are planted in adequate growing environments and provide sufficient watering and pruning to allow their establishment and growth to a mature size.

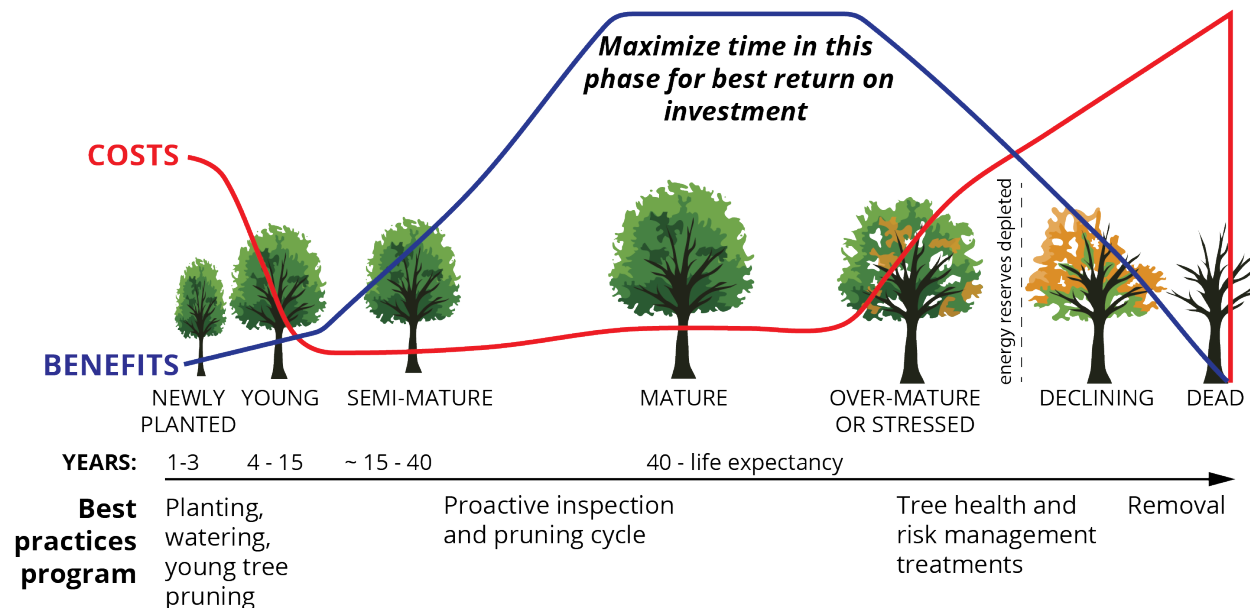


Figure 4. Magnitude of management costs and tree benefits over the urban tree life cycle in urban settings.

2.4 VALUE OF THE URBAN FOREST

Fort Saskatchewan's urban forest is highly valued by the community, particularly for providing clean air and water, providing shade, and beautifying the city. The benefits provided by the urban forest can be categorized into four ecosystem service types²:

Provisioning services: the tangible goods produced by trees and forests, including medicines, fruits, mushrooms, clean water, timber, and plant fibers.

Supporting services: the natural processes that yield indirect benefits by establishing conditions for other services to take place. Photosynthesis is a prime example of a supporting ecosystem service in the urban forest, whereby trees convert light

into energy to sustain themselves. Trees provide oxygen through photosynthesis to support other life forms.

Regulating services: offer immediate benefits through moderation or regulation of ecosystem processes. For example, trees cool air temperatures in the summer by providing shade and through evapotranspiration. Trees also absorb and store carbon from the air to help reduce greenhouse gas emissions.

Cultural services: how we appreciate the urban forest, which includes providing aesthetic value, fostering a sense of place, promoting mental and physical well-being, fostering spirituality, facilitating recreation, and boosting tourism.

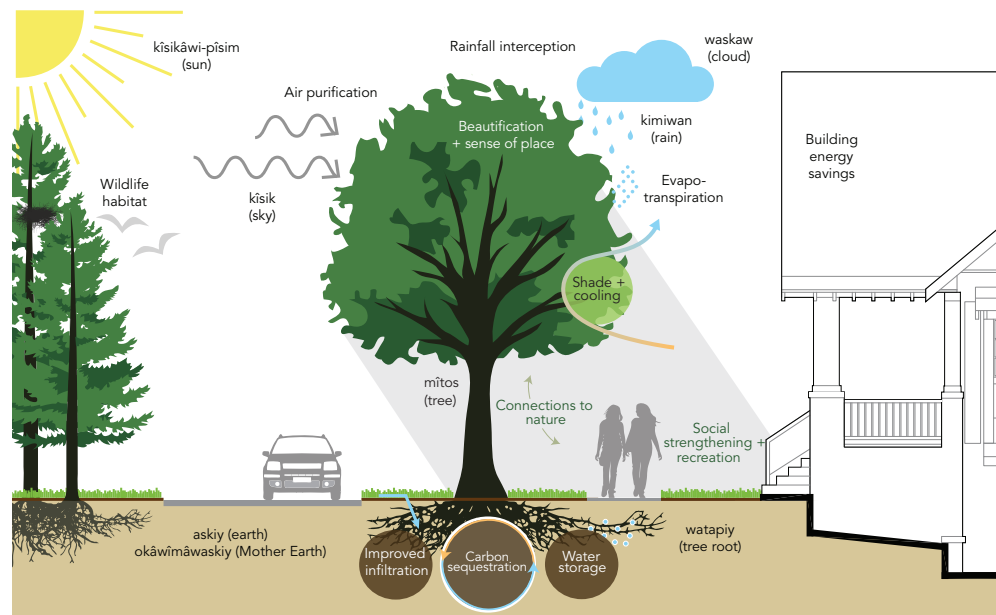



Figure 5. Benefits of individual urban trees, with Plains Cree language translation.

Indigenous oral knowledge tells us that the standing people (trees) “never grew alone”, but rather in clusters of at least three. While space might be insufficient to grow trees together in the narrower street boulevards, opportunities will be sought to learn from this knowledge in implementing this plan.





Traditional knowledge shared during this project indicates that humans have been exchanging information with trees and that trees have many lessons to share with us. See section 2.2 and section 3 to learn more about the seven sacred teachings and our shared history with the standing people.

The urban forest provides benefits across various scales, ranging from individual trees to entire woodland communities. Typically, larger and healthier trees contribute a more significant share of benefits, offering greater shade, cooling over more extensive areas, purifying more pollutants from air and water, and enhancing habitat for native fauna. The following section will summarize several common benefits associated with urban forests.

Health and community well-being

Trees are pivotal in enhancing physical and mental well-being, providing spaces for exercise and peaceful contemplation. Spending time in green spaces has been proven to reduce stress levels, improve work performance, and expedite recovery times in hospital settings^{3,4,5}. The proximity of parks or natural areas has been correlated with an increased likelihood of people achieving recommended physical activity levels⁶.

A sense of place

Urban forests add layers of meaning to individuals and communities, fostering cultural benefits such as a strong civic identity and pride⁷.

Habitat and biodiversity

Urban forests serve as biodiversity hotspots, offering habitat for numerous plants, animals, fungi, and microbes during both their life and after their death⁸. Intact forests with diverse habitats support an even greater variety of life. The animals residing in urban forests also benefit from essential ecosystem services like clean water and forest foods⁹.

Climate resilience

Urban forests play a role in carbon sequestration, aiding the global effort to mitigate climate change^{10,11}. At a local level, the

shade provided by trees and the process of evapotranspiration cools the surrounding air and surfaces¹². Areas with substantial canopy cover experience lower temperatures than those with minimal vegetation, providing a protective cover against extreme heat. Moreover, urban forests help mitigate the impact of storms and floods by intercepting and slowing rainfall with their canopy, stems, and roots¹³. They also prevent bank erosion by binding soil together through tree root systems.

Financial value

Urban trees contribute to the local economy by supporting the success of local businesses. In urban settings, trees encourage longer customer stays and increased spending, improving local shops' performance¹⁴. Research from various locations, including Finland and Florida, indicates that a high density of trees positively influences neighbourhood property values^{15,16}.

Clean air and water

Trees in urban areas serve as natural filters, capturing rain and removing pollutants from both air and water^{17,18}. This process contributes to the cleaning of the air by absorbing pollutants like carbon monoxide, road particulates, and nitrogen dioxide while releasing oxygen¹⁹.

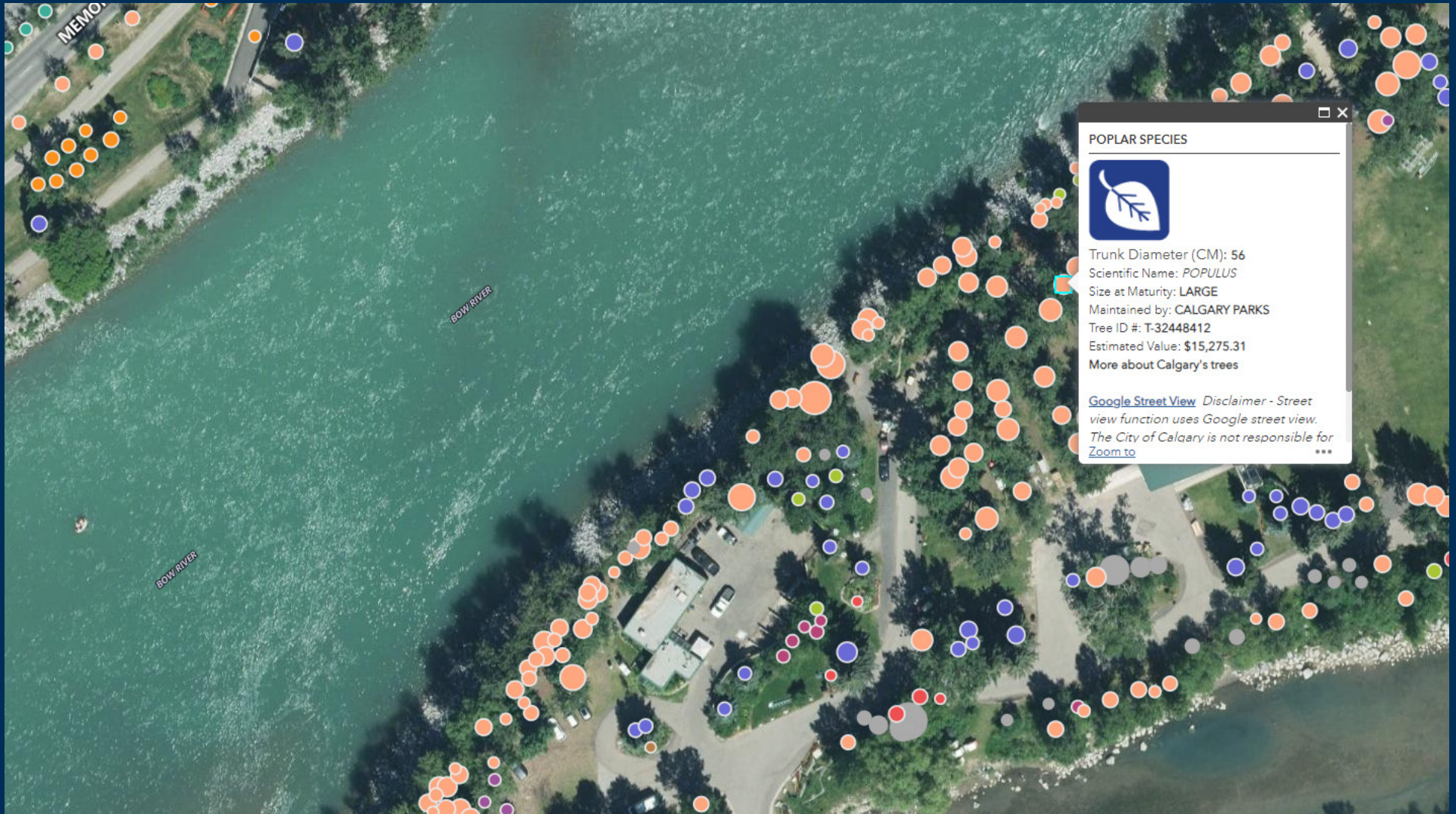
Resources

While urban forests are primarily managed for their intangible services, many cities repurpose removed trees for products such as wood chips and mulches. Fruit trees in community gardens or orchards contribute to fresh, locally grown food availability. Additionally, some trees offer medicinal resources, providing ingredients for traditional medicines and natural remedies.



Indigenous knowledge holders shared the importance of medicinal and sacred plants like fungi, sweetgrass, sage, and strawberries that hold special significance in the nehiyawak and other Indigenous cultures.

Example of urban forest tree valuation - City of Calgary



The City of Calgary hosts an online map of the City's public street and park trees. Each public tree has an associated assessment value based on the International Society of Arboriculture's Guide for Plant Appraisal (9th edition). The tree values are calculated by combining tree species, size, and health. The main motivation behind placing a monetary value on public trees is to encourage

the retention of large and unique trees across the city. It's important to note that such a monetary valuation cannot account for all the benefits provided by trees, particularly more intangible ones such as their role in shaping the community character and improving public health and well-being.

SECTION 3.0

THE URBAN FOREST THROUGH TIME

This section provides an overview of the history of the urban forest from Creation, before Treaty 6, and after the incorporation of the City of Fort Saskatchewan. Content about the history before the Treaty and near colonization is taken or paraphrased from the “A Seed is an Idea and an Idea is a Seed” Traditional Indigenous Knowledge report about the urban forest from before the Treaty.

3.1 BEFORE TREATY 6³

3.1.1 FROM CREATION

Traditional Indigenous knowledge gathered during engagement for the development of this plan, tells us that the land is sacred. The land is more than a representation of Mother Earth, it is our Mother. Many nehiyawak (Cree) Elders shared parts of the Creation story during visits held in 2023, where it was learned that trees are known as the standing people. They shared that humans are one of the youngest siblings of all societies and that trees were here long before us. There are shorter and longer versions of the Creation story, but each shares an important lesson about how the land came to be. The standing people gave parts of themselves to help humans learn to grow strong bones. When we recognize the collaboration and collective efforts that were needed to grow the earth we inhabit, we learn to uphold those original agreements.

nehiyawak Elders shared that humans and trees can speak to one another. The trees have shared many important messages with us throughout history. Many parts of the tree provide different knowledge, for example: the leaves, fruits, the trunk, root systems etc. The more we connect with the trees in a relational way, the healthier our forests can become.



³ Content taken from pipikwan pêhtâkwan (2023): “A Seed is an Idea, and an Idea is a Seed” – Traditional Indigenous Knowledge” report.



nehiyawak knowledge shares with us that there are four main layers in the earth. Deities and spiritual energy live originally in one of the layers of the earth. These living beings are then reflected into the sky as Northern Lights. The land is living, just as the things that grow out of it. We depend on the energy in those layers for human survival.

3.1.2 BIRCH HISTORY

It was shared that Fort Saskatchewan and the surrounding area was known by the nehiyawak (Cree) people as *waskwayâhtikispatinaw* (birch hills) due to the many birch trees that were present in the land prior to colonization. Birch bark was not only important for the building of canoes along *kisiskâciwan-sîpî* (the North Saskatchewan River), it was also a material used to create birch-bark scrolls with nehiyawak syllabics inscribed in them.

Birch trees are excellent protectors against wind and snow due to their strong root systems and dense foliage year round. Birch trees are a significant source of food for many animals societies, such as: foxes, birds, moose, deer, beavers and more. The birch tree produces a flower cluster known as catkins, and those flowers produce small fruits called samaras. The birch tree was a gift from Creator to connect animals and human societies. It is likely that due to colonization and development the land is no longer suited for sustaining birch.

3.2 HISTORY NEAR COLONIZATION⁴

The area known as Turner Park has been identified as a homestead for the Métis, specifically Joseph Turner. Yet, it was not known by participants how the land belonging to Mr. Turner had left his familial ownership and became public property. There was no evidence discussed of script being given and taken for these plots, although research from the Fort Heritage Precinct suggests that the property they lived in was just north of 109a Street. The area was also highlighted as a traveling land for many nehiyawak (Cree)

people from Saddle Lake First Nation and Cold Lake First Nation. The land closest to *kisiskâciwan-sîpî* (North Saskatchewan River) was prominent during trade and Elders believe it is likely to have significant artifacts such as tools, artisan crafts, and scrolls.

Turner Park was identified as a priority area for protection due to the known Métis and Indigenous history. Elders shared about the deep knowledge found in the land.

⁴ Content taken from pipikwan pêhtâkwan (2023): “‘A Seed is an Idea, and an Idea is a Seed’ – Traditional Indigenous Knowledge” report.

3.3 RECENT HISTORY

After being incorporated as a Village in 1899 and a Town in 1904, Fort Saskatchewan became a City in 1985. The urban forest management program developed as the City grew to plant and maintain trees along the streets and in parks.

In the early 2000s the City of Fort Saskatchewan hired an expert urban forester to carry out the City's first inventory of city trees. Each tree was recorded and catalogued based on tree species

and size with metal tags placed on each tree. Around 2010 the City began migrating to a digital inventory system called HisTree. This digital tracking system allowed City arborists to update tree information about existing trees, new plantings, and tree removals all directly in the field. This City's current management program is described in Section 4.2.



Figure 6. Examples of HisTree tags that were used for the City's tree inventories.

This section provides a summary of the current state of Fort Saskatchewan's urban forest and the City's management program.

4.1 STATE OF THE URBAN FOREST

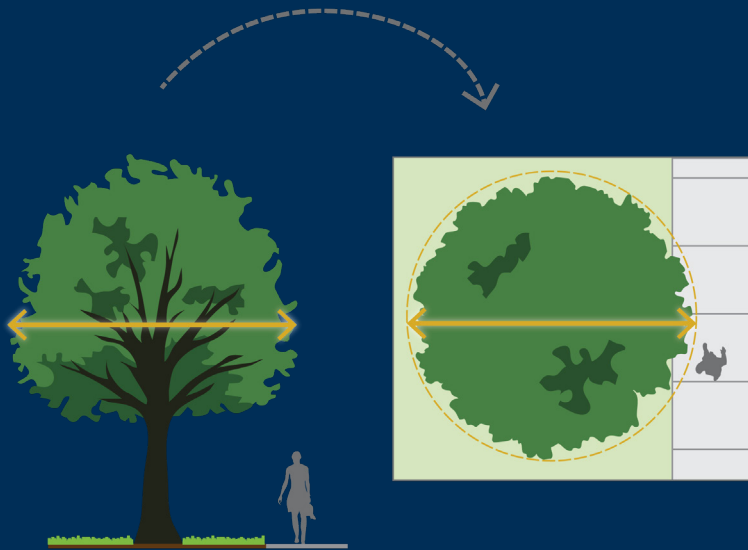
The description of Fort Saskatchewan's urban forest provides information about its current state that will be used as a baseline during the implementation of the plan. It describes the citywide urban forest and provides relevant details about natural areas and urban tree assets.

SECTION 4.0

THE URBAN FOREST TODAY

Canopy cover: A common urban forest metric

Tree canopy cover refers to the area of land covered by tree leaves and branches when looking from above. It is often expressed as a percentage of the land area.



Canopy cover is a common urban forest metric because it is easy to compare across different areas and assess the extent of an urban forest over time. It is used throughout this section to describe Fort Saskatchewan's urban forest.

4.1.1 CITY-WIDE

In 2019, the City of Fort Saskatchewan estimated its citywide tree canopy cover to be 8%, or 475 hectares of tree canopy. Within Fort Saskatchewan's developed urban area (which excludes industrial and agricultural lands), canopy cover reaches 11% (281 hectares of canopy). For comparison, canopy cover in comparable cities ranges from 7% in Lethbridge to 13% in Edmonton (Figure 7).

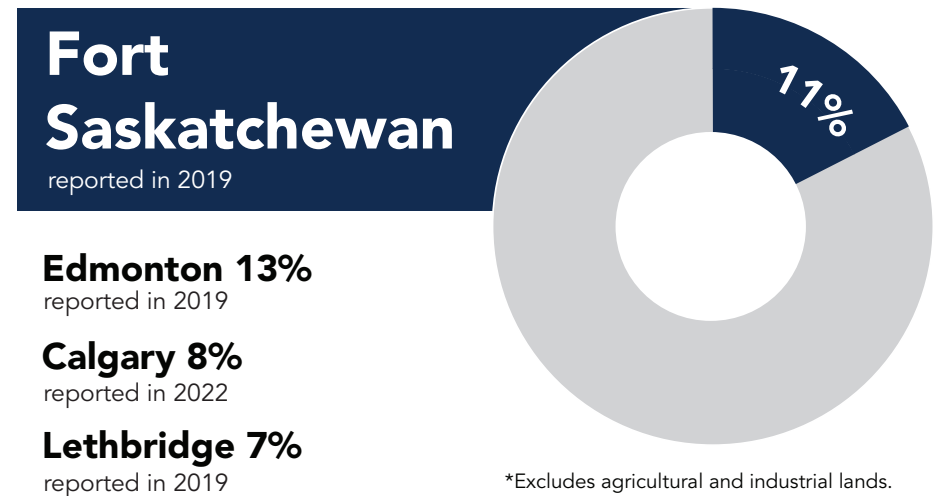


Figure 7. Canopy cover comparison between Fort Saskatchewan and neighboring cities.

Fort Saskatchewan's canopy cover is not equally distributed across the city (**Figure 8**). Areas with some of the highest canopy cover include natural areas along the North Saskatchewan River, downtown, and the surrounding established neighbourhoods.

Compared to those areas, industrial lands to the north, undeveloped areas, and some of the most recently built residential neighbourhoods have lower canopy cover.



Figure 8. City-wide canopy cover derived from 2019 LiDAR data.

- Tree canopy
- Industrial, agricultural areas



Surface temperature and canopy cover

The urban heat island effect has been well documented and describes the relationship between impervious surfaces (buildings, roads) and higher temperatures. **Figure 9** shows the land surface temperature across Fort Saskatchewan on June 27th, 2021, during the 2021 heat dome event. Across the city, parks and natural

areas with high canopy cover, as well as agricultural fields, are cooler than surrounding built-up neighbourhoods and industrial areas. This is visible in the inset map of **Figure 9**, where the cooler interpretive forest in the southwest of Fort Saskatchewan meets the hotter adjacent residential neighbourhood.

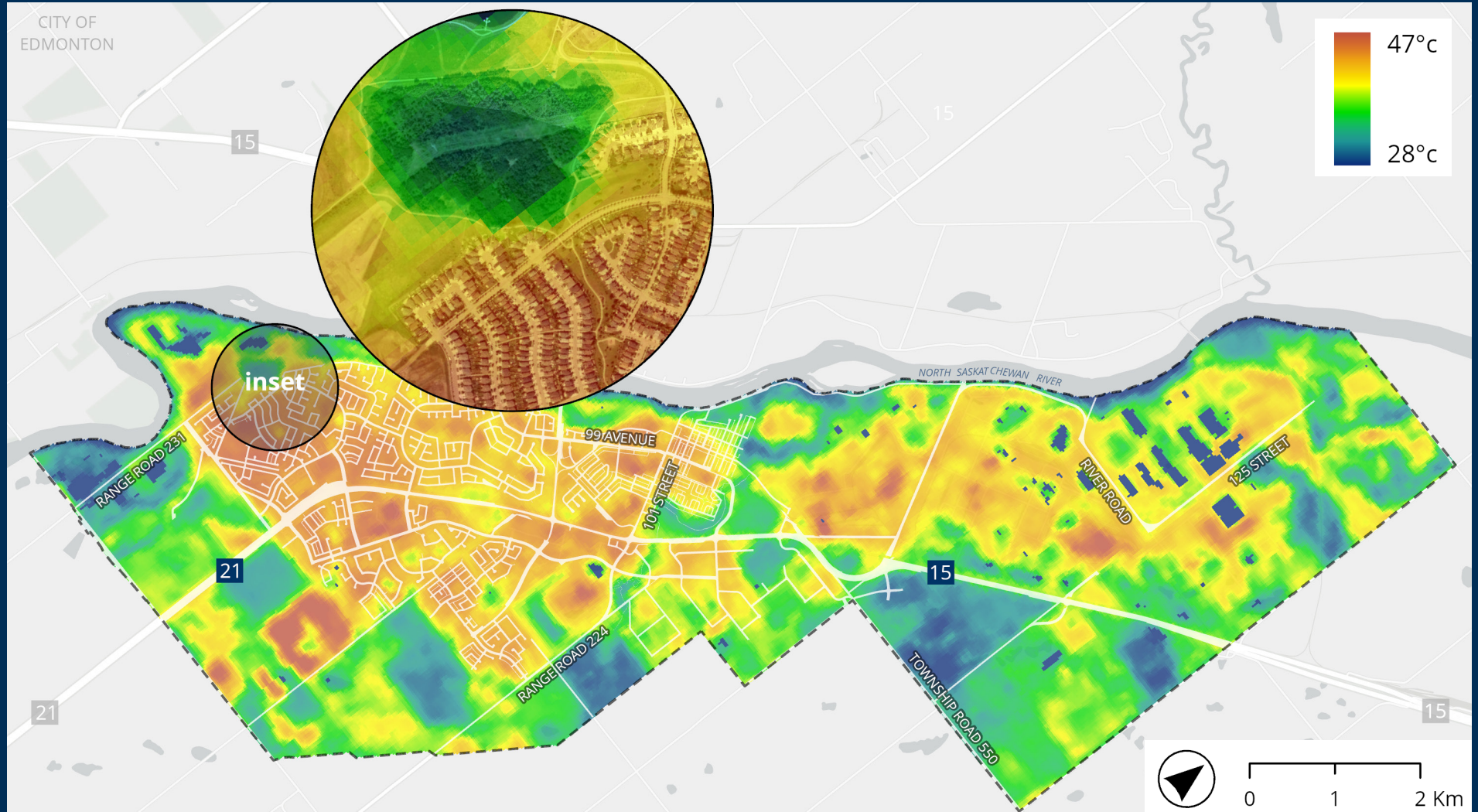


Figure 9. Land surface temperature in Fort Saskatchewan.

4.1.1.1 CANOPY BY NEIGHBOURHOODS

Canopy cover is also unevenly distributed across neighbourhoods in Fort Saskatchewan, with canopy cover ranging from <1% to 42% (**Table 1**). The average canopy cover across all neighbourhoods is 10%, while the average canopy cover for residential neighborhoods is slightly higher at 11%. The neighbourhoods with the highest canopy cover are Old Fort (42%) and Ross Creek Park (26%) near downtown and surrounding neighbourhoods

like Chamberlain (22%) and Pineview (21%) (**Figure 10**). The neighbourhoods with least canopy cover are the light and medium industrial neighbourhoods of Alsten Lands (<1%) and Bussee's Lands (<1%) as well as Sienna (<1%) and Southpointe (<1%).

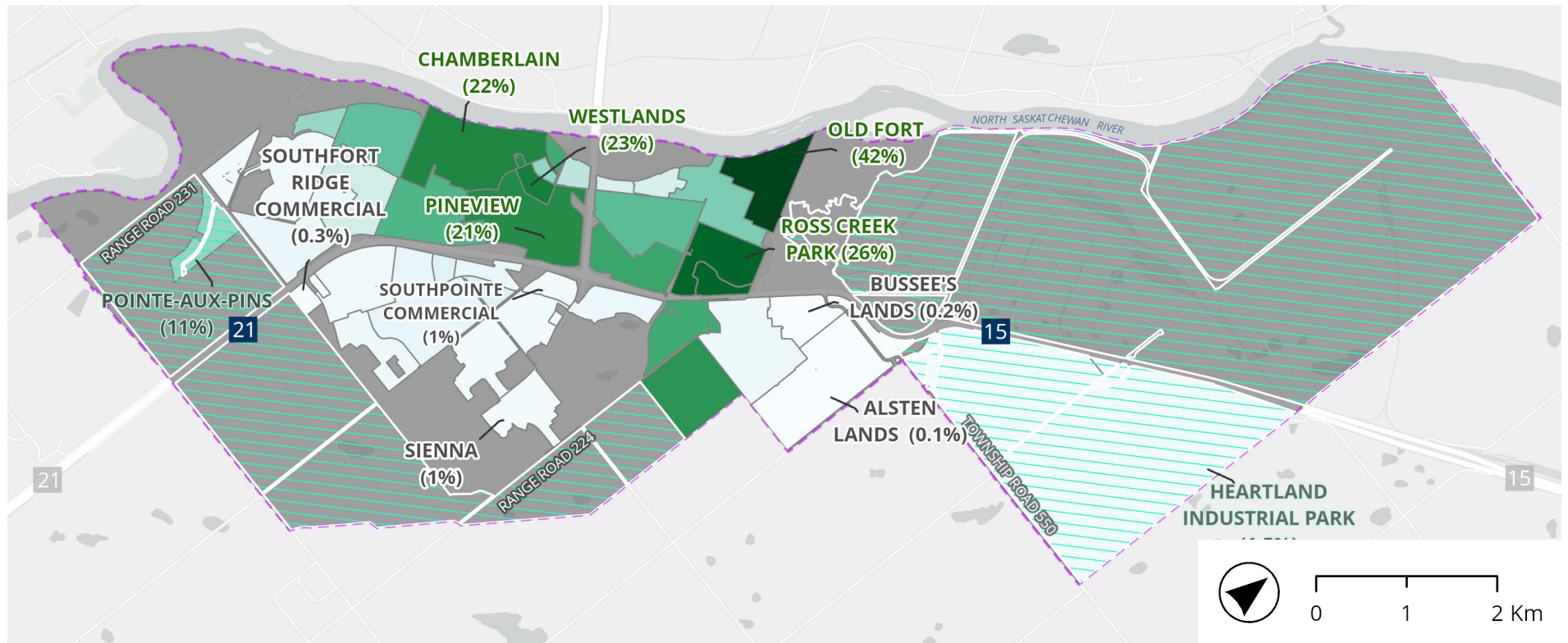


Figure 10. Canopy cover by neighbourhood labelled by the top five neighbourhoods and lowest five neighbourhoods.

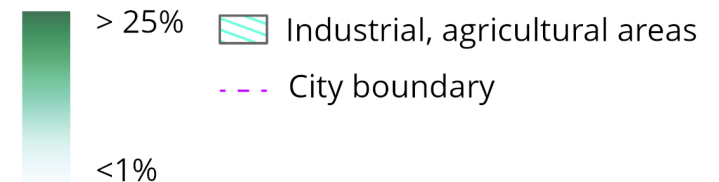


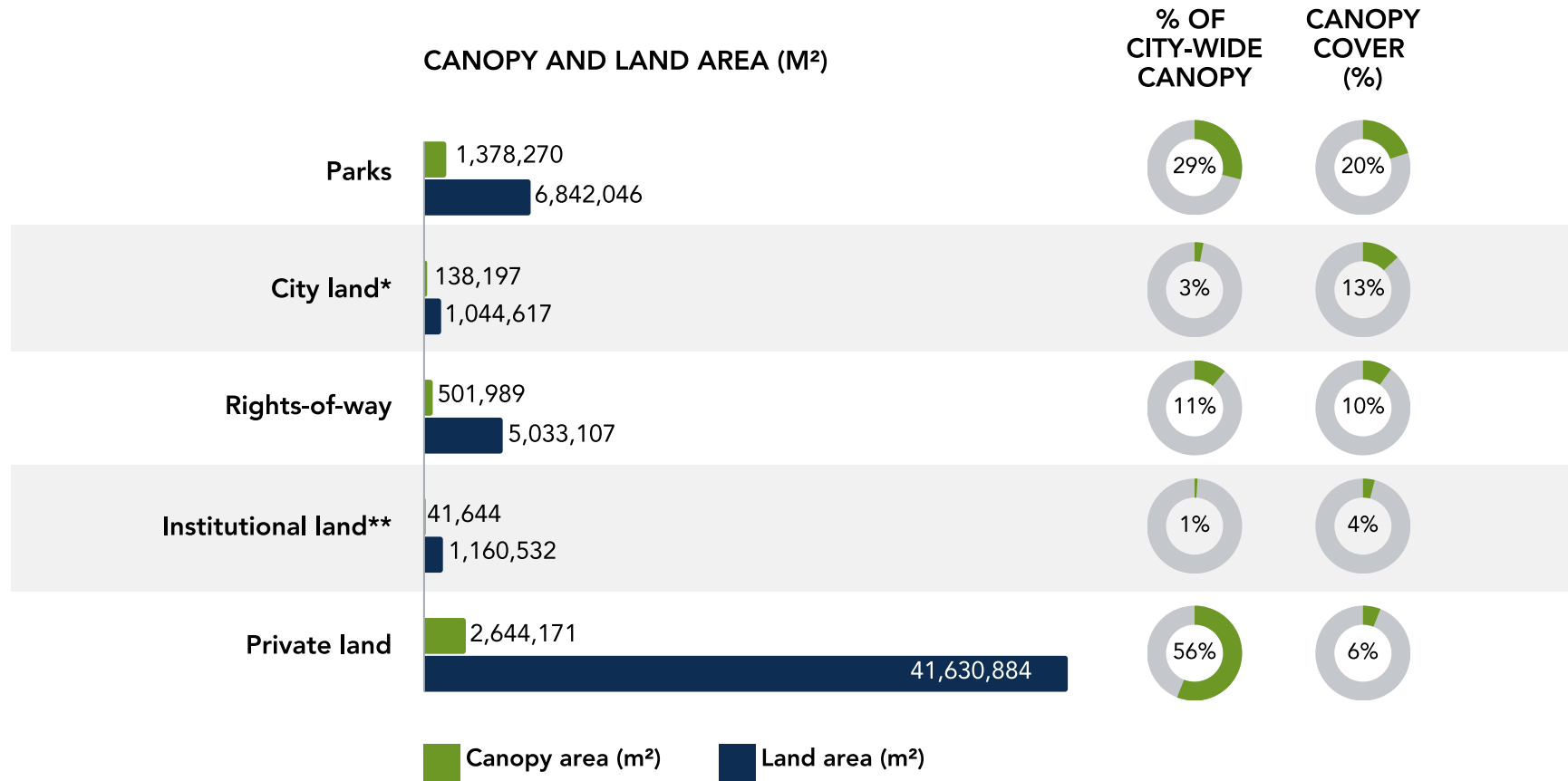
Table 1. Neighbourhoods by total land area, canopy area, and canopy cover.

NEIGHBOURHOODS	AREA (M ²) Canopy area Total area	CANOPY COVER	NEIGHBOURHOODS	AREA (M ²) Canopy area Total area	CANOPY COVER	NEIGHBOURHOODS	AREA (M ²) Canopy area Total area	CANOPY COVER
ALSTEN LANDS	1,692 1,165,755	0.1%	PINEVIEW	187,352 874,703	21%	SOUTHFORT RIDGE	9,275 533,599	2%
BRIDGEVIEW	3,365 60,917	6%	POINTE-AUX-PINS	30,992 274,736	11%	SOUTHFORT RIDGE COMMERCIAL	258 95,398	0.3%
BUSSEE'S LANDS	608 336,383	0.2%	RIVER GLEN	8,768 48,198	18%	SOUTHFORT VILLAGE	3,226 71,147	5%
CHAMBERLAIN	206,040 934,955	22%	RIVERPOINTE	8,225 97,139	9%	SOUTHPOINTE	10,516 733,395	1%
CLOVER PARK	134,102 646,564	21%	ROSS CREEK CROSSING	65,178 358,043	18%	SOUTHPOINTE COMMERCIAL	1,325 135,600	1%
CORNERSTONE	6,847 262,936	3%	ROSS CREEK PARK	146,747 569,552	26%	VALLEY POINTE ESTATES	13,760 125,156	11%
COUNTRYSIDE	5,058 44,294	11%	SHERRIDON	94,854 612,448	16%	WESTLANDS	23,179 100,724	23%
DOWNTOWN	61,710 479,297	13%	SHERRIDON EXTENSION	80,142 424,654	19%	WESTPARK ESTATES	81,415 539,451	15%
EASTGATE BUSINESS PARK	16,379 791,651	2%	SIENNA	3,648 381,893	1%	WESTWOOD TRAILS	34,978 520,631	7%
FOREST RIDGE	10,834 579,545	2%	SOUTHFORT BEND	4,232 145,387	3%	WINDSOR	17,063 603,265	3%
FORT CENTRE	6,902 118,339	6%	SOUTHFORT ESTATES	29,403 915,674	3%	WINDSOR POINTE	17,063 603,265	2%
MCNICOL	108,035 647,149	17%	SOUTHFORT HEIGHTS	4,827 99,158	5%			
OLD FORT	216,715 523,188	41%	SOUTHFORT MEADOWS	6,973 326,174	2%			
HEARTLAND INDUSTRIAL PARK	91,304 5,932,790	2%						2%

4.1.1.2 CANOPY BY OWNERSHIP

Approximately 77% of Fort Saskatchewan’s land base is privately owned or institutional land, with the remaining 23% being comprised of City-owned parks (12%), rights-of-way (i.e., streets; 9%), and City lands, i.e., City properties that are not parks or roads

(2%; **Figure 11**). Over half of the total canopy in the city lies within private lands, despite private lands having only 6% canopy cover. Parks provide almost a third of the entire canopy in the city and have 20% canopy cover.



*These include City lands that are not parks.

**These lands include the Fort Saskatchewan Correctional Centre, the Fort Pentecostal Assembly and other institutional parcels.

Figure 11. Fort Saskatchewan land ownership by canopy area, land area, percent of citywide canopy, and canopy cover.

4.1.1.3 CANOPY BY POLICY AREAS

Fort Saskatchewan's Municipal Development Plan is structured around distinct policy areas to tailor the City's planning approach to the unique needs of each of those communities. Those policy areas were adapted to report on tree canopy in distinct areas for light and heavy industrial and road rights-of-way (**Figure 12**).

The policy areas with the highest canopy cover are the study area in Clover Park (20%), followed by open spaces and natural areas (20%), downtown (17%), and established neighbourhoods south

of downtown (14%; **Figure 13**). Fort Saskatchewan's rights-of-way (i.e., streets) have 10% canopy cover. The two largest policy areas by total area all have canopy cover below 10%. Heavy industrial lands make up the largest policy area in Fort Saskatchewan, covering 1,773 hectares of land and 8% canopy cover. Future urban areas and major employment lands have a canopy cover of 5% and 4%, respectively. Light industrial areas have the lowest canopy cover of all policy areas at 2%.

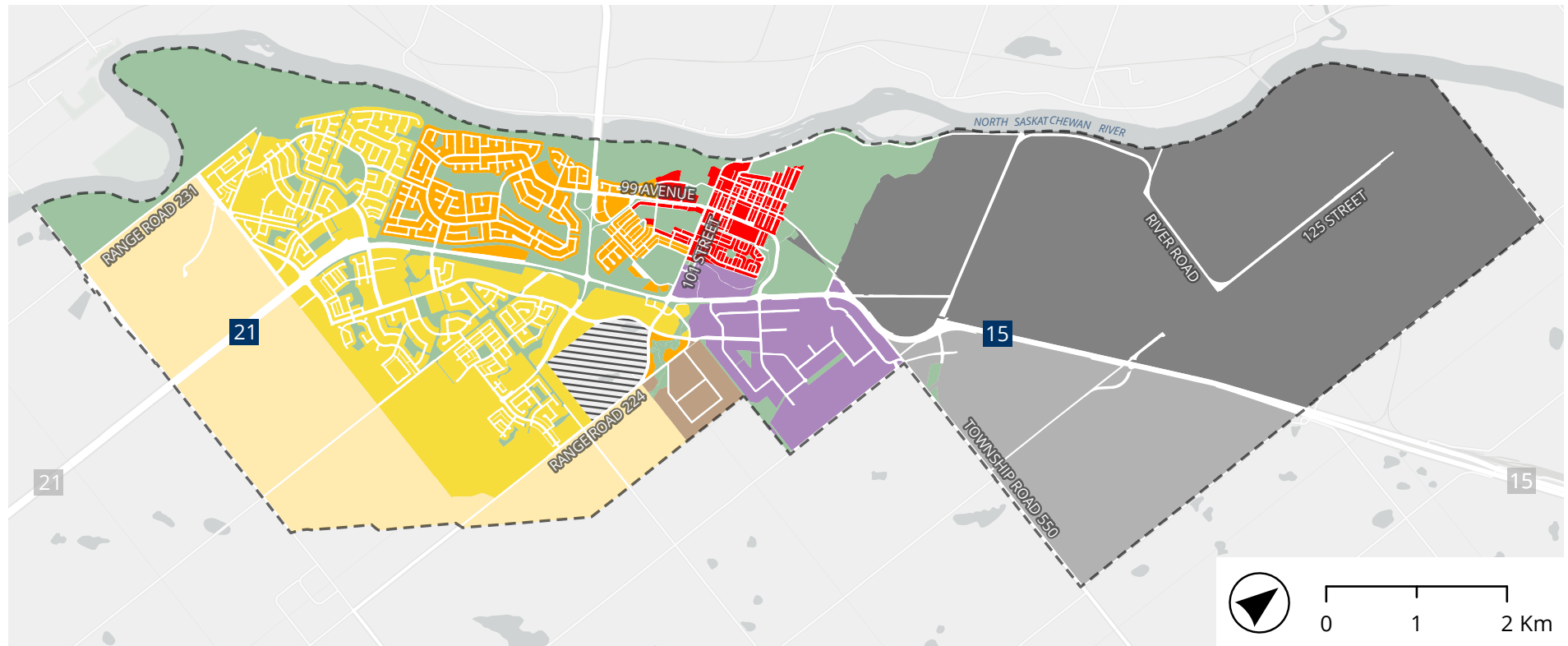
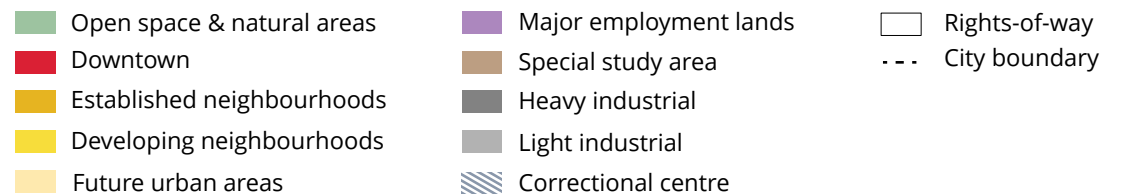


Figure 12. Policy areas in Fort Saskatchewan (adapted from the Municipal Development Plan) mapped.



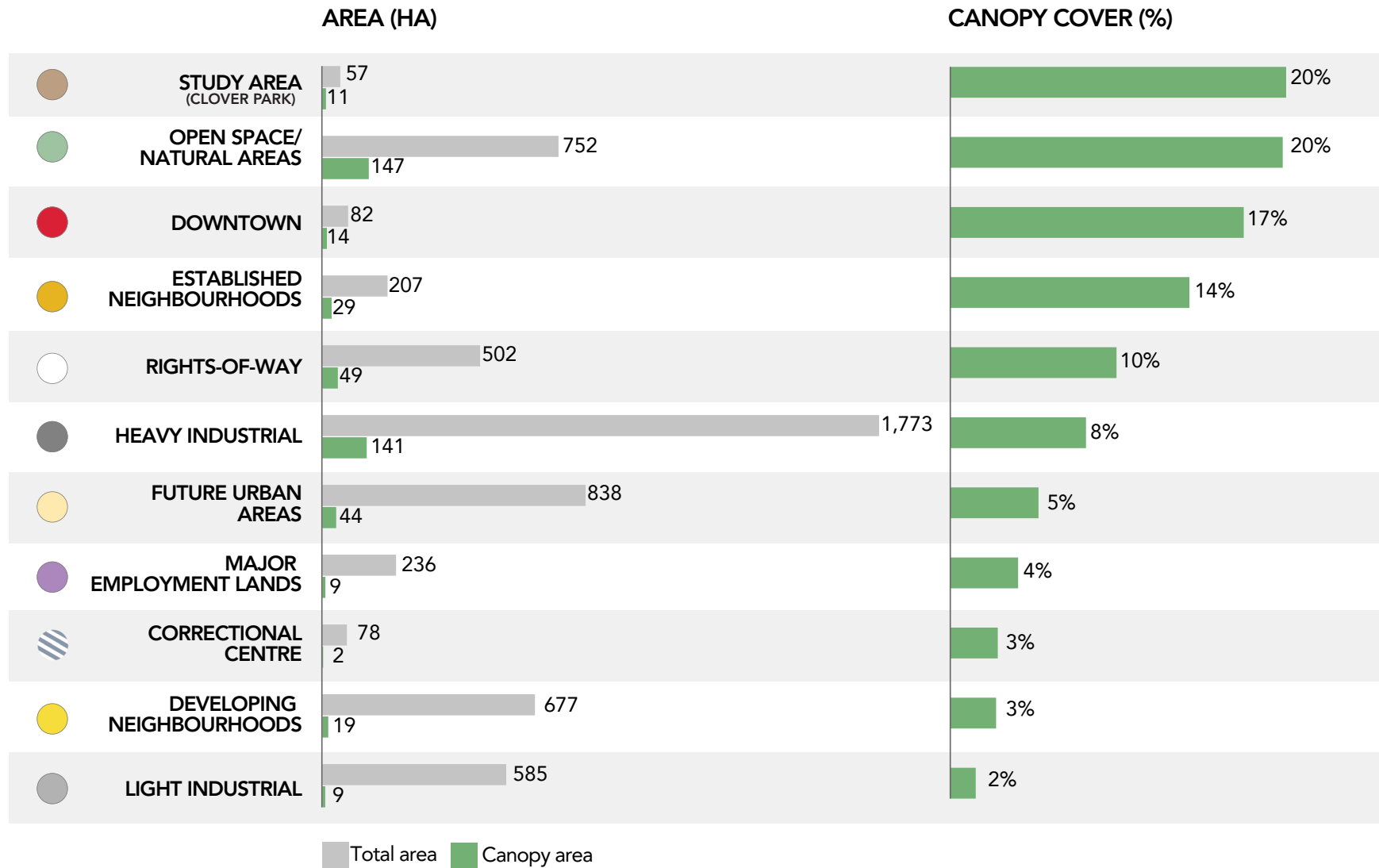


Figure 13. Policy areas in Fort Saskatchewan by land area (ha), canopy area (ha), and canopy percentages (%).

Urban forest initiatives on heavy industrial land

Initiatives by Nutrien to be included in the final draft

4.1.1.4 EQUITY AND ACCESS

Residents of some neighbourhoods of Fort Saskatchewan have a much better access to tree canopy and its benefits than others. Moreover, because some people are more vulnerable to issues like urban heat, not everyone experiences the same impacts from urban forest benefits on their wellbeing. The not-for-profit American Forests developed a metric called the Tree Equity Score that combines data about the lack of canopy cover with data about the highest need for trees to prioritize tree planting.

Need is identified with a priority index that combines social factors related to heat vulnerability (i.e., high concentration of seniors and children, unemployed, lower income, and minority groups) with urban heat to identify areas with the greatest needs for the cooling benefits of canopy cover (**Figure 14**).

The Tree Equity Score combines the priority index with a canopy gap (i.e., difference between current canopy and a target for the relevant policy area). A lower score indicates a higher priority to increase canopy cover.

Priority Index

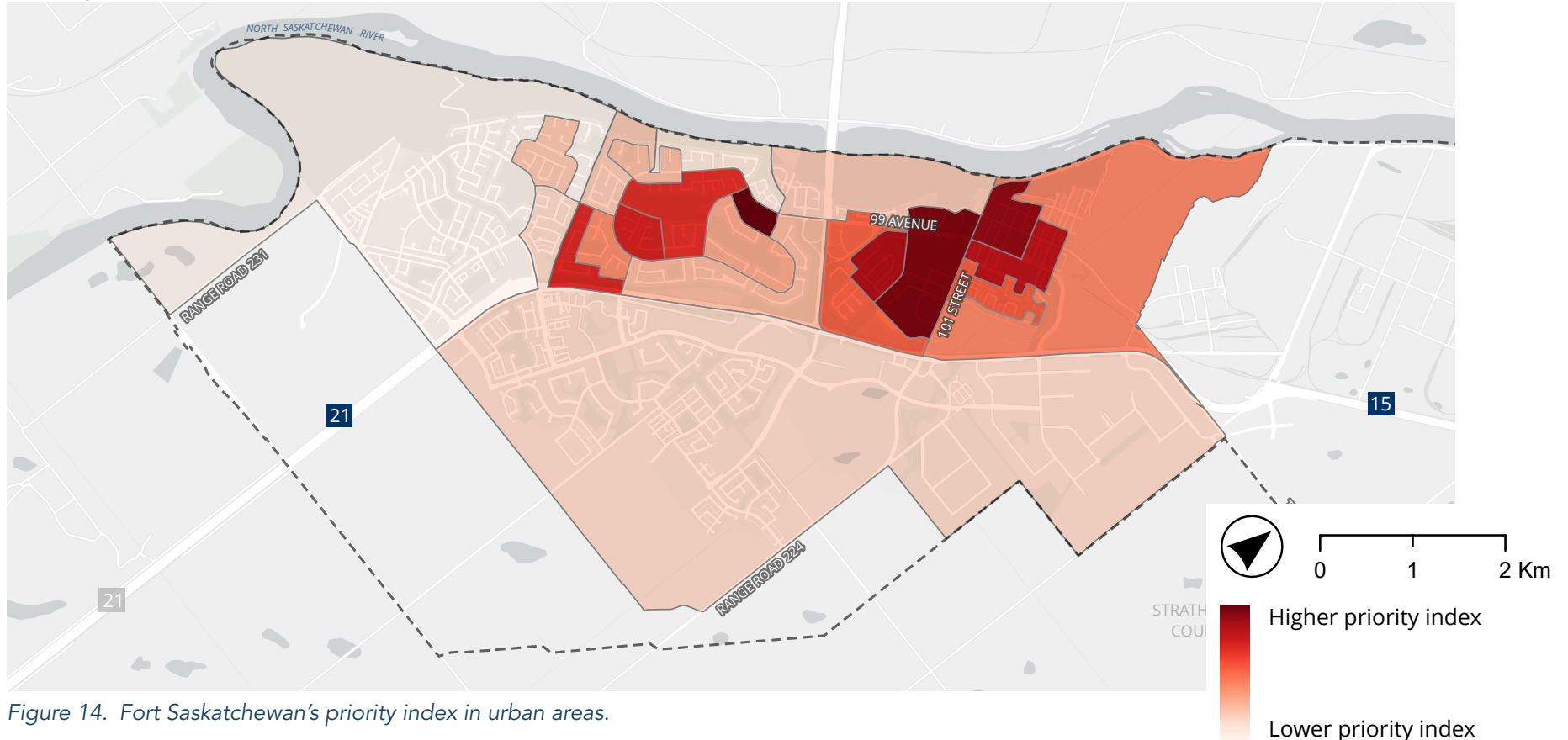


Figure 14. Fort Saskatchewan's priority index in urban areas.

Tree Equity Score

A Tree Equity Score was calculated for each census dissemination area within Fort Saskatchewan's urban area. A high Tree Equity Score implies that tree equity has been achieved based on existing canopy, goals for canopy coverage, and sociodemographic factors. In contrast, lower scores reflect relative tree inequity. In Fort Saskatchewan, the lowest scores are concentrated in the more urbanized areas of the City, specifically in the Sherridon neighbourhood and the south-west portion of the McNicol (**Figure 15**).

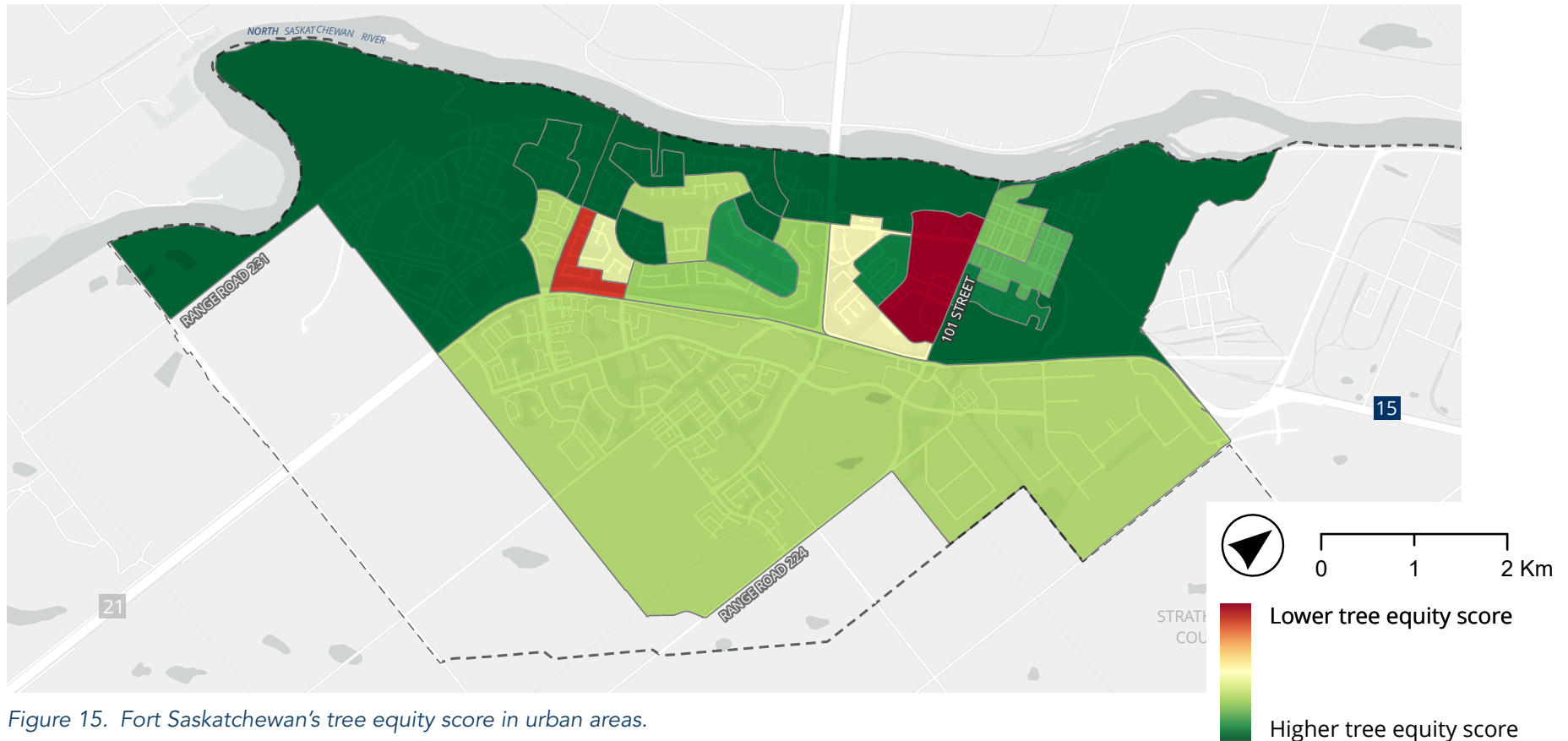


Figure 15. Fort Saskatchewan's tree equity score in urban areas.

The 3-30-300 metric

Another urban forest metric that can inform equity and access to the urban forest is the 3-30-300 guideline (**Figure 16**). The Nature Based Solutions Institute has introduced the guideline recommending that each home has a view of 3 trees, every neighbourhood maintains a 30 percent tree canopy cover, and each home be within 300 meters of the nearest public park or green space. This guidance is grounded in research demonstrating the health benefits of trees and green spaces near homes and workplaces. While seeking to achieve 30% canopy cover target in each neighbourhood provides an easy-

to-remember guideline worldwide, it may not be realistic to achieve in grassland ecosystems such as Fort Saskatchewan. In fact, the not-for-profit American Forests recommends a baseline canopy cover target of 20% for grassland cities²⁸. Similarly, while the guideline recommends each home having access to a park within 300 metres, Fort Saskatchewan's Municipal Development Plan already identifies a target for every dwelling to be within 400 metres of a park. As such, the guideline assessed for Fort Saskatchewan on the next page has been adjusted to 3:20:400.



Figure 16. The 3-30-300 metric²⁹.

How are we doing?

Many of Fort Saskatchewan's policy areas are close to achieving the 3:20:400 metric (modified from the original metric to match the 20% grassland canopy cover target and Municipal Development Plan's 400 metres from a park target). The Clover Park study area is the only policy area to achieve 100% of parcels with at least three trees within 25 m (**Figure 17**). All policy areas but Clover Park have less than 20% canopy cover. The developing neighbourhoods rank lowest in the 3:20:400 metric, having the highest number

of parcels with less than three trees within 25 m (269 parcels) and highest number of parcels further than 400 m away from a greenspace (241 parcels). Only parcels which were developed at the time of the canopy LiDAR analysis (2019) and trees that were planted by 2019 were considered in this analysis. The downtown and established neighbourhoods areas already provide a public greenspace within 400 m of all parcels.

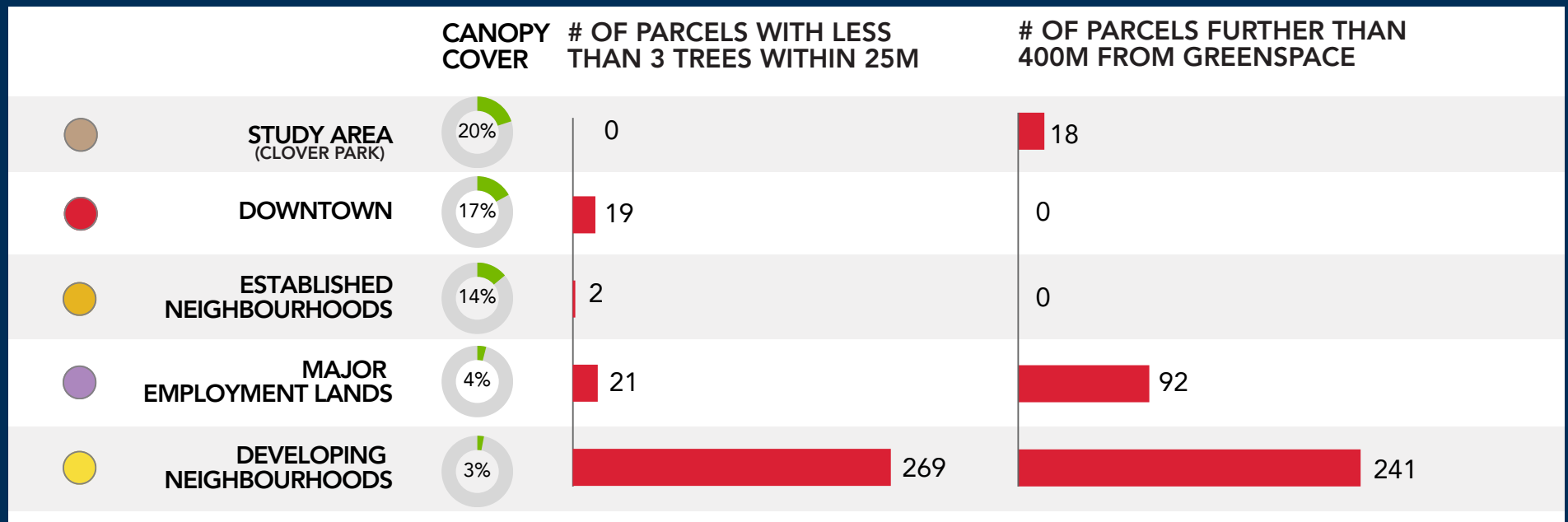


Figure 17. Fort Saskatchewan's 3-20-400 metric.

NATURAL AREAS

Trees in natural areas play many important roles in Fort Saskatchewan's urban forest. Forested natural areas are rich with native plants and animals, protect our community from floods and erosion, offer places to recreate and connect with nature, and connect us with the history of our landscape and many Indigenous teachings. Forested natural areas come in many shapes and sizes, following patterns in stone, soils, waters, and winds that have etched the river valley of kisiskâciwan-sîpî (the North Saskatchewan River). They reflect our climate, featuring species and ecosystems developed over thousands of years. Forested natural areas are also closely connected to the history of Indigenous nehiyawak (Cree) and Métis people, who sustainably harvested their wood fibres like birch bark and medicines. Today, while many forested natural areas remain in Fort Saskatchewan that are highly valued by the community, they are also highly impacted by invasive plants or animals, erosion, and fragmentation by urban and industrial development.

4.1.1.5 EXTENT OF FORESTED NATURAL AREAS

Despite many of the impacts listed above, forested natural areas provide most of Fort Saskatchewan's urban forest canopy. Within city boundaries, forested natural areas provide over 295 hectares, or 62%, of the city's total urban forest canopy. Although the Urban Forest Plan focuses on trees and forest ecosystems, Fort Saskatchewan's natural areas include other important ecosystems like streams and wetlands, open riverbanks, and restored prairies. Forests and non-forested ecosystems complement each other, playing unique roles in the broader landscape of the "parkland" natural region²⁰.

Forest in Turner Park seen from above.



4.1.1.6 FOREST TYPES

The data used to map Fort Saskatchewan's canopy (Light Detection and Ranging data, or LiDAR) can also be used to distinguish coniferous from deciduous trees to help us identify where each type is more common in the city's natural forests. Coniferous, deciduous, and mixed forests have different species compositions, lifecycles, habitat attributes, and other

features. In Fort Saskatchewan's natural areas, deciduous trees outnumber coniferous trees ten-to-one. Only 27 hectares of forested natural areas are predominantly coniferous, while 267 hectares are predominantly deciduous. **Figure 18** shows the extent of coniferous and deciduous forested natural areas in Fort Saskatchewan.

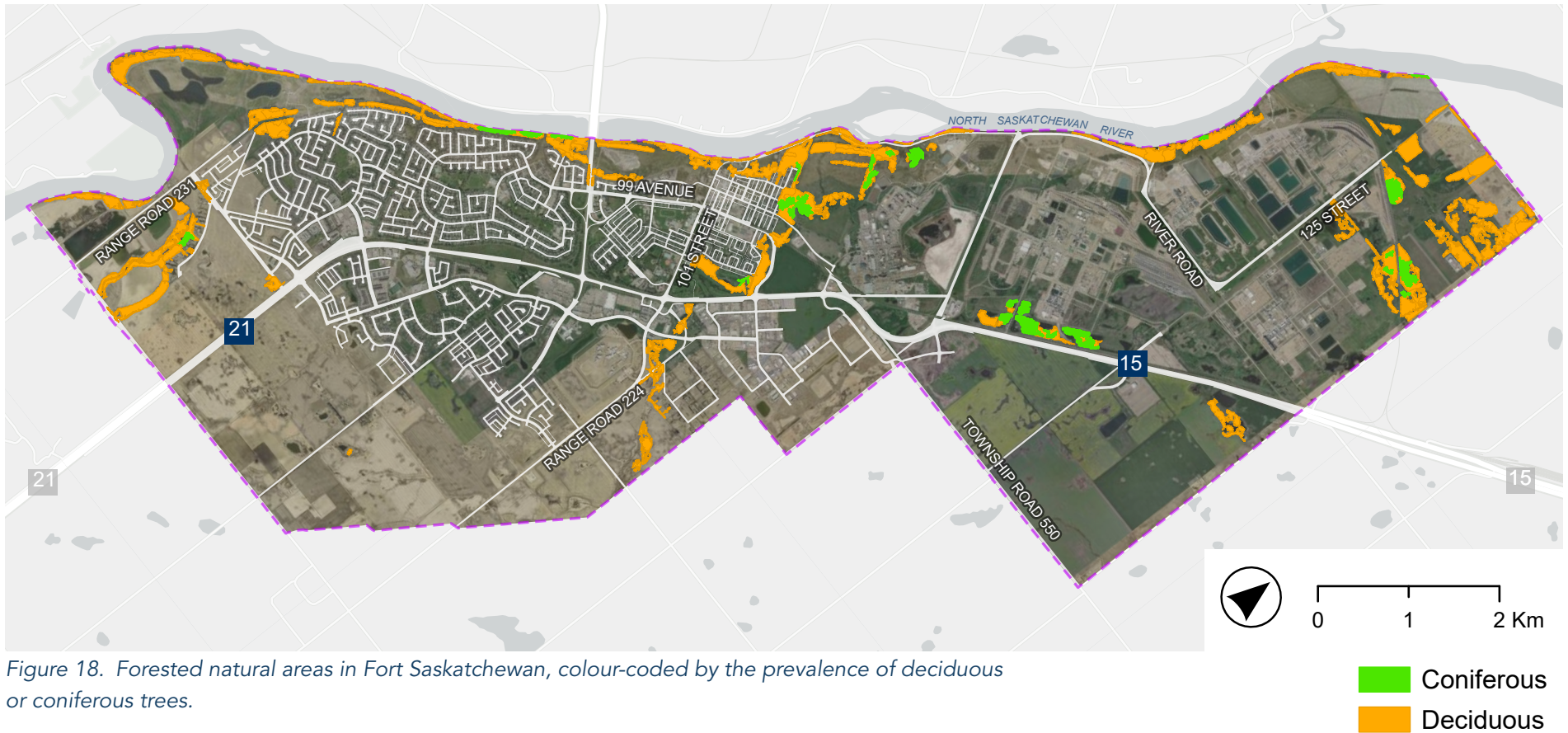


Figure 18. Forested natural areas in Fort Saskatchewan, colour-coded by the prevalence of deciduous or coniferous trees.

Common tree species in Fort Saskatchewan's natural areas

nehiyawak Elders who shared knowledge during the development of this plan explain that trees and humans speak to one another and have exchanged important messages throughout history. They recommended the creation of educational materials to help people greet trees as they walk in the forest. The following content aims to support that recommendation by providing information on common native tree species.



Lodgepole pine



Black spruce

Common native conifers

White spruce (*Picea glauca*) is the most common coniferous tree in forested natural areas and around Fort Saskatchewan. White spruce stands out for its pyramid shape of deep blue-green foliage. Look for sharp-tipped needles that are squarish in profile and branches that carry 4-5 cm long brown, papery cones. In some places, white spruces line the upper banks of the North Saskatchewan River, but the tree is also found on the slopes of the river valley and in patches near water sources on the prairie.

Less common native conifers are **jack and lodgepole pines** (*Pinus banksiana* and *Pinus contorta* var. *latifolia*), black spruce (*Picea mariana*), and tamarack (*Larix laricina*). Fort Saskatchewan is in the zone where jack and lodgepole pine ranges meet. These two trees hybridize with each other and can have similar appearances. Lodgepole pine is usually a tall, slender tree with a conical crown of tufted, emerald-green needles held in groups of two. It ranges west through the foothills and into British Columbia. Jack pine is the boreal cousin of lodgepole, and its shorter, denser stature reflects its northern, often snow-bound origin. Pines gave their name to Pointe-aux-Pins Creek. The City has planted thousands of pine trees in recent years to reforest nearby areas.

Black spruce and **tamarack** are species adapted to wet, cold, poorly drained ground like muskeg. Black spruce has short, bristly, dark green needles and grows to become a thin, spindly tree with a distinctive "club top" resembling the head of a matchstick. Tamarack is a member of the larch family, a group of deciduous conifers. It carries its soft, light green needles on stubby whorls of 15-20 needles each. In autumn, its foliage turns bright yellow before dropping.



Aspen



Balsam poplar

Common deciduous trees

Deciduous trees are much more numerous in Fort Saskatchewan's natural areas. Indigenous species in the area include **paper birch** (*Betula papyrifera*), from which the area's nehiyawak name waskwayâhtikispatinaw (birch hills) derives. Cree elders observed for the Urban Forest Plan that birch has been lost from the landscape over time, likely due to the impacts of colonization and development. Birches are still found in some of the community's natural areas. Superficially, birch can look like aspen – having whitish bark marked with dark callouses and light green foliage. However, paper birch's prize bark comes in various colours, from white to cinnamon brown or light pink, and naturally peels back from the trunk in fine sheets. Its leaves have serrated edges, compared with aspen's smooth, heart-shaped foliage.

Aspen (*Populus tremuloides*) is the most common tree in Fort Saskatchewan. The parkland natural region is where great aspen forests meet the prairie, creating a complex environment of forest glades and open meadows. Aspen is a clonal species: the trees above the ground can be the third, fourth, fifth, or hundredth generation produced by a single underground network of roots. An aspen clone in Utah named 'Pando' is the largest-known living organism, having an estimated weight of 6,000 tonnes and an age of 80,000 years. In Fort Saskatchewan, aspen is readily found in parks, natural areas, residential yards, and patches in farmland.

A close relative of aspen, **balsam poplar** (*Populus balsamifera*) is commonly seen in the river valley and around creeks and draws. Tolerant of flooding, poplars can achieve great heights along Alberta's rivers, where their furrowed, grey bark and shiny arrow-shaped leaves are often seen. Poplar is a medicine tree – it produces compounds that are natural relievers of pain and inflammation. Its sweetly scented but sticky buds are the aroma of spring in Fort Saskatchewan's riparian areas.



Introduced species in natural areas

Colonization and trade have brought several more tree species to Fort Saskatchewan, some of which are now established in forested natural areas. The most prevalent of these are **box elder, also called Manitoba maple** (*Acer negundo*), and **American elm** (*Ulmus americana*), both of which originate from further south and east in North America. These tree species arrived in Fort Saskatchewan several decades ago, with box elder being planted in the Edmonton area since the 1870s. Box elder is now well established in forested natural areas, displacing indigenous species like birch and spruce. American elm is slower-growing and less threatening to native ecosystem structure. Often planted as a shade tree by early twentieth century farmers, an American elm over 1 metre in diameter found during field work for the Urban Forest Plan was the largest tree (by circumference) observed in Fort Saskatchewan.



American elm boulevard planting



4.1.1.7 FOREST STRUCTURE

Regardless of their species composition forests in Fort Saskatchewan are generally younger than 75 years. During field work, a tool called an increment borer was used to collect a cross-section of tree rings to count the tree's approximate age. Of sampled trees, no tree older than 50 was found, although since not all natural areas were sampled the possibility of older forests remains in Fort Saskatchewan. Aspen clones could be substantially older than the ring count on individual trees (or "sprouts") from a shared root system (read more about aspen clones in the feature above).

Forest structure changes as trees age. In forests of western Canada, natural disturbances, like wildfire, flooding, or wind and icestorms, are usually responsible for allowing a new forest to germinate. Following severe natural disturbance, most forests start as dense, rapidly growing thickets. Eventually, trees grow to the point where they compete for light, water, or other resources, initiating a process called stem exclusion, where the death of smaller, weaker trees thins the forest. This allows the surviving trees to continue growth. Tree species with adaptations for living in shade or making the best of limited resources can grow in the understory of the developing forest even as stem exclusion occurs among the fastest-growing species.

As time passes, forests may develop several distinct layers, creating a complex structure of living and dead trees that offers the widest variety of forest habitats. Even young forests with simpler structures can provide critical habitats for specific wildlife. Although competition between trees helps create forest ecosystem structure, trees can also share resources with the ecosystem via complex underground networks of fungi called mycorrhizae. These forces of competition and cooperation help generate and sustain the forest's ecosystem value.

The LiDAR analysis allows us to estimate the height and size distribution of trees in forested natural areas to categorize simple forest structures, called "successional stages". Since field sampling did not reveal significant forests of old trees, only two stages are found in the city's forested natural areas:

- Sapling forests are young forests, not yet closed-in, so no significant mortality has occurred within a cohort, or "generation", of trees.
- Young forests follow the sapling stage and represent the beginning of mortality within a generation.

Young forests gradually transition to become mature and old forests, neither of which were found in Fort Saskatchewan. Young forests have been split with LiDAR canopy mapping into "short" and "tall" subtypes, reflecting the average height of the canopy trees and helping identify taller stands where forests are likely to be more highly developed in structure.

Sapling forests comprise 4.5 hectares of the city's forested natural areas, while tall young forests provide 34 hectares of canopy. Most of Fort Saskatchewan's forests are short young forests, or forests where some mortality has begun, but trees remain less than 12-15 m in height. 255 hectares of our forested natural areas belong to this type, shown in **Figure 19**. The most complex forests are scattered throughout the city, including forest patches in the southwest, downtown, and northeast/industrial areas.



Figure 19. Forest “successional stages” or structure types present in Fort Saskatchewan’s natural areas.



Sapling



Young Forest Short



Young Forest Tall

4.1.1.8 FORESTED NATURAL AREAS MANAGEMENT

Forested natural areas occur across the city on private and public property. Of all the forested natural areas in the city, 162 hectares (55%) are on private property, mainly in industrial and agricultural areas (**Figure 20**). Almost 131 hectares (45%) are City-managed, primarily occurring in parks (39%) with small areas on other City property (2%) or in the portion of road rights-of-way passing

through natural areas (3%). Less than 1% of forested natural areas occur on institutional property, such as land owned by the school district. Almost all forested natural areas within the urban area occur on City-managed property, giving the City considerable responsibility for stewarding this component of the urban forest.



Figure 20. Forested natural areas categorized by management responsibility.

Forested Natural Areas by Ownership

- City-managed
- Private
- Other public land

4.1.1.9 FOREST CONDITION

A few key forest health issues were identified during field visits conducted in the development of this plan:

Ground disturbance: Ground disturbance of some forests in the city was assessed during field work for the Urban Forest Plan. Only three sites – two in the Interpretive Forest and one in upper Ross Creek – were found to have substantially “natural” soil structure and understorey species composition. All other sites visited in forested natural areas showed some unnatural disturbance, such as erosion from trails (whether unauthorized or official) or cover of non-native or invasive species. Most sites were classified as “semi-disturbed” and showed a mixture of intact native ecosystem structure and composition with disturbed areas. Just two sites visited were mostly disturbed. Areas of high ground disturbance include the lower Ross Creek drainage, where unsanctioned trails have caused erosion in the riparian area. Unauthorized uses of forested natural areas include trail building and dumping of household waste. The nature of unauthorized uses makes reporting on and enforcing environmental protection difficult.

Invasive species and other forest health concerns: Invasive species are non-native species that, when introduced to an ecosystem, rapidly take over resources in the environment. The result of species invasion is often a loss of ecosystem structure or function, including a loss of native biodiversity. In Fort Saskatchewan’s forested natural areas, introduced species can include established tree species like box elder (*Acer negundo*), which have colonized many sites with erosion and several riparian areas. Box elder forms a dense thicket, with heavy shade reducing the presence of native understorey plants, including many members of the nehiyawak seven sacred canopy layers like wild strawberry, hazelnut, sweetgrass, and twining honeysuckle. Other plants like Siberian peashrub and Russian olive show recent invasive potential, particularly in transitional environments at the edge of forests and meadows, along disturbed agricultural lines, and in areas of poor site quality. These and many other plants listed by the Invasive Species Council of Alberta are potential threats to the parkland region’s prairies and forested natural areas.



Box elder, or Manitoba maple



Siberian peashrub

Invasive species also include new insects, fungi, or other life forms with similar potential to disrupt ecosystem structure. Changes in climate and ecosystem structure brought about by humans also allow native species to become disruptive if they are well-positioned to take advantage of environmental disturbance or human management of forests. Black knot disease, first described in Pennsylvania in the 19th century, is now a common disease in Fort Saskatchewan and the region's natural areas, causing a dark-coloured and swollen canker to form on stems and branches. Infections were found during field work in several areas, including West River's Edge Park. Damage from the disease is usually cosmetic, although it can cause tree dieback or regeneration failure in severe infection centres.

Yellow-headed spruce sawfly, a defoliating insect of native and ornamental spruce, targets young trees. It is responsible for the scraggly and moth-eaten appearance of some white spruce in the city's parks and gardens. Repeated feeding by the sawfly can kill the young trees, leaving "growing space" open for other, sometimes non-native, species to occupy.



Black knot disease



Russian olive



Yellow-headed spruce sawfly

4.1.2 CITY-OWNED URBAN TREES

As of March 2023, Fort Saskatchewan's Parks Department maintained an inventory of 15,220 street and planted park trees (**Figure 21**). The inventory includes information about each tree's

species, genus, and diameter at breast height (DBH). New trees are added to the inventory annually, and the data about existing trees is updated when staff visit the trees for regular pruning.

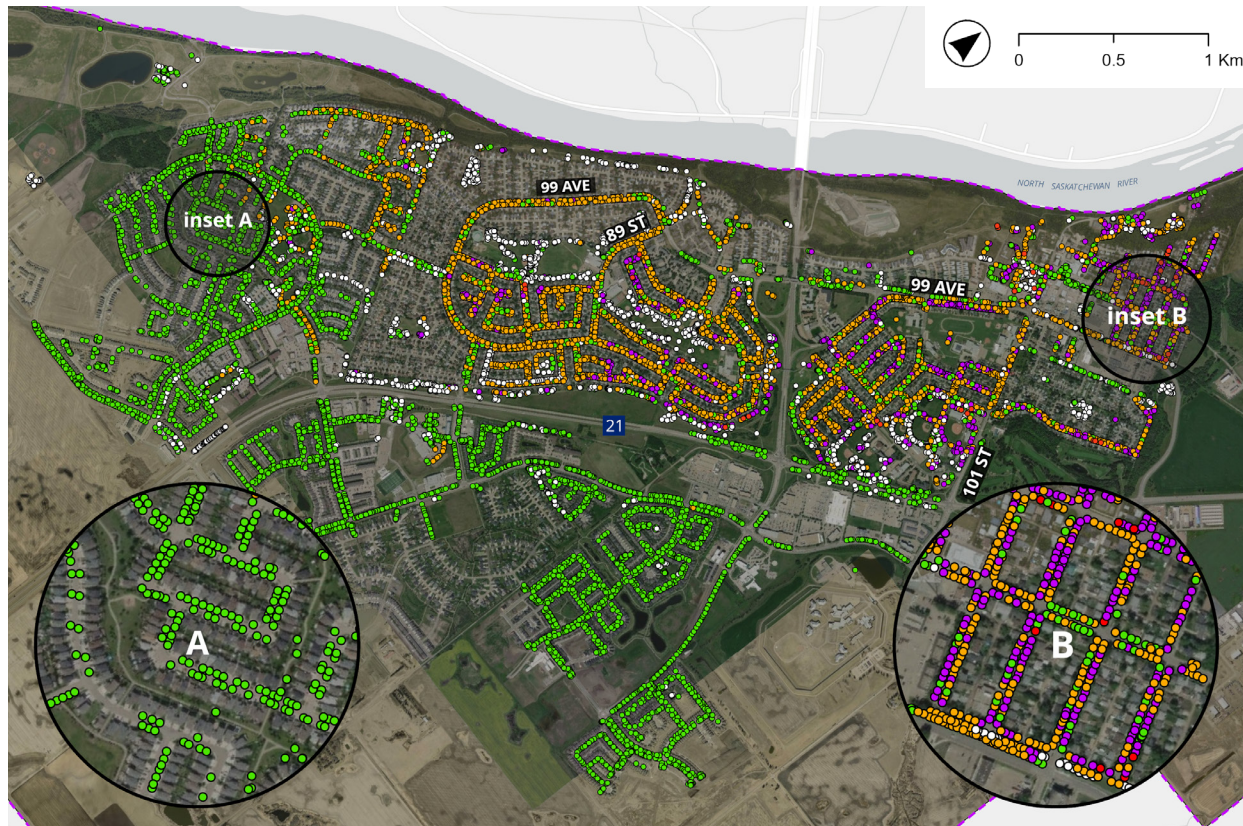


Figure 21. Fort Saskatchewan's tree inventory by size class.



Although the inventory provides good data about urban trees managed by the City, the data has some limitations. The inventory doesn't include some of the more recently planted trees in newly developed areas (approx. the last 3 years) or some planted park landscape trees. There are 1,131 trees (7.5% of the inventory) without DBH information and 1,622 (11% of the inventory) park and boulevard trees that were inventoried using inaccurate DBH measurements. These 2,753 trees have been excluded from the analysis in the sections below.

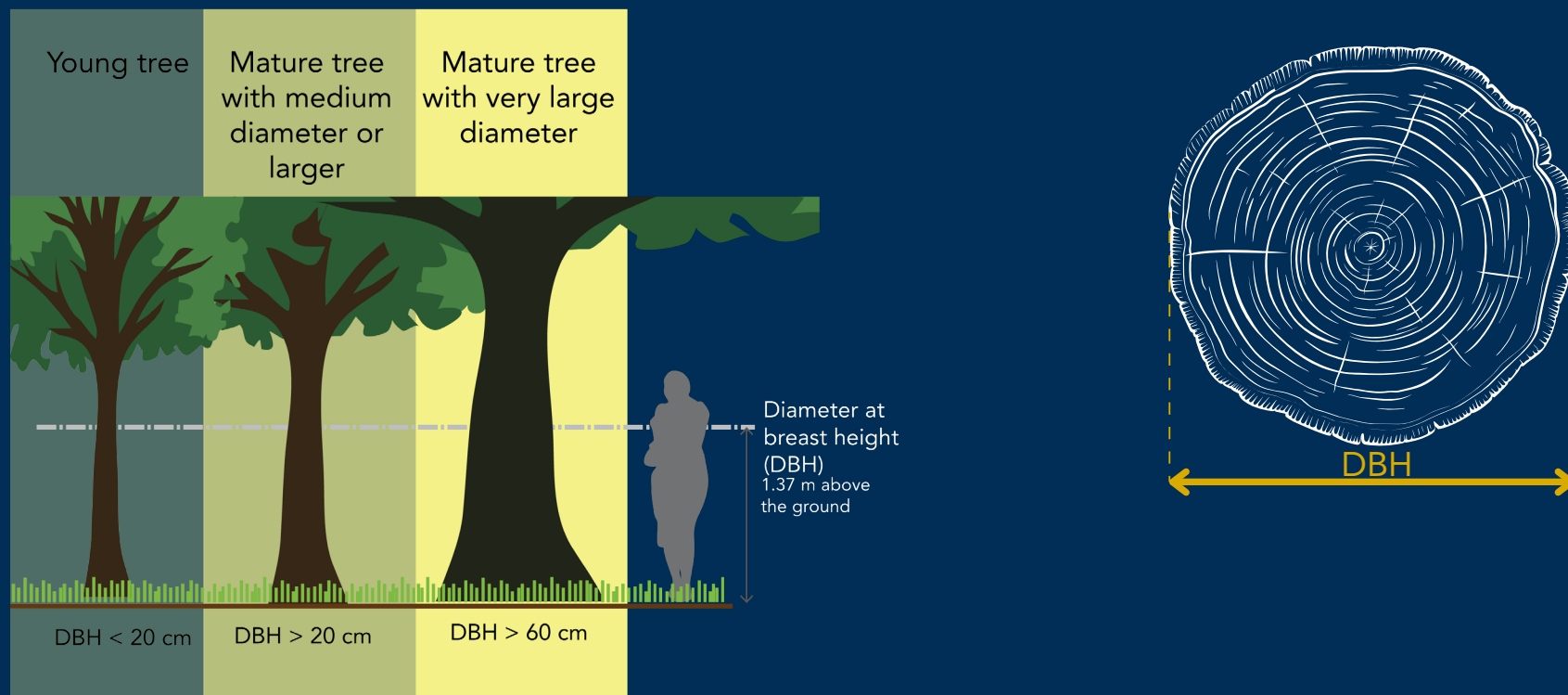
4.1.2.1 SIZE DIVERSITY

The inventory's diameter at breast height (DBH) allows us to assess size diversity across the city and can give us a general idea of age diversity (larger trees tend to be older, although this varies by species and growing conditions). As shown in **Figure 21**, tree size varies geographically across the city. Newer developments are populated with young trees (**Figure 21**, inset A), while size

diversity increases in the older downtown neighbourhoods, which also have the highest proportion of older trees (**Figure 21**, inset B). About 53% of trees in the inventory are less than 20 cm in diameter, with an almost negligible number of trees larger than 60 cm in diameter (0.3%).

What does diameter at breast height (DBH) represent?

Diameter at breast height (DBH) describes the diameter of a tree trunk taken at a standard height of 1.37 m above the ground. The graphic below provides an overview of what different size classes look like:



Research suggests that the ideal age distribution in tree inventories is 40% of trees with a DBH of less than 20 cm, 30% between 20-40 cm, 20% between 40-60 cm, and 10% greater than 60 cm²¹. This stepped distribution ensures a healthy and stable tree population as young trees replace older dying trees. **Figure 22** shows that Fort Saskatchewan’s inventory does not currently meet this distribution, with 53% of trees below 20 cm, 37% between 20 and 40 cm, 10% between 40 and 60 cm and 0.3% above 60 cm. Fort Saskatchewan’s tree inventory is mostly made up of trees less than 20 cm in diameter, indicating a growing and maturing population of public trees into the future.

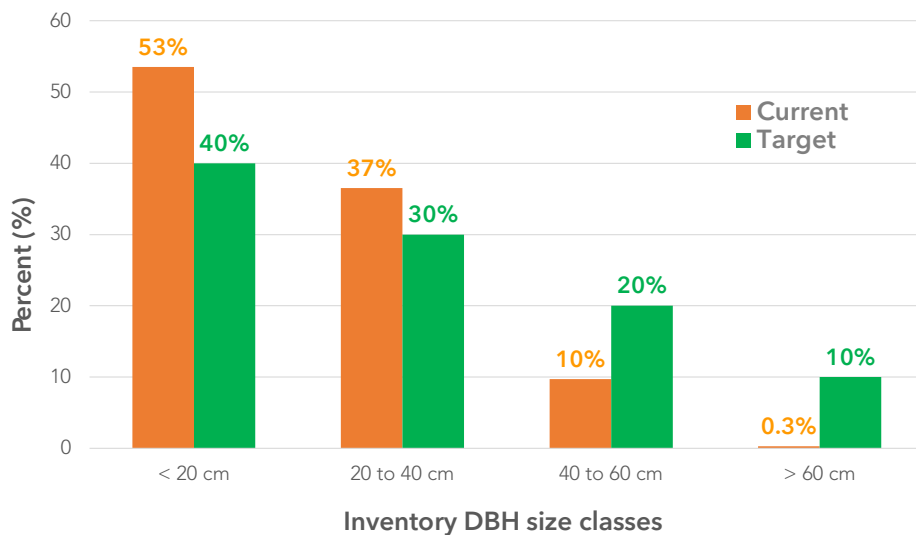


Figure 22. Current tree inventory DBH size distribution and target percent size distribution.

4.1.2.2 SPECIES DIVERSITY

Tree species diversity is integral to urban forest resilience to pests and diseases. The Edmonton Metropolitan Region’s Guide to Urban Forest Management in a Changing Climate proposes a genus diversity target adapted from the literature of no more than 20% of any genus in a City’s tree inventory²². In the City’s current inventory, 74% of the tree population is dominated by three genera: ash (39%), elm (24%), and spruce (11%), two of which are higher than the recommended 20%. At the species level, green ash (*Fraxinus pennsylvatica*, 39%) is the most widespread tree species present in the tree inventory, followed by American elm (*Ulmus americana*, 22%), and white spruce (*Picea glauca*, 5%) (Figure 23).

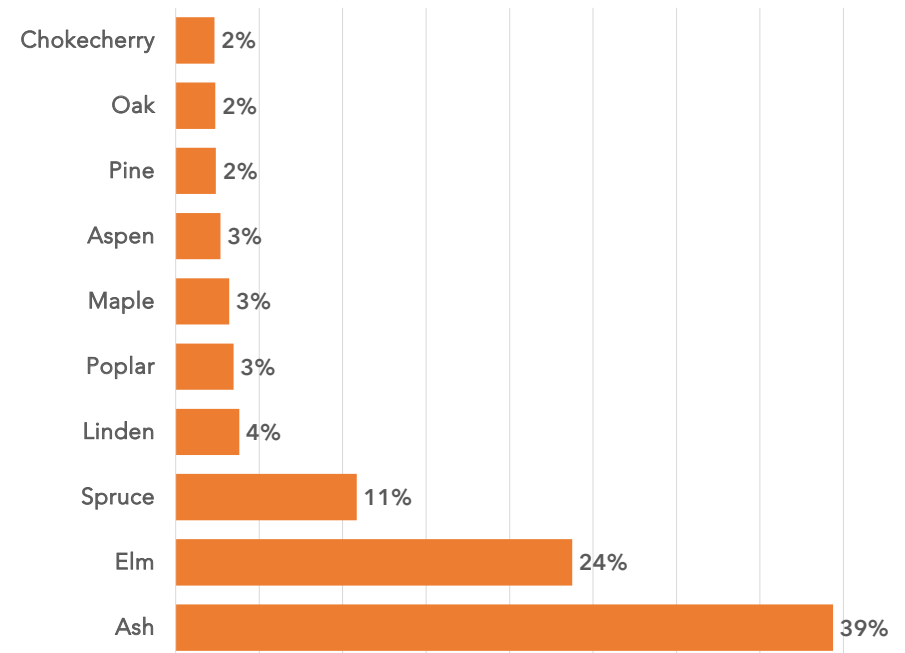


Figure 23. Dominant genera present in the tree inventory in Fort Saskatchewan.

4.1.2.3 TREE REMOVALS

City trees can require removal for a variety of reasons. In Fort Saskatchewan, some of the common reasons for tree removal include fungal diseases such as black knot, poor site and soil conditions, storm and salt damage, extended periods of summer drought, and damage. Green ash, black ash, linden trees, and

Schubert chokecherry are the City trees that have been removed the most in the past decade. The number of City tree removals in the past decade has ranged from 20 to 80 trees a year, depending on the year (**Figure 24**). Tree removal data from 2017-2020 was not available for analysis.

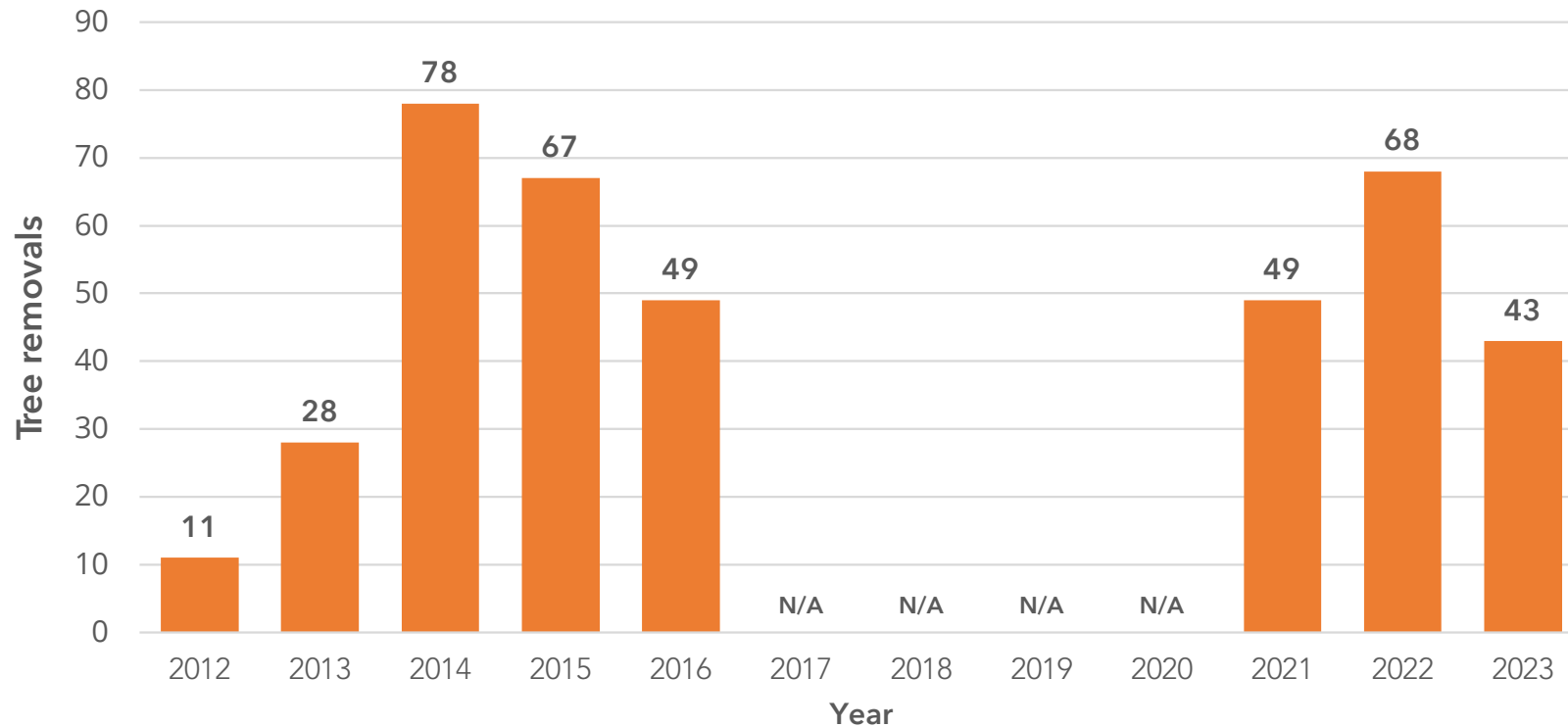


Figure 24. City tree removals (2012 - 2023) in Fort Saskatchewan.

4.2 CITY URBAN FORESTRY PROGRAM

The City of Fort Saskatchewan manages the urban forest with policies and bylaws that guide the planting, protection, and maintenance of public and private urban trees and natural areas. The City dedicates a team and budget to planting and managing

City trees. This section summarizes the program and policies in place and provides a report card that compares the City's program and policies with urban forestry best practices.

4.2.1 RESOURCING

Fort Saskatchewan's Tree and Shrub Maintenance and Horticulture team manages the City's urban forest. This program is nestled under the Public Works Department. The Tree and Shrub Maintenance and Horticulture team comprises in-house staff and contracted crews. Staff in the planning and engineering departments are also involved in subdivision and development

applications review and inspection, including the review of yard and street tree planting requirements. The Tree and Shrub Maintenance and Horticulture team's efforts are primarily focused on urban trees in streets and landscaped parks. Their team, resources, and responsibilities are outlined below.

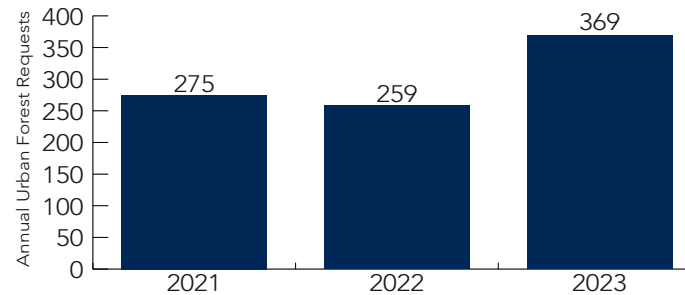
Public Works Department: urban forest resources

2024 Staffing	<p>Parks Services has a total staffing allocation of 33 FTEs. The Tree and Shrub Maintenance and Horticulture program has 6 FTE allocated, which includes:</p> <ul style="list-style-type: none"> • 0.7 FTE allocation for Management, coordination, administrative support, project planning and management • 5.3 FTEs for field staff including foreman, arborists and labours who maintain City street trees, landscaped park trees, trees along trails, shrub beds and general horticulture.
2024 Annual Operating Budget	<p>2024 Tree and Shrub Maintenance and Horticulture program budget is a net of \$610,000 of which:</p> <ul style="list-style-type: none"> • ≈\$490,000 is spent on staff salaries and wages • ≈\$60,000 is spent on horticulture • ≈\$30,000 is spent on tree planting • ≈\$25,000 is spent on watering • ≈\$21,000 is spent on tree pruning • ≈\$20,000 is spent on contracted tree pruning. <p>The program has a revenue allocation of \$36,000 that offsets some of these costs. The net cost of the program is \$610,000.</p>
Core services	<ul style="list-style-type: none"> • New tree planting + establishment • Established tree maintenance • Tree inspection + removal • Integrated pests and disease management • Horticulture.

Public Works Department: urban forest resources

Service requests
(calls from
community
members)

Service requests for the urban forest team have primarily been for tree removals, black knot management, tree pruning for sightline issues, or tree inspections for potential hazards. In recent years, the urban forest team has handled the following volume of service requests:



Tree pruning is generally on a 7-year cycle. With the growth of the community and the large amount of young trees (< 20 cm) coming up for maintenance, as shown in **Figure 21**, there will be a need to

adjust resources or service levels to meet demands of community growth and additional tree planting activities.

4.2.2 POLICIES

Urban forest management in Fort Saskatchewan is enabled and guided by provincial, regional, and municipal bylaws and policies, including:

- Enabling provincial legislation: the Municipal Government Act and the Alberta Land Stewardship Act set the rules for municipal governance and the framework for land use and development.
- Guiding policies: the Edmonton Metropolitan Region's Growth Plan and Municipal Development Plan (Our Fort. Our Future.) set the high-level vision and guide the approach to urban forest management.

- Bylaws and policies: many bylaws and City policies frame how the City regulates publicly owned trees are protected and managed and tree planting or protection requirements during subdivision or development.
- Other plans: documents such as the Community Sustainability Plan influence how the urban forest is managed through their relevant goals and actions.

The following page provides more details on how the Municipal Development Plan, bylaws, and policies regulate trees on City land and on private land during subdivision and development.

KEY

Public

Private



City park and street trees

Private yard trees

Planting new trees

The **Tree Installation & Maintenance Policy** specifies standards for City tree planting and tree maintenance for newly planted trees. The **Engineering and Servicing Standards** specify how boulevards should be built and street trees planted; new street trees planted by builders must be maintained for two years before being transferred to the City.

The **Tree Installation & Maintenance Policy** requires all new residential or commercial subdivisions to plant one tree per lot. The **Land Use Bylaw** requires developers in new multi-family subdivisions to plant one tree per 15 m² of landscaping in parking areas.

Protecting and replacing trees

The **Parkland Bylaw** prohibits the cutting, removal, or planting of park or street trees without approval. For new subdivision, policies from the **Municipal Development Plan** state that the City seeks a minimum of 10% municipal (i.e., park) and school reserve dedication plus environmental reserve (i.e., natural areas).

The **Land Use Bylaw** credits tree planting requirements on properties that retain a mature tree. For natural areas, policies from the **Municipal Development Plan** recommend that the City protect environmentally sensitive areas by acquiring environmental or municipal reserve or easements during subdivision. The **Land Use Bylaw** requires building and structure setbacks and can prohibit tree removal from the banks of water bodies and watercourses.

Maintaining trees

The **Tree Installation & Maintenance Policy** specifies regular tree maintenance of established street and planted park trees, Dutch Elm Disease detection and prevention, stump removal, and level of service for responding to requests for service.

The Province of Alberta implements an **Elm pruning ban** from April 1 to September 30 to avoid spreading the Dutch Elm Disease.

Opportunities for improvement

- Modernizing the Parkland bylaw to better define damage and enforcement measures
- Requiring better protection for City trees during construction
- Clarifying levels of service for the maintenance of trees in natural areas

- Opportunities to require the planting of more trees in new developments
- Opportunities to obtain more information about and prioritize environmentally sensitive areas for acquisition on new subdivisions

4.2.3 REPORT CARD

Fort Saskatchewan’s urban forest report card assesses the City’s urban forest management program, including relevant policies, procedures, and partnerships, against a set of criteria developed for sustainable urban forests customized to suit the local context and needs. The criteria and indicators used are based on the framework for sustainable urban forest management prepared by Leffe (2016)²³, as well as other additional references such as relevant academic research and guidelines^{24,25,26,27}.

The report card below summarizes the assessment of each indicator in Fort Saskatchewan’s current program against an optimal outcome. The criteria are associated with the core urban forest services: planning, planting, management, protection, and partnership. It provides a comprehensive assessment of areas where the City is performing well and where the Urban Forest Plan should guide efforts for further improvement.

Fort Saskatchewan’s urban forest program in 2023 rates fair, approaching good, using this criteria and indicators approach. The Urban Forest Plan includes an action plan which is tied to the evaluation found in this report card. The implementation of the action plan is intended to progress the City’s urban forest towards a good to optimal ranking.



Criteria	Rating
Plan	
General awareness in the community and across City departments of the value of the urban forest	Fair
Interdepartmental and Municipal agency cooperation on urban forest strategy implementation	Good
Clear and defensible urban forest canopy assessment and goals	<i>In Progress</i>
Tree canopy cover relative to established canopy targets	Pending Assessment
Municipality-wide urban forest management plan	<i>In Progress</i>
Municipal green infrastructure asset management	Fair
Municipal-wide biodiversity or greenspace network strategy	Fair
Municipal urban forest management program capacity	Fair
Urban forest funding to implement a strategy	Fair

Criteria	Rating
Protect	
Regulating the protection and replacement of public trees	Poor
Regulating the conservation of sensitive ecosystems, soils or permeability	Poor
Internal protocols guiding tree protection or sensitive ecosystem protection	Poor
Standards of tree protection and tree care observed during development	Fair
Cooperation with utilities on protection of public trees	Poor

Criteria	Rating
Plant/Grow	
City tree planting program and planting targets	Fair
Development requirements to plant trees on private land	Good
Streetscape specifications and standards for planting trees	Good
Equity in planting program delivery	Poor
Forest restoration and native vegetation planting	Fair
Stock selection and procurement in cooperation with nurseries	Fair
Ecosystem services targeted in tree planting projects and landscaping	Fair
Manage	
Tree inventory	Good
Knowledge of trees on private property	Good
Natural areas inventory	Poor
Age diversity in the inventory (size class distribution)	Good
Species diversity (public tree inventory)	Poor
Species suitability for local area	Good
Publicly owned tree condition	Fair
Maintenance of public, high-visibility trees	Good
Extreme weather response planning	Poor
Tree risk management	Good
Pest and disease management	Good
Waste biomass utilization	Fair
Partner	
Citizen involvement and neighbourhood action	Fair
Involvement of large private and institutional landholders	Good
Urban forest research	Poor
Regional collaboration	Fair



SECTION 5.0

COMMUNITY VALUES

Engagement for this Plan was carried out through two processes: a public engagement component and an Indigenous engagement component. It began in a Pipe Ceremony on June 15, 2023, with Pipe Carriers, Elder Jesse Morin and Lloyd Cardinal.

5.1 PUBLIC ENGAGEMENT

Public engagement was held between May and late July 2023 to develop the plan's vision, principles, and goals. The engagement was also aimed at understanding community support relating to the planting, protecting, managing and stewarding of the urban forest in Fort Saskatchewan. It included an online survey and mapping tool, booths at community events and pop-ups at community centres, two community open house workshops, and two targeted workshops with members of the local industries, environmental, and Indigenous groups.

5.1.1 LONG-TERM VISION

The long-term vision for Fort Saskatchewan's urban forest was centered around growing the city's tree canopy in an equitable manner across neighbourhoods. Respondents expressed a desire for Fort Saskatchewan to be known as a city with the most trees per capita in Alberta and Canada. Respondents' vision included an urban forest that offers recreational opportunities within natural areas, being mindful not to contribute to environmental degradation of the urban forest. Respondents also highlighted the importance of protecting large, healthy trees and making the urban forest more resilient to climate change. Finally, respondents favoured a proactive approach to tree management, turf naturalization into native prairies, and opportunities for education on the urban forest.

5.1.2 PROTECTING

When it comes to protecting the urban forest, most respondents agreed the City should focus on protecting parks and natural areas. Respondents felt strongly that the City should play an important role in protecting Ross Creek and Turner Park, including plants such as sage and sweetgrass, which are important to Indigenous community members. Respondents also agreed that the City should protect trees on publicly owned lands and streets. There was less consensus on the City's role in protecting trees on private property. Finally, respondents raised concerns regarding tree losses due to new developments and that developers should be required to protect or maintain existing trees (**Figure 25**).



Community open house (June 20, 2023)

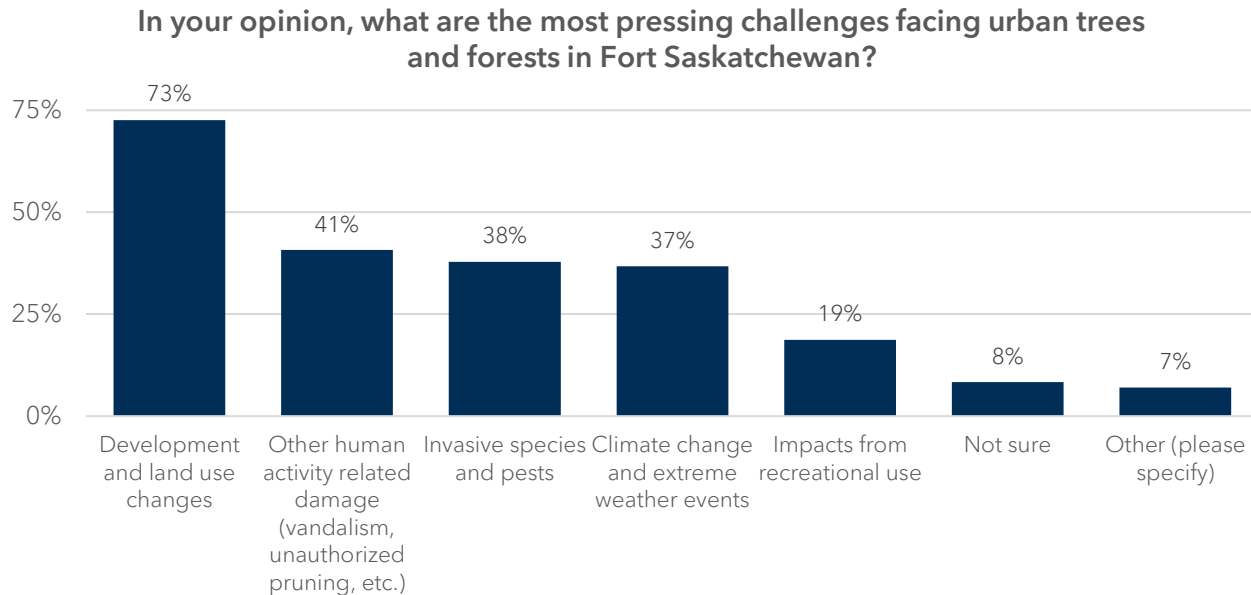


Figure 25. Survey responses on the challenges facing urban trees and forests.



Community open house (June 21, 2023)

5.1.3 PLANTING

Respondents expressed interest in the City planting more trees and larger caliper trees along boulevards. The “3-30-300” metric was highlighted as an aspirational goal for Fort Saskatchewan. On private property, the public was broadly in favor of incentives for residents to plant trees on their property and regulations requiring

new developments to plant a tree for every residential unit built. Planting more edible and fruit trees and more food forests was also of interest to the community. Respondents prioritized planting hardy tree species resistant to black knot and expressed the need to enhance biodiversity in the city.

5.1.4 MANAGING

When asked about their satisfaction with the City’s urban forest services, respondents were most satisfied with storm response, tree debris cleanup, tree pruning, and tree planting and replacement (**Figure 26**). Respondents were unaware the City provided services around public education, dangerous tree removal and pest and disease control. The services with the most dissatisfaction were pest and disease control (specifically surrounding Black Knot) and public education. The City moving to a more proactive approach to risk management of urban forest was expressed as desirable by respondents.

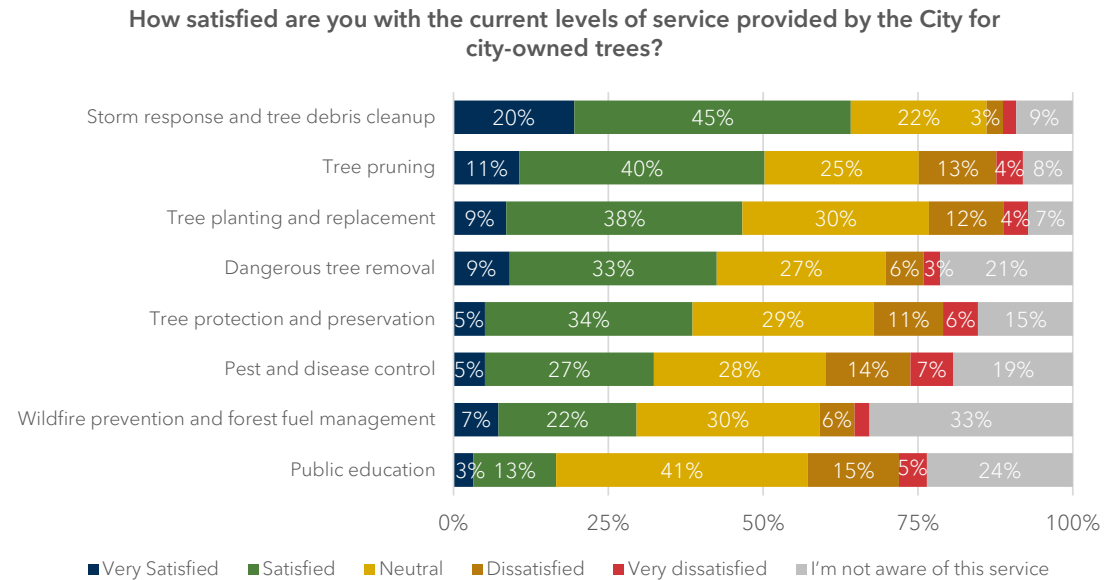


Figure 26. Survey responses on the satisfaction with urban forest services provided by the City.

5.1.5 STEWARDING AND PARTNERING

Respondents expressed a desire for more public education about the urban forest and more readily available information on the services provided by the City. Respondents were eager to learn more about native tree species selection for planting, how to prune and water trees, and pest and disease control (**Figure 27**). Additionally, respondents welcomed more partnerships with industry, community groups, schools, and a youth educational program.

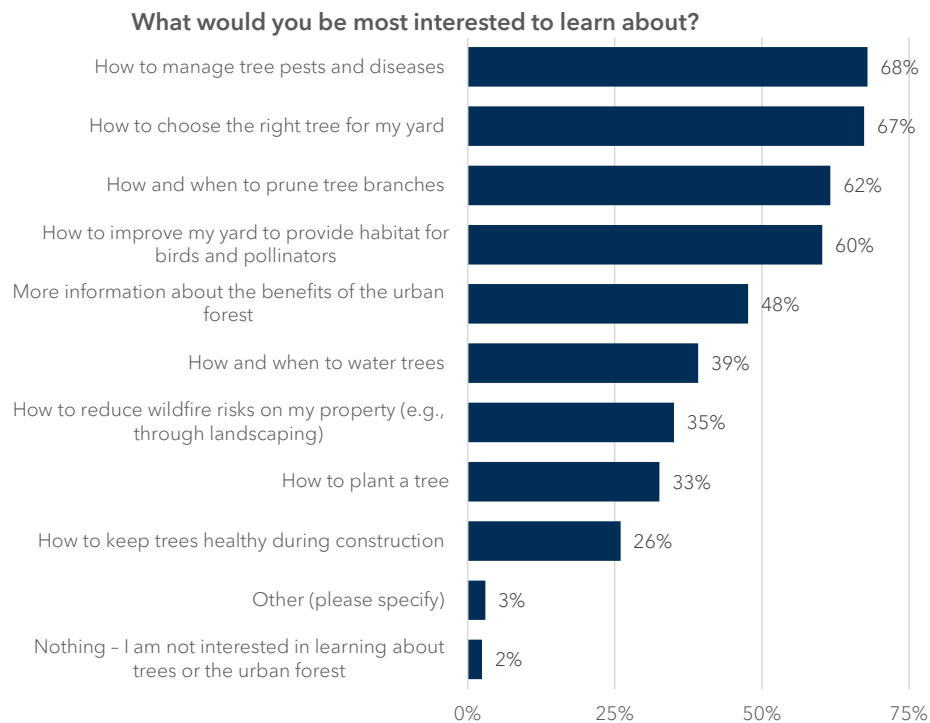


Figure 27. Survey responses on topics respondents would like to learn more about.





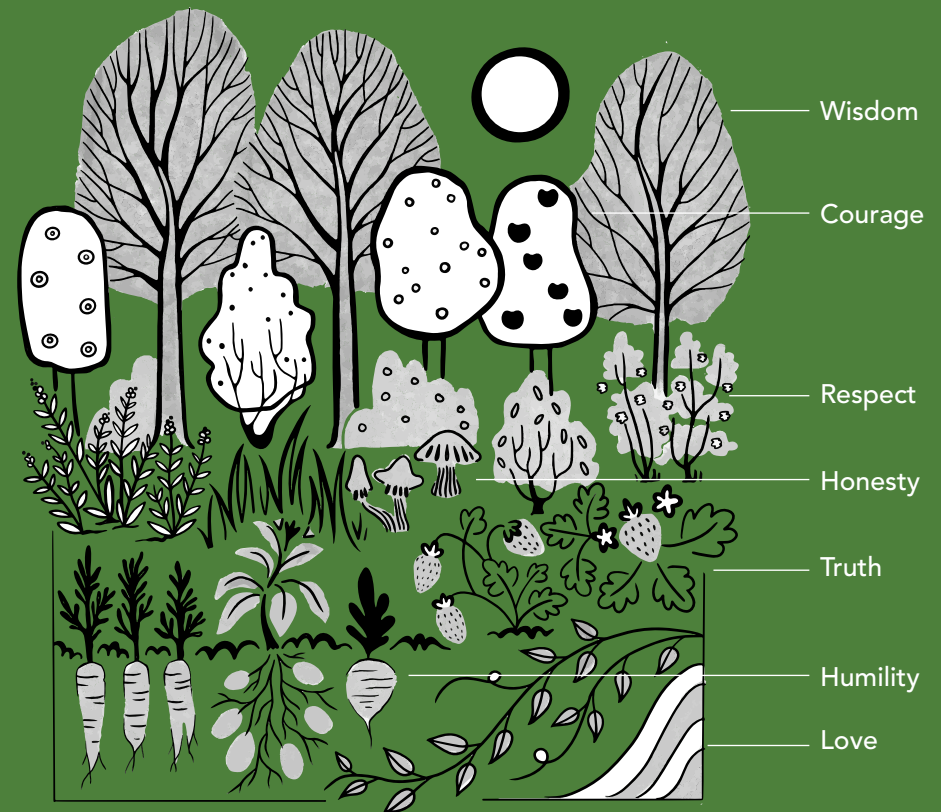
5.2 INDIGENOUS ENGAGEMENT

Indigenous engagement occurred parallel to public engagement between June 2023 and August 2023. The method for engagement with Indigenous community members of Fort Saskatchewan was keeoukaywin: The Visiting Way, an Indigenous research methodology grounded in Cree and Métis ways of knowing and being. Using keeoykaywin in practice means that all activities are grounded in reciprocity, co-lead dialogue, and prioritize protocol.

The keeoukaywin resulted in eleven recommendations to integrate Indigenous knowledge within the Western process of creating the Urban Forest Plan. These fourteen recommendations were developed in close relation to the seven layers of the food forest that are also aligned with the seven sacred teachings in the nehiyawak culture and other Indigenous cultures (Section 2.2). The 14 recommendations from the Indigenous engagement are listed below.

The recommendations listed below come from pipikwan pêhtâkwan's "Indigenous Engagement – Interim Report" and "'A Seed is an Idea, and an Idea is a Seed' – Traditional Indigenous Knowledge" reports:

- #1** Identify and outline a scope of practice for when a land breaking Ceremony would be held in the Municipality. These Ceremonies gain consent from Mother Earth, as well as tell our intentions to the other societies, specifically where we seek to remove the standing people.
- #2** Create education materials that help people walking through the urban forest areas and be able to identify different trees. They can use that knowledge to greet trees as they walk past.
- #3** Protection in the plan should include the protection of the layers of the earth, such as a topsoil protection strategy. The traditional oral knowledge in these stories aligns with What We Heard from Indigenous engagement on the Plan.
- #4** Include birch trees in the Plan to ensure that native plants and animals are able to thrive in their intended habitat. This action allows the land to be reacclimated and to return to a more holistic urban forest.
- #5** (In relation to the Canopy of **Wisdom**) We must monitor this layer with great effort and ensure that these standing people have a strong protection plan against invasive species or being removed for development.





#6 (*In relation to the Canopy of **Courage***) We must have a strong fruit bearing layer if the Plan is to be courageous and step outside the box. Fruit trees may be more expensive to maintain, but have a large value to the mental, physical, emotional and spiritual health of a community.

#7 (*In relation to the Canopy of **Respect***) Special importance for a dynamic berry layer should be considered. Where possible, planting many berries side by side, can bring the value of respect into the plan and will also provide access to a dynamic food forest for community members.

#8 (*In relation to the Canopy of **Honesty***) The Plan should include community access to more spaces where people grow and nurture types of food like squash, pumpkins, lettuce, and cucumbers.

#9 (*In relation to the Canopy of **Truth***) Sacred space to grow medicines like fungi, sweetgrass, sage, and strawberry would benefit many community members, but would hold a special place for Indigenous community members who may struggle to find these medicines growing naturally in Fort Saskatchewan any longer.

#10 (*In relation to the Canopy of **Humility***) Education that supports growing and harvesting from this root vegetable layer (e.g., potatoes and carrots) is important to community understanding. Ensuring that policies are structured to empower individuals to explore this canopy layer, not shy away from it. For example, possible restrictions on where this layer can be grown should be evaluated.

#11 (*In relation to the Canopy of **Love***) The Plan should include guidance on maintenance for this layer. Often vines and creepers have a lot of love and spread themselves quickly. They also can become the home for many invasive species and a protection plan for this layer would benefit the forest throughout all areas.

#12 To advance the efforts of reconciliation in Fort Saskatchewan, we recommend further investigation into Indigenous Peoples history in Fort Saskatchewan, prior to any changes in the current Turner Park area. Including an environmental scan completed by an Indigenous environmental scientist or agency.

A people history review should include:

- Identifying the exact homestead location for Mr. Turner,
- Discover any potential timber rights that have previous existed,
- Identify areas that are likely to have Indigenous artifacts,
- Identify traditional plants and medicines that could be lost.

#13 Rather than planting boulevard trees individually, at a set interval apart, a successful Plan will plant trees together in clusters so they can support one another.

#14 To create a collective of community members and partners who can inform the planting goals annually. A planting plan designed to be longer term will ensure Mother Earth can heal and support all other plants in what they need to thrive.

SECTION 6.0

THE URBAN FOREST OF THE FUTURE

This section provides an overview of the vision, goals, and canopy cover target that the implementation of this plan should achieve.

6.1 VISION

Fort Saskatchewan's urban forest vision was developed with input from everyone who participated in the public and Indigenous engagement, Council, and City staff. The long-term vision describes how the urban guides the implementation of the action plan by describing the outcome it seeks to achieve.

VISION:

Fort Saskatchewan's resilient and expansive urban forest supports community well-being, enhances biodiversity, and seamlessly weaves nature into every neighbourhood. Our community plants, nurtures, and grows the urban forest with guidance from the seven sacred teachings of wisdom, courage, respect, honesty, truth, humility, and love from the nehiyawak and other Indigenous cultures.

"A seed is an idea, and an idea is a seed."

– Elder Roy Bear, Chief of the Siksika Nation, sharing wisdom about the potential for the Urban Forest Plan to support not only tree planting but also to nurture and grow the urban forest with the community.



6.2 GOALS

The vision is supported by five goals that provide the framework for the Urban Forest Plan's action plan:

- GOAL 1.** Protect and grow urban trees for an equitable access to lush, tree-lined neighbourhoods
- GOAL 2.** Protect and restore natural areas to protect their cultural and historical importance, enhance their ecological value, and provide community access to the City's valued green spaces
- GOAL 3.** Manage the City's urban forest in accordance with best practices
- GOAL 4.** Partner with community members and organizations for urban forest management
- GOAL 5.** Monitor performance and adapt to changing circumstances

The following pages provide more details about what the plan intends to achieve with each goal and the specific opportunities and challenges it addresses.



6.2.1 GOAL 1: PROTECT AND GROW URBAN TREES FOR AN EQUITABLE ACCESS TO LUSH, TREE-LINED NEIGHBOURHOODS

The plan seeks to protect existing urban trees and plant more, particularly in areas with low tree equity and high proportions of vulnerable community members. Urban trees provide important benefits to residents and visitors and help connect natural areas

across the built environment. Soils are an important component in achieving better urban tree cover across the city, including protecting existing topsoils and ensuring urban trees have access to sufficient soil volume to be healthy and mature.

6.2.1.1 OPPORTUNITIES

Soil protection and management: The region is blessed with rich topsoils that can be lost through erosion or during new subdivisions if not protected adequately, as pointed out by Indigenous participants. The Regional Agriculture Master Plan highlights that soil should be recognized as a limited, non-renewable resource and managed accordingly. It emphasizes that soil management, including its reuse and recycling, should be considered as part of an area structure plan for greenfield areas. Implementing this plan can support the protection of the city's topsoil to help provide adequate growing conditions for urban trees, many of which currently struggle to survive in new street boulevards, likely because of inadequate soil.

Tree planting with new subdivision: The City already has many regulations in place to require the planting of yard and street trees in new subdivisions. The action plan proposes approaches to enhance tree planting requirements.

6.2.1.2 CHALLENGES

Challenging growing conditions: Trees in cities face various adversities associated with difficult urban growing conditions. In Fort Saskatchewan, tree mortality is exacerbated by soils with a high abundance of clay, a lack of nutrients in soils previously used for agricultural purposes, salt from roads, and poor monitoring of soils used subsequently to a new development. These challenges, together with climate change impacts like droughts and more frequent and severe extreme weather events, reduce the functional lifespan of trees, decrease the ecosystem services trees provide, and create a financial burden on the municipality. Furthermore, the cold and harsh winters in Fort Saskatchewan constrain the list of tree species that can thrive here.

Example of soil erosion
along informal trails.



Invasive species, pests, and disease management: Invasive species, pests, and diseases all pose ongoing threats to Fort Saskatchewan’s urban forest. While the City is already proactively managing or monitoring many pests and diseases, more have been detected by City staff in recent years. Climate change is anticipated to increase the number of invasive species, pests, and diseases that can survive in Fort Saskatchewan.

Protecting trees on construction sites: Working near trees can damage their trunk, canopy, or roots, which can compromise their health and survival. Yet, replacing the benefits provided by a mature tree takes a decade. Where possible, tree protection barriers or supervision from an arborist can minimize impacts on trees and maximize their chance of survival.

Planting in new developments: Fort Saskatchewan’s population has more than doubled in the last 20 years, from 13,824 residents in 2003 to 28,624 in 2023. Integrating trees on lots and street boulevards in new subdivisions is more challenging due to narrow lot sizes, smaller building setbacks, and competition for space in boulevards with driveways, utilities, and street furniture that often leave insufficient space for trees. The action plan seeks ways to maximize space for tree planting in new subdivisions.

6.2.1.3 STRATEGIES TO ACHIEVE THE GOAL:

- Strategy 1.** Improve policies, regulations, and processes for yard and street tree protection and planting
- Strategy 2.** Improve soil quality and topsoil protection
- Strategy 3.** Grow the urban forest to improve access and equity

Example of tree roots exposed during a construction project.



6.2.2 GOAL 2: PROTECT AND RESTORE NATURAL AREAS TO PROTECT THEIR CULTURAL AND HISTORICAL IMPORTANCE, ENHANCE THEIR ECOLOGICAL VALUE, AND PROVIDE COMMUNITY ACCESS TO THE CITY'S VALUED GREEN SPACES

Community members highly value natural areas as places to connect with nature and recreate. They are also very important to the Indigenous community members who provided input for this plan, either specific places with important history, or important species and medicines. The world is also facing an unprecedented biodiversity crisis that results from significant habitat loss and is compounded by the climate crisis. The plan seeks to improve the protection and support of the restoration of natural areas throughout the city and to balance the protection of ecosystems and culturally significant sites with community access for recreation and connecting with nature.

6.2.2.1 OPPORTUNITIES



Wealth of natural areas: Fort Saskatchewan has an extensive network of natural areas found along the kisiskâciwan-sîpî (North Saskatchewan River) and throughout the city. Those natural areas provide important habitat for the native fauna and flora.

Community and Indigenous knowledge: Many community members, Indigenous participants, and organizations hold important knowledge about Fort Saskatchewan's natural areas. Collaboration with those knowledge holders could improve the City's knowledge of its natural areas and support protection and restoration work.

Elders shared about the deep knowledge found in the land. Indigenous people who participated in the engagement on this plan felt that an Indigenous environmental scan of the area would result in significantly different outcomes than an environmental assessment done by non-Indigenous people. Bringing these two worlds together would offer a good opportunity to practice *etuptamunk* – two-eyed seeing.

6.2.2.2 CHALLENGES

Changing climate and invasive species, pests, and disease management: Climate change is changing ecosystems' growing conditions. Events such as more common and longer summer droughts are already impacting forests and many of their tree species. Invasive species, pests, and diseases all pose ongoing threats to Fort Saskatchewan's urban forest, which is also expected to be exacerbated by climate change. Ash trees have been stressed by ash leaf cone rollers (*Calaptilia fraxinella*) and Western ash bark beetle (*Hylesinus californicus*). While many invasive species are known to grow in the city's natural areas, few resources are available to monitor and manage them.

Erosion and damage from recreation: While recreational trails in Fort Saskatchewan's natural areas are an important community amenity, unauthorized trail development has led to erosion problems, and loss of understory vegetation in many places along the river valley and Ross Creek. The action plan seeks to support a better balance between providing access and protecting the city's natural areas.

Protection of natural areas in new subdivisions: Although the City has a few regulatory tools to protect forests along creeks or to acquire environmentally sensitive land in new subdivisions, those tools are often insufficient to protect natural areas. The ability of the City to require the protection of environmentally sensitive lands is limited by the powers granted to municipalities by the province. Still, the action plan explores options to improve the protection of natural areas in new subdivisions.

Saving black ash trees in Fort Saskatchewan

Black ash (*Fraxinus nigra*) was historically a common boulevard tree throughout the prairie provinces, selected and praised for its size, shape and fall color. Properly cared for, these trees are extremely beautiful and very long lived (up to 200 years). Black ash trees in Fort Saskatchewan have dwindled in numbers as environmental stressors increase their susceptibility to insect damage mainly from the Western ash bark beetle (*Hylesinus californicus*).

Beginning in the spring of 2021, a cultural control program was undertaken by the Horticulture Team to save the approximately 100 black ash trees left in Fort Saskatchewan. The program involved banding the trees with a sticky insect tape. The sticky tape prevents adult beetles from reaching the smaller upper branches of the tree to deposit their eggs, preventing branch dieback and reducing stress on the tree. The condition of the black ash trees has improved dramatically since 2021 as the number of beetles has been decreasing over previous seasons.



Summer 2021



Summer 2023



Summer 2021



Summer 2023

6.2.2.3 STRATEGIES TO ACHIEVE THE GOAL:

- Strategy 4.** Identify, protect and enhance sites of cultural, historical, and ecological significance to support ecosystems and community use
- Strategy 5.** Improve policies, regulations, and processes for parks and natural areas tree protection and planting

Following the Pipe Ceremony, ceremonial prints were hung on poplar trees in the river valley.



6.2.3 GOAL 3: MANAGE THE CITY'S URBAN FOREST IN ACCORDANCE WITH BEST PRACTICES

Aligning urban forest management with best practices is the best way for the City to maximize its return on investment and allow trees to grow into healthy and mature trees. This goal supports the City's existing urban forest program to maximize urban forest benefits and minimize risks. It involves supporting the City's proactive urban tree management program through a review and alignment of resources with the assets managed and defined service levels.

6.2.3.1 OPPORTUNITIES

Tree inventory: The City has maintained an inventory of its urban tree assets since the early 2000s. The tree inventory offers a great tool to track the number of assets managed and identify risks related to the size or species distribution.

City policy and proactive management program: Fort Saskatchewan already has a City Policy in place to define its urban forest levels of service, including a proactive young tree establishment and established tree seven-year pruning program that is aligned with best practices.

6.2.3.2 CHALLENGES

Growing the tree inventory: Despite having maintained a tree inventory for several decades, staff often lack the capacity to add new assets to the inventory following the transfer of new boulevard trees into City maintenance. The software used to manage the inventory also does not allow easy edits to the data while staff are visiting the trees in the field.

Proactive maintenance and resourcing: Current best practices dictate a 7-year pruning cycle for optimal tree health. Service requests, storm events, and increased construction in established neighbourhoods demand more staff's time and require additional resources, which makes the 7-year pruning cycle difficult to

maintain. Newer developments have many young trees (<20 cm) (**Figure 21**) that will need to be pruned for the first time in the coming years, which also impacts the 7-year pruning cycle. Climate change and extended summer droughts have already been increasing the need for and number of watering years required to establish trees, further challenging current allocated resources. To ensure a more proactive urban forest management program, the City must consider increasing resource allocation to effectively address the growing demand and respond to emerging challenges.

Invasive species, pests, and disease management: Invasive species, pests, and diseases pose ongoing threats to Fort Saskatchewan's urban forest. City staff regularly manage elm scale, aphids, bark beetles, and black knot and monitor Dutch Elm Disease in the urban tree population. Climate change is anticipated to increase the threat of invasive species, pests, and diseases and, therefore, also the resources required for their management.

Risk management: Tree inspections for urban trees are carried out informally during pruning cycle visits or in response to a call for service. In contrast, natural area trees are only monitored informally along a few of the City's most popular trails. Risk management policies and procedures are not currently defined in the City's Policy.

6.2.3.3 STRATEGIES TO ACHIEVE THE GOAL:

- Strategy 6.** Leverage the tree inventory to support efficient asset management
- Strategy 7.** Improve resourcing and standards to deliver target urban forest service levels

6.2.4 GOAL 4: PARTNER WITH COMMUNITY MEMBERS AND ORGANIZATIONS FOR URBAN FOREST MANAGEMENT

This goal is focused on supporting partnerships and organizations that contribute to urban forest stewardship. Many community members and organizations are already involved in caring for Fort Saskatchewan's urban forest on their properties or in city parks and natural areas. Many of the Indigenous community members engaged in developing this plan are either already involved or have shown interest in contributing their knowledge for land stewardship.

6.2.4.1 OPPORTUNITIES

Engaged community: Many community organizations are already involved and interested in Fort Saskatchewan's natural areas for environmental stewardship and recreation. Large industrial landowners have also been supporting urban forest stewardship initiatives on City land. To be successful, plan implementation should rely on and collaborate with the community towards achieving the plan's vision.

Knowledge holders: Community members, Indigenous peoples, and organizations hold profound knowledge about the land, forest, and our relationship to it. The action plan intends for the City to seek out that knowledge and use it to support implementation.

6.2.4.2 CHALLENGES

Increasing involvement and knowledge: The plan will be more successful if as many community members as possible are informed about how to care for and participate in the stewardship of the urban forest on their property or through stewardship programs in parks. Educational materials and information sharing will be important to implementing this plan.

6.2.4.3 STRATEGIES TO ACHIEVE THE GOAL:

- Strategy 8.** Support and develop community partnerships to implement the plan
- Strategy 9.** Foster connections between people and the urban forest

6.2.5 GOAL 5: MONITOR PERFORMANCE AND ADAPT TO CHANGING CIRCUMSTANCES

This goal is focused on guiding how the City can monitor its progress in implementing the plan. Monitoring is important to monitor success and identify areas of improvement but also needs to use available and manageable metrics.

6.2.5.1 OPPORTUNITIES

Tree inventory: The City already has a fairly comprehensive inventory of its urban trees that, with continued maintenance, can provide information about the growth of assets managed by the urban forest team.

Advance measurement technologies: LiDAR data was used to benchmark Fort Saskatchewan's urban forest during the development of this plan and will enable precise monitoring of changes in extent and structure.

6.2.5.2 CHALLENGES

Resources for data maintenance: Monitoring and reporting on urban forest changes may be challenging due to limited staff resources. Adequate resourcing and the use of software and tools that make it easy to update, maintain, and summarize data will be important to allow monitoring during the plan's implementation.

6.2.5.3 STRATEGIES TO ACHIEVE THE GOAL:

Strategy 10. Keep the plan up-to-date



6.3 CANOPY COVER TARGET

Municipalities often set a canopy cover target as the leading indicator to monitor their success in implementing their urban forest goals. Best practices in urban forestry suggest that the selection of a canopy cover target should be based on every community's current canopy cover, local climate, population, and development density and land use²⁸. In grassland ecosystems like Fort Saskatchewan, the US-based American Forests not-for-profit recommends aiming for a 20% target adjusted based

on population density. The City's Municipal Development Plan includes a target to raise urban tree canopy by 10% (i.e., tree canopy increase from 11% to 12.1% in the urban area). It uses policy areas to guide plans for the future of Fort Saskatchewan. Those same policy areas were adapted to serve in the modelling of the city's canopy cover target citywide and within the urban area.

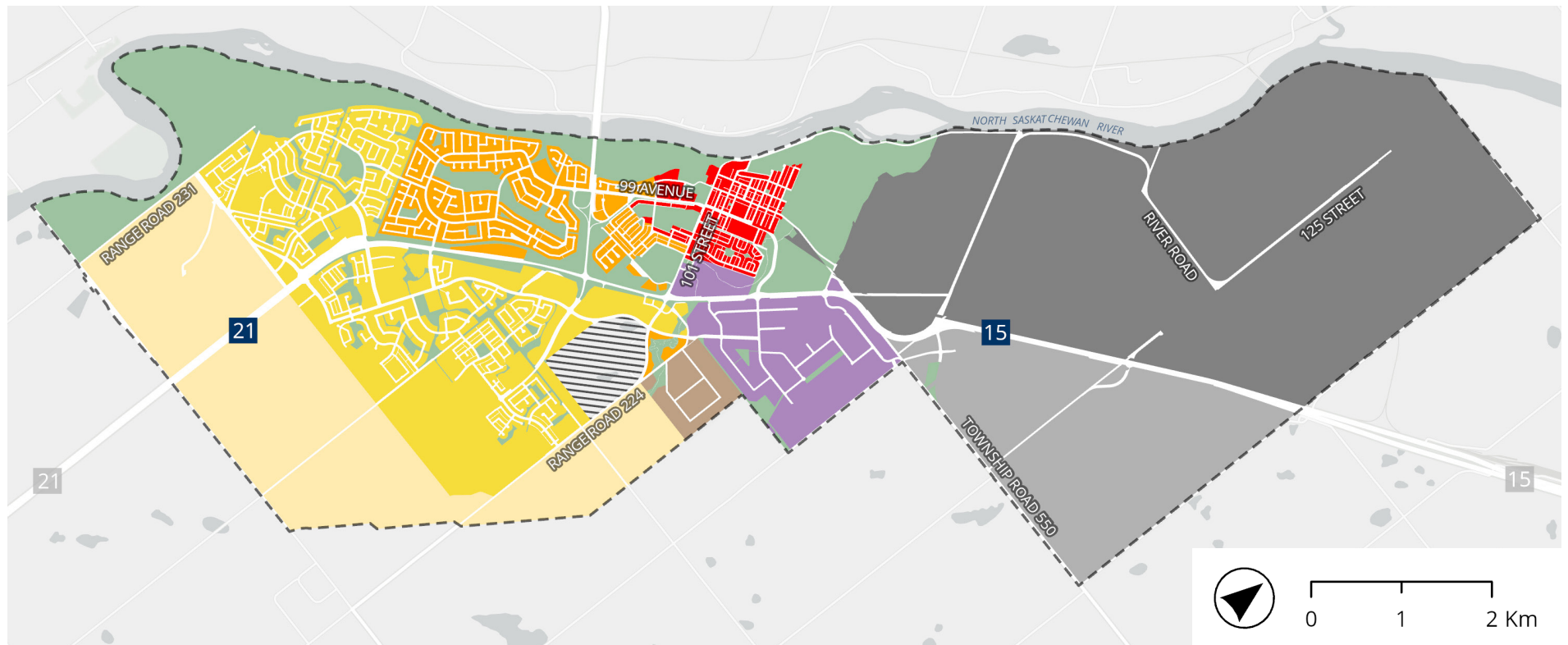






Figure 28. Policy Areas.

- | | |
|--|--|
|  Open space & natural areas |  Major employment lands |
|  Downtown |  Special study area |
|  Established neighbourhoods |  Heavy industrial |
|  Developing neighbourhoods |  Light industrial |
|  Future urban areas |  Correctional centre |

Canopy cover target: 16% within the urban area and 12% citywide

With the 10% increase in canopy target in the Municipal Development Plan in mind, the Urban Forest Plan sets a target to increase canopy from 11% to 16% in the urban area and from 8% to 12% citywide by full build out. To achieve this target, Fort Saskatchewan will require approximately 206 hectares of new tree canopy (approx. 66,040 new trees) over approximately the next 40 years (or by full build out) to grow its urban forest and make up for canopy loss anticipated to result from a combination of natural tree mortality and impacts from new subdivisions.

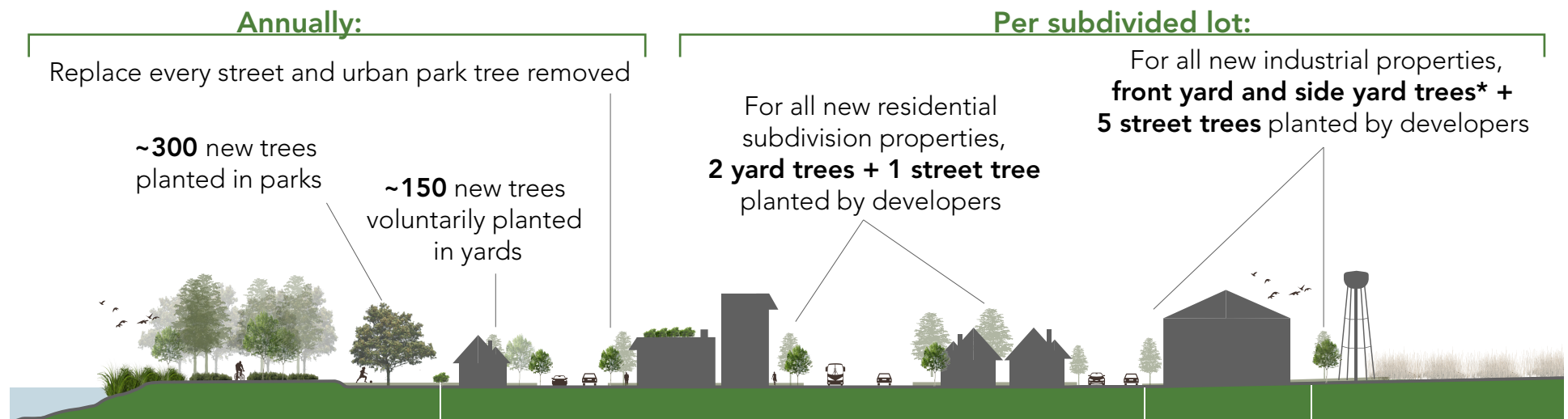
The project team used a forecasting model to estimate canopy growth and loss due to new subdivisions and a 2.5% natural mortality across the urban forest by full build out. Canopy loss due to new subdivision by full build out was estimated at 10% of developing neighbourhood's existing tree canopy, 30% of canopy in future urban areas, and 50% of canopy in light industrial areas. The model indicates that achieving the canopy cover target while offsetting canopy loss would require planting approximately 1,650

trees annually (assuming a constant rate of subdivision until full build out), as detailed in **Table 2** and **Figure 29**.

Table 2. Percentage of total new tree plantings

● Future Urban Areas	47%
● Light Industrial	21%
● Developing Neighbourhoods	20%
● Open Space & Natural Areas	9%
● Established Neighbourhoods	2%
● Downtown	1%

Monitoring will be needed over time to verify the model's assumptions and ensure that planting rates are sufficient to achieve the canopy cover target.



*On industrial properties, we assume yard plantings of one tree per 3 metre of frontage and 1 tree per 5 metres of side yard on one side of the property.

Figure 29. Annual tree planting pursuant to a 12% citywide and 16% urban area canopy cover target by full build out.

The action plan provides strategic steps and initiatives aligning the urban forest to its vision and goals.

SECTION 7.0

ACTION PLAN

GOAL 1. Protect and grow urban trees for an equitable access to lush, tree-lined neighbourhoods

Strategy 1. Improve policies, regulations, and processes for yard and street tree protection and planting

Strategy 2. Improve soil quality and topsoil protection

Strategy 3. Grow the urban forest to improve access and equity

GOAL 2. Protect and restore natural areas to protect their cultural and historical importance, enhance their ecological value, and provide community access to the City's valued green spaces

Strategy 4. Identify, protect and enhance sites of cultural, historical, and ecological significance to support ecosystems and community use

Strategy 5. Improve policies, regulations, and processes for parks and natural areas tree protection and planting

GOAL 3. Manage the City's urban forest in accordance with best practices

Strategy 6. Leverage the tree inventory to support efficient asset management

Strategy 7. Improve resourcing and standards to deliver target urban forest service levels

GOAL 4. Partner with community members and organizations for urban forest management

Strategy 8. Support and develop community partnerships to implement the plan

Strategy 9. Foster connections between people and the urban forest

GOAL 5. Monitor performance and adapt to changing circumstances

Strategy 10. Keep the plan up-to-date

The action plan tables provide a roadmap to achieve the urban forest vision and canopy cover target set out in this plan. The actions listed on the following pages are embedded under the goals and strategies with an assigned implementation timeframe, cost, and departmental responsibility.

Strategies and actions		Timeframe	Cost	Responsibility
Goal 1 PROTECT AND GROW URBAN TREES		Ongoing Short: 1-5 yrs Med: 5-10 yrs Long: 10-15 yrs	\$: Already budgeted \$\$: \$10,000-20,000 \$\$\$: \$20,000 - \$150,000 \$\$\$\$: > \$150,000	Department
Strategy 1. Improve policies, regulations, and processes for yard and street tree protection and planting				
1A	Update the Land Use Bylaw to improve tree planting requirements, specifically <ul style="list-style-type: none"> Add a tree planting requirement such as: <ul style="list-style-type: none"> Up to 2 trees per lot for lower density residential per parcel up to 400 m² and an additional tree for every additional 100 m² of parcel area, to be planted in any yard A target number of trees per parking stall in commercial and light industrial areas, and a buffer planting requirement such as 1 tree per 5 m of side yard for one side of light industrial properties. Include minimum soil volume requirements in accordance with the table provided and topsoil depth requirements (minimum 600 mm to 1,000 mm depth). In situations where mature trees are retained in development, the City could consider a 5% increase in building coverage and explore other trade-offs for retaining mature trees. Add tree and vegetation requirements around storm ponds. See Action 5A for other recommended updates to the Land Use Bylaw focused on natural areas.	Short	\$	Planning & Development
1B	Continue to improve requirements and review processes to ensure that adequate planting space is retained on-site to fit the required trees on new developments.	Med	\$	Public Works
1C	Consider creating or sharing public education materials on the value of tree protection and planting for property owners for property value or other benefits. See also Action 3D (recommending the creation of a subsidised tree program).	Short	\$	Public Works/ Corporate Communications

Action 1A: Minimum recommended soil volume per tree³⁰

Tree Size	Minimum soil volume (m ³)	Shared or irrigated soil volume (m ³)
Small tree canopy spread is up to 6m	8	6
Medium tree canopy spread is up to 10m	20	15
Large tree canopy spread is greater than 10 m	35	30

Soil volume shall be calculated as:

- Soil: Surface area (Length x Width x Depth)
- Soil cells: Volume of soil cell installation (Length x Width x Depth) x .92

Strategies and actions		Timeframe	Cost	Responsibility
Goal 1 PROTECT AND GROW URBAN TREES		Ongoing Short: 1-5 yrs Med: 5-10 yrs Long: 10-15 yrs	\$: Already budgeted \$\$: \$10,000-20,000 \$\$\$: \$20,000 - \$150,000 \$\$\$\$: > \$150,000	Department
1D	Update the Parkland Bylaw to: <ul style="list-style-type: none"> Modernize it, specifically: <ul style="list-style-type: none"> Clarify actions that constitute damage, such as affixing things to trees or blocking streams Increase the fine amounts and create new collection mechanisms such as collecting as tax arrears Create an exemption for cultural harvesting in accordance with the new City Policy detailed in Action 5B. Protect all City-owned trees (including street trees) <ul style="list-style-type: none"> Specify reasons why the City will allow removal of its trees Designate heritage trees in accordance with Tree Installation & Maintenance Policy criteria Clarify requirements for tree protection during construction such as fencing Define adequate compensation for tree removed or damage (such as the replacement cost and amenity value of the lost or damaged tree, per ISA's Guide for Plant Appraisal). 	Short	\$	Public Works
1E	Seek adoption of the Tree Installation & Maintenance Policy across all City departments to guide practices for tree protection during construction and compensation for tree loss or damage.	Short	\$	Public Works
Strategy 2. Improve soil quality and topsoil protection				
2A	Update the Engineering and Servicing Standards to: <ul style="list-style-type: none"> Include minimum soil volume requirements and acceptable alternatives for structural soil, soil cells, bridged sidewalks, or soil trenches Reduce soil compaction in boulevards to a maximum of 70 to 80% Standard Procter Density Clarify the acceptance criteria for the City to accept new trees as assets Consider opportunities to move parking and shallow utilities to back alleys to increase the space available for trees and soil in the boulevards Ensure that, when required trees cannot be provided, the cash-in-lieu provided for the City to plant those trees elsewhere is adequate to cover the cost of planting and early maintenance and is deposited into a fund that also allow its use for tree maintenance, soil amendments, or funding subsidized trees for private land. 	Short	\$\$	Fleet, Facilities & Engineering/ Public Works
2B	Continue improving development inspection processes to ensure soil is installed as per the Engineering and Servicing Standard specifications for new boulevards, such as third-party monitoring mid-development.	Ongoing	\$	Public Works

Strategies and actions		Timeframe	Cost	Responsibility
Goal 1 PROTECT AND GROW URBAN TREES		Ongoing Short: 1-5 yrs Med: 5-10 yrs Long: 10-15 yrs	\$: Already budgeted \$\$: \$10,000-20,000 \$\$\$: \$20,000 - \$150,000 \$\$\$\$: > \$150,000	Department
2C	Continue to protect topsoil by ensuring topsoil stockpiling and reuse requirements from the Engineering and Servicing Standards are being implemented, in line with policies from the Edmonton Metropolitan Regional Board's Regional Agriculture Master Plan.	Med	\$\$	Engineering
Strategy 3. Grow the urban forest to improve access and equity				
3A	Prioritize City tree planting in neighbourhoods and streets with lower tree equity and vacant planting spaces.	Medium	\$\$	Public Works
3B	Maintain an inventory of street boulevards or park locations with repeated tree failure to prioritize soil quality improvements.	Ongoing	\$	Public Works
3C	Continue to trial new tree species to diversify the urban forest with species suitable to the current and anticipated future climate conditions using the Edmonton Metropolitan Region Guide to Urban Forest Management in a Changing Climate species list.	Ongoing	\$	Public Works
3D	Consider creating a subsidized tree program for residents to purchase affordable trees for planting in their yards.	Medium	\$\$	Public Works
3E	Work with Indigenous knowledge holders to identify sacred spaces for Indigenous community members to grow medicines such as fungi, sweetgrass, sage, and strawberry.	Short	\$	Public Works/ Culture & Recreation Services
3F	Develop a planting plan that: <ul style="list-style-type: none"> • Prioritizes tree planting in clusters where suitable so they can support one another • Prioritizes planting of birch trees where conditions allow it to honour Fort Saskatchewan's nehiyawak name (waskwayâhtikispatinaw, birch hills) and support a holistic urban forest where native plants and animals thrive • Prioritizes planting in low equity areas or other priority areas identified by the community such as planting along ski trails. 	Ongoing	\$	Public Works

Strategies and actions		Timeframe	Cost	Responsibility
Goal 2	PROTECT AND RESTORE NATURAL AREAS	Ongoing Short: 1-5 yrs Med: 5-10 yrs Long: 10-15 yrs	\$: Already budgeted \$\$: \$10,000-20,000 \$\$\$: \$20,000 - \$150,000 \$\$\$\$: > \$150,000	Department
	Strategy 4. Identify, protect and enhance sites of cultural, historical, and ecological significance to support ecosystems and community use			
4A	Consider detailing the Municipal Development Plan's environmentally sensitive areas map to include more information about ecosystem types and condition and to integrate information from an Indigenous environmental scan. Use the map to help prioritize land dedicated for Environmental Reserve or for restoration projects on city property.	Medium	\$\$	Planning & Development
4B	Prepare a Historical Resource Impact Assessment (HRIA) for the Turner Park Development as part of the campground's phase 2 expansion.	Ongoing	\$\$\$	Planning & Development
4C	Consider creating or sharing public education materials on the value of tree protection and planting for property owners for property value or other benefits. See also action 3D (recommending the creation of a subsidised tree program)	Medium	\$\$\$	Public Works
4D	Consider developing an Invasive Species Management Plan to identify current and potential threats, map problem areas, define responses and prioritize treatment.	Medium	\$\$	Public Works
4E	In city parks, seek opportunities to restore and educate the community about: <ul style="list-style-type: none"> Grassland ecosystems Traditional medicines such as rat root, sweetgrass, sage, or cedar. 	Medium	\$	Public Works/ Culture & Recreation Services
4F	Continue to work with community groups to share information about natural surface trail construction and maintenance standards, remove unauthorized structures, and conduct regular cleanup events to maintain high quality trails and natural areas with a particular focus on minimizing erosion and protecting the fauna and flora.	Short	\$	Public Works/ Culture & Recreation Services
4G	Maintain a map of sanctioned trails and identify non-sanctioned trails to be decommissioned and areas that will require restoration.	Short	\$	Public Works/ Culture & Recreation Services

Strategies and actions		Timeframe	Cost	Responsibility	
Goal 2	PROTECT AND RESTORE NATURAL AREAS	Ongoing Short: 1-5 yrs Med: 5-10 yrs Long: 10-15 yrs	\$: Already budgeted \$\$: \$10,000-20,000 \$\$\$: \$20,000 - \$150,000 \$\$\$\$: > \$150,000	Department	
	Strategy 5. Improve policies, regulations, and processes for parks and natural areas tree protection and planting				
	5A	Update the Land Use Bylaw to improve protection of streams by requiring that reduction of the top of bank setbacks be proposed by a qualified environmental professional with input from a geotechnical engineer. See also Action 1A for other recommended updates to the Land Use Bylaw focused on street and yard trees.	Short	\$	Planning & Development
	5B	Consider developing a City Policy to: <ul style="list-style-type: none"> Determine when and how notifications to Indigenous communities and organizations is conducted and a land breaking Ceremony should be held prior to breaking ground or tree removals Use information from the Indigenous environmental scan described in Action 4.A. to identify plants with important medicinal or traditional uses and the process for their protection or transplantation when work takes place in or near a natural area Define bylaw exemptions to enable cultural harvesting in accordance with the Parkland Bylaw (see Action 1D). 	Medium	\$\$	Public Works/ Culture & Recreation Services
5C	Develop a Parkland Acquisition Strategy that: <ul style="list-style-type: none"> Uses the detailed inventory of environmentally sensitive areas and low tree equity mapping to prioritize land for acquisition Explores opportunities to enable interested private partners to contribute to a land acquisition fund. 	Medium	\$\$\$	Planning & Development	

Action 5C Parkland Acquisition Strategy: There are strategies available for municipalities beyond the use of cash provided in-lieu of parkland dedication to acquire new parkland. Many communities in Ontario, such as [Hamilton](#), use a Natural Areas Acquisition Fund to leverage funds from grants and partner agencies such as non-governmental organizations. Cities like [Calgary](#) have a Parks Foundation that creates parks through donations and partnerships.

Strategies and actions		Timeframe	Cost	Responsibility
Goal 3	MANAGE THE CITY'S URBAN FOREST	Ongoing Short: 1-5 yrs Med: 5-10 yrs Long: 10-15 yrs	\$: Already budgeted \$\$: \$10,000-20,000 \$\$\$: \$20,000 - \$150,000 \$\$\$\$: > \$150,000	Department
Strategy 6. Leverage the tree inventory to support efficient asset management				
6A	Continue the migration of the City's tree inventory to a software that allows on-site data collection or update and that will support integration into City asset management systems.	Ongoing	\$	Public Works/ Information Technology
6B	Update tree inventory data during pruning and start collecting tree condition information to facilitate tracking of poorly performing areas, trees that require removal, and vacant planting sites.	Ongoing	\$	Public Works
6C	Update the Engineering Standards so "as-built drawings" include the coordinates for trees planted on public properties.	Short	\$	Fleet, Facilities & Engineering
6D	Use the tree inventory to drive tree planting and maintenance budgets, specifically: <ul style="list-style-type: none"> Adjust operational and capital budget requests based on the addition of new tree assets and identify thresholds beyond which additional maintenance budget will be required Adjust funding budget requests based on the forecasted number of trees that require replacement annually using tree condition and vacant planting site data. 	Ongoing	\$	Public Works

Action 6D Pruning cycle: The City's target 7-year pruning cycle is aligned with best practices for the proactive management of urban forest assets²⁷. Communities such as St. Albert, Beaumont, and Drumheller Valley all identified proactive pruning as an important component of their urban forest plans to improve tree structure and health. Having already implemented a proactive pruning cycle, Fort Saskatchewan has already shown leadership in its urban forest management. Adjusting management budgets to the size of the tree inventory will help achieve the City's 7-year pruning cycle.

Strategies and actions		Timeframe	Cost	Responsibility
Goal 4	MANAGE THE CITY'S URBAN FOREST	Ongoing Short: 1-5 yrs Med: 5-10 yrs Long: 10-15 yrs	\$: Already budgeted \$\$: \$10,000-20,000 \$\$\$: \$20,000 - \$150,000 \$\$\$\$: > \$150,000	Department
		Strategy 7. Improve resourcing and standards to deliver target urban forest service levels		
7A	Continue to pursue funding for urban forest initiatives from sources such as the Government of Canada's 2 Billion Trees Program, the Green Municipal Fund – Growing Canada's Community Canopies, the Tree Canada Granting Programs, or Infrastructure Canada Programs (natural infrastructure fund).	Ongoing	\$	Public Works
7B	Define levels of service for forested areas and trail inspections and document risk management procedures.	Medium	\$	Public Works
7C	Revise and adjust resourcing to align with the number of assets managed and to ensure adopted service levels, such as the frequency of pruning defined in the City Tree Installation & Maintenance Policy, are being met.	Ongoing	\$	Public Works
7D	Develop an extreme weather response policy that documents call-out procedures, responsibilities, and a prioritization criterion for hazard and debris removal.	Medium	\$	Public Works
7E	Continue to inform community members about common or threatening pests and diseases as well as how to manage and prevent their spread.	Ongoing	\$	Public Works/ Corporate Communications
7F	Continue to produce mulch for use in parks and look for opportunities to up-cycle good quality timber from removed trees.	Ongoing	\$	Public Works

Strategies and actions		Timeframe	Cost	Responsibility	
<div style="background-color: #e91e63; color: white; border-radius: 50%; width: 30px; height: 30px; display: flex; align-items: center; justify-content: center; margin: 0 auto;"> Goal 4 </div>	PARTNER WITH COMMUNITY MEMBERS AND ORGANIZATIONS		Ongoing Short: 1-5 yrs Med: 5-10 yrs Long: 10-15 yrs	\$: Already budgeted \$\$: \$10,000-20,000 \$\$\$: \$20,000 - \$150,000 \$\$\$\$: > \$150,000	Department
Strategy 8. Support and develop community partnerships to implement the plan					
8A	Continue to develop partnerships with communities and organizations to support initiatives that contribute to reconciliation, for example to support connections between the City's urban forest program and cultural resource use and protection.	Ongoing	\$	Public Works/ Culture & Recreation Services	
8B	Explore ways to improve food security with parks landscaping that includes fruit or nut trees, edible plants, and community gardens in partnership with schools, food banks, or other interested community organizations.	Medium	\$	Public Works	
8C	Develop research partnerships with academic institutions, NGOs, or Indigenous community members and organizations to monitor the health of the urban forest.	Medium	\$	Public Works	
8D	Set up regular meetings with industry partners to continue to discuss synergies and opportunities for them to support City projects and objectives such as: <ul style="list-style-type: none"> • Providing funding for trees or land for City or school tree planting • Helping coordinate volunteer events (e.g., tree planting, noxious weed removals). 	Ongoing	\$	Public Works	
Strategy 9. Foster connections between people and the urban forest					
9A	Develop educational materials about urban forestry on topics such as: <ul style="list-style-type: none"> • Indigenous history on and knowledge of the land • Medicinal plants in terms of what they are, why people should not remove them like weeds and how to harvest them • Tree identification to allow people to greet trees as they walk through the forest • Common and rare fauna, flora, and fungi growing in Fort Saskatchewan forests and their importance • How to plant and maintain trees on your property: native species, how to prune and water trees, and how to handle common tree diseases • The City's urban forest program (responsibilities, regularly scheduled activities and service levels). 	Short	\$	Public Works/ Corporate Communications	

Strategies and actions		Timeframe	Cost	Responsibility
Goal 4 PARTNER WITH COMMUNITY MEMBERS AND ORGANIZATIONS		Ongoing Short: 1-5 yrs Med: 5-10 yrs Long: 10-15 yrs	\$: Already budgeted \$\$: \$10,000-20,000 \$\$\$: \$20,000 - \$150,000 \$\$\$\$: > \$150,000	Department
9B	Develop an urban forest stewardship program that integrates: <ul style="list-style-type: none"> • Events such as invasive species removal, tree planting, community gardens, etc. • Grade one seedling program • Adopt-a-tree program where people can donate their time to help with tree planting and establishment tasks like watering • Activities to familiarize the community with its urban forest such as scavenger hunts or other ludic activities and the use of QR codes or reusing of HisTREE tags to share educational materials. 	Medium	\$	Public Works

Strategies and actions		Timeframe	Cost	Responsibility
Goal 5 MONITOR PERFORMANCE AND ADAPT		Ongoing Short: 1-5 yrs Med: 5-10 yrs Long: 10-15 yrs	\$: Already budgeted \$\$: \$10,000-20,000 \$\$\$: \$20,000 - \$150,000 \$\$\$\$: > \$150,000	Department
Strategy 10. Keep the plan up-to-date				
10A	Reassess canopy cover every five years using LiDAR or other accurate technologies available.	Medium	\$	Information Technology
10B	Review implementation process and update the action plan after five years.	Medium	\$	Public Works
10C	Update the Urban Forest Protection and Enhancement Plan every 10 years to align it to changing circumstances and evolving best practices.	Long	\$	Public Works

SECTION 8.0

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**“A SEED IS AN IDEA,
AND AN IDEA IS A SEED”**
TRADITIONAL INDIGENOUS KNOWLEDGE



Submitted to:
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The City of Fort Saskatchewan

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Preamble

There are many ways Indigenous people connect to the standing people, trees. The connections I discuss below are connections specifically made to the oral history of these relations. Respecting oral history, some details are reserved for those who were present during the visits. Sacred teachings may be mentioned, but the details remain with those Knowledge Holders, to be shared with those who build the relationship and request that knowledge in an ethical way. In an effort to protect knowledge from being mis-used, direct recommendations are made to help understand the application of Indigenous knowledge within a western process of creating an Urban Forest Enhancement and Protection Plan (the Plan).

Guidance from an Elder

Elder Roy Bear Chief of Siksika Nation said that the Plan in Fort Saskatchewan has so much potential because *“a seed is an idea, and an idea is a seed”*. The work that will go into this plan needs to be more than planting new trees, it must be nurtured and grow with the community. *ani to pisi*, in *siksikaitsipowahsin* (Blackfoot language) is a phrase that teaches us about the spider web; our traditional knowledge of the original instructions on how we work together. There are similar *nehiyawak* (Cree) words that have similar teachings. To follow those instructions, we must recognize that every action we take has the power to vibrate through the web and talk to all other societies. No changes in the Plan will ever happen in isolation, everything is connected.

We thank Elder Roy for sharing these beautiful thoughts with us and in honour of the knowledge he shared, we name this report after his wisdom.



From Creation

The land is sacred. The land is more than a representation of Mother Earth, it **is** our Mother. Many nehiyawak (Cree) Elders shared parts of the Creation story for this report. During these visits, it was learned that trees are known as the standing people. Humans are one of the youngest siblings of all societies, trees were here long before us. There are shorter and longer version of the Creation story, but each shares an important lesson about how the land came to be. The standing people gave parts of themselves to help humans learn to grow strong bones. When we recognize the collaboration and collective efforts that were needed to grow the earth we inhabit, we learn to uphold those original agreements.

RECOMMENDATION: Identify and outline a scope of practice for when a land breaking Ceremony would be held in the Municipality. These Ceremonies gain consent from Mother Earth, as well as tell our intentions to the other societies, specifically where we seek to remove the standing people.

Elders shared that humans and trees can speak to one another. The trees have shared many important messages with us throughout history. Many parts of the tree provide different knowledge, for example, the leaves, fruits, the trunk, root systems etc. The more we connect with the trees in a relational way, the healthier our forests can become.

RECOMMENDATION: Create education materials that help people walking through the urban forest areas and be able to identify different trees. They can use that knowledge to greet trees as they walk past.

nehiyawak knowledge shares with us that there are four main layers in the earth. Deities and spiritual energy live originally in one of the layers of the earth. These living beings are then reflected into the sky as Northern Lights. The land is living, just as the things that grow out of it. We depend on the energy in those layers for human survival.

RECOMMENDATION: Protection in the plan should include the protection of the layers of the earth, such as a topsoil protection strategy. The traditional oral knowledge in these stories aligns with What We Heard from Indigenous engagement on the Plan.



History before Treaty

There are many ways Indigenous people connect to the land. The connections below are specifically made with components of urban forests in Fort Saskatchewan: Animals, plants, land, water, and ancestors. Elders, Indigenous communities, and Indigenous organizations were asked about significant Indigenous history and places that should be noted for the Plan. There were few Indigenous experts in this project who had a full, comprehensive history for the Indigenous people of Fort Saskatchewan, pre-colonization. However, each acknowledged Fort Saskatchewan as a sacred land for Métis people. The oral history collected here has been passed down from time before Treaty.

Birch History

It was shared that Fort Saskatchewan was known by the nehiyawak (Cree) people as waskwayâhtik ispatinaw (birch hills) due to the many birch trees that were present in the land prior to colonization. Birch bark was not only important for the building of canoes along kisiskâciwan-sîpî (the North Saskatchewan River), it was also a material used to create birch-bark scroll with nehiyawak syllabics inscribed in them.

Birch trees are excellent protectors against wind and snow due to their strong root systems and dense foliage year round. Birch trees are a significant source of food for many animals societies, such as: foxes, birds, moose, deer, beavers and more. The birch tree produces a flower cluster known as catkins, and those flowers produce small fruits called samaras. The birch tree was a gift from Creator to connect animals and human societies. It is likely that due to colonization and development the land is no longer suited for sustaining birch.

RECOMMENDATION: Include birch trees in the Plan to ensure that native plants and animals are able to thrive in their intended habitat. This action allows the land to be reacclimated and to return to a more holistic urban forest.



Seven Sacred Teachings

There are seven sacred teachings in the nehiyawak culture, and other Indigenous cultures. The seven layers of a food forest are directly aligned with the seven sacred teachings. The standing people share knowledge with humans and impart this guidance on us.

The Canopy of **Wisdom**

The oldest layer of a canopy are the biggest standing people and they protect all the other plants and animals: The walnut, the chestnut, the beech nut, and the maple trees. We learn wisdom from them. The walnut is shaped like the human brain. Western knowledge is coming to know what Indigenous knowledge always has, walnuts are great nutrition for the mind.

Recommendation: We must monitor this layer with great effort and ensure that these standing people have a strong protection plan against invasive species or being removed for development.

The Canopy of **Courage**

The next tallest layer of the standing people are the fruit trees: Cherry, apple, plum, saskatoons. Fruit trees are challenged by harsh winters, drought, or even storms. Although they may be fragile, they share their fruits which shows courage to us. We learn to not hide our gifts, even when the environment may be scary.

Recommendation: We must have a strong fruit bearing layer if the Plan is to be courageous and step outside the box. Fruit trees may be more expensive to maintain, but have a large value to the mental, physical, emotional and spiritual health of a community.

The Canopy of **Respect**

The next layer in the food forest is the berry layer, or bushes: Blueberry, raspberry, haskap, and gooseberries. Berry bushes are self-fertilizing and self-propagating. They grow together amongst each other. They come in different shapes, colours, tastes and yet they grow in harmony together. We learn to respect and how we can co-exist with one another, and the other societies from this layer.



Seven Sacred Teachings cont.

Recommendation: Special importance for a dynamic berry layer should be considered. Where possible, planting many berries side by side, can bring the value of respect into the plan and will also provide access to a dynamic food forest for community members.

The Canopy of **Honesty**

The next layer is the food that grows right above the ground: Squash, pumpkins, lettuce, and cucumbers. There is honesty about these foods, they are trusted and nutritious. They show when they are ready to be eaten and there is a honesty about that willingness to be shared.

Recommendation: The Plan should include community access to more spaces where people grow and nurture these types of foods.

The Canopy of **Truth**

The next layer is found on the surface of the ground. These are our medicines: fungi, sweetgrass, sage and the strawberry. While the strawberry is a fruit, it is a sacred berry for Indigenous people, referred to as the heart berry. The strawberry represents the earth. Unlike any other fruit, the strawberry seeds are on the surface of the fruit, just as humans occupy the surface of the earth.

Recommendation: Sacred space to grow these medicines would benefit many community members, but would hold a special place for Indigenous community members who may struggle to find these medicines growing naturally in Fort Saskatchewan any longer.

The Canopy of **Humility**

The canopy that grows just under the surface are important vegetables: potatoes, carrots, and turnips. They are not evident from the surface as much as the other layers. We often have to dig them up, on our hands and knees. This layer teaches us humility. Many of the foods that grow in this layer grow best in companionship with others, they may not be successful just anywhere.



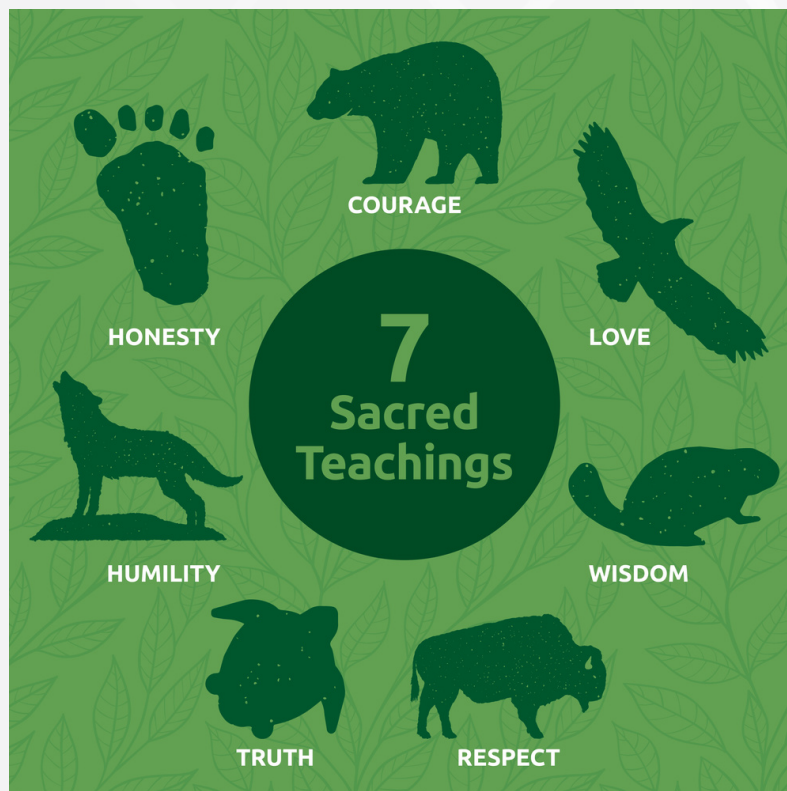
Seven Sacred Teachings cont.

Recommendation: Education that supports growing and harvesting from this layer is important to community understanding. Ensuring that policies are structured to empower individuals to explore this canopy layer, not shy away from it. For example, possible restrictions on where this layer can be grown should be evaluated.

The Canopy of Love

The last layer is the vines and creepers. They explore the forest areas and embrace other plants. They are an important layer that often provides access for animals from the ground, to higher areas for safety. From this layer we learn love.

Recommendation: The Plan should include guidance on maintenance for this layer. Often they have a lot of love and spread themselves quickly. They also can become the home for many invasive species and a protection plan for this layer would benefit the forest throughout all areas.





History near Colonization

Turner Park History

The area known as Turner Park has been identified as a homestead for the Métis, specifically Joseph Turner. Yet, it was not known by participants how the land belonging to Mr. Turner had left his familial ownership and became public property. There was no evidence discussed of script being given and taken for these plots. The area was also highlighted as a traveling land for many nehiyawak (Cree) people from Saddle Lake First Nation and Cold Lake First Nation. As Indigenous people, the land closest to kisiskâciwan-sîpî was prominent during trade and Elders believe it is likely to have significant artifacts such as tools, artisan crafts, and scrolls.

Turner Park was identified as a priority area for protection due to the known Métis and Indigenous history. Elders shared about the deep knowledge found in the land. Indigenous people felt that an Indigenous environmental scan of the area would result in significantly different outcomes than an environmental assessment done by non-Indigenous people. Bringing these two worlds together is often referred to as etuptamumk - two eyed seeing.

Recommendation: To advance the efforts of reconciliation in Fort Saskatchewan, we recommend further investigation into Indigenous Peoples history in Fort Saskatchewan, prior to any changes in the current Turner Part area. Including an environmental scan completed by an Indigenous environmental scientist or agency.

A people history review should include:

- Identifying the exact homestead location for Mr. Turner
- Discover any potential timber rights that have previous existed
- Identify areas that are likely to have Indigenous artifacts
- Identify traditional plants and medicines that could be lost.



Oral Knowledge of Collaboration

Finding Balance, Together

It was clear during consultation that there are opposing ideas of the most important value to ground the work of the Plan. Some felt protection should come first, and others felt that recreations was critical. Traditionally, Elders share that Indigenous people did not shy away from conflicting ideas because the collective would come to an understanding of what is best from one another. Collaboration is about the process, not the product.

Indigenous governance comes from the land. The standing people never grew alone. Traditionally trees grow in clusters or at least three (3). This allows their root systems to connect and provide strength to one another. By working together, they are able to protect each other from elements of wind and drought. Trees speak to one another, just as much as they speak to one. When one tree is not getting what it needs, the others around it speak through the roots and share the resources. The pecan tree is one traditional example of how trees speak to one another.

Recommendation: Rather than planting boulevard trees individually, at a set interval apart, a successful Plan will plant trees together in clusters so they can support one another.

Leadership is about who knows how to collaborate. The societies, such as animals and plants, speak to Mother Earth about what she needs. Often Plans that seek to plant all layers of the forest in the same year will fail because it is too difficult on the earth. To ensure there is balance and sustainability in the Plan, and that an investment in community collaboration ensures that the Plan stays relevant and moves with the needs of the community.

Recommendation: To create a collective of community members and partners who can inform the planting goals annually. A planting plan designed to be longer term will ensure Mother Earth can heal and support all other plants in what they need to thrive.



CITY OF
FORT SASKATCHEWAN

**Information Report
Committee of the Whole_Mar19_2024**

Snow Melt and Material Handling Site Feasibility Study

Purpose:

The purpose of this report is to provide Committee of the Whole with the results of the Snow Melt and Material Handling Site Feasibility Study.

Background:

In 2011, the City discontinued storing snow at 7915 109 Street. Since that time, the site has been used as a materials handling site. Snow from City property that cannot be stored in place is now hauled to Strathcona County or the City of Edmonton.

During the 2022 Budget process, Council deliberated a budget request to purchase land for a new material handling site. Council opted to remove the budget request from the 2022 Budget, but instead provided funding to study the land acquisition, regulatory requirements, costs, and operational logistics of having a municipal snow dump facility included with the materials handling site.

On June 28, 2022, Council adopted [The City of Fort Saskatchewan Strategic Plan 2023-2026](#). A strategic initiative within the Strategically Managed Infrastructure goal is:

“Continued evaluation and planning for major capital projects within the 10-year Capital Plan including: Veterans Way Corridor Widening and Pedestrian Crossing, Fire Station, Aquatics and Material Handling/Snow Dump Site.”

Summary Analysis:

The Snow Melt and Material Handling Site Feasibility Study is ready for Council’s review.

The current Material Handling Site is located east of 109 Street, near the Clover Park Community Garden. The site is used to process and store reclaimed asphalt and concrete, which is primarily generated from the Neighbourhood Rehabilitation and Local Road Rehabilitation annual programs. Concrete and asphalt are crushed and reused as base course materials in road, parking lot, and trail projects.

At 1.0 hectare (2.5 acres), the site can stockpile approximately 5,000 cubic metres of material. The current site is too small to effectively manage the current volume of materials. The site poses limitations, as it is located close to residential areas, borders Ross Creek, and was not formally designed or graded.

The Material Handling Site is occasionally used for temporary snow storage. The majority of the City’s snow that cannot be stored in place is hauled to the Strathcona County facility (24 kilometres haul distance) or the City of Edmonton Horse Hill’s facility (approximately 15 kilometres haul distance).

**Snow Melt and Material Handling Site Feasibility Study
Committee of the Whole_Mar19_2024
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Figure 1 – Location of Existing Material Handling Site



The report reviewed legislative requirements that would impact the operations of a snow melt and materials handling facility. Using the regulatory framework and estimates of the amount of snow and material to be stored and processed, site selection criteria were developed which include the recommended size of the parcel, site design criteria, and conceptual site plans.

The study includes recommendations for a site that would meet the City's needs for the next 50-years. The combined facility would stockpile and manage snow removed from City streets, store and process recycled construction materials, provide a hydro-vacuum dump pad, have an equipment laydown area, and allow for future expansion. To meet these requirements, the facility should meet the following criteria:

- A combined facility be approximately 16.0 hectares (40.0 acres) in size;
- A standalone material handling facility be approximately 2.5 hectares (6.2 acres) in size;
- The working face of the snow storage pile should face south to maximize melting potential;
- The site should be located close to existing truck access roads and a minimum of 350 metres (1,150 feet) from residences;
- The site should have access to the municipal storm water system with sufficient available capacity;
- Geotechnical conditions need to be able to accommodate the melt pad and settling pond;
- The site should be able to operate 24 hours a day and should not have any noise restrictions;
- The site should be flat to minimize grading costs; and

Snow Melt and Material Handling Site Feasibility Study
Committee of the Whole_Mar19_2024
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- Zoning of site should allow for this type of facility.

A combined Snow Melt and Materials Handling site would require approximately 16 hectares of land, which includes 5 hectares (12.4 acres) for future expansion. The cost estimate to construct the site is between \$9,700,000 and \$15,900,000 which includes \$4,000,000 to purchase the land with the range in estimates varying depending on the type of construction chosen.

Operating costs of the Snow Melt site are estimated at \$300,000 per year. This would be offset by savings in dump fees of approximately \$50,000 and trucking costs of approximately \$176,000 per year. Having a local site could benefit local businesses and contractors that could have access to site.

A stand-alone Materials Handling site would require approximately 2.5 hectares (6.2 acres) of land and is estimated to cost approximately \$1,900,000. This includes \$625,000 for land purchase. The larger site could stockpile 20,000 tonnes of material, a 300% increase from the current site's capacity.

Incremental operating costs of the Material Handling site would be negligible as operations would move from the existing site to the new site. Processing costs are currently charged back to the capital projects that generate and use the material.

Construction estimates for both sites could be reduced by about \$400,000 by processing and using the existing material at the Material Handling site to offset the base course requirements at the new site.

Given the large capital and operating costs associated with a Snow Melt site, the recommendation is to not proceed with a combined site at this time. However, it is recommended to secure land for the site, as there is value in locating both facilities on the same parcel of land. Both facilities have similar transportation needs, siting requirements (e.g. noise, dust), and security needs. Furthermore, space requirements could be reduced as areas can be shared in off-seasons. Purchasing a large site to enable a combined facility could become more difficult in the future as lands develop.

Financial Implications:

The project will be brought forward during the 2025 Budget Deliberations.

Internal/External Impacts:

There is no impact to operations, at this time.

Plans/Standards/Legislation:

A high-level review of applicable regulations was completed. While there are no specific provincial or federal legislation that explicitly regulates snow melt facilities, there are guidelines and legislation that have a cursory link to the construction and operation of snow melt facilities. These guidelines and legislations include:

Canadian Environmental and Protection Act
 Fisheries Act
 Committee of the Status of Endangered Wildlife in Canada and Species at Risk Act
 Migratory Bird Convention Act
 Canadian Council of Ministers of the Environment Quality Guidelines

**Snow Melt and Material Handling Site Feasibility Study
Committee of the Whole_Mar19_2024
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Province of Alberta Water Act
City of Fort Saskatchewan Land Use Bylaw
City of Fort Saskatchewan Community Standards Bylaw
City of Fort Saskatchewan Sewer Bylaw

City’s Strategic Plan:

Goal - Strategically Managed Infrastructure (maximize our existing infrastructure and plan for long-term efficiency, cost and resiliency when considering new infrastructure).

Goal - Environmental Stewardship (a commitment is in place to using our resources wisely and implement sustainable best practices).

Next Steps:

The purchase of land and the construction of a Material Handling Site will be presented during the 2025 Budget deliberations.

Attachments:

- 1. Appendix A – Snow Melt and Material Handling Site Feasibility Study



Prepared by:	Grant Schaffer Director, Fleet, Facilities & Engineering	Date: March 1, 2024
Approved by:	Janel Smith-Duguid General Manager, Infrastructure & Planning Services	Date: March 6, 2024
Approved by:	Troy Fleming City Manager	Date: March 8, 2024

Snow Melt and Material Handling Site Feasibility Study

January 19, 2024

Prepared for:



Prepared by:



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January 19, 2024

File: 114-027

City of Fort Saskatchewan
10005 – 100 Avenue
Fort Saskatchewan, AB
T8L 2C5

Attention: Joey Farebrother
Sr. Engineering Coordinator

Re: Snow Melt and Material Handling Site Feasibility Study-Draft

We are pleased to submit our Final report of the **Snow Melt and Material Handling Site Feasibility Study**. We invite the opportunity to discuss the contents of the report with the City. If there are any questions or concerns with the document, please contact the undersigned.

Regards,
AI-Terra Engineering Ltd.



Fred Greenhough, P.Eng.

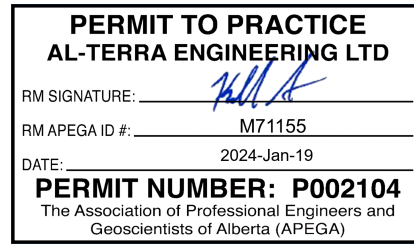
CORPORATE AUTHORIZATION

This report entitled **Snow Melt and Material Handling Site Feasibility Study** was prepared by Al-Terra Engineering Ltd., under authorization and exclusive use of the City of Fort Saskatchewan.

The designs and recommendations put forward reflect Al-Terra’s best judgment with the information available. Any use of this information in a manner not intended or with the knowledge that situations have changed shall not be the responsibility of Al-Terra Engineering Ltd.



Prepared by:
Fred Greenhough P.Eng.



Corporate Permit



1.0 Introduction

The following study was completed to determine the feasibility of a combined snow melt and materials handling facility for the City of Fort Saskatchewan. The City of Fort Saskatchewan does not currently operate a snow melt facility. The City and private operators currently haul snow cleared from roadways and parking lots to snow melt facilities in Strathcona County and the City of Edmonton. The haul distances to the Edmonton Horse Hills facility is approximately 15km and approximately 24km to the Strathcona County Facility.

Historically, a site at 7951-109 St located near the Fort Saskatchewan Correctional Facility, was used to store cleared snow. This was an undeveloped site without a formal melt pad or stormwater control. The City discontinued the use of the site for snow storage in 2011 due to the site not meeting current environmental regulations, and its close proximity to residential areas. The site was continued to be used for material stockpiling and processing. Material stockpiled and processed at this location has generally been reclaimed asphalt and concrete generated from the neighbourhood and road rehabilitation programs. The site currently handles approximately 5000m³ of material.

Discussions were held with City staff to determine appropriate sizing of the facility. In the 2021/2022 snow season approximately 50,000m³ of snow was cleared by the City with additional snow cleared by private operators. Due to the long haul distances to the neighbouring facilities and the associated costs of the haul, less snow was cleared than would be anticipated with a City owned local facility. It was estimated that current demand would be for approximately 250,000m³ of storage. This size would be conservative and would be able to accommodate a significant snow season including a single clearing of all residential streets. To accommodate growth in the 50 year time horizon the design size was doubled to be able to accommodate 500,000m³ of snow.

The project objectives for the Fort Saskatchewan Snow Melt and Material Handling Site Feasibility Study was to provide a review of the following:

- Regulatory requirements
- Site selection criteria
- Specific site design considerations
- Concept design and estimated costs
- Operational and logistics costs for a snow melt facility

2.0 Regulatory Requirements

A high-level review of applicable regulations was completed. Generally, there is no specific provincial or federal legislation that explicitly regulates snow melt facilities within the province of Alberta. However, there are guidelines and legislation that have a cursory link to the construction and operation of snow melt facilities.

2.1 Federal Regulations

Canadian Environment and Protection Act – The primary purpose of the act is to contribute to sustainable development through pollution prevention. The primary impact of this regulation on snow melt facilities would be related to the management of contaminated sites. This act could apply to contaminants such as hydrocarbons and heavy metals that are present in snow melt, if present in high enough concentrations. Relevant concentrations are not expected to occur.

Fisheries Act – The Fisheries Act is the main legislation for the management of all fish, fish habitat and water quality. This could apply to the release of melt water to streams and waterbodies that are fish bearing or contain fish habitat. This act could also apply if the construction of the facility were to impact fish habitat.

Committee of the Status of Endangered Wildlife in Canada and Species at Risk Act – This act provides legal protection of wildlife and their habitats, and applies to migratory birds, aquatic species, and terrestrial species. This act would apply if the proposed site selected for the facility contains endangered or protected species or their habitat.

Migratory Bird Convention Act – This act prohibits the disturbance to nests or nesting birds during breeding or nesting periods. This act would typically apply to the construction of a facility and may limit the construction periods if nesting birds are present.

Canadian Council of Ministers Environmental Quality Guidelines – These guidelines establish criteria, objectives, and standards for substances present in the environment and specially the *Canadian Water Quality Guidelines for the Protection of Aquatic Life*, *Canadian Water Quality Guidelines for the Protection of Agricultural Water Uses*, *Recreational Water Quality Guidelines and Aesthetics*, *Canadian Sediment Quality Guidelines for the Protection of Aquatic life* and *Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health* could potentially apply. These guidelines establish limits for potential contaminants in soil and water. These guidelines would apply to discharged melt water and melt pad soils.

2.2 Provincial Regulations

Water Act – the Water Act focuses primarily on the planning and enforcement of water use. The primary impact of this legislation is in the discharge of water from the facility and the disturbance of wetlands for construction. If the facility discharges to the natural environment the act will govern the quantity and quality of the melt water and if there are any wetlands present in the property prior to construction, which may require compensation.

2.3 Municipal Regulations

Land Use Bylaw – The Fort Saskatchewan Land Use Bylaw establishes the rules and regulations for land developments as well as the process for making decisions for development permitting. The land use bylaw will impact where the facility will be able to be constructed.

Community Standards Bylaw – the Fort Saskatchewan Community Standards Bylaw regulates the generation of noise. This bylaw could have an impact on the siting of the facility as the facility will generate noise overnight during normal operation and may be considered a nuisance.

Sewer Bylaw – The Fort Saskatchewan Sewer Bylaw regulates the quality of effluent that can be released into the municipal sewer system. Melt water from the facility that is discharged into the municipal sewer system, including surface ditches will need to adhere to the criteria outlined in the bylaw.

2.4 Provincial Guidelines

The Province of Alberta has a document, Snow Disposal Guidelines for the Province of Alberta (February 1994) which provides some guidance for the construction and operation of snow melt facilities. Other documents that were reviewed and provide additional guidance within the Canadian context includes:

- Saskatchewan Snow Dump Management Guidelines (August 2012)
- Syntheses of Best Practices - Road Salt Management - Snow Storage and Disposal (Transportation Association of Canada April 2013)

Both documents listed above are more current than the Alberta Guidelines and provide better detailed information.

3.0 Site Selection Criteria

When selecting a site for a snow melt and material handling facility it is important to recognize that there will be social, economic, and environmental impacts that will have to be identified and mitigated. A summary of the siting criteria that should be evaluated when selecting a facility location includes:

- Environmental Criteria
 - Soil/geology
 - Surface water
 - Ground water
 - Noise
- Economic Criteria
 - Land costs
 - Operation costs
 - Impacts to existing infrastructure.
- Social Criteria
 - Aesthetics
 - Land use compatibility
 - Zoning

3.1 Environmental Criteria

The primary environmental implication of the operation of a snow melt facility is managing the quality of the discharged melt water. The two most prevalent contaminants in melt water are chlorides, from road salt, and suspended solids, from road sand and erosion within the facility. Studies have shown that most of the salt applied to roadways is not retained in the snow that is removed to snow melt facilities, however, a small percentage is collected. There is no practical or economical way of removing chlorides found in snow, but chloride levels can be managed with detention and dilution within the stormwater management system. Suspended solids can also be treated with detention within the settling pond system.

There are guidelines that limit the concentration of chlorides in water that is discharged to the natural environment that can be challenging to meet for snow melt facilities. Water testing at other facilities has shown that chloride levels are generally limited to the initial spring melt which coincides with the highest storm system and stream flows allowing for the highest levels of dilution. A best practice to limit these risks is to site the snow melt facility in a location which allows for melt water to be discharged to a municipal stormwater system to allow for dilution prior to discharge to a natural environment and to have a set-back of 200m from any waterbody. Depending on the specific site, off-site upgrades to provide storm servicing may be required. It is the recommendation of Alberta Environment and Parks that snow melt facilities discharge water to municipal stormwater systems rather than natural streams or water bodies.

Another consideration is the risk of chloride infiltration to groundwater. The snow melt facility should be sited in a location with low soil permeability and areas within the site that are exposed to snow and melt water should be lined with impervious or low permeability material. A hydrogeological study may be necessary to determine if the site is appropriate for a snow melt facility. The melt pad should have at a minimum a 0.6m thick compacted clay liner constructed with soil that has a maximum permeability of 1×10^{-7} cm/s. Both surface and ground water monitoring programs should be implemented to track water quality.

Snow melt and material handling facilities generate noise from both truck traffic to the site and from equipment operating within the site. The nature of snow removal generally requires that significant work is conducted during the night therefore noise becomes a significant consideration. To mitigate noise concerns snow melt and material handling facilities should be located a minimum of 350m from any residence and haul routes should avoid residential areas. If there are residences in the vicinity of the facility, a noise study should be considered to quantify noise levels prior to the construction of the facility and after operations have commenced. Other ways to mitigate noise would be to install policies limiting trucks from using engine retarder brakes, banning trucks from banging tailgates while dumping and limiting or controlling the use of backup alarms on heavy equipment.

3.2 Economic Criteria

Locating snow melt facilities requires balancing different economic factors. It is desirable to have snow melt facilities located close to the areas being cleared to minimize hauling costs. Hauling costs are a major factor in snow removal operations. However, finding a land parcel that fits established budgets with good proximity can be challenging. A cost benefit analysis can be completed when evaluating sites to determine the overall construction and operation costs of each location to calculate the life cycle cost of the facility.

Another economic impact to be considered is the impact on existing infrastructure from the increased truck traffic. Haul trucks will reduce the life expectancy and increase maintenance costs for the roads that are used. Depending on the specific site, off-site upgrades to access roads may be required.

3.3 Social Criteria

Snow melt and material handling facilities are not aesthetically pleasing infrastructure, and this can be a factor in selecting potential sites. These facilities will generate noise, dust and litter. There is a risk that neighboring property owners may not be accommodating. It is recommended that a public engagement program be implemented to gauge public acceptance and to provide accurate information about the facility. To limit the aesthetic impacts of the facility, landscaping of the site, including berms and trees, should be considered to limit the visibility of the site. Fencing should be considered around the perimeter of the site to reduce litter from leaving the property.

When selecting a site, current zoning will need to be a consideration. A snow melt and material handling facility will be considered an industrial land use; therefore any site will need to be compatible with zoning.

4.0 Specific Site Design Considerations

Snow melt facilities consist of several interconnected components including access roads, melt pad, collection ditches and settling pond. Each component of the system has unique design challenges and design criteria.

Site Access – Snow melt facilities can experience significant traffic during snow clearing events. The site access and internal roads should be constructed to accommodate two-way traffic and to simplify internal movements, separate entrance and exit points can be provided. Depending on the specific design of the site, truck queuing may occur, and should be accommodated on-site to limit impact on adjacent public roadways. A street lighting warrant analysis should be completed to determine if additional street lighting is required at the site access points as there can be significant traffic generated during the nighttime. A limited access gate and site fencing should be considered to limit unauthorized access and dumping.

All weather Internal access roads should be provided through the site and to central dump locations. If a compacted clay liner is selected, then there can be access issues during early and late season when the ground may not be frozen and driving on the liner may not be possible.

Melt pad – Melt pads generally consist of a gently graded pad which directs melt water towards collection ditches and then to a settling pond. There are different design options for the construction of melt pads:

- Roller Compacted Concrete (RCCP) - This is the preferred surfacing material. The benefits of roller compacted concrete is that it is very durable and can withstand the loading of the snow pile and heavy equipment and is not susceptible to erosion, however it has a very high cost. Typical maintenance would involve sealing cracks that occur. The service life would be greater than 20 years, depending on the structural design.
- Asphalt Concrete Pavement (ACP) – Asphalt concrete pavement has been used in other facilities with limited success. Asphalt concrete pavement is resistant to erosion but is generally not durable enough to withstand the loading of the snow pile or the loading of the trucks and heavy equipment and the durability is impacted by the presence of chlorides. Depending on the structural design a service life of less than 20 years would be expected.
- Recycled asphalt (RAP) and granular base course (GBC) - These liners limit erosion but are not durable and can rut, requiring significant yearly maintenance and generally have high maintenance demands. RAP and GBC liners would need to be graded yearly. Removal of sand from the melt pad is also difficult as it mixes with the surface aggregate. RAP and GBC liners will become contaminated with chlorides and heavy metals and will need to have the surface material removed and replaced. The service life would be typically less than 10 years.
- Compacted Clay Liner - The other alternative is to use a compacted clay liner. Compacted clay liners typically consist of 0.6m to 1.0m thick liner constructed in thin lifts with clay with a permeability coefficient of not greater than 1×10^{-7} cm/s. The compacted clay liners have the benefit of having a low construction cost, but they do experience significant erosion, requiring yearly maintenance to regrade and recompact the surface, and for cleaning of sediment from the settling pond. Over time, compacted clay liners will become contaminated with chlorides and heavy metals and will need to have the surface material removed and replaced. The surface material would generally need to be disposed of at a facility that accepts contaminated soil. Compacted clay liners can also experience

operational issues during warm periods when the ground is not frozen. The service life would be typically less than 10 years.

The melt pad should be designed with grades between 0.5% to 1% to accommodate equipment working on the site, limit erosion and still allow for positive drainage to the collection ditches. Melt pads should be sited such that when snow is dumped and piled, the push face of the pile is in a south or west direction to promote faster snow melt. By increasing the rate of snow melt it can allow for more time in the summer/fall to complete any necessary maintenance.

Snow is typically dumped on the pad by haul trucks and dozers push the snow into the pile to maximize height. The pile can have up to 1:1 slope on the spill side and 5:1 slope on the push side. During melting operations, dozers are utilized to rip the surface of the snow pile to facilitate faster melting as sand and debris can form a crust which insulates the snow pile. Typically, the snow pile will last into late summer or early fall.

Collection Ditches – Collection ditches are used to collect the melt water and direct the melt water to the settling pond. Collection ditches experience near continuous flow during the melt season which prevents vegetation from establishing and therefore require armoring to limit erosion. During the peak melt periods significant water volumes are generated. Options for lining the ditches include HDPE liners, heavy rock rip rap and concrete. Ditches should be sized to simultaneously handle both melt water and storm events.

Settling Pond – Settling ponds are constructed to collect the melt water and stormwater generated by the site and improve the water quality prior to discharging off site. A settling pond should contain a forebay to allow for coarse material to settle prior to entering the primary pond. The primary pond should be sized to allow for 24 hours of detention and to handle a 25-year storm event. Baffles may be required to increase the detention time to allow for more sediment to be removed. Settling ponds should have the floor lined with roller compacted concrete to allow for the removal of sediment, especially in facilities with compacted clay liner melt pads as significant sediment can collect. An access road, paved with roller compacted concrete, should be provided to the base of the pond to allow equipment to access the floor. The sides of the pond should be lined with an HDPE geomembrane to limit exfiltration to the surrounding soils.

The outlet from the settling pond typically consists of a control weir and/or orifice. The control structure should be designed with a shut off gate to allow the settling pond to be isolated in the event there is a contaminant spill on site. An oil/Grit separator should be installed downstream of the control structure to provide final polishing of the discharged water.

The settling pond should ideally be discharged to a municipal storm sewer system. The melt water will have elevated chloride levels during the early melt season which may not meet federal or provincial guidelines. If melt water is discharged to a municipal sewer system, then it would need to meet the discharge criteria as outlined in the Sewer Bylaw. Within the sewer system the melt water would experience dilution prior to being discharged.

Material Handling – Material handling sites will generally consist of a graveled area that will allow for the all-weather movement of trucks, loaders and operation of a crusher. Area requirements will be specific to the crushing equipment that is used. Sufficient area will also need to be provided for raw material and processed material stockpiles. The truck traffic and crushing operation generates noise, therefore it should be located to minimize impacts to adjacent properties. The material handling site should be surfaced with gravel or asphalt millings (RAP) to reduce contaminating the stockpiles with clay and dirt and allow all-weather operation.



5.0 Concept Design and Cost Estimate

An example concept layout and construction cost estimates are provided for both a combined snow melt and material handling facility and a standalone material handling facility. The design concepts were based on requirements provided through discussions with City staff. For the snow melt facility, staff identified that there would be an estimated demand for approximately 250,000m³ of snow storage today if there was a city facility. To accommodate growth in the 50year time horizon the design size was doubled to be able to accommodate 500,000m³ of snow. The material handling site was based on the requirement for four aggregate piles containing up to 5000 t and sufficient space to operate an aggregate crusher. Additional requirements included a hydrovac dump pad and an additional 5ha for future expansion.

There is value to the City in locating both facilities on the same parcel of land due to similar transportation needs, siting requirements (noise, dust, etc.), shared security, and reduced space requirements as some areas can be shared in off seasons. However, due to land availability, it may not be possible to obtain a parcel meeting the combined requirements. The requirement for the snow melt facility to have sufficient stormwater capacity, and the need for a larger combined site may make finding an acceptable parcel difficult. If the sites are split between locations, additional land would be required to meet the design criteria due to the expected efficiencies realized by having a shared site.

The design concept shows a possible layout of the proposed facility and provides a general size to provide guidance for acquiring an acceptable property. Once a site is selected a site-specific design and layout will be required. The concept design and cost estimate were based on the following parameters:

- Melt pad capable of storing 500,000 m³ of snow.
- Lined collection ditches.
- Settling pond with roller compacted concrete floor and HDPE lined walls, outlet structure and oil/grit separator.
- Hydrovac Dump pad lined with roller compacted concrete.
- General equipment storage yard surfaced with gravel.
- Stockpile area capable of storing 4 aggregate piles of 5000t.
- Material handling/staging area for the dumping and crushing of aggregate material surfaced with gravel.
- Additional space for future expansion

The cost estimate is based on 2023 pricing but due to the nature of the material specified, such as roller compacted concrete, there can be significant price fluctuations. The cost estimates are shown in **Table 1 – Combined Site Cost Estimate** and **Table 2 – Material Handling Site Cost Estimate**. Assumptions used for the cost estimate include:

- In-situ material will be acceptable for the compacted clay liner and no offsite fill material will be required. All grading material will remain on site.
- Melt water will be able to be discharged at the property boundary and additional storm piping will not be required.
- No offsite cost allowances were included, such as road upgrades.
- Aggregate stockpiles were sized to be piled with dozers or loaders.



For the combined site cost estimate, three options were provided with differing melt pad liners, and collection ditch liners. The options provided were:

- Melt pad with compacted clay liner, and HDPE lined ditches.
- Melt pad with a hybrid liner, 50% compacted clay and 50% roller compacted concrete and concrete lined ditches.
- Melt pad with roller compacted concrete and concrete lined ditches.

An additional option that could be considered includes staging the melt pad such that only a small portion is lined with a hard surface at initial construction. This would allow for snow to be piled in this area in most years and would allow for costs of a larger melt pad being deferred.



6.0 Operational Costs

To estimate the operational costs of a clay lined snow melt facility, Strathcona County was contacted as their facility would be a similar configuration to what the City would require. The Strathcona County facility is designed for 1,000,000 m³ of storage. The County does not track all costs as some work is performed by their own forces, but the costs presented below indicate the order of magnitude of the costs. The approximate operational costs include:

- \$300,000 per year to stack snow (dozers). This number has varied from \$150,000 - \$600,000 depending on the amount of snow hauled to the site.
- \$150,000/year for site maintenance. This includes cleaning of the storm pond by pumping the water out and removing built up sediment, maintenance of the oil/grit separator and general repairs.
- \$50,000/year for melt pad maintenance. This includes removal of debris left over from the snow pile and regrading pad to remove ruts.

Overall, Strathcona County spends approximately \$500,000 per year operating their facility. This cost does not include major capital improvements such as reconstruction of the melt pad liner. As a further comparison, the City of Edmonton operates 4 large sites and had costs of \$3.2 million in 2021, which works out to \$800,000 per year per site in operating costs. The proposed facility for the City would be very similar, though smaller, than the Strathcona County facility. Based on the above example, it is estimated that operational costs will be approximately \$300,000 per year. Major capital improvements would be in addition to this amount.

Currently, the city of Fort Saskatchewan hauls snow predominantly to the Strathcona County facility and if that facility is unavailable, to the City of Edmonton Horse Hills facility. The City has an agreement with Strathcona County that is based on 2000 loads per year at a cost of \$12 per load for a total of \$24,000/year, although this volume does vary from year to year as dump fees were approximately \$50,000 for the 2021/22 winter season.

While there are going to be increased capital and operating costs to having a city owned snow melt facility there will also be cost and operational benefits as well.

A cost that is significantly impacted by the location of the snow melt facility is trucking. The amount of snow clearing can vary significantly by year. In the 2022-23 snow clearing season, the city hauled from both residential and commercial areas. From residential areas the City hauled for 21 days for a cost of \$397,824, which consisted of \$148 per hour for trucking, 16 trucks, 8 hours per day and 21 days of hauling. From the downtown commercial area, the City hauled for 10 days for a cost of \$71,040, which consisted of \$148 per hour for trucking, 6 trucks, 8 hours per day, 10 days of hauling. The total cost of snow hauling in 2022-23 was \$468,864.

There would be a reduction in trucking costs with a city owned facility, which will vary with the specific location. In the snow clearing operation trucks spend time at the loading location, driving, and at the unloading location. The return trip from the center of Fort Saskatchewan to the Strathcona County facility is approximately 48km. A city owned facility would likely reduce the return trip haul distance to approximately 15km. Assuming an average speed of 80km/h to the Strathcona County facility due to mostly 4-lane highway routes and 50km/h for a city owned facility, due mostly to local road routes, there would have been a saving of approximately 18 min per truck load which results in a saving of \$44 per load. If a typical year is 4000 loads that would result in a total savings of approximately \$176,000 per year on trucking costs.

Reducing the trucking distance has the benefit of lower costs as well as reduced traffic and reduced risk with having less trucks on the road. The costs will be reduced for private operators as well, which will result in lower costs to remove snow for private commercial and residential taxpayers.

Another potential cost benefit will be having the facility open to dumping from other municipalities and private users. While other municipalities such as the City of Edmonton, do not charge private companies to dump snow, they are considering the possibility. Depending on the rates they use there may be demand to haul snow to a city owned facility if the rates are competitive.

An operational benefit of a city owned facility would be that the City would have control of the facility and of haul routes to and from the site. This would remove the risk of other jurisdictions restricting use of their facilities to the City of Fort Saskatchewan or altering/restricting truck haul routes.

Another operational benefit is that snow clearing could be increased due to the reduced per load cost. This could result in more roads being cleared, reducing the amount of snow that is stockpiled in the boulevard. This would have the benefits of increasing the aesthetics of the community as unsightly snow piles could be removed as well as safety benefits as sightlines would be improved for both motorists and pedestrians.

If the City of Fort Saskatchewan were to construct a city owned snow melt facility the estimated costs will be:

- ◆ \$4,000,000 for land.
- ◆ \$5,700,000 to construct facility
- ◆ \$300,000 per year for operational costs

The benefits would be:

- ◆ \$50,000 per year in savings from dump fees at the Strathcona County Facility
- ◆ \$176,000 per year in savings from reduced trucking costs
- ◆ Reduced number of trucks on roadways due to shorter haul distance

6.1 Material Handling Facility

The estimated operational costs of the new material handling facility will be similar to the costs incurred at the current location. These costs are included in the current operating budget and therefore there would be minimal change. The only additional cost that may be incurred would be power for lighting if the new site is illuminated.



Construction Cost Estimate

Project: Fort Saskatchewan Snow Melt Facility Concept
Client: City of Fort Saskatchewan

Date: December 21, 2023
Job No.: 114-027

Option A - Clay Liner					Option B - RCC Liner					Option C - Hybrid Liner (50% RCC/50% CCL)				
Item	Rate	Unit	Quantity	Total	Item	Rate	Unit	Quantity	Total	Item	Rate	Unit	Quantity	Total
Construction														
Topsoil Stripping	\$5.00	m3	75000	\$ 375,000	Topsoil Stripping	\$5.00	m3	75000	\$ 375,000	Topsoil Stripping	\$5.00	m3	75000	\$ 375,000
Grading	\$7.00	m3	150000	\$ 1,050,000	Grading	\$7.00	m3	150000	\$ 1,050,000	Grading	\$7.00	m3	150000	\$ 1,050,000
Pond Liner Bottom (RCC)	\$230.00	m2	3000	\$ 690,000	Pond Liner Bottom (RCC)	\$230.00	m2	3000	\$ 690,000	Pond Liner Bottom (RCC)	\$230.00	m2	3000	\$ 690,000
Pond Liner Sides (Membrane)	\$17.00	m2	10000	\$ 170,000	Pond Liner Sides (Membrane)	\$17.00	m2	10000	\$ 170,000	Pond Liner Sides (Membrane)	\$17.00	m2	10000	\$ 170,000
Pond Liner Curb	\$150.00	m	250	\$ 37,500	Pond Liner Curb	\$150.00	m	250	\$ 37,500	Pond Liner Curb	\$150.00	m	250	\$ 37,500
Pond Outfall Structure	\$360,000.00	ls	1	\$ 360,000	Pond Outfall Structure	\$360,000.00	ls	1	\$ 360,000	Pond Outfall Structure	\$360,000.00	ls	1	\$ 360,000
Gravel Surfacing	\$32.00	m2	30000	\$ 960,000	Gravel Surfacing	\$32.00	m2	30000	\$ 960,000	Gravel Surfacing	\$32.00	m2	30000	\$ 960,000
Misc Erosion Control	\$50,000.00	LS	1	\$ 50,000	Misc Erosion Control	\$50,000.00	LS	1	\$ 50,000	Misc Erosion Control	\$50,000.00	LS	1	\$ 50,000
Misc Landscaping	\$100,000.00	LS	1	\$ 100,000	Misc Landscaping	\$100,000.00	LS	1	\$ 100,000	Misc Landscaping	\$100,000.00	LS	1	\$ 100,000
Ditch Liner - HDPE	\$300.00	m	300	\$ 90,000	Ditch Liner - RCC	\$400.00	m	300	\$ 120,000	Ditch Liner - HDPE	\$300.00	m	300	\$ 90,000
Melt Pad - Compacted Clay	\$2.50	m2	45000	\$ 112,500	Melt Pad - RCC	\$200.00	m2	45000	\$ 9,000,000	Melt Pad - 50% RCC	\$200.00	m2	22500	\$ 4,500,000
Fencing/Gates	\$20.00	m	1650	\$ 33,000	Fencing/Gates	\$20.00	m	1650	\$ 33,000	Melt Pad - 50% Compacted Clay	\$2.50	m2	22500	\$ 56,250
Site Building	\$30,000.00	LS	1	\$ 30,000	Site Building	\$30,000.00	LS	1		Fencing/Gates	\$20.00	m	1650	\$ 33,000
				\$ -					\$ -	Site Building	\$30,000.00	LS	1	\$ 30,000
Sub-Total				\$ 4,058,000					\$ 12,945,500					\$ 8,501,750
Engineering (@10%)				\$ 405,800					\$ 1,294,550					\$ 850,175
Contingency (@30%)				\$ 1,217,400					\$ 3,883,650					\$ 2,550,525
Sub-Total				\$ 1,623,200					\$ 5,178,200					\$ 3,400,700
Total		OPTION A		\$ 5,681,200		OPTION B			\$ 18,123,700		OPTION C			\$ 11,902,450

Notes:

- Estimated quantities for a 500,000m3 storage facility
- Potential off-site costs are not included
- Roller Compacted Concrete (RCC) price includes gravel base and subgrade prep

Table 1 - Combined Site Cost Estimate



Construction Cost Estimate

Project: Fort Saskatchewan Material Handling Facility
 Client: City of Fort Saskatchewan

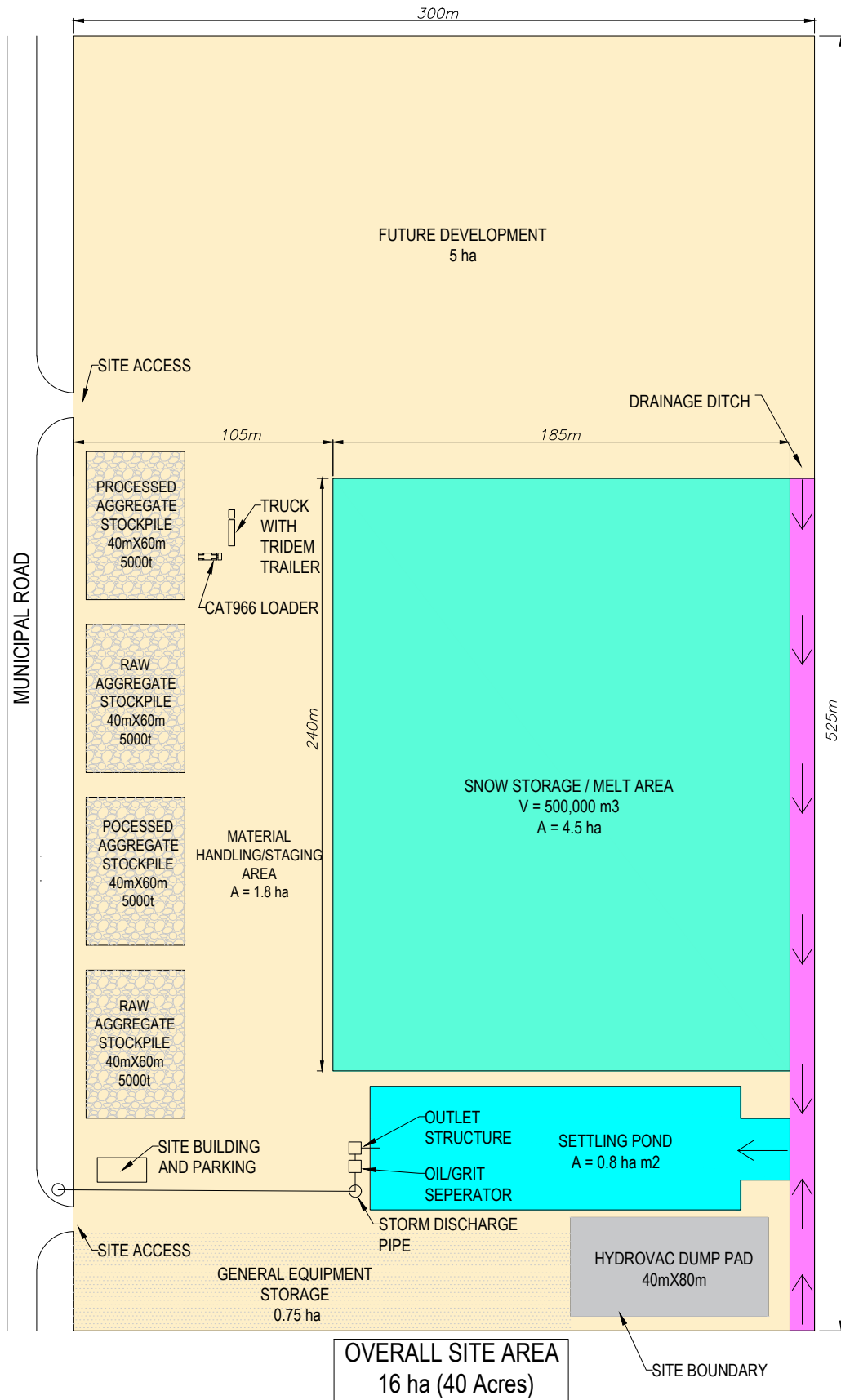
Date: Dec 21, 2023
 Job No.: 114-027

Item	Rate	Unit	Quantity	Total
Construction				
Topsoil Stripping	\$5.00	m3	10000	\$ 50,000.00
Grading	\$7.00	m3	10000	\$ 70,000.00
Gravel Surfacing	\$32.00	m2	25000	\$ 800,000.00
Fencing/Gate	\$20.00	m	800	\$ 16,000.00
Illumination	\$50,000.00	LS	1	\$ 50,000.00
				\$ -
Sub-Total				\$ 986,000.00
Engineering (@10%)				\$ 98,600.00
Contingency (@30%)				\$ 295,800.00
Sub-Total				\$ 295,800.00
Total				\$ 1,281,800.00

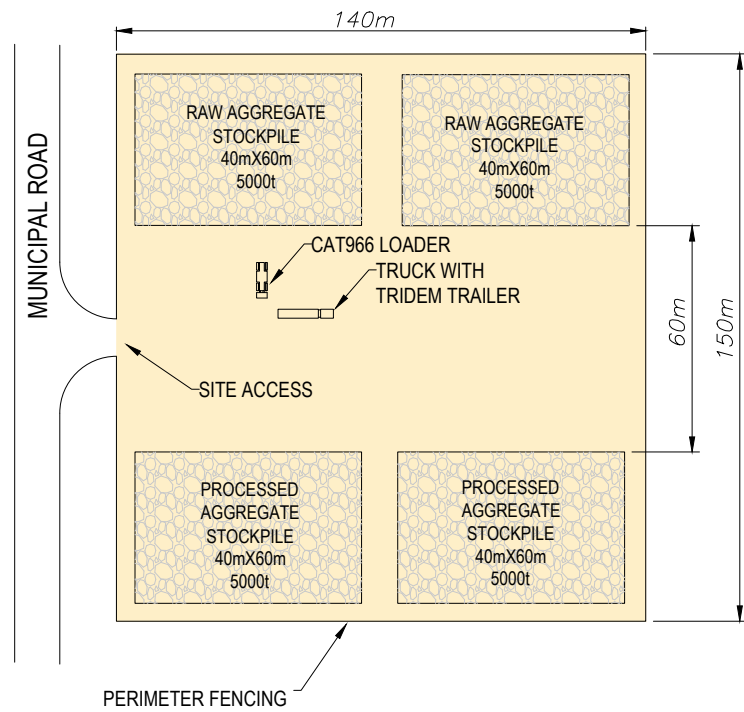
Notes:

- Estimated quantities for a 2.5 ha facility
- Potential off-site costs are not included

Table 2 - Material Handling Site Cost Estimate



SNOW DUMP & MATERIAL HANDLING SITE		
DRAWN BY: JRP	CHECKED BY: FDG	CONCEPTUAL PLAN
JANUARY 2024		
		Plan No. 1 of 1



OVERALL SITE AREA
2.1ha (5.2 Acres)



MATERIAL HANDLING SITE		
DRAWN BY: JRP	CHECKED BY: FDG	CONCEPTUAL PLAN
JANUARY 2024		Plan No. 1 of 1

7.0 Recommendations

Based on discussions with the City of the Fort Saskatchewan and provided information, the City requires a facility that will be able stockpile and manage snow removed from city streets and properties for a 50-year design life, store and process recycled construction materials, provide a hydrovac dump pad, have an equipment laydown area and allow for future expansion. To meet these requirements the facility should meet the following criteria:

- A combined facility be approximately 16 ha in size.
- A standalone material handling facility be approximately 2.5ha in size.
- The working face of the snow storage pile should face south to maximize melting potential.
- The site should be located close to existing truck access roads and a minimum of 350m from residences.
- The site should have access to the municipal storm water system with sufficient available capacity.
- Geotechnical conditions need to be able to accommodate the melt pad and settling pond.
- The site should be able to operate 24h a day.
- The site should not have any noise restrictions.
- The site should be flat to minimize grading costs.
- Zoning of site to allow for this type of facility.

Based on the operational costs that the City of Fort Saskatchewan currently spends to haul snow to facilities operated by Strathcona County and the City of Edmonton, it will not be cost effective to own and operate a city owned facility at this time. The upfront capital costs will be approximately \$4,000,000 for land, \$5,700,000 for the construction of the facility, and approximately \$300,000 per year to operate. The yearly costs to maintain the current arrangement with Strathcona County are approximately \$25,000 - \$50,000 and additional trucking costs of approximately \$176,000. If dump fees increase, or access is restricted, a city owned and operated facility could be further investigated.

Replacement of the existing material handling site should be pursued. The existing site is poor as it is located close to residential areas, was not formally designed or graded, located close to Ross Creek and is not large enough to handle the amount of material that is required. A new facility should be located in an industrial zoned location and could provide additional space for storage of City equipment.

The City could consider a parcel that is large enough to construct a snow melt facility in future. Having the two sites co-located would have operational benefits and there is value in securing land today if it is available. The size and uniqueness of the site's requirements could prove difficult to acquire in the future, therefore if an acceptable parcel is available today it should be considered.