



# Urban Forest Management Strategy

Town of Altona, Manitoba

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## Executive summary

The Town of Altona's Urban Forest Management Strategy is the first of its kind for the Town. It is a 20-year strategy focused on sustainable growth and management of the Town's urban forest. Currently, the Town consists of approximately 4,524 publicly owned trees, with a canopy cover for the entire town of 10.18% and \$127,619 in annual ecological benefits. With a drive to increase canopy cover and improve maintenance of its urban forest, the Town of Altona has committed to sustainable urban forest management.

The Town and its residents know that trees make Altona a better place to live. With threats from invasive species, climate change, insects and diseases the need for a comprehensive management strategy that addresses the Town's challenges and helps it move toward its urban forest goals is necessary.

The Altona Urban Forest Management Strategy takes the Town from now into the future with concrete objectives and strategic actions that will help preserve and enhance Altona's tree canopy to at least 15% by 2045. The plan covers regulatory, outreach, maintenance, enforcement, and tree health recommendations while maintaining flexibility for upcoming challenges.

## 1. Background

### 1.1 Historical Context

The Town of Altona sits within the ancestral and traditional territory of the Anishinaabeg, Ininew, Anishinew, Dakota and Dene Peoples, and the Red River Metis nations of southern Manitoba, signed Treaty 1 (1871) the Peguis-Selkirk Treaty.

Historically, Altona was a natural prairie with a climate that did not support many trees. Trees were rare in the area until the development of towns and cities in the area. Mennonite settlers from Russia moved to the area and settled in Altona in 1880. The area was predominantly used as farmland by the settlers until it grew large enough for the incorporation of the Town in 1956. Currently, Altona boasts a population over 4,300 and is known as the “Sunflower Capital of Canada.” It hosts an annual Sunflower Festival among other attractions.

### 1.2 Definition of an Urban Forest

An urban forest is defined as “trees, forests, greenspace and related abiotic, biotic and cultural components in areas extending from the urban core to the urban-rural fringe” by the 2019-2024 Canadian Urban Forest Strategy (CUFS) with urban forestry being defined as “the sustained planning, planting, protection, maintenance, management and care of trees, forests, greenspace along with related resources in and around cities as well as communities for economic, environmental, social, and public health benefits for people.” [12]

These definitions embody the three pillars of sustainable forest management: environment, economy, and society. All three pillars need to work together to create a thriving urban forest.

### 1.3 Purpose of the Urban Forest Management Strategy

The purpose of this Urban Forest Management Strategy is to provide the Town of Altona with a guiding document for the management and growth of their urban forest. This strategy covers suggestions for increasing the canopy cover within the Town, as well as tree planting and policy recommendations to help the Town reach their goals. This strategy encompasses the following objectives:

- Establish the vision, methodology and framework for managing the Town’s urban forest

- Analyze the existing canopy cover and the benefits of trees and other related factors while providing canopy cover and biodiversity goals for future urban forestry growth with development strategies.
- An operational roadmap with action steps for effective and efficient management of the urban forest over a 20-year implementation period.
- Include pest and disease management practices as well as recommendations for a management of the pest.
- Recommendations on by-laws, policies and possible enforcement measures with maintaining and planting trees on public/private lands.
- Create a monitoring plan that will address the effectiveness of the plan and how success will be measure.

## 1.4 Vision Statement

The Town of Altona is committed to the sustainable management of a thriving and diverse urban forest, which it aims to expand and make resilient to the changing climate.

## 1.5 Benefits of the Urban Forest

Urban forests create many benefits, including social, environmental, and economic. The social benefits of trees include aesthetics, creating areas of leisure, and social equity. The environmental benefits include climate change mitigation, stormwater runoff mitigation, water retention, wildlife habitat and air purification. The economic benefits include reduced costs of electricity for heating and cooling homes, increase property values.

Early settlers in the area planted windbreaks and hedgerows to help with the harsh environment. These barriers provided shade in the summer, insulation in the winter, and a screen from strong winds. Some of these still stand today and provide privacy and a reprieve from the wind and sun in Centennial Park, the Town's largest public park.

## 1.6 Threats to the Urban Forest

An urban forest is a dynamic and interactive ecosystem of working parts that include humans, trees, animals, insects, pests, and microorganisms. The urban ecosystem is at risk to the environmental impacts from a warming climate, as well as the new emergence of invasive pests that have no natural predators in the area. To stay healthy and vigorous, trees require routine maintenance in the form of regular inspections, watering, pruning, and/or fertilizing. Trees also require a certain level of soil quality and growing space. However, urban trees are often stressed by environmental factors such

as soil compaction, lack of growing space, pollution, and mechanical injuries. Restricted growing spaces within boulevards and urban landscapes only amplify these adverse effects, presenting a greater need for intervention.

## 1.7 Tree-Related Issues

Along with the many benefits provided by trees, they can also create some issues. Trees grow in a variety of difficult conditions and can damage infrastructure if both are not maintained properly. They can be hazardous to the public when limbs split or break. The pollen, fruits, leaves, and cones of trees can cause a mess which requires maintenance, and some people can have allergic reactions to them.

Many of the issues associated with trees can be mitigated by taking care when selecting planting locations and species. Other issues can be mitigated through regular monitoring and maintenance. The creation of and follow-through with a management strategy can help reduce the issues that can arise from trees within an urban forest.

## 2. Current State of the Urban Forest

### 2.1 Policy Context

The policies that protect and impact trees and forests in both urban and non-urban environments in Canada are not just about trees, but about the flora and fauna that surround them. Federal policies that impact urban forests include Species at Risk Act, Migratory Birds Convention Act, and the Plant Protection Act. In Manitoba, the Forest Health Protection Act and The Plant Pests and Diseases Act both impact urban forests as well. With multiple layers of government working together, Altona benefits from a web of policy to help protect its urban forest.

The Town of Altona does not currently have a Public or Private Tree By-law. Trees are mentioned in their Water Conservation By-law (By-law No. 1795/2021) as it pertains to the four stages of water conservation [6]. Trees are also mentioned in the Town's Fees and Charges By-law (By-law No. 1783/2020) under Schedule "B" – Public Works Department Fees & Rates, as a per tree reforestation fee [7]. Tree condition is not currently enforced under the Town's Property Standards By-law (By-law No. 1823/2025) [8].

### 2.2 Service Levels

The Town of Altona is currently undergoing internal changes to better document urban forestry-related tasks. Currently, maintenance requests from the public are made by phone or online and dealt with on a priority basis. Based on interviews with Town staff, work orders created by maintenance requests have a 100% completion rate. However, the Town does not currently employ a work order management system and is looking to create a proactive maintenance system to better manage their urban forest assets.

Currently, urban forestry activities are undertaken by Public Works and Parks staff and there is no Urban Forestry/Arboriculture department within the Town of Altona. There are currently no forestry-designated staff nor any Certified Arborists on staff. Tree pruning and stump grinding is performed on an as-needed basis when time permits, and juvenile tree watering is done once per week by seasonal staff in the summer.

### 2.3 Urban Forest Management Strategy Survey

A total of 193 people (approximately 4.3% of the Town population) responded to the Urban Forest Management Survey.. The survey was posted on the Town of Altona's

webpage for residents and visitors to participate. While participation in the survey was available to visitors, responses were predominantly from residents.

The survey was available for 3 weeks in late March to early April 2025. The survey was incentivized by the Town with a prize pack for the Town’s Aquatic Centre valued at \$300+. It was advertised through multiple channels including the Town’s website, social media, as well as directly through community organizations, posters in community spaces, and an insert that was mailed/emailed out with all utility bills.

### Are you a resident of Altona?

● Yes, I live in Altona	168
● No, I don't live in Altona, but I ...	15
● No, but I visit occasionally	10
● No, and I don't visit.	1



### 2.3.1 Policy-related question responses

<u>Survey Question</u>	Percentage (%)				
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I would like selected green spaces in parks and Town-owned lands to be rehabilitated into a native environment (natural prairies, parklands, or forest habitats).	23.3	33.2	23.3	15.5	4.7
Trees are very important to me	66.3	28.0	4.7	0.0	1.0
I would like more trees to be planted throughout the Town in parks and cemeteries.	39.9	45.1	13.5	0.5	1.0
I would like more trees to be planted throughout the Town on Town-owned land along roads and streets.	38.9	41.4	15.0	2.1	2.6
I would be willing to have a tree planted on my property if some of the cost was subsidized.	33.2	33.2	22.3	7.8	3.6
I think the town is doing an excellent job in maintaining the urban forest.	20.7	72.5	19.2	4.7	1.6
I believe more public money should be spent on the urban forest and park care.	20.2	31.1	39.4	7.8	1.6
I believe property owners should have to get a permit to remove certain trees on private property.	14.5	14.0	22.8	26.9	21.8
I believe property owners should be required to plant replacement trees when a healthy tree is removed.	24.3	18.6	21.2	24.3	17.6

### 2.3.2 Public perception of tree benefits

<b>Benefit</b>	<b>Percentage (%)</b>				
	<b>Very Important</b>	<b>Important</b>	<b>Neutral</b>	<b>Not Important</b>	<b>Not Important at all</b>
Reduce energy costs (trees provide shade and wind protection which reduces the need for cooling and heating)	45.1	47.1	7.3	0.5	0.0
Stormwater (trees intercept water to improve drainage and reduce erosion)	44.0	45.6	9.8	0.5	0.0
Wildlife and biodiversity (trees provide food and nesting habitat to wildlife)	55.9	33.2	9.8	1.0	0.0
Food (fruit trees can be a source for local, sustainable food)	36.3	40.9	19.7	2.1	1.0
Aesthetic (trees are green infrastructure that offer year-round visual appeal)	49.2	45.1	4.1	1.6	0.0
Real estate (large trees can increase property values and increase foot traffic for businesses)	24.3	40.4	28.0	6.2	1.0
Air quality (trees filter pollutants to improve air quality)	61.6	32.1	4.1	2.1	0.0
Climate change (trees sequester carbon which helps mitigate the effects of climate change)	25.3	32.6	10.4	3.1	5.2
Community wellbeing (trees and nature reduce stress and promote outdoor recreation)	25.3	30.0	7.3	1.0	0.5

### 2.3.3 Summary of Comments

<b>Main Comment Topic</b>	<b>Number of Comments</b>
Generally Positive	81
Tree Planting	56
Maintenance Concerns	24
Tree Replacement	11
Increase Fruit Trees	3
Public Outreach/Education	8
Species Diversity	7
Plant Health Care	3
<b>Grand Total</b>	<b>193</b>

### 2.3.4 Interpretation of Results

- 1) 94% of participants find trees to be somewhat or very important to them. This suggests a strong civic desire to see more trees in one's community.
- 2) Overall positive feedback was given on general urban forest management. A lack of strong responses suggests the town's intervention in managing the urban forest may stand to be increased through more proactive programs, extra communication, or more visible indicators, such as notices being sent informing of upcoming tree plantings, pruning, or removals.
- 3) Residents expressed a favorable opinion towards prairie and parkland rehabilitation in some green spaces and parks. This provides for an easy path towards increasing canopy cover in currently open-soil or grass-covered areas of parks.
- 4) A desire for increased tree planting throughout the Town-owned properties and rights-of-ways. This suggests a high floor of public support for increasing planting programs that would be required to meet canopy cover targets over the next 10-20 years.
- 5) Tree maintenance concerns were focused on removing hazardous branches and trees, and planting additional trees. This further suggests that the public would broadly support future additional planting programs and ensuring trees that are removed on public property are replaced in a timely manner.
- 6) The public generally finds most benefits of trees to be very important to them. However, support was softer in the context of real estate values, climate change, and providing agricultural or community wellbeing benefits. This suggests that residents would rather see larger, more shade-providing trees in their community which help provide cleaner air and energy cost reductions through added shade.
- 7) The survey found neutral-to-negative feedback on private property limiting policies in relation to trees (i.e. required planting, removal permits). This may indicate a greater need for careful consideration before proposing a regulatory framework for planting on private property. Planting programs may want to focus on public spaces first.

## 3. Tree Inventory and Analysis

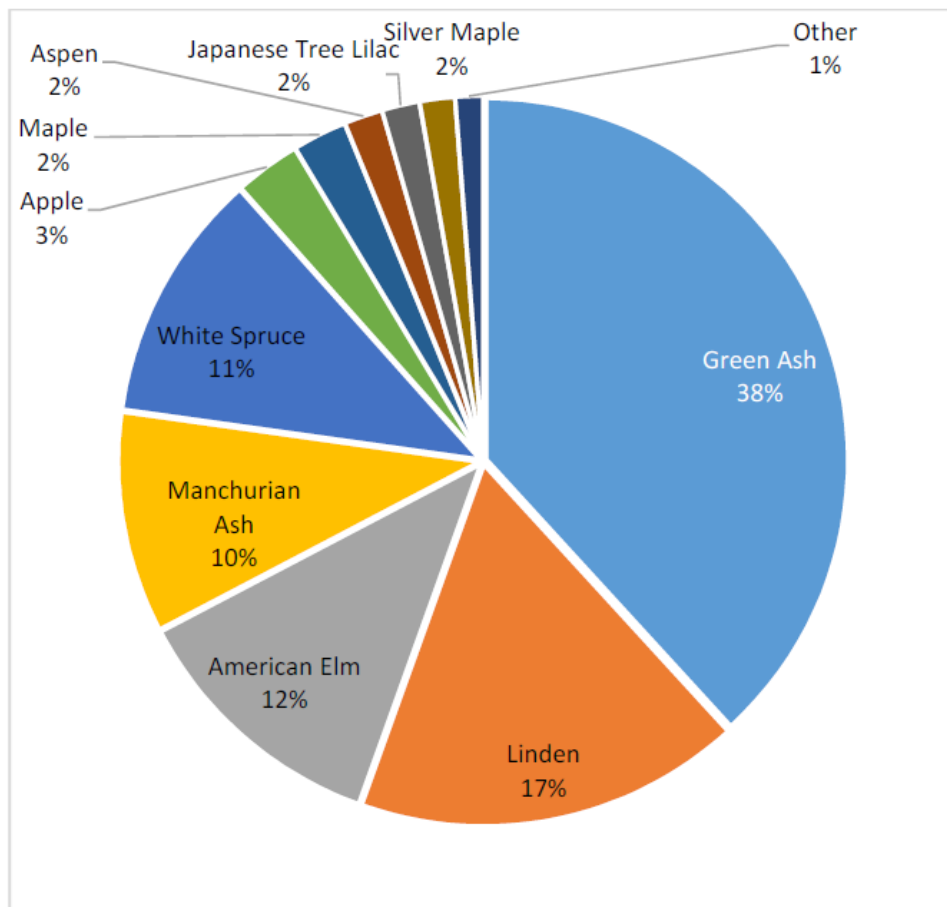
### 3.1 Tree Inventory Background

The Town of Altona undertook a tree inventory in October 2021. The inventory was performed by Green Drop Ltd. who collected information on tree location (GPS), species, diameter at breast height, health condition, location condition, and preliminary risk assessment following ISA Tree Risk Assessment Qualification (TRAQ) guidelines. Tree valuation calculations were made in the report following the Council of Tree and Landscape Appraisers (CLTA) formula.

### 3.2 Urban Forest Profile

#### 3.2.1 Species Composition

The inventory by Green Drop Ltd. collected 4,524 trees on Town-owned property within the municipal limits of Altona. There were 40 different species found, with the top 10 making up 92% of the inventory.

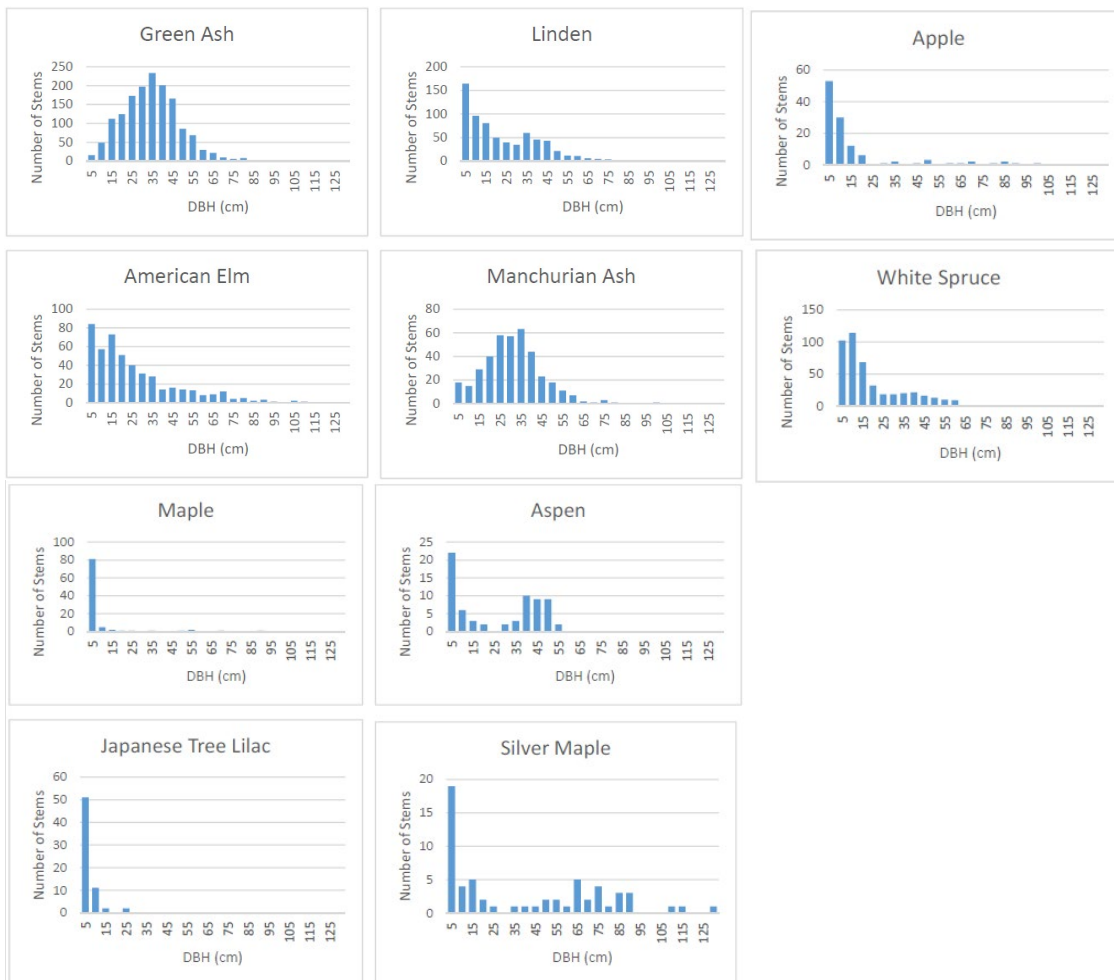


Species composition [1]

### 3.2.2 Size Distribution

The ideal size class distribution is known as a “reverse J curve” distribution or uneven-age distribution [9]. The reverse J-curve size class distribution emphasizes having a large number of small trees to replace mature trees, as mortality in young trees is often higher than mature trees [10][11]. This ensures there are enough trees available to reach maturity and provide the community and environmental benefits associated with large/mature trees. It is recommended to have 40% of the urban forest tree population as small diameter trees (under 20 cm) with 10% of the population as larger diameter trees (over 60cm).

It was found that in Altona 59% of inventoried trees had a diameter at breast height (DBH) of 30 cm or smaller; 36% were found to be under 20 cm DBH; and 23% were found to be under 10 cm DBH [1]. This distribution is very close to the recommended size class distribution. Increasing canopy cover will require both planting a large number of trees as well as maintaining existing trees for as long as possible.



Size distribution of the top 10 trees species [1]

### 3.2.3 Canopy Cover







A study of the Town's canopy cover was undertaken in 2021 using protocols based on the USDA's i-Tree Eco field plot methodology. Random plots of canopy coverage were sampled in the field across the entire town to determine an overall canopy percentage and later the same plots were assessed to observe changes in canopy coverage. The analysis found that the overall canopy cover was 12%. [1]

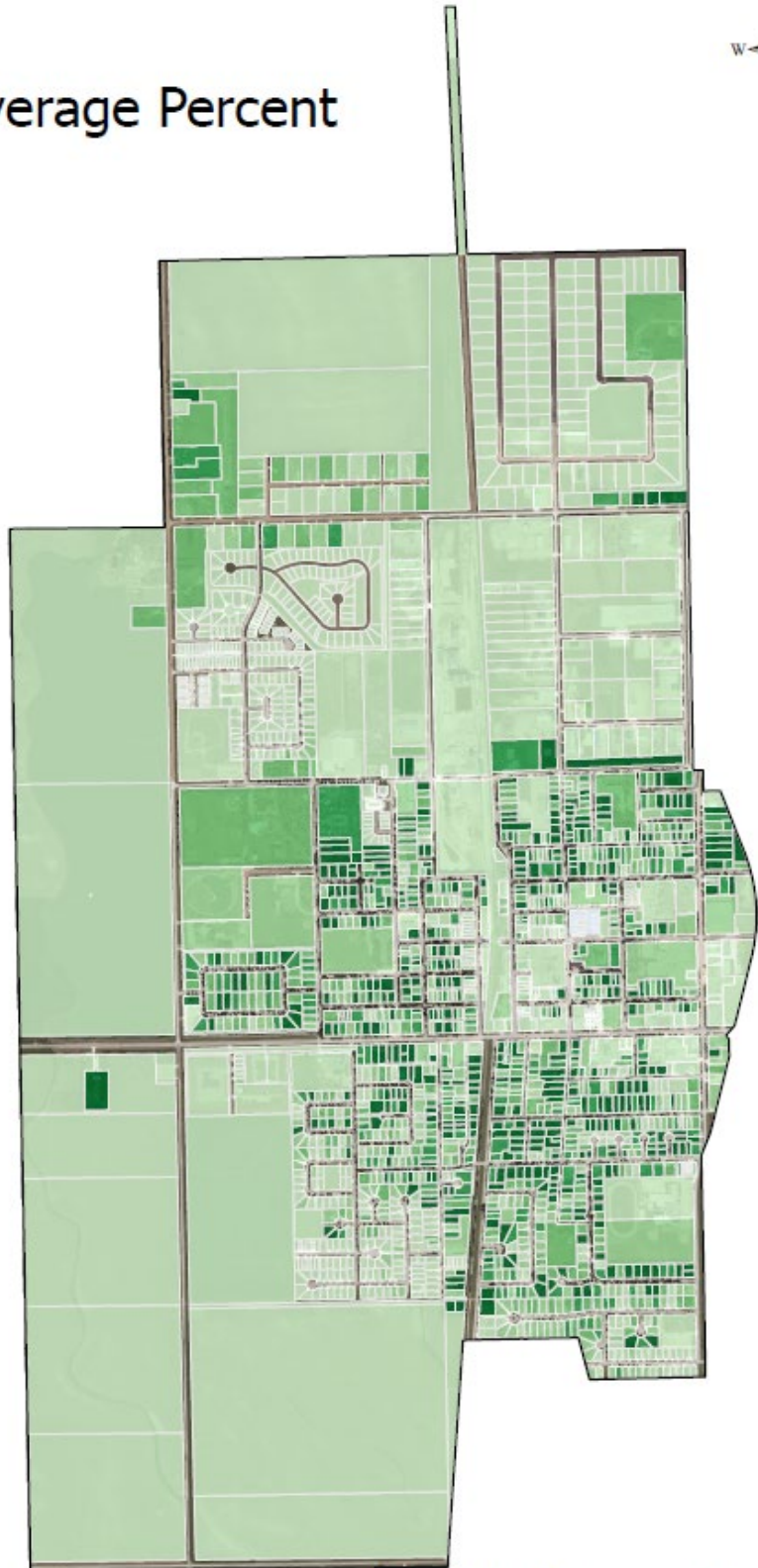
An additional assessment using remote sensing techniques to analyze the current health of the Town's existing canopy and land use was also recently completed in 2025 by Davey Resource Group. Davey Resource Group utilized an object-based image analysis (OBIA) semi-automated feature extraction method to process and analyze current high-resolution color infrared (CIR) aerial imagery and remotely sensed data to identify tree canopy cover and land cover classifications. The figure obtained was 10.18% total canopy coverage. This differed from the previous study from 2021 which estimated a 12% canopy coverage [1]. The study with the higher value used extrapolated data from ground-level canopy measurements at random sampling locations. The lower value was obtained using remote sensing data. Remote sensing allows for inaccessible areas such as private properties and buildings to be included in the total canopy coverage estimate while ground-level surveys may not accurately factor those areas into their estimates.

Utilizing leaf-on satellite and aerial imagery, NDVI (Normalized Difference Vegetation Index) methodology was used to assess canopy cover across the entire Town. Our analysis identified the canopy cover of the overall Town at 10.18%. This value was lower than the i-Tree study, which may be due to the weighting of the NDVI which accounts for vegetation density and foliage health that may not be captured in an i-Tree survey.

# Altona, MB 2024 Canopy Coverage Percent By Lot Parcel



-  Town Boundary
- Canopy Percent
  -  Below 10%
  -  10% to 20%
  -  20% to 30%
  -  30% to 40%
  -  Above 40%



## 3.3 Urban Forest Benefits

### 3.3.1 Ecosystem Benefit Analysis

The ecosystem services for air quality, carbon storage and sequestration, and storm water retention were calculated using i-Tree Canopy version 7.1.

#### 3.3.1.1 Air Quality

i-Tree Canopy was designed to give users the ability to estimate tree canopy and other land cover types within any selected geography. The model uses the estimated canopy percentage and reports air pollutant removal rates and monetary values for carbon monoxide (CO), nitrogen dioxide (NO<sub>2</sub>), ozone (O<sub>3</sub>), sulfur dioxide (SO<sub>2</sub>), and particulate matter (PM) (Hirabayashi 2014). To calculate ecosystem services for the study area, canopy percentage metrics from UTC land cover data performed during the assessment were transferred to i-Tree Canopy. Those canopy percentages were matched by placing random points within the i-Tree Canopy application. Benefit values were reported for each of the five listed air pollutants.

#### 3.3.1.2 Carbon Storage and Sequestration

The i-Tree Canopy v7.1 model was used to quantify the value of ecosystem services for carbon storage and sequestration. i-Tree Canopy was designed to give users the ability to estimate tree canopy and other land cover types within any selected geography. The model uses the estimated canopy percentage and reports carbon storage and sequestration rates and monetary values.

To calculate ecosystem services for the study area, canopy percentage metrics from UTC land cover data performed during the assessment were transferred to i-Tree Canopy. Those canopy percentages were matched by placing random points within the i-Tree Canopy application. Benefit values were reported for carbon storage and sequestration.

#### 3.3.1.3 Stormwater

The i-Tree Canopy v7.1 was used to quantify the value of ecosystem services for avoided stormwater runoff. This model uses the tree canopy percentage to report both avoided stormwater amounts and monetary value.

Through model simulation, it was determined that tree canopy decreases the runoff volume in the project area by 173,637 liters per year. Tree canopy was estimated to contribute roughly \$587 (CAD) to avoided runoff annually to the project area.

<b>ECOSYSTEM BENEFITS OF TREE CANOPY FOR ALTONA, MB</b>			
<b>Air Quality</b>			
	<b>Units (kg)</b>	<b>Value (CAD\$)</b>	
CO	29	\$1	
NO <sub>2</sub>	233	\$1	
O <sub>3</sub>	3,182	\$101	
SO <sub>2</sub>	24	\$0	
PM <sub>2.5</sub>	236	\$360	
PM <sub>10</sub>	348	\$63	
<b>Carbon</b>			
	<b>Units CO<sub>2</sub> Equiv. (kg)</b>	<b>Value (CAD\$)</b>	<b>Units Carbon (kg)</b>
Storage	22,684,844	\$4,226,846	6,186,773
Sequestration	678,937	\$126,506	185,165
<b>Stormwater</b>			
	<b>Units (L)</b>	<b>Value (CAD\$)</b>	
Avoided Runoff	173,637	\$587	
Annual Value		\$127,619	
Total Value		\$4,354,465	

## 4. Urban Forestry Goals

### 4.1 Goal Objectives, Action Items, and Anticipated Timeline

#### 4.1.1 Canopy and Biodiversity Goals

Objective	Action(s)	Timeframe (over 20-year period)
Increase Canopy cover from 10.18% to 15%	Create 38.8 ha of canopy. Would require the successful establishment of 5000 mature trees.	By 2045
Increase diversity of trees planted	Ensure through planting that no more than 30% of a single family 20% of a single genus 10% of a single species [15] are present in the public tree inventory.	By 2045
Maintain an updated tree inventory	Update the Town's tree inventory every 5 years.	Every 5 years

### 4.1.2 Engagement Goals

Objective	Action(s)	Timeframe (over 20-year period)
Increase Canopy Cover on Private Property	Hold tree planting and maintenance workshops for community members to attend to learn.	Annually
	Create a free tree program to encourage residents to plant trees on private property (1 tree per household) with mandatory tree planting and maintenance workshop.	Annually
Community Engagement	Create tree planting volunteer program(s) where residents plant trees in Town-owned parks and natural areas.	Annually

### 4.1.3 Tree Planting Goals

Objective	Action(s)	Timeframe (over 20-year period)
Increase Canopy Cover Public Property	Plant 250 trees per year to reach the goal of 5000 trees by 2045.	Annually
	Track removals and new plantings each inventory update to reassess planting needs.	Every 5 years
Increase Successful Establishment of Newly Planted Trees	Install water bags on Town-owned juvenile trees and water regularly (watering schedule to be determined by current environmental factors).	Annually

#### 4.1.4 Maintenance Goals

Objective	Action(s)	Timeframe (over 20-year period)
Proactive Maintenance	Develop a proactive tree monitoring program.	By 2030
	Create database to track tree maintenance activities.	By 2030
	Maintain the proactive tree monitoring program.	Annually after 2030
	Monitor trees in poor or declining condition annually and remove as needed.	Annually
	Prune and inspect all trees every 5 years.	Continuous
Maintain an updated tree inventory	Reassess canopy coverage every 5 years.	Every 5 years
Increase Successful Establishment of Newly Planted Trees	Perform structural pruning on new trees.	Annually
Tree Pest Monitoring	Create pest-specific monitoring program as described in Section 5.2.	Annually

### 4.1.5 Policy Goals

Objective	Action(s)	Timeframe (over 20-year period)
Creation of a Public Tree By-law	Perform internal study on tree removals during construction.	By 2028
	Recommendations for Town-owned tree policy.	By 2030
Increase Canopy Cover on Private Property	Recommendations for Privately-owned tree policy.	By 2035
Tree Planting Guidelines	Create guideline document(s) outlining Town requirements for tree planting along boulevards, in parks and cemeteries, and in natural areas.	By 2030
Increase Successful Establishment of Newly Planted Trees	Create soil volume requirements on boulevards of new developments.	By 2030
Property Standards By-law amendment	Include tree condition standards in property standards by-law.	By 2026
Policy enforcement and staffing recommendations	Train a by-law enforcement officer to detect potential issues for forestry follow-up.	By 2030

## 5. Plan implementation

### 5.1 Planting Guidelines and Species List

#### 5.1.1 How to determine ideal planting locations

Determining the correct location for a tree is important for both the tree and surrounding infrastructure. Assessing potential planting locations based on overground and underground utilities and assets is crucial to ensure success. Planting trees a set distance away from planned or existing utilities or structures will allow the tree adequate room to grow and reduce maintenance costs due to competition with infrastructure. In addition to the previously mentioned planting considerations, soil volume and quality are important. It is recommended to have 30 cubic meters of good quality topsoil for a single tree, no more than half of which should be shared with neighbouring trees. In areas where soil volume standards cannot be met, it is recommended to install soil cells or engineered soils. Where possible, larger tree varieties are to be prioritized for planting; however, the right tree in the right place will ensure successful establishment and growth potential.

Recommended setbacks from infrastructure:

- Hydro poles and above ground lines: 6 meters
- Stop Signs: 6 meters
- Light Standard: 4 meters
- Bus Stops: 3 meters
- Driveways: 3 meters
- Fire hydrants: 3 meters
- Regulatory signs: 3 meters
- Manholes: 2.5 meters
- Walkways: 1.5 meter
- Boulevard Strip: 1.5 meters from curb edge

Recommended\* spacing between trees:

- large trees: 8 meters
- medium trees: 7 meters
- small trees: 6 meters

\*See Appendix A for tree sizes.

#### 5.1.2 Species recommendations

The Town of Altona currently sits within plant hardiness zone 3b, with a hardiness index of 37 [2]. According to Government of Canada data, from 1961 to 1990, Altona was in plant hardiness zone 3a and hardiness index 33. This shows a track of increase

in temperature over time consistent with climate change. Therefore, species recommendations were made for both plant hardiness zones 3b and 4a, based on climate change modelling from Natural Resources Canada Plant Hardiness. A list of recommended species can be found in Appendix A: Recommended Species List.

Seed zone (geographic origin) of planting stock should be taken into consideration when selecting plant materials. Plant materials from a climatically different region should not be planted.

Planting ash trees is not recommended, as they currently make up 38% of the trees in Altona and with the looming threat of Emerald Ash Borer, increasing species diversity is recommended.

### 5.1.3 Post-planting maintenance recommendations

To ensure the successful establishment of newly planted trees, several factors need to be taken into consideration.

- 1) Adequate watering to encourage root growth after planting. Water bags can be installed around the base of newly planted trees to ensure they receive enough water regularly.
  - a. Water bag installation reduces operator time required at each tree and allows for slower release of water which increases infiltration into the soil and root zone subsequently decreasing surface runoff [16].
  - b. Watering bags should be installed on all newly planted Town-owned trees on boulevard rights-of-way in the Spring, being removed in the fall after two growing seasons.
- 2) Applying mulch over the newly planted area improves soil condition and helps maintain soil moisture, especially during hotter conditions.
- 3) Annual inspections of newly planted trees is important to make sure trees that don't survive are replaced in a timely manner.
- 4) Structural pruning of juvenile trees helps with long-term maintenance by removing branches that may cause structural issues later, as well as encouraging the tree to grow with optimum structure to ensure future success.

### 5.1.4 Public engagement

It is recommended that the Town hold public tree planting events. Registration to events should be tracked to gauge community interest and follow up participants.

Tree planting events can include:

- Workshops where residents learn how to plant trees and care for juvenile trees.
- Volunteer tree planting events where residents learn how to plant trees and practice in Town-owned parks and natural areas.

- Maintenance workshops where residents learn how to care for mature trees.

The creation of a free tree program would encourage residents to plant trees on private property (1 tree per household) with a mandatory tree planting and maintenance workshop to educate property owners and help ensure planting success. The introduction of an online registration system to track who has been given a tree is recommended and can be used to follow up with residents on their experience and tree establishment success.

## 5.2 Monitoring Pests and Diseases

With a changing climate, factors like drought and intensive heat waves can disrupt the natural working order of urban ecosystems. Regional climate models have indicated that by 2050, the annual number of days with an average temperature over 22°C will double [3]. Stressors like heat and drought make plant and tree species more susceptible to disease and pests which capitalize on weakened defense systems of stressed trees. This is especially problematic in regions that experience hot dry conditions, such as Altona. This warming climate can completely shift a forest species distribution making urban forest planning more difficult, and time sensitive. Heat waves can be exacerbated in urban settings where a larger surface area of paved landscape acts to trap heat, holding the temperature into the evenings causing further stress to existing trees. This is known as the Urban Heat Island effect. These stressors reduce vigor and make trees more susceptible to pest infestation and diseases. As more exotic pests are imported into the country through global transportation, a strong monitoring system will be necessary to detect their presence and help prevent their establishment. Forest stressors will play a large role in urban forest management in the coming future due to forest pests and changing climate conditions.



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### 5.2.1. Existing High-Risk Pests and Diseases

Below are the most significant pests and diseases currently impacting Altona's urban forest. Each is listed with its origin, description, life cycle, host species, and current management.

#### **Dutch Elm Disease (DED)**

- **Origin:** Non-native
- **Description:** Fungal infection (*Ophiostoma* spp.) blocks elm's vascular system; causes rapid wilting and death.
- **Life Cycle:** Spread by native and European elm bark beetles; can also move via root grafts.
- **Host Trees:** American elm (highly susceptible), Siberian elm.
- **Management:** Basal bark sprays, prompt removal of infected trees, preventative fungicide injection, firewood bans.

#### **Cottony Ash Psyllid (CAP)**

- **Origin:** Non-native (Europe)
- **Description:** Small sap-sucking insect causing leaf curling and dieback in ash.
- **Life Cycle:** Multiple generations per year; eggs hatch in spring and nymphs feed inside curled leaves.
- **Host Trees:** Primarily black ash and Manchurian ash (green ash less affected).
- **Management:** Systemic insecticides limited in effectiveness; deep watering and stress reduction most effective.

#### **Forest Tent Caterpillar (FTC)**

- **Origin:** Native
- **Description:** Defoliating caterpillars causing widespread leaf loss during outbreaks.
- **Life Cycle:** One generation per year; overwinter as eggs; larvae feed in spring.
- **Host Trees:** Broadleaf trees including aspen, elm, ash, maple.
- **Management:** Btk sprays during outbreaks, physical removal of larvae, maintaining tree vigor

### 5.2.2. Emerging Threats

These pests and diseases are not yet established but pose imminent risk. Each listing includes the likely arrival timeline, direction of approach, description, life cycle, host trees, and recommended management.

#### **Emerald Ash Borer (EAB)**

- **Origin:** Non-native (Asia)
- **Anticipated Arrival:** Within 5 years
- **Likely Direction:** North/northeast spread from Winnipeg
- **Description:** Metallic-green beetle larvae girdle ash trees; causes near-total mortality.
- **Life Cycle:** Annual generations; D-shaped exit holes; rapid population build-up.
- **Host Trees:** All ash species.
- **Management:** Early detection with prism traps, insecticide injections on high-value trees, phased removal and replanting.

#### **Spongy Moth (LDD Moth)**

- **Origin:** Non-native (Europe)
- **Anticipated Arrival:** Within 5–10 years
- **Likely Direction:** Eastward spread from Ontario

- **Description:** Defoliating caterpillars with periodic outbreaks.
- **Life Cycle:** One generation per year; egg masses overwinter; larvae feed in spring.
- **Host Trees:** Oaks, birch, maple, poplar, willow.
- **Management:** Egg mass scraping, Btk sprays during outbreaks, public education on detection.

#### **Oak Wilt**

- **Origin:** Non-native fungal disease (USA)
- **Anticipated Arrival:** 5–10 years
- **Likely Direction:** South and east (Minnesota, Ontario)
- **Description:** Vascular wilt killing red oaks in 1 season; slower decline in bur oak.
- **Life Cycle:** Beetle-vectored; also moves via root grafts.
- **Host Trees:** All oaks (bur, red, pin).
- **Management:** Prevention by restricting firewood movement, pruning restrictions, prompt removal of infected trees, trenching to sever roots.

#### **Asian Longhorned Beetle (ALB)**

- **Origin:** Non-native (Asia)
- **Anticipated Arrival:** Possible over next 10 years (low-probability, high-impact)
- **Likely Direction:** Random introduction via transported materials
- **Description:** Large wood-boring beetle; tunnels weaken and kills host tree.
- **Life Cycle:** 1–2-year cycle; larvae tunnel into heartwood.
- **Host Trees:** Maples, birch, poplar, willow.
- **Management:** Vigilant monitoring, rapid eradication if detected.

#### **Elm Zigzag Sawfly**

- **Origin:** Non-native (Asia)
- **Anticipated Arrival:** 5–10 years
- **Likely Direction:** East (Ontario detections)
- **Description:** Defoliator creating characteristic zigzag feeding on elm leaves.
- **Life Cycle:** Multiple generations per year.
- **Host Trees:** All elm species.
- **Management:** Monitoring, targeted foliar insecticides if needed.

#### **Spotted Lanternfly**

- **Origin:** Non-native (Asia)
- **Anticipated Arrival:** 5–10 years (uncertain, but potential due to rapid spread)
- **Likely Direction:** From the east (Ontario, U.S.)
- **Description:** Sap-feeding planthopper creating honeydew and mold.
- **Life Cycle:** Eggs overwinter; nymphs and adults feed heavily.
- **Host Trees:** Maple, walnut, willow, poplar, fruit trees.
- **Management:** Early detection, egg mass removal, insecticidal control if established.

### 5.2.3. Overview of Treatment Priorities

Pest/Disease	Potential Impact	Monitoring Action	Timing/Frequency
Emerald Ash Borer	Catastrophic loss of ash	Maintain & expand prism traps; inspect ash	Annual, May – Sept.
Dutch Elm Disease	Continued elm mortality	Visual inspections; basal spraying follow-up	Monthly, May- Sept.
Oak Wilt	Rapid oak decline	Public reporting & targeted inspections	Monthly, May-Sept.
Spongy Moth	Severe defoliation	Egg mass surveys & visual monitoring	Winter surveys, Larvae May-June
Cottony Ash Psyllid	Chronic stress to ash	Visual inspection for leaf curl	Annual, June-July
Elm Zigzag Sawfly	Defoliation of elms	Leaf inspections for zigzag feeding	Annual, June-Aug
Asian Longhorned Beetle	High-risk if introduced	Staff inspections for exit holes	Annual, July-Aug
Spotted Lanternfly	Moderate nuisance + damage	Egg mass checks on outdoor items	Annual, spring & fall
Forest Tent Caterpillar	Periodic defoliation	Egg mass surveys, larval presence	Annual, winter, May-June

#### 5.2.3.1 Risk Ratings

High risk: likely to arrive/expand soon with high risk of catastrophic impact. Moderate risk: Likely to arrive/expand soon, but manageable or periodic. Low risk: Less likely to arrive soon, but still high impact if introduced.

- **High Risk:** Emerald Ash Borer, Dutch Elm Disease, Oak Wilt
- **Moderate Risk:** Spongy Moth, Elm Zigzag Sawfly, Cottony Ash Psyllid, Forest Tent Caterpillar
- **Low Risk:** Asian Longhorned Beetle, Spotted Lanternfly

#### 5.2.4. Projected Timeline

Pest / Disease	Anticipated Arrival / Peak Risk	Recommended Timing of Control Actions
Emerald Ash Borer	2025–2030	Start monitoring immediately; prepare treatment plan by Year 2; implement treatments/removals once detected.
Dutch Elm Disease	Ongoing annually	Continue annual basal sprays, inspections, removals each season.
Oak Wilt	2028–2035	Begin public education Year 1; enforce pruning/firewood restrictions immediately; prepare containment plan by Year 4.

Pest / Disease	Anticipated Arrival / Peak Risk	Recommended Timing of Control Actions
Spongy Moth (LDD Moth)	2027–2032	Start monitoring Year 2; prepare Btk treatment plan by Year 3; be ready to respond in any outbreak year.
Asian Longhorned Beetle	Potential any time (low likelihood)	Annual staff training and inspections; maintain readiness for immediate response if detected.
Elm Zigzag Sawfly	2028–2035	Begin monitoring Year 3; prep treatment protocols by Year 5.
Cottony Ash Psyllid	Ongoing, low–moderate levels	Monitor annually; treat infestations as needed.
Spotted Lanternfly	2028–2035	Begin education and monitoring Year 3; ready rapid response if found.
Forest Tent Caterpillar	Next outbreak likely in 3–6 years	Annual monitoring; plan Btk sprays in outbreak years.

### 5.2.5. Work-load Allocation

- **Monitoring:** Feasible for all pests with dedicated seasonal inspections.
- **Treatments:** Limited capacity for large-scale spraying—recommend contracting out Btk applications during severe outbreaks.
- **Tree Removals:** DED removals are manageable with contracted arborists if volume exceeds capacity.
- **Education & Outreach:** Can be integrated into existing municipal communications.

## 5.3 Maintenance

The maintenance recommendations below are made with the assumption of two full-time forestry-designated crew of two staff comprised of at least one Certified Arborist or equivalent designation with access to one mobile lift/bucket truck within 3 years. A third crew should be hired within 10 years, or when work becomes difficult to complete in the designated time.

### 5.3.1 Pruning recommendations

A 5-year pruning schedule should be created where all Town-owned trees are pruned once every 5 years, including street trees, park trees, and cemetery trees. A regularly updated tree inventory should be used to assist in prioritizing hazardous/poor condition tree pruning with all other non-urgent tree pruning taking place during the designated calendar year. Juvenile tree pruning should be performed as soon as trees are no longer under warranty and then occur every 2-3 years until mature.

### 5.3.2 Removal recommendations

A tree inventory should be conducted every 5 years so that tree conditions can be monitored regularly. Trees with poor condition should be monitored annually; hazardous trees should be removed as soon as possible.

### 5.3.3 Stump removal recommendations

Locates for underground utilities prior to any digging is recommended. Stump removals should be built into the work order monitoring process so that stump removal work orders are automatically created after a tree is removed. Planting in the stump pit is recommended, as the ground will be easier to dig and locates have already been obtained, unless the location is no longer suitable.

### 5.3.4 Centennial Park Management Strategy

Management options for Centennial Park and its aging tree population

1. Remove trees as they become hazardous/condition deteriorates and replant accordingly.
  - This option is reactive. This option would have lower removal costs due to decreased removal complexity. However, canopy goals would suffer. This option would allow for planting a larger variety of tree species, as selecting shade tolerant species would not be as important for successful establishment.
2. Underplant between existing trees then remove existing trees once newly planted trees are established and tall.
  - This option is proactive. This option would require skilled tree removal once the mature and declining trees are in a state requiring removal to ensure that the underplanted trees become damaged. Time requirements for removal would increase with this option; however, it would reduce the impact on the canopy goals as underplanted trees would mitigate some of the canopy loss. This option would require planting species that are partially or fully shade tolerant underneath canopies or near the edge of the canopies of existing trees.

## 5.4 Policy Recommendations

The policy recommendations below are made with the assumption that a by-law enforcement officer will be trained to detect potential forestry-related issues prior to policy implementation. In addition, forestry staff can be trained to accompany policy by-law enforcement staff to potential forestry-related infractions as a subject matter expert.

### 5.4.1 Public Tree By-law

It is recommended that the Town of Altona create a public tree by-law that enforces ownership rights of the Town for trees on Town-owned properties and rights-of-way. This includes restrictions on injury, damage, pruning, and removal of trees on public property; a clear definition on ownership of trees that are on the boundary between public and private properties; encroachment or unauthorized activities within a tree's minimum protection zone; and construction within the minimum tree protection zone of a tree.

Prior to the creation of a Public Tree By-law, we recommend the Town perform a study on tree removals through development applications to inform minimum requirements for the by-law.

It is recommended to include tree protection guidelines and tree planting guidelines within the Public Tree By-law or as supporting policy documents in order to create a standard within the Town of Altona for policy enforcement and guidance.

#### 5.4.2 Property Standards By-law Amendment

The Town of Altona updated its Property Standards By-law (By-law No. 1823/2025) in February 2025. It is recommended that an amendment be made to the By-law which allows the Town to create standards for tree maintenance on private property, including but not limited to hazardous tree maintenance and/or public utility and infrastructure interference.

#### 5.4.3 Private Tree By-law

The creation of a private tree by-law can be polarizing to residents. However, with the goal of increasing canopy cover, it is important to consider possibilities on private property. The creation of a private tree by-law assists with reaching overall Town canopy coverage goals and creating benefits for the community and environment. Public consultation throughout the process of private tree by-law creation to help determine the current acceptable limits of the community are strongly recommended.

Some suggestions for a private tree by-law are as follows:

- Tree removal permits triggered by a minimum tree diameter.
  - Activities performed within a minimum tree protection zone to require a permit.
  - Minimum tree protection guidelines.
- Tree replacement planting requirements for trees removed on private property.
  - Replacement planting guidelines, including species recommendations and minimum nursery stock size requirements.
- Fees for permit processing.

## 5.5 Budget

Activity	Budget Allocation	Notes
<b>Tree Planting</b>		
Plant 250 trees per year	\$30,000	Trees to be planted by internal staff. 10 gallon ball and burlap saplings for boulevards. 7-15 gallon potted saplings for parks and natural areas.
Tree watering	\$20,000 over 2 years.	Water bags are to be reused every other year and replaced when needed.
Soil sampling	\$100 per kit ~20 samples	Soil analysis to determine best species selection for tree plantings; soil type and NPK levels
<b>Monitoring Pests and Diseases</b>		
Emerald Ash Borer	\$3,000 annually	Traps, tree inventory, initial injections for specimen trees. Additional traps, inventory, specimen injections should be prioritized.
Dutch Elm Disease	\$2,250 annually	Spraying & removals. Flexible to reflect severity of infestation
Oak Wilt	\$750 annually	Public education, inspections, reserve for containment. Will have to increase once Oak Wilt is in proximity to Altona
Spongy Moth	\$750 annually	Monitoring through winter egg mass surveys, emergency ground sprays. Aerial spray programs would be additional. Outbreaks are cyclical.
Asian Longhorned Beetle	\$500 annually	Staff training and annual inspections.
Elm Zigzag Sawfly	\$500 annually	Seasonal monitoring and spot treatments as needed. Flexible funds if pest is not present.
Spotted Lanternfly	\$500 annually	Outreach, inspections, egg mass removal materials.
Cottony Ash Psyllid	\$500 annually	Treatments as needed.
Forest Tent Caterpillar	\$250 annually	Monitoring and outbreak sprays. Only required during outbreak seasons.
Contingency Reserve	\$1,000 annually	For unexpected pest outbreaks or emergencies.
<b>Tree Maintenance</b>		
Equipment costs	\$5,000 annually per crew	Long-term use items (e.g. small and large bar chainsaws; pole pruner, pole chainsaw, hand saw, climbing ropes, climbing saddles, hi-vis, hard hats, chainsaw pants, eye protection, ear protection, boots allocations program, rigging gear).
	\$1,000 annually per crew	Consumables (e.g. chain oil, 2-stroke oil, gas, diesel, chainsaw files, chain replacements).

Activity	Budget Allocation	Notes
	\$100,000 per chip truck	The Town currently has one chip truck. A second should be purchased within 3 years, a third within 10 years.
	\$160,000 per bucket truck with dielectric testing	We recommend replacing the current mobile lift truck with a bucket truck to streamline operations.
Full-time staff costs	\$80,000 per full-time staff per year	A second crew (two people) within 3 years; a third crew (two people) should be hired within 10 years.
Inventory Update	\$25,000 every 5 years	Consultant-based fees.
Reserve budget	\$5,000 annually	Equipment maintenance and replacement.
Policy		
Perform internal study on tree removals during construction.	Staff time	Approximately 80 hours.
Public tree by-law creation	\$15,000	Consultant-based fees.
Training Forestry staff to accompany by-law enforcement or vice versa	Staff time	Approximately 8 hours.
Private tree by-law creation	\$15,000	Consultant-based fees.
Creation of tree planting and maintenance documents	\$10,000	Consultant-based fees.

## 6. Future of the Strategy

Urban Forest Management Strategies are a great starting point to assist with improving the urban forest. It is important to remember that this strategy serves as a guide for the next 20 years. The actions within hold true for the Town's current goals, and should the goals change, the strategy will need to be adjusted.

Review of staffing, budget, and work plans should take place annually, with progress reviews summarizing strategy implementation taking place every 5 years. A formal review of the strategy should take place at the 10-year mark to ensure the strategy continues to align with the Town's goals and objectives.

## 6.1 Strategy Monitoring

Objective	Action(s)	Timeframe (over 20-year period)	Monitoring Recommendations	Monitoring Timeframe
<b>Canopy and Biodiversity Goals</b>				
Increase Canopy cover from 10.18% to 15%	Create 38.8 ha of canopy. Would require the successful establishment of 5000 mature trees.	By 2045	Reassess canopy through a canopy study.	Every 5 years.
Increase diversity of trees planted	Ensure through planting that no more than 30% of a single family 20% of a single genus 10% of a single species (Lilly & Currid, 2010) are present in the public tree inventory.	By 2045	Data included in tree inventory updates.	Assess every 5 years after tree inventory update.
Maintain an updated tree inventory	Update the Town's tree inventory every 5 years.	Every 5 years	Update tree inventory every 5 years.	Every 5 years.
<b>Engagement Goals</b>				
Increase Canopy Cover on Private Property	Hold tree planting and maintenance workshops for community members to attend to learn.	Annually	Track engagement per event (signed up vs attended) and review annually.	Annually
	Create a free tree program to encourage residents to plant trees on private property (1 tree per household) with mandatory tree planting and maintenance workshop.	Annually	Track engagement per event (signed up vs attended) and review annually.	Annually

Objective	Action(s)	Timeframe (over 20-year period)	Monitoring Recommendations	Monitoring Timeframe
Community Engagement	Create tree planting volunteer program(s) where residents plant trees in Town-owned parks and natural areas.	Annually	Track engagement per event (signed up vs attended) and review annually.	Annually
			Monitor tree planting success by annually inspecting newly planted trees to determine establishment success.	Annually
<b>Tree Planting Goals</b>				
Increase Canopy Cover Public Property	Plant 250 trees per year to reach the goal of 5000 trees by 2045.	Annually	Reassess canopy through a canopy study.	Every 5 years.
Increase Successful Establishment of Newly Planted Trees	Install water bags on Town-owned juvenile trees and water regularly (watering schedule to be determined by current environmental factors).	Annually	Monitor tree planting success by annually inspecting newly planted trees to determine establishment success.	Annually
<b>Maintenance Goals</b>				
Proactive Maintenance	Develop a proactive tree monitoring program.	2030	Complete a cost-effectiveness and/or cost-benefits analysis of the different options available for work order tracking software.	2026
	Create database to track tree maintenance activities.	2030	Touch base annually to monitor progress.	Annually

Objective	Action(s)	Timeframe (over 20-year period)	Monitoring Recommendations	Monitoring Timeframe
	Maintain the proactive tree monitoring program.	Annually after 2030	Track work order completion through database.	Annually
	Monitor trees in poor or declining condition annually and remove as needed.	Annually	Monitor through the work order database.	Annually
	Prune and inspect all trees every 5 years.	Continuous	Monitor through the work order database.	Annually
Maintain an updated tree inventory	Reassess canopy coverage every 5 years.	Every 5 years	Included in inventory update.	Every 5 years
Increase Successful Establishment of Newly Planted Trees	Perform structural pruning on new trees.	Annually	Track work order completion through database.	Annually
Tree Pest Monitoring	Create pest-specific monitoring program as described in Section 5.2.	Annually	Monitor success rates of adopted pest management strategies through field assessments.	Annually
<b>Policy Goals</b>				
Creation of a Public Tree By-law	Perform internal study on tree removals during construction.	By 2028	Dedicated staff member to create a report outlining study findings.	2028
	Recommendations for Town-owned tree policy.	2030	Track public initiated work orders through database.	Review public tree by-law every 5 years to ensure it is staying up to date with current standards.
	Recommendations for Privately-owned tree policy.	2035	Reassess canopy through a canopy study.	Every 5 years.

Objective	Action(s)	Timeframe (over 20-year period)	Monitoring Recommendations	Monitoring Timeframe
Increase Canopy Cover on Private Property			Assess public opinion regarding private tree by-law.	Every 5 years.
Tree Planting Guidelines	Create guideline document(s) outlining Town requirements for tree planting along boulevards, in parks and cemeteries, and in natural areas.	2030		
Increase Successful Establishment of Newly Planted Trees	Create soil volume requirements on boulevards of new developments.	2030	Complete a cost-effectiveness and/or cost-benefits analysis.	2026
Property Standards By-law amendment	Include tree condition standards in property standards by-law.	2026	Successful amendment of by-law.	ASAP
Policy enforcement and staffing recommendations	Train a by-law enforcement officer to detect potential issues for forestry follow-up.	2030	Track staff training.	As needed.

## References

- [1] Green Drop Ltd (2021). Tree Inventory for the Town of Altona Manitoba.
- [2] Natural Resources Canada: “Plant Hardiness Zones”. 2021. Retrieved from: <http://planthardiness.gc.ca/>
- [3] City of Morden. (n.d.). City of Morden Approved Species List and Diversification Guidelines.
- [4] City of Winnipeg. (n.d.). Acceptable tree species for planting on city-owned properties.
- [5] Durand, R. (2025). List of Cold Hardy Prairie Trees.
- [6] Town of Altona. (2021). Water Conservation By-law
- [7] Town of Altona. (2020). Fees and Charges By-law
- [8] Town of Altona. (2025). Property Standards By-law
- [9] Richards, N.A. (1983). Modeling survival and consequent replacement needs in a street tree population. *J. Arboric*, 5.11:251-255.
- [10] Richards, N.A. (1979). Modeling survival and consequent replacement needs in a street tree population. *J Arboric*, 5:251–255
- [11] Miller RG, Miller RW. (1991). Planting survival of selected street tree taxa. *J Arboric*, 17:185–191
- [12] Tree Canada. (n.d.). Canadian Urban Forest Strategy: 2019-2024. Retrieved from <https://treecanada.ca/wp-content/uploads/2018/10/TC-CUFS-2019-2024-Eng-1.pdf>
- [13] Hirabayashi, S. (2014). i-Tree Canopy Air Pollutant Removal and Monetary Value Model Descriptions. [http://www.itreetools.org/canopy/resources/iTree\\_Canopy\\_Methodology.pdf](http://www.itreetools.org/canopy/resources/iTree_Canopy_Methodology.pdf) [Accessed 5 February 2025]
- [14] i-Tree Canopy v7.1. i-Tree Software Suite. [Accessed 5 February 2025] <http://www.itreetools.org/canopy>
- [15] Lilly, S.J, and Currid, P. (2010). Arborists’ Certification Study Guide. International Society of Arboriculture.
- [16] Hossain, S.M.Y. et al (2019). A Comparison of Indirect Watering Devices for Benefiting Newly Transplanted Urban Trees. *J Arboriculture & Urban Forestry* 45(4): 109-119

## Appendix

### Appendix A: Recommended Species List

Large: Trees over 15m tall

Medium: Trees between 8m and 15m tall

Small: Trees under 8m tall.

\* DED Tolerant

Common Name	Botanical Name	Size
Balsam Fir	<i>Abies balsamea</i>	Large
Manitoba Maple	<i>Acer negundo</i>	Large
Red Maple	<i>Acer rubrum</i>	Large
Silver Maple	<i>Acer saccharinum</i>	Large
Sugar Maple	<i>Acer saccharum</i>	Large
Freeman Maple	<i>Acer x freemanii</i>	Large
Tamarack/Eastern Larch	<i>Larix laricina</i>	Large
Norway Spruce	<i>Picea abies</i>	Large
White Spruce	<i>Picea glauca</i>	Large
Black Spruce	<i>Picea mariana</i>	Large
Jack Pine	<i>Pinus banksiana</i>	Large
Red Pine	<i>Pinus resinosa</i>	Large
Eastern White Pine	<i>Pinus strobus</i>	Large
Balsam Poplar	<i>Populus balsamifera</i>	Large
Eastern Cottonwood	<i>Populus deltoides</i>	Large
Sargent Poplar	<i>Populus sargentii</i>	Large
Trembling Aspen	<i>Populus tremuloides</i>	Large
Lanceleaf Poplar	<i>Populus x acuminata</i>	Large
Northern Pin Oak	<i>Quercus ellipsoidalis</i>	Large
Bur Oak	<i>Quercus macrocarpa</i>	Large
Peach-leaved Willow	<i>Salix amygdaloides</i>	Large
Laurel Leaf Willow	<i>Salix pentandra</i>	Large
Basswood/American Linden	<i>Tilia americana</i>	Large
Little leaf Linden	<i>Tilia cordata</i>	Large
Prairie Expedition Elm*	<i>Ulmus americana</i> 'Lewis and Clark'	Large
Triumph Elm*	<i>Ulmus x</i> 'Morton Glossy'	Large
Ohio Buckeye	<i>Aesculus glabra</i>	Medium
Prairie Horizon Alder	<i>Alnus hirsuta</i> 'Harbin'	Medium
American White Birch/Paper Birch	<i>Betula papyrifera</i>	Medium
Asian White Birch	<i>Betula platyphylla</i>	Medium
Common Hackberry	<i>Celtis occidentalis</i>	Medium
Butternut	<i>Juglans cinerea</i>	Medium

Black Walnut	<i>Juglans nigra</i>	Medium
Eastern Hop-Hornbeam/Ironwood	<i>Ostrya virginiana</i>	Medium
Amur Cork Tree	<i>Phellodendron amurense</i>	Medium
American Mountain Ash	<i>Sorbus americana</i>	Medium
European Mountain Ash	<i>Sorbus aucuparia</i>	Medium
Eastern White Cedar	<i>Thuja occidentalis</i>	Medium
Night Rider Elm*	<i>Ulmus davidiana</i> var japonica 'Night Rider'	Medium
Discovery Elm*	<i>Ulmus davidiana</i> var. japonica 'Discovery'	Medium
Amur Maple	<i>Acer ginnala</i>	Small
Tatarian Maple	<i>Acer tataricum</i>	Small
Saskatoon-berry	<i>Amelanchier alnifolia</i>	Small
Pagoda Dogwood	<i>Cornus alternifolia</i>	Small
Red-osier Dogwood	<i>Cornus sericea</i>	Small
American Hazelnut	<i>Corylus americana</i>	Small
Beaked Hazelnut	<i>Corylus cornuta</i>	Small
Hawthorn	<i>Crataegus chrysocarpa</i>	Small
Snowbird Hawthorn	<i>Crataegus x mordenensis</i> 'Snowbird'	Small
Toba Hawthorn	<i>Crataegus x mordenensis</i> 'Toba'	Small
Russian Olive	<i>Elaeagnus angustifolia</i>	Small
Gladiator Crab Apple	<i>Malus adstringens</i>	Small
Siberian Crabapple	<i>Malus baccata</i>	Small
Flowering crabapple	<i>Malus x adstringens</i>	Small
Wild Plum	<i>Prunus americana</i>	Small
Amur Cherry	<i>Prunus maackii</i>	Small
Pincherry	<i>Prunus pensylvanica</i>	Small
Chokecherry	<i>Prunus virginiana</i>	Small
Showy Mountain Ash	<i>Sorbus decora</i>	Small
Japanese Lilac Tree	<i>Syringa reticulata</i>	Small
Nannyberry	<i>Viburnum lentago</i>	Small
Downy arrowwood	<i>Viburnum rafinesqueanum</i>	Small
Highbush cranberry	<i>Viburnum trilobum</i>	Small

[3][4][5]

## Appendix B: Sample Monitoring Scheme (2026-2030)

Activity	Target notes	20-year target or target year	2026-2030 5-year current			Annual Target	Yearly Actual				
			5-year target	Actual	% Complete		2026	2027	2028	2029	2030
<b>Canopy and Biodiversity</b>											
Municipal tree planting	Create 38.8 ha. (increase to 15% canopy coverage) by 2045	5000 trees planted	1000			250					
Species diversity	<30% single family										
	<20% single genus										
	<10% single species										
Inventory	Complete inventory every 5 years, update canopy and biodiversity statistics.	4 complete updates	1								
<b>Public Engagement</b>											
Private canopy cover	Annual planting/maintenance workshop - free tree give away	20 workshops	5			1					
Public engagement	Annual public participation tree planting day in public space	20 public planting days	5			1					
<b>Tree Establishment/Maintenance</b>											
Waterbags / mulch	Install and maintain until established (5yrs)	100% of all trees planted <5yrs	0			0					
Tree monitoring	Annually - pest/diseases, overall condition	100% of all municipal trees	22620			4524					
Structural pruning	Improve performance of newly planted trees - first 5 years	100% of newly planted trees	0			0					

Activity	Target notes	20-year target or target year	2026-2030 5-year current			Annual Target	Yearly Actual				
			5-year target	Actual	% Complete		2026	2027	2028	2029	2030
Cycle pruning	5 year pruning cycle - annually 20% of all municipal trees	100% of all municipal trees	4524			905					
<b>Policy</b>											
Public trees	Study tree removals during construction - #, size, location	report done by 2028	1								
	Develop public tree policy and by-law	done by 2030	1								
Private owned trees	Develop private tree policy and by-law	done by 2030	1								
Planting guidelines	Establish guidelines for planting boulevards, parks, cemeteries, natural areas, etc.	done by 2030	1								
	Soil volume requirements for new developments	done by 2030	1								
Property standards	Include tree condition standards in property standards by-law	done by 2026	1								
Enforcement	Train by-law officer to recognize tree related issues for Forestry Dept follow-up	done by 2030	1								
<b>Urban Forest Management Plan</b>											
Continuous improvement	Plan, Do, Check, Act - 5-year review of targets, achievements, consequences. Update	review 2030, 4 updates by 2045	1								

Activity	Target notes	20-year target or target year	2026-2030 5-year current			Annual Target	Yearly Actual				
			5-year target	Actual	% Complete		2026	2027	2028	2029	2030
	policy, plans, targets accordingly.										
	Formal review of this strategy details should take place at the 10-year mark to ensure the strategy continues to align with the Town's goals and objectives.	update 2035									

### Appendix C: Sample Operations Gantt Chart (2026-2030)

Activity	Target notes	Target	2026				2027				2028				2029				2030			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
<b>Capacity Improvements</b>																						
Work order tracking system	Purchase or create computerized system to track tree maintenance activities, service requests, costs, removals, stump removals.	ASAP	This could take a couple of years to research, define needs/wants, develop or purchase a system.																			
ISA certified arborist (or equivalent)	Train or hire one full-time staff.	2026	Budget, implement																			
2 full-time forestry staff	Increase from current full-time staffing to 2 crews of 2.	2028			Budget, advertise, interview, hire in time for 2028 pruning season																	
2 full-time forestry staff	Increase to 6 full-time Forestry staff total.	2035	To be scheduled for the next 5-year update.																			
<b>Capital Improvements</b>																						
1 mobile lift/bucket trucks and associated equipment	Increase to 2 trucks and associated required equipment.	2028			Research, budget, advertise, purchase in time for 2028 pruning season																	
1 mobile lift/bucket and associated equipment	Additional lift and associated required equipment.	2035	To be scheduled for the next 5-year update.																			
<b>Planting - Create 38.8 ha. (increase to 15% canopy coverage) by 2045, &lt;30% single family, &lt;20% single genus, &lt;10% single species - 5000 trees planted by 2045</b>																						

Activity	Target notes	Target	2026				2027				2028				2029				2030			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Tree Planting	1000 trees planted by 2030.	250 trees / year	Finalize planting sites, species / caliper selection, order stock, plant.				Finalize planting sites, species / caliper selection, order stock, plant				Finalize planting sites, species / caliper selection, order stock, plant				Finalize planting sites, species / caliper selection, order stock, plant				Finalize planting sites, species / caliper selection, order stock, plant			
Waterbags/mulch	Install and maintain on new plantings until established (5yrs).	100% of all newly planted trees		Install at planting, ongoing maintenance, removal					Install at planting, ongoing maintenance, removal					Install at planting, ongoing maintenance, removal					Install at planting, ongoing maintenance, removal			
Inventory	Complete inventory every 5 years, update canopy and biodiversity statistics	4 complete updates by 2045																				
Monitoring program	Annual field reconnaissance - pest/diseases, overall condition, prioritize pruning requirements, identify and monitor poor condition trees for removal.	100% of all municipal trees			Field recon			Field recon			Field recon			Field recon			Field recon			Field recon		
	Identify potential planting sites for next season.				Coordinate with recon			Coordinate with recon			Coordinate with recon			Coordinate with recon			Coordinate with recon			Coordinate with recon		

Activity	Target notes	Target	2026				2027				2028				2029				2030			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Data, Statistics update	Annual inventory data updates - plantings, work orders, maintenance, removals, stumps, field recon details, etc.	Annually				Data updates				Data updates				Data updates				Data updates				Data updates
Tree Inventory	Complete inventory and evaluation of all municipal trees	2030																			Contractor or in-house	
	5-year update of canopy and biodiversity statistics	2030																				Contractor or in-house
<b>Pruning / removals</b>																						
Structural pruning	Improve performance of newly planted trees - first 5 years	100% of <5yr old plantings				Schedule, implement				Schedule, implement				Schedule, implement				Schedule, implement				Schedule
Cycle pruning	5 year pruning cycle - annually 20% of all municipal trees	100% of all municipal trees				Schedule, implement				Schedule, implement				Schedule, implement				Schedule, implement				Schedule
	Removal of declining trees as identified by annual recon.	Annually	Schedule as required.																			

Activity	Target notes	Target	2026				2027				2028				2029				2030				
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
<b>Public Engagement</b>																							
Private canopy cover	Annual planting/maintenance workshop - free tree give away.	Annually	Create workshop, schedule, order "free trees"				Schedule, order				Schedule, order				Schedule, order				Schedule, order				
Public engagement	Annual public participation tree planting day in public space.	Annually		Design, schedule, order				Schedule, order trees				Schedule, order trees				Schedule, order trees				Schedule, order trees			

<b>Policy</b>																						
General	Update Property Standards by-law No.1823/2025 to allow the Town to create standards for tree maintenance on private property.	2026	Draft, submit for approval, adopt																			

Activity	Target notes	Target	2026				2027				2028				2029				2030			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
	Study tree removals during construction (number, size, location) - follow-up report to inform public tree policy and by-laws.	2028	Ongoing data collection, finalize report, recommendations for public tree policy and by-laws																			
	Tree protection guidelines - to be included in both public, and private, tree by-laws.	2030												Draft, submit for approval, adopt								
	Planting Guidelines to include in public tree policy & by-laws - establish guidelines for planting boulevards, parks, cemeteries, natural areas, etc., including soil volume requirements.	2030										Draft, submit for approval, adopt										
Municipal owned trees	Develop public tree policy and by-law, including restrictions on injury, damage, pruning, and removal of trees on public property; a clear definition on ownership of trees that are on the boundary between public and private	2030										Draft, submit for approval, adopt										

Activity	Target notes	Target	2026				2027				2028				2029				2030			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
	properties; encroachment or unauthorized activities within a tree's minimum protection zone; construction within the minimum tree protection zone of a tree.																					



Activity	Target notes	Target	2026				2027				2028				2029				2030					
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4		
	Include tree condition standards in property standards by-law	2030									Draft, submit for approval, adopt													
Enforcement	Train by-law officer to recognize tree related issues for Forestry Dept follow-up	2030																	Recruit, train, liaise with Forestry branch					
<b>Urban Forest Management Plan</b>																								
Continuous improvement	Plan, Do, Check, Act - 5 year review of targets, achievements, consequences. Update policy, plans, targets accordingly	2030, 4 updates by 2045																					Contractor or in-house	
	Formal review of the strategy should take place at the 10-year mark to ensure the strategy continues to align with the Towns goals and objectives.	2035	to be scheduled in next 5 year update.																					