Naturalized Boulevards in Canadian Prairie Cities

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Image from Native Plant Gardener

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1.0 Executive Summary

Naturalization efforts within cities are increasing around the globe. They assist with positive ecological outcomes, climate change adaptation, personal health outcomes, and more in urban centres. This report looks specifically at boulevard naturalization projects along roadways in the Canadian prairies, and what lessons can be learned from them and potentially replicated in the prairie city of Winnipeg, Manitoba.

Four naturalization projects across three prairie cities were explored for this report. This research involved document analysis, which identified common trends, challenges, and outcomes. Included in the document analysis were seeding charts, municipal reports, and published documents. The trends that emerged throughout the different projects included similarities in site preparation and installation process, specific native plant species used, and maintenance. Reported outcomes and challenges were also shared among the projects. In all cases, initial phases of the projects were successful and the sites were able to become established. These established sites reported positive outcomes in ecological growth and biological diversity, climate change adaptation, positive aesthetics, and reduced maintenance costs. Shared challenges included challenging growth seasons due to drought, up-front investment and installation costs, public response during initial phases, and weed management during the establishment process.

The findings of this report highlight how beneficial naturalization is for urban cities as they adapt to climate change. Naturalization efforts are happening with increased regularity in Canada; however, there are few projects happening along boulevards. Despite the limited number of boulevard naturalization projects, there are lessons to be learned from them. The sites studied highlight the importance of strong public engagement and awareness, and how critical the implementation, growth and seeding plan is. The findings also establish that, if successful, naturalization projects are beneficial to people, communities, neighbourhoods, cities, and the environment.

The research conducted in this report highlighted an important area for future study. While there is a great collection of literature and knowledge on naturalization, there is little on naturalization in winter cities and the unique challenges they face. Further research into the impacts of winter on naturalization are an encouraged addition to the field.

2.0 Introduction

2.1 Research Intent

This research explores how naturalization efforts can potentially be implemented in the city of Winnipeg, Manitoba along boulevards and roadsides. It explores naturalization projects done in Winnipeg and other cities across Canada, with an emphasis on other prairie cities, due to their shared climate constraints. These practices are examined from the perspective of how they could be replicated in Winnipeg, or if they should be. These outcomes and lessons learned form the basis of the report.

Naturalization efforts in cities have gained immense popularity in recent years. River banks, open spaces, boulevards, and more are targeted as cities attempt to "green" themselves. Initiatives are being conducted on a global scale in an effort to recreate previously existing natural environments. As cities carry out these measures, more knowledge about naturalization is continuously gained.

Naturalization is different from "greening" a space. While greening a roadway would mean planting trees, shrubs, and other flora along the roadside, it does not discriminate between local and exotic plants. Naturalization focuses exclusively on using flora native to the region. This is done for many reasons, including pollination, Indigenous values, climate change adaptation, reduced maintenance costs, and more (Bolund & Hunhammar, 1999).

The vision for this report began with an image - what would cities look like if they fully embraced local naturalization? How would placemaking change if you could feel the natural environment of where you were, regardless of what city you were in? What environmental outcomes could be seen on a global scale? In Rome, for example, you would see the flora and environment unique to the area. With naturalization, the same could be said for each other city and region in the world, adding natural identity and environmental benefits on a global scale. What would that do not only for sustainable practices but also unique cultural identity? (In many cases, it would also include embracing Indigenous cultures.) While a project of that size was outside the scope of this report, it did lead to a smaller, local-scale project.

2.2 Research Questions

1. How do naturalized boulevards assist Canadian prairie cities in adapting to climate change?
2. What boulevard naturalization initiatives are happening in Winnipeg and other prairie cities in Canada?
3. What lessons do initiatives from elsewhere offer Winnipeg?

2.3 Research Scope

This project looks at naturalization efforts across the region known as the Canadian prairies. This region is generally considered to include the provinces of Alberta, Saskatchewan, and Manitoba, as well as western Ontario. This region was selected for research as it shares a general climate with Winnipeg, which is located in the centre of it. A shared climate is important for naturalization research, as climate plays a major role in naturalization efforts. For example, a winter city will have many considerations for naturalization that a non-winter city will not. Additionally, much of the Canadian prairie shares the same historical habitat (tall grass prairie) and native plants.

The first research question examines how naturalization efforts help Canadian cities react to climate change. This was studied by looking at the naturalization efforts of prairie cities, and examining the ecological outcomes of the projects. Ecological outcomes were examined through two perspectives. First, what do native plants provide and how do they impact the environment? And second, what impacts do maintenance efforts and changes to them have on the environment? Finally, these perspectives were compiled to determine the impact naturalization can have in mitigating climate change.

The second research question specifically looks at naturalization efforts taking place along boulevards and medians. This was studied by speaking to officials from municipalities and private firms about naturalization projects they had done, and then finding reports and other documentation about that work and the outcomes. The specific intent of this was to discover what trends and patterns emerged from the various projects..

The third research question takes the findings of the first two and looks at them through the lens of the city of Winnipeg. It discusses the findings from the first two, contextualizes them from a Winnipeg perspective, and explores the key lessons and takeaways from successful or unsuccessful naturalization projects. Finally, it explores how to utilize that knowledge within Winnipeg.

2.4 Document Overview

This report is divided into six different sections. The first section offered an introductory overview of the topic area. The second section features a literature review. This section looks at existing research and knowledge on the topic of naturalization, considering it from many different angles. These angles include naturalization within cities, the impacts of urbanism, the benefits of indigenous species, the benefits of urban green spaces to cities, the benefits of urban green spaces to people, how urban green spaces are achieved, and the downsides of native plants. The third section considers the research methods used, particularly document analysis. The fourth section covers findings. Here, the results of the naturalization projects that were looked at are discussed. The various processes, results, and other outcomes are explored. The fifth section turns to discussion. This segment discusses overlapping themes, shared processes, and results. The sixth and final section is the conclusion. The conclusion offers recommendations for naturalization in Winnipeg, revisits the study's research questions, and offers final thoughts on the topic.

3.0 Literature Review

3.1 Introduction

There is an ever-growing body of literature on naturalization that has been steadily growing since the 1990's. Despite regional differences, information is shared on a global level as naturalization efforts take place across the world. The impacts on naturalization within cities have been studied, looking at the impacts of urbanism and how indigenous species can be used to offset them. Naturalization efforts have provided benefits to individual people, ecosystems, and cities as a whole. This literature review examines the research done to date on the topic of naturalization.

3.2 Naturalization Within Cities

Naturalized boulevards are built around the concept of increasing the level of green space within a city. A naturalized boulevard is a street-side strip of land where native plants have been allowed to grow with limited mowing and maintenance. They can be considered a form of green infrastructure, which Chenowith et al. (2018, p. 139) define as "The living network of spaces, water, and other environmental features in both towns and the countryside." Additionally, for a natural space to be part of green infrastructure it must be a component of a designed network (Chenowith et al, 2018). Part of green infrastructure are urban ecosystems, which are ecosystems within cities. Bolund & Hunhammar (1999) explain that cities are part of a larger ecosystem, as they are dependent on the ecosystems outside the city as well as the urban ecosystem within it. These urban ecosystems include all greenspaces within urban centres such as lawns, parks, and other areas with a mixture of grass, trees, and other plants (Bolund & Hunhammar, 1999). Many species of both flora and fauna are dependent on these urban ecosystems to thrive, as there are direct links among vegetation complexity, indigenous plant species and the biodiversity of insects and animals within urban environments (Threlfell et al, 2017; and Mata et al, 2020).

3.3 The Impacts of Urbanism

Prior to European settlement, the prairies of North America was a vast grassland ecosystem with herds of bison dominating the landscape (Johnson et al, 1994, p. 5). The region is characterized by its wide range of weather and temperatures, with frequent droughts and seasonal temperature averages causing cyclic changes in the native flora and fauna of the regions (Johnson et al, 1994, p. 6). For these reasons, plant communities have never been stable; wildfires, bison grazing, and seasonal weather patterns were vital to the landscape (Johnson et al, 1994, p. 6). This natural landscape has since been obliterated, with little of it remaining. Cropland has replaced the natural prairie, and bison have been replaced by cattle, leaving the remaining prairie fragmented, surrounded, and cut off, leading to flora species native to woodlands to take over (Johnson et al, 1994, p. 6). Brown & Amacher (1997, p.4) lay out seven consequences of this severe disturbance: ecosystems have less resilience to climate change; biodiversity and sustainability has been lost to invasive species; soil nutrient levels have deteriorated and erosion has become more prevalent (Bretzel et al, 2009, p. 263); altered weather patterns have enhanced the availability of toxic chemicals; natural hydrologic

pathways have been impacted; deterioration of water quality and quantity in ecosystems; and impacts on vegetation development and vegetation-animal interactions due to loss of fauna. Urbanization has increased these outcomes, and is considered to involve near-permanent alteration of land use and the elimination of the natural dominant ecosystem (Kareiva et al, 2007; and Grimm et al, 2008). The urban heat island effect is also present in cities, as air temperatures are as much as 0.7 degrees Celsius higher within cities than in the surrounding areas, caused by all of the concrete and non-permeable surfaces within them (Bolund & Hanhammar, 1999). Impervious surfaces also turn rainfall into a higher proportion of surface-water run-off which in turn increases peak flood discharges and decreases water quality (Bolund & Hunhammar, 1999).

The aforementioned alterations and sometimes devastating outcomes to ecosystems are happening on a global scale, and urbanization is one of the driving factors (Isbell et al, 2017; Johnson & Munshi-South, 2017; Lambert et al, 2021; Palma et al, 2017; and Piano et al, 2017). These impacts are predicted to become even worse, as global urban populations are projected to grow from 3 billion people in 2000 to 6.4 billion people by 2050 (French, 2022). These world-wide increases will put additional strain on infrastructure, resource, and space requirements, increasing the urgency to protect urban diversity through suitable habitat (Threlfall et al, 2017, p.1; and French, 2022). Thankfully, many public land management agencies, both in Europe and North America, have identified the decline in ecosystem health and adopted ecosystem management (Brown & Amacher, 1997, p. 1). Architects are also embracing “biomorphic urbanism,” which uses the inspiration of nature to create sustainable cities with reduced environmental impacts (French, 2022).

3.4 Benefits of Climate Change Adaptation for Cities

Climate change adaptation means, “Taking action to prepare for and adjust to the current and projected impacts of climate change” (Global Center on Adaptation, 2024, para. 1). Climate change adaptation strategies come in many forms, and naturalization or greening is a significant one. The greening of urban lands can lead to tremendous improvements in local, natural biodiversity among flora and fauna (Mata et al, 2023). Numerous studies have proven that increasing vegetation structure and indigenous plant diversity increases biodiversity among animals in urban centres (Baldock et al, 2019; and Beninde et al, 2015).

Typically, the larger the patch size of green space that is improved, the greater the benefits will be (Beninde et al, 2015). However, impacts can still be felt on a smaller scale. Simple small greening actions have been found to have tremendous impacts on insect populations, including pollinators, after only three years post-greening (Mata et al, 2023). Corridors (greenways connecting larger green patches within urban areas) are incredibly effective at promoting biodiversity, and much more efficient than stepping-stone habitats (Saura et al, 2014; and Fahrig, 2003). Simple greening effects, such as naturalizing a boulevard, can have tremendous, identifiable impacts on the dynamics and structure of complex ecological communities (Mata et al, 2023). These ecological improvements and biodiversity enhancements all help urban centres adapt to climate change. Additionally, urban greenspace can carry aesthetic and historical values that promote the attractiveness of the urban centre to both residents and tourists (Chiesura, 2004, p.130).

Vegetated areas provide a tremendous source of permeability for urban centres, which is another climate change adaptation strategy.. Bernatzky (1983) found that vegetation-free cities had rainwater runoff rates of 60%, compared to 5 to 15% of vegetated areas. Areas with weather extremes, such as Winnipeg, can benefit greatly from green areas collecting rainwater (Bolund & Hunhammar, 1999). Urban greening through vegetation, especially with indigenous species, provides other benefits as well such as air filtering reducing air pollution (Givoni, 1991; Al-Dabbous and Kumar, 2014; and Gallagher et al, 2015), micro-climate regulation and climate change adoption (Moore and Hunt, 2013; and Young, 2011), noise reduction (Costanza et al, 1997), rainwater drainage and stormwater runoff (Dunn, 2010; Leichenko, 2011; and Riffat et al, 2016), sewage treatment (French, 2022), recreational and cultural values (Costanza et al, 1997; and Bolund & Hunhammar, 1999), urban aesthetics and regeneration (Kambites & Owen, 2006; and Wright, 2011), urban landscape and land management (Moore & Hunt, 2013; and Chenowith et al, 2018), and fire reduction (Leichenko et al, 2011; and Riffat et al, 2016).

3.5 Benefits of Climate Change Adaptation for People

Increasing urban vegetation and green spaces also brings many mental health benefits for people living within urban centres. Studies have shown that stress levels decrease when exposed to natural environments (Ulrich et al, 1991; and Bolund & Hunhammar, 1999) while

they have increased in typical urban environments. Human life is enriched by encountering urban nature, and it often provides social and psychological benefits to people (Chiesura, 2004, p. 129). Additional benefits have even been attributed to natural areas that require less maintenance, such as mowing (Clark et al, 2014; and Beninde et al, 2015). The socio-ecological benefits provided to urban residents through urban nature have become so profound that understanding and quantifying them has become a critical point of research and practice for policymakers and practitioners (Mata et al, 2020; and Nilon et al, 2017). Cultural values can also be incorporated through vegetation, as native species can have close cultural associations with local Indigenous cultures (Mata et al, 2020; and Mata et al, 2023). In Manitoba, an example of this is the prairie crocus. Indigenous cultures in the region have legends about the prairie crocus, and it is a symbolic native species (Milner, 2018).

Human physical health can also be improved through exposure to vegetation in urban settings. Contact with the microbiota of green spaces can benefit the immune system (Rook, 2013; and Beninde et al, 2015). Vegetation can also be used to control pests such as mosquitoes (French, 2022). Indirectly, other benefits can include increased property values, reduced crime rates and an improved sense of community (Dunn, 2010; and Chenowith et al, 2018).

3.6 How Urban Green Space Benefits are Achieved

The benefits of urban greenspace are many, but how do they provide benefits? Design plays a key role in making the most of the benefits provided, and how vegetation is used within the design is critical. Up to 85% of air pollution in a park can be filtered out through trees (Bernatzky, 1983). However, thick vegetation may only cause turbulence while thinner cover lets the air through, allowing for filtration (Bernatzky, 1983; and Bolund & Hunhammar, 1999). The presence of trees also helps develop social ties and reduces aggression in people (Kuo et al, 1998; and Chiesura, 2004, p. 130). In addition to the density of trees, specifically native species, the volume of understory vegetation has a direct correlation with animal diversity (Threlfall et al, 2017, p. 1). Increased understory vegetation by 20%, specifically when the species are indigenous, increases wildlife occupancy by up to 120% for bats, birds, beetles, and bugs, and up to 140% for all native taxa (Threlfall et al, 2017, p. 1). Interestingly, these results are only seen with native species, as exotic bird

species have neutral growth (Threlfall et al, 2017, p. 1). This is backed by Beninde et al (2015), and Aronson et al (2014), who state that vegetation is a major factor regarding fauna, as it provides food and habitat. Native vegetation can be encouraged through replacing grass and lawns with meadows, which increase pollinator and plant diversity (Tessler et al, 2023, p. 1085). Ultimately, investment in natural capital can be done as simply as planting trees (Hinterberger, 1997, p. 4; and Chenowith et al, 2018).

When designing urban greenspace around the benefits they provide, native species have some great advantages over exotic ones. Native species have previously succeeded and evolved in the climate they are being planted in, giving them critical advantages for future climate change (Brown & Amacher, 1997, p. 6 & 8). This means they are already shaped by the climate and locale, and likely can do so again as climates change (Brown & Amacher, 1997, p. 9, & French, 2022). Native prairie gardens have also proven to improve soil conditions (Johnston et al, 2016; Golchin et al, 1994; and Puget et al, 2000). Indigenous plants also have the potential to undo the unintended consequences of exotic plant species (Pysek et al, 2020; and Mata et al, 2023). In particular, native wildflowers have proven to enable derelict soils to vegetate, enhance wildlife biodiversity and population counts, and look aesthetically pleasing at the same time (Bretzel et al, 2009, p. 263).

Choices for what species of plant to use should be made on three major factors: functional traits, biogeography, and cultural concerns with an emphasis on plants with biocultural value (French, 2022). Plants can be utilized for specific traits within urban landscaping, and their lifespans should be taken into consideration, as well as the outcomes desired by the end-user (French, 2022). Embracing considerations like these and others, such as sustainable biodiversity goals, should be priorities for designing future cities (Son et al, 2012; and Beninde et al, 2015). Policies, strategies, and planning requirements are all tools that can be used to increase urban greenspaces and the benefits found within them (Chenowith et al, 2018). These studies, benefits, and outcomes all combine to show how boosting ecosystems provide a myriad of benefits (Mata et al, 20123), especially when it is in the form of ecological restoration (Kaiser-Bunbury et al, 2017).

3.7 The Benefits of Native Species

Indigenous plant species have great potential within urban centres. Tallgrass prairie, which was once the dominant landscape of the North American prairies, could provide belowground characteristics that improve urban soil (Johnston et al, 2016). Additionally, wildflowers can replace grassy areas and save money through removing mowing costs while also stabilizing roadside soils and preventing erosion (Bretzel et al, 2009, p. 263). Indigenous species also often have more seeds per pound than introduced species, which reduces the cost of planting them (Brown & Amacher, 1997, p.6). Integrating biomorphism into urban centres can reduce the impacts of anthropogenic urbanism and provide prototypes of how humans can coexist with nature in urban settings (French, 2022). Not integrating nature into urban centres can lead to hidden costs and negative impacts through the damage done to the natural ecosystem (Brown, 1995; Mills et al, 1994; and Seagrave, 1976).

3.8 Downsides of Native Plants

While there are many benefits to using indigenous plant species during naturalization efforts, there are some drawbacks as well when they are compared to introduced species. Introduced species are often easier to acquire, as they are widespread and have large markets for their seeds. For some indigenous species, seed availability can be limited on the commercial market (Brown & Amacher, 1997, p. 6). Many indigenous plant species also face local stereotypes. In many cases they are classified, or simply viewed as undesirable weeds (Brown & Amacher, 1997, p. 9). This can make it difficult for local residents to embrace these plants as perennial parts of their personal environment. Introduced species may also have some advantages over Indigenous species, specifically when it comes to a specific task or role. Introduced species can be pulled from across the globe, meaning the local species has to outperform every other comparable species across the globe. In many cases, there may be a similar species that has an increased capacity for a given service (French, 2022).

3.9 Gaps in the Literature

There is an important gap in the literature regarding naturalized boulevards and their potential in Winnipeg. This gap is Winnipeg's status as a winter city, and what the harsh climate does to naturalization efforts within the city.

While the plant species native to the Winnipeg area are hardy and evolved to survive Winnipeg winters, they may not be prepared for the impacts of winter roadway maintenance. Roads in Winnipeg are consistently salted and sanded to remove ice and create a safer driving environment in winter. This leads to piles of sand on curbsides that can smother plants, as well as exposure to salt that can be toxic and harmful to them. This is an area that must be further studied to identify how to properly implement naturalization along boulevards in Winnipeg.

3.10 Summary

While naturalization is not without its downsides, there is no doubt as to the ecological benefits it provides. Urbanization and increased density bring a myriad of new challenges in the 21st century, and naturalization helps to offset many of them. Naturalization reduces the urban heat island effect, improves mental health outcomes, has advantages for climate change adaptation, and greatly increases biodiversity and supports pollinator populations. While naturalization may not be the answer to every landscaping situation, it has proven that it should be part of the conversation, as its benefits have been widely recognized.

4.0 Research Methods

This research was undertaken using a qualitative methods approach. A document analysis was conducted to answer the following three research questions: 1) How do naturalized boulevards assist Canadian prairie cities in adapting to climate change? 2) What boulevard naturalization initiatives are happening in Winnipeg and other prairie cities in Canada? And 3) What lessons do those initiatives offer for Winnipeg?

The following sections relay the steps taken in the document analysis process, the geographic scope of the project, and limitations associated with it. Document analysis was conducted through the framework developed by Bowen (2009).

4.1 Research Field

Seven cities and institutions were selected to examine their naturalization work. These locations were selected based on the recency of their naturalization projects as well as their geographic locations. Further criteria included similarities in scale (limits to one or two sites), and municipal or institutional initiatives with public interaction. All locations are in the region known as the Canadian prairies, which share similar climate patterns. The Canadian prairies are generally considered to consist of the provinces of Alberta, Saskatchewan, and Manitoba (Government of Canada, 2012). While specific areas still feature minor differences between each other, the consistent patterns of winter snowfall, freezing, snow removal, and growing seasons overlap consistently. Table 1 shows the seven sites and their locations.

Table 1: Location of study sites originally proposed.

Location	**Province**
City of Grande Prairie	Alberta
City of Winnipeg	Manitoba
City of Selkirk	Manitoba
University of Manitoba	Manitoba
City of Edmonton	Alberta
City of Calgary	Alberta
City of Portage la Prairie	Manitoba

While these seven sites were selected, not all of them were used for the research involved in this report. The cities of Edmonton and Portage la Prairie did not have any reports on their projects available to include, and the city of Calgary did provide a report, but it was confidential and not yet released to the public. As a result, it could not be included in the findings. As such, the research was driven by the results found in the cities of Grande Prairie, Alberta, Winnipeg, Manitoba, Selkirk, Manitoba, and at the University of Manitoba, also in Winnipeg. The map in Figure 1 shows the distribution of the selected locations across the Canadian prairies.

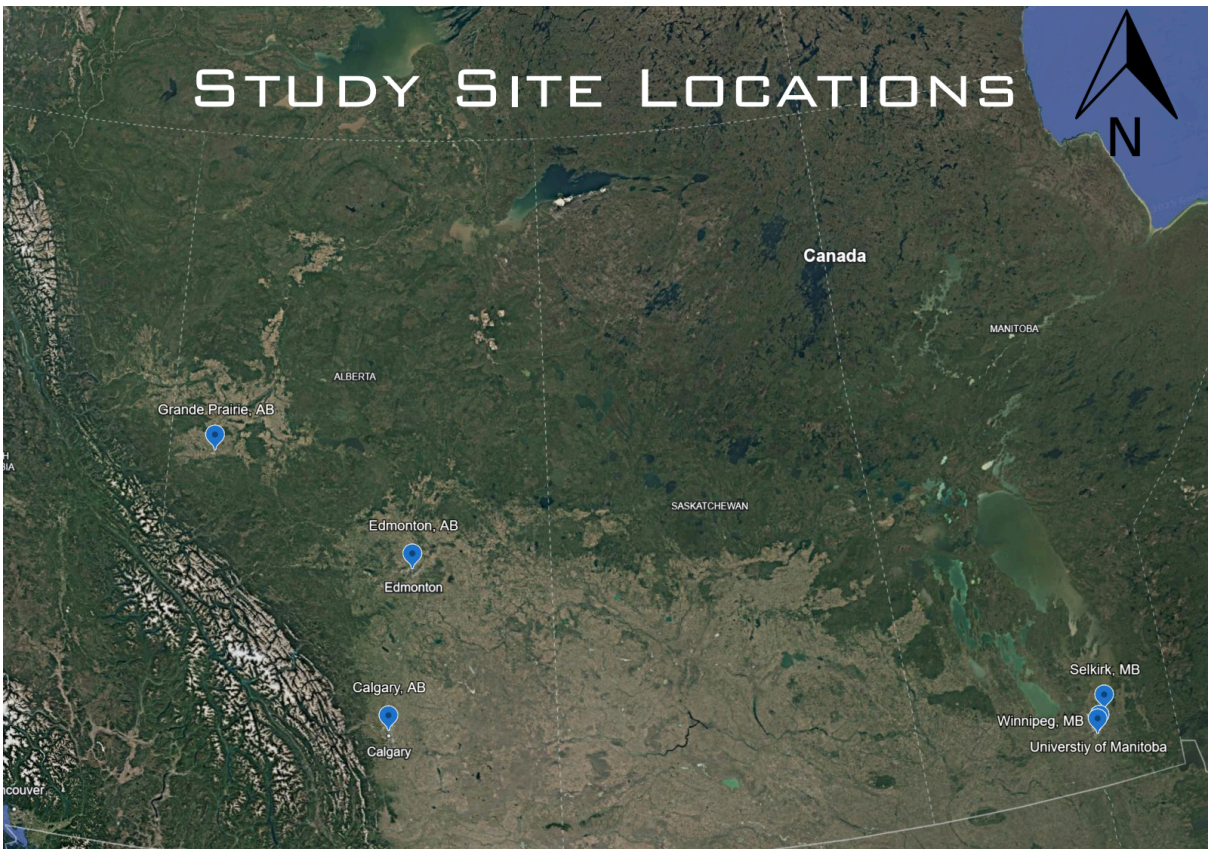

Figure 1: The spread of the originally proposed study sites (image from Google My Maps).

In addition to the identified prairie projects, two more Canadian projects were identified in the cities of Montreal, Quebec and Vancouver, British Columbia. These projects were meant to provide context from outside the Canadian prairies to see if any external methods could be utilized in Winnipeg. Unfortunately, neither municipality responded in time to provide information for this report.

The reports provided by the three contributing cities and one contributing institution were examined to answer the three research questions.

4.2 Document Analysis

Internal reports, reports to council, seeding maps, published documents, and media releases were all examined to determine the creation process and results of naturalization efforts in the selected municipalities and institutions. The documents were found through a combination of internet searching (which included searching media outlets, municipal databases, and general internet searching) and provision by experts who worked on the

projects. Once collected, the documents were compared to one another to determine patterns in installation process, species used, site types, reported outcomes, expenses, community engagement, and more. These documents provided the core of the research into the topic of boulevard naturalization, and provided the foundation for the discussion of the topic. Depending on the naturalization project, the selected sites had differing documentation available to be included. Table 2 outlines the type of documents provided with each municipality and institution. In the case of each municipality and institution, the documentation was provided by either the municipality itself or from the landscaping or engineering firm that conducted the work themselves. Any documents that are not publicly available online have been included in the appendixes.

Table 2: Naturalization projects and documentation.

Municipality/Institution	**Types of Documents Shared**
City of Winnipeg	Municipal reports, published documents
City of Grande Prairie	Municipal reports
City of Selkirk	Published documents
University of Manitoba	Seeding map

Seeding maps display seeding mixes that were used in a project, and where those mixes were applied. They provide context for proximity to roads and other potential hazards, as well as detailed information about the plants that were seeded. They are useful for analysis as they provide a historical context to a project once completed, and can help provide a contextualized blueprint for what is or is not successful.

Municipal reports are reports made to city council by administrative staff. These reports provide insight into a project through the perspective of how successful it was. Specific amounts of detail range from report to report, but they often provide insight into why a project was undertaken, what the goals of it were, how it was to be completed, and how successful it was.

Published documents are informational pages released by an entity to the general public. In this case, the documents examined were released by municipalities and published

on their city websites. Published documents can cover any number of topics and be released for any number of reasons. In the case of the releases looked at for this report, the naturalization documents were either educational or offered information about particular projects.

4.3 Limitations

Unfortunately, there are several limitations associated with this study. The first of these limitations was that the diversity in the number of projects studied was not met. While seven naturalization projects on the Canadian prairies were identified, only four actually had reports available to be used for research and study. In the case of Calgary, a detailed report was provided. However, it was not yet publicly shared and could not be used. As previously mentioned, projects from Vancouver and Montreal were also unable to be used. Naturalization projects in Montreal include sites in Mount Royal, Charbonneau Park Shoreline, Parc Jean-Drapeau, and Trame verte et bleue du Grand Montréal. In Vancouver, naturalization projects have created pollinator meadows in parks and golf courses.

The fact that many municipalities did not have official records or public documentation of their projects, nor did the firms that carried out the work, was a significant hindrance. Many reports are kept internal by municipalities and private firms, or are never conducted in the first place. In many cases there are internal reports that are not publicly available about the creation of a project, but reports are rarely generated on the outcomes of a naturalization project. In addition, naturalization projects are relatively new in Canada, which made the impact of internal-only reports even more impactful as there are limitations to how many projects can be studied.

In addition to the shortage of applicable reports, Winnipeg and the surrounding area have a distinct factor that separates it from other parts of the Canadian prairies. This soil is classified as Chernozemic soil, which is mainly composed of Red River clay deposits (City of Winnipeg, n.d.a). The soil around Winnipeg is unique and not shared by other provinces or even other parts of Manitoba. This means there is an additional missing contextual layer about what could work in Winnipeg for naturalization efforts. Thankfully, of the four projects that were studied for the report, two were in Winnipeg itself while another was in the city of

Selkirk, which is under 50 kilometres from Winnipeg. These sites all shared the local Winnipeg soil, which allowed for that limitation to be removed in 75% of the projects.

5.0 Findings

5.1 City of Grande Prairie

In spring 2023, the City of Grande Prairie launched a Boulevard Naturalization Pilot Project (DeVries, 2024, p. 2). The project was divided into three areas; 116th Avenue, 84th Avenue, and Resources Road. The project is designed to run for three growing seasons, concluding in fall of 2025.

The pilot project was launched at the behest of City Council under the grounds of three anticipated outcomes; environmental impact, economic impact, and social impact (DeVries, 2024, p. 3). The hopes for the environmental outcomes are to improve slope stabilization in subject areas, improve pollinator habitats, and reduce erosion during rain events. The economic goal of the pilot project is to prove the financial viability of naturalization by reducing long-term site maintenance costs to see if it could work as a model in other suitable locations. Socially, the expectation is that naturalized spaces will fold into the backdrop of the surrounding landscape after receiving sufficient time to become established. However, the short-term outcomes anticipated a subjectively unattractive appearance for residents in certain areas where mowing had been standard practice for decades.

The 2024 report to council provided an update on the status of the pilot project at the completion of the second growing season. Across all three locations, grasses are thriving and mowing operations have ceased, allowing for natural reseeding (DeVries, 2024, p. 2). Figures 2, 3, and 4 each show various elements of the pilot project.

Figure 2: Seed-bearing stocks along the 116th Avenue site show the viability of natural reseeding (DeVries, 2024, p. 5).

Balsam poplar trees, a tree native to the region, have begun naturally sprouting across the three sites (DeVries, 2024, p. 2).

Figure 3: Balsam poplar emerging along the Resources Road site (DeVries, 2024, p. 5).

Additionally, noxious weeds have responded as expected to spot treatments from 2023 (DeVries, 2024, p. 2). However, they still exist in some areas and the city will address its approach accordingly in the 2024 season.

Figure 4: Noxious weeds (in this case, what appears to be Canadian thistle) responding to 2023 treatments (DeVries, 2024, p. 6).

The pilot project garnered significant interest from residents of Grande Prairie in the 2023 season, the first year of the project. The majority of this interest was negative, as many residents did not approve of the change in appearance of the sites (DeVries, 2024, p. 2). The city responded in 2023 by making slight changes to the maintenance of the sites, including mowing along private fences to establish a buffer zone. These initiatives provided dividends in 2024, as Access Grande Prairie (the city's online resident inquiry portal) saw a 76% decrease in naturalization related inquiries from 2023 to 2024, and a 90% decrease in inquiries specific to the pilot project in the same time frame. At the end of the report administration's recommendation to council was to maintain the project for its final season, which council agreed to.

5.2 City of Winnipeg

In 2020, the city of Winnipeg began a project to naturalize portions of the green space buffering both sides of Fermor Avenue from Lagimodiere Boulevard to the intersection with the Seine River (Appendix B). The intent of the project was to complete an ecological and financial analysis by comparing the Fermor project to the practice of regular turf mowing.

Traditionally, the city of Winnipeg has practiced consistent mowing to achieve a lawn of green grass as the maintenance standard city-wide (Appendix B). This process is straightforward, and results in a recognizable appearance that can be considered neat and tidy. However, regular mowing can have detrimental ecological effects in many cases. Regular mowing reduces biodiversity, has a negative impact on pollinators, burns fossil fuels and contributes to greenhouse gases. The city viewed this project as a viability test to both maintenance costs and greenhouse gas emissions. While there have been multiple naturalization projects in Winnipeg's history, they have had varied results with some extreme successes and some failures. However, none of these projects have evaluated the cost savings of naturalization efforts, which would be the success or failure consideration for the Fermor project.

City staff anticipated several potential outcomes or experiences for the project. Visual changes to the area would occur, which could result in complaints from residents (Appendix B). To mitigate this, seeing success from wildflowers in some areas could generate public support and enhance pathway user experiences. Regardless of wildflower success, the project was expected to be beneficial for pollinators and increase the area's ecological value.

Three options were provided for city council to select from. Of the three options, Option B was the recommended selection by administration (Appendix B). Option B would ultimately be selected, and given a proposed budget of $5,000.

Option A was the simplest and cheapest of the three options. In this scenario, the plan was simply to stop mowing (Appendix B). Since the area had been regularly cut for years, it was unlikely to revert to its natural status. Additionally, one or two cuts a season may still have been required if Canada thistle issues developed and began impacting neighboring properties. This is a practice that has been undertaken in several locations in Winnipeg,

including along Abinojii Mikanah. This option had no capital costs, and may have required minimal maintenance costs.

Option B, which was the recommended and selected option, was a step up from Option A. It included planting wildflower plugs or potted plants within limited areas of existing vegetation, with a possibility to include light tillage and seeding with a mixture of native species (Appendix B). The goal of Option B was to increase biodiversity and pollinator habitat with the hope wildflowers would also spread to larger areas of existing vegetation. Option B was to be used in combination with Option A, which could result in the same potential Canada thistle issue. In this scenario, weed removal would need to be done through either targeted spot spraying or targeted cutting. Option B had estimated installation cost ranges from $0.80 to $1.90 per metre squared, with long-term costs to be determined.

Option C was the most extensive of the three options as it involved a full native grassland installation. Existing vegetation was to be removed through the use of herbicides and maintained in a vegetation free state for two seasons to eliminate any weeds (Appendix B). After the first two seasons, the area would be seeded with native grasses and managed for a further two to three years until it was fully established. However, it would still potentially be susceptible to Canada thistle infestations and could require herbicide usage in addition to controlled burns at five-year intervals to maintain the health of the grass. Option C would provide an aesthetically consistent look and a long-term community of native grasses, and has become standard practice in Winnipeg in new developments around retention ponds. The proposed cost of the installation of Option C ranged from $4.00 to $16.00 per metre squared, depending on the size and difficulty of the installation area. Long-term costs were to be determined and based on the requirements for periodic burning and weed control.

Following the selection of Option B in 2020, the project moved forward and was started in 2021 before maturing into the maintenance stage in 2023 (Appendix C). The site was seeded with a diverse mix of native grasses and wildflowers, and additional wildflowers were provided through plug plantings. The project began with a difficult start as 2021 saw a drought and minimal seed germination which caused an increase in establishment costs. The following year was more successful, as regular rains allowed the site to flourish and transform from a low-quality turf to a diverse grassland. The site now provides critical habitat for pollinators as 17 species of wildflower, including black eyed Susan, purple prairie clover

and whorled milkweed, and eight types of native grasses have become established. These wildflowers were selected to provide blooms throughout the year to provide a season-long source of food for beneficial insects and pollinators. In addition to the ecological benefits, carbon emissions have been reduced through the reduction in mowing.

Despite the ecological success of the project, the overall goal of providing a cost comparison was not accomplished for several reasons. First, the cost of a naturalization project is difficult to determine due to varying factors from site to site (Appendix C). These factors include site selection. Typically, beneficial sites are selected that are close to existing natural areas, have favorable sizes and shapes, have a favorable moisture regime, and have an undisturbed soil profile. However, other sites are weedy, dry, and/or adjacent to roadways where de-icing salts limit plant growth.

The second limitation falls within the city's costing model. Currently, there is no model employed by the city of Winnipeg that is able to compare the true cost of naturalization to the cost of mowing (Appendix C). Despite this limitation, a ballpark number was able to be established for the Fermor Avenue site. For the duration of the project the cost to establish the site was $2.85 per metre squared, and $0.23 per metre squared to maintain. Estiamshions for the mowing cost at a service level comparable to the Fermor site would be $0.34 per metre squared. This suggests the maintenance costs for naturalization is lower than mowing, however naturalization has a larger upfront cost.

In addition to the Fermor project, the city of Winnipeg provides an online brochure on naturalization to its residents. The brochure provides a basic overview of naturalization intentions within the city of Winnipeg. It identifies three key areas where naturalization and no-mow zones are to occur. The first of these areas is along waterways such as rivers and creeks, where naturalization provides vegetation that improves water quality and helps prevent erosion (City of Winnipeg, n.d.b, p. 2). Existing natural areas are also identified as naturalization zones, where reducing or eliminating mowing can provide a buffer zone that encourages native plant species to spread. Existing areas where native species persist are also identified for naturalization, as they allow important and attractive prairie flowers and grasses to flourish where they would be otherwise suppressed by regular mowing. In addition to these three identified existing areas, the city is actively re-introducing prairie grasslands and

naturalized retention ponds in new developments to protect natural diversity, improve water quality, and add beauty to the surroundings.

There are multiple common plants associated with naturalization in the areas listed above in Winnipeg. Table 3 displays these common plants.

Table 3: Common naturalization species in Winnipeg (City of Winnipeg, n.d.b, p. 2).

Herbaceous Species	**Trees and Shrubs**	**Undesirable Species**
Goldenrod	Manitoba Maple	Canada Thistle
Aster	Green Ash	Dandelion
Fleabane	Bur Oak	Sow Thistle
Wild Licorice	Trembling Aspen	Smooth Brome Grass
Prairie Sage	Chokecherry	Quack Grass
Milkweed	Red Osier Dogwood	Sweet Clover
Bedstraw	Highbush Cranberry	Burdock
False Solomon's Seal		
Canada Anemone		
Sedge		
Rush		
Big Bluestem		

The brochure identifies further ecological benefits as well, broken into four categories. The first category is protecting natural heritage, as naturalization preserves forests, restores healthy wetlands, and reintroduces prairie grasses and wildflowers (City of Winnipeg, n.d.b, p. 2). The second category is improvements to stream health and riverbank stability, as naturalization filters pollutants, reduces erosion, and provides a healthier environment for fish and other aquatic species. The third category is increased biodiversity as natural areas provide a place for many varieties of wildflowers, trees, and shrubs, which attract and sustain additional diversity in birds and butterflies. The final category is enhanced water quality, as natural wetlands and naturalized retention basins remove nutrients and pollutants from runoff water before it can flow downstream into rivers and lakes.

Finally, the brochure identifies several challenges to naturalization. Naturalization is a long-term process, and some areas can take years to develop. During those initial phases, naturalization can result in weed problems as invasive species capitalize on the no-mow environment (City of Winnipeg, n.d.b, p. 2). Hand pulling and cutting are often required for control during these first few seasons, but eventually weed populations reduce as the new, naturalized environment develops. Wind-blown plastics and papers, as well as grass clippings and other trash, can become an issue. If a naturalized area is located in a wind-exposed site, litter can collect within it. Despite these challenges, the brochure states the personal well-being and environmental health benefits outweigh these challenges.

5.3 City of Selkirk

In 2020, the city of Selkirk began a naturalization project along the northernmost boulevard on Main Street (Selkirk, 2024). The first step of the project was to turn the northernmost boulevard into a naturalized wildflower boulevard. This specific site was chosen for two reasons; first, it was close to the municipal office where maintenance staff work from. Second, the northern section of Main Street has lower traffic than the rest of the street, providing a safer environment for staff to work on the boulevards (Figus, 2022). The goal of the project is to convert areas into naturalized spaces or prairie grass ecosystems (Selkirk, 2024). The project is expected to prove that naturalization reduces operational costs and improves environmental impacts through not requiring mowing, native species requiring much less watering than imported grasses, and improved drought tolerance among native species. Additional impacts the city of Selkirk wants to see naturalization create include carbon sequestration and reduction of greenhouse gases; increased soil quality, erosion control, and groundwater management; increased water quality around bodies of water; increased biodiversity and the protection of plant, animal, and pollinator species; reduced urban heat island effect; and improved educational opportunities and engagement with nature (Figus, 2022). Figure 5 displays the aesthetic outcomes of the first stage of the project.

Figure 5: The first stage of the naturalization project was to convert a section of the northernmost boulevard on Main Street into a wildflower boulevard (Selkirk, 2024).

In 2022, the program was expanded to include three additional plots immediately south of the original Main Street site (Selkirk, 2024). Three different varieties of clovers were planted to determine the viability of no-mow zones along medians (Figus, 2022). These three sites had three different seeding mixes. The first was a mixture of existing grass, white clover, and red clover. Interestingly, this mix is also being tested in a different site to see if it is viable to be used for a sports field. The second site has a mix of white and red clover, and the third site has micro clover. When established, red and white clover are four to five inches in height while micro clover is around two inches tall. The city is anticipating it will take three to five years for the sites to become established. Figure 6 displays the three clover sites.

Figure 6: The three separate clover sites (Figus, 2022).

5.4 University of Manitoba

In 2021, the University of Manitoba hired Native Plant Solutions to carry out the Dafoe Road Renewal Program (Appendix A). Three different seeding mixes were along Dafoe Road, which is located on the university's Fort Garry campus. The first seeding mix was used on both sides of Dafoe Road, between the sidewalk and road on University Crescent south of Dafoe to Freidman Crescent, and along Freidman Crescent to King's Drive. The second mix was used on the outside three metres of the center boulevard on University Crescent and from Dafoe south to Freidman Crescent (Appendix X). The final seeding mix was seeded in the central area of the University Centre boulevard. Figure 7 shows the distribution and planting locations of the seeds.

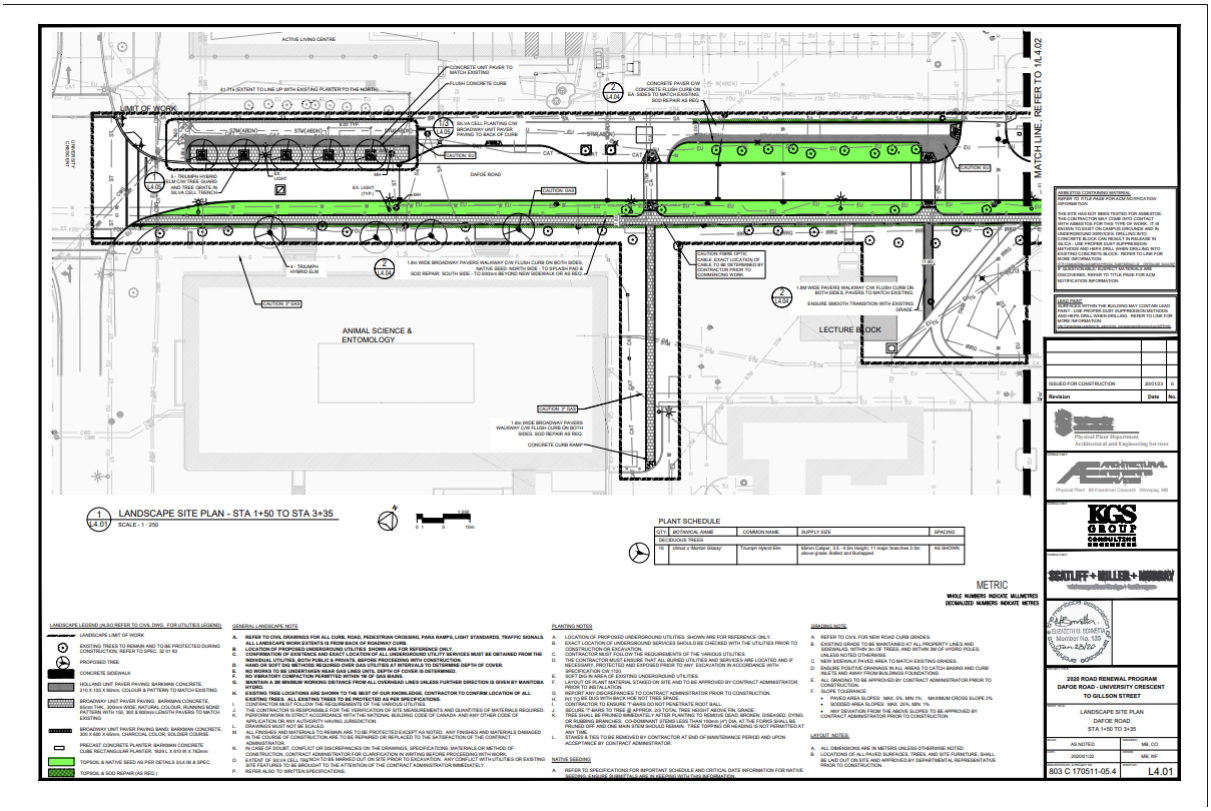

Figure 7: A seeding map of the University of Manitoba Dafoe Renewal Project (image courtesy of Gord MacKay/Native Plant Solutions)

The first seeding mix consisted of 70% alkaligrass, which was a mix of Fults alkaligrass (an introduced species) and Nuttals alkaligrass (an indigenous species) (Appendix A). Table 4 provides the seeding mix pounds of pure live seed (PLS) per acre. Figure 8 shows the established grasses.

Table 4: Seeding Mix PLS distributions

Plant	**Mix 2 PLS**	**Mix 3 PLS**
Side-oats grama	1.5	0.5
Little bluestem	1.0	1.0
Western wheatgrass	1.0	0.5
Tufted hairgrass	0.5	0
Nutall's alkali grass	1.75	0
Blue grama	Added, amount not specified	0
Junegrass	Added, amount not specified	0
Buffalograss	Added, amount not specified	0
Side-oats grama	Added, amount not specified	0
Supplementary wildflower seeding	0	0.1
Purple prairie clover	0	0.2
Prairie coneflower	0	2.5
Wild bergamot	0	2.5
Meadow blazing star	0	2.5
Dotted blazing star	0	2.5
Black eyed Susan	0	2.5
Big bluestem	0	2.5
Indian grass	0	0.5
Switchgrass	0	1.0
Canadian wildrye	0	0.25
Slender wheatgrass	0	0.1
Green needle grass	0	2.5

Figure 8: The salt tolerant seed mixture on Dafoe, designed to only be mowed once or twice a year. The western (left) side of the image shows a thinner layer of grass, which is caused by salt accumulation preventing water uptake. The same is seen on the right of the image beside the sidewalk, but to a lesser extent (image courtesy of Gord MacKay/Native Plant Solutions).

5.5 Summary

Seven naturalization sites across three Canadian prairie cities and four separate projects were examined. The city of Grande Prairie has three different naturalization sites, which have been considered successes. They have achieved climate change adaptation and ecological outcomes, while mitigating negative public feedback. Recorded benefits include decreased soil erosion, increased pollinator habitat, and reduced maintenance costs.

In Winnipeg, two separate naturalization projects have both been successful. In the City of Winnipeg's project positive environmental outcomes were achieved and although maintenance costs appear to have been reduced, it could not be officially determined. At the University of Manitoba site, detailed seeding has resulted in a healthy natural grass ecosystem. While it does face challenges such as winter snow removal, it has been able to mitigate those impacts and still be successful.

The city of Selkirk has undergone two phases of naturalization across two neighbouring sites along medians. The first was successful, creating a pollinator habitat among other ecological outcomes, and the second is underway. The second project is to establish the viability of clover as a no-mow ground covering, however it is too early to tell whether or not the project will be successful.

The following table, Table 5, summarizes the outcomes observed and challenges faced by the projects.

Table 5: Key Findings Summary

Project	Challenges	Climate Change Adaptation and/or Mitigation Benefits	Positive Ecological Outcomes
Grande Prairie	Negative resident feedback	Reduced emissions	Slope stabilization, reduced erosion, increased pollinator habitat
Winnipeg	Drought	Reduced emissions	Increased pollinator habitat
Selkirk		Improved drought resistance, reduced emissions	Increased soil quality, improved erosion control, increased biodiversity
University of Manitoba	Snow removal practices		

6.0 Discussion

Multiple shared trends emerged across the four naturalization projects. These trends displayed both climate specific issues as well as outcomes well established by existing literature. These trends have been condensed into six categories through exploration and comparison. The six categories are 1) Aesthetic Changes and Community Feedback, 2) Changes to Maintenance and the Relationship with Climate Change, 3) The Use of Seeding in Projects, 4) The Cost of Naturalization, 5) Environmental Challenges Faced by Naturalization Projects, and 6) Ecological Outcomes of Naturalization.

6.1 Aesthetic Changes and Community Feedback

The naturalization projects in the cities of Winnipeg and Grande Prairie each reported on the impacts of the aesthetic appearance of their projects. These reports focused both on the potential beauty of a naturalized landscape, as well as potential community pushback due to the relatively unattractive appearance of the early stages of the naturalization process.

The process of turning a previously mowed and maintained lawn into a naturalized area is one that takes time. Often, it takes as many as three or more years for a site to become

established. In those first few years the site can resemble an unmaintained yard. Weed populations such as Canada thistle can be a common problem, and grass heights can grow to previously unseen levels. In areas where consistent maintenance has been the standard for years or even decades, residents can become upset at the change. Grande Prairie fell victim to this, as the city received many complaints about the project from residents of the area. Those complaints became so numerous, the city was forced to adjust the scope of the project and respond by returning a portion of the site area to its previously mowed state.

While negative community feedback is a potential issue, there are ways to get ahead of it. A strong promotional and educational campaign, alongside community engagement before a project begins, can help ease resident concerns. Residents are less likely to be upset if they understand the benefits of naturalization, why the project is happening, what it will look like when it is established, and how long the process will take. Residents are much more likely to support the project if they are well-informed about the process and what is happening. If they are unaware of the project, they may simply see a previously maintained site that appears as though it is no longer being maintained, which would likely and justifiably upset them.

Despite the potential early negative aesthetic challenges associated with naturalization, the end result can be quite beautiful. While natural aesthetic beauty is of course subjective by nature, naturalization can carry a form of beauty distinct from common city practices. Wildflower gardens can often see support from the general public, and can reflect the historic and native beauty of an area. Once completed, naturalization projects are often embraced and supported by residents due to their appearance and benefits.

6.2 Changes to Maintenance and the Relationship with Climate Change

While naturalization provides many ecological benefits, the simple act of stopping classic maintenance patterns can have a positive impact on carbon emissions. Both Winnipeg and Selkirk noted the impact in their projects, specifically stating the reduction of emissions through ending the continuous process of lawn mowing. Specifically, the City of Selkirk noted it spends roughly 300 hours per week mowing (Selkirk, 2024). Any reduction here will

help reduce carbon emissions, with the more naturalization that occurs reducing emissions even further.

In addition to reducing carbon emissions, Winnipeg and Selkirk both noted supplementary benefits for anticipated outcomes from climate change. The naturalized projects in both cities are drought-tolerant once established, and require far less watering than classic lawns and other introduced species. The native prairie climate is one that is historically used to droughts and reduced rainfalls, which is what is projected to increase with climate change. As both Selkirk and Winnipeg identified, having naturalized green spaces will better prepare the cities for the impacts of climate change.

6.3 The Use of Seeding in Projects

With seeding and plant data available from three of the naturalization projects (Winnipeg, Selkirk, and the University of Manitoba), we can compare them to see what plant species were used across the three sites. An additional benefit to this is the proximity of the sites to one another, as they are all located within 50 kilometres of each other. This means they share the same climate, weather, and soil, and can be directly compared to each other.

In the cases of Selkirk and Winnipeg, specific species of wildflowers were not clearly stated. While the Winnipeg project mentioned black eyed Susan, purple prairie clover and whorled milkweed all being present on the site, they are only three of the 17 reported wildflowers. Similarly, the wildflowers used in Selkirk are not specified, but simply alluded to in a general term. This means we cannot directly correlate the successes of the projects to similarity in wildflower species. While it could be a possibility, data to prove it is not publicly available.

Similarly to the lack of wildflower data available, Selkirk and Winnipeg once more only generally refer to the planting of grasses. Specific species are not mentioned, only that they were planted in both cases. The most detail provided in the Selkirk site is that the species used were salt-tolerant, while in the Winnipeg project the only detail is that eight species of native grass have become established. Again, while this could be a factor for shared success in the projects, there is no data available to prove or disprove the hypothesis.

While the Selkirk project again does not share any common info with the University of Manitoba site, the university project does have some overlap with the Winnipeg site. In both cases, black-eyed Susan and purple prairie clover are both mentioned as being present in each site. While these are far from enough evidence to prove anything on their own, they do suggest there is knowledge about where and when to use native plant species. If this is the case, the information would be best shared and utilized by future projects in the region. Many naturalization projects have occurred in the Canadian prairies, and if specific information such as plant species used and seeding details was released to the public, it could provide tremendous benefits to the successes of future naturalization projects.

6.4 The Cost of Naturalization

The cost of a naturalization project comes in two phases. First is the upfront implementation cost, and second is the maintenance cost once the project is established. While the upfront costs are much higher than a traditional grass lawn, there is evidence to suggest that maintenance is cheaper when naturalization is done.

The Winnipeg project was the only one to directly mention the costs associated with it. The project was able to be completed without going over the budget of $5,000, and worked out to cost $2.85 per metre squared to establish. However, the report specifically mentions how more data needs to be collected to firmly establish average implementation and maintenance costs. This is an area that would benefit greatly from publicly shared and accessible project data. The Winnipeg project specifically mentions lacking a proper costing model. If municipalities and private firms were to work together and share their experiences, region-specific cost models could be produced, benefiting each individual region.

Although implementation cost effectiveness cannot be directly determined, there is enough evidence to support that maintenance costs of naturalized sites are cheaper than classic mowing. Winnipeg's project showed an estimated saving of $0.11 per metre squared, or 32%. Saving nearly one-third of the cost of maintenance is substantial, and if applied over an entire city could have tremendous saving benefits for the municipality. Grande Prairie also noted these potential savings, confirming the financial implications in the maintenance stage. However, the unknown true cost of naturalization does not allow us to compare the overall

cost of a naturalization project to the continued regular site maintenance of consistent mowing.

6.5 Environmental Challenges Faced by Naturalization Projects

Across the four naturalization sites, three problem areas occurred. Drought caused delays in Winnipeg while Canada thistle populations required continued maintenance in both Winnipeg and Grande Prairie. On the University of Manitoba site, snow removal and road de-icing practices hampered the growth of the planted species.

Drought is an issue in that while it can be predicted, there is not much that can be done to prevent it. Drought during the germination process would not stop the implementation of a naturalized site, but would increase costs as additional watering would be needed, as well as potential re-seeding. Drought could also cause delays, potentially as much as the loss of a full growing season, which could cause implementation costs to further increase. However, in the case of the Winnipeg project, drought conditions were able to be overcome and the project was able to be successful.

Canada thistle is a problematic weed that thrives during implementation periods as the naturalized plants are attempting to establish themselves. Both the Winnipeg and Grand Prairie projects experienced issues with Canada thistle, although they were not unexpected. Classic mowing maintenance handles any potential Canada thistle growth, cutting it down before it can grow and bloom. However, in naturalized no-mow situations, it can thrive. Both Winnipeg and Selkirk were able to control the Canada thistle populations through spot removal treatments, proving that it is an easily overcome issue. However, it still does provide a cost to treat and can impact the financial viability of a project.

Perhaps the largest issue specific to boulevard and median naturalization is winter snow removal and road maintenance. Winter snow removal in Winnipeg and other winter cities often sees plows clearing snowfall on roads, and the roads themselves sanded and salted to remove ice and provide traction for cars. These two processes combine to see the salt and sand pushed onto boulevards, which has the potential to smother any plants along the roadway. While salt-tolerant species can be used, like in the Selkirk project, sand can still

smother plants. This was seen in the University of Manitoba project as the plants closest to the roadway had considerably less growth than the adjacent plants. While region-specific, this has the potential to cause considerable negative impact on naturalization efforts immediately adjacent to roadways.

6.6 Ecological Outcomes of Naturalization

The Winnipeg, Selkirk, and Grande Prairie naturalization projects all reported multiple positive ecological benefits, primarily centred around increased biodiversity and benefits to pollinators. Although each project featured different locations and different plants, they all saw similar benefits to those two ecological areas.

Wildflowers and clovers were mentioned by both Winnipeg and Selkirk as beneficial for pollinators. Indigenous plants are what native pollinator species have evolved to use, and providing them increases their habitat and food sources. In the case of the Winnipeg project, wildflower species were specifically chosen to provide season-long food sources for local pollinator species. In Selkirk, clover was specifically chosen to fill this role and provide additional pollinator habitat. In both cases, these intentions were successful and reflected in the outcomes of the respective projects.

Biodiversity increases were reported in both Winnipeg and Grande Prairie. In Winnipeg, the naturalization project succeeded in establishing 17 wildflower species and eight grass species on the site. In Grande Prairie, the naturalization of the site resulted in the unplanned natural growth of the native balsam poplar tree species. In both cases, the impacts of naturalization on biodiversity were showcased as they flourished both naturally during the maintenance stage and with assistance during the implementation stage.

6.7 Summary

Naturalization efforts have a significant aesthetic impact, both positively and negatively. While they take time to become established, and be quite unseemly during this time, the end result can be a beautiful representation of the historical indigenous landscape.

Naturalization also offers many ecological benefits that assist with climate change adaptation. Increases to pollinator species, improved stormwater retention, increased drought resistance, decreased erosion, and reduced carbon emissions are all outcomes associated with naturalization. These outcomes not only improve the ecology of the area, but also help cities adapt for climate change.

Similar to the aesthetic appearance of naturalization, the maintenance cost of a project comes in two phases. In the first phase, implementation costs are higher than in a classically maintained lawn. However, once the project matures into the second phase, maintenance costs are lower for naturalization than they are for a regularly mowed lawn.

There are some challenges associated with naturalization projects, especially along boulevards and medians. In the early stages of a project, when the native species are attempting to establish themselves, they are vulnerable to drought and invasive weeds. While this can be counteracted through well-designed seeding, it is not a perfect solution and requires additional maintenance. Winter cities have the additional problem of snowfall removal which can cause sand and salt to build up along roadsides, smothering both young and established plants there.

7.0 Conclusion

7.1 Revisiting the Research Questions

This research report began with three research questions. How has the research uncovered informed each of those questions? The following section will explore each question individually to determine the outcomes delivered by this report.

Question 1: How do naturalized boulevards assist Canadian prairie cities in adapting to climate change?

Naturalization efforts have the same climate change outcomes regardless of where they are located. Boulevards, medians, park space, and greenways all have the same outcomes. The only change between them is the scale of the outcomes, depending on the physical size of the naturalization project.

Naturalization projects have many positive outcomes that assist Canadian prairie cities in adapting to climate change. Plants that are native to the Canadian prairies are naturally hardy species, ready to resist drought conditions and survive on low amounts of watering. Climate change projections include more drought conditions on the Canadian prairies, and natural species are prepared to handle it. Climate change projections also predict more storm events in the Canadian prairies. Again, naturalized areas collect more stormwater runoff than traditional lawns and provide additional riverbank and wateredge stabilization. They prevent erosion, and filter and purify water as it enters the waterway system. Furthermore, naturalized ecosystems do not require regular mowing, reducing carbon emissions and helping to reduce the impacts of climate change.

Question 2: What boulevard naturalization initiatives are happening in Winnipeg and other prairie cities in Canada?

While there are many naturalization efforts happening across Canadian prairies cities, there are fewer that are happening along boulevards. Of note, the cities of Selkirk, Manitoba and Grande Prairie, Alberta are in the process of completing boulevard naturalization projects. Winnipeg itself, while not having any current boulevard naturalization efforts, has multiple ongoing and previously attempted naturalization efforts, particularly in new developments.

Question 3: What lessons do those initiatives offer for Winnipeg?

While the many benefits of naturalization have been discussed throughout this report, there are three key lessons to be learned for conducting naturalization projects in Winnipeg. Those lessons are the importance of conducting public engagement, the importance of proper implementation, and the importance of promoting biodiversity.

Conducting efficient and productive public engagement and education is imperative for a naturalization project. Community feedback can be one of the largest challenges in any initiative, as residents are often resistant to change and can hold enough political sway to invoke change in a project, as seen in Grande Prairie. Naturalization is particularly susceptible to this, as it takes a previously maintained landscape and then appears to have

abandoned it as the naturalization process takes place. Informing the community about a naturalized project can bring community members on board with the project, as they come to understand the benefits and final aesthetic and ecological outcomes of naturalization.

Proper implementation is vital to the success of a naturalization project. The seeded plants are very susceptible to failure in their establishment phase, and planning for proper implementation can determine whether the project succeeds or fails. If a project is properly planned, following proper procedures and maintenance, it is likely to succeed. However, if it is not properly planned and seeded, it may fail despite proper maintenance.

Any naturalization effort should promote biodiversity in both flora and fauna. The more biodiversity present in the plant species of a naturalization project, the better it can support local pollinators and other animal and insect populations. Increased biodiversity has many beneficial outcomes, and should be the designed goal and end result of a naturalization project.

7.2 Opportunities for Future Research

There are several opportunities for future research. Through the course of this research project, two consistent themes with missing data emerged; the impacts of snow clearing on naturalization, and the lack of published reports and publicly shared knowledge in Canada.

Snow clearing and winter road maintenance have a large impact on naturalization efforts along roadways. Roads are salted and sanded during the winter season to improve traction for cars, and then snowplows drive those substances onto neighbouring boulevards and medians when clearing snow. This snow, sand, and salt smothering can completely disrupt the growth cycle of plants along the edge of the roadway. It is a legitimate concern for naturalization within winter cities (and is also an issue for other greening efforts as well). Researching remedial efforts for it would be extremely beneficial to the literature and knowledge of naturalization. Whether it be through hauling snow away, finding an alternative to salting, or any other change to traditional snow removal practices, incorporating alternative snow removal practices alongside naturalization has many potential benefits.

The second opportunity for future research is less an area of research, and more so the public sharing of information. Currently, many naturalization projects do not have any published or publicly available reports. While processes and outcomes are certainly monitored by municipalities and private firms, this knowledge is not shared. If data were freely shared amongst municipalities, which are not competing with each other for naturalization, every municipality in their respective regions would benefit. As highlighted by this report, Winnipeg did not have enough data for a cost comparison model. If Winnipeg had access to the naturalization efforts conducted in other nearby municipalities, a model could likely be developed and utilized. This model could then provide a framework or criteria for other municipalities, allowing for more naturalization projects. Additionally, if naturalization costs are shared, a model could be created that shows the fiscal advantages of naturalization. A public financial model would be a tremendous asset in creating new naturalization projects.

7.3 Final Thoughts

Naturalization is a great initiative for municipalities to undertake. It provides benefits in adapting to climate change and many green infrastructure benefits. It promotes citizen health in urban centres, and can promote local cultural values and histories. Naturalization has a lower maintenance cost than classic lawn mowing, although it does have a higher implementation cost. While there is still more to be learned about naturalization in Canadian prairie cities, specifically around the impacts of snow removal, there is no doubt that naturalization efforts are to be encouraged and continued in the many municipalities that call the Canadian prairies home. For all these reasons, the City of Winnipeg should explore all possible options for naturalization within its boundaries, whether it be located along boulevards or in any other form.

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Appendices

Appendix A - University of Manitoba Seeding Report

Three seed mixes will be seeded during the 2021 Road Renewal Program:
This seed mix was seeded on both sides of Dafoe Road & between the sidewalk and road on University Crescent south of Dafoe to Freidman Cresent. Also along Freidman Crescent to Kings Drive.

.1 Seed Mix #1: City of Winnipeg Salt Tolerant Grass Seed

.1 Seventy percent (70%) Fults or Nuttals alkaligrass (*Puccinellia*spp.), twenty percent (20%) Audubon or Aberdeen creeping red fescue and ten percent (10%) perennial ryegrass.

Seed Mix #2 was used on the outside 3 meters of the center boulevard on University Crescent. From Dafoe south to Freidman.

.2 Seed Mix #2: Native Salt Tolerant

Species PLS lb/acre*	
Side-oats grama 1.50	Additional species added to the mix
Little bluestem 1.00	Blue grama
Western wheatgrass 1.00	Junegrass
Tufted hairgrass 0.50	Buffalograsss
Nuttall's alkali grass 1.75	Side-oats grama
Total 5.75	

*Seeding rate for drill seeded areas only, seeding rate will change for other seeding methods.

Seed mix #3 was seeded in the centre area of the university Crescent Boulevard

.3 Seed Mix #3: Native Prairie

.1 Grass mix shown below shall be supplemented with wildflower seeding.

.2 Purple prairie clover, prairie coneflower, wild bergamot, meadow blazing star, dotted blazing star, and black eyed Susan shall be seeded evenly at a rate of approximately 2.5 pounds per acre.

Species PLS lb/acre*
Big bluestem 2.50
Indian grass 0.50
Switchgrass 1.00
Side-oats grama 0.50
Little bluestem 1.00
Canada wildrye 0.25
Slender wheatgrass 0.10
Western wheatgrass 0.50
Green needle grass 2.50
Total 8.85

*Seeding rate for drill seeded areas only, seeding rate will change for other seeding methods.

Appendix B - Winnipeg 2020 Council Report

Minutes – Standing Policy Committee on Infrastructure Renewal and Public Works – July 7, 2020

REPORTS

Item No. 32 **Public Works Maintenance and Naturalization of Green Space – Fermor Avenue (St. Boniface Ward)**

STANDING COMMITTEE RECOMMENDATION:

The Standing Policy Committee on Infrastructure Renewal and Public Works concurred in the recommendation of the Winnipeg Public Service and recommended to Council:

1. That the Public Service proceed with the naturalization project based on Option B, as set out in this report, for vegetation management of selected areas along Fermor Avenue.

2. That an ecological and financial analysis be completed comparing the Fermor Project (Option B) to the practice of regular turf mowing and that the Public Service report back on the matter to the Standing Policy Committee on Protection, Community Services and Parks by the end of 2023.

3. That the Proper Officers of the City be authorized to do all things necessary to implement the intent of the foregoing.

Minutes – Standing Policy Committee on Infrastructure Renewal and Public Works – July 7, 2020

DECISION MAKING HISTORY:

Moved by Councillor Browaty,

That the recommendation of the Winnipeg Public Service be concurred in and forwarded to the Executive Policy Committee and Council.

Carried

Councillor Lukes, Waverley West Ward, submitted a communication with respect to the matter.

STANDING COMMITTEE RECOMMENDATION:

On January 7, 2020, the Standing Policy Committee on Infrastructure Renewal and Public Works concurred in the recommendation of the Riel Community Committee, with the following amendment:

- Replace the words "120 days" with "180 days"

COMMUNITY COMMITTEE RECOMMENDATION:

On December 13, 2019, the Riel Community Committee passed the following motion:

WHEREAS the Parks and Open Space Division mowing schedules have lengthened over the years, as the operating budget has not kept pace;

AND WHEREAS there are numerous green spaces in Winnipeg which are "passive" and generally unused, existing only for aesthetic purposes;

AND WHEREAS the City of Winnipeg is subject to the same commercial pesticide bans as homeowners and thus has had difficulty controlling weeds and dandelions;

AND WHEREAS native plants and flowers are beneficial to wildlife and urban ecosystems including pollinators;

AND WHEREAS other municipalities have had success reducing their maintenance liabilities and expenses with this approach;

AND WHEREAS preservation of natural areas to support climate mitigations is identified as Strategic Opportunity #7, Community Climate Resiliency, in the City of Winnipeg's Climate Action Plan;

Minutes – Standing Policy Committee on Infrastructure Renewal and Public Works – July 7, 2020

DECISION MAKING HISTORY (continued):

COMMUNITY COMMITTEE RECOMMENDATION (continued):

THEREFORE BE IT RESOLVED that the Standing Policy Committee on Infrastructure Renewal and Public Works be requested to direct the Public Service to report back within 120 days on the following:

1. Options for converting or naturalizing portions of the green space buffering both sides of Fermor Avenue from Lagimodiere Avenue to the intersection with the Seine River, including perennials, flowers, and/or native plant species.

ADMINISTRATIVE REPORT

Title: Naturalizing Areas along Fermor Avenue

Critical Path: Standing Policy Committee on Infrastructure Renewal and Public Works – Executive Policy Committee

AUTHORIZATION

Author	Department Head	CFO	CAO
D. Domke	J. Berezowsky	P. Olafson, Interim CFO	M. Ruta, Interim CAO

EXECUTIVE SUMMARY

There are numerous regularly-mowed areas within Winnipeg that have a passive use and for which alternative vegetation options could be considered. A range of options exists for how vegetation can be naturalized and the definition of success may be different depending on the option used. The costs to achieve success have not had full analysis and at this point can't be accurately compared to standard mowing practices. For the purpose of this analysis, the options for naturalization have been divided into three groupings; Option A – Reduce or Eliminate Mowing, Option B – Enhance Existing Vegetation, and Option C – Full Native Grassland Installation.

Option B is recommended along Fermor as it is likely most beneficial from a biodiversity perspective and would provide an example of naturalization possible along a typical transportation corridor. Installation of Option B along Fermor can take place utilizing existing operational resources in 2020.

While cost savings are a factor to consider, naturalization projects may be best viewed for the environmental and ecological benefits they provide.

RECOMMENDATIONS

1. That the Public Service proceeds with the naturalization project based on Option B, as set out in this report, for vegetation management of selected areas along Fermor Avenue.

2. That an ecological and financial analysis be completed comparing the Fermor Project (Option B) to the practice of regular turf mowing and that the Public Service report back on the matter to the Standing Policy Committee on Protection, Community Services and Parks by the end of 2023.

3. That the proper officers of the City be authorized to do all things necessary to implement the intent of the foregoing.

REASON FOR THE REPORT

On January 7, 2020 the Standing Policy Committee on Infrastructure Renewal and Public Works concurred in the recommendation of the Riel Community Committee, as amended, and directed the Winnipeg Public Service to report back within 180 days on the following:

1. Options for converting or naturalizing portions of the green space buffering both sides of Fermor Avenue from Lagimodiere Avenue to the intersection with the Seine River, including perennials, flowers, and/or native plant species.

IMPLICATIONS OF THE RECOMMENDATIONS

The cost of the project is $5,000.00, and will be funded by the Public Works Department Parks and Open Space Division operating budget. Implementation of naturalization along the proposed sections of Fermor would result in visual changes to the vegetation along these areas. Complaints may be generated from residents as it may appear that the City is not maintaining its mowing standards. On the other hand, the success of wildflowers in some areas may generate support and enhance the experience for some pathway users along these sections.

The implementation of the naturalization project will be beneficial for pollinators and increase this area's ecological value.

The project will be evaluated for success based on the cost of installation and long term maintenance in comparison with standard mowing operations.

HISTORY/DISCUSSION

Regular mowing to achieve a green lawn of grass has been used as a widespread standard maintenance practice for many years. This type of vegetation management is relatively straightforward, and provides a recognized appearance that could be described as neat and tidy.

However, regular mowing is detrimental from an ecological perspective in many cases, and there are many passive greenspaces where the elimination or modification of mowing could be considered. Regular mowing has the effect of reducing biodiversity, flowers and pollen from the landscape which in turn has a negative effect on pollinators and the overall natural food chain. Mowing also results in the burning of fossil fuels and the release of hydrocarbons into the atmosphere which adds to air pollution and greenhouse gases. A reduction in mowing could be a step towards reducing carbon emissions and mitigating climate change.

In Winnipeg's past, there have been a number of alternative vegetation attempts. While some of these projects have been extremely successful, others have not. The costs to modify existing turf to naturalized areas can vary and the cost of maintaining these naturalized areas may also be varied. One thing that is apparent is there is a lack of accurate data to determine whether naturalizing passive turf areas will result in a cost saving.

The green space buffering both sides of Fermor Avenue from Lagimodiere Avenue to the intersection with the Seine River consists of both right-of-way and parkland. The Fermor Buffer Park provides an excellent opportunity to conduct a naturalization pilot project which will test the

ability to produce success from an ecological perspective while also reducing maintenance effort and costs associated. It is similar to much of the corridor along Fermor, but has the advantage of providing a larger expanse of turf between the Niakwa trail and the ditch which is the most desirable area for a naturalization project. The area is illustrated in Appendix A.

While methods and options for naturalizing grassland are varied and can be implemented through different approaches or scaled to a variety of situations, they have been grouped into three options below. These options have all been utilized in the past and are ongoing at various locations. The opportunity to add a site using Option B at Fermor Buffer Park would further our understanding of the costs and maintenance issues associated with these options by adding a site along a well-used transportation corridor.

Option A. Reduce or eliminate mowing

In some areas, the simplest solution is simply to stop mowing. Unless adjacent to an existing natural area, if the area has been regularly mowed for a number of years the plant community will not generally revert to a naturalized environment containing native plants. It is most often that weed issues related to Canada thistle will develop. If Canada thistle issues develop and affect neighbouring properties, the site will need to be rough cut at least twice per year. Alternate thistle control measures, such as herbicide use, may also be considered in addition to or as an alternative to cutting.

Option A has been utilized in many locations and for a variety of reasons. Many parts of the Bishop Grandin corridor currently fall within this option and are an example of this type of naturalization where issues with weeds require follow up with one to two cuts per season. The slope of the retention pond in Burland Park is another example where this method has been used and no cutting is currently used to control weeds.

There are no capital costs to implement this option, however, the maintenance costs are dependent on aesthetic and weed issues that may develop.

Option B. Enhance Existing Vegetation

This involves the planting of wildflower plugs or potted plants within limited areas of existing vegetation. It can also include light tillage and seeding with a mixture of native species. The goal is to increase biodiversity and pollinator habitat with the hope that the wildflowers will also spread into larger areas of the existing vegetation. This option is used in combination with Option A, and can also result in the need to manage Canada thistle. Rough cutting of the thistle is limited as a management option due to the desire to not mow down the wildflowers planted in the area. Thistle management must be more targeted either through spot spraying or targeted cutting. The benefit of this option is that it can create a colourful biodiverse environment which provides excellent pollinator habitat.

A number of versions of this option have recently been installed at various locations. The best comparable site recently installed would be at Lagimodière Park, where the slope along a portion of the pond was seeded and has had wildflower nodes installed. Adding a similar project along Fermor would help determine cost and success for this type of option.

The estimated cost for installation of this option may range from $0.80 to $1.90 per m^2 depending on seeding techniques used and the amount of wildflower nodes installed. Long term maintenance costs are yet to be determined.

Option C. Full Native Grassland Installation

This involves removing the existing vegetation through the use of herbicides and maintaining it vegetation-free for two seasons to eliminate the maximum amount of weeds from the seed bank. The area is then seeded with a mix of native grasses and managed for two to three years until native grasses are fully established and will out-compete most non-native weed introductions. This type of vegetation provides an aesthetically consistent look when installed correctly and a long term community of native grasses. It is however still susceptible to Canada thistle infestations. Herbicide usage is required for thistle control and controlled burns are utilized at approximately 5-year intervals to maintain the health of the native grass community.

This treatment has been used at a large number of locations. It has become the standard vegetation used around naturalized retention ponds within new developments, including widespread use in Waverley West, Royalwood and Sage Creek. A recent installation along Keewatin Street/Dr. Jose Rizal Way also provides an example of a location where it has been used exclusively along a transportation corridor as alternative vegetation.

The cost of installation ranges widely depending on the size of the area for installation and difficulty in establishment due to existing plant communities. Depending on the site and complexity, installation may range from $4.00 - $16.00 per m^2. Long term maintenance costs have yet to be determined but are estimated based on the requirement for periodic burning and some weed control.

The installation cost of applying Option B to select areas along Fermor is estimated at $5,000.00. The cost of the project will be absorbed in the Naturalist Services budget. Option B provides the best opportunity to increase biodiversity and pollinator habitat along Fermor. It will also provide an excellent example of how this type of naturalization can be used along transportation corridors in the future.

FINANCIAL IMPACT

Financial Impact Statement

Date: May 19, 2020

Project Name:
Naturalizing Areas along Fermor Avenue

First Year of Program 2020

	2020	2021	2022	2023	2024
Capital					
Capital Expenditures Required	$ -	$ -	$ -	$ -	$ -
Less: Existing Budgeted Costs	-	-	-	-	-
Additional Capital Budget Required	$ -	$ -	$ -	$ -	$ -
Funding Sources:					
Debt - Internal	$ -	$ -	$ -	$ -	$ -
Debt - External	-	-	-	-	-
Grants (Enter Description Here)	-	-	-	-	-
Reserves, Equity, Surplus	-	-	-	-	-
Other - Enter Description Here	-	-	-	-	-
Total Funding	$ -	$ -	$ -	$ -	$ -
Total Additional Capital Budget Required	$ -				
Total Additional Debt Required	$ -				
Current Expenditures/Revenues					
Direct Costs	$ 5,000	$ -	$ -	$ -	$ -
Less: Incremental Revenue/Recovery		-	-	-	-
Net Cost/(Benefit)	$ 5,000	$ -	$ -	$ -	$ -
Less: Existing Budget Amounts	5,000	-	-	-	-
Net Budget Adjustment Required	$ -	$ -	$ -	$ -	$ -

Additional Comments:

Direct costs in 2020 represent the estimated amount to implement Option B. Ongoing maintenance costs in future years will be in addition to the amounts identified in this report and have yet to be determined. All costs associated with naturalizing areas along Fermor Avenue will be charged to the Public Works Department Parks and Open Space Division operating budget.

"Original signed by J. Peters, CPA, CGA"
J. Peters, CPA, CGA
Acting Manager of Finance & Administration

CONSULTATION

This report has been written in consultation with: N/A.

OURWINNIPEG POLICY ALIGNMENT

The report is in accordance with direction strategies of A Sustainable Winnipeg:

- 09 Continue to Respect and Value Our Natural and Built Environment
- Direction 5 Provide Safe and Effective Pest and Weed Control in City Operations

WINNIPEG CLIMATE ACTION PLAN ALIGNMENT

The report is in accordance with Strategic Opportunity #7:

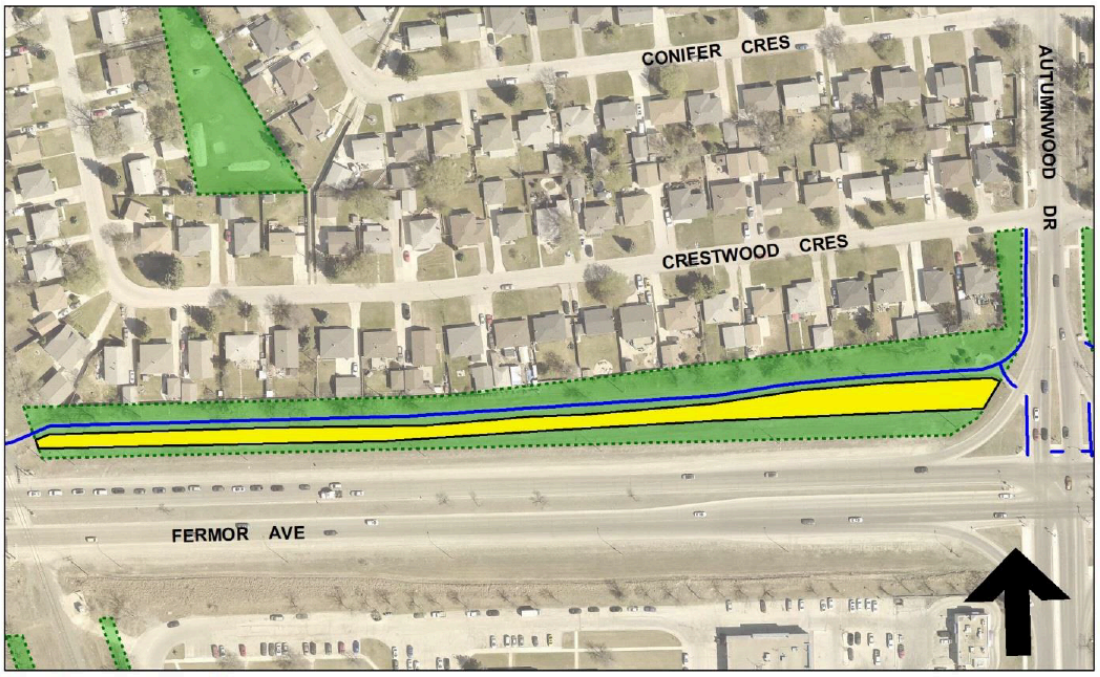
- 7.1 Implement Opportunities to Improve Winnipeg's Resilience and Adaptability to the Effects of a Changing Climate (Primary Responsibility: Office of Sustainability)
- 7.3 Preserve and Manage Parks and Natural Areas to Support Climate Change Mitigation (Primary Responsibility: Public Works - Parks).

SUBMITTED BY

Department: Public Works
Division: Parks and Open Space
Prepared by: R Penner / P Mutch
Date: May 20, 2020

Attachment: Appendix A - Proposed Naturalization Area along Fermor Ave.

Appendix A
Proposed Naturalization Area along Fermor Ave.



Fermor Buffer Park - Proposed pilot project (2700m2)

Appendix C - Winnipeg 2024 Council Report

Agenda – Standing Policy Committee on Community Services – February 6, 2024

REPORTS

Item No. 4 **Public Works Maintenance and Naturalization of Green Space – Fermor Avenue**

WINNIPEG PUBLIC SERVICE RECOMMENDATION:

1. That this report be received as information.

Agenda – Standing Policy Committee on Community Services – February 6, 2024

DECISION MAKING HISTORY:

STANDING COMMITTEE RECOMMENDATION:

On November 20, 2023, the Standing Policy Committee on Community Services concurred in the recommendation of the Winnipeg Public Service and granted an extension of time of 60 days for the Winnipeg Public Service to report back on the following:

1. That the Public Service proceed with the naturalization project based on Option B, as set out in this report, for vegetation management of selected areas along Fermor Avenue.

2. That an ecological and financial analysis be completed comparing the Fermor Project (Option B) to the practice of regular turf mowing and that the Public Service report back on the matter to the Standing Policy Committee on Protection, Community Services and Parks by the end of 2023.

COUNCIL DECISION:

On July 23, 2020, Council concurred in the recommendation of the Standing Policy Committee on Infrastructure Renewal and Public Works and adopted the following:

1. That the Public Service proceeds with the naturalization project based on Option B, as set out in this report, for vegetation management of selected areas along Fermor Avenue.

2. That an ecological and financial analysis be completed comparing the Fermor Project (Option B) to the practice of regular turf mowing and that the Public Service report back on the matter to the Standing Policy Committee on Protection, Community Services and Parks by the end of 2023.

3. That the Proper Officers of the City be authorized to do all things necessary to implement the intent of the foregoing.

ADMINISTRATIVE REPORT

Title: Public Works Maintenance and Naturalization of Green Space – Fermor Avenue

Critical Path: Standing Policy Committee on Community Services

AUTHORIZATION

Author	Department Head	CFO	CAO
D. Domke	M. Cantor, Acting	N/A	M. Jack

EXECUTIVE SUMMARY

In spring 2021, the Public Service began work on the pilot project to naturalize a section of Fermor Avenue based on Option B, as described below. As of 2023, the Fermor site has been successfully established with native species despite difficult weather patterns – such as drought during the establishment period.

In terms of ecological value, the established sites provide for increased biodiversity through planting wildflowers, providing habitat for pollinators, storing carbon and reducing mowing. All of these work towards the goals of resiliency and climate change mitigation. These naturalized sites also support the City of Winnipeg's role in protecting biodiversity as a signatory to the Montreal Pledge: Cities United in Action on Biodiversity.

The costs of this naturalization project are difficult to accurately compare to mowing due to the natural variability of sites and additional sites should be considered to ensure integrity of the estimates. The limited data available suggests that the cost of maintenance may be lower for naturalized sites compared to mowing over the long term. However, in order to achieve these savings, a significant upfront capital cost is required to transform existing turf to naturalization.

At this point, the Public Service does not have resources to scale up naturalization activities beyond the scope of small pilot projects. If the Public Service were directed to scale up naturalization efforts, a portion of funding from the Winnipeg Parks Strategy (approved by Council on May 26, 2022) would have to be adopted for a Habitat Restoration Technician (1.0 Full Time Equivalent) to help achieve natural feature target levels of service by implementing enhanced habitat naturalization and restoration initiatives across the parks system. In addition, Parks would require additional capital budget of $200,000 from 2024 to 2026, $100,000 for 2027, and $200,000 for 2028 for the Parkland Naturalization and Restoration Program.

RECOMMENDATIONS

1. That this report be received as information.

REASON FOR THE REPORT

On July 23, 2020, Council concurred in the recommendation of the Standing Policy Committee on Infrastructure Renewal and Public Works and adopted the following:

1. That the Public Service proceeds with the naturalization project based on Option B, as set out in this report, for vegetation management of selected areas along Fermor Avenue.

2. That an ecological and financial analysis be completed comparing the Fermor Project (Option B) to the practice of regular turf mowing and that the Public Service report back on the matter to the Standing Policy Committee on Community Services by the end of 2023.

IMPLICATIONS OF THE RECOMMENDATIONS

There are no implications arising from receiving this report as information.

HISTORY/DISCUSSION

On January, 7, 2020, the Standing Policy Committee on Infrastructure Renewal and Public Works requested the Public Service to report back on options for converting or naturalizing portions of the green space buffering both sides of Fermor Avenue from Lagimodière Avenue to the intersection with the Seine River, including perennials, flowers, and/or native plant species.

A number of methods and options for naturalizing grassland were presented with Option B, as described below:

> Option B. Enhance Existing Vegetation
>
> This involves the planting of wildflower plugs or potted plants within limited areas of existing vegetation. It can also include light tillage and seeding with a mixture of native species. The goal is to increase biodiversity and pollinator habitat with the hope that the wildflowers will also spread into larger areas of the existing vegetation. This option is used in combination with eliminating mowing, and can also result in the need to manage Canada thistle. Rough cutting of the thistle is limited as a management option due to the desire to not mow down the wildflowers planted in the area. Thistle management must be more targeted either through spot spraying or targeted cutting. The benefit of this option is that it can create a colourful biodiverse environment which provides excellent pollinator habitat.

The green space along Fermor Avenue from Lagimodière Avenue to the intersection with the Seine River was chosen for the naturalization pilot project. The area naturalized at Fermor Buffer was limited to 1100 m² due to the constraints of the site. The area is illustrated in Appendix A.

The Fermor Buffer restoration project was started in 2021, and has now matured into the maintenance stage in 2023. This site was seeded with a diverse mix of native wildflowers and grasses, and had additional native wildflowers added through plug plantings. The first year of the project was characterized by drought and minimal seed germination which caused an increase in establishment costs. Regular rains throughout the 2022 growing season were beneficial, and allowed the site to flourish.

In ecological terms, the seeding project has transformed the Fermor plot from a low-quality turf to a diverse grassland with numerous wildflowers including black eyed susan, purple prairie clover and whorled milkweed. These flowers, along with many others present, provide critical habitat for pollinators. Wildflowers for this project were selected to provide blooms throughout the year and thus provide a season-long food source to beneficial insects and pollinators. In total, 17 species of native wildflower and eight types of native grass have become established at this site as part of this project. A table related to new biodiversity of wildflower and grasses added and percent change in weed presence is included in Appendix A.

Naturalization initiatives such as the Fermor buffer are a direct step in meeting the commitments of the Montreal Pledge. On July 13, 2023, Council concurred in the recommendation of the Standing Policy Committee on Water, Waste and Environment that the City of Winnipeg become a signatory to the Montreal Pledge: Cities United in Action for Biodiversity. This pledge includes 15 tangible actions that cities can take for biodiversity including integrating biodiversity and restoring and rehabilitating ecosystems.

In addition to ecological benefits, native grasslands play an important role in carbon sequestration. Like all plants, grassland plants absorb carbon dioxide through photosynthesis to grow; however, the deep and prolific roots of tall grass prairie species make this plant community an especially effective mechanism for the storage of carbon. Once atmospheric carbon is transported into the grassland soil by plants, a portion of it can remain stored as soil organic material for hundreds of years. This project also moves towards climate mitigation goals outlined in the City of Winnipeg's Climate Action Plan by reducing fossil fuel usage through a reduction in mowing.

Unfortunately, the costs of this naturalization project are difficult to accurately compare to mowing for two reasons. First, each naturalization site is different because each site is in a different size and state of readiness. For example, beneficial sites are often closer to existing natural areas, have favourable sizes and shapes, have a favourable moisture regime, and have an undisturbed soil profile. On the other hand, other sites are very weedy, dry, and adjacent to roadways where de-icing salts are used that limit plant growth. As a result, it is not reasonable to use just one location for a cost comparison to mowing without additional sites being considered. Secondly, the existing financial system is not able to compare the true cost of naturalization to the cost of mowing without developing a full costing model.

Regardless of these costing limitations, a "ball park" cost comparison was completed to compare the costs of naturalizing the Fermor site to the cost of mowing. The cost to establish the Fermor site was $2.85 m² and $0.23 m² per year for maintenance. In comparison, the estimated mowing cost is approximately $ 0.34 m² per year for mowing at service level comparable with Fermor-type of mowing (see Appendix B).

The limited data available suggests the cost of maintenance may be lower for naturalized sites compared to mowing over the long term. However, in order to achieve these savings, a significant upfront capital cost is required for establishment of a new naturalized area. More research is required on the costs of additional naturalization sites as well as research on a reliable costing model to actually predict costs accurately to compare naturalization and mowing costs.

At this point, the Public Service does not have resources to scale up naturalization activities beyond the scope of small pilot projects. Current naturalization projects are done largely in

partnership with community partners and volunteer stewardship groups or as restoration of landscape required due to infrastructure projects.

If the Public Service were directed to scale up naturalization efforts, the recommended funding and Full Time Equivalent (FTE) requested through the Winnipeg Parks Strategy would have to be adopted and funded. The report, approved by Council on May 26, 2022, referred funding for a Habitat Restoration Technician (1.0 FTE) to the budget process to help achieve natural feature target levels of service by implementing enhanced habitat naturalization and restoration initiatives across the parks system. This is complemented by an incremental Parks Capital budget request of funding of $200,000 from 2024 to 2026, $100,000 for 2027, and $200,000 for 2028 for the Parkland Naturalization and Restoration Program.

Financial Discussion

While the Public Service has been able to develop costing metrics for both Parks Grass Maintenance (mowing) and naturalized areas, the methodologies used to develop these cost estimates were different for each approach. It should be noted that, due to the nature of this report, the Pubic Service used data that was readily available. Therefore, while the numbers in the report are useful for a high-level assessment of continuing with naturalization, these costs are not directly comparable due to differences in the estimation methods.

In order to estimate the costs associated with Parks Grass Maintenance (mowing), the Public Service used 2022 Actual Costs for all expenditures incurred in the Public Works Department and charged to the Park Grass Maintenance service category. This approach would be considered a full cost method including the direct costs of staff involved in the mowing, plus foreman supervision time, equipment and operating costs, management time, as well as an allocated portion of support services (e.g. – allocating of Human Resource Division costs).

In 2022, a total of $7.3 million was expended on Park Grass Maintenance activities. As the total hectares in inventory were 2,135.0 hectares, this results in an annual mowing costs of $0.34 m² for one year of maintenance based on data from 2022.

In order to estimate the cost of maintaining naturalized areas, the Public Works Department tested naturalization at four locations. These sites were small in area totaling 1.5 hectares. A total of $26,502 was expended on establishing the areas and a total of $5,576 was expensed on maintenance costs over the period of study (see Appendix B).

The Public Service believes that the average cost of $0.23 m² for one year of maintenance at the Fermor Buffer Parks site best represent the costs associated with maintaining a naturalized area. As noted in Appendix B, costs incurred were $253 for a one-year period of maintenance data for this site.

Costs for the maintenance period were determined by manually tracking hours for time spent on site and were costed using the hourly rate for the employee plus an hourly charge for a vehicle (i.e. – direct costing methodology). Once established, maintenance activities were fairly minimal, mainly being related to inspecting the site twice per year. Litter collection, weeding, reseeding and periodic burns were not incurred in the maintenance period under review.

Comparison of the two costing estimates is difficult as the Parks Grass Maintenance is costing a larger scale operation (2,135.0 hectares) and comparing it to costs associated with a small pilot project (1.5 hectares). Further, Parks Grass Maintenance is a full costing approach that contains overheads while the naturalized area only included direct costs, and did not include overheads.

It should also be noted that there was a significant variation in maintenance costs for the four locations in the pilot project for naturalized areas, ranging from $0.12 m² for one year of maintenance to $0.23 m² for one year of maintenance. Per discussion with Parks division staff, the costs associated with the Fermor site of $0.23 m² for one year of maintenance are considered to be most indicative of ongoing maintenance costs.

FINANCIAL IMPACT

Financial Impact Statement Date: December 18, 2023

Project Name:

Public Works Maintenance and Naturalization of Green Space - Fermor Avenue

COMMENTS:

As this report is for information purposes, there are no financial impacts.

J. Ruby, 2023-12-20
J. Ruby, CPA, CA
Manager of Finance & Administration

CONSULTATION

This Report has been prepared in consultation with: N/A

OURWINNIPEG POLICY ALIGNMENT

Our Winnipeg Goal: Environmental Resilience
2.24 Low-Impact Ecosystem Management - Prioritize sustainable, integrated plant, pollinator and pest management, that achieves humane, safe, low-carbon, and low-chemical solutions to support the health of local ecosystems.

Complete Communities 2.0
G3. Parks and Recreation
Ecological function
4.3 Design and manage open space and park areas for their highest environmental and ecological performance;
4.3.1 Integrate interdisciplinary natural resource goals with planned park, recreation and infrastructure improvements to reduce costs and maximize public benefit;
4.3.2 Demonstrate a commitment to biodiversity and ecological integrity through planning, regulation, and collaboration;
4.3.3 Demonstrate the benefits of both natural and restored environments as contributors to quality of life.

WINNIPEG CLIMATE ACTION PLAN ALIGNMENT

The report is in accordance with **Strategic Opportunity #7 – Community Climate Resiliency:**
7.1 Implement Opportunities to Improve Winnipeg's Resilience and Adaptability to the Effects of a Changing Climate.
7.3 Preserve and Manage Parks and Natural Areas to Support Climate Change Mitigation.

WINNIPEG POVERTY REDUCTION STRATEGY ALIGNMENT

The report is in accordance with:

- Goal 6: All City Services are Equitable, Inclusive and Accessible.

SUBMITTED BY

Department: Public Works
Division: Parks and Open Space
Prepared by: Rodney Penner / Dave Domke
Date: December 21, 2023
Attachments:

Appendix A – Fermor Naturalization Report

Appendix B – Naturalization Costs