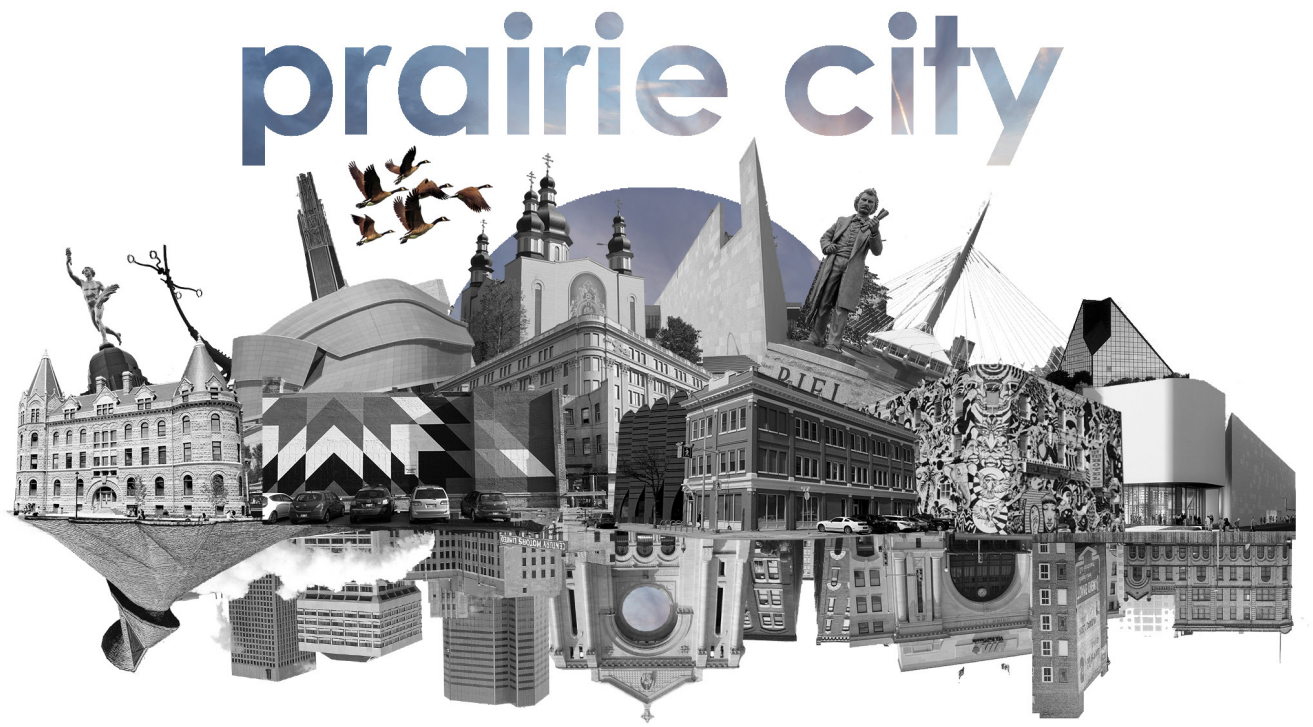

Challenges, best practices, and opportunities for tallgrass prairie development in Winnipeg

By: Nik Friesen-Hughes

Land Acknowledgement: Winnipeg is located on Treaty 1 territory, the original lands of Anishinaabeg, Cree, Oji-Cree, Dakota, and Dene peoples, and on the homeland of the Métis Nation.

TGP = Tallgrass Prairie

TGP Development = includes natural tallgrass prairie ecosystem as well as landscape interpretations of Tallgrass prairie

Forb = An herbaceous plant that is not a grass

About the summary: This is an extended summary of a Capstone project undertaken from September 2020 – April 2021, through the Master of City Planning program at the University of Manitoba.

CONTEXT

What is tallgrass prairie?

TGP is an ecosystem extending from southern Canada down through central United States. TGP is highly influenced by fire, grazing, harsh climatic conditions and was influenced by indigenous land management including controlled burns. TGP is dominated by herbaceous plants with little to no tree and shrub cover. While grasses account for the majority of biomass, forbs account for the majority of species richness[1]. Due to their exceptionally deep root systems, TGP plants are highly resilient to extreme hot and cold temperatures, wind, and drought. Tallgrass prairie is one of the most endangered ecosystems in the world with less than 1% remaining[2]. The majority of Manitoba's TGP was destroyed through settler-colonial activities such as agriculture and urbanization – today, little to no true TGP remains.

Urban landscapes

Human activities have negatively impacted the earth through excessive consumption of natural resources, inefficient land use, environmental pollution, and the destruction and degradation of natural ecosystems[3]. These impacts are made worse by increasing climate change, population growth and urbanization. As the quality and quantity of natural ecosystems diminishes, the ability for the earth to buffer these impacts decreases.
There are many differences between urban landscapes and natural landscapes. In general, urban environments contain limited ecological value: existing natural ecosystems are small and fragmented with diminished capacity to support biodiversity and provide ecosystem services. Cities are dominated by built structures and impervious surfaces such as roads, buildings, and concrete: removing water and nutrients, absorbing heat, and providing limited support for non-human life. Plants largely consist of non-native annuals, perennials, and are actively managed for a neat and controlled appearance. Non-native plantings require additional inputs such as water and fertilizer, and provide limited ecosystem services in comparison to natural ecosystems[4].

Potential:

The design and planning of urban environments has the potential to address these issues and benefit the natural environment. Developing natural ecosystems and incorporating native plants is increasingly advocated as an effective approach to supporting biodiversity, providing ecosystem services, mitigating the impacts of climate change, and developing more environmentally sustainable urban environments.

Winnipeg:

Historically, Winnipeg was naturally a mix of tallgrass prairie and forest. Today, Winnipeg bears little resemblance to the historical landscape. There are few preserved or developed TGP projects in Winnipeg, and existing projects are of minimal in size and ecological quality. Urban Tallgrass prairie development in Winnipeg has the potential to provide significant environmental, ecological, economic, sociocultural, and aesthetic benefits in comparison to conventional urban landscapes such as mown non-native grassland.

METHODS

The capstone asked the following research questions:

1. Should Winnipeg develop TGP?

2. What are the challenges associated with TGP development?

3. What are the best practices associated with TGP development?

4. What are the opportunities for TGP development in Winnipeg?

To answer the questions, I conducted a review of urban ecological restoration and TGP development literature, site visits and observation of TGP development projects in Winnipeg, and semi-structured interviews with 11 key informants.

Site Visits and observation: 13 sites were selected, were visited on multiple occasion through July – December 2020. Through observation I noted a number of variables including general environmental conditions, surrounding urban context, proportion of native and non-native plants, apparent plant health, and site use patterns.

Semi-structured interviews: Eleven key informants were interviewed including 3 Landscape Architects, 3 Academics, 2 TGP Development Practitioners, as well as a City Planner, City of Winnipeg Naturalist, and commercial grower of TGP plants.

Categories: The research questions have been sorted into three general categories including physical, logistical, and sociocultural. In reality, the topics discussed intersect and overlap with one another: they are all interconnected, and there are no hard categories. I've developed these categories for the purpose of improving clarity.

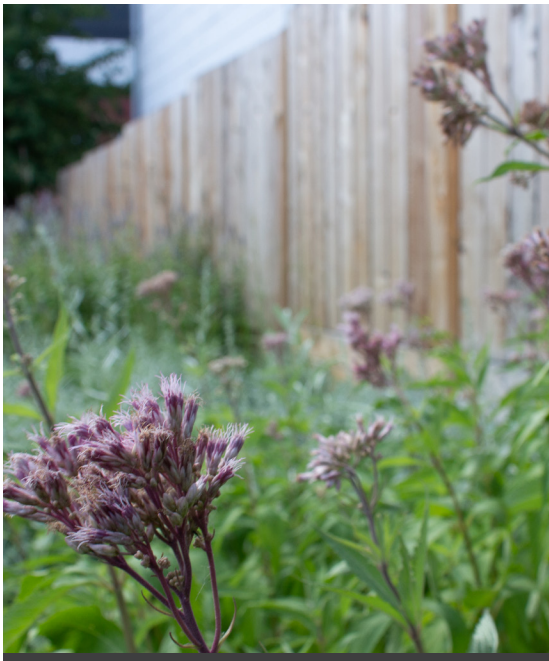

FIGURE 1 | Langside Learning Garden

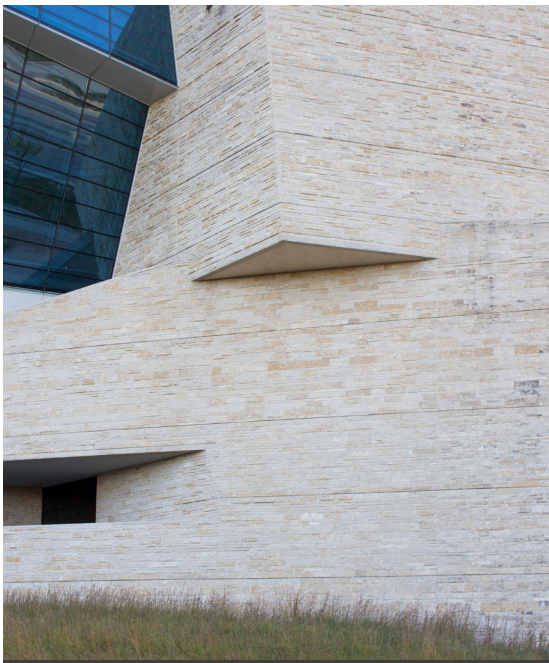

FIGURE 2 | Canadian Museum of Human Rights

FINDINGS

Types:

Through interviews, site visits and observations, as well as the literature review, I identified and classified TGP development into 5 general categories. They all have individual benefits, limitations, and are suited to different situations.

1: Preserve:
Description: Natural TGP ecosystem
Benefits: Highest ecological, environmental, and educational value
Limitations: Requires high level of specialized knowledge, intensive management, and cannot be created

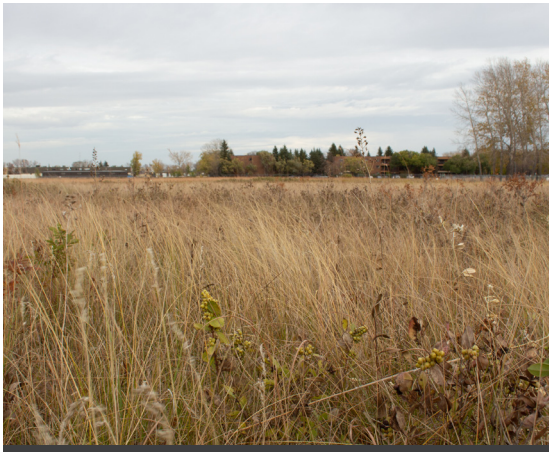

FIGURE 3 | Living Prairie Museum

2: Restoration:
Description: Modelled to resemble true TGP in ecosystem function and species composition
Benefits: High environmental, ecological, and educational value
Limitations: Resource intensive, requires specialized knowledge and intensive management

3: Matrix:
Description: Establish a mix of primarily native grasses that can be managed with broadleaf herbicides.
Benefits: Efficient management, highly resilient, can provide similar environmental benefits as TGP such as erosion control, proven and dependable
Limitations: Minimal species diversity, lower ecological value, lower educational value

FIGURE 4 | Canadian Mennonite University

4: Showcase:
Description: A garden containing close to 100% native TGP species designed to maximize visual appeal. Contains a higher proportion of forbs relative to grasses
Benefits: High educational value, well-suited to small-scale sites, typically limited cultural opposition
Limitations: Inefficient initial management, requires specialize knowledge

5: Passive:
Description: Modify or diminish practices to favor ecological succession of native plants
Benefits: Minimal resources required, can have significant environmental and ecological benefits
Limitations: Can have a messy and chaotic appearance that may generate social opposition, difficult to incorporate people on site

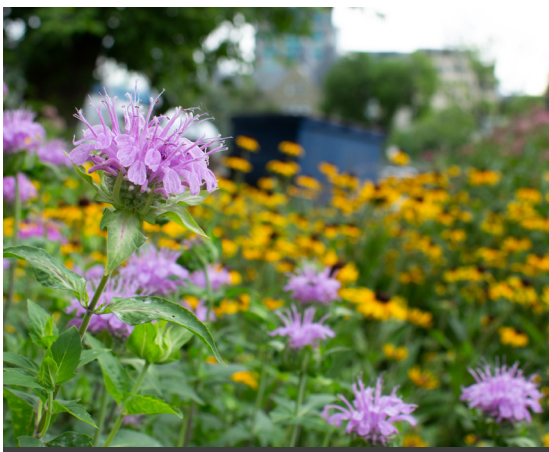

FIGURE 5 | Langside Learning Garden

RQ1: Should Winnipeg develop tallgrass prairie?

Winnipeg's landscape history is complex and unclear; parts of Winnipeg were forest and others were TGP, and these different ecosystems naturally shifted over time. Regardless of where TGP was once located, TGP development within Winnipeg is worthwhile as a means of providing significant environmental, ecological, economic, and sociocultural benefits in comparison to conventional urban landscapes such as mown, non-native turfgrass. There is not one best solution; there are many useful approaches to TGP development. Once established, TGP development is highly resilient.

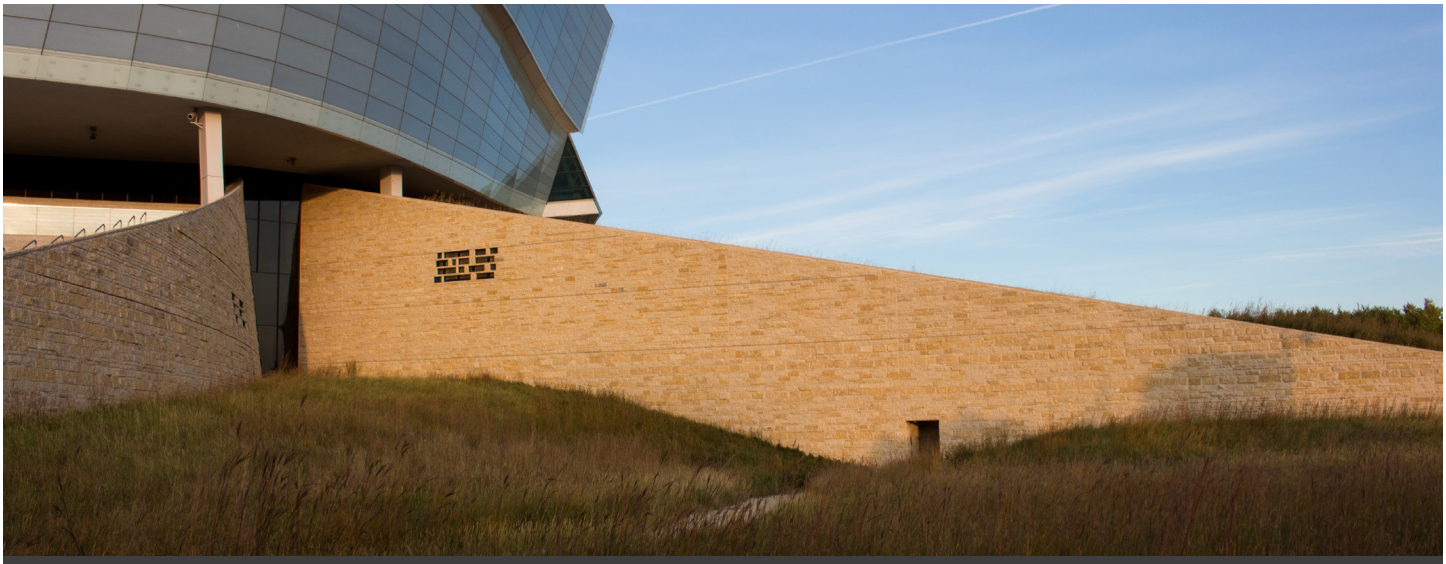

FIGURE 6 | Canadian Museum of Human Rights

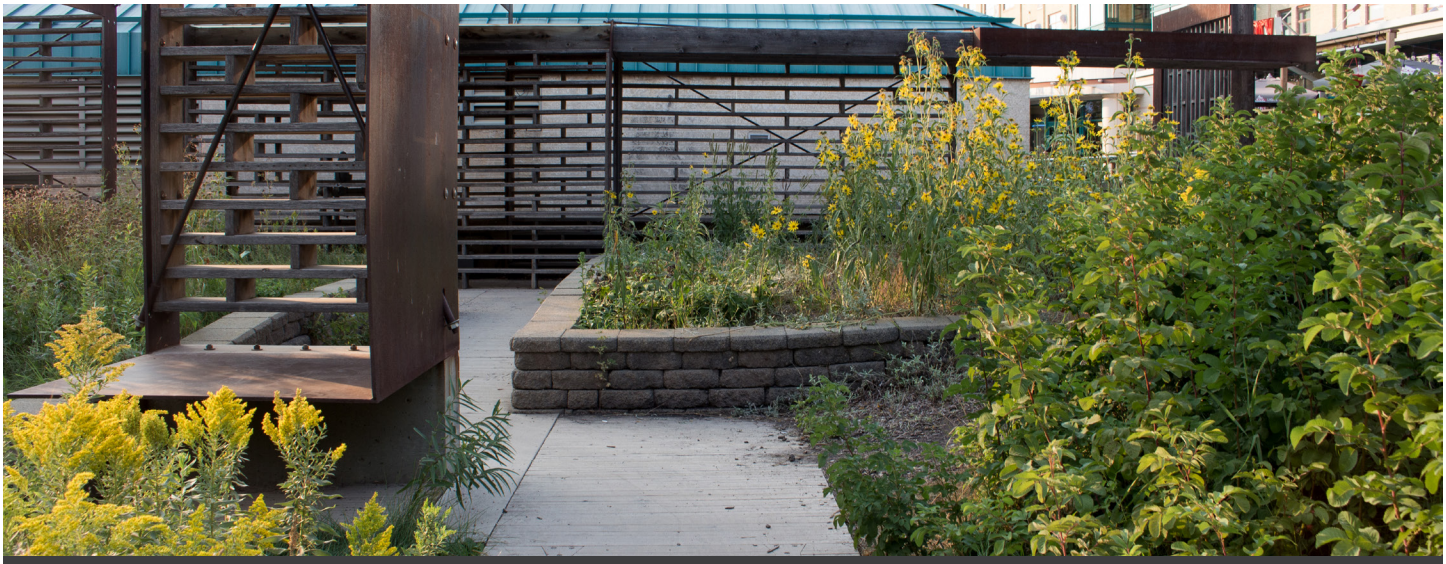

FIGURE 7 | The Forks Prairie Garden

RQ2: What are the challenges associated with tallgrass prairie development?

Physical:

Lack of management was a major challenge, particularly during initial establishment, and led to invasive non-native species outcompeting TGP species.
Environmental challenges pose significant challenges: fragmentation led to decreased ecological function, high proportion of edge habitat led to competition from non-native species, while contamination and compaction from human activities created adverse growing conditions.
Complexity: design and construction of high-quality TGP development requires significant knowledge and experience.

Logistical:

Resource limitations pose major challenges to TGP development. Financial support, local plant availability, and well-trained staff are critical to TGP development success.
Time: In general, TGP development takes a minimum of 5 years to develop and it may not look very attractive until that time. It can be challenging to achieve acceptance from landowners, as well as the support of the public during the establishment period.
Policy and funding: There is a lack of policy and funding supporting, protecting, and incentivizing TGP development in Winnipeg.
Land use pressure is a major challenge. Currently, developers lack incentive to develop or preserve existing TGP, and other land uses can be more profitable.

Sociocultural:

Cultural landscape preferences are a major barrier in Winnipeg. Many people prefer a neat and tidy plant appearance and associate long grass with 'messiness'.
Lack of education and exposure is another major barrier – many people don't know what TGP is, and have never seen it in person.
Incorporating recreation and access on site is a major challenge, as on-site human activities can negatively impact TGP through compaction and contamination.

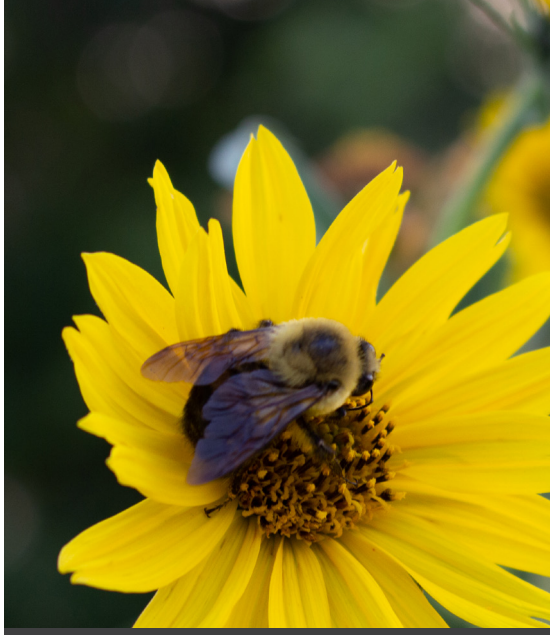

FIGURE 8 | The Forks Prairie Garden

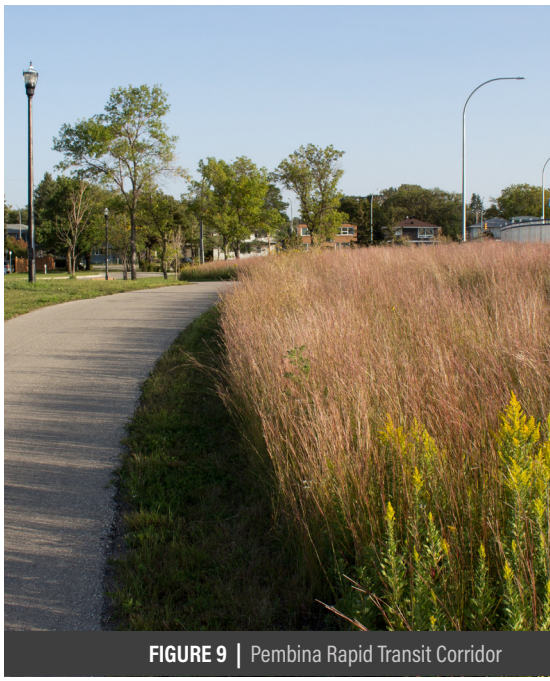

FIGURE 9 | Pembina Rapid Transit Corridor

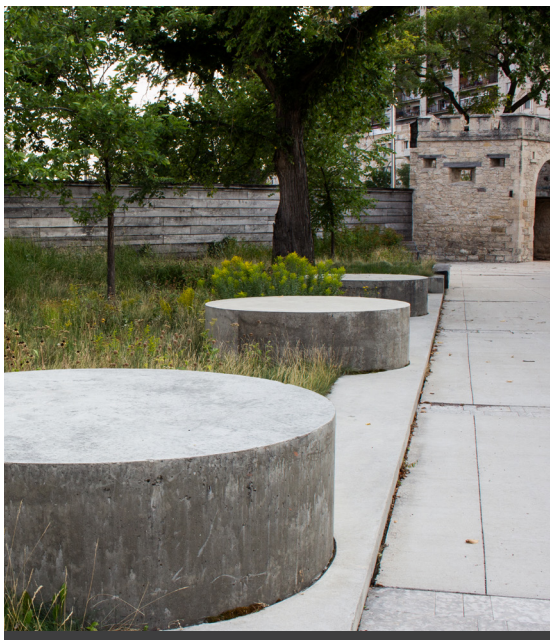

FIGURE 10 | Upper Fort Garry Heritage Park

RQ3: What are best practices associated with tallgrass prairie development?

Physical:

Committed management is critical for TGP development success – especially during the establishment period.
Design to optimize site attractiveness by increasing species and forb diversity, and planting nodes of forbs along key interaction points as a mean of improving public perception and educational value.
Communicate 'intention' by making it apparent the site is managed and has been planted on purpose by including well-defined pathways and interpretive signage.

Logistical:

Orient different sites towards specific functional goals: some spaces may be better suited to increase educational value, while some may be better suited to promote ecosystem function.
Committed ownership, financial support, and fixed land use are critical to long term success of TGP development.
Supportive policy and funding can greatly improve TGP preservation and development success.

Sociocultural:

Public TGP education is critical as a means of increasing understanding and generating social acceptance and support for TGP
Improve community engagement efforts and collaborate with local community organizations to greatly increase project efficacy, generate social support, and reduce financial and labour resource requirements.
Incorporate recreation opportunities strategically as a means of increasing social acceptance and generating support of TGP

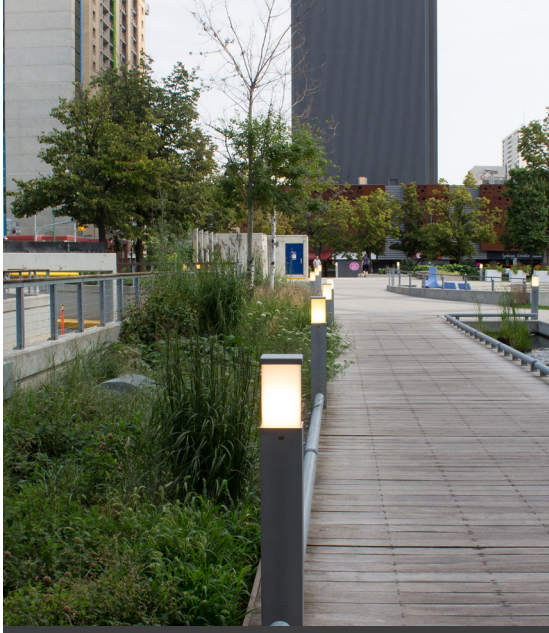

FIGURE 11 | Millennium Library

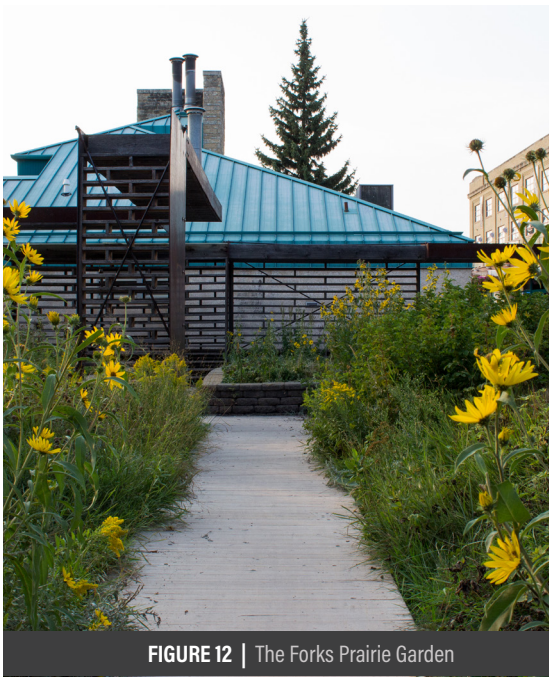

FIGURE 12 | The Forks Prairie Garden

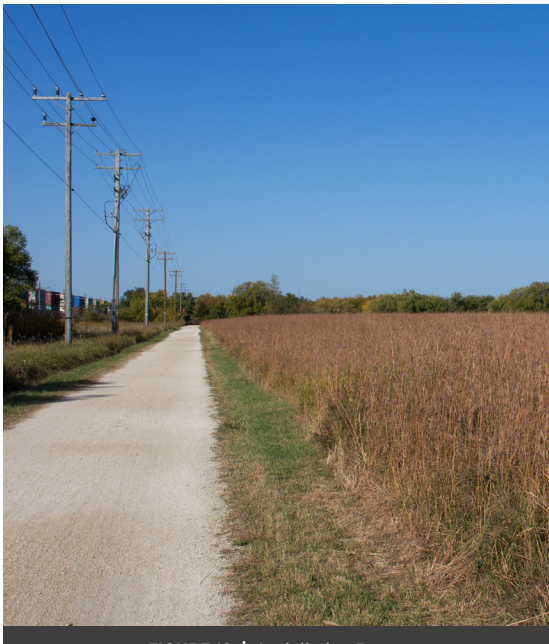

FIGURE 13 | Assiniboine Forest

RQ4: What are the opportunities for tallgrass prairie development?

There are significant opportunities for TGP development in Winnipeg:

Avoid an 'all or nothing' approach: instead of focusing on eliminating conventional non-native urban plantings, or including 100% native plants, TGP development efforts should focus on improving the quantity, quality, and diversity of native species.

Focus on quality: TGP development should focus on high-quality, attractive development and committed management to improve public perception and cultural acceptance of 'natural' landscapes such as TGP.

Shift cultural landscape preferences towards a TGP aesthetic of longer grass. Culture change is a critical opportunity in Winnipeg to increase and support TGP development, influence supportive policy, and generate political will necessary for large scale projects.

Develop Winnipeg's cultural and landscape identity by showcasing plants from the original landscape, and support Indigenous planning and design initiatives in Winnipeg in the spirit of reconciliation.

Increase education and exposure to TGP, particularly for children, as a means of improving appreciation and cultural acceptance of TGP in Winnipeg.

Develop policy that either mandates or incentivizes TGP preservation and development in Winnipeg
Increase government funding to support developers and private landowners in TGP preservation and development.

Connect with and support community and grassroots efforts relating to TGP development.

Re-orient City management efforts: gradually shift city management away from mown non-native turfgrass, annuals, and non-native perennials towards TGP development and increase the size and capabilities of the City Naturalist department.

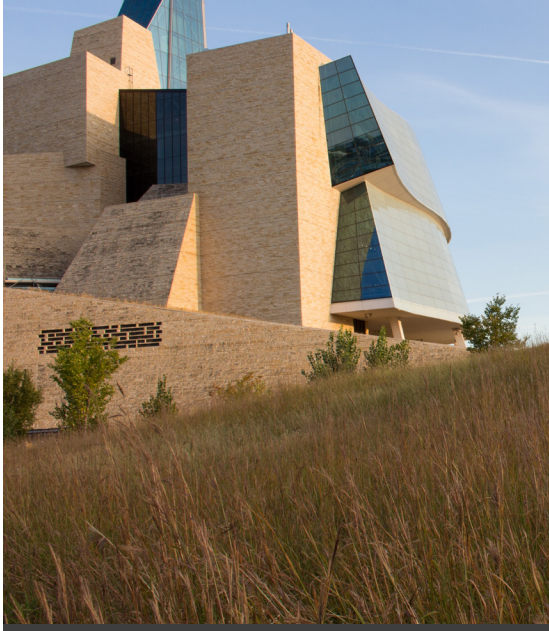

FIGURE 14 | Canadian Museum of Human Rights

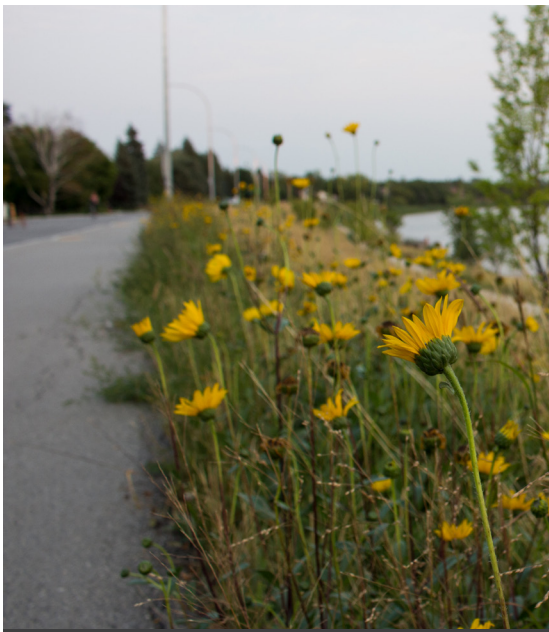

FIGURE 15 | Lindale Drive

FIGURE 16 | Upper Fort Garry Heritage Park

Physical Opportunities:

There are a variety of physical opportunities for TPG development in Winnipeg, and a combination of different applications for different locations is most promising.

Protecting existing TGP is the highest priority. Existing TPG has the highest ecological and environmental value and contains critical habitat for endangered biodiversity.

Large scale infrastructure is a major opportunity. Sites such as right-of-ways, cloverleafs, transportation corridors, retention ponds and riverfronts are well suited for native grass matrix, restoration, and potentially passive restoration in sites with minimal public access. Their large size can provide significant ecological and environmental benefits, they can be efficiently managed and possess greater resilience than small sites, and there is generally greater acceptance of long grass in these areas. Gradually incorporate nodes of forbs at strategic interaction points to improve species diversity as well as aesthetic and educational value.

Institutional land and public parks are another major opportunity. These sites have committed ownership, financial stability, and fixed land use – increasing site quality and chance of success. Additionally, sites often possess high public visibility – providing key opportunities for education, as well as influencing perception and culture change. They are well suited for native grass matrix, restoration, and showcase gardens in the most visible areas.

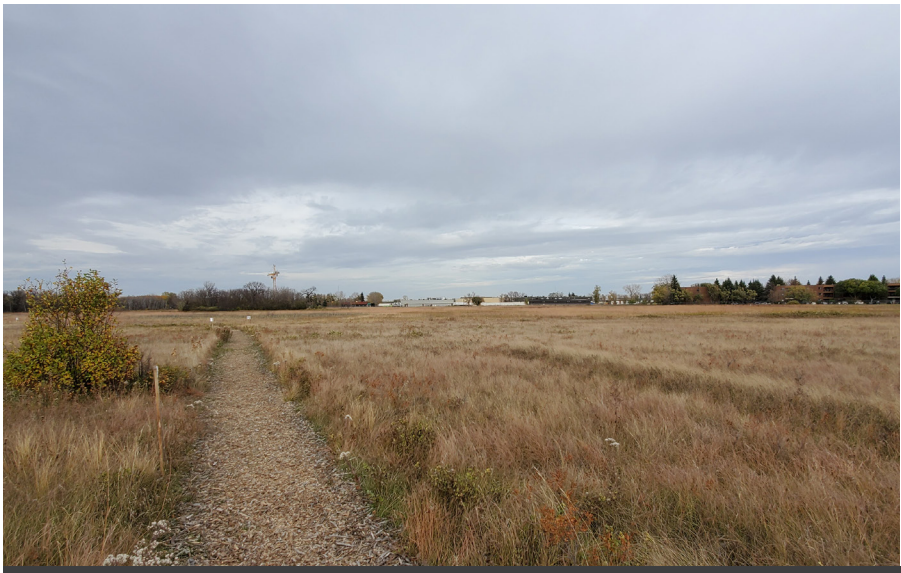

FIGURE 17 | Living Prairie Museum

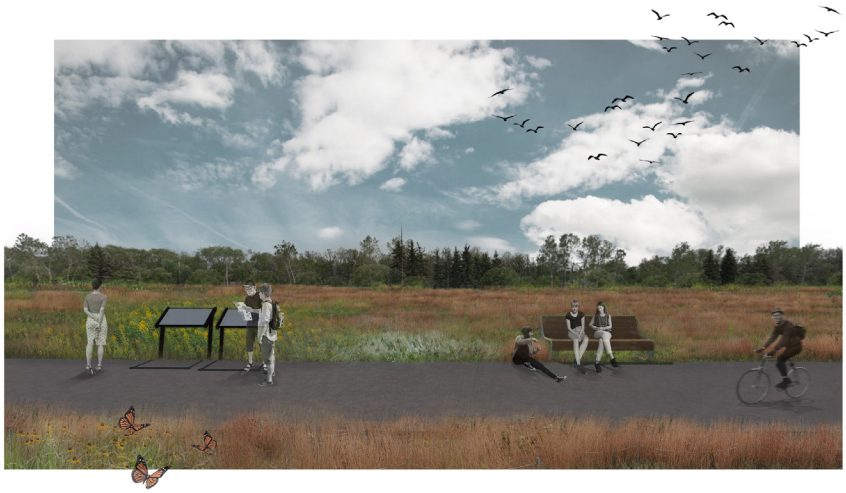

FIGURE 18 | Large scale infrastructure: Bishop Grandin

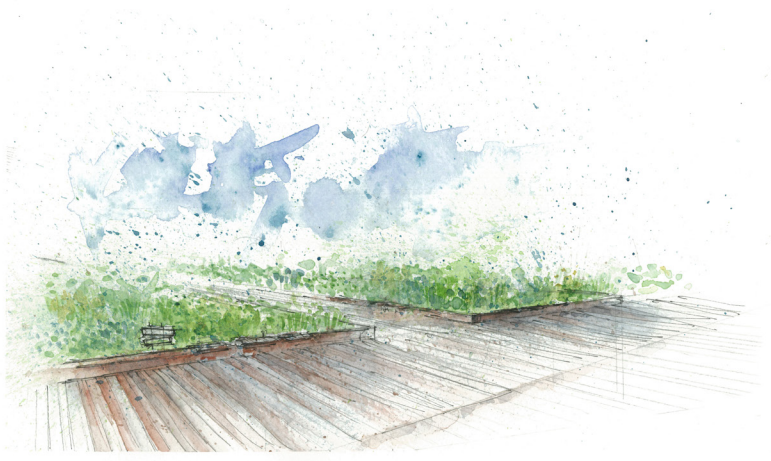

FIGURE 19 | Public Park

Small-scale infrastructure and residential sites are another opportunity. Many sites possess high visibility, making them well suited to provide educational benefits, promote cultural acceptance, and provide underrated ecological benefits. Homeowners can do this on their own at comparatively low cost and maintain the gardens themselves. With committed management and public financial support these gardens could be highly influential. These sites are well suited to a combination of native grass matrix and showcase gardens.

FIGURE 20 | Residential boulevards and yards

Schoolyards provide key opportunities for TGP exposure, interaction, and education. Success is highly dependent on committed management and staff succession, and many schools are already planting native wildflower gardens. It can be challenging to provide opportunities for children to access TGP without negatively impacting plant health, but worthwhile if undertaken strategically. These sites are well suited to native grass matrix and showcase gardens.

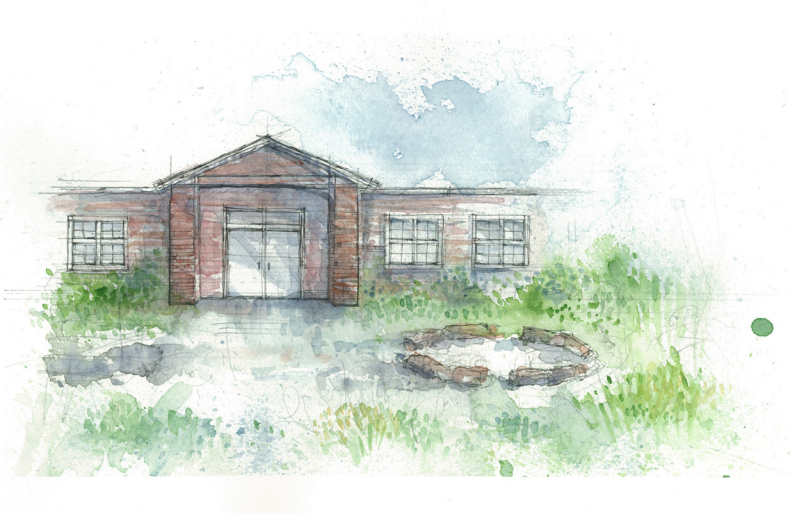

FIGURE 21 | Schoolyard

Greenroofs can have significant environmental and educational benefits. However, they are expensive in comparison to other forms of TGP development, and should be a low priority in Winnipeg. In cities with higher density they are a more worthwhile investment.

FIGURE 22 | Green roof on the Hudson's Bay building

CONCLUSION

In conclusion, TGP development in Winnipeg is worthwhile and should be given greater priority. There are a variety of challenges and best practices associated with TGP development, as well as many opportunities for TGP development in Winnipeg. Collectively, these findings present a variety of ways forward in transforming Winnipeg into a 'prairie city'.

Notes:

1 - Mutch, P. D. (2007). *Assessment of Small Scale Tallgrass Prairie Restoration in an Urban Environment* (University of Manitoba). Thesis (M.Env).
2 - Robertson, K. R. (1997). The Tallgrass Prairie. In *Integrative Biology* 335.
3 - Beatley, T. (2016). *Handbook of Biophilic City Planning & Design.* Island Press.
4 - Forman, R. T. T. (2014). *Urban Ecology: Science of Cities.* Cambridge University Press.

All images created by Nik Friesen-Hughes