

Green Infrastructure Planning in an Urban Context:
“Green Plans” in Four Winnipeg Inner-City Neighbourhoods

By

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ABSTRACT

This research project explores the integration of the concept of urban green infrastructure (GI) into three “green plans” developed by four Winnipeg inner-city neighbourhoods. These plans were developed in response to the barriers and adverse conditions that challenge the neighbourhoods’ green space planning. The “green plans” also reflect a demand for quality multifunctional green spaces from residents in Winnipeg inner-city neighbourhoods. Through a literature review, “green plans” evaluation, key-informant interviews, and a focus group interview, many factors that influence on the urban green infrastructure planning in Winnipeg have been identified, including external opportunities and challenges, internal strengths and weaknesses. These factors were synthesized with a SWOT-TOWS framework to identify strategies and measures to address situations that these inner-city neighbourhoods might face in the process of urban GI planning. This study provides recommendations in terms of capacity building, policy and regulation, education, financing and partnership for GI planning in Winnipeg urban neighbourhoods, as well as suggestions on the future research. Several conclusions have been drawn to summarize the research results, including: green infrastructure planning in the Winnipeg urban neighbourhood context will be taking different physical forms in terms of network connection, which will have great impact on the GI benefits, GI planning principles and processes, and planning practices in those Winnipeg inner-city neighbourhoods; the “green plans” of the four Winnipeg inner-city neighbourhoods provide valuable lessons for preparing for future urban GI planning; and incorporating urban green infrastructure into current neighbourhood “green plans” will face various opportunities and challenges. Combined with some internal factors, these opportunities and challenges put GI planning in different situations, each of which need their own strategies and measures. This research project demonstrates that by employing the strategy of green infrastructure, green spaces planning can provide an increased range of positive contributions to the inner-city neighbourhoods and elsewhere of Winnipeg.

Keywords: Green Infrastructure; Planning; Green Plans; Inner-City
Neighbourhoods

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CHAPTER 1: INTRODUCTION

This practicum investigates green infrastructure (GI) planning in an urban neighbourhood context by examining three plans (they are generally called as “green plans” hereafter) that were developed by four Winnipeg inner-city neighbourhoods to direct their urban green space and healthy living style planning. The purpose of the proposed research was to identify factors including the opportunities and challenges that influence inner-city neighbourhood green infrastructure planning, and further to analyze and explicate the prospects, challenges, and potential measures for urban green infrastructure planning in Winnipeg.

This chapter begins with a statement of the research problem, followed by the specific research questions that are addressed. It further includes an introduction of the background information of this research, the research methods, the significance of the study, the biases and limitations, and provides a brief outline of the chapters.

1.1 Problem Statement

In the inner city or urban core neighbourhood context, natural green spaces are limited and fragmented compared with suburban and rural areas. With a lack of funding and little recent expansion of park systems in cities, open space amenities that contribute to livability are increasingly in short supply, creating an inequity between the core and suburbs (Banerjee, 2001). This is evident in Winnipeg, especially in Winnipeg inner-city neighbourhoods. A survey conducted by Supporting Employment & Economic Development (SEED) showed that more inner-city residents were not satisfied with the conditions of parks than people living in non-inner city areas (Forsyth, Bodnarchuk, O’Kell, & Roos, 2004, p.30). It also made the statement that less green spaces are

provided for recreation use around the inner city area of Winnipeg (Forsyth, Bodnarchuk, O’Kell, & Roos, 2004, p.30). However, the general disconnect from nature in inner-city neighbourhoods is greatly shaped by complex factors reflecting social-economic, technological, and political status molded by the city’s history.

Winnipeg inner-city neighbourhoods have long been the home to a large proportion of population susceptible to urban poverty. According to Carter, Polevychok, and Sargent (2005), 23.5 percent of Winnipeg’s poor families lived in impoverished neighbourhoods in 1980, and this number had increased to 39 percent by 1990 (p.1). The poverty levels of the inner city were much higher than for the city on the whole in the period of 1971 to 2001 (Carter et al., 2005). This trend has continued, as documented in the *West Central Winnipeg Community Profile 2006* (Alphonso and Wiebe, 2009). On one hand, this situation has put pressure on neighbourhoods for affordable housing. On the other hand, the prevalence of housing affordability problems directly result from elevated amounts of destitution in these areas (Carter, Polevychok, & Sargent, 2003). These adverse conditions have led to the situation that housing developments have priority over green space maintenance and development in such highly contested areas, which in turn further exacerbates the difficulties of green space planning within these neighbourhoods.

Another obstacle, especially for children and older adults trying to use green space amenities comes from the “car mono-culture”, which is one of the principal causes of environmental crises in urban areas. These selected neighbourhoods are host to several major commuter routes, such as Ellice Avenue, Sargent Avenue, and Arlington Street, which bring heavy traffic through the communities. While there is a sizeable

active transportation community situated in these inner-city neighbourhoods due to their proximity to downtown¹, the lack of crosswalks and traffic calming facilities continue to act as barriers and limit the access to green space such as parks and tot-lots in those neighbourhoods.

Besides the existing adverse land-use conditions, these neighbourhoods face lacking policy guidance on the municipal and provincial governments level and with internal capacity building. Since the values of green space in urban areas are not easily calculated on a concrete monetary basis compared with housing developments, local government decision-makers are often struggle to strike a balance between urban development and green space planning (Anton, 2005). In addition, as non-profit organizations, the neighbourhood development organizations also need to build their capacities for gaining municipal support, securing funding, and for effective project management skills.

In view of these barriers and difficulties, some inner-city neighbourhood development organizations in Winnipeg have designated committees that have developed “green plans” through ongoing community consultation and engagement, to help facilitate neighbourhoods green space planning. The “green plans”, normally spanning a five-year period, provide overall vision for green space and for healthy lifestyle planning in these neighbourhoods, along with green initiatives and projects that facilitate the neighbourhoods to achieve their goals and realize the broader vision. From a perspective of green infrastructure, the designated green space planning committees

¹ According to Census 2006, 26.7% of residents in Spence use biking and walking as their main transportation mode, the same mode in West Broadway is 29%, in Daniel McIntyre 11.6% and in St. Matthews 11.3%

and the “green plans” they have in place, have provided organizational and institutional opportunities for the green infrastructure planning in these neighbourhoods.

Green infrastructure (GI) is often used as a strategy to raise the status of green spaces and other green elements in communities to be as important as “built infrastructure” such as utility lines or “social infrastructure” such as social organizations (Benedict & McMahon, 2001). Such a strategy provides a holistic way for urban neighbourhood green space planning by integrating other environmental resources with existing green spaces. The GI strategy in urban neighbourhoods focuses on greening small parcels of lands, maintaining and improving existing neighbourhood environmental assets, such as community gardens, street trees, vegetation, and active transportation corridors, if possible, to function as green infrastructure with other natural green spaces (e.g. parks) as a whole to provide multiple benefits in urban neighbourhood. Therefore, adopting a strategy of urban green infrastructure in Winnipeg inner-city green space planning is expected to offer potential solutions to the problems outlined.

1.2 Research Questions

The following research questions, within three themes, were developed to address the research problem statement for this practicum:

1. Concerning green infrastructure:

1a. What does green infrastructure mean in the urban context?

1b. What are its benefits?

1c. What are the principles of and process for green infrastructure planning?

1d. How does this concept relate to those selected neighbourhoods in this research?

2. Learning from the neighbourhood “green plans”:

2a. What lessons can be drawn from the three selected Winnipeg neighbourhood “green plans” regarding inner-city neighbourhood green infrastructure planning?

3. GI opportunities, challenges and neighbourhood organizations:

3a. How can the concept of urban green infrastructure be articulated and integrated with neighbourhood green plans?

3b. What opportunities and challenges affect the degree to which urban green infrastructure can be incorporated into the neighbourhood green plans?

3c. What is the role of neighbourhood development organizations in the process?

1.3 Research Background

Green infrastructure is an umbrella term incorporating various land-use strategies and engineering measures. The term has different meanings to different people according to the context where it is employed (Dunn, 2010; Benedict & McMahon, 2001, 2006; Mell, 2008). For the purposes of this study, green infrastructure is defined as properly planned natural green spaces including parks and other built /engineered green elements (such as community gardens and active transportation routes) jointly developed to provide multiple benefits for the life of urban communities. The multiple benefits of green infrastructure describes the capacity to deliver ecological, social, environmental and economic services to urban residents, such as enhanced biodiversity, promoting

physical and mental health, improved air, water and soil quality, and increased land and property value, (Forest Research, 2010; Benedict & McMahon, 2001). Therefore, it is vital to promote green infrastructure planning in human settlements for the purpose of moving towards increased sustainability.

While the attention to the benefits generated from green infrastructure for human society has increased notably in planning fields in the last decade, the focus remains concentrated on larger scale (regional and city-wide) and rural area green infrastructure planning². However, as some authors have argued, that green infrastructure planning can and does happen at various scales within urban communities and neighbourhoods (Benedict & McMahon, 2006), and “[i]n many ways [neighbourhood] is the scale at which green infrastructure has the greatest impact on the lives of local people” (Barton & Jones, 2009, p.7). Meanwhile, the scope of green infrastructure varies in areas and locations within the urban-rural continuum. In addition to typical natural green spaces (e.g. parks, woodlands), those lands with built/engineered features including community gardens, green roofs, and school playgrounds can be planned as green infrastructure. The term “green” here not only refers to certain land use pattern, but also to healthy community functions.

Since research on green infrastructure planning practices at the urban neighbourhood scale is limited in the literature (as discussed in Chapter 2: Key Themes in the Literature), conducting this in-depth exploration of examples of urban neighbourhood green plans contributes to better understanding of the benefits that GI can

2 See Conservation Fund GI case studies: <http://www.conservationfund.org/our-conservation-strategy/focus-areas/green-infrastructure/case-studies/>

bring to human settlements and provides valuable suggestions for green space planning in Winnipeg urban neighbourhoods.

1.3.1 Introduction to “green plans” of four Winnipeg inner-city neighbourhoods

The four inner-city neighbourhoods selected for this research are: Spence, West Broadway, Daniel McIntyre, and St Matthews (see Figure 1). These are all located west of downtown Winnipeg, in part of an area referred to as the West End. These neighbourhoods are relatively densely populated areas having limited urban green (open) spaces. According to the City of Winnipeg, the proportion of open space is 4.03%, and there are 2.54 acres of open space per 1000 people in the Downtown community area³. Compared with these numbers, the ratio of open space in Spence is 2.57%, 0.77 acres per 1000 people. West Broadway has 2.67% open space, 0.84 acres per 1000 people. Daniel McIntyre and St. Matthews each have respectively 1.86% open space, 0.60 acres per 1000 people, and 1.32% open space, 0.48 acres of open space per 1000 people (D. Beaton, personal communication, August 4, 2011, see Figure 2 and Figure 3). Compare to the neighbourhoods near the urban core, the percentage of open space is much higher in the city’s suburban area.

³ City of Winnipeg has 12 community areas in which Downtown community area contains 24 neighbourhoods, including the four neighbourhoods selected for this study

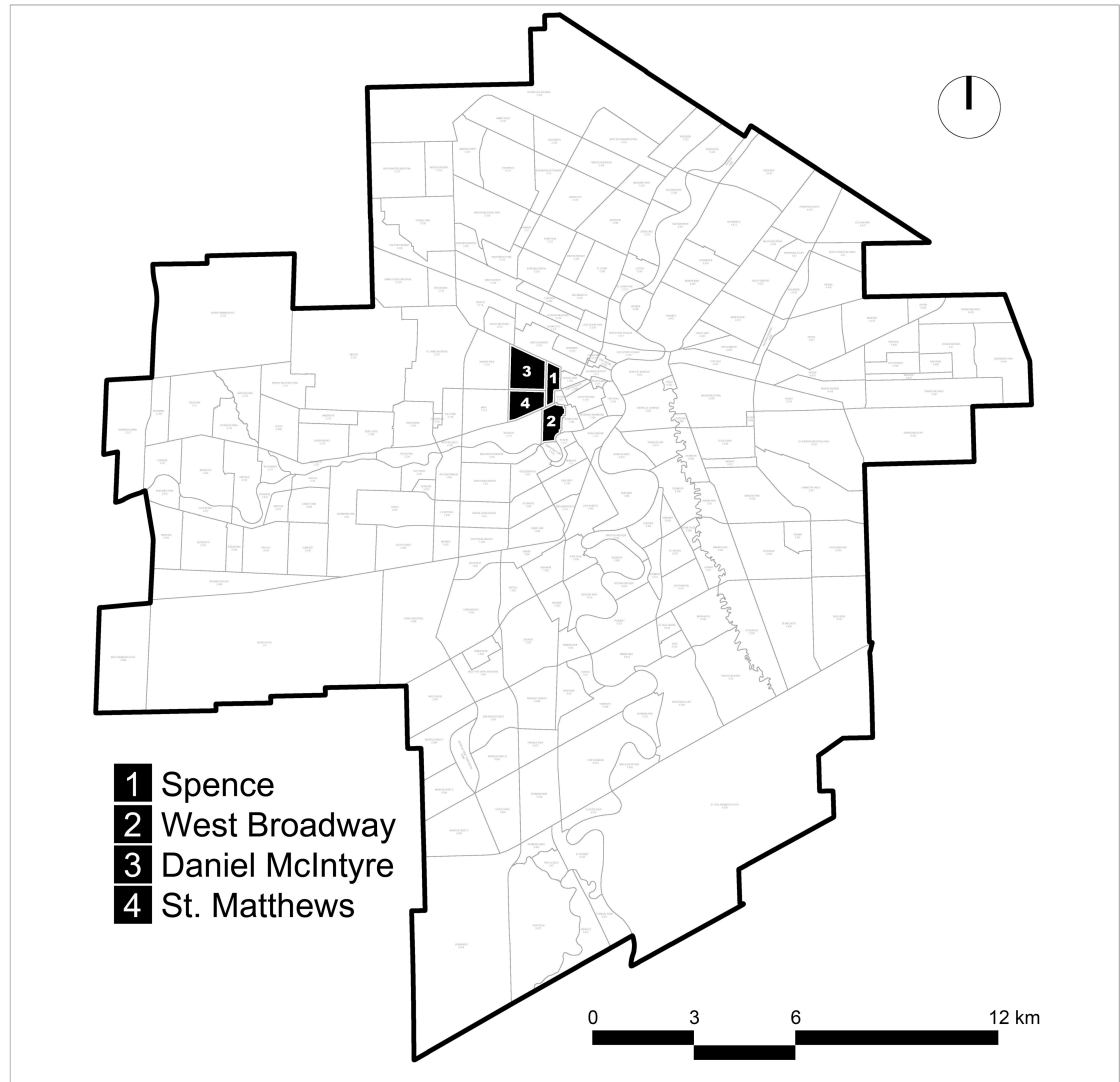


Figure 1. Context map of the four inner-city neighbourhoods selected for this research

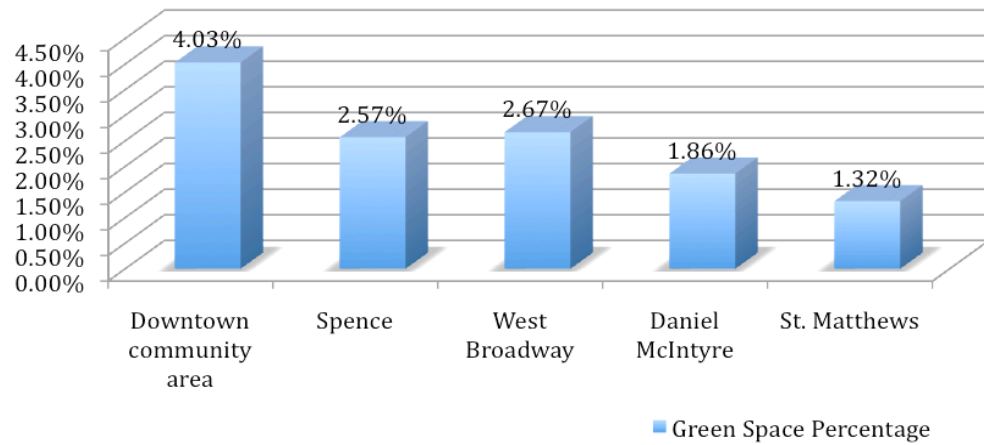


Figure 2. Comparison between downtown community area and the four selected neighbourhoods regarding green space percentage

Spence

0.77 / 1000 
acre

West Broadway

0.84 / 1000 
acre

Downtown Community Area

2.54 / 1000 
acre

Daniel McIntyre

0.60 / 1000 
acre

St. Matthews

0.48 / 1000 
acre

Figure 3. Comparison between downtown community area and the four selected neighbourhoods regarding green space area per thousand people

Along with the limited open space provisions in these neighbourhoods, access to these green spaces has been challenged by the presence of major thoroughfares. This is most evident in the Spence, Daniel McIntyre, and St. Matthews neighbourhoods, as indicated in their neighbourhoods “green plans”. For example, within the neighbourhood boundaries, 15,600 to 18,600 vehicles were counted on Ellice Avenue, and 13,000 to 16,900 vehicles were counted on Sargent Avenue during average weekday 24 hours (City of Winnipeg Public Works Department, 2012). These major commuter roads cut through those neighbourhoods. Therefore, a number of community gardens in those neighbourhoods are intentionally situated mid-block to promote accessibility without need for crossing the heavy traffic routes.

The existing green spaces in those neighbourhoods take the form of neighbourhood parks, community gardens, tot lots, vacant lots and other open spaces that provide amenities for neighbourhood residents and environment. The current short supply of green spaces in those selected inner-city neighbourhoods is rooted in complex issues that contribute to the current situation. Community members in those neighbourhoods have actively taken actions to find some ways to tackle the issues. One of their actions was to form the neighbourhood development organizations (NDOs)⁴ to work for the neighbourhoods.

Spence and West Broadway have their own neighbourhood development organizations—Spence Neighbourhood Association (SNA) and West Broadway Community Organization (WBCO)⁵ responsible for neighbourhood development in their respective neighbourhoods. Daniel McIntyre and St. Matthews have a joint development

4 NDOs are also known as community development corporations (CDCs)

5 The organization's former name was West Broadway Development Corporation (WBDC)

organization called Daniel McIntyre/St. Matthews Community Association (DMSMCA) to represent the two neighbourhoods in community development work. The Provincial *Neighbourhoods Alive!* Program is credited with supporting the formation of the three NDOs and providing resources to sustain community-building projects.

The Spence Neighbourhood Association was incorporated in 1997 as a non-profit housing group to improve living conditions in the neighbourhood (Spence Neighbourhood Association, n.d.). As the organization continued to grow, it has become a neighbourhood development organization with designated committees that help to address problems in the neighbourhood development process. In 2004, SNA began a process to inventory vacant lots and community planning that led to the Image and Greening Committee (renamed as the Environment and Open Spaces Committee in 2012) developing green space goals for the following 5 years. (Spence Neighbourhood Association, n.d.). This resulted in the neighbourhood planning document-*Spence Neighbourhood Green Plan: A Five Year Strategy 2005-2009* (this is abbreviated as the *Spence Green Plan* hereafter). The *Spence Green Plan* was the first of its kind in Winnipeg, inspiring other inner-city neighbourhoods to follow suit (Spence Neighbourhood Association, n.d.). The *Spence Green Plan* focused on addressing five areas: health, safety, learning, environmental responsibility, and social capital and community development through a long-term commitment to green space planning in the neighbourhood. The plan also identified targeted green spaces and other green element sites, plan implementation timelines, and maintenance plans. In the updated version of *Spence Green Plan- Spence Neighbourhood Association Green Plan 2010-2014* (see

Figure 4), released in 2010, a section titled “Recommendations to the City of Winnipeg” was added to seek support from the City for the neighbourhood green space planning.



Figure 4. Spence Neighbourhood Association Green Plan 2010-2014 cover page © Used with permission from Spence Neighbourhood Association

The West Broadway Community Organization (WBCO), legally incorporated in 1997, is a non-profit organization working with community residents, organizations, and other stakeholders to plan and coordinate community development and neighbourhood renewal cause. Through a community-based planning process, WBCO developed a planning document – *West Broadway Green Space Planning Process and Green Space Plan* (It is abbreviated *WBCO Green Plan* hereafter, see figure 5) in 2011, as an affiliation to the official community plan. The *WBCO Green Plan* highlighted the community green space planning consultation process and results as well as the phased

plans for green projects in the neighbourhood (West Broadway Community Organization, 2009). Along with the *WBCO Green Plan*, a literature review of research on benefits of urban green spaces was compiled as a supplement. The literature review explored social, economic, health and environmental benefits of green space development and their relevance to the West Broadway neighbourhood. It also pointed out various forms and roles that urban green infrastructure can take and play in neighbourhood planning and development process.



Approved by WBDC Board of Directors
April 2009

Figure 5. West Broadway Green Space Planning Process and Green Space Plan cover page © Used with permission from West Broadway Community Organization

The Daniel McIntyre/St Matthews Community Association (DMSMCA) is a non-profit community organization incorporated in 2008. It defines its development goals through regular consultations and ongoing networking with residents and

stakeholders. One of the achievements that resulted from this process is the *DMSMCA Five Year Green Action Plan* (abbreviated *DMSMCA Green Action Plan* hereafter, see Figure 6), which satisfies the third milestone of the *Community Led Emissions Reduction (CLER)* program: local climate change action plan. The *CLER program* was a four-year pilot project to support community-led action on reducing greenhouse gas (GHG) emissions, launched by Province of Manitoba on April 1, 2008. As a participating neighbourhood association, DMSMCA has agreed to try to reduce GHG emissions to 6% lower than 2003 levels in the two neighbourhoods in 2010 (DMSMCA, 2010). The Green Action Plan of DMSMCA includes a collective vision for a green Daniel McIntyre/St Matthews community and the greening projects leading to the realization of such a vision. A list of identified greenspace to preserve or improve is also included in the *DMSMCA Green Action Plan*, which can be considered as a preparation for the community green infrastructure planning work.

**Daniel McIntyre/St Matthews Community
Association: Five Year Green Action Plan
February 2010**



Figure 6. DMSMCA Five Year Green Action Plan cover page © Used with permission from Daniel McIntyre/St. Matthews Community Association

SNA and WBDC developed their own “green plans” respectively, while DMSMCA representing two neighbourhoods developed a “green action plan” to direct green space planning and address the need to reduce GHG emissions. The three “green plans” in the four inner-city neighbourhoods comprise collectively the objects to be evaluated later in this research.

1.3.2 Project Background

While undertaking a volunteer internship in the Spence Neighbourhood Association in the summer of 2011, the researcher established contacts and identified prospective key informants expected to be willing to participate in the research. Audits of community gardens and green spaces were implemented during this period, which provided an experiential perspective for the researcher. Further work for the purpose of completing data collection, and interviews related to this research occurred in the summer 2013.

1.4 Research Methods

The research follows a linear progression through a literature review, neighbourhood “green plans” evaluation, and semi-structured interviews. A focus group was employed as a way to solicit feedback and reflections on the initial findings and draft recommendations. In addition, a SWOT-TOWS framework was also used to synthesize the outcomes of analysis to the research results. Key themes in the literature regarding the research topic were reviewed to inform both of the methods and recommendations from the research. The research process was ongoing, with time

allowed for additions to the literature review as the research was conducted. The evaluation of the neighbourhood “green plans” was based on an adapted green infrastructure plan evaluation framework. The range of informants includes: neighbourhood development organization staff, planners from City of Winnipeg, officers from Province of Manitoba *Neighbourhood Alive!* Program, as well as neighbourhood residents and business owner. Semi-structured interviews were conducted with key informants of greening projects in the selected neighbourhoods. The interview results were grouped with main themes summarized from the responses. The feedback from focus group interview also helped to further inform responses to the research questions and in formulating conclusions and in providing recommendations. SWOT is the abbreviation of Strength, Weakness, Opportunity, and Threat, while TOWS is in the abbreviation of same elements with SWOT, but in different orders. The purpose of using SWOT-TOWS framework was to identify strategies and measures to address situations that inner-city neighbourhoods may be facing in the process of urban GI planning.

1.5 Significance of Study

The research attempts to address some gaps in the green infrastructure literature. As a majority of existing literature on green infrastructure planning initiatives is regarding large-scale (regional or city-wide) and non-urban area green infrastructure planning, this research will provide insight on what a vision of an urban community context green infrastructure will be. Specifically, the researcher of this project intends the result to shine a light on the incomplete knowledge of planning green infrastructure in urban core neighbourhoods.

This project will be valuable for Spence, West Broadway, Daniel McIntyre, and St. Matthews, the four neighbourhoods being studied, as well as other neighbourhoods that are planning for the development of urban green infrastructure in Winnipeg, and neighbourhoods in other municipalities. While geographical and socio-economical suitability must be considered in relation to the findings derived from this research, many general themes are expected to have application in other similar contexts.

It is expected that the findings of this project will provide the community organizations, planners, policy makers, community residents and relevant interest groups, with a better understanding of green infrastructure planning in an urban context, and to help facilitate them in taking the green infrastructure tool into consideration when planning a more sustainable neighbourhood.

1.6 Biases and Limitations

This practicum document was written under the potential influence of a few biases and limitations. One potential bias is that the researcher undertook an internship with the Spence Neighbourhood Association (SNA). SNA developed the *Spence Green Plan*, which was evaluated in this research. The experience of that internship fostered part of the researcher's interest in the topic of this practicum. However, the researcher of this practicum would like to clarify that his interest and work with SNA had limited influence on the perception of the project's findings, which also had limited bias for the project.

One limitation of this project may come from the availability of key informants interviewed, especially the planner in the City of Winnipeg. There is only one planner in

the City who is familiar with the green plans and greening projects, which were investigated. However, the information collected from the City of Winnipeg planner not only represents their opinion, but also from viewpoint of the planning authorities in the City, which helped to minimize the potential disadvantage of interviewing a single city planner informant.

Another limitation is that this research project employed qualitative research methods to collect information, due to the purpose of this research project as stated in the introduction section. Considering the characteristic of qualitative research methods, the results of this research project need to be understood in specific contexts and may only be applied to areas with similar settings.

1.7 Outline of Chapters

This document comprises five chapters, a reference list and several appendices. Chapter 1 provides an overall introduction of the research topic, presenting the research problem, research questions, background information, and the significance of this study. It also outlines the biases and limitations for the study. Chapter 2 presents a literature review of the key themes of this research, including green infrastructure planning in the urban context, its functions, benefits, planning principles and process, and roles of stakeholders in planning practice. The chapter also includes a discussion and evaluation of neighbourhood “green plans”. Chapter 3 describes the research methods used in this study and identifies the findings resulting from the research. Chapter 4 addresses the research questions, presenting the main findings accordingly, then uses the SWOT-TOWS framework to synthesize the outcomes of analysis. Finally, Chapter 5 provides

recommendations for green infrastructure planning in urban neighbourhoods of Winnipeg and for future studies. It also draws conclusions of the whole research project. The Appendices provide supplementary information such as ethic approval certificate, semi-structured interview guide, focus group information sheet, and sample consent forms, as well as a SWOT elements table.

CHAPTER 2: KEY THEMES IN THE LITERATURE

In order to develop a better understanding of urban green infrastructure, this research project investigates how the concept can be better integrated with neighbourhood “green plans”, and identifies what opportunities and challenges affect the degree to which urban green infrastructure can be incorporated into the neighbourhood “green plans”, and what strategies can be used to deal with adverse conditions. To inform both of the methods and recommendations from the research, the literature review was implemented to provide a context for the investigation of the role of urban green infrastructure in contributing community sustainability, as related to the selected neighbourhoods. The main themes explored in this literature review include: green infrastructure in the urban context; urban green infrastructure benefits; urban green infrastructure planning principles and processes; and roles of stakeholders including neighbourhood development organization, the local government and provincial government, and community members in the urban green infrastructure planning. The introduction to the selected neighbourhood “green plans” and a discussion regarding the “green plans” evaluation were also included in the literature review to provide a context for understanding the relations of current “green plans” and green infrastructure plan.

2.1 Green Infrastructure in the Urban Context

The green infrastructure (GI) concept is becoming more frequently used by planners, policy-makers, designers and engineers as a powerful way of making environmental considerations a core element of community plans (Wilkie and Ascroft, 2009). This concept was first introduced in a report issued by U.S. President’s Council

on Sustainable Development in 1999. In the report, green infrastructure was deemed as the “natural life support system” contributing to the health and quality of life for communities and people (The President’s Council on Sustainable Development, 1999, p.64). Using the term *green infrastructure* is intended to raise the status of green spaces and other green elements in communities to be as important as “built infrastructure” (Benedict & McMahon, 2001). Sandström (2002) notes, “in current efforts to achieve sustainable urban development, ‘green infrastructure’ has the same dignity as ‘technological infrastructure’ has had in traditional urban planning” (p.375).

U.S. EPA defines the term *infrastructure* as “the substructure or underlying foundation or network used for providing goods and services; especially the basic installations and facilities on which the continuance and growth of a community, State, etc., depend” (U.S. EPA, 2009, p1). This definition includes examples of gray infrastructure, such as road and utility lines, as well as examples of social infrastructure, such as schools, hospitals, and libraries (Benedict & McMahon, 2001; U.S. EPA, 2009). It does not include natural practices that can be used for climate change adaptation and environmental improvement, which is a reflection of benefits provided by green infrastructure (U.S. EPA, 2009).

The scope of *infrastructure* has evolved to respond to the needs of growth and priorities of humans in striving for livability in communities (Williamson, 2003). *Livability* refers to factors that collectively contribute to the quality of life in a community (Partners for Livable Communities, n.d.). These factors involve the built and natural living environments, social, economic, and educational aspects of a community (Partners for Livable Communities, n.d.). In different development stages of human

settlement, priorities for achieving livability may emphasize different types of infrastructure. Williamson (2003) summarized the advances of infrastructure in the history of the United States in different eras since mid-late 1800s. Infrastructure evolution in the United States is a typical example of responding to the needs for livability by humans. From building electricity lines for meeting energy demand to construct highways for accommodating automobiles, and from installing sewage treatment plants for combating water pollution to promote mass transit for alleviating traffic congestion, technology advancements have shaped the infrastructure forms and met humans' priorities for livability (Williamson, 2003). In the 21st century, facing the new challenge of sustainability and livability arising from urban growth, people began to pay more attention to the benefits of natural area which is similar to grey infrastructure in addressing urban growth issues and promoting community's livability. The complement of natural area function for the grey infrastructure, which is expressed by the concept of green infrastructure, has provided more opportunities for humans to address sustainability issues by taking advantage of synergies between built and green infrastructure.

Centralized provision of infrastructure by government has gradually replaced the individual or small group service. Compared with the basic human services provided by individuals or smaller groups in ancient times, such larger government system arrangement has reflected the increasing complexity of society (Williamson, 2003). On the municipal level, delivering basic service infrastructure is one part of the central roles of municipal government in Canada (Tindal and Tindal, 2008). With the rise of civil society, more non-governmental organizations (NGOs), especially community-based

organizations began to undertake some responsibilities of community development initiatives, such as community environmental education, community economic development, community green space and affordable housing projects (U.S. Department of State, 2012). Part of the community development work undertaken by NGOs is related to infrastructure planning and maintenance, including active transportation route planning, neighbourhood parks and greenspace planning and maintenance, which are considered elements of green infrastructure planning.

In practice the term *green infrastructure* has many definitions, meaning different things to different people according to the context where it is employed (Benedict & McMahon, 2001, 2006; Dunn, 2010; Mell, 2008). Generally, there are two main streams regarding this concept: *natural* green infrastructure and *built* green infrastructure.

Natural green infrastructure considers green spaces and natural areas as being as critical and essential as built infrastructure in sustaining continuance and growth in a community. One common approach to define natural green infrastructure is an interconnected network of green spaces, which provide multiple benefits to humans and nature (Benedict & McMahon, 2001, 2006; Jane Heaton Associates, 2005; Natural England, 2009; Randolph, 2004). For example, England's Community Forests describe GI as "the network of open space, woodlands, wildlife habitat, parks and other natural areas, which sustain clean air, water, and natural resources and enrich their citizens' quality of life" (England's Community Forests, n.d.). This approach implies green infrastructure is often provided in large spatial scales and in non-urban environment (Wilkie & Ascroft, 2009). Built green infrastructure provides functions of built system by harnessing natural process and employing vegetative technologies. Typical of this

stream is its approach to stormwater management techniques. These techniques include a network of engineered/built elements that mimic natural hydrological features addressing sewer overflows and filtering pollutant from stormwater run-off (U.S.EPA, 2008; Wise, 2008). This “green infrastructure” is also called low impact development techniques (LID) in North America, sustainable urban drainage system (SUDS) in Britain or water-sensitive urban design in Australia (Donofrio, Kuhn, McWalter, & Winsor, 2009; Scottish Executive, 2001; U.S.EPA, 2000). In addition, community gardens, natural playground and active transportation routes can also be planned as components of built green infrastructure.

Typically the central urban area is denser than elsewhere in a city, and the dominant environment is human-made, with limited green spaces in the form of small size parks. Non-natural but environmental-friendly settings such as community gardens, schoolyards, and active transportation routes can be incorporated into green infrastructure when considering how to take advantage of existing local resources in urban green infrastructure planning. For the purposes of this study, it is deemed viable to define green infrastructure on the basis of the most expansive functions that are beneficial to the urban areas especially to communities and neighbourhoods, as eco-centricity and anthropocentricity of green infrastructure should be balanced in order to favor the broadest objectives in urban area. Therefore, urban green infrastructure is defined as properly planned natural green spaces such as parks and other built /engineered green elements such as community gardens and active transportation routes that jointly to provide multiple benefits for the life of urban areas. One of the prominent

characteristics of green infrastructure in the urban context is multi-functional and multi-benefits.

2.2 Urban Green Infrastructure Benefits

Green infrastructure influences residents' lives in multiple ways at community and neighbourhood scales (Barton & Jones, 2009). Properly planned green infrastructure can perform a variety of functions with benefits that are conferred accordingly. While the focus of documents differs, wide-ranging benefit can be provided in ecological, environmental, aesthetical, health and social domains by green infrastructure (Benedict and McMahon, 2006; Kambites and Owen, 2007).

Ecological values of urban green spaces are considered as the intrinsic benefits of green infrastructure (Baycan-Levent, Vreeker & Nijkamp, 2009). Regarding the ecological merit that it provides, physical connectivity among green spaces is the focal point in much of the landscape ecology literatures (Benedict and McMahon, 2006). Efforts to develop a network of accessible green spaces are vital steps in efforts to lessen the impacts of landscape barriers on species populations and to overcome habitat fragmentation common in urbanized areas (Beatley, 2011). Such strategies fit better at the larger scale (city and region) and rural setting. However, in dense urban areas, creating greenspace networks connected by linear greenways or green corridors is not typically feasible due to the established built environment.

As an ever-increasing environmental issue, Climate change and its impact on human health and safety is a growing concern for Canadian municipalities (Bruce, Egner, & Noble, 2006). Increased frequency of extreme weather such as summer heat

waves and incidents of flood and winter ice storm have significant negative impacts on the economic and social structure of communities. Adapting to climate change is crucial to ensuring continued sustainability of Canadian communities. In Britain, the concept of green infrastructure obtained wider recognition from its role in adaptation to climate change (Pauleit, Liu, Ahern, and Kazmierczak, 2011). The findings from The Adaptation Strategies for Climate Change in the Urban Environment (ASCCUE) project conducted by the University of Manchester, showed that green infrastructure appears to play a vital role in buffering the summer temperature increase associated with climate change (Gill, Handley, Ennos, and Pauleit, 2007). Green infrastructure can help manage urban surface water runoff and improve water quality through restoring natural environmental features in urban area and mimic those hydrological functions within the built environment (Forest Research, 2010; Wise, 2008).

Aesthetics is an important environmental benefit offered by urban green infrastructure. Urban green spaces have a great impact on the image and beauty of towns and cities (Tibbatts, 2002). Venn and Niemela (2004) stated that urban green spaces containing human-modified parks, gardens, recreation sites as well as informal greenspaces could provide multiple benefits for both cities and its residents, including the quality urban environments. Urban green spaces are often significant part of neighbourhood revitalization projects (Tibbatts, 2002). Fairburn and Smith (2008) reported that the most deprived populations were more likely to be living in areas of low environmental quality. Well-managed and quality green space are valued and sought after by local residents and businesses. Aesthetically enjoyable urban green spaces could increase property values, improve area image, and attract more people to the area

(Cousins and Land Use Consultants, 2009). Meanwhile, aesthetically quality green spaces in neighbourhoods also reflect residents' care for the living environment, which can help foster a sense of community and social cohesion (Jorgensen, Hitchmough, & Dunnett, 2007).

Besides the ecological and aesthetical benefits, human health and social well-being improvements are also identified as merits during green infrastructure planning practices (Dunn, 2010; Kuppaswamy, 2009; Tzoulas, Korpela, Venn, Yli-Pelkonen, Kaźmierczak, Niemela, & James, 2007). The benefits of green infrastructure on human health are reflected by both the physical health and psychological/mental health. On one hand, a commonly presumed mechanism of green spaces' influence on people's physical health is through its effect on physical activity (Bedimo-Rung, Mowen, & Cohen, 2005; de Vries, Verheij, Groenewegen, & Spreeuwenberg, 2003). Besides the potential positive effects that green spaces bring to physical activity, other influences of green spaces on health, such as lower stroke mortality, reduced morbidity and increased survival of seniors are also documented by various researchers (Hu, Liebans, & Rao, 2008; Maas, van Dillen, Verheij, & Groenewegen, 2009; Takano, Nakamura, & Watanabe, 2002). On the other hand, provision of easy access to green spaces has positively influenced peoples' stress and stress related health. In addition to the stress relief effects of green infrastructure, findings in some research also suggest beneficial influences of green spaces on children's concentration and focus attention, which are quite prevalent issues of inner-city low-income neighbourhoods (Taylor, Kuo, & Sullivan, 2001; Wells, 2000).

Potential benefits of green infrastructure on social interaction and social cohesion have been well documented. Kaplan and Kim (2004) suggested open spaces and natural

features in a residential area play a vital role in promoting people's sense of community and interactions with others (p.313). In a study exploring whether social contacts as a possible mechanism behind the relation between green space and health, Mass, van Dillen, Verheij, and Groenewegen (2009) found that green space is "positively related to peoples' feeling of loneliness and shortage of social support, especially for children, elderly, and people with lower economic status" (p.594). This study also concluded that loneliness and lacking social support partly intervenes the relationship between green space and health (Mass et al, 2009). A Chicago study about the use of neighbourhood common space areas also confirmed vegetation cover in common spaces promote social activities, which contribute to the vitality of neighbourhoods (Sullivan, Kuo, & DePooter, 2004). It is held that the opportunities for social interactions which green space offers can help build social cohesion for community members, especially beneficial for those who suffer from social exclusion more than others, such as youth, seniors, and ethnic minorities. A group of Swiss researchers conducted an empirical study to explore the role of public urban green space in facilitating the social interaction of youth from different cultures (Seeland, Dübendorfer, & Hansmann, 2009). They found urban public green spaces plays an important role for Swiss youth from different cultures to interact, which is deemed as the fundamentals for social inclusion (Seeland et al, 2009). In a research about Chicago inner-city children, Taylor, Wiley, Kuo, and Sullivan (1998) found children playing in green spaces also have more opportunities to be with adults, which may improve their communication skills and further help them be integrated in the society (p.2). Another study examined the influence of green outdoor common spaces on the social integration of seniors by interviewing ninety-one older

adults from a poor inner-city neighbourhood of Chicago. The findings showed that activities in green outdoor common spaces are strongly correlated with older adults' social integration and their sense of community (Kweon, Wiley, & Sullivan, 1998). There are also studies examining ethnicity and race in relation to urban green spaces. For example, Shinew, Glover, and Parry (2004) conducted a study on the role of community gardens in integrating people from different races. One of their findings indicated that interracial contacts occur in gardening, and many gardeners believed "community gardens bring together people of different races" (p.349).

Contrary to the findings of studies previously mentioned, Ravenscroft and Markwell (2000) investigated the relation between young people and urban park recreation provision in a UK context and drew tentative conclusions that "while such levels of access reflect the significance of parks and public spaces to ethnic minority youths, such accessibility does not, in itself, imply any degree of social or ethnic integration" (p.135).

However, in a critical review of greenspace benefits on life quality, Bell, Hamilton, Montarzino, Rothnie, Travlou, & Alves (2008) stated that "There are clear patterns in some places of common greenspaces – be they parks, gardens or communal spaces in housing – facilitating the formation of social and community ties and also fostering place attachment" (p.36).

2.3 Urban Green Infrastructure Planning Principles and Process

The initiatives of green infrastructure planning underway around the world, especially in North America and Europe provide experiential references for the

development of theory. U.S. literature on green infrastructure planning principles tends to focus on ecological functions, while UK sources are more based on social benefits (Kambites & Owen, 2006; Mell, 2008).

2.3.1 Urban green infrastructure planning principles

Although many green infrastructure planning principles are drawn from larger spatial scale practices, there are still some principles that can be followed when planning at urban neighbourhood scale. The following four principles are useful benchmarks or strategic frameworks for communities and neighbourhoods taking advantage of existing green assets to plan for localized green infrastructure (Benedict & McMahon, 2001, 2006).

Principle 1: Promoting connectivity/linkage in green infrastructure planning.

Connectivity or linkage plays an important role in green infrastructure planning. It is an inherent attribute of green infrastructure that is based on landscape ecology and conservation biology perspectives (Benedict & McMahon, 2006; Forman, 1995).

Creating spatial connectivity or linkage among green spaces to function as a whole is the primary goal of many green infrastructure planning practices. Connections allow the movement of wildlife and people, and plant species to extend (Kambites & Owen, 2006). As mentioned before, creating linear networks of green space in densely urbanized area is not easy because of existing built environment. Therefore, strategic efforts are needed to address the challenge. Ahern (2007) uses an adapted “mosaic model” based on applied landscape ecology to describe the landscape elements of green infrastructure in urban contexts (p.270). In this model, urban roads, power lines or even drainage ways can be

considered as corridors that link important green spaces, such as urban parks, community gardens, playgrounds, and vacant lots (Ahern, 2007).

It is noted “successful green infrastructure also requires linkages among the programs and staff of different agencies, nongovernmental organizations, and the private sector” (Benedict & McMahon, 2006, p.38). One of the ways to achieve this is through an ongoing planning process “for people to come together, build connections, and reach consensus on what is to be accomplished and the strategies to be used” (Benedict & McMahon, 2006, p.87).

Principle 2: Green infrastructure planning should reflect local context. Green infrastructure planning is a highly contextualized activity. The resources and challenges for planning practices vary between different environmental, social, political, and economic circumstances. When considering applying green infrastructure in specific fields, local characteristics need to be identified, respected, and enhanced wherever possible (Kambites & Owen, 2006; Town and Country Planning Association, 2008). In literature, those planning processes described are only references distilled from various green infrastructure planning practices, but not standard approaches. For example, the landscape features and green infrastructure elements in urban areas have many differences compared with those in suburban or rural areas. Therefore, urban green infrastructure planning should take opportunity of the distinct green infrastructure assets to make them compatible with urban settings. Only in this way can green infrastructure’s benefits be delivered to lives of urban dwellers.

Principle 3: Green infrastructure planning benefits are afforded to both nature and people. Unlike built infrastructure, which is mostly created for the benefit of human

beings, green infrastructure need to be planned and designed for the wide range of ecological, environmental, social and economical functions that accrue benefits to both nature and people. The primary aim of green infrastructure planning is for ecological and environmental protection, so the beneficial effect of it on nature is self-evident. The associated benefits of green infrastructure planning for people can be identified in several aspects. Some green infrastructure elements can function as natural drainage, which can help reduce the needs for grey infrastructure, that in turn saves public funds for other needs of community (McDonald, Allen, Benedict & O'Conner, 2005; Sandström, 2002). Also, some green infrastructure elements, like urban parks and community gardens provide quality places to enhance social life and improve community health and wellbeing.

Principle 4: Green infrastructure planning should secure sustainable support.

To meet the original objectives and provide lasting benefits for communities, long-term management of green infrastructure is indispensable. This requires reliable funding, institutional arrangement, and organizational support from stakeholders and other relevant groups. Reliable funding is a critical issue for both green infrastructure and other types of infrastructure planning. Multiple funding opportunities are needed in order to cover the capital cost of creating and maintaining green infrastructure (Town and Country Planning Association, 2008). Meanwhile, stakeholders and the general public should also be involved in the green infrastructure planning. Their needs can be respected through engagement in the planning process. On one hand, this can bring diverse knowledge to improve the planning; on the other hand, stakeholders' involvement is beneficial to the long-term maintenance of green infrastructure by

creating more community buy-in and understanding (Benedict & McMahon, 2001; North West Green Infrastructure Think Tank, 2008).

The four principles listed above were summarized from GI related research and practices and could be used in small scale and urban context green infrastructure planning practices. In this research, these principles will help guide the analysis of information generated from the key informants interviews and provide partial answers to the research questions in following chapters.

2.3.2 Urban green infrastructure planning process

By reviewing the literature on green infrastructure planning process and methods (Benedict & McMahon, 2006; Jane Heaton Associates, 2005; Kambites, & Owen, 2006; Natural England, 2009; North West Green Infrastructure Think Tank, 2008; Town and Country Planning Association, 2008), a general planning process can be identified and summarized in four steps as follows:

Step 1: Building partnerships. The process of green infrastructure planning can start from setting up the partnerships with existing and potential stakeholders and the general public that are needed to plan and deliver green infrastructure in the projected area. The success of green infrastructure planning depends on continuing input from public, private and voluntary sector partners. (North West Green Infrastructure Think Tank, 2008) This requires the leaders of the planning projects carefully reach out to stakeholders before the planning process begins. Benedict and McMahon (2006) suggest a list of potential participant in a green infrastructure initiative, it contains a broad group of representatives from public sector officials to private individuals, from corporate

landowners to real estate developers, from nonprofit organizations focused on conservation to neighborhood or homeowner associations. Of course, professionals who come from various disciplines such as urban and regional planning, landscape architecture, geography, geology, etc. can't be neglected.

Step 2: Envisioning the future. Building partnerships with the people and organizations that can help support and sustain the green infrastructure initiative is often the first step. Once it has been done, the next step will be creating a vision for the project together with the partners. Normally, any collaborative activity needs vision to make progress. First, envision what to accomplish, and then describe the vision via words and/or pictures (Benedict & McMahon, 2006; Williamson, 2003). Successful green infrastructure planning often takes collaborative approach, and visioning plays an essential role in it. It not only helps to identify what the future should look like, but also helps to identify the steps to reach the goal. Green infrastructure planning, guided by visioning, offers collaborative groups the power to implement. Also, visioning provides collaborative groups in the planning process with an opportunity to reach consensus on values. The most useful tools to assist representative groups in formulating a vision for green infrastructure planning project are a vision statement and vision schematic (Benedict & McMahon, 2006; Natural England, 2009; Williamson, 2003). A vision statement describes the ideal future status of the project in words, but does not include the process or steps to achieve the desired future. A vision schematic is often used to visualize the vision statement and clarify what the vision means for stakeholders of green infrastructure planning.

Step 3: Resource audit and investigation. A collective vision presents directions on where green infrastructure planning should go and what resources can be used. Identification of green infrastructure resources can be achieved through community consultation processes that audit and investigate those existing green spaces and environmental assets that requires maintaining and enhancing (Town and Country Planning Association, 2008). Sometimes, it can be aided by accessing datasets regarding the demographic census, land use, environmental values, and legal information for targeted area for green infrastructure planning (North West Green Infrastructure Think Tank, 2008). In most administrative regions, those data are held by local authorities (e.g. land use data in the municipal planning department), or provincial or national government. Some geographic information is held by non-profitable organizations. For example, Spence Neighbourhood Association and Daniel McIntyre/St. Matthews Community Association both worked with Manitoba Eco-Network to develop neighbourhood green maps by using the geographic data and technology in the GIS (Geographical Information System) centre of Manitoba Eco-Network.

Step 4: Developing a plan. All three aforementioned steps are preparation for green infrastructure plan creation and implementation. At the initial stage, some questions should be answered in order to create local-distinctive green infrastructure plan. These questions are: Where are changes needed, what changes are needed, and by what means are they sought? (North West Green Infrastructure Think Tank, 2008). In order to answer these important questions, the findings of former steps should be reviewed in order to make the plan unique to the area that is being addressed. Answering

these questions also helps inform the implementation process incorporated into the green infrastructure plan.

The plan needs to integrate a vision that reflects consensus values of all parties and goals that prioritize target resources with tasks or steps that must be undertaken to accomplish those goals. When looking at those existing green infrastructure plans that have been developed by various groups or organizations, it is easily found that most plans took the form of implementation or action plan, but not strategic or development plan, which means those green infrastructure plan delineate specific steps or tasks that need to take (Benedict & McMahon, 2001, 2006; Natural England, 2009; North West Green Infrastructure Think Tank, 2008; Williamson, 2003).

To obtain supports from local authorities, “green infrastructure advocates need to fully understand the parameters in which they are working” (Benedict & McMahon, 2006, p.100). It requires green infrastructure planning project teams being familiar with relevant legal requirements relating to the projects, such as zoning by-law, land-use plans, and other environmental regulations.

The GI planning process presented in this section reflects common steps of conducting GI planning in communities. The general process provides a guide on how to conduct GI planning project on community level. However, applying the process in specific urban neighbourhoods requires an adaptation to the local context, respecting the community values and utilizing the existing community assets, especially for those neighbourhoods selected for study in this research.

2.4 Stakeholders' Roles in Green Infrastructure Planning

Green infrastructure planning projects are highly contextualized and may be as diverse as the scales and locations in which they occur. Through reviewing the literature of the GI planning process, a common approach could be found in that most of the successful practices began the planning process by building partnerships with existing and potential GI planning stakeholders (Barton & Jones, 2009; Benedict & McMahon, 2006; North West Green Infrastructure Think Tank, 2008). GI stakeholders normally include directly relevant public or private landowners and land managers, as well as any parties who care about the future community development (Benedict & McMahon, 2006).

At different scales, there may be different groups involved in the GI planning practices. At the community level, GI planning is not a monodrama in which only one party participates. Community organizations, local government and the local residents often play a vital role in green infrastructure planning and implementation. Community initiatives or environmental projects provide opportunities for GI planning (Landscape Institute, 2011). Projects being implemented in communities could be integrated into a larger cause in GI planning and design, through efforts from community organizations, community volunteers and local government (Benedict & McMahon, 2006).

Community organizations, especially neighbourhood development organizations (NDOs) are key players in the partnership of GI planning stakeholders. NDOs represent local neighbourhood interests and encompass a wide range of activities, including development work and non-development service delivery and advocacy (Checkoway, 1985; Mayer, 1984). The role of NDOs in neighbourhood planning may vary between

planning contexts. In the circumstance when GI planning developed from bottom up, the neighbourhood development organizations lead the project of the planning, build connections with other stakeholders and consolidate the efforts to create community green infrastructure. For example, some neighbourhood development organizations in Toronto have collectively engaged in the urban green infrastructure planning, with the assistance from GreenHere, an environmental charity. These NDOs include the Dupont Improvement Group: Improving Neighbourhood (DIG-IN), Carleton Village Residents' Association, Dufferin Grove Park Residents' Association, and Regal Heights Residents' Association. They collaborate with GreenHere, the City of Toronto and local residents in developing GI elements such as park redesign and community reforestation (GreenHere, n.d.).

When the GI planning initiative is government-led, the project could be implemented through a commission appointed by elected leader or other types of collaborative group (Benedict & McMahon, 2006). Local governments (municipalities) are the main public landowners in urban area. They have the authority to regulate the land use within their jurisdictions. Sometimes, municipalities could transfer landownership to neighbourhood non-profit organizations for the sake of empowering neighbourhood stewardship of green (public) space. For example, the City of Chicago has sold city-owned vacant lots for just \$1 to local NDOs for community development purposes including neighbourhood green spaces since 2009 (Sfondeles, 2014).

Regulatory tools for land use, such as zoning, environmental impact regulations and comprehensive plans, are often used by local government for regulating GI planning at the community level (Benedict & McMahon, 2006). The local government also plays a

role in providing GI planning related funding. Municipal tax, development fees and other local taxes and fees as well as tax incentives offered by local government can offer financial supports for GI planning projects (Benedict & McMahon, 2006). The provincial government is also a source of financial support for community development projects including GI planning projects. In the United States, some GI projects, such as Maryland's Program Open Space and the Florida Forever Program have gained support from State funding for land acquisition and conservation in building GI networks⁶. In Canada, provincial governments normally fund community development projects, such as *Neighbourhood Alive!* in Manitoba and *Community Initiatives Program* in Alberta. Green infrastructure provides multiple benefits for communities, which can be considered as a tool to promote community development. Therefore, these community development provincial funding programs are potential sources for community GI planning projects. Apart from financial support, the provincial government is also a green infrastructure related policies provider. For example, *TomorrowNow-Manitoba's Green Plan* has proposed to facilitate the move toward GI through working with communities in identifying GI best practices and through legislative changes to recognize the GI benefits and require further implementations (Manitoba Department of Conservation and Water Stewardship, 2012). Although the provincial policies do not normally regulate community GI planning directly, they have the power to have impacts on the comprehensive plan and other short-range plan-making and implementation in municipalities that can have direct influence on the community GI planning. There are

6 For a detailed description of these two programs, please see Maryland State Department of Natural Resources website <http://www.dnr.state.md.us/land/pos/> and Florida State Department of Environment Protection website http://www.dep.state.fl.us/lands/fl_forever.htm

many opportunities for integrating green infrastructure into community planning, such as providing lands for passive recreation in the park and other green spaces, incorporating GI planning principles into community revitalization and heritage preservation (Benedict & McMahon, 2006).

Local residents or community members are vital groups that foster stewardship during community GI planning and implementation. Stewardship is a reflection of community members continued involvement. Almost all GI planning projects need community members' involvement in different ways, from setting priorities and providing advice on the planning, to volunteering in the maintenance and management of GI assets, regardless of whether it is a community or government-led initiative (Benedict & McMahon, 2006). Sustained community involvement depends on the understanding of green infrastructure and its benefits to community as well as proper planning which are results from successful community education. Workshops, brochures, walking tours can all be used as GI education methods (Benedict & McMahon, 2006).

2.5 Neighbourhood “Green Plans”

Neighbourhood “green plans” reflect community members' desires for quality green spaces and environment-friendly living styles in their neighbourhoods. In this research, the three “green plans” developed by the selected Winnipeg inner-city neighbourhoods compliments their neighbourhoods' five-year community plans, and has provided guidance for many projects that improve the physical space in these neighbourhoods.

2.5.1 Introduction to the “Green Plans”

The following section provides a brief introduction to each of the three “green plans” in terms of plan rationale, plan structure, plan relevant information (including funders for the plans and plan making participants) will be presented before the evaluation to help readers gain a general understanding of those “green plans”.

The process of developing the three green plans all adhere to the community-led approach, which reflects the community values by respecting community members’ wishes and priorities in neighbourhood green spaces and other greening work. The *Spence Green Plan* was developed based on attention to five core issues in the neighbourhood: health, safety, learning, environmental responsibility, social capital and community development. These five areas reflect the community members’ vision of building the neighbourhood “a more secure, stable and cohesive community” (Spence Neighbourhood Association, 2009, p7). The *Spence Green Plan* is comprised of three main parts. The first part is the executive summary and introduction of the whole plan. The second part presents the vision of the neighbourhood as conceived by community members and depicts the background of the plan making, including the neighbourhood context, community planning processes, and a list of green spaces and environmental-friendly elements that need to be developed, maintained and improved. The third part consists of the maintenance schedule for the neighbourhood green spaces and achievement highlights since the *SNA Green Plan* developed in 2002. The *SNA Green Plan* was made by the efforts of SNA staff, a group of volunteers sitting on the Environment and Open Space Committee and various community members who devoted their time and energy to sharing ideas about greening work and volunteering in

implementations. The funding from *Neighbourhood Alive!* Program in the Provincial Housing and Community Development Department and other funders also contributed to make this plan happen.

The *WBCO Green Plan* is the second inner-city neighbourhood “green plan” in Winnipeg, which is similar to the *Spence Green Plan* but has its own distinctions. The *WBCO Green Plan* emphasizes a planning process that was based on an extensive community consultation in the neighbourhood, as well as the importance of green space to the inner-city context, which were reflective benefits identified in the literature review. Compared with the other two green plans (*Spence Green Plan* and *DMSMCA Green Plan*), the *WBCO Green Plan* was developed with a separate literature review document describing the social, economic, environmental and health benefits, how those benefits are relevant to West Broadway Neighbourhood, and what green space can become in the neighbourhood. Therefore, this document not only explained why the neighbourhood needs green spaces, but also how and what green spaces will be fit with the neighbourhood. The *WBCO Green Plan* is comprised of four parts: the executive summary; a brief introduction to the reason and process to draft the plan; five phases to implement the plan; and a summary of results from the community consultation process. Funding for the *WBCO Green Plan* is mainly from the provincial government-*Neighbourhood Alive!* Program, *Manitoba Conservation Sustainable Development Innovation Fund* and federal government-Environmental Youth Corps, which is sponsored collectively by ECO Canada, Environment Canada, Human Resources and Skills Development. The plan making of the *WBCO Green Plan* involved a diversity of people in the neighbourhood representing green spaces user groups.

Compared to the two former “green plans”, the *DMSMCA Green Plan* features a series of actions aiming to reduce greenhouse gas (GHG) emissions. These actions are commitments of the DMSMCA as a participant in Manitoba’s *Community Led Emissions Reduction (CLER)* program. A collective vision for greening Daniel McIntyre and St. Matthews neighbourhoods was made by community members, in two community planning sessions named “ThinkGreen”. The vision listed principles of neighbourhood green planning and goals to help achieve the vision. The need for more public green spaces and the comparatively small amount of green spaces in the neighbourhood underlies the vision, the goals and the plan. The whole *DMSMCA Green Plan* is structured in three components: The first one includes an executive summary, collective vision and the current status of green spaces in the neighbourhood. The second component is a series of actions that were proposed to take on improving neighbourhood greenspaces and to reduce neighbourhood emissions. The last part is about partnership and knowledge resources for the neighbourhood greening project, and a review of the ThinkGreen community planning consultation process. The *DMSMCA Green Plan* was funded jointly by Province of Manitoba *Neighbourhood Alive! Program*, the Program from Housing and Community Development Department and the *Community-Led Emission Reduction* pilot program from Municipal Government Department (previously named Local Government Department). The ThinkGreen plan-making process attracted individuals from local community groups and political representatives, including a city councilor and staff from the local MLA and MP’s office.

2.5.2 Neighbourhood “Green Plans” Evaluation

Evaluation is an intrinsic activity in decision-making processes, including planning (Alexander, 2006). Although planning evaluation is considered a necessary and core issue in a planning process (Khakee, 1998; Oliveira and Pinho, 2010a), the quality of a plan is difficult to determine due to the highly relative and historical characters with other issues, such as capacities, intentions and outcomes (Alexander and Faludi, 1989). According to Baer (1997), few evaluation criteria for general plans have been developed by planning professions, and plan evaluation criteria rely on differentiating plan-making phases. He distinguished several types of plan evaluation based on different stages in the plan-making process, combined with identifying following questions: who conducts the evaluation? When to undertake the evaluation? And what to evaluate?⁷ Similarly, Talen (1996) developed four types of planning evaluation: evaluation prior to plan implementation, including evaluation of alternative plans and analysis of planning documents; evaluation of planning practice, comprising studies of planning behavior and description of the impacts of planning and plans; policy implementation analysis, and evaluation of the implementation of plans. In their article on methodology for planning evaluation, Oliveira and Pinho (2010b) presented three kinds of planning evaluation. The first type involves ex-ante assessment in plan-making phase. The second and the third are in plan implementation phase, with performance and conformance based methodology respectively (Oliveira and Pinho, 2010b). Generally, evaluation of plans can happen into two phases: plan-making phase evaluation and plan implementation and outcome phase evaluation. The role of evaluator can be taken by planning professionals,

⁷ For a review, see Baer's (1997) discussion on stages for plan evaluation

or other researchers, regardless of whether they are in the same organization with plan authors. As Alexander (2006) stated, “the objects of evaluation in planning include neighbourhood, city and regional plans” (p.8) and projects in multiple scales. The contents of plans for evaluation are largely decided by the purpose of plan evaluation, depending on the planning stages. In the plan-making stage, the evaluations include a variety of topics, ranging from planning process to plan discourse to plan alternatives (Baer, 1997; Talen, 1996). For the implementation and outcome stage, the evaluations often emphasize the linkage between the outcomes and the plan objectives in a conformance-based strategy or the function of the plan as guidance for prospect planning decision-making and the importance of planning procedure, which is based on performance methodology (Laurian, Day, Berke, Ericksen, Backhurst, Crawford, & Dixon, 2004; Oliveira and Pinho, 2010b).

The planning evaluation literature aforementioned is about plans without pertaining to certain plan type. However, they can also inform evaluating neighbourhood plans. For the purpose of this research, the researcher intended to examine three neighbourhoods “green plans” to identify factors, including opportunities and challenges that influence inner-city neighbourhood green infrastructure planning. Although those neighbourhoods’ green plans were not developed as green infrastructure plans, they still have potential to provide organizational and institutional opportunities for the green infrastructure planning in those neighbourhoods with the green planning committees. There are limited resources for evaluating a green plan, especially on the basis of green infrastructure planning. A feasible way may be applying an adapted green infrastructure plan evaluation framework to the evaluation of those neighbourhoods’ “green plans”.

McDonald, Allen, Benedict, and O' Conner (2005) developed frameworks of evaluating green infrastructure plans for various planning scales, including regional, local, and site scales. The frameworks were derived from review of several green infrastructure plans by the authors and could provide a reference to be adapted for evaluation of neighbourhood "green plans" in this research.

2.6 Summary

The various literature reviewed in this chapter inform key themes related to green infrastructure and planning, as well as the evaluation of neighbourhood "green plans". The key themes in the literature review also inform the other research methods in this study, the semi-structured interviews and the focus group interview, which will be presented in Chapter 3: Research Methods and Findings. The findings from the literature help to inform and answer in part, the research questions of this study and in making the recommendations for other urban neighbourhoods in Winnipeg, which are provided in both Chapter 4: Addressing the Research Questions and Synthesis and Chapter 5: Conclusions and Recommendations.

CHAPTER 3: RESEARCH METHODS AND FINDINGS

The main methods employed to address the research questions of this project were: a review of key themes of green infrastructure planning and neighbourhood “green plans” evaluation; neighbourhood “green plans” evaluation based on adapted GI plan evaluation framework; semi-structured interviews, as well as a focus group interview aiming to get feedback and reflections about the initial findings. The combination of methods enabled the completion of original empirical research that can expand the range of understanding and contribute to planning practice.

3.1 Literature Review and Implications

The literature review included peer-reviewed journal articles, published books and grey literature (technical reports, governmental documents, community/neighbourhood reports). A review of existing literature is an essential component of this research as it offers a broad context for the research (Bui, 2009). Conducting a comprehensive literature review helps to ensure “integrity and sophistication” in the research (Gray, 2009, p.99).

The main themes explored here include green infrastructure in the urban context; urban green infrastructure benefits; urban green infrastructure planning principles and process; and roles of stakeholders including neighbourhood development organization, the local government and provincial government, and community members in the urban green infrastructure planning. The three selected neighbourhood “green plans” were also introduced and discussed about their evaluation in the literature review to provide a

context for understanding the relations of current “green plans” and green infrastructure plan.

The concept of green infrastructure is a highly contextualized subject understood by people in different grounds from differing perspectives. There is no standard definition of this concept, the understanding of its meaning are largely depending on the circumstances where the concept is used. Even though the components constituting green infrastructure may vary in different settings, such as urban to rural, natural to densely built, common features can be found among those settings, demonstrating the multi-functionality and multi-benefits, which can be considered but have generally not been paid much attention to in traditional green space planning.

Outdoors recreation and the associated health benefits provided to people tend to be emphasized in traditional green space planning. However, green infrastructure planning seems to go beyond the health benefits to embrace a broader set of services relating to social well being and ecological/environmental enhancement, even though the ecological rewards are limited by the often small size of green infrastructure in urban area. However, even the small gardens and mature trees along the streets in urban neighbourhoods can provide suitable and essential habitat for certain birds and insects.

Adopting proper green infrastructure planning principles and effective processes is conducive to the planning practices in an urban context. The key principles presented in the literature review chapter (see section 2.3) need to be understood by stakeholders, especially city planners and local government policy makers. The principles can act as guidance partially contributing to sustainable community design practice when taking urban green infrastructure into consideration.

It should be noted that the key principles and planning processes need to be adapted to the particular social, political, environmental, and economic circumstances where they are being applied. This is consistent with one of the key principles documented in the key themes in the literature chapter: Green infrastructure should reflect local context (see section 2.3.1). In an urban neighbourhood context, green infrastructure planning can arise from priorities of promoting higher quality and more accessible green spaces and demands for healthy living styles (Daniel McIntyre/ St. Matthews Community Association, 2010; Spence Neighbourhood Association, 2009; West Broadway Community Organization, 2009).

Neighbourhood development organizations (NDOs) often engage in different activities in specific neighbourhood planning work depending on planning systems in different jurisdictions. This contributes to different roles that NDOs assume and powers that they can use to influence planning process. Given the fact that civil society theory has advocated polycentric practices in new governance and no fully empowered NDOs in the neighbourhood planning, active involvement from other stakeholders of neighbourhood planning are vital to the success. The partnership of stakeholders does also apply to the urban green infrastructure planning that is part of neighbourhood planning practice in many jurisdictions.

The question of how to evaluate a green infrastructure plan is and should be part of neighbourhood plan evaluation. Studies about evaluating general plans provide few evaluation criteria, which reflect the character of distinct plan-making stages (Baer, 1997). Also, a lot of issues contribute to the evaluation work (Baer, 1997; Alexander and Faludi, 1989). Therefore, no universal standard could be properly used to assess general

plans, not to mention a specific type of plan, e.g. a green plan or a green infrastructure plan. However, when talking about a specific neighbourhood green plan evaluation, such as the one in each selected neighbourhood in this study, the evaluation criteria could be adapted from existing literature and meanwhile taking consideration of other influential factors in those neighbourhood context, such as the intentions to develop those “green plans”, the capacities of those neighbourhood development organizations and achievement made by those “green plans” (Alexander and Faludi, 1989).

The research questions addressed in this thesis are within three themes as follows:

1. Concerning green infrastructure:

1a. What does green infrastructure mean in the urban context?

1b. What are its benefits?

1c. What are the principles of and process for green infrastructure planning?

1d. How does this concept relate to those selected neighbourhoods in this research?

2. Learning from the neighbourhood “green plans”:

2a. What lessons can be drawn from the three selected Winnipeg neighbourhood “green plans” regarding inner-city neighbourhood green infrastructure planning?

3. GI opportunities, challenges and neighbourhood organizations:

- 3a. How can the concept of urban green infrastructure be articulated and integrated with neighbourhood green plans?*
- 3b. What opportunities and challenges affect the degree to which urban green infrastructure can be incorporated into the neighbourhood green plans?*
- 3c. What is the role of neighbourhood development organizations in the process?*

The literature review on green infrastructure and planning helped to partly answer the questions in the first theme. The discussion about stakeholders' roles in GI planning informed the selection of semi-structured interviewee groups and the research findings categorization, helped to answer the questions in the first and third theme. The feedback from the focus group also provides answers to questions in the first and third themes. The review about the neighbourhood "green plans" evaluation guided the evaluating aspects of the three Winnipeg inner-city neighbourhood "green plans" and drew lessons from the results of the evaluation, which provided answers to the second research theme.

3.2 Neighbourhood "Green Plans" Evaluation

Preparing an evaluation of the three "green plans" is part of the research method of this study. The goal of doing this is to identify what factors may have an influence on the work that green infrastructure is integrated in the existing "green plans". To achieve this goal, these "green plans" need to be examined by an adapted "green infrastructure plan evaluation frameworks", which were adapted and derived from previous research and implementation on green infrastructure plan evaluation. McDonald et al. (2005)

claimed that certain elements exist in different green infrastructure plans, which could be selected as criteria for the evaluation work. In this research, the evaluation frameworks developed by McDonald et al. (2005), were adapted by the researcher to use in evaluating the “green plans”.

3.2.1 “Green Plans” evaluation framework

The evaluation of the three “green plans” is based on an adapted green infrastructure plan evaluation frameworks, which provides four plan elements: Goal Setting, Analysis, Synthesis, and Implementation (McDonald *et al.*, 2005). Each plan element contains several criteria that represent the purpose of the element and were chosen in consideration of plan-making background.

Goal Setting. Three criteria are selected to elaborate this element: Plan foundation, stakeholder involvement, and vision statement. Plan foundation provides information about the reason of the plan was made and elements to compose the plan. Stakeholder involvement reveals participation of actors who influence or are influenced by the plan. Vision statement identifies the community values, assets, and concerns about the green infrastructure.

A specific section of articulating the reason to develop such “green plans” can be found in each plan, and they all provided detailed information about the needs by the neighborhoods to have a “green plan” to direct their green space planning and greening projects implementations. The *Spence Green Plan* did an exceptional job in the goal setting by listing goals to be achieved in the next 5 years, which not only set up the target

for the planning and implementation work, but also provided a basis to review the accomplishments (Spence Neighbourhood Association, 2009).

Stakeholders played a key role in creating all of the “green plans” being examined. All three “green plans” were developed through extensive public consultation processes in the neighbourhoods. Besides neighbourhood residents and local businesses, various groups ranging from environmental groups, religious groups to local services institutions, such as daycares, neighbourhood centres and so on were invited to be involved in the “green plans” developing process. Although levels of governments were identified as crucial partners for neighbourhood greening projects, involvement of different levels of governments were very rare in the plan development stage. Especially for the municipal government who was one of the most important levels of government to interact with around green issues, the interaction was only limited to specific projects. Perhaps stronger partnership with three level of government, especially the city government in future urban green infrastructure is necessary in order to facilitate the GI plan formation and implementation.

A clear vision statement was expressed in both the *Spence Green Plan* and the *DMSMCA Green Plan* indicating an overall image that community members want to see in the neighbourhoods. Although both “green plans” emphasize on the importance of accessing neighbourhood green spaces, other aspects of social life of the neighbourhoods, such as local business, youth education are also highly valued in the vision statements as community members would like to see a more resilient and sustainable community (Daniel McIntyre/ St. Matthews Community Association, 2010; Spence Neighbourhood Association, 2009). Even though the *West Broadway Green Plan*

has an “Overall Vision for West Broadway” part, it was too specific to greening project and did not provide a whole view of green infrastructure and the relevant elements in the neighbourhood both in a mid-term or long-term range.

Analysis. For a strict green infrastructure plan, the section of analysis is meant to assess the design of green infrastructure network with criteria of network design criteria, and network suitability analysis (McDonald et al., 2005). In the current research, the “analysis” element was adapted to use different criteria in evaluating the neighbourhood “green plans” considering the physical network is not feasible in the urban neighbourhood context of this study. Connectivity is “an overriding characteristic of green infrastructure” and can be interpreted in different aspects (Kambites & Owen, 2006, p.490). First, connectivity is reflected in the spatial aspect. It is difficult to link separated green spaces to form a physical network in those dense neighbourhoods. However, by utilizing or converting the existing streets as active transportation routes, and enabling active transportation users to share roads with automobiles, the connectivity of different green spaces can be improved with the arrangement. The three “green plans” each talked about the development of active transportation routes or facilities as part of the neighbourhoods greening projects. Those active transportation paths together with pedestrian connections and mature trees along the residential streets constitute examples of “connective tissue” that can help link those separated greenspaces at the urban neighbourhood scale (Baker, Mahé, Wiseman, & van Vliet, 2009). Currently, active transportation planning for those neighbourhoods is either at the conceptual stage or taking the form of individual safety promotion projects. No obvious statement could be found of intentions to use the active transportation corridors to directly interconnect

neighbourhood greenspaces, which need to be improved in future green infrastructure planning. Secondly, connectivity is also referred to as social connection, including a high level of cooperation between stakeholders and multiple benefits for various users. Stakeholders ranging from community members, local businesses, to levels of governments and environmental organizations were identified in the “green plans”. Perhaps exploring effective methods to achieve stronger partnerships between stakeholders for higher level of cooperation/collaboration is an issue that required to be addressed during the neighbourhood green infrastructure planning. Greening projects proposed in the current “green plans” have addressed many neighbourhood concerns and desires, which provide potential for multiple benefits to different user groups. More programs designed for green spaces can be used to enhance the potential of green infrastructure planning.

Synthesis. The synthesis stage of green infrastructure plan evaluation is intended to prepare the plan for further implementation. Therefore examining the available resources combined with the results of the “Analysis” section is necessary to move plan forward to project implementation. Two criteria are selected for evaluation in this stage: Identifying priorities and relationship to plan goals. Specific implementation priorities evaluate the lands classification for green infrastructure, and relationship to plan goals examine whether the final implementation priorities meet the goals of the plan.

Urban lands in populated areas are quite contested as a result of growth. Limited land provision often results to competing interests between housing development and greening projects. When talking about the land use options for green infrastructure planning in urban area, a key factor not to be neglected is land availability. Without

sustained land provision, green infrastructure will literally lose its ground. However, it is a challenge to have plenty of lands for green infrastructure planning in dense and populated urban neighbourhoods. For the selected neighbourhoods in this study, most of the green spaces (including pocket parks and community gardens) are built on public lands owned by the City of Winnipeg. As the community organizations have no jurisdiction for those lands, any project to occur on these lands needs to obtain approval and support from the municipal government. For the public lands, green infrastructure planning needs support from the City in terms of sustained land provision policy and other relevant benefits. For some private lands, or some property owned by a community organization, which are often vacant residential lots, green infrastructure planning requires a close collaboration between community organizations and the landowner to ensure the lands can be used for green infrastructure for the long term.

As with all types of green infrastructure plans, the identified priorities should meet the goals set by the plan. The greening projects that are prioritized by community consultation processes and documented by “green plans” all reflect the community goals in building a neighbourhood that includes well maintained green spaces and healthy and safe recreational sites that can be enjoyed by community members. In future green infrastructure planning, the priorities of implementation need to be tailored to the new aims and goals. For example, one of the green infrastructure planning principles is that green infrastructure planning benefits are affordable to both nature and people. Due to the small size of greenspaces in those inner-city neighbourhoods, creative strategies and methods should be developed to achieve the goal.

Implementation. Plan implementation elements evaluate how green infrastructure plan goals can be achieved by employing implementation tools and funding resources. Two criteria were selected in the evaluation stage: Implementation tools and funding resources.

Implementation tools evaluate “the documentation and assessment of potential conservation tools that can be used to protect lands within the green infrastructure network” (McDonald *et al.*, 2005, p.14). It may include policies and programs that can be used to promote green infrastructure. Although there is no thorough tool list in those “green plans”, certain tools have been adopted by the community organizations in implementing the plan. For example, the Community Economic Development principles are practiced by recruiting local youth and volunteers to maintain green spaces, and by training local residents to develop environmental-friendly skills, in all the selected inner-city neighbourhoods considered in this research.

Sustained funding is crucial to realizing the vision of a green infrastructure plan. The three neighbourhood “green plans” development largely depended on the funding from provincial government (e.g. *Neighbourhood Alive!* Program). Some of the greening projects implemented were also funded in part by the City of Winnipeg and environmental groups, such as Evergreen Canada and the Manitoba Eco-Network. A list of viable funding programs is a necessary part of a green infrastructure plan, documenting federal, provincial, municipal and private funding sources. Descriptions of the available funding opportunities should also be included in the use for future references when applying for specific funding sources.

3.3 Semi-structured Interview and Findings

This section reports on the results of the semi-structured interview regarding questions, as listed in the interview guide (Appendix B). According to Gray (2009), semi-structured interviews are useful for qualitative analysis, using non-standard formats to probe questions where “it is desirable to have respondents to expand on their answers” (p.373). A semi-structured interview format will allow the order of questions vary to fit the flow of the interview, depending on the direction taken by the respondents. There is potential to gain valuable and insightful qualitative information, though this could result in non-standardized data. The interviews were conducted with stakeholders involved in greening projects in the selected Winnipeg inner-city neighbourhoods (see Table 1) to produce unique information and address gaps found through the literature review and “green plans” evaluation. Specifically, interview questions related to perceptions and views from different stakeholders on the investigated neighbourhood green planning projects, and potential neighbourhood green infrastructure. The questions were designed to solicit responses from four main stakeholder groups: neighbourhood development organizations, municipal government, provincial government, and local residents and businesses.

Table 1. Key informants and associated roles

Key Informant	Role
Spence Neighbourhood Association	Develops green plan and promotes neighbourhood green space planning
West Broadway Development Corporation	Develops green plan and promotes neighbourhood green space planning
Daniel McIntyre/St. Matthews Community Association	Develops green plan and promotes neighbourhood green space planning
City of Winnipeg	Administers strategic plans and policies, conducts land use by-laws regarding neighbourhood green space planning
Province of Manitoba Neighbourhoods Alive! Program	Sponsors green plans and greening projects
Local Residents and Business Owners	Neighbourhood green infrastructure users

The interview responses were grouped into the following main themes: Benefits to community, community involvement, stakeholders' roles, and factors influencing green infrastructure planning. Each main theme contains several sub-categories to further articulate the findings.

3.3.1 Benefits to community

A wide range of the benefits attributable to greening projects implemented in the selected neighbourhoods were recognized by interviewees, including social interaction and cohesion, community beautification and environmental protection. Challenges that hinder such benefits were also identified during the interviews.

Social interaction and cohesion. Social benefits are widely documented in the green infrastructure planning literature (see section 2.2). All neighbourhood members interviewed expressed their satisfaction with more tight community connection by

engaging neighbourhood greening projects.

“I think they (greening projects) benefitted me in that it’s a really good way to connect with other community members, so there are people on my block who I now know and I see and can stop to chat with them that I wouldn’t to know otherwise.” – Local Resident

“...I know there are lots of benefits in the neighbourhood. But for me, it’s especially the social connections that I already made and learning...” – Local Resident

“It (engaging in greening projects) gets people together, out of their house, and promotes community safety. I enjoy gardening there. So the community connection and doing the gardening in such an urban area have benefitted me in the neighbourhood.” – Local Resident

Community beautification and environmental protection. As part of the goals of community revitalization efforts, promoting community beautification and environmental protection is an effective way to build sense of pride of community members. The SNA Environment and Open Spaces Committee was even named as Image and Greening Committee when it started up.

“The nicer the parks are, the more enjoyable that everyone is, and the better sense of feeling you have pride of your community.” – Local Resident

Also, the positive changes to the neighbourhood image and the environment brought by the neighbourhood greening projects could also help change their preconceived notions about Winnipeg inner-city neighbourhoods:

“We do need promotion of our gardens in inner city to outside who only heard stories about horrible things. We need to bring them here and build connections.” – Neighbourhood Development Organization Staff Person

The community-driven neighbourhood beautification and environmental protection projects can also provide benefit to local business. For example, a local resident and business owner made the following comments in the interview:

“I would say that having those green spaces look nice help the business community as well because it makes properties become valuable, and it gives nice space for employees to go and eat lunch outside, makes their production get done better. ”

Challenges. A couple of challenges have been identified from interviews. One of them is related to the size of green spaces that are being managed in those neighbourhoods. Whatever pocket parks, tot lots, and community gardens there are in these neighbourhoods, they are all small in size (less than one acre). From an ecological perspective, the benefits may not be as significant as other large size of green spaces, which was also reinforced by the literature review (see section 3.1).

“I am afraid the ecological benefits of those green spaces [in the neighbourhoods] are limited, because they are too small, but they do carry somewhat [ecological] benefits even if we couldn't see them.” – Local Resident

“It's the larger greenspace that I found more [ecologically] valuable in this neighbourhood. The small community gardens are pretty, but they just don't provide that much benefit. – Local Resident

To envision the future green infrastructure planning in those inner-city neighbourhoods, the intrinsically ecological benefits should not be neglected even though adverse conditions apply. Strategic measures should be considered when facing the reality that habitats are in the risk of human activities in urbanized area and established built environment.

The other challenge to hinder the benefits brought to the community was about the types of green spaces in the neighbourhoods. Those inner-city neighbourhoods hold a very high interest in building community gardens as a type of green space that can provide both fresh foods and venue for physical activities. However, compared with

other types of green spaces such as parks, community gardens provide benefits to gardeners directly, and only to the public in indirect way. It is obvious that not all green spaces users are gardeners. Even those who expressed interest in gardening, they may not practice gardening in community gardens if they have a backyard garden.

“A lot of people have their own backyards, and they see value of their community gardens, but they didn’t use the community gardens.” – Local Resident

From the perspective of the City, the creation of community gardens is relevant to the idea of public place or public realm. The gardening projects in the selected inner-city neighbourhoods have been part of public life and community urban greening movement due to the move-in of immigrants who came from a tradition of growing their own foods. Unlike pocket parks that can serve broader group of neighbourhood members for their recreation needs, community gardens seem to only serve the needs of the user-gardeners. Especially to avoid overuse or vandalism, protection instruments are often used, such as fences, signs, gates and locks. These things are considered as creating limited accessibility and uninviting atmosphere by some people, which is uncommon in public spaces. Therefore, the City of Winnipeg is cautious about working with neighbourhood development organizations to create community gardens. A municipal planner explained the reason in the interview:

“Any people can go on it (community garden), but certain people apparently have more rights than others, because they pay the fees and have the garden spots...The City always has to be careful in that we are not creating scenarios where some one might construe that we are making exclusive use.”
– A Planner in the City of Winnipeg

3.3.2 Community involvement.

The approach taken to perform greening projects can vary from process to process in community revitalization. Yet, community involvement is an element that is an unquestionable element of all greening efforts in the inner-city neighbourhoods studied. Local residents are recognized as experts with regards to the needs and conditions of their neighbourhoods. They are the most important stakeholders of neighbourhood greening projects, and their willingness to engage and commit to the greening efforts determines the likelihood for success.

Community-led approach. All neighbourhood development organizations studied in this research are practicing Community Economic Development (CED) principles⁸, which requires local decision-making, including local ownership and control, grassroots involvement and people working together to meet community needs (Neechi Foods Worker Co-op, n.d.). Reflecting on the greening projects, a community-led approach was adopted by neighbourhood development organizations to guide the community revitalization efforts. Through the community-led approach, community values are reflected from onset of the consultation process of developing neighbourhood “green plans” to the greening project implementation and management.

“...Community values come from the community consultation ... All of the greening project ideas were brought up by people through discussion with community members.” – Neighbourhood Development Organization Staff Person

⁸ The Neechi CED principles are also adopted by the Province of Manitoba as the CED framework and are recommended in Manitoba.

“We have brought community input into the development of green spaces, so I think that is a reflection of value of the community.” – Neighbourhood Development Organization Staff Person

“I think just from the very simple fact that the community actually came up with the projects themselves.... We have a residents-led committee that we work with, and they make sure our work is on track.” – Neighbourhood Development Organization Staff Person

The community-led approach is also supported by the provincial government *Neighbourhood Alive!* program through providing resources to those neighbourhood organizations to plan and coordinate neighbourhood revitalization work.

“We take a community-led model that aid the neighborhood to action on their priorities” – Province of Manitoba *Neighbourhood Alive! Program* Staff Person

Furthermore, such a bottom-up approach helps to smooth the process of implementation and reduce the risk of failure by lacking community buy-in.

“...so the greening projects were supported [by community members] because they were identified by the neighbourhoods. I think that is the best way to mitigate some of the problems that could happen.” – Neighbourhood Development Organization Staff Person

Involvement types — how do community members support the project?

Community involvement in greening projects took different forms in those neighbourhoods. Interview responses indicated that support from local residents had started at the beginning of “green plans” and with the greening projects consultation processes (see Figure 7).

“I think initial support would be through the community consultations– Neighbourhood Development Organization Staff Person

“When we did consultations on our green plan development, we had always heard from the residents that community gardens are important green spaces.” – Neighbourhood Development Organization Staff Person

“I think the supports started from the beginning... People actually generated the list of ideas. From small things like community gardens to big ideas like geothermal, people voted to express their ideas that what they want to see happening in the neighbourhoods.” – Neighbourhood Development Organization Staff Person



Figure 7. Community members at an open house event, reviewing concepts for Jacob Penner park redevelopment and discussing with a representative from the neighbourhood development organization

Volunteering is another great part of involvement types of community members, from sitting in the neighbourhood organization committees to facilitating and implementing relevant projects, from contributing labour to neighbourhood clean up, tree banding and other maintenance work, to attending workshops and sharing green work knowledge and skills (see Figure 8).

“We get a lot of volunteers from residents on helping planting, helping tree banding, and helping cleaning the neighbourhood, and picking up trash along river bank.” – Neighbourhood Development Organization Staff Person

“The support was shown by having people come out, participate in workshops, or in the projects that we do.” – Neighbourhood Development Organization Staff Person



Figure 8. Community members volunteered in tree banding to protect neighbourhood elm trees

Challenges. Major challenges to community involvement were found from interviews with stakeholders. One of them was coming from the demographic character of those neighbourhoods: high residential mobility. Situated in the city’s major revitalization area, those neighbourhoods are known to have a high residential turnover rate, which is related to high percentage of rental units. For example, in West Broadway neighbourhood, 92.8% dwelling tenure are rental (City of Winnipeg, 2006). In addition, the typical dwelling units in the four inner-city neighbourhoods have an average of 1.9 bedrooms, while families in the four neighbourhoods have on average 3.0 persons per family (City of Winnipeg, 2006)⁹. Apparently, the high percentage of rental units and discrepancy between dwelling unit size and the family size together contribute to the

⁹ The average of dwelling unit size and family size are calculated based on 2006 census City of Winnipeg Neighbourhood Profile

transient character of those neighbourhoods. The transiency of neighbourhood residents causes difficulties to foster identity and ownership of greening projects, and in turn hinder people's involvement in them. A former neighbourhood organization staff elaborated:

“I think the neighbourhood residents who were hard to engage for the green projects are those who lived in the neighbourhoods and were very struggling...Those people were too transient, and had too many things to handle in their life. This caused problems of involvement in our greening work. ”

The other challenge is about effective communication between neighbourhood development organizations and community members. Effective and efficient communication is crucial to promote mutual understanding and engagement. Due to levels of poverty above the city average in those inner-city neighbourhoods, access to Internet is not affordable for a large portion of families. Email that is a common communication media in many people's daily life is not convenient for some people who live in those neighbourhoods. Although neighbourhood development organizations such as SNA and DMSMCA has developed monthly newsletters to inform neighbourhood residents of neighbourhood events and projects updates, these newsletters are only delivered to homeowners or people who have mailbox. Those who live in apartment buildings sometimes couldn't get the newsletters because of limited access to their mailboxes by deliverers; Moreover, some workshops held by neighbourhood development organizations were scheduled on weekdays due to lacking of staff assistance, so they attract fewer people to attend as the time was not convenient. One neighborhood resident made similar observation during the interview:

“You know I could access the Internet in my apartment, and the only way I can get in touch with is newsletter. However, sometimes I didn’t receive it, and I have to walk to [neighbourhood organization] office to pick up... One day I found there was a workshop, but wait a minute, it was on Thursday and I was not sure I could catch it.” Neighborhood resident

3.3.3 Stakeholders’ roles.

Questions related to roles of stakeholders of current greening projects and future green infrastructure planning were asked to pre-identified stakeholders in the interviews. Their responses were summarized into following sub-categories:

Neighbourhood organizations’ role. Neighbourhood organizations are major “green plans” developers and greening projects performers. In the future green infrastructure planning, they may act as major planning process facilitators and green infrastructure plan implementation collaborators. Undertaking proper roles in those tasks could help those organizations better understand the neighbourhood planning process, their rights and responsibilities and their relationship with other planning partners. In the current neighbourhood “green plans” and greening projects structure frame, roles of inner-city neighbourhood development organizations are similar to the ones described by Checkoway (1984), Rohe and Gates (1985) that neighbourhood development organizations (NDOs) could produce their own plans and monitor the plan implementation. Based on the current structure frame, the roles of neighbourhood development organizations are acting as liaisons and advocates between community members and relevant stakeholders, including levels of government, local businesses and other community groups. They are also environmental educators on the community level to foster people’s more sustainable behaviours. For the role of liaison and advocate, most neighbourhood resident interviewees expressed their satisfaction with the work had

been done. Through the “greening committees” made up of volunteering local residents in those neighbourhoods, neighbourhood development organizations build bridges between citizens and government to communicate and channel information about policies about neighbourhood greening work. They advocate for the aspirations of local residents for sustained green spaces and community gardens to the government. Regarding the role of neighbourhood development organizations, some local residents made such comments in the interview:

“They are instrumental in driving the projects that are happening. I think they are doing as good jobs as they can.”

“So the biggest role of the organization is to be open enough in every way to consult and know what the neighbourhood wants for the greening projects.”

“We need the neighbourhood organization to make that bridge between community members and the City to make sure our voices are heard and they are doing right.”



Figure 9. Environment and Open Spaces Committee (“greening committee”) meeting in a community garden (SNA)

When envisioning the role of neighbourhood development organizations in future neighbourhood green infrastructure planning, people have different ideas. Some local resident interviewees think the NDOs can take leading role in the planning process, with support from local government:

“I think the neighbourhood associations are right people to be involved in the process, they may even be the right people to lead the process, but they won’t be able to do that with more support from the City.”

“For some projects, the community organizations can take a leading role in it. For some, they really need the City’s close involvement.”

Others think the neighbourhood development organizations should undertake the role of facilitators and work together to facilitate green infrastructure planning, as the municipal government has the jurisdictions on land use, and the green infrastructure planning should across neighbourhood boundaries to get more achievement.

“I think part of the role of neighbourhood organizations could be more managing expectations... For those complex projects, for example building natural stormwater management system in the neighbourhood, the City should make sure it keeps working. I think it might be meeting the City first, just find out what some of those jurisdictions might be.” – Local Resident, Former Neighbourhood Development Organization Staff

“Definitely the three inner-city neighbourhood associations need to work together on the green infrastructure [planning]. Somehow lines of communication need to be established.” – Local Resident

No matter what kind of roles the neighbourhood development organizations will play in green infrastructure planning, one thing is certain: neighbourhood development organizations need strong support from community members. A neighbourhood development organization staff person stated:

“...We are capable working with different projects, and that is because we come from what the residents want, and where in some ways going to what

the residents want and connect them on behalf of the residents. Yes we play an important role, but that is because the community members set priorities and move us forward, and working with community members and volunteers are also pleasant. ”

Community members’ role. The basic role of community members in future neighbourhood green infrastructure planning is setting priorities of greening work through engaging the consultation process. The community-led approach still needs to follow in the GI planning process by providing channels for community members to express their ideas about what the neighbourhoods can be by green infrastructure planning. A community member elaborated on this with the following statement:

“I think their (community members) role is to be involved in consultations, and share their ideas about what they are looking for in terms of green infrastructure..... I think that’s the City’s responsibility to ask people what they want to see. Once it is done, it is individual people’s responsibility to respond as possible as they can, and involve as much as they can. I think it is neighbourhood associations’ job to involve and help to facilitate that.”

Another role for community members is to contribute their environmental and greening knowledge to the neighbourhoods and share with others. This is compatible with one of the neighbourhood development organization’s role in environmental educator.

“We got many talented community members who would like to share their knowledge. This has helped us a lot for the environmental knowledge proliferation.” - Neighbourhood Development Organization Staff Person

Levels of governments’ role. Government is an essential part of any kind of neighbourhood planning process. They are the only party that has the power of land use jurisdictions and planning regulations. Depending on the planning system, municipal

government and provincial government function differently in the green infrastructure planning.

Municipal government role. According to the *City of Winnipeg Charter Act* (2002), the City has the planning authority of making and adopting the development plan, which is the city's top statutory planning document. Under this system, other lower level planning documents, including neighbourhood plans must comply with the directions of the City's development plan. Therefore, the basic role for the City of Winnipeg in neighbourhood green infrastructure planning is to set directions for GI planning to ensure it complies with the City's development plan, which is known as *Our Winnipeg* (City of Winnipeg Planning and Development Department, 2011).

The management of neighbourhood planning process differ in various planning systems, so no standardized process fits all planning situations, as each neighbourhood is unique (Province of Manitoba and City of Winnipeg, 2002). In Winnipeg the management of neighbourhood planning process is unclear: According to the neighbourhood plan guide, the management role seems to be on neighbourhood development organizations, but in actual planning process, e.g. Corydon-Osborne Neighbourhood Plan, the management role was undertaken by the City by contracting a consultant in charge of facilitating the process. From perspective of neighbourhood development organizations and local residents, the City could do more to support neighbourhood GI planning, such as providing funding, expertise, and capacity building resources and GI related educational information through different media. Also the City

is the main planner and provider of both traditional grey infrastructure and green infrastructure.

“The City has more resources, and they could do more. However, as neighbourhood organizations are drivers of community, the City should support these organizations from ways of funding, capacity buildings and expertise.” – Neighbourhood Development Organization Staff Person

“It’s quite huge, and a lot of things should be on them, obviously on the financial. The municipal government should fund what we are doing to make our neighbourhood great. They are also regulators of what we [are] allowed to do and not allowed to do.” – Local Resident and Business Owner

“The City has a big role in providing funding and planning. Be actually a leader and providing vision, and supporting the community by actually planning things” – Neighbourhood Development Organization Staff Person

Provincial government role. The Province of Manitoba supports community development through programs initiated by various departments. Among those programs, *Neighbourhoods Alive!* is a key one that supports urban neighbourhood revitalization efforts. *Neighbourhoods Alive!* is a long-term, community-driven, social and economic development strategy initiated by Provincial Housing and Community Development Department. Since being established in 2000, *Neighbourhoods Alive!* has helped thirteen designated neighbourhoods in Winnipeg, including the neighbourhoods in this research by providing them with financial support and planning resources. Based on the community-led model, *Neighbourhoods Alive!* has funded priorities identified by community members in these inner-city neighbourhoods. If neighbourhood members identified the greening work as priority, NDOs could make proposals for *Neighbourhoods Alive!* funding. Through programs under *Neighbourhoods Alive!* such as Neighbourhood Development Assistance (NDA), Neighbourhood Renewal Fund (NRF), and Community Initiatives (CI), SNA, WBCO and DMSMCA could hire people

working as greening coordinators, make “green plans” and implement greening projects and programs in their respective communities.

“We support communities through pilot funding. So if you live in a community where the priority has been named in greening or active transportation, we would like to see the funding application. The project could be in a plan, or it could be just a project idea. But it has to tie into this neighbourhood focus... We fund the development of green plan and greening activities matching the green plan.”- Province of Manitoba Neighbourhood Alive! Program Staff Person

As a long-term community revitalization rehabilitation project, green infrastructure planning need sustained financial and planning aid from the provincial government. Since most of sub-programs in *Neighbourhoods Alive!* provide temporarily project-based funding support except for NDA which is core operational funding for Neighbourhood Renewal Corporations (NRCs)¹⁰, neighbourhood development organizations need to look for more sustained funding opportunities to complement future GI planning.

“We typically are not the only funders for NRCs, and we are project funders. If people look at long term green initiatives, then it is a matter of dedicating staff or volunteers looking for funding from other sources, writing application proposals and doing monitoring.”- Province of Manitoba Neighbourhood Alive! Program Staff Person

3.3.4 Other factors influencing GI planning.

Apart from the aforementioned findings, interviewees also indicated the following factors that influence future GI planning in Winnipeg inner-city neighbourhoods: Constrained funding opportunities, competing interests between

¹⁰ Neighbourhood Renewal Corporations (NCRs) is formal term used in *Neighbourhoods Alive!* program referring to neighbourhood development organizations that are supported by *Neighbourhoods Alive!* program.

greening and housing, programming development in green spaces, and understanding and acceptance of green infrastructure concept.

Constraint funding opportunities. Funding is a key resource for community development. Sufficient and sustained funding is crucial for the success of neighbourhood green infrastructure planning and maintenance. The neighbourhood development organizations are largely depending on project-based funding sources for the current greening work. However, this may undermine the long-term efforts to maintain neighbourhood green spaces, especially for future neighbourhood green infrastructure planning.

“I think the big issue is it’s easier to find initial funding for projects, but it’s harder to find funding for on-going projects. I think it is really short-sighted on the funders part, because when you get community involved, their interested and engaged, then you have to let it drop as you don’t have any more funding for it.... We could probably have done more if we have funding.” – Neighbourhood Development Organization Staff Person

“Funders are always want to see something new and exciting, even though you could demonstrate very well the successful ongoing projects, or getting more people to involve in it, they still don’t fund it, because it is not new.” – Neighbourhood Development Organization Staff Person

Competing interests between greening and housing. As they are situated in the inner-city area, these neighbourhoods are highly contested. A struggling effort to strike a balance between housing development and green space planning has been made by both neighbourhood development organizations and municipal government. The issue is complicated by the fact that some vacant lots are in private ownership. Without better conflict solution strategies, green infrastructure planning is in the risk of losing ground. Some new trials have been made to reconcile the two demands by integrating housing with greening in the same project. For example, in collaboration with the Westminster

Housing Society, a non-profitable social housing developer, the West Broadway Community Organization built a four-unit block of affordable housing on a site having an accessible garden, which is on Langside Street, Winnipeg (see Figure 10).

“There are lots of things needed to be done. The lands are limited, and we have many community members needing affordable housing. The balance between housing and greening should be managed.”- Local Resident

“We have a lot of issues that need to be taken in our neighbourhood, like housing, affordable housing. Can green infrastructure take priority above that? No. ” – Neighbourhood Development Organization Staff Person

“The City can only control the public lands, and efforts have made to provide affordable housing and green spaces. The issue is complicated, and the City respects what the local residents desire.” – Planner in the City of Winnipeg

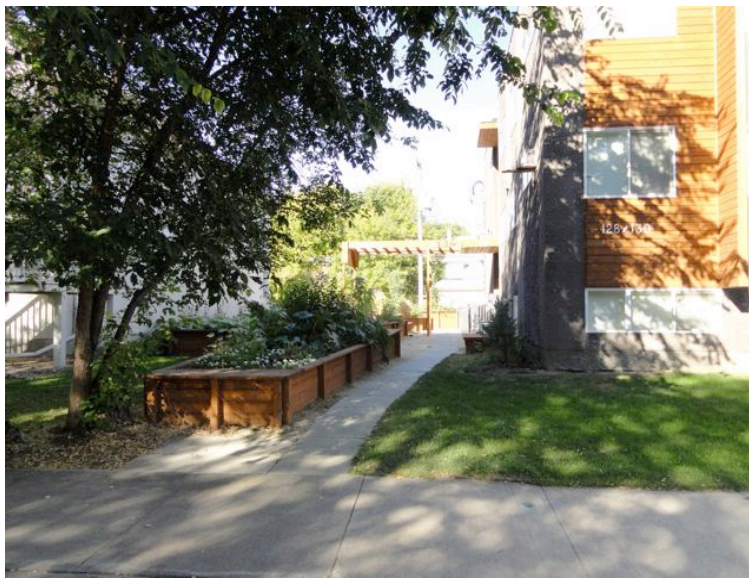


Figure 10. Hinsta House: a four-unit affordable housing project integrated with an accessible garden on Langside Street, Winnipeg

Program development in neighbourhood green spaces. Programs for physical and social activities in neighbourhood green spaces, including parks, tot lots, community gardens are highly demanded by community members, especially for children and older adults. Developing more programming could attract more people to use the green spaces

and more attention to those neighbourhood assets, which leads to be more involved in the green infrastructure planning work.

“I think it is really important to have funding for people to do maintenance in the green space and providing programming for the green space. That is conducive to bringing new people to the green spaces and involve more in the GI planning process.” - Local Resident

“I think what we have is basically what we are going to be left with if everything remains the place. So the only improvement I see would be more programming within this (green) infrastructure that exists and that we have created.” - Local Resident

Understanding and acceptance of the GI concept by stakeholders. Buy-in of GI by both community members and local authorities are vital to the relevant planning. Even the GI concept is more widely used by professionals in promoting community health and well being, it is still a new idea for many community members to understand what it refers to. Compared to traditional green space, the concept “GI” may sound like jargon, which many people are unfamiliar with.

“I think it might tend to alienate people who are used to talking about green space, because infrastructure sounds more like jargon. I would hesitate in the community meeting when we talk about green plan to refer to collectively all our green in our neighbourhood as green infrastructure, because people may don’t understand when I use jargon.” - Local Resident

The understanding of the value of GI to urban life is extremely important for local authorities. Municipal government plays a significant role in providing policy and resources support to neighbourhood green infrastructure planning. Fortunately, politicians in the City have realized how green infrastructure can provide multiple benefits to our communities. The City’s proposed 2014 preliminary capital budget called for up to \$1 million allocated to reforestation, and Mayor Sam Katz has acknowledged

trees as part of city's green infrastructure, providing environmental, economic and social benefits to our communities. (City of Winnipeg, 2013)

3.4 Focus Group Interview: Feedback and Reflections

Group interviews reduce the costs of research while increasing the response rate of inquiries. As a specific format of group interview, the focus group has been used widely in market research since the 1950s, and has spread in popularity to other research fields (Gary, 2009). This research utilized this method to solicit feedback and reflections on the findings and draft recommendations arising from the other research methods employed. The focus group interviewees were recruited from individuals who are familiar with the research and relevant topics, including the key informants interviewed in the semi-structured interviews.

The focus group was held on Dec 17, 2013 from 6pm to 8pm at Daniel McIntyre/St Matthews Community Association boardroom (823 Ellice Ave). Five people attended, including neighbourhood development organization staff and residents from Spence, West Broadway and Daniel McIntyre and St. Matthews respectively. One week before the focus group meeting, the researcher provided copies of the initial research findings and recommendations to those individuals who indicated their intention to attend. On the day of the focus group interview, a hardcopy of the Focus Group Interview Information Sheet (abbrev. Information Sheet) was handed out to attendees (See Appendix C). The Information Sheet documented the purpose of the research, the purpose of the focus group, the ethics considerations, the focus group procedure and the initial findings and recommendations in order to help inform the focus group attendees to

understand the background of the research and the interview process.

To start the focus group, the researcher first thanked participants and introduced the purpose of the research and the focus group briefly. Participants were also encouraged to look through the initial findings and recommendations to recall their thoughts quickly. Then, each item of initial findings and recommendations was openly discussed. The whole focus group session was audio recorded and transcribed. The transcription of the content was analyzed against the initial findings and recommendations derived from other research methods employed in this study. Since the purpose of the focus group interview was to solicit feedback from key informants regarding the initial findings and recommendations, overall participants expressed that the items for discussion had accurately reflected their opinions regarding the matters. A summary of the comments on four topics is presented in the following four sections.

3.4.1 Regarding “benefits to community”

One of the focus group participants suggested to add the benefits for mental health and community members’ empowerment to the initial findings under “benefits to community”, pertaining to the selected neighbourhoods greening projects;

The benefits for mental health are included in the categories of community health, which has been documented in the “Key Themes in the Literature” (see 2.2). One of the investigated neighbourhoods had introduced a “therapeutic garden” into an affordable housing development to meet psychological needs of the tenants. The benefits of community members’ empowerment is actually a reflection of the social benefits of

green infrastructure/green space and can be categorized in first sub-item “social interaction and cohesion” of the Information Sheet (see Appendix C).

A participant disagreed with the identified challenge to the “benefits to community”: as the ecological impact of the green spaces maintained by a neighbourhoods is not as significant as other large size green spaces elsewhere. The participant’s opinion was that such ecological benefits are still large considering the valuable green spaces situated in populated urban area. Others suggest that different measurements need to be considered when talking about the issue.

One participant suggested to add “providing opportunities for people to get together” to the item “Benefits to Community”. The author thinks this point is part of the first sub-item “Social interaction and cohesion” of “benefits to community” in the Information Sheet (see Appendix C).

3.4.2 Regarding “community involvement”

One participant commented on “Community-led approach” that this approach enables people to start from one project to many prospects.

Another community development organization staff expressed that they haven’t done much demographic investigations when they did community consultation on some greening projects. They would like to pay more attention to the issue as it could help them to better understand the community-led approach and involve more community members in supporting the projects.

A participant pointed out that the issue addressed above is a challenge for community involvement. Another participant think this issue is related with one of the

challenges to community involvement: high residential mobility in those neighbourhoods. One neighbourhood resident participant expressed concerns about the staff and board membership of those neighbourhood development organizations that are mostly made from a White, Anglo-Saxon structure. Actually there are lots of visible minorities and aboriginal people in those communities. This is related to another challenge: effective communication between neighbourhood organizations and community members.

3.4.3 Regarding “stakeholders’ roles”

Most participants expressed concerns with the roles of municipal government. One neighbourhood development organization staff participant complained that it is a big challenge to get the “green plans” to be compatible with the City’s comprehensive plan because it is hard to get people from different departments working together. Another neighbourhood development organization staff participant agreed with that and indicated that municipal government is an important stakeholder, but also one of the biggest barriers to successfully integrating the green infrastructure with “green plans”.

3.4.4 Regarding “other factors influencing GI planning”

All participants agreed that there are “competing interests between greening and housing”. One participant stated that the long-term sustained funding required could be a challenge for foundations or campaigns to donate to environmental issues. So it might be government’s role for the long term funding. A participant suggested that adding land

availability to the factors influencing GI planning, as this is a big issue for both public landownership and private landownership.

3.5 Summary

This chapter presented the results from research methods that were employed in this study. Literature review results showed that theories of GI benefits, GI planning principles and processes can be adapted to the planning practices in those selected Winnipeg inner-city neighbourhoods. Many factors identified in this research through “green plans” evaluation and key informant interviews could influence the GI planning in the selected inner-city neighbourhoods in Winnipeg. Those factors were analyzed with regards to the research questions in the following chapter and further synthesized with SWOT-TOWS in order to come up with strategies and measures to respond to different situations of GI planning in those neighbourhoods being investigated. In addition, the focus group provided valuable feedback on the initial findings from other research methods.

CHAPTER 4: ADDRESSING THE RESEARCH QUESTIONS AND SYNTHESIS

The content of this chapter is structured by responding to the research questions within three themes, set out in Chapter 1. Subsequently, a synthesis of analysis results is conducted within a SWOT- TOWS analysis framework.

4.1 Green Infrastructure: What does this concept tell us?

1. Concerning green infrastructure:

1a. What does green infrastructure mean in the urban context?

1b. What are its benefits?

1c. What are the principles of and process for green infrastructure planning?

1d. How does this concept relate to those selected neighbourhoods in this research?

Green infrastructure planning in an urban context provides unusual challenges as well as opportunities for the planning profession, local government, as well as community groups. Rooted in the natural settings of rural areas, the original concept of green infrastructure highly emphasized the inter-connected form of natural green spaces. It was a strategy of “smart conservation” employed by professionals and local authorities to direct conservation practices and address the challenges resulting from haphazard development (Benedict & McMahon, 2001). Much of the literature about green infrastructure in North America has an ecological focus, the work on green infrastructure planning and design emphasize significance of protecting ecology and natural area in dealing with the challenge between land development and conservation. Based on the theory of landscape ecology, the focus on ecology conservation of GI approach is mainly

reflected in the design of connectivity of GI components (Ahern, 2007; Benedict & McMahon, 2001, 2006; Williamson, 2003). Even though the fact that green infrastructure planning and design can be implemented at various scales, is acknowledged by planning and conservational professionals, the large-scale, non-urban settings for green infrastructure are much more common, and as such an approach often embraces ecological importance of open spaces that reflect original GI planning basis (Benedict & McMahon, 2006). In an urban context, especially for densely populated urban neighbourhoods, the built environment has constrained the planning and design of network of natural green spaces to form “conventional” green infrastructure. The physical network of green infrastructure in the forms of “hub” and “link” (Benedict & McMahon, 2001, 2006) is hard to fully achieve in the urban neighbourhood scale, as the elements of GI network such as large green spaces and conservation corridors are lacking in those urban areas. This presents a great challenge to build a green infrastructure network, which typically exists in larger scale (city and regional scale) GI planning and design implementation. However, the environmental assets at the urban neighbourhood scale, such as street trees, verges, hedges, pocket parks, school yards and pedestrian and cycle routes could provide or representing potentials to be converted into green infrastructure assets through a proper planning process. Collaboration among various stakeholders can help enhance the existing local green infrastructure assets and further turn them into community assets, such as maintaining trees to improve the streetscape, turning neglected vacant lots into community gardens or pocket parks, as well as looking for help from municipal government in resources support, such as green infrastructure planning policy support and funding opportunities. Therefore, in the urban

context, especially in the urban neighbourhood context, green infrastructure means creatively improving the existing underutilized environmental assets through greening projects, and converting them into community assets that provide multiple benefits for urban settlements.

Various forms of benefits of green infrastructure were acknowledged in the literature and through interviews. The benefits can be categorized as two main streams: benefits for nature and for humans. Although ecological and environmental benefits for nature are considered as intrinsic ones of green infrastructure, to let these values take effective still need an appropriate environment and arrangement. In urban areas, due to the typical lack of large size of greenspaces and human activity's disturbance on natural environment, the ecological benefits of urban green infrastructure may not be as significant, even though they still provide some habitats such as vegetated surface for certain insects and bird species. However, regarding climate change adaptation, green infrastructure does provide great benefits for urban area. Canopies of mature street trees and well maintained vegetated spaces help to mitigate heat island effects, decrease urban runoff, and improve water quality-issues related to climate change and urbanization. The social benefits of green infrastructure for community members are more obvious in the study. The positive correlation of green infrastructure and human health is well presented in health-related studies. Even though the positive effects of neighbourhood greening projects on neighbourhood residents' health are not widely reported by people interviewed, it can be implied by their involvement in neighbourhood greening projects and their demands for quality green space for physical activities. Green infrastructure can also greatly promote the social interaction and cohesion of the community, which

was well claimed by interviewees in this research (see 3.2.1). The inner-city neighbourhoods selected in this research are all known as culture-diversity neighbourhoods. Engaging neighbourhoods through greening projects do provide opportunities for local residents to foster a sense of community and connections with other community members. It could be anticipated that in future neighbourhood green infrastructure planning, such benefits will be better amplified through attracting more community members using quality green spaces and other greening element of green infrastructure.

Urban green infrastructure planning principles presented in the literature review chapter summarizes successful practices in other places, and need to be observed in planning localized green infrastructure. Besides the four principles mentioned in the literature review (see section 2.3.1), another principle that applies to the four selected Winnipeg inner-city neighbourhoods is that green infrastructure planning in these neighbourhoods can use a community-led planning approach. This principle was followed by neighbourhood development organizations in developing their neighbourhood “green plans” and greening projects, which were considered as successfully reflecting community values. Such an approach can be utilized to guide the other four principles in the efforts to conduct future neighbourhood green infrastructure planning to ensure the GI planning clearly reflects community values.

Consistent with one of the principles of urban green infrastructure planning which states: ‘green infrastructure planning should reflect local context’, the process of GI planning also varies with each different context. A general process of GI planning starting from building partnerships to developing a plan can be applied to the proposed

neighbourhoods in this research (see 2.3.2). To reflect the local context, the process should also include a review of current “green plans” and greening projects, if they exist in the proposed neighbourhoods, as a basis for developing a new GI plan. This step could happen between the steps of “envision the future” and “resources audit and investigation” to provide a clear understanding of the institutional resources for stakeholders.

For the selected inner-city neighbourhoods in this study, the concept of green infrastructure means a new view of, and new ideas about, the existing environmental assets within each neighbourhood. Being located in relatively densely populated areas of Winnipeg, these neighbourhoods have distinct disadvantages in accessing green infrastructure asset compared with some suburban, less densely populated neighbourhoods. Fortunately, the neighbourhood development organizations have gained valuable experience in developing neighbourhood “green plans” and greening projects initiatives by engaging a varied group of stakeholders. The experience can contribute to their future GI planning by providing guidance on how to take advantage of the existing environmental assets and enable them to be better used. For these neighbourhoods, the existing green spaces are no longer amenities, but are seen as necessities for more sustainable living. The spaces can be converted from just green infrastructure elements into community assets through better planning to form neighbourhood green infrastructure and consolidating the multiple benefits that have been delivered to the community.

4.2 Lessons Learned from Neighbourhood “Green Plans”

2. Learning from the neighbourhood “green plans”

2a. What lessons can be drawn from the three selected Winnipeg

neighbourhood “green plans” regarding inner-city neighbourhood green infrastructure planning?

The three “green plans” developed by the four neighbourhood development organizations are a reflection of the collective efforts made in pursuing sustainable neighbourhood revitalization and development. The plans are living documents for directing current neighbourhood greening projects and providing an institutional basis for future green infrastructure planning. Compared with a strict green infrastructure plan, there are some gaps that need to be filled for the existing neighbourhood “green plans” (see section 3.2). These gaps help to inform the following three main lessons learned from the three “green plans”.

4.2.1 Lesson one: Developing a clear vision and goal setting for neighbourhood GI planning

Visioning is an essential element in collaborative planning. It not only helps planning groups identify what they want the future to look like, but also helps them to consider and identify the steps to make a dream reality. The visioning process also provide planning groups with opportunities to arrive at a consensus on community values, overcoming barriers in the planning process and increasing the level of mutual understanding and trust. It should be noted that vision development in a green infrastructure plan should follow the principle of green infrastructure

planning: to maintain a community-led approach. Effective visioning requires extensive outreach to stakeholders, as only a vision statement that has been recognized by various stakeholders can have the buy-in needed to drive the planning process.

Since the current neighbourhood “green plans” are not strictly green infrastructure plans (even though many community members and neighbourhood group staff think they are similar), a clear vision statement incorporating assumptions, frustrations, and dreams of people in neighbourhood green infrastructure planning is required. Some of the local residents and neighbourhood development organizations felt the support from municipal government on the neighbourhood greening projects was not sufficient. Perhaps this is due to the limited involvement from the municipal government at the onset of neighbourhood “green plans”, a phenomena that continued into the greening projects. As a former neighbourhood development organization staff mentioned in the interview:

“What we were originally trying to do with the plan is to get it endorsed and respected by the City, but that was difficult to have someone prepare the document for the City without the City’s involvement very actively.” –
Neighbourhood Development Organization Staff Person

Therefore, it is important to have all stakeholders engaged from the beginning of GI planning process and to develop the GI planning vision collectively.

An effective vision statement for GI planning presents the ideal future of neighbourhood green infrastructure; the vision doesn’t tell people how to achieve the desired state, which could be done by setting specific goals in the planning document. McDonald et al. (2005) differentiate the green infrastructure plan from other types of

“green plans” in the goal setting: “green infrastructure plans must include goals for the protection of ecological functions and processes, as well as protection of working lands, and open space for human benefit.”(p.9-10). These factors are commonly included in different types of plans, but are not typically contained in one plan. Even though a plan doesn’t embrace thorough objectives for conservation planning, it can be still regarded as a green infrastructure plan as long as conservation goals are set (McDonald et al., 2005).

4.2.2 Lesson two: Developing active transportation facilities to interconnect neighbourhood greenspaces

In view of the influence of built environment on green infrastructure planning in the urban neighbourhood context, it is sensible to take some innovative strategies to achieve conventional concept of physical connectivity of green infrastructure in the urban area. The three selected inner-city neighbourhood “green plans” all have schemes to develop active transportation in their neighbourhoods. Active transportation routes or facilities have important implications and opportunities for GI planning: they can be used as connections of neighbourhood greenspaces. The major thoroughfares and speeding cars within neighbourhood presents great barriers for people to access green spaces. Active transportation facilities, such as bike lanes, bike boulevards, shared lane marking (or sharrow) and even crosswalks can encourage people to use less vehicles and engage in environmental-friendly traffic mode. Together with street trees, verges, and hedges, these active transportation facilities can function as links to connect green spaces in the neighbourhoods and collectively comprise the physical form of urban green

infrastructure. However, a large part of active transportation plans remain as intentions, without being put into practice. There are many reasons accounting for this situation, with some related to the land use jurisdiction. The City of Winnipeg is the only authority regarding land use and transportation planning within the city. Even if the community group has a clear desire to promote active transportation in the neighbourhoods, they still need authorization and resources from the City. This is an area where the City government could be a partner in the neighbourhood GI planning.

4.2.3 Lesson three: Developing more programs to enhance potential of benefits of neighbourhood green infrastructure.

Placemaking has been used as an effective way for community revitalization work in some Winnipeg's neighbourhoods, such as Central Park (Trejo, 2012). New park furniture, play structures, and activity programs have brought the park back to being part of people's lives again (Cassidy, 2012). According to Castello (2010), a place is a space in which the user experiences a unique physical and psychological reaction that makes the location stand out above the surrounding context of the city. The difference between a place and a space is in that place provides unique human experiences. Therefore, a place is the mixture of physical settings with human experiences. Programs in "place" can function as bridges linking physical settings and human experiences. Some good jobs have been done by the neighbourhood development organizations to foster people's sense of place and attract people's involvement in placemaking. For example, the Spence

neighbourhood Kids Garden and West Broadway neighbourhood Kid's Garden have developed programs to educate local kids about the natural surroundings (see Figure 11).



Figure 11. Children's party held in Spence neighbourhood Kids Garden on Furby Street

Other community members are also engaged through community events, such as garden celebrations, tree banding and spring clean up. These programs have helped to achieve the goals of using neighbourhood green spaces as environmental education spaces in the “green plans”. They also help to deliver the benefits of well developed and maintained green spaces to human beings by providing environmental-friendly places and promoting social interaction. For future green infrastructure planning, more programs dedicated to physical and social activities are required to enhance the potential benefits of green infrastructure. Increasing programming in urban green spaces of those neighbourhoods in this study is also highly demanded by local residents, especially children and older adults who would love to spend their time in doing physical and social activities in urban green.

4.3 Incorporating Green Infrastructure Planning with “Green Plans”

3. GI opportunities, challenges and neighbourhood organizations:

3a. How can the concept of urban green infrastructure be articulated and integrated with neighbourhood green plans?

3b. What opportunities and challenges affect the degree to which urban green infrastructure can be incorporated into the neighbourhood green plans?

3c. What is the role of neighbourhood development organizations in the process?

Urban green infrastructure refers to properly planned and managed natural green spaces such as parks and other built/engineered green elements such as community gardens and active transportation routes within urban areas. The green infrastructure approach uses natural processes to provide multiple benefits for the life of urban settlement. The planning of urban green infrastructure follows the common principles of green infrastructure planning in a variety of scales. These principles were summarized from successful practices of GI planning and represent the common sense of professionals engaging in the work. Meanwhile, the principles that urban green infrastructure planning follows should also reflect the local context. In this research, the context factor is that neighbourhood “green plans” and related greening projects have been developed and implemented by local community groups through a community-led approach. It is anticipated the GI planning in those neighbourhoods also follow the same principle. Guided by the principles, the process of urban green infrastructure planning should also reflect the local context by integrating into the current neighbourhood “green

plans”. A review of the progress made towards the goals of “green plans” and neighbourhood greening projects achieved by the neighbourhood development organizations is necessary to understand the opportunities and challenges of incorporating GI concept into the “green plans”. Opportunities and challenges for integrating GI into neighbourhood “green plans” were identified through the literature review, the “green plan” evaluation, the key informant interviews, and clarified in the focus group meeting. The following are some opportunities identified:

The urban green infrastructure supports municipal and provincial government policies on sustainable development by integrating social, environmental and health aspects of development. The purpose of urban green infrastructure planning is to contribute to and promote sustainable development in urban areas that is compatible with the vision and goals of the municipal development plan and other provincial sustainable development policies. For example, City of Winnipeg’s development plan *OurWinnipeg* (2011) has provided directions and strategies to promote recreation and quality of life for Winnipeggers in terms of “Promote and enable opportunities for all age groups to be active as part of their daily lives” (p.58) and “Work in partnership with communities to identify and address neighbourhood issues” and “Promote cleanliness and beautification” (p.81)

Developing urban green infrastructure also offers opportunities to partner with various stakeholders, including neighbourhood residents, local landowners, community groups, and local government in the use of land areas. Green infrastructure planning is a collaborative process to turn existing environmental assets into community assets. The community-led approach for developing neighbourhood “green plans” and greening

projects has laid a solid foundation for future urban green infrastructure planning supported by collaboration of stakeholders.

In addition, the GI planning process should identify and highlight existing and potential opportunities for multifunctional use in urban neighbourhoods. The planning process will support social inclusion and community cohesion in urban areas by involving community members in planning and management processes as well as fostering a sense of community. GI planning will also contribute to building a more livable community and enjoyable environment by encouraging people's outdoor activities of all age groups and cultivate people's sustainable behaviour through educational programs such as workshops and community-based social marketing (McKenzie-Mohr & Smith, 1999).

Finally, urban green Infrastructure planning in these neighbourhoods could lead to enhanced protection of the cultural heritage to which it is linked, gaining greater recognition for certain visual amenities and local distinctiveness. For instance, the selected Winnipeg inner-city neighbourhoods are traditionally home to a significant urban aboriginal community. To honour and respect aboriginal people's traditions, the City of Winnipeg supported the creation of Aboriginal Spirit Park and Chief Grizzly Bear's Garden in the West Broadway neighbourhood and Spence Neighbourhood. In Jacob Penner Park, a city park located in Daniel McIntyre neighbourhood, a skateboard plaza was installed to meet the needs of skateboarding community and reflect the sports culture in the neighbourhoods. In future green infrastructure planning, those aboriginal culture park and skateboarding structures are valuable GI elements that can protect local cultural heritage and distinctiveness.



Figure 12. SNA Chief Grizzly Bear’s Garden plaque



Figure 13. Jacob Penner Park Skateboard Plaza

There are five challenges that need to be addressed when integrating the concept of green infrastructure into neighbourhood “green plans”:

First, inconsistent piecemeal approaches to the implementation of the urban green infrastructure planning present a great challenge to the future urban green infrastructure planning. The concept of green infrastructure is rapidly becoming more widely recognized by the professional planning community. Green infrastructure planning offers a way for converting environmental-friendly elements into valuable community assets as well as means of delivering sustainable urban development if built in urban areas. However, there is still some uncertainty about what green infrastructure is, what value it can bring and how it can be planned and managed in an urban context. This uncertainty has partly resulted from the piecemeal approach to the subject, with the limited practical experience of implementing such project in urban core context.

Second, insufficient provincial/municipal support and funding for measures that emerge from community-led GI planning process is another challenge for the researched cases. Originating from the United States and Europe, the concept of green infrastructure is still new to many Canadian communities. Lacking directions in the policy field is an apparent obstacle for implementation of green infrastructure. For example, the approval process for development separates infrastructure planning from land use and landscape planning. This perhaps poses challenges to obtain permits or regulatory approvals for green infrastructure planning. In addition, sustainable funding sources and opportunities are vital factors for successful urban green infrastructure planning and maintenance. There may be some difficulties to obtain long-term and sustained funding, which has been indicated by key informants interviews (see 3.3.4).

Third, competing interests between greening and housing may pose difficulties for land availability for urban green infrastructure. As stated in the previous chapter,

lands in these inner-city neighbourhoods are highly contested. The need for affordable housing development poses a high demand for land availability, which in turn creates competition between housing and greening based on limited land supply. Without land, green infrastructure planning suffers from slow progress or even losing ground.

Fourth, limited understanding and acceptance of the GI concept may hinder public awareness and public engagement in planning. Even though the GI strategy was considered as “old wine in new bottles” by some researchers that implied GI planning was similar to conventional green space planning (Davies, McGloin, MacFarlane, & Roe, 2006, p.6), the GI concept may sound like jargon to community members who are familiar with traditional green space planning and would not likely support something they are not familiar with. Such adverse situations may further affect the attitude of local authorities about neighbourhood green infrastructure planning, as local residents may influence the decision making of local authorities. When it comes to community revitalization and development projects, municipal government respects public opinion and priorities set by community members. If the public shows little interest in the discourse, local government may not devote much effort to promote a green infrastructure planning project. This can be very detrimental to the project in the long run.

In addition, some site-scale green infrastructure elements in urban areas, such as green roof, rain garden and bioswales can be susceptible to seasonal weather changes and extreme weather conditions. The efficacy of those green infrastructure elements in certain weather conditions, e.g. cold winter in Winnipeg, may not live up to expectations.

By reviewing current neighbourhood “green plans” and greening projects, the role of neighbourhood development organizations in this research is identified as a type of liaison and advocate role between community members and various stakeholders, such as levels of government, local businesses and other community groups. The NDOs also assume the role of environmental education in cultivating a local sustainable living culture. Such roles represent the efforts of grass-root organizations of the neighbourhood level in advancing community revitalization and the City’s neighbourhood planning system. Community revitalization is implemented jointly by the Province of Manitoba and the City of Winnipeg, through the *Building Communities Initiative*. The neighbourhood development organizations complement the role of two levels of government by engaging neighbourhoods in the “green plans” development and greening projects implementation. All the neighbourhood development organizations in this research have tried to have the “green plans” endorsed by City of Winnipeg in the several years since those plans were developed. To date none of the “green plans” got endorsed by the City. However, if endorsed, these “green plans” could be recognized by the City of Winnipeg as part of official neighbourhood plans. Urban GI planning in those Winnipeg inner-city neighbourhoods will ideally be a cross-agency and cross-undertaking involving more jurisdictions and resources that requires cross-boundary collaboration of neighbourhood development organizations and leadership and support from the local government. In this ideal scenario, the City of Winnipeg would play more important role in urban green infrastructure planning. Regardless of differing opinions from local residents about the role of neighbourhood development organizations in the future GI planning (see 3.3.3), the partnership between NDOs and the local government

is crucial to the success. At the plan making stage, NDOs can continue to play the role of liaison and advocate in the planning process, coordinating community consultation and public engagement; working closely with the municipal government who provides resources, such as technical support, funding and policy. During the implementation stage, NDOs would take responsibility of maintaining the green infrastructure, monitoring performance and keeping the initiatives alive through citizen involvement and educational programs.

It is anticipated that urban GI planning in these inner-city neighbourhoods will face various opportunities and challenges in the process of integrating the GI concept into the current neighbourhood “green plans”. When combining with the internal strengths and weaknesses, these opportunities and challenges have great impact on the future GI planning project and present different situations that that GI planning may face. A SWOT-TOWS framework synthesis was carried out in the following section in order to understand these situations and come up with relevant strategies and measures.

4.4 A Synthesis of Analysis Outcomes with SWOT-TOWS Framework

The synthesis of analysis outcomes utilized a SWOT analysis tool to summarize factors in terms of strengths, weaknesses, opportunities and threats (challenges) that influence GI planning in the selected inner-city neighbourhoods in this research. Following the SWOT, a TOWS matrix was employed to identify strategies to improve the situations as described by the SWOT factors.

4.4.1 SWOT analysis

In this research, a SWOT model is employed as a framework to synthesize the findings collected by using research methods. SWOT is acronym of *Strengths*, *Weaknesses*, *Opportunities* and *Threats*. The approach originated from a research project on the United States' Fortune 500 led by Albert Humphrey in Stanford University in the 1960s-1970s (Friesner, 2010). It is often used in business and marketing research for strategic planning but is also employed as a tool in many other disciplines. In this research project, a SWOT analysis is used to consider the impact factors and environmental conditions that influence urban green infrastructure planning in the four neighbourhoods in order to identify potential measures that are conducive to the planning in these neighbourhoods, as well as in others of Winnipeg. It is noted that SWOT analysis uses "Threat" to represent external adverse conditions, which is similar to the term "Challenge" used in this research previously. Therefore, in the SWOT analysis hereafter, the element "Threat" is considered as interchangeable with "Challenge" term previously mentioned.

The SWOT elements were derived from the research findings of this study (see Appendix F). The external elements, Opportunity and Threats (Challenge), have been presented in section 4.3 as part of answering the research question. The internal elements, Strength and Weakness, will be introduced in the following sections.

Opportunities

- Urban green infrastructure supports municipal and provincial government policies on sustainable development by integrating social, environmental and health aspects of development;

- Urban GI planning offers opportunities to partner with various stakeholders, including neighbourhood residents, local landowners, community groups, local government in the use of land areas;
- GI planning process will identify and highlights existing and potential opportunities for multifunctional use in those urban neighbourhoods;
- Urban GI planning in those neighbourhood will lead to enhanced protection of the cultural heritage to which it is linked, gaining greater recognition for certain visual amenities and local characteristics.

Threats (Challenges)

- Inconsistent piecemeal approaches to the implementation of the urban green Infrastructure planning presents a great challenge to the future urban green infrastructure planning;
- Insufficient provincial/municipal guidance and funding for measures that emerge from successful GI planning, is another challenge for the researched subject;
- Competing interests between greening and housing may pose difficulties for land availability of urban green infrastructure;
- Limited understanding and acceptance of GI concept may hinder public awareness and public engagement in the planning project.

Strengths

- Neighbourhood green spaces provide potential multifunction through GI planning and contribute to the quality of urban life;

- Institutional structure of neighbourhood development organizations support green infrastructure planning;
- Community member's active involvement in the greening project have built long term incentives for green infrastructure plan implementation;
- Lessons Learned from existing neighbourhood “green plans” and greening projects provide valuable resources for future green infrastructure planning.

Weaknesses

- Urban built environment constrains GI planning in creating green space networks;
- Currently, there is no legally binding legislation or policy for green infrastructure at provincial or municipal level;
- There is a lack of a recognized methodology for green infrastructure planning in an urban context, especially for urban neighbourhood context;
- Urban green infrastructure may require more time for proper site investigation and performance maturation.

4.4.2 TOWS framework of urban GI planning influential factors

The TOWS matrix is tool similar to SWOT, widely used for situational analysis (Wehrich, H., 1982). It utilizes the same elements developed by SWOT analysis, but further develops strategies based on the resulting information from SWOT. Because it is a tool to summarize strategies to improve the target, the TOWS was used in order to first examine the Threat and Opportunity, then the Weakness and Strength (Hamel, G., n.d.).

TOWS matrix has four components: SO (Strength-Opportunity), WO (Weakness-Opportunity), ST (Strength-Threat), and WT (Weakness-Threat). SO (Strength-Opportunity) leverages internal strengths to maximize external opportunities; WO (Weakness-Opportunity) overcomes internal weaknesses by utilizing external opportunities; ST (Strength-Threat) employ internal strengths to counter external threats; and WT (Weakness-Threat) means to minimize both internal weaknesses and external threats.

In this research, the four components of the TOWS matrix were analyzed with the identified elements, to arrive at and come up with the following strategies, reported in the four components:

SO (Strength-Opportunity) - Continue to implement the neighbourhood greening projects documented in the “green plans” by involving more community volunteers through extensive outreach and public engagement; The neighbourhood development organizations need to review provincial and municipal policies in order to make sure future green infrastructure planning and implementation compatible with the policy requirements. This will be conducive to obtaining supports from the governments; Building broad as possible partnership with various stakeholders of green infrastructure planning. Forging the alliance and inter-relationship among them, especially for some key stakeholders such as local landowners and local government will help coordinate and guide the activities that make GI a reality; Conducting a review of current neighbourhood “green plans” based on an adapted GI plan evaluation framework (see 3.2) to understand the gaps between

neighbourhood “green plans” and a GI plan. It also helps identify local GI elements that can be used to reflect local distinctiveness.

WO (Weakness-Opportunity) - Using mature street trees, verges, hedges, active transportation facilities innovatively to form “connective tissues” in linking neighbourhood green spaces as green infrastructure; Look for precedents of urban green infrastructure with similar settings to learn their successful stories that inform local neighbourhood GI planning; Approaching provincial government to develop sustainable policies in supporting urban GI planning, and the municipal government to develop a city-wide greenspace master plan in recognizing the importance of urban GI. Such efforts can be made by involving diversity of stakeholders, as they are critical in the local decision-making process by advocating support for green infrastructure; In view of the urban GI need more time for site investigation and performance maturation, long-term funding is very important to sustain urban GI to continually provide multi-functions. Project-based funding will hinder the progress of GI when funding cease.

ST (Strength-Threat) - Re-establishing the “Urban Green Space Coalition” which used to be a research alliance of SNA, WBCO, and DMSMCA to research on consistent green infrastructure planning approaches; Collaborating with 'housing committee' on conflict resolution of competing interests between green space planning and housing development in each neighbourhood development organization. An example of accomplishment with this, is the design and construction of a four unit block of affordable housing on a site having an accessible garden, in the West Broadway Neighbourhood; Trying to find more ways to raise awareness of inner-city

neighbourhood green infrastructure planning by advertising on community newspapers, radios and create more programs in community gardens and other green spaces that can be engaged in by different age groups, especially for older adults and children. These efforts will help promote understanding and acceptance of GI.

WT (Weakness-Threat) - Urban GI planning in such a situation is quite uncommon and very difficult to deal with. In business, companies who are in such situation often strive to take a survival strategy (Wehrich, H., 1982). The ideal prospect would be to overcome the internal weaknesses and to develop them into strengths that move toward to a SO (Strength-Opportunity) situation (Wehrich, H., 1982). In such situations, the best strategy for urban GI planning in these neighbourhoods would be to continue with the work on “green plans” and greening projects. While doing this work, make every effort to enhance strengths and to be alert for some system changes where the opportunities to minimize internal weakness can occur. This process is expected to require patience and courage to endure.

Table 2. TOWS matrix of strategies for four Winnipeg inner-city neighbourhoods GI planning

	Strengths	Weaknesses
Opportunities	<p>SO:</p> <ol style="list-style-type: none"> 1. Involve more community volunteers through extensive outreach and public engagement; 2. Review provincial and municipal policies to fit GI planning and implementation into policy requirements; 3. Forging the alliance and inter-relationship among key stakeholders will help make GI a reality; 4. Conduct a review of current “green plans” based on an adapted GI plan evaluation framework to understand the gaps for a GI plan. It also helps identify local GI elements that can be used to reflect local characteristics. 	<p>WO:</p> <ol style="list-style-type: none"> 1. Using mature street trees, verges, hedges, active transportation facilities innovatively to form “connective tissues” in linking neighbourhood green spaces as green infrastructure; 2. Looking for precedents of urban green infrastructure with similar settings to learn their successful stories that inform local neighbourhood GI planning; 3. Approach levels of governments to develop sustainable policies in supporting urban GI planning, and to develop a city-wide greenspace master plan in recognizing the importance of urban GI; 4. Secure long-term funding opportunities to sustain urban GI to continually provide multi-functions
Threats (Challenges)	<p>ST:</p> <ol style="list-style-type: none"> 1. Re-establish the “Urban Green Space Coalition” which used to be a research alliance of SNA, WBCO, and DMSMCA to research on consistent green infrastructure planning approaches; 2. Collaborate with 'housing committee' on conflict resolution of competing interests between green space planning and housing development; 3. Find more ways to raise awareness of inner-city community green infrastructure planning and promote acceptance of GI by advertizing on community newspapers, radios and create more programs that can be engaged in by different age groups. 	<p>WT:</p> <ol style="list-style-type: none"> 1. Continue with the work on “green plans” and greening projects. While doing this work, make every effort to enhance strengths and to be alert for some system changes where the opportunities to minimize internal weakness can occur. This process is expected to require patience and courage to endure.

CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS

This concluding chapter first provides recommendations for GI planning in Winnipeg urban neighbourhoods and then recommends possible directions for future study. Finally the key conclusions from the research findings are stated.

5.1 Recommendation for Green Infrastructure Planning in Winnipeg urban neighbourhoods

Compared to the practice at the larger scale (city and regional) and in non-urban settings, urban green infrastructure planning considered in this research has certain distinctive features that are not commonly found in traditional GI planning. This involves the concept that street trees along with active transportation facilities can form “connective tissue” to link separated green spaces; elements of urban green infrastructure, such as community gardens provide venues for social activities and food production for local residents; cultural landscape reflecting local characteristics will be incorporated in the GI planning. These distinctions can help inform GI planning practice in other Winnipeg inner-city neighbourhoods having similar settings.

This research explores the potential of integrating the GI concept into the existing neighbourhood “green plans”. The research tries to identify factors influencing inner-city neighbourhood green infrastructure planning through undertaking a literature review, the evaluation of “green plans” and conducting interviews with key informants. While geographical and socio-economical conditions vary, some general themes derived from this research are expected to have potential applications in other neighbourhoods. The recommendations from this research for Winnipeg urban neighbourhoods can be

summarized into five broad categories: capacity building, policy and regulation, education, financing, and partnership.

5.1.1 Capacity building

Create a neighbourhood development organization representing community members conducive to starting up an urban green infrastructure planning process.

Based on the findings from evaluation of the “green plans” and key informant interviews, the organization is instrumental in advocating community needs and priorities amongst the relevant stakeholders. In Winnipeg, there are a number of urban neighbourhoods that have developed NDOs or resident associations by community stakeholders. Examples include: the Central Neighbourhood Development Corporation, the North End Community Renewal Corporation, and the Wolseley Residents Association. These community organizations can help to facilitate the urban GI planning if community members would like to develop GI in their neighbourhoods.

Organize a research team to study urban GI planning. A better understanding of GI knowledge is essential in facilitating an urban GI planning process.

Neighbourhood development organizations or community groups can designate staff to form working groups and recruit volunteers to research urban GI planning, draft grant proposals, and learn lessons from successful practices identified in other places.

Recruit volunteers through extensive outreach and public engagement.

Volunteers are valuable assets for community development projects. From initial community consultations and plan making through to implementation and maintenance, volunteers can contribute to various works ranging from providing advice on the

planning to engaging in the fieldwork of maintaining green infrastructure elements. Perhaps most importantly, volunteers can generate support from other stakeholders, especially the City of Winnipeg, for neighbourhood GI planning.

5.1.2 Policy and regulation

The municipal government role: Integrate the GI concept into neighbourhood planning and design so that neighbourhood green spaces, cultural heritage and active transportation facilities can better function together as an integrated system to provide multiple benefits. According to the key informant interview results, the basic role of the City of Winnipeg in neighbourhood green infrastructure planning is to make planning directions for GI planning to ensure it complies with the City's development plan. If a GI plan can be embedded in the city's secondary plan system (either as statutory plan or non-statutory plan), GI planning will be consistent with the City's development plan and have the opportunity to have the GI elements function collectively with other neighbourhood plan elements. Developing a city-wide greenspace master plan is also useful in recognizing the importance of GI planning and in providing comprehensive guidance regarding how to combine and integrate GI elements to provide multiple benefits. A greenspace master plan that includes green infrastructure may need coordination among different departments and branches in the municipal government, such as Planning, Property and Development, the various divisions in Public Works Department, and Community Services Department. The City of Toronto has developed a city-wide park management plan- *The Parks Plan 2013-2017*, as a guide for the development, management and operation of park system in the City of Toronto (City of

Toronto, 2013). It was a joint effort of divisions in the City of Toronto and external stakeholders. It is noted that the Parks Plan 2013-2017 recognizes the green space system including parks and trails as “city infrastructure” that “provides relief from the built-up, urbanized environment” (City of Toronto, 2013, p.2).

The provincial government role: Provide a clear mandate for integrating the GI concept into community revitalization and climate change action policy and the regulatory framework. The Government of Manitoba has been supporting community revitalization projects including neighbourhood greening projects through the *Neighbourhoods Alive! (NA!)* Program. The NA! Program is delivered through the Department of Housing and Community Development. The Municipal Government Department also offers community revitalization programs-the *Winnipeg Regeneration Strategy* (WRS) and the *Building Communities Initiative* (BCI), that can be accessed by Winnipeg urban neighbourhoods. Manitoba Conservation and Water Stewardship Department provides resources and funding for climate change action and for green initiatives in Manitoba municipalities. In addition, Manitoba’s Green Plan-*TomorrowNow* and the *Sustainable Development Act* regulate issues related to sustainable development in the province. However, none of these programs, plans or regulations clearly designate GI as a strategy to deal with community revitalization and climate change. Green infrastructure has been shown to provide multiple benefits including those leading to revitalization and climate change adaptation (See Chapter 2). Integrating GI into current policy and the regulatory framework will raise the status of GI in promoting community revitalization and climate change adaptation in urban environment. Lessons can be drawn from the Ontario Government which has released a

new *Provincial Policy Statement* that includes green infrastructure policy and practice (Ontario Ministry of Municipal Affairs and Housing, 2014). It clearly requires that “Planning authorities should promote green infrastructure to complement infrastructure” (Ontario Ministry of Municipal Affairs and Housing, 2014, p.15).

5.1.3 Education

Design creative educational programs to promote understanding and acceptance of GI planning and related benefits. The benefits of urban GI need to be more widely understood by community members and other stakeholders in order to gain acceptance of this concept in neighbourhood planning. The experience of four Winnipeg inner-city neighbourhoods as reported in the semi-structured interviews, show that local residents have a strong desire to increase their knowledge about environment protection to improve their lives. Knowledge transfer between community members is also desired, according to the interviews, as this is a convenient way of learning new things. A focus on urban green infrastructure also provides a great tool for environmental and ecological knowledge education, as the GI can provide opportunities for people, especially children to learn the processes of nature and knowledge to protect the local environment. NDOs or other community groups should take advantage of GI’s environmental education function by delivering relevant knowledge to community members using all kinds of available media and creating innovative programs to engage stakeholder.

The municipal government has a key role in GI planning education at neighbourhood level. Currently the City of Winnipeg maintains a website offering information and policies about the City’s green spaces, including parks and community

gardens on public lands, on the City of Winnipeg Public Works Department website. There is another webpage named “Greenspace” linking the City of Winnipeg’s environmental directory on the City’s official website introducing green living and climate change adaptation and mitigation strategies. The City could expand these web pages to address GI planning and in particular to provide content for the neighbourhood level. Urban GI planning educational materials, such as GI fact sheets, GI planning best practices, GI policies and GI research results gleaned from other jurisdictions could be included on these sites, to be broadly accessible by community groups and others who are interested in GI planning. The City should provide increased assistance to community groups to build GI planning pilot projects to test the good practices and showcase multiple benefits to the community. The results of the pilot projects are expected to provide valuable lessons for both community groups and the municipal government about GI planning at the neighbourhood scale. Important here are to find and experience ways to have various City departments work in a more integrated manner.

5.1.4 Financing

Look for sustained funding opportunities from public, private and third sectors. Green infrastructure planning and management is not a short-term project. Development may take several years for the whole project to benefit the community. For those neighbourhoods that do not yet have a “green plan”, the process may take much longer. Therefore, gaining sustained financial support is vital for urban GI planning implementation and continually to function properly. The three neighbourhood development organizations in this research received project funding from the Province,

municipal government and some non-profit organizations, to implement their neighbourhood greening projects. For urban green infrastructure planning, it is recommended that neighbourhoods need to seek and secure long-term funding opportunities in all kinds of ways. Identifying source of funding to support urban GI planning is largely dependent on what is available and which party initiates the planning. When urban GI planning is initiated by the municipal government, this usually implies the GI plan will be part of the neighbourhood planning system, and will probably receive some funding from the municipal tax-supported budget. When the urban GI planning is initiated by community groups, financial aid could be expanded from public sector to private sector or third sector (volunteer or non-profit sector). Government funding is often insufficient for the completion of GI planning because it is restrained by the budget system. Also, funding programs from federal and provincial governments are typically structured to provide matching funding, which requires community groups to seek the primary funding from other sources. In addition to recognized national and local non-profit organizations, such as Evergreen Canada, the David Suzuki Foundation, the Winnipeg Foundation and the Manitoba Eco-network, local businesses can also contribute the financial support to the GI planning initiatives. Considering the benefits that urban GI could provide to local businesses and land owners, such as increasing property values; providing improved streetscapes to attract people's visiting and spending; improving worker's productivity, local business owners or land owners may want to contribute some money or land to the proposed planning project depending on how thoroughly they understand the potential benefits (Sustainability South West, 2010). Therefore, effective communication between community groups, local business and

landowners is necessary to convey increased understanding of the GI benefits by private sectors. Also, certain incentives can be offered to business owners to encourage their support. For instance, there may be opportunities for a business to advertise their donations during the GI planning process. With the help of local government and financial institutions, some innovative financing instruments such as lines of credit, start-up grants/loans can also be used to support urban GI planning projects.

5.1.5 Partnership

Building a broad and close partnership with various stakeholders is essential to develop a GI plan that reflects the priorities of residents and stakeholders.

Provincial and municipal government are key partners in urban GI planning.

Neighbourhoods who engage in GI planning could invite relevant government staff to join their planning advisory committee, providing advice regarding policy and legal information and other advice. This could help the local decision-making system increase understanding of the GI and make favourable decisions for GI planning. Also, neighbourhoods could approach three levels of government for funding assistance even though no single funding could get the work done. Another important partner would be the local businesses that are often represented by the neighbourhood Business Improvement Zone (BIZ). For example, the West Broadway BIZ has developed a Master Plan, including recognition that greening the streetscape and creating active transportation facilities are elements of urban green infrastructure. In future neighbourhood GI planning, the West Broadway Community Organization could work with West Broadway BIZ and other community organizations to realize the proposed GI

elements in the WB BIZ Master Plan. Similar partnership could also be built in other Winnipeg urban neighbourhoods to strengthen their GI planning process. Meanwhile, neighbourhood residents need to be better engaged to generate support for the GI planning projects. Community members have talents to contribute in a variety of ways, such as background research, grant proposal writing, information sharing and circulation, and essential maintenance labour, such as seeding, planting, watering, weeding and so on. In brief, building and maintaining partnerships with stakeholders through extensive outreach and public engagement provides the public confidence needed to sustain a long-term GI planning project.

5.1.6 Summary

The recommendations presented above are focused on addressing common issues that may affect urban neighbourhood green infrastructure planning in Winnipeg. Even though each neighbourhood may have distinct conditions and face different challenges, they still need to tackle many similar issues as listed in previous sections of this chapter when embarking on GI planning. Neighbourhoods should tailor these recommendations to their situations and make appropriate improvements to meet their local needs.

5.2 Recommendations for Future Research

This research project explored the factors that influence the inner-city neighbourhood green infrastructure planning, and further to analyze and explicate the prospects, challenges, and potential measures for urban green infrastructure planning in

Winnipeg. The research findings have answered the research questions set out at the beginning of the project. Four recommendations for future research are stated next.

First, investigate a pilot or demonstration urban green infrastructure planning project in Winnipeg. So far the findings from this research are based on respondents' perspective of projected GI planning in four Winnipeg inner-city neighbourhoods. There is no fully featured GI planning yet in these neighbourhoods, but rather some projects with features of GI elements. Therefore research should be conducted on a pilot or demonstration GI planning project when initiated in a Winnipeg urban neighbourhood, to assess how the factors identified in this study actually influence the GI planning and what measures are taken to facilitate the planning project. There is much potential for the four inner-city neighbourhoods considered in this research, to redesign their streetscapes to have features of urban green infrastructure elements, such as street trees, bicycle routes, and street furniture. Examples can be found in *West Broadway BIZ Master Plan* that promotes active transportation, pedestrian-friendly streetscapes, and infill tree planting in the business zone area (Scatliff+Miller+Murray, 2012) (see Figure 14). Similar and further integrated redesigns can be implemented in other streets, alleys, parks, and schoolyards of the four selected inner-city neighbourhoods when a pilot GI planning project is initiated.

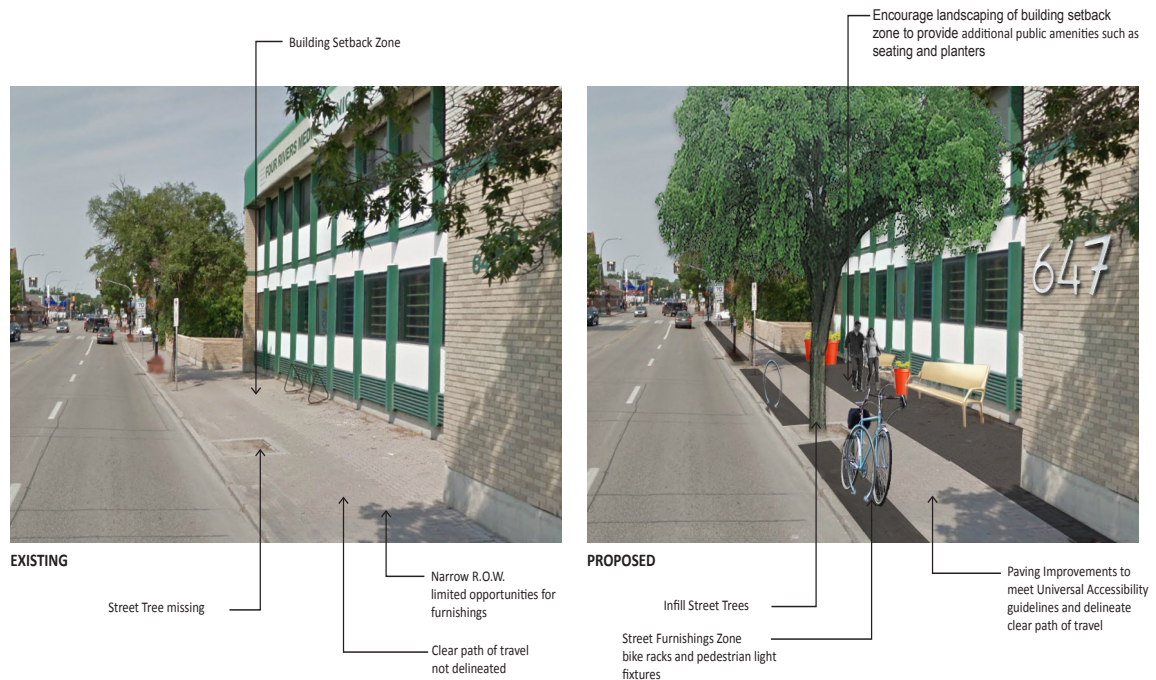


Figure 14. Broadway Corridor Streetscaping Example - Landscaping building setback zone. © Used with permission from West Broadway BIZ and Scatliff+Miller+Murray Inc.

Second, research to determine what would be a sustained model to finance the urban GI planning. An urban green infrastructure planning project will not succeed without sustained financial support. Current greening projects in the inner-city neighbourhoods studied are assisted by the combined financial resources from public and private (third) sectors. Further study on how a sustainable financing model can be or has been achieved to implement the urban GI planning projects is valuable, considering that neither the public entities or private entities (third sectors) can typically provide sufficient funding for the GI planning on their own.

Third, considering the important role that municipal government plays in urban GI planning, the interaction and relationship between the City of Winnipeg and neighbourhood development organizations could be further researched. The City of Winnipeg is a key partner in urban neighbourhood GI planning. The City has the

authority in regulating land use, providing green space planning policy, and making planning directions for GI, which has great impact on any urban GI planning project. Since the urban GI planning has the potential to be incorporated into the neighbourhood planning system, the question needing to be addressed is: What is an appropriate relationship between the City and the NDOs in GI planning?

The fourth recommendation is associated with studying the role of community gardens in the urban neighbourhood GI planning. Urban agriculture is popular in the four Winnipeg inner-city neighbourhoods considered in this study, as well as other urban neighbourhoods in the city (e.g. North Point Douglas). In the urban setting that lacks large green spaces, community gardens inevitably comprise a main component of GI resources. Further research about the status, benefits and challenges of community gardens in urban GI planning will be beneficial for the practices of GI planning in those neighbourhoods where residents are keen on urban agriculture.

5.3 Conclusions

Three main conclusions are drawn from this study. **The first is that green infrastructure planning in the Winnipeg urban neighbourhood context will take different physical forms in terms of network connection, which will have great impact on the GI benefits, GI planning principles and processes, as well as the planning practices in Winnipeg inner-city neighbourhoods.** Conventionally the physical network of GI is usually composed of large tracts of green spaces and green corridors (e.g. greenways, greenbelts) that are in the form of “hub” and “link” (Benedict & McMahon, 2001, 2006). Such network design is primarily focused on natural

processes and their ecological benefits, and the fit to a large scale, rural and peri-urban context. In relatively densely populated urban settings, such as those typical of Winnipeg inner-city neighbourhoods, as considered in this research, the standard GI network design is difficult to achieve, as the urban neighbourhood built environment provides limited supply of the natural features that contribute to conventional GI networks. Therefore, GI planning in Winnipeg urban neighbourhoods needs to employ existing environmental elements such as street trees, verges, hedges, pocket parks, school yards and pedestrian and cycle routes that could provide potentials to be conceived as or converted into, green infrastructure assets through better planning and design processes. These “unconventional” GI elements comprise the urban GI form and consolidate the benefits that could be delivered to the local urban communities. An informative reference for inspiration is the re: Streets website (<http://www.restreets.org/>), presenting comparative – now and after- illustrated concepts to represent inclusive design approaches for the public realm integrating multiple functions. This resource is particularly relevant as the focus is on the re-design of neighbourhood streets to provide multiple benefits in addition to green infrastructure, such as creating social gathering places, reinforcing mobility and access, offering play and recreation opportunities and enhancing neighbourhood image and local identity.

The physical form of GI in urban settings also has an influence on the potential benefits this can deliver to local communities. The intrinsic ecological benefits of green infrastructure are not as significant as those possible having larger area green spaces. However, urban GI can provide significant benefits for climate change adaptation in urban areas according to various researchers (Forest Research, 2010; Gill et al., 2007;

Pauleit et al., 2011; Wise, 2008). Compared with benefits regarding the ecological and environmental field, the social and health benefits of green infrastructure for community members are more obvious in this study. Perhaps this is because the GI in urban neighbourhoods places emphasis more on human interactions with nature. This research recommends a community-led approach be applied to guide other principles and practices of urban GI planning, to ensure community values and priorities are reflected in the planning process. A review of green plans and/or any greening projects, that may exist in the particular neighbourhoods, should be conducted, to provide the basis for the new GI plan, reflecting local context. There are opportunities for the selected neighbourhoods in this study to understand existing neighbourhood environmental assets from a new perspective when considering building green infrastructure. These neighbourhoods have laid a good foundation for GI planning preparation by developing their neighbourhood “green plans” and undertaking various greening projects.

The second conclusion that this research project has made is that the “green plans” of the four selected Winnipeg inner-city neighbourhoods provide valuable lessons for preparing for future urban GI planning. The “green plans” developed by these neighbourhoods are living documents that direct neighbourhood greening projects and reflect collective efforts of stakeholders in pursuing sustainable neighbourhood revitalization. Even though the greening projects have some features that urban GI normally possess, such as neighbourhood greenspaces providing both habitat for birds and insects and gathering place for community members, there are still some obvious gaps between those greening projects and what is intended by green infrastructure planning projects (see section 3.2.1). To help address the gaps, the lessons from the

neighbourhood “green plans” include developing a clear vision and goal setting for neighbourhood GI planning; developing active transportation facilities to interconnect neighbourhood green spaces; and developing more programs to enhance potential of benefits of neighbourhood green infrastructure. These lessons reflect certain issues that can be improved upon in transitioning from the current neighbourhood greening projects to an urban GI planning project as presented here.

The final conclusion is that strategies and measures are needed to tackle specific situations that are created by external opportunities and challenges, as well as internal strengths and weaknesses, when incorporating urban green infrastructure into neighbourhood “green plans”. Urban GI planning in the selected Winnipeg neighbourhoods needs to reflect the local context by respecting the community-led planning approach and integrating the GI concept into “green plans”. The current “green plans” and greening projects need to be examined to understand the opportunities and challenges of incorporating the GI concept into the “green plans”. Opportunities and challenges of urban GI planning identified in this research involve government policies, stakeholder partnership, multifunctional use of green spaces, cultural heritage enhancement and local distinctiveness recognition, implementation approaches, competing interests between housing and greening, and the understanding and acceptance of green infrastructure idea. These opportunities and challenges reflect external impacts that the four selected Winnipeg inner-city neighbourhood will face in regards to GI planning. The external impact of opportunities and challenges can become more complicated when taking the internal impact factors such as the neighbourhoods’ strengths and weaknesses into account. Therefore, through a SWOT-TOWS framework

analysis, the strategies and measures that can be used to ameliorate or cope with different situations that neighbourhood may be facing during GI planning process, are developed and summarized. Whatever situations that Winnipeg urban neighbourhoods may face while engaging in urban GI planning, the neighbourhood development organizations (NDOs) are key players in the planning process. Depending on the stage of urban GI planning, the role of NDOs may be different. During the GI plan making stage, NDOs may continue to play the role of liaison and advocate similar to when developing neighbourhood “green plans” and greening projects. In the plan implementation stage, NDOs may assume more responsibilities for GI project management, such as maintaining the green infrastructure, monitoring the performance and keeping initiatives alive through citizen involvement and educational programs.

LIST OF REFERENCES

- Ahern, J. (2007). Green infrastructure for cities: the spatial dimension. In VBP Novotny (Eds.), *Cities of the future: Towards integrated sustainable water and landscape management* (pp.267-283). London: IWA Publishing.
- Alexander, E.R. (2006). Evolution and status: Where is planning-evaluation today and how did it get here? In E. R. Alexander (Eds.), *Evaluation in planning: Evolution and prospects* (pp.3-16). Burlington, VT: Ashgate Publication Company.
- Alexander, E.R. & Faludi, A. (1989) Planning and plan implementation: Notes on evaluation criteria. *Environment and Planning B: Planning & Design*, 16(1), p. 127–140.
- Alphonso, M. & Wiebe, E. (2009). West Central Winnipeg community profile 2006: Daniel McIntyre, St. Matthews, Spence. Winnipeg: Neighbourhood Alive! Program, Province of Manitoba.
- Anton, P.A. (2005). *The economic value of open space: Implications for land use decisions*. Saint Paul, Minnesota: Wilder Research. Retrieved October 5, 2013, from <http://www.embraceopenspace.org/vertical/sites/%7B82DBC2D2-DFA6-4A33-879D-A8D2AF1A5804%7D/uploads/%7B3A54EEAC-BD55-4A8F-B49F-EC58D5CD328F%7D.PDF>
- Baer, W. C. (1997). General plan evaluation criteria: An approach to making better plans. *Journal of the American Planning Association*, 63(3), 329-344.
- Baker, C., Mahé, R., Wiseman, K., & van Vliet, D. (2009). Green infrastructure networks as urban connective tissue. *Plan Canada* 49(1), 36-40.
- Banerjee T. (2001). The future of public space: Beyond invented streets and reinvented places, *Journal of the American Planning Association*, 67(1), 9-24
- Barton, M. and Jones, N. (2009). *A guide to planning green infrastructure at the sub-regional level* (draft v3.1). Natural Economy Northwest Program Retrieved March 9, 2011 from http://www.greeninfrastructurenw.co.uk/resources/Sub_Regional_GI_planning_guide_v3.pdf
- Baycan-Levent, T., Vreeker, R., Nijkamp, P. (2009). A multi-criteria evaluation of greenspaces in European cities, *European Urban and Regional Studies* 16 (2), 219–239.
- Beatley, T. (2011). *Biophilic Cities: Integrating nature into urban design and planning*. Washington D.C.: Island Press

- Bedimo-Rung, A. L., Mowen, A. J., & Cohen, D. A. (2005). The significance of parks to physical activity and public health: A conceptual model. *American Journal of Preventive Medicine*, 28(2 Suppl 2), 159-168. doi:10.1016/j.ampre.2004.10.024
- Bell, S., Hamilton, V., Montarzino, A., Rothnie, H., Travlou, P. and Alves, S. (2008). *Greenspace and quality of life: A critical literature review*. Stirling, Scotland: Greenspace Scotland. Retrieved March 6, 2012, from http://www.openspace.eca.ac.uk/pdf/appendixf/OPENspacewebsite_APPENDIX_F_resource_9.pdf
- Benedict, M. A., McMahon, E. T. (2001). *Green infrastructure: Smart conservation for the 21st century*. Washington, D.C.: Sprawl Watch Clearinghouse. Retrieved from November 15, 2010, from <http://www.conservaionfund.org/node/484>
- Benedict, M. A., McMahon, E. T. (2006). *Green infrastructure: Linking landscapes and communities*. Washington D.C.: Island Press.
- Bruce, J., Egner, M. and Noble, D. (2006): *Adapting to climate change: a risk-based guide for Ontario municipalities*. Report submitted to Natural Resources Canada, Climate Change Impacts and Adaptation Program. Retrieved June 6, 2012 from http://adaptation.nrcan.gc.ca/assess/2007/synth/ref_e.php
- Bui, Y. N. (2009). *How to write a master's thesis*. Thousand Oaks, CA: Sage Publications Inc.
- Cassidy, C. (2012, May 27) Central Park— 'Peg-style': Revitalization of our 'urban green' worth making a big splash about. *Winnipeg Free Press*, Retrieved February 15, 2014, from <http://www.winnipegfreepress.com/local/central-park---peg-style-154680025.html>
- Castello, L. (2010). *Rethinking the meaning of place: Conceiving place in architecture-urbanism*. Farnham, Surrey: Ashgate Publishing Limited.
- Carter, T., Polevychok, C., & Sargent, K. (2003). *Winnipeg's inner city in 2001*. Retrieved November 17, 2013, from <http://geography.uwinnipeg.ca/Carter/Publications/Research/RH-01.pdf>
- Carter, T., Polevychok, C., & Sargent, K. (2005). *Poverty changes in Winnipeg neighbourhoods 1981-2001*. Retrieved November 17, 2013, from <http://geography.uwinnipeg.ca/Carter/Publications/Research/RH-05.pdf>
- Checkoway, B. (1984). Two types of planning in neighborhoods. *Journal of Planning Education and Research*, 3(2), 102-109. doi: 10.1177/0739456X8400300209
- Checkoway, B. (1985). Neighborhood planning organizations: Perspectives and choices. *The Journal of Applied Behavioral Science*, 21(4), 471.

- City of Toronto. (2013). *Parks plan 2013-2017*. Retrieved March 27, 2014 from http://www1.toronto.ca/city_of_toronto/parks_forestry__recreation/community_involvement/files/pdf/parksplan.pdf
- City of Winnipeg. (2006). *2006 census-neighbourhood profiles*. Retrieved (Jan 8, 2014) from <http://winnipeg.ca/census/2006/Community%20Areas/Downtown%20Neighbourhood%20Cluster/Neighbourhoods/Downtown%20East/Downtown%20East%20Neighbourhoods/West%20Broadway/West%20Broadway.pdf>
- City of Winnipeg Charter Act. (2002, c.39). Retrieved February 10, 2012, from Manitoba Laws website <https://web2.gov.mb.ca/laws/statutes/2002/c03902e.php>
- City of Winnipeg Planning and Development Department (2011). *Our Winnipeg*. Retrieved August 15, 2012, from <http://www.winnipeg.ca/ppd/OurWinnipeg/pdf/OurWinnipeg.Jul15.2010.pdf>
- City of Winnipeg. (2013). *Budget 2014: Capital budgets calls for increasing the investment in reforestation to \$1 million, an increase of 161 per cent, to further protect our City's tree canopy*. Retrieved Jan 21, 2014, from http://winnipeg.ca/cao/media/news/nr_2013/nr_20131203.stm#1
- City of Winnipeg Public Works Department. (2012). *2012 Traffic flow map*. Retrieved November 19, 2013 from <http://www.winnipeg.ca/publicworks/PDF/Transportation/Traffic-Flow-Map-2012.pdf>
- Cousins, P. and Land Use Consultants. (2009). *Economic contribution of green networks: current evidence and action*. Retrieved April 10, 2014, from <http://gtgkm.org.uk/documents/economic-contribution-of-green-networks-1285344532.pdf>
- Daniel McIntyre/ St. Matthews Community Association. (2010). *DMSMCA: Five year green action plan*. Retrieved June 2, 2014, from, <http://www.dmsmca.ca/index.php/greening/greening-action-plan>
- Davies, C., McGloin, C., MacFarlane, R., & Roe, M. (2006). *Green infrastructure planning guide project: Final report*. Retrieved February 28, 2014, from <http://www.scribd.com/doc/33007993/Green-Infrastructure-Planning-Guide>
- De Vries, S., Verheij, R. A., Groenewegen, P. P. and Spreeuwenberg, P. (2003). Natural environments –healthy environments? An exploratory analysis of the relationship between greenspace and health. *Environment and Planning A* **35** (10), 1717–1731. doi:10.1068/a35111

- Donofrio, J., Kuhn, Y., McWalter, K., & Winsor, M. (2009). Water-sensitive urban design: An emerging model in sustainable design and comprehensive water-cycle management. *Environmental Practice*, 11(03), 179-189.
- Dunn, A. D. (2010). Siting green infrastructure: Legal and policy solutions to alleviate urban poverty and promote healthy communities. *Boston College Environmental Affairs Law Review*, 37(1), 41.
- England's Community Forests. (n.d). *What is green infrastructure*. Retrieved from <http://www.greeninfrastructure.co.uk/>
- Fairburn, J., Smith, G. (2008). Environmental justice in South Yorkshire: working towards a better quality life. Retrieved April 15, 2014 from http://staffs.ac.uk/assets/Environmental%20Justice%20in%20South%20Yorkshire_tcm44-21944.pdf
- Forman, R. T. (1995). *Land mosaics: the ecology of landscapes and regions*. New York: Cambridge University Press.
- Forest Research (2010). *Benefits of green infrastructure: Report to Defra and CLG*. Farnham, England: Forest Research. Retrieved April 14, 2013 from [http://www.forestry.gov.uk/pdf/urgp_benefits_of_green_infrastructure_main_report.pdf/\\$FILE/urgp_benefits_of_green_infrastructure_main_report.pdf](http://www.forestry.gov.uk/pdf/urgp_benefits_of_green_infrastructure_main_report.pdf/$FILE/urgp_benefits_of_green_infrastructure_main_report.pdf)
- Forsyth, S., Bodnarchuk, J., O'Kell, J., & Roos, L. (2004). *Winnipeg quality of life project final report*. Retrieved Dec 24, 2013, from <http://seedwinnipeg.ca/files/FinalCompleteReport.pdf>
- Friesner, T. (2010). *History of SWOT analysis*. Retrieved March 2, 2014, from <http://www.marketingteacher.com/swot/history-of-swot.html>
- Gill, S., Handley, J., Ennos, A., & Pauleit, S. (2007). Adapting cities for climate change: the role of the green infrastructure. *Built Environment*, 33 (1), 115-133
- Gray, D. E. (2009). *Doing research in the real world*. London: Sage Publications Ltd.
- GreenHere.(n.d.). *Reforestation Projects*. Retrieved April 2, 2014 from <http://www.greenhere.ca/reforestation-projects.html>
- Hamel, G. (n.d.). *Difference between SWOT & TOWS analysis*. Retrieved March 15, 2013, from, <http://smallbusiness.chron.com/difference-between-swot-tows-analysis-23169.html>

- Hu, Z., Liebens, J., & Rao, K. R. (2008). Linking stroke mortality with air pollution, income, and greenness in northwest Florida: An ecological geographical study. *International Journal of Health Geographics*, 7(1), 20-20. doi:10.1186/1476-072X-7-20
- Jane Heaton Associates. (2005). *Green infrastructure for sustainable communities*. [Leaflet]. Nottingham: Environment Agency. Retrieved October 28, 2010 from http://www.seco.org.uk/downloads/CSE_Partner_publications/greeninfrastructureguide.pdf
- Jorgensen, A., Hitchmough, J. and Dunnett, N. (2007). Woodland as a setting for housing-appreciation and fear and the contribution to residential satisfaction and place identity in Warrington New Town, UK. *Landscape and Urban Planning*, 79, 273–287.
- Kambites, C., Owen, S. (2006). *Renewed prospects for green infrastructure planning in the UK. Planning, Practice & Research*, 21, 483-496.
- Kaplan, R., & Kim, J. (2004). Physical and psychological factors in sense of community: New urbanist kentlands and nearby orchard village. *Environment and Behavior*, 36(3), 313-340. doi:10.1177/0013916503260236
- Khakee, A. (1998) Evaluation and planning: inseparable concepts. *Town Planning Review*, 69(4), 359–374.
- Kuppuswamy, H. (2009). Improving health in cities using green infrastructure: A review. *FORUM Ejournal*, 9, 63-76.
- Kweon, B., Wiley, A. R., & Sullivan, W. C. (1998). Green common spaces and the social integration of inner-city older adults. *Environment and Behavior*, 30(6), 832-858. doi:10.1177/001391659803000605
- Landscape Institute. (2011). *Local green infrastructure: Helping communities make the most of their landscape*. Retrieved February 10, 2014, from http://www.landscapeinstitute.org/PDF/Contribute/LocalGreenInfrastructurewebversion_002.pdf
- Laurian, L., Day, M., Berke, P., Ericksen, N., Backhurst, M., Crawford, J., & Dixon, J. (2004). Evaluating plan implementation: A conformance-based methodology. *Journal of the American Planning Association*, 70(4), 471-480. doi: 10.1080/01944360408976395
- Maas, J., van Dillen, S M. E., Verheij, R. A., & Groenewegen, P. P. (2009). Social contacts as a possible mechanism behind the relation between green space and health. *Health & Place*, 15(2), 586-595. doi:10.1016/j.healthplace.2008.09.006

- Manitoba Department of Conservation and Water Stewardship. (2012). TomorrowNow-Manitoba's Green Plan. Retrieved May 24, 2014 from <http://www.gov.mb.ca/conservation/tomorrownowgreenplan/pdf/tomorrowNowBook.pdf>
- Mayer, N. (1984). *Neighborhood organizations and community development: Making revitalization work*. Washington, D.C.: Urban Institute Press
- McDonald, L. A., Allen, W. L., Benedict, M. A., & O'Conner, K. (2005). Green infrastructure plan evaluation frameworks. *Journal of Conservation Planning*, 1, 6-25. Retrieved November 14, 2011, from <http://www.journalconsplanning.org/2005/volume1/issue1/allen/manuscript.pdf>
- McKenzie-Mohr, D. & Smith, W. (1999). *Fostering sustainable behavior: An introduction to community-based social marketing (second edition)*. BC, Canada: New Society Publishers
- Mell, I. C. (2008). Green infrastructure: concepts and planning. *FORUM: International Journal for Postgraduate Studies in Architecture, Planning and Landscape*, 8 (1), 69–80.
- Natural England. (2009). *Green infrastructure guidance*. Retrieved June 7, 2011, from <http://publications.naturalengland.org.uk/publication/35033>
- Neechi Foods Worker Coop. (n.d.). *Community Economic Development (CED) guiding principles*. Retrieved (Jan 2, 2014) from http://ccednet-rdec.ca/sites/ccednet-rdec.ca/files/ced_principles.pdf
- North West Green Infrastructure Think Tank. (2008). *North West green infrastructure guide*. UK: The North West Green Infrastructure Think Tank. Retrieved May 12, 2011, from <http://www.greeninfrastructurenw.co.uk/resources/GIguide.pdf>
- Oliveira, V., & Pinho, P. (2010a). Evaluation in urban planning: Advances and prospects. *Journal of Planning Literature*, 24(4), 343-361. doi: 10.1177/0885412210364589
- Oliveira, V., & Pinho, P. (2010b). Measuring success in planning: Developing and testing a methodology for planning evaluation. *Town Planning Review*, 81(3), 307-332. doi: 10.3828/tpr.2010.7
- Ontario Ministry of Municipal Affairs and Housing. (2014). *Provincial Policy Statement, 2014*. Retrieved from Ontario Ministry of Municipal Affairs and Housing website: <http://www.mah.gov.on.ca/AssetFactory.aspx?did=10463>
- Partners for Livable Communities. (n.d.). *What is livability?* Retrieved May 1, 2014, from <http://livable.org/about-us/what-is-livability>

- Pauleit, S., Liu, L., Ahern, J., & Kazmierczak, A. (2011). Multifunctional green infrastructure planning to promote ecological services in the city. In Niemelä, J. (Eds.), *Urban Ecology: Patterns, processes, and Applications* (pp. 273-285). New York: Oxford University Press.
- Province of Manitoba and City of Winnipeg. (2002). *A guide for developing neighbourhood plans*. Retrieve (Nov.18, 2013) from the City of Winnipeg website http://www.winnipeg.ca/ppd/pdf_files/Nhbd_guide.pdf
- Randolph, J. (2004). *Environmental land use planning and management*. Washington, DC: Island Press.
- Ravenscroft, N., & Markwell, S. (2000). Ethnicity and the integration and exclusion of young people through urban park and recreation provision. *Managing Leisure*, 5(3), 135-150. doi:10.1080/13606710050084838
- Rohe, W. M. and Gates, L. B. (1985). *Planning with neighborhoods*. Chapel Hill: University of North Carolina Press
- Sandstrom, U. G. (2002). Green infrastructure planning in urban Sweden. *Planning Practice & Research*, 17, 373-385. Retrieved from EBSCOhost Academic Search Complete database.
- Scatliff+Miller+Murray. (2012). *West Broadway BIZ master plan*. Retrieved January 10, 2014, from <http://westbroadwaybiz.com/>
- Scottish Executive. (2001). *Planning and sustainable urban drainage systems*. (Planning Advice Note PAN 61). Retrieved September 12, 2011, from <http://www.scotland.gov.uk/Publications/2001/07/pan61>
- Seeland, K., Dübendorfer, S., & Hansmann, R. (2009). Making friends in zurich's urban forests and parks: The role of public green space for social inclusion of youths from different cultures. *Forest Policy and Economics*, 11(1), 10-17. doi:10.1016/j.forpol.2008.07.005
- Sfondeles, T. (2014, March 20). City wants to offer vacant Englewood lots for a dollar. *Chicago Sun-Times*. Retrieved April 2, 2014, from <http://www.suntimes.com/>
- Shinew, K., Glover, T., & Parry, D. (2004). Leisure spaces as potential sites for interracial interaction: Community gardens in urban areas. *Journal of Leisure Research*, 36(3), 336-355.
- Spence Neighbourhood Association. (2009). Spence Neighbourhood Association Green Plan 2010-2014. Retrieved June 2, 2011, from http://media.wix.com/ugd/37e087_ee1f7071b67a4f6a98a0761890c8ff4e.pdf

- Spence Neighbourhood Association. (n.d.). Spence Neighbourhood Association 10th Anniversary Timeline. Retrieved May 1, 2013, from http://media.wix.com/ugd/37e087_a7b71473055f0f02e0c89929b34edf1d.pdf
- Sullivan, W., Kuo, F., & DePooter, S. (2004). The fruit of urban nature - vital neighborhood spaces. *Environment and Behaviour*, 36(5), 678-700. doi:10.1177/0193841x04264945
- Sustainability South West. (2010). *Urban green infrastructure networks: the social, economic and environmental potential*. Retrieved February 4, 2012, from <http://www.sustainabilitysouthwest.org.uk/assets/files/GI%20briefing%20note.pdf>
- Takano, T., Nakamura, K., & Watanabe, M. (2002). Urban residential environments and senior citizens' longevity in megacity areas: The importance of walkable green spaces. *Journal of Epidemiology and Community Health*, 56(12), 913-918. doi:10.1136/jech.56.12.913
- Talen, E. (1996). Do plans get implemented? A review of evaluation in planning. *Journal of Planning Literature*, 10(3), 248-259. doi: 10.1177/088541229601000302
- Taylor, A. F., Kuo, F. E., & Sullivan, W. C. (2001). Coping with add. *Environment and Behavior*, 33(1), 54-77. doi:10.1177/00139160121972864
- Taylor, A. F., Wiley, A., & Kuo, F. E., Sullivan, W. C., (1998). Growing up in the inner city: Green spaces as places to grow. *Environment and Behavior*, 30(1), 3-27. doi:10.1177/0013916598301001
- The President's Council on Sustainable Development. (1999). *Towards a sustainable America — Advancing prosperity, opportunity, and a healthy environment for the 21st century*. Washington, D.C.: U.S. Government Printing Office, 1999.
- Tibbatts, D. (2002). *Your parks: the benefits of parks and greenspace*. London: Urban parks forum. Retrieved April 10, 2014, from <http://www.greenspace.org.uk/downloads/ArchivedPublications/YourParks.pdf>
- Tindal, C. R. and Tindal, S.N. (2008). *Local government in Canada (seventh edition)*. Scarborough, ON: Nelson College Indigenous.
- Town and Country Planning Association. (2008). *The essential role of green infrastructure: Eco-towns green infrastructure worksheet*. Retrieved March 6, 2012, from http://www.tcpa.org.uk/data/files/etws_green_infrastructure.pdf

- Trejo, F. V. (2012). *Community rejuvenation through placemaking initiatives: Planners, farmer's markets and urban neighbourhoods, Central Park neighbourhood, Winnipeg, Canada* (Master's thesis). Retrieved February 14, 2014, from MySpace University of Manitoba database <http://hdl.handle.net/1993/11463>
- Tzoulas, K., Korpela, K., Venn, S., Yli-Pelkonen, V., Kaźmierczak, Niemela, J. and James, P. (2007). Promoting ecosystem and human health in urban areas using green infrastructure: a literature review. *Landscape and Urban Planning*, 81 (3), 167–178.
- U.S. Department of State. (2012). *Fact Sheet: Non-Governmental Organizations (NGOs) in the United States*. Retrieved from June 8, 2014, from <http://www.humanrights.gov/2012/01/12/fact-sheet-non-governmental-organizations-ngos-in-the-united-states/>
- U.S. Environmental Protection Agency. (2000). *Low impact development (LID): A literature review* (EPA-841-B-00-005). Washington DC: Government Printing Office.
- U.S Environmental Protection Agency. (2008). *Managing wet weather with green infrastructure action strategy*. Washington DC: Government Printing Office. Retrieved 2011, March 9 from http://www.epa.gov/npdes/pubs/gi_action_strategy.pdf
- U.S Environmental Protection Agency. (2009). *Definition of "Infrastructure" for purposes of the American Recovery and Reinvestment Act of 2009*. Retrieved May 1, 2014, from http://www.epa.gov/ogd/forms/Definition_of_Infrastructure_for_ARRA.pdf
- Venn, S.J., Niemela, J.K. (2004). Ecology in a multidisciplinary study of urban green space: the URGE project. *Boreal Environment Research* 9, 479–489.
- Wehrich, H. (1982). The TOWS matrix-A tool for situational analysis. *Long Range Planning*, 15(2): 54-66 Retrieved March 6, 2013, from http://www.usfca.edu/fac_staff/wehrichh/docs/tows.pdf
- Wells, N. M. (2000). At home with nature: Effects of "greenness" on children's cognitive functioning. *Environment and Behavior*, 32(6), 775-795. doi:10.1177/00139160021972793
- West Broadway Community Organization. (2009). *Green space planning process and green space plan*. Retrieved June 2, 2011, from <http://www.westbroadway.mb.ca/greening-2/green-space-plan-long-term-planning>

- Williamson K.S. (2003). *Growing with Green Infrastructure*. Doylestown: Heritage Conservancy. Retrieved November, 10, 2010 from http://www.greeninfrastructurenw.co.uk/resources/Growing_with_GI.pdf
- Wilkie, K., & Ashcroft, C. (2009). From Grey to Green: The transformation of Canada's infrastructure. *Plan Canada*, 49(1), 11-13.
- Wise, S. (2008). Green infrastructure rising. *Planning*, 74(8), 14-19.

APPENDICES

Appendix A: Ethics Approval Certificate



Research Ethics and Compliance

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APPROVAL CERTIFICATE

March 26, 2013

TO: Shengxu Li (Advisor D. van Vliet)
Principal Investigator

FROM: Susan Frohlick, Acting Chair
Joint-Faculty Research Ethics Board (JFREB)

Re: Protocol #J2013:039
"Green Infrastructure Planning in an Urban Context: "Green Plans" in Four
Winnipeg Inner-City Neighbourhoods"

Please be advised that your above-referenced protocol has received human ethics approval by the **Joint-Faculty Research Ethics Board**, which is organized and operates according to the Tri-Council Policy Statement (2). **This approval is valid for one year only.**

Any significant changes of the protocol and/or informed consent form should be reported to the Human Ethics Secretariat in advance of implementation of such changes.

Please note:

- If you have funds pending human ethics approval, the auditor requires that you submit a copy of this Approval Certificate to the Office of Research Services, fax 261-0325 - please include the name of the funding agency and your UM Project number. This must be faxed before your account can be accessed.
- if you have received multi-year funding for this research, responsibility lies with you to apply for and obtain Renewal Approval at the expiry of the initial one-year approval; otherwise the account will be locked.

The Research Quality Management Office may request to review research documentation from this project to demonstrate compliance with this approved protocol and the University of Manitoba *Ethics of Research Involving Humans*.

The Research Ethics Board requests a final report for your study (available at: http://umanitoba.ca/research/orec/ethics/human_ethics_REB_forms_guidelines.html) in order to be in compliance with Tri-Council Guidelines.

Appendix B: Semi-Structured Interview Guide



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Inner-City Neighbourhoods Interview Background

The four Winnipeg inner-city neighbourhoods: Spence, West Broadway, Daniel McIntyre, and St. Matthews are located around downtown core areas. In addition to the three “green plans”, those neighbourhood also designated green and environment committees to guide the green space development work, which can be considered as overcome the drawbacks of limited green spaces and lacking support from municipal government.

Research Objectives

This research when completed will partially fulfill the requirements of the Master of City Planning Degree at the University of Manitoba. Through investigating the existing green plans developed in four Winnipeg inner-city neighbourhoods, the intent of this research is to identify factors including opportunities and challenges that influence inner-city neighbourhood green infrastructure planning and further to analyze and explicate the prospects, challenges, and potential measures for urban green infrastructure planning in Winnipeg.

Consultation & Methods

My intention is to consult with members from various stakeholder parties of the four neighbourhoods green projects, including neighbourhood development organizations staff, municipal and provincial government staff, local residents as appropriate to gain an understanding of the environment of conducting neighbourhood green infrastructure planning and the partnerships required to establish in the planning process.

Confidentiality and Consent

Participation in this study is voluntary, and interviews will be recorded digitally, if permission is granted by the participants. If permission to record is not granted, only hand written notes will be used. All audio files and interview notes collected during the research process will be destroyed upon completion of the thesis. Consent will be obtained from participants in writing. An overview of research results will be given to all participants at the conclusion of the thesis project. The full practicum document will be made available to those who are interested, in PDF format, by e-mail.

a. For Neighbourhood Development Organization Staff

1. How have the greening projects provided benefits to neighbourhood residents?
2. Have the greening projects gained support from local residents? What kinds of support have been received?
3. Have the greening projects caused any conflicts or complaints within the neighbourhood?
4. From your experience, what are the difficulties that may influence the development of greening projects? (e.g. Resources? Money? Information? Data? Tools?)
5. In what ways do the greening projects reflect community values?
6. Do you think any partnerships have been formulated through the greening projects? Who do you identify as the partners? How has this changed over time?
7. Have you heard of the term “green infrastructure”? (If not, the interviewer provides explanations).
8. From your perspective, are the green spaces in the neighbourhood considered as “green infrastructure” or having potential to develop as “green infrastructure”?
9. How do you think the concept “urban green infrastructure” can be incorporated into the green plans?
10. Have you identified any factors (positive or negative) that may influence the concept (urban green infrastructure) to be incorporated in the green plan? What are they?
11. What do you think of the role of the neighbourhood development organization(s) in green infrastructure planning process?

Follow-up questions may be required to clarify or expand upon interview responses.
Any follow-up questions will be re-numbered for consistent data entry.

Some examples may include:

- What was effective, what wasn't?
- What are the barriers?
- What has worked best/worst?
- How could this be improved upon?

b. For City of Winnipeg Staff -Planning, Property and Development Dept, Public Works Dept-Parks and Open Space Division

1. What kind of role can planners play in these neighbourhood greening projects?
2. What kind of role can the City of Winnipeg play in the neighbourhood greening projects?
3. Are you familiar with the “green plan” in any of those neighbourhoods? (If yes..). 3a. What are some of your thoughts regarding the green plans you are familiar with?
4. In what ways will/have the “green plans” meet/met the municipal planning objectives
5. Do you think the greening initiatives in those “green plans” can be promoted to other neighbourhoods in Winnipeg? (If yes) 4a. Why? (If no) 4b. What are the challenges or barriers? (e.g. Resources? Money? Information? Data? Tools?)
6. Have you heard of the term “green infrastructure”? (If not, the interviewer provides explanations).
7. From your perspective, are the green spaces in the neighbourhood considered as “green infrastructure” or having potential to develop as “green infrastructure”?
8. If the concept “urban green infrastructure” is incorporated into the neighbourhoods “green plans”, do you think it will help green space planning in those areas?
9. What do you think of the roles of the neighbourhood development organization(s) in green infrastructure planning process? Are their roles compatible with ones of the City of Winnipeg? Why?

Follow-up questions may be required to clarify or expand upon interview responses.
Any follow-up questions will be re-numbered for consistent data entry.

Some examples may include:

- What was effective, what wasn't?
- What are the barriers?
- What has worked best/worst?
- How could this be improved upon?

c. For Province of Manitoba - Neighbourhoods Alive Program and other related programs

1. What is/was the purpose of the Neighbourhoods Alive program (or other related programs) in sponsoring those neighbourhoods greening projects?
2. What kind of role can Province of Manitoba play in those neighbourhood greening projects?
3. How do you measure the performance of the Neighbourhoods Alive Program (or other related programs)? 3a. How would you rate the performance of these neighbourhood greening projects?
4. Are you familiar with the "green plan" in any of those neighbourhoods? (If yes..). 4a. What are some of your thoughts regarding the green plans you are familiar with?
5. Do you expect more Winnipeg urban neighbourhoods to develop similar "green plans" and greening projects supported by the Neighbourhood Alive Program (or other related programs)? And why?

Follow-up questions may be required to clarify or expand upon interview responses.

Any follow-up questions will be re-numbered for consistent data entry.

Some examples may include:

- What was effective, what wasn't?
- What are the barriers?
- What has worked best/worst?
- How could this be improved upon?

d. For Neighbourhood Residents and Businesses

1. Have the greening projects benefited your life? OR In what ways would you say the greening projects benefited your life.
2. How do you value the existing greening projects?
3. From your perspective, what could be done to improve the neighbourhood green spaces related to your specific preferred use?
4. How effective are the neighbourhood greening projects in providing the experience you are after? 4a. And how could this experience be enhanced?
5. Have you heard of the term “green infrastructure”? (If not, the interviewer provides explanations).
6. Do you consider neighbourhood green spaces as “green infrastructure” or having potential as “green infrastructure” if properly planned and managed? (If yes) 5a. Why? (If no.) What are the challenges or barriers?
7. What do you think of the role of the neighbourhood development organization(s) in green infrastructure planning process?

Follow-up questions may be required to clarify or expand upon interview responses.

Any follow-up questions will be re-numbered for consistent data entry.

Some examples may include:

- What was effective, what wasn't?
- What are the barriers?
- What has worked best/worst?
- How could this be improved upon?

Appendix C: Focus Group Interview Information Sheet



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1. Purpose of the Research

The role of this research is to satisfy the major degree project requirement of the Master of City Planning Degree at the University of Manitoba. The project is titled *Green Infrastructure Planning in an Urban Context: “Green Plans” in Four Winnipeg Inner-City Neighbourhoods*. The intent of this research is to identify factors including opportunities and challenges that influence inner-city neighbourhood green infrastructure planning and further to analyze and explicate the prospects, challenges, and potential measures for urban green infrastructure planning in Winnipeg.

2. Purpose of the Focus Group

The focus group interview is one of my research methods for my major degree project. My intention is to consult with members from various stakeholder parties of the four neighbourhoods green projects, who may be familiar with my research and relevant topics as appropriate to gain feedback and reflections on my initial findings and draft recommendations arising from the other research methods, including semi-structured interviews, literature reviews and “green plans” evaluation.

3. Ethics Considerations

This research has been approved by the Joint Faculty Research Ethics Board at the University of Manitoba. Participants will be given a copy of consent form and required to sign on it before joining the focus group. For other ethical things regarding the focus group, please see the Informed Consent Form for details.

4. The Focus Group Procedure

The focus group interview will take about 1-1.5 hours, depending on the process flow. Refreshments will be provided during the session. Participants will be invited to look through the initial findings and recommendations first, which have been sent to them prior to the focus group. Then each item will be discussed openly to see whether these findings reflect the facts that people perceived and the recommendations addressing the issues. Follow-up questions may be asked to clarify or expand the responses. The focus group interview session will be audio recorded to ensure accurate record of responses. A flip chart will be used or notes taken, to record the responses to support the discussion.

5. Initial Findings

1). Benefits to community

1)a Social interaction and cohesion

Social benefits are widely documented in the literature about green space planning. All the neighbourhood members interviewed expressed their satisfaction with more tight community connection by engaging neighbourhood greening projects;

1)b Community beautification and environmental protection

Even those who are not directly involved in neighbourhood greening projects still enjoy the positive changes to the neighbourhood image and the environment brought by greening projects;

1)c Challenge: The environmental and ecological impact is not significant because the size of green spaces in the neighbourhoods, which are currently being planned, developed, and maintained are small

2). Community involvement

2)a Community-Led approach

Neighbourhood greening projects reflect community values through the consultation process of developing “green plans”, to the project implementation and management;

2)b Involvement types-how do community members support the projects

Community members were involving in the community consultation process; Volunteering in greening committees; Helping to maintain green spaces; Attending workshops, and sharing green work knowledge and skills.

- 3)b Challenges to community involvement: Transient population and high residential mobility; Effective communication between neighbourhood organizations and community members; The difficulties to foster ownership and identity.

3). Stakeholders roles

3)a Neighbourhood organization's role

Advocating to levels of government on behalf the neighbourhoods; Acting as liaison between municipal government and neighbourhood residents; Continuing to be environmental educator to foster more sustainable behaviors;

3)b Community member's role

Share environmental knowledge with the neighbourhood development organizations and community members; Share ideas about what the neighbourhoods can be;

3)c Levels of government's role

- Municipal government: Making planning directions for GI planning to make it compatible with the City's development plan; Providing educational information about GI through different media, such as info on City's green space website; Providing support in terms of funding, expertise, and capacity building;
- Provincial government: *Neighbourhood Alive!* Program is also a key partner in community development efforts. Gain more financial support from other department programs, such as Climate and Green Initiatives in Manitoba Conservation and Water Stewardship Department

4). Factors influencing GI planning

4)a Transient population

High residential mobility "detracts from efforts to build community capacity and cohesion"(Carter, Polevychok, & Sargent, 2003) and creates less-engaged residents.

4)b Funding opportunities

Lacking sufficient, long-term funding. Funding has often been project based, which may undermine the long-term efforts to maintain neighbourhood green spaces; Financial support for labour work are not sustained and create staff turnover which may undermine greening work in the neighbourhoods.

4)c Partnership

Partnership with stakeholders, including other inner-city neighbourhood development organizations, school board, local business organizations, and levels of governments, especially municipal government to support GI planning in the inner-city neighbourhoods;

4)d Competing interests between greening and housing;

Contested lands in urban core areas, with a struggling effort to strike a balance between housing development and green space planning by the neighbourhood development organizations and municipal government. Without better conflict solution strategies, GI planning is in the risk of losing ground

4)e Programming development in green spaces

Providing more programs in the neighbourhood green spaces, including parks, tot lots, community gardens for people, especially for children and older adults may attract more people to use them and more people to be involved in the GI planning.

4)f Understanding and acceptance of the GI concept by community members

The “buy in” of GI is vital to both community members and local authorities. Better understanding and further acceptance of this new strategy in green space planning will be conducive to GI planning.

4)g The existing “green plans” in the four neighbourhoods can be further developed with broader partnerships to embrace green infrastructure planning.

6. Initial Recommendations

Successful green infrastructure planning in the neighbourhoods requires a wider and effective collaboration effort between stakeholders and relevant resources.

- 6)a. Create more programs in community gardens and other green spaces that can be engaged in by different age groups, especially for older adults and children;
Continue to operate “Winnipeg inner-city community garden bike and bus tour” and

- try to find more ways to raise awareness of inner-city community green infrastructure planning by advertizing on community newspapers, radios; Invite other garden groups such as university garden groups to attend events and programs.
- 6)b. Collaborate with 'housing committee' on conflict resolution of competing interests between green space planning and housing development in each neighbourhood development organization. An example of accomplishment with this, is the design and construction of a 4 unit block of affordable housing on a site having an accessible garden, in the West Broadway Neighbourhood.
 - 6)c. Search for alternative sources of funding potentials for green space maintenance, facility development and upgrading, including community fund-raising, sponsorship; Create database for funding opportunities for the future reference; Recruit volunteers or university students to search funding opportunities, draft application proposals; Approach City of Winnipeg and Province of Manitoba for grant funding.
 - 6)d. Re-establish the “Urban Green Space Coalition” which used to be a research alliance of 'greening committees' of SNA, WBCO, and DMSMCA to work on issues relating to green infrastructure planning; Work with school boards to develop youth-based environmental group to involve in greening school yards and other neighbourhood green spaces; Work with business groups such as West End Biz and West Broadway Biz on green street initiatives.
 - 6)e. Review existing “green plans” to evaluate what has been achieved in past years, plan and implement community consultations on future neighbourhood green infrastructure planning
 - 6)f. Work together with other community development programs. Green infrastructure planning itself can not change the characteristic high residential mobility in these neighbourhoods. However, with the support of other community development programs promoting reinvestment to the neighbourhoods, green infrastructure planning and implementation do have potential to encourage people to stay.

Appendix D: Informed Consent Form for Semi-Structured Interview



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Tel: (204) 474-6578
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Research Project Title: *Green Infrastructure Planning in an Urban Context:*

“Green Plans” in Four Winnipeg Inner-City Neighbourhoods

Principal Investigator and contact information: Shengxu Li

Research Supervisor and contact information: Dr. David van Vliet

This consent form, a copy of which will be left with you for your records and reference, is only part of the process of informed consent. This form explains what the research is about and what your participation will involve. If you would like more detail about something mentioned here, or information not included here, you should feel free to ask. Please take the time to read this carefully and to understand any accompanying information.

1. Purpose of the Research

The role of this research is to satisfy the major degree project requirement of the Master of City Planning Degree at the University of Manitoba. The project is titled *Green Infrastructure Planning in an Urban Context: “Green Plans” in Four Winnipeg Inner-City Neighbourhoods*. The purpose of this research project is to identify factors including the opportunities and challenges that influence inner-city neighbourhood green infrastructure planning through neighbourhood “green plans” evaluation, and further to analyze and explicate the prospects, challenges, and potential measures for urban green infrastructure planning in Winnipeg.

2. Procedures:

You are being asked to participate in a semi-structured interview asking questions about green infrastructure planning in four Winnipeg inner-city neighbourhoods—Spence, West Broadway, Daniel McIntyre and St Matthews. The semi-structured interview is intended to solicit perceptions and views from stakeholders on the investigated neighbourhood green planning projects, and potential neighbourhood green infrastructure planning. The semi-structured interview is expected to take up to one hour, and will be recorded and notes taken. The project is expected to include a minimum of eight key-informants from various stakeholders for the interview.

3. Recording Devices and Data Storage

With your consent, semi-structured interview and focus group will be taped using a voice recorder to ensure accurate record of responses. Written notes of the interview will also be taken. If you don't wish to be recorded, only hand notes will be used. All data collected including audio files and hand notes, will be stored securely. Digital data will be protected by password only accessed by myself. Hand written notes and other physical completed forms will be stored securely in my briefcase while in the field and locked in my home office cabinet. All data collected will be destroyed at the conclusion of the thesis project (anticipated October 2013).

Do you agree the researcher to use a voice recorder for audio recording the interview? (Please tick one of the following boxes.)

☐ Yes ☐ No

4. Potential Risks and Benefits

There are no risks in this research project beyond normal everyday risk. The research doesn't address personal or confidential issues. The study only asks for your opinions and knowledge on integrating green infrastructure concepts into neighbourhood green space planning. Participants will benefit professionally by learning more about successful approaches to integrating green infrastructure into neighbourhood green plans as an outcome of this research.

5. Confidentiality:

Your privacy is important. All information that may reveal personal identifiers will be removed prior to data analysis in order to protect anonymity and confidentiality.

Recordings of interviews and notes taken will be secured during the project and destroyed at project completion, expected in October 2013. . Even so, absolute confidentiality cannot be guaranteed because of the small group of participants involved in the research. You should be aware that the jurisdiction/organization you are from would be identified, as well as the general role you played in the organization and planning process. If at any time you wish to withdraw from the project, your responses will not be used in the final document.

6. Credits or Remuneration

There is no credit, remuneration, or compensation for participants' involvement in this study.

7. Debriefing and Dissemination

A summary of research will be made available to all participants. As a thesis research project, the study results will be primarily available to academia for the purpose of knowledge proliferation. For those who are interested, the final completed Major Degree Project will be made available by email in PDF format.

Your signature on this form indicates that you have understood to your satisfaction the information regarding participation in the research project and agree to participate as a subject. In no way does this waive your legal rights nor release the researchers, sponsors, or involved institutions from their legal and professional responsibilities. You are free to withdraw from the study at any time, and /or refrain from answering any questions you prefer to omit, without prejudice or consequence. If you choose to withdraw from the study, please contact the Principal Investigator Shengxu Li and/or his Supervisor Dr. David van Vliet by email listed above by October 31, 2013. Your continued participation should be as informed as your initial consent, so you should feel free to ask for clarification or new information throughout your participation.

The University of Manitoba Research Ethics Board(s) and a representative(s) of the University of Manitoba Research Quality Management/ Assurance office may also require access to your research records for safety and quality assurance purposes.

This research has been approved by the Joint Faculty Research Ethics Board. If you have any concerns or complaints about this project you may contact any of the above-named persons or the Human Ethics Coordinator (HEC) at 204-474-7122. A copy of this consent form has been given to you to keep for your records and reference.

Participant's Signature _____ Date _____

Researcher's Signature _____ Date _____

Appendix E: Informed Consent Form For Focus Group



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Research Project Title: *Green Infrastructure Planning in an Urban Context:*

“Green Plans” in Four Winnipeg Inner-City Neighbourhoods

Principal Investigator and contact information: Shengxu Li

Research Supervisor and contact information: Dr. David van Vliet

This consent form, a copy of which will be left with you for your records and reference, is only part of the process of informed consent. This form explains what the research is about and what your participation will involve. If you would like more detail about something mentioned here, or information not included here, you should feel free to ask. Please take the time to read this carefully and to understand any accompanying information.

1. Purpose of the Research

The role of this research is to satisfy the major degree project requirement of the Master of City Planning Degree at the University of Manitoba. The project is titled *Green Infrastructure Planning in an Urban Context: “Green Plans” in Four Winnipeg Inner-City Neighbourhoods*. The purpose of this research project is to identify factors including the opportunities and challenges that influence inner-city neighbourhood green infrastructure planning through neighbourhood “green plans” evaluation, and further to analyze and explicate the prospects, challenges, and potential measures for urban green infrastructure planning in Winnipeg.

2. Procedures:

You are being asked to participate in a focus group asking questions about green infrastructure planning in four Winnipeg inner-city neighbourhoods—Spence, West Broadway, Daniel McIntyre and St Matthews. The focus group is intended to gain feedback about, and reflections on, the findings and draft recommendations arising from the other research methods used in this inquiry. The focus group is expected to take one hour. The focus group discussion will be audio recorded and notes will be taken. The focus group is expected to include a minimum of five participants from the various stakeholders concerning this research.

3. Recording Devices and Data Storage

The focus group session will be audio recorded to ensure accurate record of responses. Written notes will also be taken. All data collected including audio files and hand notes, will be stored securely. Digital data will be protected by password, accessed only by the researcher. Hand written notes and other **documents** will be stored securely in the researcher's briefcase while in the field and locked in his home office cabinet. All data collected will be destroyed at the conclusion of the thesis project (anticipated October 2013).

I hereby provide consent to the researcher using a voice recorder for audio recording the interview? (Please tick the following box). ☐ Yes

4. Potential Risks and Benefits

The risks associated with participating in this research are minimal. There are no known physical, psychological economic or social risks associated with participating in this study. The research doesn't address personal or confidential issues. I will be asking questions only related to your knowledge and opinion on the subject. Participants will benefit by learning more about successful approaches to integrating green infrastructure into neighbourhood green plans as an outcome of this research.

5. Confidentiality:

Your privacy is important. All information that may reveal personal identifiers will be removed prior to data analysis in order to protect anonymity and confidentiality. Recordings of interviews and notes taken will be secured during the project and destroyed at project completion, expected in October 2013. Even so, absolute confidentiality cannot be guaranteed because of the small group of participants involved in the research. You should keep this in mind when responding to questions in the focus group. If at any time you wish to withdraw from the project, your responses will not be used in the final document.

6. Credits or Remuneration

There is no credit, remuneration, or compensation for participants' involvement in this study.

7. Debriefing and Dissemination

A summary of research will be made available to all participants. As a thesis research project, the study results will be primarily available to academia for the purpose of knowledge proliferation. For those who are interested, the final completed Major Degree Project will be made available by email in PDF format.

Your signature on this form indicates that you have understood to your satisfaction the information regarding participation in the research project and agree to participate as a subject. In no way does this waive your legal rights nor release the researchers, sponsors, or involved institutions from their legal and professional responsibilities. You are free to withdraw from the study at any time, and /or refrain from answering any questions you prefer to omit, without prejudice or consequence. If you choose to withdraw from the study, please contact the Principal Investigator Shengxu Li and/or his Supervisor Dr. David van Vliet by email listed above by December 31, 2013. Your continued participation should be as informed as your initial consent, so you should feel free to ask for clarification or new information throughout your participation.

The University of Manitoba Research Ethics Board(s) and a representative(s) of the University of Manitoba Research Quality Management/ Assurance office may also require access to your research records for safety and quality assurance purposes.

This research has been approved by the Joint Faculty Research Ethics Board. If you have any concerns or complaints about this project you may contact any of the

above-named persons or the Human Ethics Coordinator (HEC) at 204-474-7122. A copy of this consent form has been given to you to keep for your records and reference.

Participant's Signature _____ Date _____

Researcher's Signature _____ Date _____

Appendix F: SWOT Elements Derived from Research Findings

<p><i>Strengths</i></p> <ul style="list-style-type: none"> ○ Neighbourhood green spaces provide potential multifunction through GI planning and contribute to the quality of urban life; ○ Institutional structure of neighbourhood development organizations support green infrastructure planning; ○ Community member's active involvement in the greening project have built long term incentives for green infrastructure plan implementation; ○ Lessons Learned from existing neighbourhood “green plans” and greening projects provide valuable resources for future green infrastructure planning. 	<p><i>Weaknesses</i></p> <ul style="list-style-type: none"> ○ Urban built environment constrains GI planning in creating green space networks; ○ Currently, there is no legally binding legislation or policy for green infrastructure at provincial or municipal level; ○ There is a lack of a recognized methodology for green infrastructure planning in an urban context, especially for urban neighbourhood context; ○ Urban green infrastructure may require more time for proper site investigation and performance maturation.
<p><i>Opportunities</i></p> <ul style="list-style-type: none"> ○ Urban green infrastructure supports municipal and provincial government policies on sustainable development by integrating social, environmental and health aspects of development; ○ Urban GI planning offers opportunities to partner with various stakeholders, including neighbourhood residents, local landowners, community groups, local government in the use of land areas; ○ GI planning process will identify and highlights existing and potential opportunities for multifunctional use in those urban neighbourhoods; ○ Urban GI planning in those neighbourhood will lead to enhanced protection of the cultural heritage to which it is linked, gaining greater recognition for certain visual amenities and local characteristics. 	<p><i>Threats (Challenges)</i></p> <ul style="list-style-type: none"> ○ Inconsistent piecemeal approaches to the implementation of the urban green Infrastructure planning presents a great challenge to the future urban green infrastructure planning; ○ Insufficient provincial/municipal guidance and funding for measures that emerge from successful GI planning, is another challenge for the researched subject; ○ Competing interests between greening and housing may pose difficulties for land availability of urban green infrastructure; ○ Limited understanding and acceptance of GI concept may hinder public awareness and public engagement in the planning project.