

Shaping spaces in challenged places:

What to do with The Flats; Brandon's flood-prone area

By

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Abstract

The severity and frequency of flooding-related catastrophes are increasing, and lands adjacent to rivers that were formerly the hub for city growth and commerce now face constant threats of flooding. As flood risks have become more at the forefront of legislative consciousness, with governments increasing flood-protection and mitigation measures for flood-prone areas, landowners within such areas are left with little support and direction for their lands. In exploring the issues facing landowners within flood-prone lands, this practicum focuses on whether governments should be directly involved in finding solutions for landowners to ensure a situation where both private landowners and governments benefit. The research concludes that development within flood-prone areas should be avoided, and that municipalities should, given adequate capacity and ability, relocate existing residents from flood-prone areas to repurpose the area for flood-mitigation measures. The research recommends that the City of Brandon become a member, and participate in the Red River Basin Commission, while also exploring opportunities to play a leadership role in the implementation of a similar commission for the Assiniboine River Basin.

Key words: urban planning, development, flooding, Brandon, Assiniboine River

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Chapter 1: Introduction

1.1 Background, Problem Statement & Research Questions

Municipalities across Canada often include areas that were formerly the location of intense activity and importance during the years of early growth. These lands, once crucial drivers of the local economy and the sites of intense activities, are now typically characterized by vacant or derelict buildings and sites, and low land values; they receive minimal interest for redevelopment. Underutilized, their infrastructure has become outdated and there have little development potential. Many of these sites formerly accommodated heavy industrial uses that have left environmental contamination, and the potential costs of remediation further reduce interest developers might have to invest in them; local governments have struggled to provide enough incentives to encourage developers to cleanup and reinvest in these areas. These landmarks and historically relevant sites now face rising costs associated as current environmental policies have increased the standards that must be achieved to permit development. Additionally, these sites were originally connected to the rest of the country by waterways and heavy rail lines. However, with the rise of the automobile and trucking industries, and the flight of inner-city residents and businesses to the periphery of cities, these routes are no longer used as intensely.

Many of these challenged areas are characterized by their proximity to waterways – mainly rivers in smaller Canadian cities. As weather related events, particularly flooding, have increased in frequency and intensity, waterfront areas are more vulnerable than previously thought, and the understanding of areas in danger of

flooding have expanded. Provincial policies are increasing flood protection requirements in response to larger scale floods; where previously protection levels against a 1-in-100 year flood were required, protection against more severe 1-in-300 year flood has now becoming typical. As with increased environmental standards, the requirements for augmented flood protection measures has increased development costs in these vulnerable areas.

The city of Brandon (population 50,000) has many examples of challenged spaces, most notably the area known as “The Flats”. This 80 hectare area is the site of this practicum investigation. Brandon experienced extreme flooding of the Assiniboine River in both 2011 and 2014, and these events caused local and provincial politicians and planners to recognize flood-prone areas and to re-evaluate the policies related to development in these areas. The results are stricter legislation and regulations that have stalled development in The Flats, and landowners in the flood-prone areas are left with few options for their properties.

As indicated in Figure 1, The Flats is located in central Brandon, immediately north of downtown and bounded by the major CP Rail lines to the south, the Assiniboine River to the north, 1st Street to the east and 18th Street to the west. Figure 2 identifies existing land uses within The Flats area, and as can be seen the majority is either designated for residential or industrial purposes. Those industrial uses are all agricultural-related and feature three large companies – McKenzie Seeds, Coop Feeds and Heartland Livestock Services, all of which contribute to both noise and pollution that negatively impacts the existing residential parcels in the area. In addition, Figure 3 identifies flood-prone areas adjacent to the river – the majority of The Flats falls within

this risk area. The risk area is based on current data, however, and is likely to change over time. According to the Prairie Climate Atlas, precipitation in Brandon is expected to increase by 13mm annually by 2080 under current, fossil-fuel dependent practices, including an additional 30mm of precipitation during the spring months (Prairie Climate Centre, 2016). As the Assiniboine River rises and risks flooding every spring due to snow melt, adding additional precipitation will only exacerbate the yearly flood risk for existing landowners in the area.

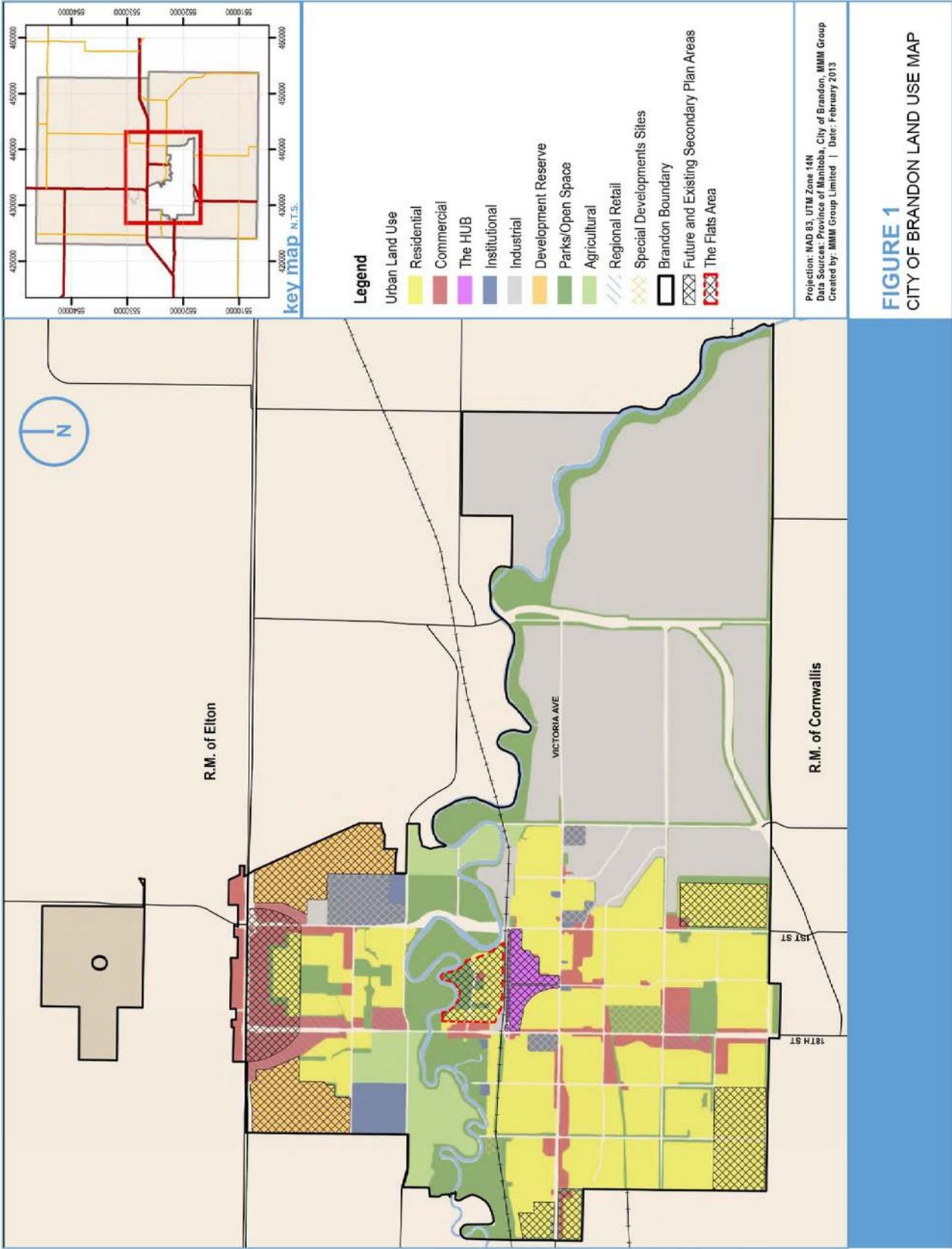
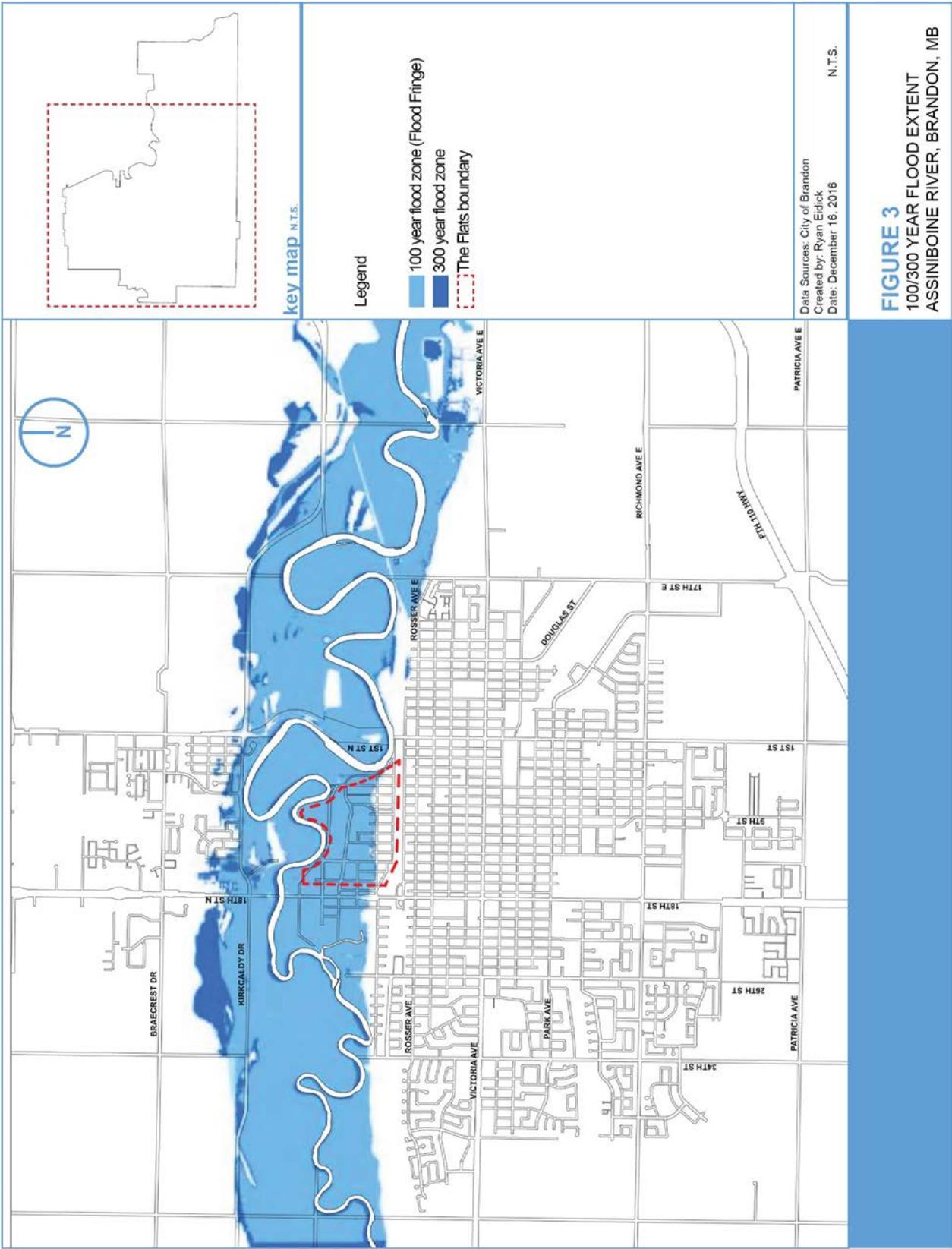


FIGURE 1
CITY OF BRANDON LAND USE MAP



The *Brandon and Area Planning District Development Plan*, adopted in 2013, acknowledges this vulnerability of The Flats, and designates the majority of the area immediately to the south of the Assiniboine River as “Parks and Open Spaces.” The southern portion is mainly designated “Residential,” however many existing residential and industrial land uses are currently located within the area designated “Parks and Open Spaces,” and the 100-year flood zone, known as the ‘Flood Fringe’ in the *Brandon and Area Planning District’s Development Plan*, as shown in Figure 3 extends into the areas designated “Residential.” Areas within the Flood Fringe are required to conform to the provincial development regulations that stipulate all development must be built above the 100-year flood level, while areas within the Flood Plain are not permitted for development whatsoever. This means the majority of landowners in the area are either faced with designations that do not permit development, or subject to regulations related to flood protection; neither of which will facilitate high development potential, and will reduce the value of the land.



With low development potential, one option available to the city is the expropriation of land in The Flats for a combination of recreation and renaturalization purposes to mitigate the flood risk on residential properties; however, this option comes with uncertainty. This would fall in line with the recommendations of the city of Brandon's recently adopted Greenspace Master Plan, as the document calls for The Flats area to be naturalized and used by the city for flood-mitigation and riverbank stewardship purposes (Peter J. Smith & Co., 2015). The plan, although recently adopted, follows the designation of the BAPD Development Plan that designates the area as "Parks and Open Spaces", in showing The Flats area as an Activity Greenspace (Figure 4) – an area to be developed for both passive and active recreational needs of Brandon residents. Directly north across the Assiniboine River from The Flats is the Riverbank Discovery Centre – a tourism centre featuring partnerships between Tourism Brandon and Ducks Unlimited that acts as a year-round access to trails and pathways along both sides of the Assiniboine River. The Riverbank Discovery Centre lands are designated as Celebration Greenspace and is dedicated to public recreational use as well as river corridor protection through riverbank enhancements to protect private properties against flooding. However, the Discovery Centre grounds have focused the majority of their efforts on the north part of the Assiniboine River, leaving the south side alone save for the inclusion of walking trails connecting to Eleanor Kidd Park and to the HUB – the Brandon's historic downtown.



That being said, the City of Brandon must be in a financial position capable of purchasing multiple lots of land, and current landowners would be required to find alternative dwellings. Expropriation requires a large investment from the city as well, it is unlikely it would invest in The Flats in the near future when it has committed to providing services to priority growth areas in other parts of Brandon - the Southwest and North Hill areas (BAPD Growth Strategy, 2013).

This research has identified possible approaches to development in flood-prone areas derived from a synthesis of the literature, informative selected precedent studies, and a focus group. Three main approaches were studied: re-naturalization of flood-prone areas, redevelopment within flood-prone areas, and maintaining the status quo within flood-prone areas – which in this case refers to restricting development altogether through regulatory changes at provincial and municipal levels.

This practicum identifies and explores the constraints preventing development in The Flats, as well as compare how the situation for current landowners in The Flats compares to other similar properties in flood-prone areas of other municipalities. Chapter 5 identifies precedents for how to address flood-prone areas. The findings of the research were presented to a focus group in Brandon to determine which approach would be most suitable to the specific circumstance, and was aimed to inform further discussion.

The research was guided by three questions:

1. What are the difficulties in developing sites in flood-vulnerable locations within small- to medium-sized cities?

2. Should flood-vulnerable places be promoted for redevelopment? What are the implications / challenges if no development occurs or is developed as public open space?
3. What are the implications / challenges if the area redevelops?

The research examined a number of potentially informative precedents in North America. The researcher selected two similar-sized cities across North America that have faced development challenges due to close proximity to floodplains within the past twenty years. The findings derived from the analysis of these cities informed further discussion through the focus group portion of the research regarding the development of frameworks for the mitigation of challenged lands for other cities across Canada.

Publicly available documents were the main source of information to identify measures taken by administrations in the precedent studies, as a review of current and historical development plans, secondary plans and zoning by-laws have framed how these lands are being dealt with, as well as how their uses have changed. For context, a review of relevant provincial regulations governing environmentally challenged lands for each city was undertaken, to compensate for perceived differences across cities in different provinces. Current and historical regulations were compared to identify whether a change in regulations contributed to the individual approaches in flood-prone areas.

The results of the analysis were summarized and informed the compilation of a list of recommended approaches based on the findings of the research. These were presented to a focus group consisting of individuals residing in the city of Brandon to comment on the analysis and on the feasibility of each recommended approach. Members of the focus group included planners, residents and developers. Each

approach identified was presented to the group, with the intention being that they provided comments and feedback based on their personal and professional experiences. The results of this focus group, although not accurately portraying the thoughts and opinions of the larger population, contributed to determining the practicality of each approach in the context of Brandon.

Further details of the research methods are discussed in Chapter 3.

1.2 Significance of Project

The practicum findings and recommendations can serve as a basis for a future secondary plan for areas with moderate to severe risks of flooding. The research drew on precedent studies from across North America, and weaved contemporary planning policies focused on the transition and remediation of these areas into more usable public amenity spaces or recreational lands. The importance of the research goes beyond simply providing cities with crucial background research and a view of the policies and regulations that aided in decision making regarding development in flood-prone areas. The research recommendations can serve as a set of possible approaches for the City of Brandon in determining the best outcome for dealing with The Flats area.

A secondary purpose of the research is to act as a check and balance for government officials at both the municipal and provincial levels, since the area has already had development restrictions put in place. Planners at the both the provincial and municipal levels can use the research towards defending decisions already made, or to offer alternative solutions to pursue. Different options were pursued through the research in order to offer sound background reasoning that municipal planners can give

current landowners in The Flats further reasoning behind the development restrictions being put on their properties by both municipal and provincial governments.

1.3 Biases & Limitations

The research will inevitably contain certain biases as a result of personal values and experiences relevant to the issues at hand. The research in this practicum begins with the assumption that there are issues with development in challenged places in a variety of locations across North America. This assumption comes from the professional experience of the researcher, who was employed as a planner with the City of Brandon from 2012-2014, where the issue of development in The Flats had not been formally addressed by statutory documents at the time.

Although other primary options for The Flats will be discussed, including redevelopment and expropriation by the municipality for public use or by the Provincial government for protection and re-naturalization, there may be a bias towards redevelopment – in this case meaning urban development, due to the preferences of the researcher.

While efforts will be made to represent an accurate cross-section of the demographics of Brandon, those chosen to partake in the research came from similar socio-economic statuses and were chosen based on their knowledge of development. The results of this research could be compared to the results found in other locales, and these limitations should be addressed in future research. The sample size for the focus group was also smaller than initially intended; originally the intent was to include a local politician, an environmental expert, and multiple developers to gather the most accurate

data from a wide variety of sources. However, these additional focus group members were not able to attend, either due to scheduling conflicts or a lack of desire to participate. Having only one member of the development industry present at the focus group session only gave one point of view of the development industry, and it would have been beneficial to have more developers present to hear if there were any varying opinions. In addition, both the residents selected to participate no longer own any land within the affected Flats area, although they had previously lived in the area. Neither resident had participated in the BAPD Development Plan public engagement sessions either, therefore they were not aware of the changes that were made regarding properties within The Flats. Having a resident that currently lives in The Flats and participated in the BAPD Development Plan engagement sessions would have been beneficial, as the residents that did participate were forced to think back to their previous situations and could have misrepresented their opinions due to the amount of time elapsed since they inhabited The Flats area.

Chapter 2: Should municipalities promote redevelopment?

Previous research covering the redevelopment of flood-vulnerable and contaminated sites is reviewed to identify consistent themes, as well as gaps in the research, particularly in the application of strategies to address the development of flood-prone sites in smaller cities. The review identifies three key areas of issues that affects the redevelopment of flood-vulnerable and contaminated sites, including the roles planning can play in the transition of these areas, the relationship between politics and planning that may affect development efforts, and the social impacts of displacement.

2.1 The role of planning

Planning is a key process toward improving the physical, economical and future of all lands that have been left derelict. Flood events are a threat to municipalities, and they are becoming increasingly frequent and destructive, and urgent interventions have already occurred to minimize the risk of extensive damage to properties. Planning has the potential to address some ongoing problems that confront many municipalities and governments (Berke & Campanella, 2006; Knowles & Allan, 1998; Saxe & Campbell, 2010; Wilby & Keenan, 2012; Wright & Czerniak, 2000). Researchers such as Berke and Campanella (2006) as well as Saxe and Campbell (2010) argue that planning can provide expertise to aid authorities responsible to identify flooding dangers at their early stages; and reduce chances that they will be caught by surprise when a catastrophe occurs. Unfortunately, the authors note that North American municipal governments have been mostly reactionary to disasters and have not realized the importance of

planning in preparation for these types of catastrophes, nor for helping determine the proper mitigation of derelict sites as a result of flood damage. Berke and Campanella (2006) also suggest that planners can assist decision makers with recommendations for sites during the development processes, using their knowledge of local contexts and various land use policies to inform their recommendations.

In a bid to address the impacts of contaminated sites, the Government of Canada established the *Federal Contaminated Sites Action Plan* in 2005 (Saxe & Campbell, 2010). The plan was established to provide guidance, training and support to different authorities about the risks posed to humans, animals and the environment as result of contamination in various forms, including flooding. With this blueprint, Provincial health departments are able to develop methods of assessing the health risks that may emanate from the contaminated lands and take proper precautions (Health Canada, 2013b). Canadian municipalities can undertake the same commitment as their provincial colleagues to ensure that there is regular and efficient use of resources and restoration of areas that have fallen derelict or underutilized. Examples of this can be seen in the relatively contemporary push for the redevelopment of inner-cities and downtown areas, including Brandon, where *The Downtown HUB Secondary Plan* was adopted in 2012 to aid in the attraction of investment to Brandon's downtown through reduced development regulations and other incentives. In addition, proper planning that would culminate in the effective reclamation of some or all of the contaminated lands in question would provide a platform to reduce the pressures exerted on basic amenities by the surging population in the cities (Saxe & Campbell, 2010). However, as Mason (2011) notes, municipalities sometimes look to redevelopment as a first option rather

than reclaiming spaces to be utilized for public purposes, such as parks. As municipal administrations evolve in response to environmental conditions and disasters, more of a focus may be placed on preservation rather than development (Mason, 2011, pages 414-415).

As climate change continues to expand in consciousness, especially as it relates to urban development, planners are becoming more versed in how planning decisions affect the environment when implementing land use decisions. Climate change is almost universally accepted in contemporary society, and may be the single largest challenge facing the entire world over the past century (Harry & Morad, 2013). This is not to say that climate change is more important than ongoing issues such as access to clean drinking water, food security and global economic crises, to name a few; however climate change is linked to each of these existing issues and in many cases, could worsen existing issues should current development and lifestyle patterns continue (Morecroft & Cowan, 2010). The need to continue adapting urban development patterns to meet new environmental considerations means planners must now balance such considerations with overlapping economic, social, political and cultural factors. It is therefore crucial that planners fully understand the impacts of climate change to properly implement policies and regulations aimed to reduce the impacts of development; which has been difficult as environmental responsibility remains in its infancy in the consciousness of higher-level decision-makers (Harry & Morad, 2013). As Wilson and Piper (2010) note, planners must continue to take an active role as champions for sustainable development practices, as the sustainability movement is still

broad in its definitions and goals, leaving the item open to contention and reducing the ability to successfully implement environmentally responsible programs.

With climate change likely to significantly increase the risks facing urban development due to flooding and storm events, planners face the difficult task of planning for resiliency in future developments without fully understanding the future of climate change (Muller, 2007). Differing opinions exist on the approach planners should take with regards to future planning. As Muller (2007) opines that decision-makers are faced with two main options: mitigation – which addresses and punishes polluters by putting regulations in place that penalize or restrict major contributors to climate change more than the societal average, and adaptation – which attempts to accommodate contributors to climate change, however penalizes them through increased taxation in order to fund projects that serve the greater good. However, Muller (2007) also notes that moving beyond the binary debate is crucial, as the largest issue planners and politicians face is making decisions, especially as they relate to flooding, based on long term forecasts. As was discussed in previous chapters, flooding is looked at by 100 year increments, therefore decisions related to flood-mitigation infrastructure must accommodate flood levels that, in the next century, are likely to not be the standard anymore (Muller, 2007).

The key to developing resilient communities, therefore, is for planners to identify flood sources such as rivers as an asset as well as a risk, especially through the lens of climate change. As Davoudi (2014) discusses, applying risk-based approaches to planning practice has resulted in the growth of quantitative and calculation in urban planning, which mimics engineering decision-making methodology. This conflicts with

the judgmental and qualitative nature of the planning profession, and could lead to decisions that become increasingly based on current facts and quantitative data, which further limits the planners' ability to effectively make decisions for future settlements (Davoudi, 2014, p.366). By identifying flood sources as an asset, planners look at both how the natural environment affects development and how development affects the natural environment; a combination of lenses that contributes to development decisions that balance the present and future needs for both systems.

Further to identifying flood sources as assets, planners must also play the role of environmental advocates to ensure the costs of environmental stewardship are in line with the benefits to the overall public. With flood sources being seen as risks, the discussion surrounding how to deal with them tends towards mitigation – removing vulnerabilities and avoiding the risk source by any means necessary (Dymen & Langlais, 2012). Therefore, planners can balance the perception of costs of programs that seek to protect landowners from flood sources by asserting that the flood source is a risk – therefore the benefits to the program outweigh or balance the costs. By considering the flood source as an asset as well and creating opportunities for interaction between people and nature, planners can further strengthen the cost-benefit analysis of flood-mitigation measures through by looking at the qualitative benefits of both the security and safety brought to the residents, as well as the overall public benefits (Davoudi, 2014). This can be achieved through initiatives such as the development of passive or active recreational lands in the place of development adjacent to flood sources.

2.2 Relationship between politics and planning

The success or failure of the plans established to facilitate redevelopment of contaminated historical sites in Canada, is largely determined by the political issues surrounding them (Al-Attar, 2011; Oliveira & Pinho, 2010; Tyler & Ward, 2011; Wedding & Crawford-Brown, 2007). Planning decisions are often surrounded by conflict, as planners' recommendations must always take into consideration the opinions of a broad range of interests, individuals and sectors, from developers to politicians to members of the community. Because planners and elected officials both serve the public interest, at least in theory, it would make sense that collaboration between the two realms would come naturally. In reality, however, the relationship between planners and politicians has often been strained, at least in part, Tyler and Ward (2011) argue, because they work on different timelines. Unlike planners, politicians are generally bound by two to four year terms, therefore they often make decisions based on this short timeframe that will best help them to secure re-election (Anthopoulos & Vakali, 2012). Conversely, planners work with long-term planning goals, generally with 10-, 15- or 20-year time spans (Tyler & Ward, 2011). This mismatch of timelines results in the planning processes and political decisions hurried through in order to please the public within the shorter frame.

While planners rely on a number of methods to engage the public to generate ideas and support, including public hearings, focus groups, surveys, committees and programs (Tyler & Ward, 2011), some of these methods require a time investment that may not fit within political terms of office. Elected officials often seek immediate public feedback – without the benefit of public education about the issues – to gauge what

people want rather than the methods used by planners (Tyler & Ward, 2011; Oliveira & Pinho, 2010). As Oliveira and Pinho (2010) state, in an ideal planning situation:

decision-maker[s] would consider all possible courses of action, according to a number of established ends, identify and assess all the consequences following from the adoption of each course of action, and then select the most preferable alternative (p. 344).

This is not always the case due to conflicts in timelines. As Oliveira and Pinho state, the key for planners and elected officials to building a sound relationship then, is compromise: in order to make appropriate decisions, elected officials need to use planning processes to gain a wide perspective on the issues at hand. At the same time, planners need to provide elected officials with a variety of strategies and give them the flexibility they require while continuing to focus on long-term objectives.

Saxe and Campbell (2010) explained that each Province in Canada is guided by a number of environmental statutes as determined by federal government policy. When government objectives differ from planning objectives, conflict arises. The same is true for governments of different levels, as municipal and provincial regulations and policies are guided by federal guidelines. For instance, as Sprague et. al. (2007) found, most sites with traces of petroleum from former uses remained abandoned and undeveloped for many years following their decommissioning. Federal governments mandate provincial policies regarding environmental sustainability and contaminated sites, and provincial regulations are then implemented and monitored by municipal governments (Sprague et. al., 2007). Municipal governments must then endure the backlash from local developers and property owners, as the regulations affect their business directly. It is only through the intervention of organizations and processes such as Risk Based

Corrective Action – a process that identifies and manages contaminants on a site to ensure the health of all site users - that issues like approvals for the assessment of risk in vulnerable sites have been hastened and re-evaluated, leading to policy change throughout all levels of government (Esposito, 2000).

Poor political interventions have been blamed for unsuccessful plans intended to reclaim contaminated lands. For example, in the 1990s, the New Brunswick Department of Environment and Local Government was experiencing some challenges in the remediation of brownfield sites and in meeting some of its environmental targets (Sprague et. al., 2007, p. 24). This resulted in friction between governments and industries that yearned for consistent development criteria and regulations across the province; therefore, there was reluctance on the part of private financiers to offer any financial support for development on contaminated lands (Sprague et. al., 2007, p. 25-30).

Similar frustrations occur at a variety of political levels, as environmental clean-up programs are often implemented and monitored by local governments, however, these programs require approval by provincial and, at times, federal authorities (Sprague et. al., 2007; Craggs, 2013). For example, the program aimed at remediating the contaminated lands around John C. Munro Hamilton International Airport cannot commence until the Federal Minister of Environment gives approval, thereby delaying the entire process and causing frustration for construction companies and local governments (Craggs, 2013). In contrast, as noted by Saxe and Campbell (2010), redevelopment projects initiated by the federal government are not subject to provincial or municipal regulations, therefore, unless there is mutual and political understanding

between governments, very little can be regulated by lower levels of government. This can result in greater friction between governments. As the processes of redevelopment of contaminated lands entails a complex chain of events (Foote, 2012; Wedding & Crawford-Brown, 2007), they require government cooperation with the public and private sector, all levels of government and the community at large in order to succeed. If any of the groups are at odds, the challenges may not be overcome (Weitz & Moore, 1998).

2.3 The impacts of displacement

Following disasters, residents of affected areas are often displaced. Though often short-term, municipalities may look at relocating residents out of affected areas; however, it is not unusual for relocation to be viewed as a long-term solution to disaster relief efforts (Levine, Esnard & Sapat, 2007). Although this may be necessary in times of disaster, it is never easy for those individuals and communities that are displaced, especially in the long term. It is not easy for anyone to leave their home to start over in a new location. Disaster-driven displacement often leads to a number of social issues, including the loss of housing and employment, as well as marginalization and food insecurity (Levine, Esnard & Sapat, 2007; World Bank, 2011; Zetter et. al., 2013)

If an area is affected by a natural disaster, a municipality's first response is usually to protect life by moving people out of harm's way, relocating them from the affected areas to a safe place (iDMC, 2007). In most situations, the land or property is temporarily inaccessible to the displaced people as a result of the disaster. After the initial disaster relief effort is over, and if the affected area(s) are deemed safe for residents once again, those affected are often permitted to return to their homes (The

World Bank 2011). In such cases, though land may be still available to the residents, property is often lost, as homes and belongings are damaged or destroyed (Cooper, 2012). In some other cases even the land may not be available after the disaster, as is the case with some lands affected by tsunamis in northern Indonesia and areas of New Orleans following Hurricane Katrina (iDMC & NRC, 2011).

In the aftermath of a disaster, people may cope with their loss in different ways; some wish to return to their land and attempt to rebuild (Zetter et. al, 2013). Some people attempt to start over elsewhere, as returning to their previous locations is traumatic and too costly (Zetter et. al, 2013). Others are left homeless, losing money, property and their former lifestyles to the catastrophe. However, the monetary loss as a result of the disaster is markedly different depending on income levels, something that has become evident with the number of low-income residents suddenly homeless following Hurricane Katrina (iDMC & NRC, 2011). The main challenge for governments is to restore communities by either providing similar physical environments elsewhere or by redeveloping the damaged areas, should it be deemed the best approach. To do that, Zetter and Fiddian-Qasmiveh (2013) argue that governments need to assess property recovery cost, compensation, restitution and exchange for each individual. For example, they must consider whether the municipality should provide equal compensation to everyone after the disaster or differentiate based on individual conditions before the disaster. Often governments spend a great deal of money without obtaining positive results for everyone (Cooper, 2012). However, governments often decide that providing land, property or housing to the affected people is instrumental to a successful program, rather than simply providing monetary contributions (World Bank,

2011). Therefore, the importance lies in making the lost properties available again in a similar condition to the affected people, or provide them with new, comparable properties to aid in restarting their lives elsewhere.

Providing some kind of property in the short or long term often does not solve the entire issue after displacement has occurred. One of the main issues is to create an environment where those displaced have a sustainable livelihood comparable to their former lives (World Bank, 2011). As discussed, this can be achieved by helping the displaced return home or re-integrate elsewhere; however, the location where the disaster occurred often times falls into disrepair with limited job opportunities (World Bank, 2011). With many families losing their economic stability during a time of crisis, the problem of economic marginalization can escalate and is quickly followed by social and psychological marginalization (Zetter & Fiddian-Qasmiveh, 2013).

As economic security becomes more prevalent as a result of displacement, the psychological stress associated with the issues related to loss of home can lead to various levels of depression, which as noted by Cooper (2012), increases mortality rates among displaced populations. When municipalities are unprepared for the disaster, and therefore the displacement of residents, the areas to which they are relocated are often below standard in terms of sanitation and cleanliness. Often times, residents are relocated to areas where unsafe water supplies and a lack of sewage system are more common, increasing the likelihood of health epidemics that contribute to higher mortality rates (iDMC & NRC 2011).

Displacement is a complex social process. Governments and authorities often underestimate the total social costs of displacement, and are often unprepared for the

aftermath of a disaster, leading to reactionary measures such as displacement being the only readily available solution. Displacement is often seen as a short-term result after disaster, however often results in a long term solution due to poor planning. If after displacement people are not provided a sustainable livelihood then the very purpose of saving life from a natural disaster loses its meaning. Simply providing a new, temporary location often is not enough as displaced people struggle to survive in a new environment. For these reasons, governments should consider all social costs prior to deciding on a strategy rather than defaulting to displacement.

Although existing conditions in flood-vulnerable lands are unfavorable to residents and landowners in the area, the difficulties in promoting flood-vulnerable lands for development are related to social and political issues that are not easily dealt with at the planning level. Municipalities, and planners especially, must take into account these factors when making decisions related to whether a flood-prone area should be promoted for redevelopment. The literature tends towards the difficulties in locating private development adjacent to flood sources, and discusses flood sources as a risk to be avoided primarily, setting up the basis for the research that flood-prone areas should not be promoted for development. This will be explored further and compared against precedents in Chapter 5.

Chapter 3: Research Methods

Three information collection methods were used to frame the issue and attempt to find solutions that are both theoretically sound and practical in application. The goal of this research is to synthesize examples from the literature with real world practices in an attempt to find a solution or sets of solutions that are palatable and achievable in the local Brandon context. The research methodology therefore studied two precedents based on the findings from the literature review in an effort to find a relationship between the two.

3.1 Literature Review

Going beyond theoretical findings related to the risks and impacts of flooding and displacement as a result of flooding identified in the previous chapter, the literature review aimed its focus at identifying approaches to dealing with land in flood-prone areas that could be implementable by municipalities. The literature review provided the baseline to be tested against the real-world precedent studies. With the research questions already established through the previous, broader planning theory review, the literature review could be more focused on determining approaches that could be applied by municipalities. The literature has been split into categories, the first in Chapter 2 that discusses the difficulties in developing in flood-prone areas, and the second in Chapter 4 that looks at the processes available to municipalities in dealing with flood-prone areas.

3.2 Precedent Study

The practicum relies on the examination of precedents in North America to test the findings within the literature review. The intention was to select two similar-sized cities in North America that have faced development challenges due to close proximity to floodplains, within the past twenty years. The findings derived from the analysis of these cities informed further discussion at the focus group stage regarding the development of framework for the mitigation of challenged lands for The Flats. In addition, the synthesized research could serve as a guideline for other cities across Canada.

Publicly available documents were the main source of information, as a review of current and historical development plans, secondary plans and zoning by-laws framed how these lands are being dealt with, as well as how they have evolved from their previous uses. For context, a review of relevant provincial regulations governing environmentally challenged lands for each city was completed, which compensates for perceived differences across cities in different provinces. Current and historical regulations was compared to identify whether a change in regulations contributed to the individual approaches in flood-prone areas.

3.3 Focus Group

The final refining of ideas to determine the validity of the approaches in the local Brandon context identified in the literature review and the precedent study comes through an assessment by local Brandon residents that had explicit knowledge of development in The Flats and Brandon, including a private developer, a municipal

planner, and local residents that formerly owned land within The Flats area. A focus group was selected as the best method to refine the data and the information derived from the literature and precedent studies, as focus groups have been highlighted as a method to bring attention to perceptions from residents and practitioners that may have eluded other research techniques (Vogt, King & King, 2004). Focus groups are their most effective in the later stages of research, when enough data from other sources have been gathered that a meaningful discussion surrounding the existing knowledge base can be had; resulting in a the focus group process complementing other research methods (Vogt, King & King, 2004). As Innes and Booher (2004) identify, the focus group encourages participant engagement, often resulting in direct conversation with those of other opinions, but also with decision makers, which provides each participant with the opportunity to understand processes and constraints facing other groups. The flexibility provided to the facilitator by the format of the focus group allows a wide range of discussions to be had, resulting in a deeper analysis of topics (Simon, 1999). To avoid biases and homogeneity among participants, focus groups allow the facilitator to select only participants that would bring value to the discussions, making it an ideal research method when a basic understanding of a certain topic is required (Simon, 1999).

Chapter 4: What can municipalities do with regards to development in challenged areas?

4.1 Current and historical processes

Municipalities employ diverse processes and methods to clean-up flooded and contaminated sites. The need for this clean-up is borne from the fact that both public and private sectors are often reluctant to make any significant investments in properties that are deemed to pose potential threats to human health, and until they are considered safe, they have only minimal resale value and redevelopment possibilities (Howland, 2000; Meyer, Williams, & Yount, 1995). In addition, as environmental issues have entered mainstream consciousness, flooding has been identified as a global issue; with this rise in awareness, the literature on the development and land-use practices for environmentally sensitive areas, including flood-prone areas, is more readily available and can be compared across municipalities and countries. For instance, United States redevelopment regulations that govern environmentally challenged sites emphasize voluntary participation and private sector investment, while British government policies rely almost exclusively on private investment (Al-Attar, 2011). In both cases, however, governments have strict regulations with regards to the cleanup measures required prior to the development of greenfield sites, making private sector investment less attractive; hence, brownfield sites that have lower standards for remediation and fewer regulations become more attractive to developers (Al-Attar, 2011; Jackson-Elmoore, 2012).

Other countries have been observed to rely heavily on the public sector to fund the redevelopment programs. In these cases, in the long-run, entire programs are under the scrutiny of public authorities that have oversight of projects' implementation and,

ultimately, land reuse programs. Healey (2003) expresses the need for full participation in decision making processes in planning and implementation of these programs (p.248-250); where the public as well as governments implement and monitor clean-up programs in a completely transparent and open process. Saxe and Campbell (2010) found that redevelopment processes for environmentally challenged sites in Canada involve issues like obtaining approvals from not only municipalities, but higher levels of governments as well. This delays timelines, and as previously mentioned, creates frustration and trust issues between construction companies, developers and government officials. In the United States, high-risk contaminated sites that lie within government inventories qualify for cleanup incentives and other assistances from the federal government (Saxe & Campbell, 2010). In Canada, most municipalities place emphasis on building capacity within the community as the first step toward promoting redevelopment of environmentally challenged sites. After ensuring that the community has the capacity, developers and government administration work to create and implement programs (Saxe & Campbell, 2010).

Once implemented, monitoring the progress of the programs becomes crucial. The municipalities and other stakeholders have the potential to assess the requirements that would facilitate effective completion of the programs (Cicon, 2009; Saxe & Campbell, 2010). This involves measuring issues like the change in municipal tax revenue as well as the decline in potential environmental and health hazards. Finally, most municipalities develop strategies to keep the community informed, hence, they are able to reduce chances of reoccurrence of the uses and processes that contaminated

the lands to begin with, and also enlighten various levels of government on the best alternative methods of dealing with brownfield sites (Sternberg, 2000).

Reclamation and conservation activities have been involved a sequence of actions that entail understanding historical sites, planning for their conservation and the development of sensitive interventions that maintain the character of the site (Lam, 1996; Madanipour, 2006; Smith, 1990; Wu, 2013). Former industrial sites bear some attributes worth retaining, both for their historical significance in the early development of towns and cities, their proximity to waterways that present flood threats, and for their past and future contributions to the local economy. According to different researchers, issues that hinder redevelopment of historically significant sites are tied to policy changes and standards that have been revisited in the recent past (Posey & Rogers, 2010; Mitsova & Esnard, 2012; Wilby & Keenan, 2012;). In particular, Wu (2013) identifies rising populations as a major contributor to policy changes, as much of the land previously dedicated to agriculture and industrial uses has been rapidly converted to residential lands. As will be discussed later in this review, political pressure played a role in the rapid expansion of residential development, and now in the wake of recent disasters involving residential neighbourhoods located within vulnerable areas, new pressure from other levels of government and various agencies has resulted in a shift in policies and standards that now affect the redevelopment potential of these properties (Berke & Campanella, 2006). Hurricanes Katrina and Rita are well documented disasters, the impacts of which caused different levels of government to identify issues with the location of residential communities in relation to potential catastrophes; however, other non-environmental disasters have played a role in the change of

regulations as well. For example, the recent train derailment in Lac-Megantic, Quebec, that caused the relocation of roughly 1,000 nearby residents has led to calls for the enforcement of railway protection zones (Giovannetti, Robertson & McNish, 2013).

A further complication associated with the general dilapidation of some previously significant historical sites, according to the Ministry of State for Foreign Affairs, Trade and Development Canada (FATDC, 2013) is that the problems of land contamination further propagates climate change. This, in turn, leads to unsustainable economic growth, specifically in sectors that rely on natural resources like forestry, tourism and energy among others. To address this, there have been a myriad of policy changes intended to curb climate change; these promote redevelopment programs in most of the contaminated lands. Examples related to planning include the rise of eco-regional planning, the implementation of new development policies following New Urbanism and Smart Growth principles, and updated growth management plans at both the municipal and regional level (Mason, 2011).

4.2 Change of policies

One of the methods employed by local municipalities to deal with development in flood-prone areas is to change local bylaws and statutory plans that may direct development either into or away from designated areas. In the Canadian context, this includes amending or writing Municipal Development Plans, Growth Studies, and other statutory plans designating land to reflect development priorities for a specific area. Change in policy is closely related to law, and as Starkweather, Low and Pearlman (2004) identify, the decision often rests with municipalities to choose between regulating

in favour of the development industry through development incentives, and regulating in favour of environmental sustainability through development disincentives.

Planners at the local level use Land Use Bylaws or Zoning Bylaws (depending on the municipality) to regulate land use within municipal boundaries. Land Use Bylaws designate lands for development, and cluster all lands according to predetermined land use districts that regulate the types of developments that can be built within those districts. In Canada, these bylaws are informed by regional and provincial policies related to land use, therefore planners at the municipal level only have the ability to regulate insofar as the planning documents at higher levels allow. As Kob (2000) outlines, planners can use local land use bylaws to designate lands for either environmental protection or human development, however in contemporary instances both are not commonly done on the same lands. Land Use bylaws are flexible to allow future amendments, giving planners the ability to review and alter land use designations as overarching policies and local priorities and considerations change.

The most common example of this in contemporary planning is related to the regulation of urban sprawl (Starkweather, Low & Pearlman, 2004) through statutory plans and land use bylaw regulations. While municipalities attempt to regulate the built form and dispersal of land uses within new greenfield developments in an attempt to curb the rate at which agricultural land is being consumed and transformed to urban development, Helling (2001) argues that less regulation may in fact be better for the municipality, as typical suburban developments aid in keeping the overall housing market affordable. The same principles have been applied to the regulation of natural areas, including those lands affected by flooding. As Kob (2000) finds, the rise of

programs aimed at curbing development in environmentally sensitive areas not only changes the physical environment of developments, but also affects existing social and economic systems in place. The research argues that environmental initiatives such as the preventing of development in environmentally sensitive areas requires a model where municipal governments, developers and the public are engaged equally throughout the whole process to minimize impacts on each of the groups (Kob, 2000). If one group is left out of a process, or if one group is not satisfied with the results, the success of the outcomes are less likely to be fully achieved. For instance, if regulations impact or restrict development in order to preserve natural features, developers will not invest and the area will therefore remain stagnant, or worse. If regulations promote development without strict environmental restrictions, the public may lose common amenity spaces that impact the natural habitats and biodiversity that makes the area desirable, therefore rendering the area less desirable and over the course of time, in decline. And finally, should the regulations not be implemented successfully by the municipality due to legal or internal policy or political reasons, the municipality could face backlash from both developer and public.

Zoning bylaw amendments are the most commonly used tool developers can use to achieve their development goals. However according to Beydoun and Pearlman's (2001) research, a rise in federal cases in the United States related to overregulation of land have been heard during the late 1990s as municipalities continuously amend their local bylaws (ordinances) and policies to regulate the use of land. According to the research, the great irony is that many municipalities are forced to amend existing statutory plans, documents and bylaws to remain consistent with policies and programs

implemented at state, regional and federal levels (Beydoun & Pearlman, 2001; Freilich & Peshoff, 1997).

In Canadian planning law, municipalities are free to conduct planning activities and make planning decisions based on their own legislation, however, that power must be granted by their Provincial government counterparts. In Manitoba, the Planning Act grants the authority to municipalities to prepare their own statutory plans, including land use bylaws, however, as per section 41, all statutory plans and land use bylaws must be consistent with land use policies established by Provincial Ministers (Planning Act, 2016). Furthermore, all statutory plans and land use bylaws must be circulated to the Provincial Ministers to ensure consistency and for comments (Planning Act, 2016), a process that is integral to smaller municipalities that do not have the planning capacity or experience to adequately implement their own statutory plans. However, this process adds an additional layer of bureaucracy on all applications a larger municipality with sufficient planning experience – like Brandon, may make with regards to their land use decisions.

In summary, although not a perfect solution as evidenced by the research on both sides of the argument, planners at the local level have tools, in the form of a Land Use Bylaws, to protect and regulate development within environmentally sensitive areas both in terms of environmental protection and promoting development. Land Use Bylaws also contains the flexibility to allow for future changes to be made as the local context; for example, as awareness and efforts promoting environmental sustainability and flood mitigation measures increases, planners at the local level have the opportunity and legal ability to change regulations simply. However, because municipal

planning law is dictated by Provincial land use policies and plans, municipal planners as all applications and decisions must be approved by Provincial regulatory bodies.

4.3 Land Swaps

When municipalities attempt to mitigate flooding in areas vulnerable to flood events by changing policies, thereby rendering some existing properties non-conforming, the discussion in the literature tends towards the exchanging of land between the municipality and the individual landowners whose properties have been devalued. As Beydoun and Pearlman (2001) study, there is a point in which regulation approaches the ‘taking’ of land from landowners; often reached when regulations from a variety of different sources are overlaid onto the same area. A contemporary example related to flooding would be the designation of flood-prone land as parkland by municipal planning departments, which allows for the existing landowner to continue his or her operations in perpetuity provided they do not change the intensity, but not allow for any further development or expansion of existing conditions. However, if a second set of regulations were placed on a portion of the land by provincial environmental protection agencies for the re-naturalization and protection of the adjacent water body, the lands in question become further unusable, to the point where the lands are better off being taken by the municipality or the province and exchanged for lands elsewhere. The feasibility of this, of course, depends on the financial situations these governments experience, in addition to the inventory of land available to government agencies and its appropriateness for simple one-for-one trades (Dagan, 1999; Laitos, 1997; Stein, 2000).

There is a great deal of literature on the benefit of land takings for the greater community benefit however the literature leaves a gap in the discussion of how to

successfully take the land for preservation or community benefit purposes, while also protecting the interests of those from which the lands are being taken (Starkweather, Low & Pearlman, 2004),. More study is required into the issues involved with exchanging lands between agencies and individual landowners to further understand the cost-benefit analysis.

4.4 Improving Infrastructure

One of the hallmarks of areas that are developmentally stagnant is outdated infrastructure, or infrastructure that cannot handle the capacity demand by existing developments, especially during a flood event (Heikkila, 1997; Paulsen, 2014). In large flood events, existing infrastructure such as storm drainage systems get overloaded in older neighbourhoods as the capacity for which they were built has been surpassed as lands become increasingly dependent on storm systems through increased daily activities. In addition, worsening flood events as a result of snow melt and urban development have increased the demands on existing systems not designed to handle contemporary storm loads. As Paulsen (2014) studies, increases in the populations of neighbourhoods by 1 percent may result in a proportional increase in infrastructure expenditures required, assuming the new residents have the same demands as existing residents in an area. However, growth in established neighbourhoods, in other words infill development, does not generally mirror existing developments in terms of infrastructure demand (Addison, Zhang & Coomes, 2012). New dwellings, even developed with the latest in environmentally sensitive technologies, have larger demands on existing services than their historical counterparts, and as Addison et. al. (2012) find, infill developments tend to focus on including more new and high end

appliances and plumbing fixtures as a means of selling the properties at a higher value, due to higher than average land cost in established neighbourhoods. As a result, infill properties are equipped with appliances and fixtures that would not normally be found in existing dwellings in the same neighbourhood that were built in a previous era and have not yet been updated.

The benefit of infill development increasing the demand on existing infrastructure, however, is that the new development also contributes additional taxes to the municipality, especially so when the value of properties is reassessed at a much higher value than the development it replaced (Paulsen, 2014). The increased demand on infrastructure triggers the municipality to invest in upgrades for the area, and the increased tax revenue from the infill property subsidizes the upgrades, if only to a small extent. Increased tax revenue, unfortunately for the residents in the neighbourhood, is a long-term revenue source for municipalities, and therefore cannot be counted on immediately for subsidizing infrastructure upgrades. As Paulsen (2014) notes, this is a primary reason that municipalities adopt development levies, a system of payment of a proportion of the required infrastructure upgrades triggered by development permits that increase the intensity of a development (Gerrard et. al., 2001; Williams & Berger, 1972). Levies are a mechanism that can add financial resources to a municipality's coffers immediately, or more accurately, as the demand increases as a result of development. The levies are determined by bylaw and are based on a review of all relevant upgrades by the municipality, then divided up and charged to individual landowners based on the size of the property in question (Paulsen, 2014). Therefore, in an effort to improve infrastructure in an area in need of upgrades that is consistently devastated by flooding,

it can be argued that municipalities should promote development to offset the costs of the infrastructure upgrades; either through increased tax revenue or development levies.

Another structural method of improving infrastructure to deal with flooding is construction of new infrastructure in an effort to protect existing developments (Few, 2003; Heikkila & Huang, 2014). Improving river channel improvements, riverbank enhancements or naturalization, and the construction of dikes or levees are primarily used because they are viewed as cost effectiveness, however, as Few (2003) notes, the environmental cost over time due to poor construction, maintenance, and the unfeasibility in constructing such features over a widespread flood-prone area, outpaces that of the benefit to the community.

Few (2003) also notes that the difficulty in implementing such physical barriers and measures is due to the need for the initiatives to be implemented by municipalities and governments. In areas where only a portion of lands relative to the overall scale of the municipality itself are affected by flooding, governments that represent the populace as a whole may battle against the priorities of citizens who live or work in other areas, and therefore will have difficulty justifying to the greater population the need for measures that only affect a small number of vulnerable lands relative to the whole (Few, 2003 p.53-54). Heikkila and Huang (2014) also note that the cost relative to the benefit to municipalities is directly related to the length of the shoreline needing to be diked or enhanced. Their research concludes that improvements to infrastructure in flood-prone areas is financially beneficial to municipalities in areas with higher population density, where more are affected by flooding and where municipalities can recoup some of the

costs to develop the necessary infrastructure through taxes and other means (p. 28-31). Fletcher, Vietz and Walsh (2014) however, argue that riverbank improvements have the ability to reduce flooding while also improving overall stormwater systems for municipalities. Therefore, when seen through the lens of overall citizen benefit, the projects are more likely to receive public support and less direct funding from only those that are affected. They note that the concept of *low impact development* (LID) has increased in public consciousness and in frequency of use as a principle in municipal engineering departments. LID aims to balance new urban development with existing storm runoff patterns to reduce post-development flows to match pre-development levels on a particular site (Fletcher, Vietz & Walsh, 2014, p. 544-545). The most common approaches to LID include the construction of naturalized swales, rain gardens and stormwater ponds that filter runoff and slow the discharge into municipal sewer systems (Novotny & Witte, 1997). As Fletcher, Vietz and Walsh (2014) argue, the use of naturalized systems along riverbanks and other waterbodies act as ‘last resort’ of sorts – they capture stormwater prior to it going immediately into rivers, preventing the rapid rise of rivers and eventual flooding downstream. The difficulty is that in order to successfully mitigate flooding concerns in an area, most or all areas of development along the entire length of a river or stream must have similar mitigation practices. When only isolated areas use this LID inspired infrastructure along riverbanks, the risk of flooding downstream is only reduced, not eliminated entirely (Fletcher, Vietz & Walsh, 2014). This is further evidenced by the events of Hurricane Katrina on New Orleans, where existing levees and dikes that were built along the Mississippi River to withstand

1-in-300 year floods were rendered completely ineffective in stopping flood waters from reaching New Orleans (Wetmore, 2007).

Finally, the use of adaptive architecture to withstand flooding can be implemented through policy at the municipal level or provincially through Building Code requirements, to ensure all new buildings within designated flood-prone areas are able to withstand flooding to some degree (Heikkila & Huang, 2014). Such measures include the use of flood-resistant construction materials, the raising of living spaces above typical and historical flood levels, and other design features such as constructed swales and drainage courses being included in the building and site design (Bramley & Bowker, 2002). However, unlike previous measures that can be considered and constructed at a district scale, this method relies on individual landowners and is therefore not the most practical of methods in the long term to deal with flooding, unless, as Heikkila & Huang (2014) note, municipalities get involved through grant programs or the land swapping with individual owners so the municipality takes on the flood-vulnerable properties for reconstruction.

4.5 Summary

Three main methods were identified in the literature for municipalities to mitigate flooding in flood-prone areas: the first is to restrict at-risk land uses from development in flood-prone areas, and having better adaptive reactionary measures in place. The second is relocation of residents occupying at-risk properties. The third method involves the physical construction of mitigation measures. According to the literature, the improvement of existing infrastructure and the construction of new infrastructure to mitigate flooding in vulnerable areas is the most used method by municipalities.

However, as researchers studying Hurricane Katrina and its effects on New Orleans can attest, even these physical measures cannot completely eliminate the risk of flooding in prone areas. Relocation, the restriction of at-risk land uses and improvement of reactionary measures are far less discussed throughout the broader literature, due to the implementation of these methods being less practical in contemporary budget-conscious societies. In the subsequent chapters, practical examples of implementation methods used by municipalities across North America will be identified in an effort to identify what methods outlined by the literature have been implemented and to what degree of success.

Chapter 5: What have municipalities done?

Brandon is not unique in its experience of regular flooding due to proximity of development to a major river. In this chapter, two examples of North American municipalities that have experienced similar situations as those in Brandon were examined to determine a set of practical approaches to mitigating the issue of development within flood-prone areas that could suit the Brandon context. Each municipal precedent was chosen based on their geographical, demographic and economic similarities to Brandon.

5.1 High River, Alberta

The Town of High River (population 13,000) in southern Alberta is developed along both the north and south banks of the Highwood River; a tributary of the larger Bow River that gathers its water from the Canadian Rockies in Peter Lougheed Provincial Park. The Highwood River is subject to frequent flooding, including the most recent major flood event in 2013 that, in concert with the rise of the Bow and Elbow Rivers, caused the displacement of more than 100,000 Albertans (CBC News, 2013a).

The previous large-magnitude flood of the Highwood River was in June of 2005, and resulted in the loss of three lives and over \$165 million in damages (Government of Alberta, 2006). Following this flood, a multi-department Flood Mitigation Committee was developed to design a strategy to mitigate the damage done to Albertan municipalities as a result of flooding from rivers and streams. The Committee was comprised of representatives from various Provincial departments, including Infrastructure and Transportation, Environment and Municipal Affairs, as well as Chair George

Groeneveld, MLA of Highwood and former Minister of Agriculture and Rural Development. The main purpose of the Committee was to reduce economic losses to the Provincial government as a result of disaster assistance funds that get allocated to victims of flooding (Government of Alberta, 2006). After two years of development and consultations with all municipalities in Alberta, a Provincial Flood Mitigation Report was drafted. The report concluded with 18 recommendations, the majority of which required only funding and resource allocation from the Provincial government. Some, however, required partnerships between the Province of Alberta and the federal government, while others were to be carried out by municipal governments with the guidance of other levels of government.

The simplest of the recommendations was to provide updated flood risk maps available to all municipalities to aid in their land use planning decisions. Although flood risk mapping had existed since 1989, the primary issue was that the maps were outdated and did not include all 36 municipalities the report found that required flood risk mapping (Government of Alberta, 2006). Alberta Environment recommended that a new position be created to oversee the creation and updating of maps as new information becomes available, or as a result of further flooding. The Town of High River was involved in the consultations throughout the process, and had flood risk maps already in place as of 1992 (Government of Alberta, 2015a).

One of the more controversial recommendations made in the report was an addition to Clause (2)(c) of Section 96 of the *Water Act*, that stated that Disaster Financial Assistance may be restricted for flood damages to development in a flood risk area after designation (Government of Alberta, 2006). As a result of the addition of that

clause, local governments were to use flood risk mapping to designate local flood risk areas within their bylaws, and take all decisions related to development, zoning or land use into account as they related to flood risk. The public and local governments were concerned with how existing properties would be impacted (Government of Alberta, 2006).

Nevertheless, the amendment to the Water Act was included and is currently in effect (Alberta Queen's Printer, 2014). What this means for municipalities across Alberta, including High River, is that as flood risk maps get updated, there may be some existing properties, either developed or vacant and held in private ownership, that are now located within a flood-risk zone. Residential developments within flood-risk areas are still permitted to receive governmental assistance should damage from flooding occur, however, all new developments will not automatically qualify for this assistance. In order to qualify, flood-proofing must be incorporated into the development, with the costs borne by the individual landowners primarily as the Provincial government will only subsidize 15% of the needed upgrades (CBC News, 2013b). The reduced assistance and small subsidies combined with up-to-date flood mapping are intended to encourage homeowners to relocate from existing dwellings in flood-prone areas.

Following the flood of 2013, during which nearly 80% of the Town of High River was impacted by flooding (Government of Alberta, 2015b), Alberta's provincial government offered up to 100% of the cost of relocation, in some cases purchasing land outside the flood-prone areas and land swapping with homeowners residing within flood-prone areas (CBC News, 2013b; Government of Alberta, 2015b). In total, 102 residents of High River qualified for the program and were relocated at the expense of

the Government of Alberta (Kaufmann, 2013), however, there were many others that had applied and were not considered in a high danger area, and therefore, did not qualify for the land swap at the time the program was in effect. This program aided those affected by the 2013 flood, however, the program was discontinued in 2014, meaning future governmental assistance is not guaranteed and relies on the government in power at the time. In addition, the Municipal Government Act was amended in 2013 to allow governments, both municipal and provincial, to restrict or disallow development within flood-prone areas as defined in flood mapping (CBC News, 2013b).

On September 14, 2015, the Town of High River implemented a Flood Risk Map in line with most recent Alberta Environment flooding information; the previously approved Flood Risk Map in the Land Use Bylaw was based on data from 1992 (Town of High River, 2015). The map, although similar to the previously approved map, highlights an issue that simply changing the regulations has on existing developments: existing properties that are zoned for development have their development potential undermined by the Flood Risk Overlay Map. As we can see in Figure 5, land use designations do not correspond to the Flood Risk Overlay Map; there are properties that are zoned, primarily for residential use, however, because they are also located within an area prone to flooding, their actual development potential is reduced. For existing developments, the properties may exist in their current state in perpetuity, however, any redevelopment or major alteration requires the property to be flood-proofed and developed to a minimum of 0.5m above the design flood level (Town of High River LUB, 2015).

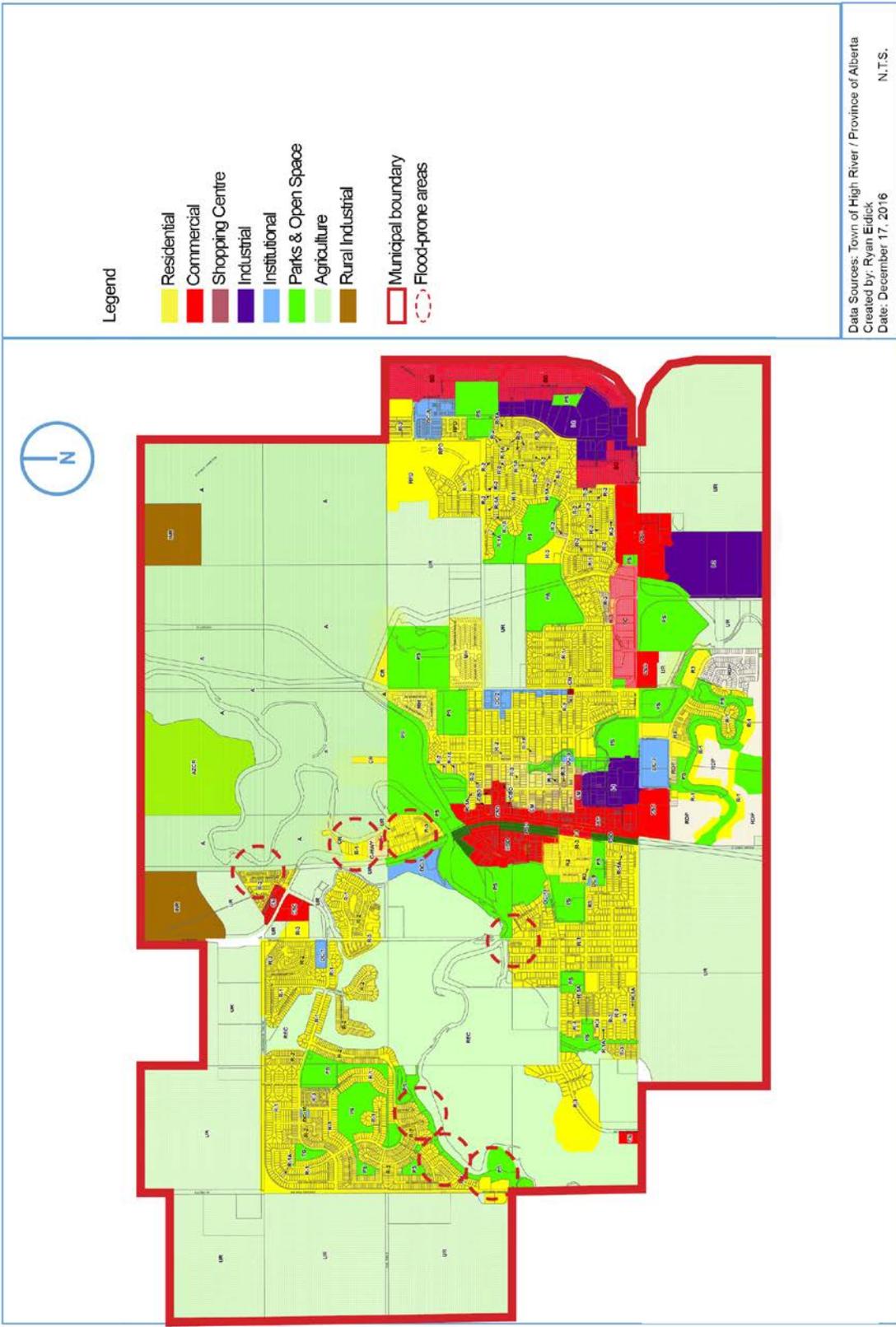


FIGURE 5
LAND USE PLAN
HIGH RIVER, AB

Beach Way SW, a subdivision in western High River is an example of the effects of a change in regulations on existing properties. The lands are zoned R-1 (Residential Single-Family District), and located within the Floodway, according to Map 2: Flood Hazard Overlay Map in the Town of High River's Land Use Bylaw. The Floodway regulations stipulate that only uses related to Essential Public Utilities, Intensive Agriculture, Public Parks or Parking Areas are permitted to be constructed, and that all existing buildings cannot be altered or replaced unless accompanied by flood mitigation measures acceptable to the Town of High River and Alberta Environment (Town of High River LUB, 2015). The increased regulations cause additional layers of bureaucracy to any landowner looking to renovate an existing dwelling, even for an addition as simple as a deck or sunroom.

In summary, the Town of High River utilized two of the methods that were identified in the literature review as possibilities to mitigating the issue of development in flood-prone areas, as both a land swap program was utilized, as well as amendments to the land use bylaw. Both methods were heavily influenced by the Province, especially the land swap program, which was completely funded and administered by the Government of Alberta. Locally, the municipality used updated flood mapping from the Provincial Government of Alberta to update and amend its Land Use Bylaw to reflect areas prone to flooding. In total, 52 existing dwellings are located within the Floodway, while more than 200 are located within the Flood Fringe, all of which were zoned and developed prior to the adoption of the updated Flood Risk Map Overlay. When looked at in isolation, adopting overlay maps and regulations is a simple method to protecting municipal and provincial interests with regards to flood mitigation. When examined in

concert with the amendments to the Water Act and Municipal Government Act, the change in regulations essentially absolves governments from providing aid in most circumstances to properties located within designated flood-prone areas, and existing landowners are the most penalized as their properties are subject to additional regulations that were not necessarily in effect when the properties were first purchased and developed. In both circumstances, the municipality was unable to undertake the programs on its own, so was required to defer to Provincial regulators.

The other jurisdiction considered is the cities of Grand Forks and East Grand Forks.

5.2 Grand Forks, North Dakota & East Grand Forks, Minnesota

These two cities (populations 55,000 and 8,600 respectively), located and separated by the Red River, experienced devastating flooding in 1997 and are informative precedent studies due to their being located in two separate States juxtaposed with their geographical proximity. Although the two cities operate independently, they collaborate on issues related to the Red River; most notably, on flood prevention measures.

In 1997, an estimated 60,000 residents were evacuated from Grand Forks, North Dakota as the Red River rose to historic levels and covered roughly 2,200 square miles (5,698 km²) of land in both North Dakota and Minnesota (Division of Homeland Security, 2007). The flood claimed the lives of 17 residents of North Dakota and altered the landscape of flood-preparedness measures in both Canada and the United States.

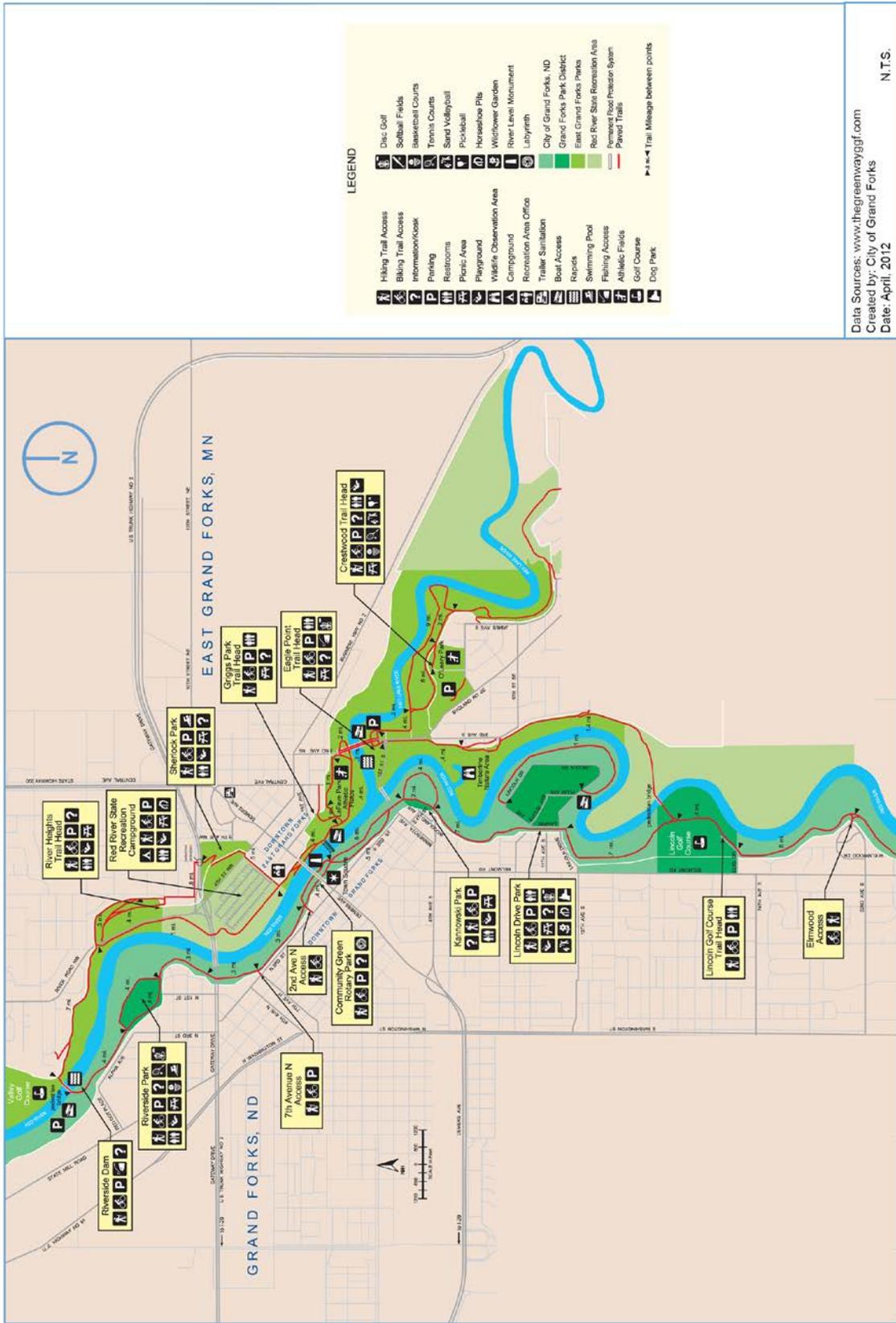
The aftermath of the flood resulted in the restructuring of the International Joint Commission (IJC), an organization charged with the regulation and protection of transnational bodies of water, at the behest of both Canadian and United States federal governments (IJC, 2000). Tasked primarily with examining the causes for the devastating 1997 flood as well as finding means to reduce or eliminate impacts of future flooding, the IJC commissioned a report in 2000 outlining 7 conclusions and 28 recommendations, as well as the endorsement of 2 conclusions and 30 recommendations from the International Red River Basin Task Force's 2000 report (IJC, 2000). The mitigation measures examined were primarily related to improving infrastructure – namely diking and the construction of intermediate storage systems. It concluded that floods were highly probable with the existing systems due to the increase in likelihood of significant flood events in the future (IJC, 2000). As was the case with High River, the report also found that improvement was required to existing floodplain information and databases to ensure current and accurate data was being given to residents and municipalities in vulnerable areas (IJC, 2000).

Six years after the 1997 flood, the Red River Basin Commission ordered an independent report be undertaken to study the progress made since the major flood event and in the wake of the IJC recommendations. The report found that the formation of the IJC's International Red River Basin Board, the Red River Basin Commission and the Red River Basin Institute, as well as the state-led Minnesota Red River Watershed Management Board and the Red River Joint Water Resource District has led to an increase in integration between municipalities, states and provinces with regards to flood mitigation regulations (R. Halliday & Associates, 2003). This increased level of

collaboration and sharing of resources resulted in policy changes at the Canadian federal and provincial government levels, as both Environment Canada and Manitoba Conservation now more openly share data on climate and streamflows. The report notes that due to budget constraints, the sharing of information was not always the case, and this had previously hindered the ability of state governments south of the border to effectively study and prepare for major flood events (R. Halliday & Associates, 2003).

Additional regulatory changes were administered in Grand Forks, mainly dealing with the funding of dike construction in both Grand Forks and East Grand Forks. As the R. Halliday & Associates report (2003) identifies, although the funding for the dike projects require Federal budget approval every year, the project has been consistently funded, and continues to be funded for maintenance and emergency reserve funds, even though the implementation program was completed in 2007 (City of Grand Forks, 2016a).

The largest mitigation measure taken to reduce both the probability of future major flood events within City of Grand Forks and East Grand Forks boundaries, as well as the damage to homes within flood-prone areas, has been the development of the Greenway system along the banks of the Red River. The system, originally proposed in 1997 by North Dakota congressional delegates and planned primarily by the U.S. Army Corps of Engineers, officially began construction in 2001 and was completed in 2007 (City of Grand Forks, 2016b). The system spans more than 2,200 acres (890 ha), features two golf courses, boat launches, campgrounds, and sports facilities for year-round use (City of Grand Forks, 2016b). More importantly though, was the



Data Sources: www.thegreenwaygfg.com
 Created by: City of Grand Forks
 Date: April, 2012

N.T.S.

FIGURE 6
 THE GREENWAY
 GRAND FORKS & EAST GRAND FORKS

implementation of the Greenway, combining resources at local, state and federal levels to ensure a self-sufficient system of management, planning and emergency preparedness was in place to aid current and future populations affected by flooding.

The aid the Army Corps of Engineers provided to the successful implementation of the Greenway program cannot be overstated. As a federal agency under the Department of Defense, whose main focus is to provide technical expertise in designing and implementing major infrastructure projects, mainly related to flood mitigation (Lancaster & Genega, 1996), the Army Corps is among the largest public engineering, design and construction management companies in the world (USACE, 2016). As a result, the Army Corps has access to data and expertise that likely outpaces that of the private sector engineering companies due to their involvement within the federal government and army proceedings. With the capacity of the Army Corps at their service, the cities of Grand Forks and East Grand Forks were able to quickly and effectively take action. In addition, the greenway was supported by funding by various levels of government, however the consulting costs that Grand Forks and East Grand Forks would have typically otherwise paid, as with all public infrastructure projects, were saved by the two cities as this was funded by the federal government.

Immediately following the flood, North Dakota implemented a Crisis Counseling Plan, a Donations Management Plan, and the Division of Community Service – a new state division, to help residents recover after the flood event (Division of Homeland Security, 2007). Both plans have since become national models of success, and implemented not only by other states, but by the federal government as well (Homeland Security and Emergency Management, 2015). The State also received more than \$200

million in funding from the federal government to provide disaster housing for residents, as well as buyout homes within the flood-prone areas that now accommodate the Greenway system (Division of Homeland Security, 2007). Finally, with careful design and implementation, the banks of the Red River that now feature the Greenway system have also been re-naturalized, enhanced and protected by dikes, blending recreational and flood-mitigation measures into one succinct system. The system has proved effective - damages to local infrastructure and properties totaled \$557.5 million in 1997 during record flood levels, however dropped to just \$9.6 million in 2006 during the third highest recorded flood (Division of Homeland Security, 2007).

To summarize, the Cities of Grand Forks and East Grand Forks utilized strong state and federal support to become a national leader in emergency preparedness, and quickly overcame a major flood event while simultaneously ensuring that future damage from flood events would be minimized. The speed at which this was accomplished is remarkable, as within ten years of the flood event, more than 50 State agencies now support the State Emergency Operations Plan, and the entire flood-prone area has been reconstructed and redeveloped into a usable recreation area for the entire community. The Cities relied heavily on State support, both in funding and the implementation of measures and programs to support local initiatives and needs. Based on the research, however, it appears the entire process was initiated and led by state governments rather than local governments, and relied more on the creation of action plans rather than simple changes in policy.

5.3 Summary of precedent studies

In both precedent studies, the examples of mitigation measure derived from the literature review are evident in their utilization, however are achieved on different scales and using different methods. In both cases, development within flood-prone areas was restricted; however in High River the onus, and therefore the risk, was placed on individual landowners through changes in policy that limited development to certain circumstances. In contrast, Grand Forks and East Grand Forks eliminated private landowners from the equation completely by becoming the primary landowner themselves through the purchasing of at-risk properties.

In both cases, the municipalities relied heavily on financial support from provincial/state legislations to achieve the goal of reducing the risk of flooding on at-risk properties. However, the Province of Alberta chose education and the dissemination of information to private landowners, while the States of North Dakota and Minnesota actively lobbied the federal government for funding and created multiple task forces and action groups to oversee the vision. It has only been three years since the flood in High River, meaning there are many pages left to be written on how flood mitigation measures will be implemented, however the early results differ greatly from what has occurred in Grand Forks and East Grand Forks. That being said, the aid received from the Army Corps of Engineers is equivalent to federal funding; something that was not available to High River politicians and planners, and greatly benefited the cities of Grand Forks and East Grand Forks.

5.4 Answers to research questions so far

The research was originally guided by three questions, and following the literature and precedent study reviews, it provides an opportunity to begin to frame how those questions may be answered at the conclusion of this research.

Question 1: What are the difficulties in developing sites in flood-vulnerable locations within small to medium sized cities?

This question will be answered in more detail through the focus group exercise, however at this juncture it appears that the difficulty mainly relates to policies implemented by municipal and provincial/state legislators. In both Manitoba and Alberta, policies aimed at protecting buildings from flooding have been implemented following major flood events, while in the states of Minnesota and North Dakota, similar policies have been implemented as well. These policies generally aim at raising all habitable spaces; everything but a garage basically, above an agreed upon flood level – generally 1:100 year flood level. This means that existing homes have become non-conforming, and all new developments must be built up higher than current grades in most circumstances. As mentioned, this will be explored and elaborated on further during the focus group portion of the research.

Question 2: Should flood-vulnerable places be promoted for redevelopment? What are the implications / challenges if no development occurs or is developed as public open space?

Based on the research to this point, it does not appear that flood-vulnerable places should be promoted for redevelopment, but rather development should be located away from such areas. Cost implications to flood-proof buildings appears to be the major hurdle for private landowners, as well as the value of the properties once the new policies have been implemented. Insurance risks increase as well with the change

in policies. Grand Forks and East Grand Forks have developed their flood-prone areas into public open space successfully, however did so through the support and more importantly, the funding from state and federal agencies. The high financial requirement to expropriate land and relocate existing residents elsewhere requires detailed cost-benefit analyses to be undertaken. The greenway system has become a major landmark and active transportation corridor for the cities of Grand Forks and East Grand Forks, however it is important to question whether or not the cities would have pursued the same program had they not received aid from higher levels of government, and whether the cities would have received support from tax-payers to undertake such a large program using solely municipal taxes. The cost of the project would have to be sold effectively to residents as a balance with the overall public benefit.

This question will again be explored further through the focus group process.

Question 3: What are the implications / challenges if the area redevelops?

Neither the literary research nor the precedent studies recommend redevelopment, therefore this question remains relatively unanswered to this point. Based on the preliminary literature review, however, the implications to existing landowners are the retention of property values as they maintain the ability to redevelop or sell their lands for continued habitation or redevelopment. However, one of the challenges outlined in the literature is that the frequency and intensity of storm events are increasing due to overall climate and environmental factors, therefore policies restricting development in flood-prone areas are likely to increase in their restrictiveness, or eventually prohibit development altogether.

Further exploration of these themes will be explored during the focus group process to understand the full implications on residents and municipalities should redevelopment occur.

Chapter 6: Focus Group Findings

6.1 Introduction

In order to identify the most appropriate method to deal with development in flood-prone areas as it relates specifically to the situation in Brandon, Manitoba, a focus group was conducted in August 2016 to supplement the findings reported in the literature review and derived from the precedent studies. A series of questions and topics were developed to lead discussions in the focus group, with the intention to better understand the local perspectives regarding development in The Flats. Specifically, whether development should occur in the area, and how best to achieve a balance between private land and public interests.

A total of five participants made up the focus group, each selected based on their knowledge of The Flats or development in Brandon as a whole. The group included one municipal planner from the City of Brandon, one private-sector developer that focuses the majority of their work in Brandon, one representative of Fire and Emergency Services with the City of Brandon, and two private residents that had previously owned land in The Flats area. In the below table, the informants are listed with their assigned acronym used throughout the remainder of this chapter:

Informant	Acronym
Municipal Planner	P1
Private Sector Developer	D1
Fire & Emergency Services Personnel	F1
Private Resident	R1
Private Resident	R2

Twelve questions were prepared to guide the conversations and the questions were organized into three topic headings: Introductory Questions, which provided the researcher and other participants an understanding of the backgrounds of each participant and allowed everyone to be engaged early in the process with the hopes they find their confidence and voice prior to delving into the more poignant questions; Opportunity and Measures, the most direct line of questioning that focused on the prospect of development itself, and the opportunities for development within The Flats; and General Discussion, which outlined the findings in the research and had each participant respond with their most preferred approach as well as a discussion on the reasons for choosing that approach. In general, the discussion revolved around the struggle between public and private interests related to development, and the opportunities and barriers found within the local bureaucratic development process. A copy of the focus group schedule, rules and sample questions can be found in the Appendix, all of which received approval from the University of Manitoba Research Ethics and Compliance Board; a copy of the approval can also be found in the Appendix.

The focus group followed a set of rules and line of questioning intended to provide both comfort and confidence to all participants, ensuring that all answers were honest and unbiased. The format allowed for the questions to be expanded upon should the need arise, and the flexibility to adapt the questions to suit individual backgrounds was crucial given the diversity of the participants' familiarity with the subject matter and development processes. One weakness of the format was the difficulty encountered in managing the different personalities. For example, the participant from the development

industry, who was much savvier in terms of the knowledge of development processes and the effect of regulatory changes on their business, was more outspoken than the individual residents. To overcome this limitation, efforts were made to establish a rapport with each participant before the formal question period by asking questions unrelated to the subject matter and making small talk in order to make every participant feel comfortable in the setting. Throughout the focus group process, efforts were made to ensure no single person or group of people dominated the proceedings and every participant had an opportunity to speak their opinions without prejudice from other participants. In addition, the questions were sometimes softened or reworded in an attempt to deliver them in the most unbiased manner possible. The setting and layout of the physical environment was also important, as the researcher took every effort to ensure that each participant had an equal seat and surrounding relative to the researcher and the group. Refreshments were provided, and one break was taken partway through the nearly two hour exercise to ensure everyone had an opportunity to use the restroom if need be, and effectively reset the tone and thoughts of each participant.

Given the diversity of the participants, it was anticipated that the responses would vary greatly and the data would have few recurring themes. Common subjects, however, emerged across the participants, which were used to categorize main theme areas. Those theme areas include

1. Unsatisfactory current infrastructure conditions exist in The Flats;
2. Development in flood-prone areas should be avoided;
3. Better education and communication from the City for residents is needed; and
4. Partnerships between various levels of government is required.

Although numbered, the above list does not represent a hierarchy of topics, as each theme that emerged was equally beneficial to the research and the understanding of the possibilities within The Flats. In addition, the themes have similarities and connections that make them difficult to rank.

6.2 Analysis

All participants generally acknowledged that The Flats suffers from constant flooding during almost any rise in water level along the Assiniboine River, and as a result the land values are lower and therefore the area is generally occupied by those of lower socio-economic status. The municipal planner (P1) pointed out that the flood-prone area in The Flats is actually broken down into two categories, the Floodplain and the Floodfringe. P1 was also fairly flexible in the approach to dealing with development in both areas, stating:

No development should occur in the floodplain, except for recreational uses which can withstand flooding, like passive parks. Development in the floodfringe should be restricted to areas which are currently developed.

The point made by P1 is important, and is in-line with the Provincial planning policies regarding development in flood-prone areas. The second statement regarding areas which are currently developed required additional explanation, to which P1 elaborated that development should only occur in areas that are already zoned and are free of caveats, such as Development Reserves or other restrictions, on the title of the land. P1 concluded by saying that the City should not support any further rezoning applications that would intensify or densify flood-prone areas, especially not for residential developments.

When R1, R2 and F1 were asked about their personal opinions on whether the City should prioritize development in The Flats, given its geographic advantages – adjacent to downtown, good access to transit as well as arterial roadways – all were hesitant, responding that priorities should be focused elsewhere. F1 also commented:

The City has done a lot of work to prevent future floods, so the risk has been minimized to a degree. With that being said, I feel as if there are other areas of the City that would be prime locations for development, and the risk of flooding is an unnecessary one to take.

Participants also agreed that the area is in need of infrastructure upgrades, and one of the residents spoke of a family member still residing in the area that suffered through an unfortunate event as a result of outdated infrastructure:

A few years ago, she received approximately three and a half to four feet of water and sewage in her basement due to crumbling infrastructure and lack of storm sewers in the area. It was devastating to witness the water pouring in and the destruction and clean up that ensued.

The development industry representative agreed with the resident (R1) that flood-proofing measures and infrastructure upgrades were necessary to even make the area livable for current residents, let alone bringing in new residents through increased development. P1 mentioned that under the current political climate in Brandon, it would be difficult to convince Council to invest in The Flats, stating that the support is not present following two 1-in-300 year floods within a 5-year time period. In response to the question of whether or not additional opportunities for development should occur in The Flats, the developer responded:

Probably not at this time. After two major flood events in the past few years, the City still needs to complete flood protection measures in the area.

F1 elaborated that only during the last flood in 2014 was Fire and Emergency Services called out to locations in The Flats for reasons related to flooding:

Out of my ten-year career I have only been called out specifically due to flooding during the last flood, and there were no calls specifically from properties during this time period. But we responded to different duties for about a month like victim retrieval (people falling into the river) and helping with levee construction.

These comments suggested that the current conditions would need to be improved for residents and businesses already in the area prior to any further development to occur. Participants suggested that increased development was one way of spurring the upgrades necessary to bring the infrastructure up to current standards, as well as increasing flood protection measures through development levies. P1 responded that the City should be, and has been, active in its role of discouraging new investment or development in The Flats, although neither resident participant had been aware of the change in designation. Both P1 and D1 agreed that it may be difficult for new businesses to find investors, as banks and insurance companies are becoming increasingly cautious around investments in areas with potentially catastrophic natural hazards. P1 mentioned that the new Brandon and Area Planning District's Growth Strategy identified flood-prone areas as non-developable and intended for future expansion of recreational space. D1 raised the issue that the general public may not be aware of that policy, stating that the only piece of legislation s/he was familiar with relating to The Flats was a study done over a decade ago by the City of Brandon's Economic Development Department. In addition, F1 was only aware of the physical construction of dykes by the City to protect flood-prone properties, and both R1 and R2 also indicated they were unaware of the designation in the Growth Plan.

F1 also stated a personal belief that the City has been strong at educating the public on ways to improve existing structures to prevent flooding, especially in The Flats. D1 agreed that the City has been active in education, however, believed that the City should provide additional financial incentives to existing homeowners to off-set the cost of necessary upgrades.

That last comment shifted into the discussion surrounding the results from the literature review research and precedent studies, as the participants were given an introduction into the results and asked to comment on which method of dealing with The Flats was most appropriate. The options presented to the participants were:

1. Restriction of development through regulatory changes and allowing no further development in the area;
2. Land swapping with the city, or the city purchasing land from existing landowners for the redevelopment as public recreational spaces;
3. Infrastructure upgrades and/or the construction of physical barriers to protect existing landowners and allowing for some new development; and
4. Promoting development through regulatory changes and/or leaving the area as it currently exists.

The first three options were based on the findings from the literature review and supported by the precedent studies, while the fourth option was proposed to ensure all options were explored without bias. All participants indicated that they were in support of the second option under the context of unlimited financial resources being available. Specifically, the measures taken from the precedent studies in Grand Forks / East Grand Forks were praised, where various levels of government partnered to purchase

lands in significant danger of flooding and redevelop the area as a passive recreational area – while also solidifying the eroding landscape, therefore providing for additional support and protection against future floods. Even residents agreed The Flats should be avoided by developers, stating that they did not wish similar hardships they had experienced on future families that may well have limited choices when selecting an appropriate dwelling, for financial reasons. When P1 was asked about the input they received during the BAPD Growth Plan exercise from the development industry, P1 stated that the development industry has been generally accepting of the limitations to development in floodplain areas, and followed that up with additional insight, that:

...they are part of the community and have seen firsthand the hazards of developing land in hazardous floodplain areas. Developers have generally accepted the vision and do not pursue land acquisition in the floodplain.

D1 agreed, stating that the company s/he represents has not actively sought out land in The Flats, and will likely not in the future. P1 continued, that residents living in the area had tried to make their properties more marketable for sale, requesting that the City only raise dykes from their current level during major storm events to help preserve views to the River from their properties. R2 noted some disappointment that the value of property purchased well before new regulations came into effect being lowered as a result, however, stated:

While I agree that land should be used for development should the need be there, I find it hard to agree to allow this to potentially happen to more people.

R1 proposed a hybrid solution to help current landowners while also protecting against future flooding, suggesting that rather than purchasing properties and moving

residents out of the area, governments should invest in upgrading the existing infrastructure to a level that is satisfactory and consistent with other areas in town. This would allow existing residents to upgrade their homes as needed without fear of infrastructure failure, and could even keep the value of their existing homes high, as they could be the most desirable dwellings in the City in terms of the potential views of the Assiniboine River and the proximity to Downtown. R1 continued that in addition to underground infrastructure upgrades, the City and other levels of government should partner to construct a physical barrier to protect existing homes from rising water levels. D1 opined that it would be the most unfeasible of all the options presented unless the City had access to funds from provincial and federal governments, as the upgrades necessary in the area represent a large investment due to the age of the existing services. P1 was asked about the relationship between various levels of government with regards to flood protection measures, to which the response was that governments at the provincial and municipal levels generally cooperate on matters related to flooding effectively. However it is at this point a reactionary situation due to the financial situations at both the municipal and provincial levels, therefore s/he was unsure about the availability or the desire of governments at different levels to participate in such an endeavor.

When discussing the potential for a land swap, D1 brought up the Black Property, a city-owned parcel on the north side of Brandon that is being promoted for development. D1 mentioned that the city could trade lands from that property for those within The Flats. D1 also noted:

Only problem is that I'm sure most of the homes in The Flats would be worth around \$100,000-\$150,000, which wouldn't go far on a new home. Probably only the lot, since there are many expensive off-site costs to develop the Black Property. I believe this would be a very interesting thing to look at though.

D1 went on to rank the preferred options, stating that the first option was the most feasible due to the simplicity in making the necessary changes; however added:

I know if I was a landowner I would not be happy and you would more than likely have the entire group of homeowners in the area come together to oppose this option.

D1 also stated that the third and fourth options were similar and would be the most unfeasible from the development industry's perspective:

In my opinion the area wouldn't be a very desirable area for new mid- to high-end residential development anyway, so the cost (to do the necessary upgrades/regulatory changes) would more than likely be wasted.

P1 preferred option 1, reiterating that governments at both levels do not at this time have the required funds to undertake any of the other options feasibly. S/he did indicate the need for further cooperation and planning could take place, however it would require cooperation and the desire from all residents in Manitoba, not just those affected by flooding along the Assiniboine River, to have any chance of success.

F1 identified option 1 as their preferred option given the circumstances, stating that unless governments can predict flooding far better than in previous instances, there is no reason that anyone should be residing in these areas. S/he talked about how everyone in Brandon seemed to be caught off guard by the previous flood, and until the

city is able to predict and control flooding in The Flats more effectively, the risk to existing landowners is not worth the potential reward.

R1 preferred option 3, identifying the need to ensure existing residents had every chance to continue living there and could get the most value for their properties once they decided to move on.

R2 preferred option 1, stating that there was already enough areas in within the city that require some thinking and support prior to focusing attention on The Flats. S/he mentioned that it was understood that pushback would occur from the residents still living in the area, however the government would receive far more complaints from residents in other areas that would not be supportive of any funds being diverted to one sole area in the city.

6.3 Summary & Observations

At first it appeared all the participants agreed on option 2 being the preferred method with dealing with The Flats, however, after further discussion amongst the group it became among the least feasible due to the costs associated with the option. All participants agreed that The Flats should not be promoted for development, however the resident participants did show sympathy for existing landowners and argued in favour of increasing the value of those lands as much as possible. This runs counter to what the original belief of the researcher; that there would be some bias towards development by some members of the focus group. This was at least a little surprising, however as mentioned in Chapter 1.3, the limitations of the smaller group, especially

having only one member of the development industry at the table, may have resulted in the unanimous decision that development should be restricted.

The biggest theme arising from the discussion was that the problem of mitigating flooding concerns on private properties was something that could not be dealt with simply by the municipal government; it would take efforts and support from various levels of government, most notably the provincial government, to have any significant impact on the area in a positive way. All participants stated their preferred option based on feasibility once the discussion had completed, which indicated a low level of faith in the ability of both their local and provincial governments in making a substantial change to current conditions. Option 1 is essentially already in place, with the provincial government having changed the regulations regarding development in flood-prone areas already, and the City of Brandon having already designated this area as undevelopable in the BAPD Growth Plan. It was a disappointing result from a research perspective, as it essentially indicated that nothing can be done in addition to what is currently happening, and that current conditions were the best that could be achieved. This is perhaps an issue with the Canadian political system and financial situations, as the precedent study from High River yielded a similar result as to what was heard from the participants, however the example from the United States had a far larger impact and benefit to all those involved. All participants were excited about this option at first blush, until it was thought about and discussed in detail regarding the difficulties faced under the current political system and financial realities faced by all levels of government.

Chapter 7: Synthesis & Research Questions Revisited

In this chapter, further analysis of the answers to the research questions are discussed following the information derived from the focus group, picking up from the discussion in Chapter 5.4. In addition, the implications for professional planners and directions for further study are identified, with specific recommendations made based on the results of the research.

7.1 Research Questions

Question 1: What are the difficulties in developing sites in flood-vulnerable locations within small to medium sized cities?

The foremost issue with developing sites in flood-prone areas is the high probability that infrastructure upgrades are required prior to any new development. As was discovered throughout the precedent studies as well as the focus group, flood-prone areas are generally associated with older infrastructure, as these areas were previously developed at times where both regulations surrounding development in close proximity to flood sources as well as the frequency and intensity of flood events were minimal. With increased regulations in place, such areas have been slow to redevelop, meaning infrastructure upgrades were never a priority to accommodate new development, nor were there new investments into the area that could stimulate infrastructure upgrades.

The second issue is one that was touched on throughout this document; the changing of regulations over the course of time with regards to environmental preservation and the protection of residents from flooding. As evidenced by the area in

question – The Flats in Brandon – regulatory changes at the provincial level have trickled down to municipalities to create a difficult environment for redevelopment in such areas. As environmental protection and preservation measures continue to increase in importance, continued increases in minimum standards for development in flood-prone areas may occur and push existing development opportunities further away; leaving an even more difficult situation for existing landowners.

While the emphasis throughout the precedent studies and focus group revolved around the physical and quantifiable challenges, such as crumbling infrastructure and aging buildings in need of major renovations, it was the social implications exposed by the literature review that are most difficult to overcome in the opinion of the researcher. When an area that is repeatedly under duress from natural events out of the control of the residents, and rather than providing support, governments push new regulations to restrict any new investment into the area, existing conditions deteriorate and leave low quality developments. This becomes a cycle where the land values are decreased to the point where it becomes a monoculture of low quality housing and incompatible land uses, as landowners are unable to sell or improve their properties without adhering to much higher standards of development. The social degradation is worsened by the constant threat of having to relocate during flood events; a stress that disrupts daily life and could further affect the financial situations of those having to relocate should governments not provide any assistance. Landowners in such areas find themselves in a bizarre situation where they are unable to sell their lands due to government restrictions on the lands in question, however also may not receive assistance from those same governments should they want to relocate.

**Question 2: Should flood-vulnerable places be promoted for redevelopment?
What are the implications / challenges if no development occurs or is
developed as public open space?**

The prevailing response was that flood-prone areas should not be promoted for redevelopment, especially from participants of the focus group. Although the participants were generally sympathetic to the residents currently living in such areas, and understood that increased development in the entire area could lead to better conditions for all existing landowners, it was unanimous that these areas should not see any development. The results from the literature review tended to be related to the development of the lands for public use rather than for private holdings, and the precedent studies further confirmed that as both Grand Forks and High River did not promote their flood-prone areas for redevelopment. In both cases, governments acted on the issue by opting instead to restrict private land holdings through the purchase of land for public use as was the case in Grand Forks, and restricting redevelopment opportunities through increased minimum building standards in designated flood-prone areas in High River.

The implications if no further development occurs would be most felt by existing residents, as a lack of new investment in the area would lead to the further degradation of the infrastructure in the area. Political support to upgrade infrastructure beyond a temporary solution would be difficult given that the area would never be further developed. This could lead to existing landowners continually having issues with their infrastructure – be it roads or underground services – and the further lowering of both the aesthetic and appeal of the area. Also, the continued efforts to relocate existing residents during a time of flooding would be a continued financial burden on

governments, and put unnecessary strain on existing landowners as their lives are continuously disrupted.

The biggest challenge with developing such areas for public use is the acquisition of land to do so. As was the case in Grand Forks, over 890 hectares of land was consolidated to create the Greenway system, much of which was purchased from private landowners. This program was wildly successful and the Greenway is a major natural feature and attraction for the public, however the cost to purchase the land required a partnership and financial contributions from multiple levels of government, including the federal government. If smaller municipalities had surplus land that could easily be exchanged with landowners in flood-prone areas, the process of accumulating land within flood-prone areas would be much smoother; however, as is the case with the City of Brandon, the available land for trading is often undeveloped, meaning the trade would require negotiation to ensure a fair trade is made for residents. The timing also plays a factor, as the cost and time required to bring services into an undeveloped area would require studies and construction, while also requiring political support through budgetary approvals. As was discussed during the focus group, residents in other areas of the municipality may feel slighted should a project in their neighbourhood or larger community be delayed or cancelled in order to finance the relocation of existing residents to a new area serviced through government funding.

Furthermore, it would be very difficult for governments to finance the relocation of every landowner at once, depending on the availability of land in municipal reserves. As mentioned, political support would be required, however the bureaucratic process for selling available land and redesignating it for development in addition to constructing the

lands up to a standard comparable to what the residents are leaving behind could take multiple political terms. It is possible to imagine a scenario where local government changes during one of these processes, and a new budget to continue the project is not approved by the new government; leaving existing landowners in limbo and the project half-completed. The city could partner with Brandon Riverbank Inc. and Ducks Unlimited as is the case at the Riverbank Discovery Centre on the north side of the Assiniboine River, as Brandon Riverbank Inc. has funded over \$5 million for projects related to enhancing the Assiniboine River corridor since its inception in 1995 (Brandon Riverbank Inc., 2016). However, none of the focus group members even made mention of partnering with that group, and the implications are that the lands within The Flats would be turned over to organizations as is the case with the Riverbank Discovery Centre. Those organizations would be required to manage and maintain the lands, which would require additional funding for the expanded scope of their lands. With funding coming from various levels of government, including the federal government, it would require convincing all levels to invest in the project and may not be guaranteed as political powers change over time. However, based on what was accomplished in Grand Forks and East Grand Forks with the greenway system, which is also run by a non-profit organization much like the Riverbank Discovery Centre, a partnership between various organizations and governments would need to be explored.

The results of the research came to the same conclusion as both the Province of Manitoba's and the City of Brandon's administrations when the decision was made to restrict all development in flood-prone areas. As indicated in chapter 1.3, the bias of the researcher was towards allowing development, however after seeing the abundance of

research preaching the opposite, combined with the results of the precedent study and focus group session, I have softened my original position that development should be pursued. Although blanket restrictions affect only a small percentage of residents overall, the belief of the researcher has evolved to suggest that governments work more closely with affected residents and landowners to ensure that an appropriate plan – whether a buyout/relocation plan or a renaturalization/flood mitigation measures plan are put in place that benefits all parties affected, including the municipality itself.

Question 3: What are the implications / challenges if the area redevelops?

There was little discussion in both the literature review and the two precedent studies regarding the implications should the area redevelop, as most of the literature focuses on how to restrict development in these areas rather than promote it. As it relates to the City of Brandon, redevelopment would be nearly impossible other than to renovate an existing building, as the permits required to construct any addition or replacement development would not be approved by the City due to the lack of planning rationale through the zoning bylaw and associated documents to support such an application. Any redevelopment would also go against provincial regulations in place to restrict development in such areas, making it even more difficult to get the necessary approvals to redevelop.

When looking at the situation hypothetically, the implications remain difficult to allow any new development in The Flats area. A discussion arising in the focus group outlined the possibility that landowners within flood-prone areas would have a difficult time getting insurance on homes or mortgages, or would have to pay higher premiums due to their proximity to a known flooding source. This would further inhibit existing

landowners from redeveloping their lands unless they were prepared to take the financial risk.

The issue of redevelopment could also include typical infill development implications felt in any area of municipalities; the gentrification of the lands, pushing existing landowners to relocate to other areas due to higher taxes. However, this is not a topic that was developed throughout the research, and would require additional study.

7.2 Implications for Professional Planners

The difficulty for planners at the municipal level is that their local bylaws and statutory documents are all informed by decisions at the provincial/state and regional levels, as evidenced by the difference in approach in High River and Grand Forks related to their flood-prone lands. Where the municipal government in High River was forced to amend statutory documents to adhere to provincial regulations and thereby render some of the properties of residents they represent valueless, local governments in Grand Forks and East Grand Forks were able to successfully transform their flood-prone area into a space benefitting every resident due to the assistance they received from state and federal governments.

Planners at various levels of government need to come together to ensure a result that suits the municipality in question, while still protecting the interests of all levels of government related to environmental preservation and flood protection. Higher levels of government have the authority to influence the decisions of local planning departments without having to deal with much of the pushback these decisions have on residents at the local level.

Conversely, the research findings clearly indicate that development in flood-prone areas should be restricted or avoided altogether. The difficulty will be finding an appropriate solution, as each municipality that deals with flooding operates within a different context. In Brandon, an entire area that would normally be prime for development due to the geographic location falls within a flood-prone area, while in High River, a much smaller number of properties are affected. In both regions, however, the similar regulations have been implemented by the provincial government, and although both circumstances are different, municipal governments are forced to regulate them similarly. Although the need for development restrictions in flood-prone areas are necessary, planners at both the municipal level and the provincial level need to work together with politicians to ensure an appropriate solution tailored specifically to the municipality in which the flood-prone lands exist is found.

The key recommendations based on the research and analysis are:

1. Brandon to explore joining the Red River Basin Commission; and
2. Explore opportunities to establish a similar commission for the Assiniboine River Basin.

The Red River Basin Commission has played a large role in synchronizing flood-mitigation measures between the United States and Canada, with mapping standards and the sharing of flood forecast and post-flood data aiding in the collective protection against future flooding. Although not geographically located within the Red River Basin, with the Assiniboine River flowing into the Red River, Brandon has implications related to being upstream from a major flood-source and should be involved in any decision-making that may affect water levels along the Assiniboine.

The Red River Basin Commission is made up of a 41-member board, all of which are politicians from their respective municipalities. Brandon could have their mayor or a member of council participate in the Commission. The sharing of information would be mutually beneficial, as the City of Brandon could contribute information related to their flood history that has spiked in the past 5 years, while the Commission could educate the city of Brandon on the organization and implementation of such a commission. The Red River Basin Commission has been largely successful since its origin at commissioning studies and reports that work towards the effective implementation of policies in municipalities on both sides of the border. The City of Brandon is not currently involved in a similar commission for the Assiniboine River Basin, as there has yet to be a formal committee organized. Learning from how the Red River Basin Commission went from inception to their current level of influence would help Brandon take a leadership role in the execution of a similar committee for the Assiniboine River Basin.

In 2014, after this research began, there was a push by some municipalities along the Assiniboine River to form a similar organization, called the Assiniboine River Basin Initiative (Stevenson, 2014), however, that initiative has yet to gain any traction due to a lack of funding from both Saskatchewan and North Dakotan governments (Stevenson, 2015). With support from the Province already in place, as they have pledged \$100,000 towards starting the Assiniboine River Basin Initiative (Stevenson, 2015), the City of Brandon would be well suited to taking on a leadership role for the organization. With a strong city charged with leading the proceedings, it could give the

governments of Saskatchewan and North Dakota peace of mind in participating in and funding the initiative.

The Assiniboine River Basin Initiative or a similar organization could then follow in the footsteps of the Red River Basin Commission and begin by outlining an overall vision and a set of goals for the organization, such as the provision of flood forecasting for municipalities along the Assiniboine River, the implementation of flood mitigation measures and recovery programs, conservation of natural resources as well as fish and wildlife habitats, and the education of municipalities and the general public on matters related to the Assiniboine River Basin., and follow up with implementation measures to ensure that all municipalities implicated by the Assiniboine River are given a strong set of resources when making decisions related to their own flood-prone areas.

7.3 Directions for Further Study

Further research into the differences between Canadian and American political systems would bring clarity to the difference in approaches in dealing with flood-prone lands, and what lessons and strategies can be learned from each. As the precedent studies showed, Grand Forks and East Grand Forks received substantial aid from upper levels of government to repurpose flood-prone areas for public use, while in High River the provincial government changed their regulations and expected municipalities to follow suit, and the federal government was not involved in the post-recovery efforts. Comparisons between the scopes and purviews of each level of government for both the United States and Canada would be beneficial to supplement the research related to dealing with flood-prone areas. Taxation methods and the distribution of these taxes

could provide clarity into the challenges different levels of government face when deciding how to allocate funds.

In a similar manner, additional precedent studies featuring Canadian examples would be beneficial to explore any similarities and differences between provinces. Other cities such as Thunder Bay, Montreal and Fredericton experienced river flooding, and further study surrounding the measures taken by municipalities and their respective provinces would complement the existing research from High River. In addition, further research on precedent studies from other municipalities in the United States could identify any differences between the way state-level governments deal with flood-prone areas. Because the procedures for emergency preparedness were implemented by every state in the United States based on the programs established following the flood in Grand Forks and East Grand Forks, additional research into the success of the program across the country could be explored as well.

Much of the discussion surrounding the re-naturalization of The Flats area is related to using the lands for recreational purposes. The Greenspace Master Plan designates the area as an Activity Greenspace, meaning the development of the area for both passive and active recreational opportunities. Included in the designation are elements such as sports fields and courts, however notes that each Activity Greenspace be developed based on a needs analysis and the context of the site itself. While The Flats could be used for additional sports fields, the site should have a naturalization component as the primary focus. Further research into re-naturalization methods and programs implemented by other river municipalities across North America could provide

a valuable next step from this research, and give additional research to decision-makers in Brandon to aid in the development of policy surrounding The Flats.

Chapter 8: References

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FOCUS GROUP RULES

1. PARTICIPATION

- Everyone is encouraged to participate
- You may be called upon individually to get your opinion if it hasn't been given

2. ANSWERS

- There are no right or wrong answers – feel free to express your opinion
- A range of opinions are preferred, so please provide your opinion even if it is contrary to that of another participant

3. PRIVACY

- What is said in this room stays in this room
- We will ensure that everyone feels safe to share their opinions
- We encourage completely honest answers
- Once the meeting is over, please do not share the names or opinions of others in the focus group with non-participants
- Once the meeting is over, please do not share the names or opinions of others in the focus group with non-participants

FOCUS GROUP QUESTIONS

1. INTRODUCTORY QUESTIONS

- What is your name?
- What is your current role? How long have you been involved in the development industry in Brandon?

2. OPPORTUNITY & MEASURES

Consider your previous experience in development in Brandon:

- Have you personally purchased property for development in the flood-prone area? If so, has development occurred? Why or why not?
- Should more opportunities for development exist in this area? Why or why not?
- What role could governments play in increasing development opportunities in this area?
- Are you aware of any measures that have been taken to promote the area for development?
- What challenges face development in this area?
- What measures have or can be adopted to review the feasibility of development in this area?
- Should opportunities for development exist in this area? Why or why not?

3. GENERAL DISCUSSION

- Consider the approaches in dealing with flood-prone areas identified in the research. How viable are each of the approaches in your opinion?
- What challenges will there be in implementing policy related to any of these approaches for flood-prone areas?
- How collaborative are flood mitigation processes between various levels of government? Between governments and private developers? Between governments and private landowners?



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APPROVAL CERTIFICATE

February 18, 2016

TO: Ryan Eidick (Supervisor: Richard Milgrom)
Principal Investigator

FROM: Lorna Guse, Chair
Joint-Faculty Research Ethics Board (JFREB)

Re: Protocol #J2015:137
"Shaping spaces in challenged places: What to do with The Flats:
Brandon's floodprone area"

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 and will expire on February 18, 2017.**

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, please mail/e-mail/fax (261-0325) a copy of this Approval (identifying the related UM Project Number) to the Research Grants Officer in ORS in order to initiate fund setup. (How to find your UM Project Number: <http://umanitoba.ca/research/ors/mrt-faq.html#pr0>)
- 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.

umanitoba.ca/research