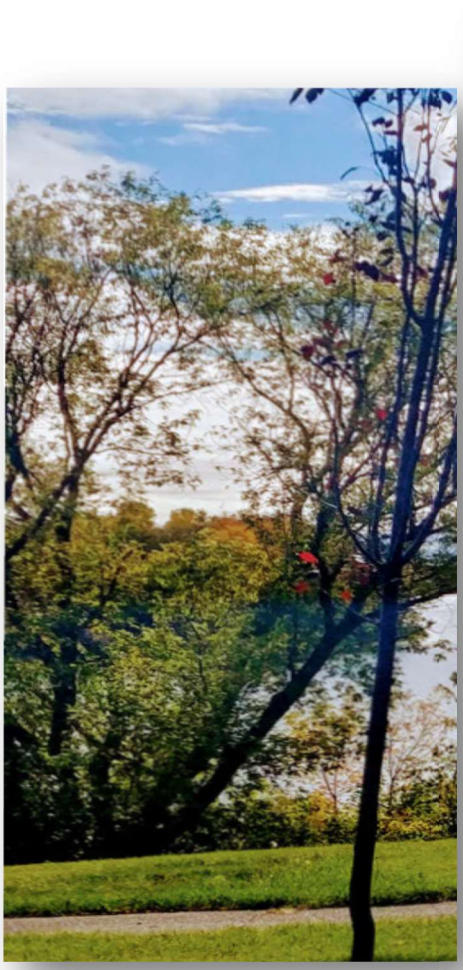
Assessing Climate Change Adaptation Readiness of Small Municipalities: A Case Study of Land Use Planning in Selkirk, Manitoba



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EXECUTIVE SUMMARY

Municipalities face increasing challenges due to climate change, including flooding, drought, storms, and wildfires. To reduce risks and strengthen community resilience, they must adopt proactive adaptation strategies. While climate adaptation is widely discussed, it is essential to assess how prepared municipalities are for implementing adaptation planning.

This research explores climate adaptation at the local level through land use planning. It develops a framework for evaluating municipal readiness for adaptation and assessing the capacity of local governments to build resilience through inclusive and effective land use policies. Specifically, the study examines how well Selkirk, Manitoba, integrates climate adaptation principles into its land use planning strategies. By identifying existing gaps and challenges, the research provides insights into how Selkirk can enhance its resilience through improved planning efforts.

The study employs two primary research methods: document analysis of Selkirk's land use plans and semi-structured interviews with professionals. The document analysis reveals that although Selkirk has taken steps toward climate adaptation, these efforts have not yet been fully incorporated into its official land use planning documents. Interviews highlight key barriers to integration, including limited funding, resource constraints, lack of political support, and insufficient stakeholder engagement at the governance level.

The findings emphasize that incorporating adaptation planning into land use policies is a complex process influenced by multiple factors. To successfully integrate climate adaptation, municipalities need strong intergovernmental collaboration, sustainable funding mechanisms, and educational initiatives to

build awareness and capacity. Strengthening these areas will help Selkirk and other municipalities develop more resilient and adaptive land use planning frameworks.

1.0 INTRODUCTION

1 Chapter 1: Introduction

1.0 Context

Climate change is one of the most pressing challenges facing humanity today. The Intergovernmental Panel on Climate Change (IPCC, 2021, p.5) reports that human activities have led to a 1.07°C rise in global surface temperatures, an alarming increase that has intensified extreme weather events, such as heatwaves, heavy rainfall, droughts, wildfires, permafrost thawing, and cyclones. These shifting climate patterns and growing unpredictability are becoming more evident across all regions of Canada, exposing communities to increasing risks.

Municipalities of all sizes, whether rural or urban, are experiencing the far-reaching effects of climate change, impacting ecosystems, infrastructure, economies, and social systems (Government of Canada, 2010, p.3). Given these challenges, proactive adaptation planning is more important than ever. While adaptation is widely acknowledged as a necessary response, it is crucial to assess whether municipalities are truly prepared to address climate risks. Unlike a single end goal, climate adaptation is an evolving process of continuous adjustments designed to enhance long-term resilience (City of Calgary, n.d., p.5).

This raises a critical question: Do municipalities have the capacity to confront the growing threats posed by climate change? Figures 1 and 2 illustrate the impact of climate change in Manitoba, highlighting the urgent need for effective adaptation strategies.

Figure 1: Severe flooding in the Red River Valley near Rosenort, 1997

Figure 2: Smoky conditions in Winnipeg

1.1 Research Purpose

Land use planning plays a crucial role in understanding climate change. Hirokawa and Rosenbloom (2012) emphasize that local governments have the responsibility to implement effective strategies and tools that enhance community adaptability to changing climate conditions. Additionally, land use policies can help mitigate climate change by guiding development in ways that reduce greenhouse gas (GHG) emissions and their associated impacts (Tang et al., 2009, p. 369).

While much of the existing research has focused on evaluating mitigation strategies for natural hazards (Burton et al., 2011, p. 373), there has been limited investigation into the direct connection between land use planning and climate change adaptation, particularly at the municipal level. This research aims to fill that gap by examining how adaptation planning can be integrated into municipal land use policies.

The study seeks to assess municipalities' preparedness for climate adaptation through land use planning, evaluating their capacity to build resilience against climate impacts. By developing a framework for analyzing municipal readiness, this research highlights the role of robust and inclusive land use planning strategies in strengthening local government's ability to respond to climate challenges effectively.

1.2 Research Questions

The research seeks to answer the following questions:

- To what extent do Selkirk's land use planning policies and strategies consider and integrate climate adaptation principles?

- How can current gaps and barriers be addressed to enhance Selkirk's capacity to become a climate-resilient municipality through improvements to its land use planning?

The primary research question examines the extent to which climate change adaptation planning is integrated into Selkirk's land use planning documents. Specifically, it seeks to explore whether Selkirk's policies and strategies actively align with its climate change adaptation strategies and are reflected in its land use documents, such as development plans, zoning bylaws, community concept plans, and climate change adaptation plans. The second research question investigates the challenges and limitations in Selkirk's land use planning that may impede effective climate change adaptation. It examines the gaps and barriers municipalities face when incorporating adaptation planning into land use policies and strategies while also exploring potential solutions to overcome these obstacles.

1.3 Scope of Research

This research explores municipal readiness for climate change and the extent to which climate adaptation strategies are integrated into land use planning, using the City of Selkirk as a case study. The study examines Selkirk's land use plans and policies to determine their alignment with the climate change adaptation plans and policies. Additionally, it identifies common gaps and challenges municipalities face when implementing adaptation-focused policies at the local level and explores potential solutions to enhance the effectiveness and implementation of these strategies.

1.4 Overview of Document

This report comprises six chapters:

Chapter 1: Introduction presents the research topic, which focuses on exploring the concept of climate change adaptation planning through municipalities, specifically examining their land use plans and policies. This chapter also identifies gaps in existing research and presents the key research questions that will shape the study.

Chapter 2: The Literature Review provides an overview of climate change adaptation planning, and the critical role municipalities play in its implementation. It explores how land use planning serves as an effective tool for adaptation while also examining the challenges and barriers in mainstreaming adaptation strategies into planning processes. Additionally, this chapter identifies gaps in existing research and highlights how this study contributes to advancing knowledge in the field.

Chapter 3: Research Methods outlines the various research methods used in conducting the study. The chapter includes subsections that detail the documents analyzed and the interview participants involved in the research. Additionally, it addresses the limitations of the study, providing insight into the challenges and constraints encountered during the research process.

Chapter 4: The Analysis and Findings chapter outlines the key barriers and challenges identified in the study. It presents a detailed discussion of the results from document analysis and interviews, offering insights into how these findings address the research questions and enhance the understanding of climate adaptation in land use planning.

Chapter 5: The Discussion chapter critically analyzes the key findings from the document analysis and interviews. It examines each research question in depth,

offering insights into the implications and significance of the results within the broader research context.

Chapter 6: Conclusion summarizes the study's key findings and provides final thoughts on the research. It also highlights areas for future research and suggests potential avenues for further exploration.

2.0 LITERATURE REVIEW

2 Chapter 2: Literature Review

2.1 Introduction

Literature review offers a systematic and critical analysis of existing knowledge, methodological approaches, key findings and critical evaluation on a given topic (Sumer, 2011). According to Snyder (2019), it is an essential step for understanding the evolution of academic thought and for identifying the established methods that can inform and support the researcher's own inquiry. Given the findings by Fu and Li (2022) that comprehensive plans supporting climate adaptation often failed in practice, it is crucial to assess whether adaptation principles are effectively integrated into current urban planning frameworks, highlighting the gap between planning intentions and actual implementation.

The insights from this literature review guided the development of my research pathway, exploring climate change adaptation planning and addressing key aspects that align with the study's main research questions:

- The definition of climate adaptation and the importance of its recognition by local municipalities.
- The role of municipalities in climate change adaptation, with a focus on land use planning.
- Key indicators and frameworks for assessing municipal preparedness for climate adaptation through land use planning.

These aspects shape the study's context by guiding the exploration of the relationship between land use and adaptation planning. They also help identify the challenges, barriers, and opportunities municipalities face in integrating climate adaptation into policy documents.

2.2 What is climate change adaptation planning?

Adaptation, as described by the United Nations Climate Change (n.d.), refers to modifying our practices, policies, and systems to manage the effects of climate change, whether current or anticipated. Essentially, adaptation planning involves formulating strategies and policies that enable communities and organizations to respond to climate challenges and prepare for future environmental changes.

Adaptation planning focuses on critical questions, including how future climate projections compare to past conditions, the risks linked to these changes, and the strategies or recommendations needed to develop effective policies for mitigating climate impacts. This process involves determining the required resources and timelines to effectively lessen the impacts of climate change (Füssel, 2007, p. 268). Adaptation policies are designed to address the inevitable consequences of climate change, even when strong efforts are made to curb greenhouse gas emissions.

Adaptation is defined as essential "adjustments" to policies, technologies, behaviour, management, practices, and processes that facilitate better management of a shifting climate (Government of New Brunswick, 2023, p.6). To help communities better manage the effects of climate change, governments formulate adaptation plans that aim to reduce vulnerabilities, mitigate risks, and enhance adaptive capacity (Vogel & Henstra, 2015, p. 111).

Smit and Pilifosova (2018, p. 883) categorize climate change adaptation into two types: responsive and proactive. Proactive climate change adaptation addresses climate change impacts after they occur, while anticipatory adaptation takes preventive measures beforehand. In both cases, effective policies and planning are crucial in reducing climate change effects. Similarly, Biswas and Rahman (2023, p. 5) emphasize that climate adaptation planning involves understanding climate change

complexities, assessing related risks and uncertainties, and ensuring coordination across various levels of governance.

Developing and implementing effective policies is crucial, along with managing natural resources and infrastructure while ensuring financial and technological support. Furthermore, involving stakeholders and promoting the exchange of knowledge and guidance are essential parts of the planning process. According to Richardson (2010, p.6), Canadians have historically developed various strategies to cope with extreme climate variability; however, the emergence of rapid climatic events presents new challenges. Therefore, governments and communities must strengthen their adaptation efforts to manage both present and future climate risks effectively. Figure 1, adapted from the United Nations Framework Convention on Climate Change (n.d.), illustrates the adaptation policy cycle, which begins with risk assessment, followed by adaptation planning, implementation, and monitoring. This structured approach supports continuous improvement in adaptation planning.

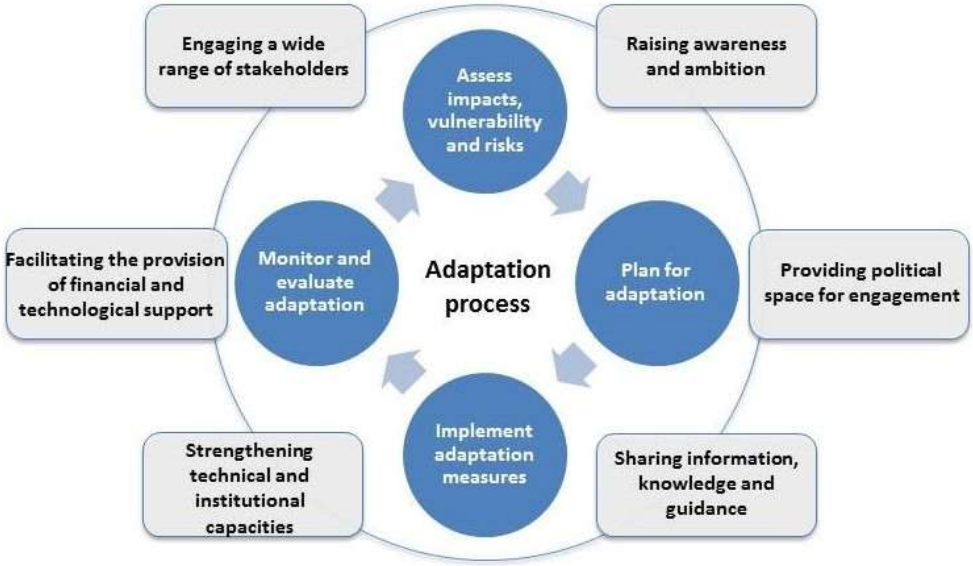

Figure 3: Figure showing the Adaptation process. (Adapted from The United Nations Framework Convention on Climate Change)

2.3 Mitigation and adaptation: The two pillars of climate resilience

To address climate change, adaptation and mitigation can be applied separately or combined for a more effective response. According to the IPCC (2022), while climate change is inevitable, employing adaptation and mitigation strategies can help prevent significant risks. Mitigation is essential for reducing the severity of climate impacts. In contrast, adaptation planning aims to reduce long-term damage and optimize municipal resources when the impacts of climate change are unavoidable. However, there are key differences between adaptation and mitigation.

Grafakos et al. (2019, p. 88) state that mitigation policies focus on lowering greenhouse gas emissions and are generally developed at a national scale in global standards. These policies consider national and international governance structures and can be relatively easily monitored. In contrast, adaptation policies and planning are developed with a focus on climate change, considering local or regional contexts. Furthermore, they are much more complex to measure and depend heavily on the associated risks and vulnerabilities.

According to Baynham and Stevens (2013, p.559) and Hamin (2011, pp.128-129) although mitigation offers potential benefits, it requires a collective effort from federal, provincial, and local governments. This process involves significant inter-departmental coordination, where some municipalities put in the effort while others may simply benefit from the outcomes. As a result, local governments are often more inclined to prioritize adaptation over mitigation, as adaptation provides direct local benefits, even when considering broader national or international goals.

Füssel (2007, pp. 265-266) explains that although adaptation and mitigation play crucial roles in addressing climate change, adaptation planning can be prioritized in

specific situations. For instance, adaptation strategies are often customized to address specific local conditions and vulnerabilities, making them more effective for communities. Additionally, adaptation enhances the resilience of both communities and ecosystems, thereby reducing potential damages. Adaptation planning plays a crucial role in supporting vulnerable populations already experiencing the effects of climate change. While mitigation remains essential, adaptation serves as a key mechanism for strengthening community resilience and preparing for the uncertainties of a shifting climate.

2.4 Role of municipalities in climate change adaptation planning

Adaptation planning has historically been implemented at the national level (Measham et al., 2011, p. 890). However, there is a growing shift toward localized approaches as communities increasingly experience the direct effects of changing climate scenarios. This transition emphasizes the need to assess vulnerabilities and develop adaptation strategies at the municipal level. Measham et al. (2011, p. 890) state that municipalities play several essential roles in addressing climate change. They are responsible for developing plans and policies that address climate impacts, fostering a connection between communities and risk assessments to identify vulnerabilities, and facilitating adaptation through effective resource management. They have played a key role in formulating and executing climate change adaptation strategies for their community, considering built infrastructure, residential areas, ecological elements, and the natural environment.

Furthermore, they have incorporated these adaptation strategies into planning frameworks, including land use policies, zoning laws, and building regulations, to enhance community resilience (Guyadeen et al., 2018, p. 122). In conclusion, municipalities are well-equipped to tackle the impacts of newly changed climate

regimes as they maintain close connections with key stakeholders and at-risk communities.

2.5 How can land use planning be used as a climate change adaptation tool?

Land use planning serves as a crucial instrument for climate change adaptation. As mentioned previously, adaptation involves recognizing and prioritizing risks, vulnerabilities, and impacts, developing governance frameworks, and effectively implementing these strategies. Integrating land use planning into adaptation policies can mitigate climate-related impacts, including flooding, drought, heat stress, and other risks linked to a changing climate. According to Tang et al. (2009, p.370), land use planning can alter local development patterns and reduce greenhouse gas emissions, effectively addressing community development challenges while aligning with long-term municipal climate change adaptation plans.

Additionally, they play a vital role in managing land use activities and practices that can affect climate change. For example, promoting urban green spaces can help reduce heat stress and mitigate heat island effects. The government of Canada (2012, p.7) states that in Canada, land use planning relies on a range of tools, such as official land use plans, adaptation and forest management plans, risk management strategies, zoning bylaws, land subdivision agreements, and urban design guidelines.

Mathews (2011, pp. 8-9) indicates that climate change adaptation plans are ineffective, being individual policies. Instead, they must be integrated with other local land use plans and development policies, enhancing the adaptive capacity of municipalities. They can also become an authorized tool for enforcing and implementing adaptation strategies (Baynham & Stevens, 2012, p.562). This

integration not only facilitates implementation but also creates appropriate funding support, stakeholder awareness and political interests.

2.6 Barriers to streamlining adaptation planning in land use planning

Biswas and Rahman (2023, p.2), indicate that even though municipalities are perceived to be the lowest level where adaptation strategies and policies are implemented, they seldom are free to execute or design them. They are influenced and subjected to federal and provincial adaptation goals and strategies. Their efforts are largely constrained by the intricate multi-level governance system, financial limitations, and restricted adaptive capability. Furthermore, climate adaptation usually involves long-term objectives that can be expensive, leading to a prioritization of more immediate and tangible issues. Moreover, the limited ability to develop and execute adaptation strategies poses a significant challenge to developing land use policies using climate adaptation strategies (Vogel & Henstra, 2015, p. 111; Measham et al., 2011, p. 894).

Rogers et al. (2023, p.1334) suggest that lack of stakeholder support and not prioritizing adaptation planning are frequently identified barriers. Although the literature identifies broader barriers to mainstreaming adaptation planning, these may not necessarily apply uniformly to individual municipalities, such as the City of Selkirk. Therefore, to uncover the specific barriers relevant to this context, an assessment framework has been developed, which is discussed in detail in section 3.3.

2.7 Summary

In conclusion, climate change presents a profound challenge for municipalities, requiring proactive adaptation strategies to safeguard communities, infrastructure and stakeholders from its growing impacts. While adaptation planning is critical, municipalities face significant barriers, including capacity limitations, complex governance structures, and the need for effective coordination and public participation. Incorporating climate adaptation into land use planning policies and plans is a crucial strategy for overcoming these challenges, ensuring that local policies and practices align with the evolving realities of climate change. Through a framework that assesses strategic, enforcement, and guiding drivers, municipalities can better check their adaptation readiness and identify areas for improvement in their land use plans and policies aligning with climate adaptation. Looking ahead, local governments must consistently refine and enhance their land use plans and policies to align with climate adaptation strategies. Ensuring these plans are clear and accessible will help strengthen resilience and minimize vulnerabilities amid ongoing climate risks.

3.0 RESEARCH METHODS

3 Chapter 3: Research Methods

3.1 Research Methods

This section discusses the approach I used to address my research inquiry and provides strategies, steps and procedures employed to assess the mainstreaming of adaptation planning through the land use plans and policies. This study seeks to assess the ability of local governments, particularly the City of Selkirk, to enhance resilience against climate impacts using effective and inclusive land use planning tools and strategies.

The assessment is conducted through two research methods: document analysis and semi-structured interviews. To answer the first research question: To what extent do Selkirk's land use planning policies and strategies consider and integrate climate adaptation principles, the document analysis method is employed. Moreover, semi-structured interviews are aligned with my second line of inquiry, which discusses how current gaps and barriers can be addressed to enhance Selkirk's capacity to become a climate-resilient municipality through land-use planning improvements.

The following sections detail the scope of this research, the methodologies used to address the research questions, and the study's limitations.

3.2 Research Context

The City of Selkirk was established in 1882 as a vibrant community of approximately 10,504 (Statistics Canada, 2023) and a land area of 24.82 square kilometres adjacent to Red River (City of Selkirk, 2019, p.9). They have pioneered in creating and implementing climate change adaptation strategies through their strategic plan. Due to their great positioning in terms of local economic development, long-term asset management planning and proactive approach to early climate

change planning, they represent a valuable case study for examining best practices in climate change adaptation planning (Environment and Climate Change Canada, 2020, p.34).

Figure 4: Map showing Development Plan of City of Selkirk.

Figure 5: City of Selkirk, Street Tree Policy implementation

3.3 Document Analysis

Document analysis is a structured approach to examining and assessing documents, requiring the interpretation of data to extract meaning, develop an understanding of the content, and generate empirical knowledge (Bowen, 2009, p.

27). It was selected as a qualitative research method because it enables a thorough examination of the document's content, identifying the presence or lack of key characteristics like goals, policies, implementation process, monitoring and evaluation strategies, coordination and participation and presentation tactics relevant to the study.

The research method involved content analysis, in which the land use policies and plans of the City of Selkirk were examined. These policies and plans were selected based on their relevance to land use planning and were analyzed to determine the adaptation readiness of the City of Selkirk in terms of land use planning. Table 1 indicates the list of Selkirk's land use plans and policies examined within this research.

S.No.	Name of the land use document	Year
1	Red River Planning District, Development Plan By-law No. 272/19	2020
2	City of Selkirk Zoning By-law 4968	Updated in 2024
3	City of Selkirk West End Concept Plan	2020
4	Climate Change Adaptation Strategy (CCAS) 2019-2029.	2019

Table 1: List of documents used for Content Analysis

According to Donoghue and Rosene (2023, p.44), content analysis is a suitable method to assess the comprehensiveness of municipal plans and explore their effectiveness. In this study, "plan comprehensiveness" refers to the inclusion of characteristics outlined in the evaluation framework, while "effectiveness" pertains to the land use plan's capacity to support climate change adaptation indicators, demonstrating its preparedness for climate change. Guyadeen et al. (2018, p. 122) state that researchers often assess the quality of plans by using key characteristics or indicators to determine their commitment to addressing climate change and the extent to which they provide supporting evidence for this commitment. For this study,

I developed a coding protocol with aligned indicators focused on identifying evidence of integration of climate adaptation concepts in the land use plans of the City of Selkirk. Drawing on existing literature (Guyadeen et al., 2022, p.2; Guyadeen, 2019, p.5; Guyadeen et al., 2018, p. 124; Baker et al., 2012, p.13), I established eight characteristics under three sections indicating drivers for evaluating Selkirk's land use plans, accompanied by forty-three descriptive indicators which can be seen in Appendix-1.

The framework is categorized into three drivers, namely strategic, enforcement and guiding drivers. The following sections providing details on each driver:

3.3.1 Strategic Drivers

The factual foundation offers essential knowledge and information about the impact of climate change on municipalities, including risk and vulnerability assessments, legislative context, and the current status of land use and infrastructure (Guyadeen et al., 2022, p. 2; Guyadeen, 2019, p. 5; Guyadeen et al., 2018, p. 124; Baker et al., 2012, p. 13; Olazabal et al., 2019, p. 282; Tang et al., 2019). This information is essential for evaluating a municipality's current and future readiness based on the documented details in land use plans and policies.

The goals are derived from the factual foundation, addressing issues such as vulnerability reduction and strategies related to land use planning, transportation, infrastructure, and more (Baker et al., 2012; Guyadeen et al., 2018, p. 124; Guyadeen, 2019, p. 5; Guyadeen et al., 2022, p. 2). Finally, policies, underscore the guiding principles outlined in relevant documents, primarily focusing on transportation, land use, energy conservation, waste management, and water and sewer management. It also includes targets for hazard reduction and communication strategies (Baker et al.,

2012, p. 13; Guyadeen et al., 2018, p. 124; Guyadeen, 2019, p. 5; Guyadeen et al., 2022, p. 2; Tang et al., 2019, p. 372; Raparthi, 2022, p. 164).

3.3.2 Enforcement Drivers

Implementation is the process of executing a plan, policy, decision, or strategy. Effective implementation involves utilizing financial resources, establishing clear priorities and action plans, designating responsible parties, setting appropriate timelines, and defining clear lines of accountability and reference (Baker et al., 2012; Guyadeen et al., 2018, p.124; Guyadeen, 2019, p.5; Guyadeen et al., 2022, pp.2-3; Tang et al., 2019; Raparthi, 2022, p.165).

Monitoring and evaluation offer a path for tracking the progress and updates of the established targets and goals. This section defines the relevant evaluation indicators, assigns responsibilities, outlines M&E plans, and sets future timelines for revising or updating land use plans and policies (Baker et al., 2012, p.13; Guyadeen et al., 2018, pp. 124-125; Guyadeen, 2019, p.5; Guyadeen et al., 2022, p.3; Olazabal et al., 2019, p.283).

3.3.3 Guiding Drivers

Coordination emphasizes the need for cooperation between federal, provincial, and local governments in adaptation planning and ensuring land use plans are aligned (Guyadeen et al., 2022, p. 3; Guyadeen et al., 2018, p. 125; Guyadeen, 2019, p. 5). Participation emphasizes the involvement of stakeholders and the public in the development of land use plans that integrate climate change adaptation strategies, as well as in future planning and decision-making. (Guyadeen et al., 2022, p. 3; Guyadeen et al., 2018, p. 125; Guyadeen, 2019, p. 5; Olazabal et al., 2019, p. 283). Moreover, organization and presentation look at how well land use plans are

structured to communicate climate adaptation strategies understandably (Guyadeen et al., 2022, p. 3; Guyadeen et al., 2018, p. 125; Guyadeen, 2019, p. 5).

The following step in developing the protocol involved designating indicators to assess each characteristic. These indicators were based on the original literature reviewed during the literature review process. Whenever a gap was identified in the framework, new indicators were created. For example, under the factual foundation, an indicator was added to assess how future buildings might be impacted by climate change. Another addition, under goals, was an indicator focused on building types. Lastly, under policies, an indicator addressing energy efficiency was incorporated. To analyze the plans and policies, coding is done manually to review the indicators. The land use plans and policies are reviewed on whether the indicators were not present at all, whether they were mentioned but not elaborated or whether they have been explicitly present.

3.4 Semi-Structured Interviews

Semi-structured interviews are carried out to gain insights into professionals' viewpoints and opinions regarding the readiness of municipalities for climate change adaptation through land-use planning plans and policies. Smith (1995, p. 10) suggests that semi-structured interviews offer flexibility, allowing for in-depth exploration of interesting themes within the set questions to provide a more comprehensive and detailed understanding. They allow the researcher to probe deeper into the perspective presented by the participants.

I created a semi-structured interview guide comprising 24 questions, divided into three parts. The first part, comprised of Questions 1 to 5, is a get-to-know question that references the roles and responsibilities of the participants and determines whether they have worked with the City of Selkirk in any capacity related to climate

change adaptation planning and land use planning. The second part, questions 6 to 15, is aimed at participants who have worked with the City of Selkirk in any capacity related to climate change adaptation planning. The third section, questions 16-24, targets professionals who have never worked with Selkirk and so are questioned on general municipalities-based questions which are not specific to the City of Selkirk. The Questionnaire is available in Appendix 1.

A total of 8 interviews were conducted during the study (Table 2). Three professionals interviewed were selected because they work with the City of Selkirk. The rest of the planners or experts are interviewed because of their involvement in the creation or implementation of climate adaptation strategies and policies. Participants were identified and recruited by searching publicly available information online, such as government websites, the City of Selkirk's official site, and planning firm websites. The aim was to interview professionals familiar with the processes, challenges, and barriers municipalities face when adopting climate adaptation planning.

Types of Professional	Requests	Accepted	Completed
Planners	14	08	05
Consultants	03	01	01
Professional	02	02	02

Table 2: List of Interviews requested, accepted and completed

Professionals and experts were initially contacted by email to invite their participation in the research. After signing the consent form (Appendix 2), I sent them an information sheet explaining the purpose of the study and a list of interview questions (Appendix D). The interviews were conducted via the Teams platform using a licensed University of Manitoba account and lasted between 1 and 1.5 hours. All the

interviews were audio-recorded with participant consent and transcribed using the Teams AI transcription tool. The transcripts were then reviewed for accuracy, and discrepancies were cross-checked with the original audio files as needed. The confidentiality of the participant's identity was maintained according to the option they chose while signing the consent form. To maintain confidentiality, participants were assigned codes and descriptors such as 'Consultant 1', 'Planner 2', etc.

Once all the interviews were transcribed, I manually coded the transcripts. I created specific codes for each question and grouped them to analyze the responses. For instance, barriers, mainstreaming, adaptation planning, etc., are some of the codes used for analysis. The codes were developed from the literature review and reviewed and built upon new codes from the interviews. This process allowed me to identify how each participant contributed their insights and helped reveal patterns across the data, which were later compared to the literature review.

3.5 Limitations in Research

This study has several limitations. Due to the limited research time, I concentrated on a single case study of the City of Selkirk. While a comparative document analysis involving multiple case studies could have offered broader insights, focusing on one case allowed for a more detailed analysis.

Furthermore, the unavailability of many professionals, particularly those in government offices, presented a challenge. With frequent turnover in government positions, many new professionals had recently joined and were not ready to participate in the interviews. As a result, participation was lower than anticipated, which may limit the depth of the findings.

Lastly, the evaluation framework developed for this study focuses only on the presence or absence of particular characteristics and indicators rather than assessing

how explicitly they have been adopted. Despite these limitations, the methodologies employed in the study effectively capture the integration of climate change adaptation concepts in the selected land-use planning documents. Future researchers can modify the methodology and protocols for application in larger or multiple study areas.

4.0

ANALYSIS AND FINDINGS

4 Chapter 4: Analysis and Findings

4.1 Introduction

This section is organized into two main components: document analysis findings and interview findings. The document analysis explores how well land use policies and plans correspond with the climate change adaptation evaluation framework, particularly regarding municipalities' preparedness, emphasizing the City of Selkirk. The documents examined in this analysis include the Red River Planning District, Development Plan By-law No. 272/19 (August 19, 2020), the City of Selkirk Zoning By-law 4968 (updated on October 24, 2024), the City of Selkirk West End Concept Plan (April 2020), and the Climate Change Adaptation Strategy (CCAS) 2019-2029.

Following this, the interview findings section presents a summary of the responses from interview participants. This portion highlights the challenges and barriers municipalities face, particularly the City of Selkirk, and provides insight into the key factors involved in mainstreaming adaptation strategies into land use plans and policies.

4.2 Climate Adaptation Readiness

Climate adaptation readiness is defined as the capacity of governance structures and policy processes to determine how and when adaptation will take place. In other words, climate adaptation readiness acts as a structure that enables climate change adaptation through context-specific factors, which convert possible actions into actual actions (Amegavi et al., 2021, p.2). As such, climate readiness helps identify existing gaps by reviewing existing adaptation plans and policies aimed at addressing climate impacts to provide insight into what is necessary for an effective response to climate change. Understanding this is essential for evaluating a city's readiness to address the challenges caused by changing climate (Otto et al., 2021, p.4). For instance, to

assess the climate readiness of the City of Selkirk, I have done an extensive document analysis where the content of the land use plans and policies are reviewed in accordance with the climate change adaptation evaluation framework. The framework indicators aim to assess whether the land use plans and policies align with climate change adaptation concepts. The following section presents the findings of analyzing the land use documents of the city of Selkirk assessed as per the assessment framework.

4.2.1 Document Analysis Findings

This section summarizes the results of the content analysis of land use plans and policies of the City of Selkirk. This analysis features four documents: Red River Planning District, Development Plan By-law No. 272/19 (August 19, 2020), the City of Selkirk Zoning By-law 4968 (updated on October 24, 2024), the City of Selkirk West End Concept Plan (April 2020), and the Climate Change Adaptation Strategy 2019-2029. Although the Climate Change Adaptation Strategy is not a land use plan, its review is done to understand how the City of Selkirk has equipped themselves for climate change adaptation through this document. Together, these documents are critical in guiding development within the City of Selkirk.

For the purposes of this study, it is important to note that the City of Selkirk does not have a secondary plan, and the West End Concept Plan has been adopted as a by-law. Although the city is in the process of updating its Development Plan, the revised version has not yet been released to the public. The following sections provide a detailed analysis of the documents mentioned above.

4.2.2 Factual Foundation

This section examines the factual content within the documents, focusing on whether they address the general and municipality-specific impacts of climate change.

The review of these documents revealed that the Zoning By-law 4968 (2024) is the least aligned with the concept of climate adaptation. It primarily focuses on land use plans and zoning tables, outlining permitted and conditional uses, which are also represented on a map falling under indicator 12 (City of Selkirk, 2024, p.20). While the document is consistent with the Planning Act and the Development Plan, it does not incorporate climate change adaptation strategies. Despite being implemented in 2001 and updated regularly, the by-law has not been revised to include climate adaptation concepts.

In contrast, the Development Plan (2020) aligns with provincial planning (Planning Act) and principles and guidelines for sustainable development (Red River Planning District, 2020, p.8). It provides a detailed description of current land use planning, supported by a land-use map (Red River Planning District, 2020, p.11). Both plans only correspond to two indicators on the framework: legislative context (indicator 6) and current land use planning (indicator 12).

The West End Concept Plan (2020) is aligned with the Climate Change Adaptation Strategy (2019), representing indicator 6 (City of Selkirk, 2020, p.10). The document discusses a total plan area of 670 acres, with the city owning 55% of it as of 2019 (City of Selkirk, 2020, p.2) under the indicator of current land availability (indicator 11). Even though it is not specifically mentioned in the plan, its policies and goals create awareness (indicator 7) about the impact of climate change.

Lastly, the Climate Change Adaptation Strategy (CCAS) addresses the impact of climate change under Indicator 1, noting that the temperature in Selkirk increased by 1.8°C between 1948 and 2016, with changing precipitation patterns and an increase in extreme weather events (City of Selkirk, 2019, p.4). The plan also provides an in-depth analysis of risk assessment (City of Selkirk, 2019, p.26) and health concerns for vulnerable populations (City of Selkirk, 2019, p.33) under Indicators 3 and 4, respectively.

Additionally, it raises awareness about the changing climate, as outlined in Indicator 7(City of Selkirk, 2019, p.15). In relation to Indicators 8-10 (current and forecasted data), the document discusses projections made by climate models from the Climate Atlas, focusing on both the "high carbon scenario" and the "business as usual scenario"(City of Selkirk, 2019, p.17). Under Indicators 13-15 (infrastructure), the plan examines the effects of severe storm seasons, high temperatures, and polar vortex events on sewer systems, Red River flooding, challenges in maintaining building temperatures, and stress on roadways (City of Selkirk, 2019, p.19).

As previously mentioned, this section includes 15 indicators, and the documents examined fall short of meeting fall short of addressing many of the aspects of the assessment framework. They fail to provide essential information about the impact of climate change on the municipalities. Specifically, the land use plans do not address key details such as current and forecasted data, risks and vulnerabilities or raise awareness about the severe weather conditions that Selkirk may face in the future. While the CCAS covers many indicators, it lacks a comprehensive identification of vulnerable populations and the specific impacts of climate change on these groups.

This analysis reveals that The City of Selkirk's land use plans are missing critical fact-based information that should serve as the foundation for Climate change adaptation

planning for the municipality. The absence of these key elements undermines the effectiveness of the land use plans, as they fail to account for the anticipated challenges posed by climate change. Without addressing these foundational aspects, the plans may not provide the necessary guidance to the City for adaptive strategies or adequately prepare the municipality for future climate-related issues.

Strategic Driver: Factual Foundation					
No.	Indicators	City of Selkirk Zoning By-law 4968	Red River Planning District, Development Plan By-law No. 272/19	City of Selkirk West End Concept Plan	Climate Change Adaptation Strategy
1	Impact of Climate Change				✓
2	Specific impact on Municipality				
3	Risk Assessment				✓
4-5	Vulnerability Assessment				✓
6	Legislative Context		✓	✓	
7	Creating Awareness			✓	✓
8-10	Current & Forecasted Data				✓
11	Current land availability				
12	Land use	✓	✓	✓	
13-15	Infrastructure				✓

Table 3: Summary of the presence of indicators for factual Foundation

4.2.3 Goals

This section examines the goals related to specific sectors within the documents, such as reducing vulnerabilities, land use, housing, transportation, and waste and water management.

Regarding Zoning By-law 4968 (2024), the plan outlines goals for various specific sectors, including regulations concerning permitted or conditional uses related to accessory structures and building types, specifically targeting the housing sector as indicator 18 within the framework (City of Selkirk, 2024, p.5). Referencing indicator 25, the document discusses proposals for flood-prone or hazard-prone lands, which focus on the section pertaining to natural and man-made hazard goals (City of Selkirk, 2024, p.9). It also addresses the regulation aimed at providing land for commercial development, which falls under indicator 21 of the framework (City of Selkirk, 2024, pp.70-73). Furthermore, the document specifies the intent and objectives for parks, recreation, and open spaces under indicator 24, highlighting the protection of environmentally sensitive lands within the development plan to align with the zoning by-law (City of Selkirk, 2024, p.83).

The Development Plan (2020) outlines several goals and objectives related to sustainable development. For instance, it discourages unsustainable land use and development while promoting efficient resource use, which falls under indicator 17. Moreover, it includes specific goals related to creating LEED-certified green buildings and neighbourhoods focusing on wind and solar energy-producing initiatives under indicators 21 and 23, respectively. The plan also addresses the objective of offering centralized wastewater services and maintaining the natural capacity of streams, ensuring long-term sustainable water supply, which corresponds with indicator 22. It aims to ensure accessibility within the development (Indicator 19) and promotes affordable housing options (indicator 18) throughout the district (Red River Planning

District, 2020, pp.16-17). The plan indicates that one of the objectives (indicator 20) is to optimize the utilization of solid waste management stations and landfill sites within Selkirk (Red River Planning District, 2020, p.27). In addition to the previously mentioned goal, under indicator 24, the plan also seeks to preserve and sustain natural ecosystems by protecting natural habitats and urban forests, while minimizing development impacts on various ecosystems, such as wetlands (Red River Planning District, 2020, p. 31).

The West End Concept Plan (2020) outlines land use objectives under Indicator 17, which promotes mixed-use village areas accommodating a wide range of land uses, including institutional, retail, commercial, cultural, and residential. Indicator 18, focused on housing, addresses the goal of permitting stand-alone residential buildings such as small plex-type multiple units, mid-rise apartments, and live/work units (City of Selkirk, 2020, p. 11). It also advocates for a minimum average density of 25 units per gross development acre in mixed-use villages and 15 units in neighbourhood areas. Additionally, it highlights transportation objectives under Indicator 19, which encourages active transportation and enhances transit ridership. The goal is to improve accessibility for individuals of all ages and abilities, creating a pedestrian-friendly, transit-oriented urban village (City of Selkirk, 2020, p. 10).

Regarding Indicator 21, which relates to building types, the document stresses design that lessens resource consumption and integrates sustainable energy sources (City of Selkirk, 2020, p. 14). Moreover, it aims to establish planned stormwater management facilities within regional and community parks under Indicator 22 (City of Selkirk, 2020, p. 17). Under Indicator 23, which concerns energy efficiency, the plan seeks to create energy-efficient neighbourhoods and develop strategies to decrease per capita energy consumption and greenhouse gas emissions (City of Selkirk, 2020, p. 24). Lastly, indicator 24, focused on open spaces and parks, outlines its aim of

incorporating existing mature trees, forested areas, and native vegetation into the village's design (City of Selkirk, 2020, p. 13).

CCAS (2019) serves various sectors in the City of Selkirk, including transit services, transportation, parks and open spaces, water, sewer, fire utilities, and land drainage. The objectives for each sector are intended to overlap. For instance, the plan outlines goals like establishing a street tree program with tree inventory and an urban forest program, which aligns with indicators 24 and 25. Moreover, they also target the creation of aquifer monitoring programs and policies and protocols for water shortage. In addition, their goal is to develop a water master plan that incorporates climate change projections (indicator 22).

The plan discusses developing a neighbourhood program catering to vulnerable populations, aligning with indicator 16 (City of Selkirk, 2019, p. 38). Finally, the plan addresses the establishment of a land drainage improvement study to assess flood-prone areas while also creating an asset management risk policy to prioritize at-risk infrastructure (City of Selkirk, 2019, pp. 46-47). The plan does not explicitly talk about detailed goals regarding housing, transportation and the waste management sector.

Strategic Driver: Goals					
No.	Indicators	City of Selkirk Zoning By-law 4968	Red River Planning District, Development Plan By-law No. 272/19	City of Selkirk West End Concept Plan	Climate Change Adaptation Strategy
16	Vulnerability reduction				✓
17	Land use		✓	✓	
18	Housing	✓	✓	✓	

19	Transportation		✓	✓	
20	Waste Management		✓		
21	Building Type	✓	✓	✓	
22	Sewer and Wastewater		✓		✓
23	Energy efficiency		✓	✓	
24	Parks, open spaces and community spaces	✓	✓	✓	✓
25	Natural and man-made hazard	✓			✓

Table 4: Summary of presence of indicators under Goals

4.2.4 Policies

Zoning By-law 4968 (2024) outlines policies concerning various specific sectors, such as regulations for flood and hazard-prone lands subjected to 100-year flood levels, as indicated in Indicator 32 within the framework (City of Selkirk, 2024, pp. 13-15). This policy also addresses construction regulations for permanent buildings or structures with basements and superstructures. Furthermore, the document discusses efficient land use (Indicator 26) through mixed-use development regulations (City of Selkirk, 2024, p. 28). Turning to Indicator 28 regarding transportation, the by-law states that pedestrianization will be promoted by developing walkways and bike paths (City of Selkirk, 2024, p. 87).

The Development Plan (2020) outlines several sustainable policies aimed at combating climate change occurring in Selkirk. This plan includes detailed policies for designated land use zones that promote infilling and revitalize existing built-up

areas, which fall under indicators 26 & 27 (Red River Planning District, 2020, pp.41-81). Discussing indicators 28 to 32, the plan encompasses various policies related to sustainable land use development, carbon trading, implementing green procurement strategies, and reducing ecological footprints through LEED certifications while aiming to decrease greenhouse gas emissions. The plan encourages municipalities to adopt climate change adaptation and mitigation policies within their communities and promotes redeveloping brownfield sites. Furthermore, it fosters public engagement in efforts to enhance sustainable development (Red River Planning District, 2020, p.17).

The plan outlines these policies with sustainable nuances to foster development, thereby mitigating risks associated with climate change. While the plan promotes various strategies to address climate change in Selkirk, it fails to acknowledge the vulnerable populations, which should be a primary consideration when designing policies, as they are among the most affected individuals in the community.

The West End Concept Plan (2020) addresses nearly all indicators within the policy section. Beginning with indicator 26, efficient land use, the plan emphasizes policies such as permitting secondary suites with detailed neighbourhood plans and urban guidelines, as well as encouraging infill development in accordance with zoning by-laws (City of Selkirk, 2020, p. 14). Additionally, the plan examines the implementation of phased remediation or naturalization, if necessary, for community parks (City of Selkirk, 2020, p. 17). In discussing indicator 27, which relates to land use planning and climate change, the document connects both elements of land use and climate change. In addition to various policies that align land use with climate change, the plan notes that development potential must not exceed the carrying capacity of the land, as this could ultimately impact the ecological balance (City of Selkirk, 2020, p. 17).

Indicator 28 outlines transportation-related policies, setting a strategic direction to create pathways that meet universal accessibility design standards as per provincial guidelines. Additionally, it addresses connecting pedestrian paths, cycling lanes, and off-road pathway networks to the city's transportation system (City of Selkirk, 2020, pp. 11-12), focusing on designing streets based on the "Complete Street" concept. The plan discusses Indicator 29, which pertains to policies establishing minimum standards for energy-efficient building design. Furthermore, it addresses establishing standards to maximize on-site renewable energy, particularly solar energy and energy recovery systems. It also explicitly promotes green building certifications such as LEED and Green Globe, which feature greater energy efficiency than the minimum requirements (City of Selkirk, 2020, p. 25).

The plan states that a minimum standard for waste reduction and diversion will be established during the construction process, which falls under indicator 30 (City of Selkirk, 2020, p. 25). Moving on to indicator 31, water management, the plan features a dedicated section on stormwater, water, and wastewater management, outlining various policies related to conservation, reduction, and the encouragement of reuse (City of Selkirk, 2020, pp. 27-28). Concerning indicator 32, the plan promotes various strategies that indirectly align with hazard reduction across different policy levels. It discusses the policy concerning establishing design standards for permeable surfaces in driveways and parking areas (City of Selkirk, 2020, p. 25). Lastly, with respect to indicators 33 and 34, the plan lacks policies related to the education and public participation of various stakeholders. While the plan raises awareness about climate change and its integration into adaptation strategies, it does not include a specific section on this topic.

As mentioned in the previous section, CCAS (2019) addresses several goals that are aligned with various policies for each goal. Concerning the street tree program,

the city aims to establish policies and procedures within this program, which was already completed in 2019 through a separate policy guideline not assessed in the research. Similarly, the policies under asset management risk and the aquifer monitoring program were also developed and implemented in 2019 and 2021, respectively. The policies under the water master plan and the land drainage plan are designated for a medium-term plan hence they cannot be assessed within this framework (City of Selkirk, 2019, pp. 46-47).

The plan lacks specific policies on waste management, efficient land use, and energy efficiency. The policies overlap and are described under adaptation actions, which are not policies but rather pathways forward, thus failing the assessment framework.

Strategic Driver: Policies					
No.	Indicators	City of Selkirk Zoning By-law 4968	Red River Planning District, Development Plan By-law No. 272/19	City of Selkirk West End Concept Plan	Climate Change Adaptation Strategy
26	Efficient land use	✓	✓	✓	
27	Connection to land use planning		✓	✓	
28	Transportation	✓	✓	✓	
29	Energy Efficiency		✓	✓	
30	Waste management		✓	✓	
31	Water management		✓	✓	

32	Hazard reduction (Built environment)	✓	✓	✓
33-34	Communication			✓

Table 5: Summary of the presence of indicators under Policies

4.2.5 Implementation

The Zoning By-law 4968 (2024) does not mention the implementation process and timelines, priorities, or associated responsibilities.

The Development Plan (2020) states that the RRPD and its member municipalities are responsible for implementing the policies it outlines, which fall under indicator 38 (Red River Planning District, 2020, p.84). The plan aligns with sustainable development goals.

The West End Concept Plan (2020) states that its implementation must be in planned phases, and the timeframes for this are flexible. However, the document fails to mention the responsible authorities and process for this. Also, the document does not state the priority actions or goals but is subjected to random development.

CCAS (2019) discusses climate change risks and provides a consequence table based on priority. This table (City of Selkirk, 2019, p. 33) outlines the consequences associated with each municipal area based on the risk level. This list serves as a checklist of high priorities during the current adaptation planning of actions and strategies, which falls under indicators 37 and 38. Turning to indicator 39 timelines, the plan outlines the tactics associated with the climate adaptation actions mentioned in the document and their alignment with Selkirk's strategic plan (City of Selkirk, 2019, pp.46-47).

The timelines for these actions are clearly defined, with short-term strategies set for 2019-2021, medium-term strategies for 2022-2025, and long-term strategies to be implemented from 2026-2029. Although the document discusses the implementation of strategies with associated timelines, it does not include a dedicated section that outlines the process for implementing the policies and strategies. Developing action plans and strategies in isolation can lead to challenges during the implementation phase, potentially hindering the plan's long-term success.

Enforcement Driver: Implementation					
No.	Indicators	City of Selkirk Zoning By-law 4968	Red River Planning District, Development Plan By-law No. 272/19	City of Selkirk West End Concept Plan	Climate Change Adaptation Strategy
36	Process				
37	Priorities				✓
38	Responsibilities		✓		✓
39	Timelines				✓
40	Reference				

Table 6: Summary of the presence of indicators under Implementation

4.2.6 Monitoring and Evaluation

The Zoning By-law 4968 (2024) does not indicate the processes, responsibilities, timelines for updates or any key performance indicators related to adaptation within the document.

The Development Plan (2020) discusses that progress and success of the policies under this plan must be periodically assessed (indicator 43) but does not clarify any

detailed process or performance indicators to do so (Red River Planning District, 2020, p.86). Moreover, the plan also mentions that the RRPD board must review the plan within 5 years and present the findings to the province for amendments (Red River Planning District, 2020, p.86), which falls under indicator 42 (Responsibilities). The plan fails to provide an outlined process specifically for monitoring and evaluating the policies. Moreover, it does not provide any key performance indicators that help quantify the implementation of the policies.

The West End Concept Plan (2020) indicates that it is a living document that requires periodic review. However, the plan does not outline the process or the parties responsible for its updates. Additionally, it lacks key performance indicators to measure its success in adaptation planning.

According to CCAS (2019), a key feature of the plan is its capacity to be reviewed and updated as necessary by the City in alignment with the strategic plan (City of Selkirk, 2019, p. 44). While this aspect is somewhat related to indicator 43, it does not clearly outline the monitoring and evaluation process or specify the stakeholders responsible for these tasks. Furthermore, the plan includes an assessment score for adaptation actions (City of Selkirk, 2019, pp. 37-43), which serves as a tool for senior management to evaluate potential actions. However, these scores are not intended to guide post-implementation evaluation. Instead, they function as a priority checklist that aids decision-making based on factors such as investment cost, annual cost, and timeframe.

The document lacks a detailed explanation of the timelines and processes required for the ongoing monitoring and evaluation of the plan. Additionally, it does not specify who is responsible for overseeing the monitoring and evaluation of the adaptation tactics and strategies once they are implemented. This information is crucial for ensuring accountability and the effective tracking of progress.

Enforcement Driver: Monitoring and Evaluation					
No.	Indicators	City of Selkirk Zoning By-law 4968	Red River Planning District, Development Plan By-law No. 272/19	City of Selkirk West End Concept Plan	Climate Change Adaptation Strategy
41	Process				
42	Responsibility		✓		
43	Updates		✓		✓
44	Indicators				

Table 7: Summary of the presence of indicators under Monitoring and Evaluation

4.2.7 Coordination

The Zoning By-law 4968 (2024) does not discuss the alignment with federal, provincial, and regional adaptation within the document and does not mention any other official adaptation plans in the association.

The Development Plan (2020) is aligned with the Provincial Planning Act, which establishes the Provincial Land Sue Policies (indicator 45) and global sustainability goals (Red River Planning District, 2020, p.86). The document discusses that the province is responsible for allowing amendments or minor changes to the document. Besides that, the plan does not provide multi-level governance or align with any other plans and policies conforming to climate change.

The West End Concept Plan (2020) is in accordance with the Development Plan (Bylaw 190/08) and Zoning By-law No. 4968, and it also aligns with CCAD (2019).

CCAS (2019) complies only with the City of Selkirk's Strategic Plan (City of Selkirk, 2019, p.9) and not with any other federal, provincial, or regional adaptation policy.

Guiding Driver: Coordination					
No.	Indicators	City of Selkirk Zoning By-law 4968	Red River Planning District, Development Plan By-law No. 272/19	City of Selkirk West End Concept Plan	Climate Change Adaptation Strategy
45	Multi-level governance		✓		
46	Other plans			✓	

Table 8: Summary of the presence of indicators under Coordination

4.2.8 Participation

The Zoning By-law 4968 (2024) does not address stakeholder engagement in the creation, implementation, or updating of the plan.

The Development Plan (2020) indicates that creating this document required community input from public consultation and elected council officials (Red River Planning District, 2020, p.6), representing indicators 47 and 48. However, I want to mention here that the document does not provide details of how the engagements happened or who the stakeholders who participated in the process were.

The West End Concept Plan (2020) does not include information on stakeholder engagement in creating, implementing, and updating the policy.

CCAS (2019) discusses the planning process of CCAS in detail, elaborating on the timeline from 2018 to 2019 (City of Selkirk, 2019, pp. 51-52), which involves the City of Selkirk staff and Prairie Climate Centre (indicator 47). However, this did not include any involvement from public stakeholders in creating and updating the plan.

Guiding Driver: Participation					
No.	Indicators	City of Selkirk Zoning By-law 4968	Red River Planning District, Development Plan By-law No. 272/19	City of Selkirk West End Concept Plan	Climate Change Adaptation Strategy
47	Stakeholder engagement		✓		✓
48	Evolution		✓		

Table 9: Summary of the presence of indicators under Participation

4.2.9 Organization and Presentation

The Zoning By-law 4968 (2024) only has a definition section (indicator 50) at the end of the document (City of Selkirk, 2024, p.89), but it does not have any summary, illustrations, or diagrams explaining the goals and policies.

The Development Plan (2020) document includes a Glossary (indicator 50) at the end of the report (Red River Planning District, 2020, p.103) and illustrations (indicator 51) explaining the planning hierarchy in Manitoba and the contents of the development plan (Red River Planning District, 2020, p.8,10). However, the plan does not include a summary that clearly summarizes the goals and policies contained within the document.

The West End Concept Plan (2020) has an illustration defining the guiding principles (City of Selkirk, 2020, p.5), which falls under the purview of indication 51. Other than that, the document does not have any summary or glossary.

CCAS (2019) has various illustrations summarising the adaptation framework (City of Selkirk, 2019, p.14), climate consequences and corresponding adaptation actions

(City of Selkirk, 2019, pp.37-43) and table of tactics with adaptation actions and timelines (City of Selkirk, 2019, pp.46-47) falling under indicator 51. The document also contains a glossary (City of Selkirk, 2019, p.50) under indicator 50, but it lacks a clear and concise summary outlining goals and policies.

Enforcement Driver: Organization and Presentation					
No.	Indicators	City of Selkirk Zoning By-law 4968	Red River Planning District, Development Plan By-law No. 272/19	City of Selkirk West End Concept Plan	Climate Change Adaptation Strategy
49	Summary				
50	Glossary/Definition	✓	✓		✓
51	Illustrations		✓	✓	✓

Table 10: Summary of the presence of indicators under Organization and Presentation

Using this content analysis, I have summarized the assessment indicators present in the documents derived in Tables 3 to 10. This provides a comprehensive checklist that informs where the City of Selkirk is failing to mainstream climate adaptation planning in its land use plans.

4.3 Interview Analysis Findings

To better understand the challenges and barriers municipalities face while integrating the adaptation plan and incorporating it into land use policies, I interviewed planners and consultants who have either directly worked with the City of Selkirk or have experience with other municipalities. As mentioned earlier, the interviews were semi-structured, discussing the preparedness of municipalities, the challenges and barriers they face, the role of stakeholders, and their influence on the mainstreaming process, as well as the factors that are most critical for incorporating

adaptation planning into land-use plan documents. The analysis of the interviews is organized into six themes, which are summarized in the next section.

S.No.	Participant Code	Descriptor
1	Planner-1	Private Organization- Planner
2	Planner-2	Private Organization- Planner
3	Planner-3	Public Organization (Province)- Planner
4	Planner-4	Public Organization (Province)- Planner
5	Planner-5	Public Organization (Municipality)- Planner
6	Consultant-1	Public Organization (Province)- Consultant/ Professional
7	Consultant-2	Public Organization (Municipality)- Consultant/ Professional
8	Consultant-3	Public Organization (Municipality)- Consultant/ Professional

Table 11: Participant Codes and Descriptors

4.4 Challenges and Barriers for Municipalities

4.4.1 Perceived preparedness of municipalities

The discussions during the interview revealed that most participants feel municipalities are unprepared for climate change. Several participants agreed that municipalities either lack a climate change adaptation plan or have isolated documents. Since these documents exist as standalone entities, they lack context in relation to land use plans and vice versa. This significantly reduces the statistics on municipalities' preparedness. The participants also acknowledged that municipalities are generally aware of changing climate conditions and related hazards like flooding, permafrost, heat waves, and others. While they may have taken steps to address these

issues, there does not appear to be a comprehensive written strategic adaptation plan in place.

Although the interviews provided valuable insight into this matter, the assessment is somewhat mixed. Some municipalities recognize the effects of climate change and have adaptation plans or strategies in place, while many are already working to mitigate the impacts without a formal document.

4.4.2 Important challenges and barriers

This discussion illuminated the various barriers and challenges identified by nearly all participants as recurring themes. For instance, most participants indicated that one of the significant obstacles municipalities encounters is the four-year political timeframe of politicians. This factor is significant, as adaptation planning and the updating of land use plans are long-term processes that are greatly influenced by changing governance. This is followed by the elected officials, as all plans undergo the approval procedure by the city council. Unless the elected officials are on board and possess the right attitude, adaptation planning remains a challenge.

Another major challenge is the budgetary constraint that many municipalities currently face. Municipalities lack the funds necessary to create adaptation plans and subsequently develop or update land use plans. This barrier is two-fold: not only do they lack funding, but they also lack the resources and staff capacity to apply for funding applications and maintain a dedicated team focused on creating, maintaining, and implementing these strategies within the community. Some participants noted resistance from the community. Since municipalities have limited budgets, they prioritize their more immediate and ongoing responsibilities over developing adaptation plans.

4.4.3 Role of stakeholders within governance levels

All the participants agreed that different stakeholders have varying degrees of control over the process and, therefore, influence the adoption of adaptation planning in land use documents. For instance, decision-makers such as council members are elected within an electoral cycle, which affects the decisions related to long-term planning and short-term planning. As adaptation planning falls under long-term plans, they are often overlooked. Moreover, leadership is another influential stakeholder in this scenario. According to the participants, the presence of passionate leadership and dedicated staff is the most valuable asset driving municipalities to integrate adaptation planning into land use plans and to implement strategies within the community.

Most participants agreed with this, citing Selkirk's effective implementation of adaptation strategies due to the presence of strong leadership and resource capacity supported by dedicated staff. And lastly, the members of the community. Participants also mentioned that there are many mixed reactions within the community. While the risks associated with climate change are real and occur annually, the community recognizes the importance of adaptation and mitigation strategies. However, these concerns are occasionally overshadowed by the urgent need to tackle other issues, such as upgrading infrastructure following a hazardous event.

4.4.4 Current state of adaptation planning within municipal land use planning

Most participants noted that although progress cannot be quantified, municipalities are on the right track. The planners from the private organization generally reached a consensus that the movement towards developing adaptation strategies is slow, while integrating them into land-use documents remains quite negligible. Many municipalities are already conducting risk and vulnerability

assessments and feasibility studies, and numerous have received funding to develop adaptation plans. However, streamlining land-use documents with adaptation planning still has a long way to go. Participants from the public sector agreed on the slow adoption of adaptation planning within municipalities but remained optimistic about the situation.

4.5 Streamlining adaptation planning into land use plans and policies

4.5.1 Critical factors for mainstreaming adaptation planning in land use plans

The discussion on the critical factors explored various responses. For instance, the planners emphasized that incorporating them into by-laws and standards is essential. As the development progresses, the plans and policies must be updated to accommodate that development. Moreover, collaborating across different departments with a full understanding of the issues at hand is also very important for mainstreaming adaptation planning into land use documents. They also noted that capacity building is a crucial factor. Having specialized staff and good leadership is vital for effective collaboration within the team, affecting their work on climate change adaptation.

One of the participants emphasized that easy access to current and forecasted climate data, as well as information on climate hazards for the municipalities, is also a vital factor. The availability of this data and the ease of access to information can help municipalities clearly understand the impact of climate change, enabling them to make informed decisions. Furthermore, support from federal and provincial governments is essential, especially regarding financial assistance and the availability of tools and resources such as climate adaptation guidebooks, among others.

4.5.2 Use of Climatic data and projections for making informed decisions

Most participants agreed that having climate data and projects based on changing climatic conditions is essential for developing adaptation plans and strategies. However, they are only utilized to a certain extent in policy creation. They certainly serve as a foundation for creating adaptation plans and strategies; however, most planners do not leverage this data when formulating land use policies. Another interesting point that emerged during this discussion is that while access to climate data is important, truly understanding the data—including its forecasted projections—and using it in decision-making presents a different challenge altogether. This can often exceed the capacity of municipalities due to a lack of specialized professionals on their teams.

The next section of the report will discuss in detail the research findings from the content analysis of various land use documents from the City of Selkirk, along with the interview findings in conjunction with the literature review findings.

5.0 DISCUSSION

5 Chapter 5: Discussion

5.1 Introduction

This section presents critical findings in detail from the document analysis and interviews in conjunction with the literature review. The discussion in this chapter revolves around municipalities' readiness to adopt climate change adaptation indicators in their plans and policies, along with suggestions from experts in this field. Using content analysis of the documents selected for this study, the extent of mainstreaming critical concepts such as infrastructure, climate data, buildings, transportation, risk and vulnerabilities, land use, municipal services, and hazard management was explored.

Moreover, the interviews underscore the importance of planners as the driving force for incorporating adaptation planning concepts into land use planning documents. The study also emphasizes that aligning all land use plans and policies with climate change adaptation concepts is not merely about compliance; it involves weaving these concepts into the very fabric of policies and implementation strategies within municipal land use planning documents.

5.2 Barriers and challenges in mainstreaming adaptation planning into land use plans

5.2.1 Resource Constraints

The main barriers and challenges that emerged from the literature regarding mainstreaming adaptation planning concepts are often related to municipalities' resource constraints. Municipalities often lack the financial resources to support tasks and activities related to adaptation planning (Measham et al., 2011, p.894). This was also evident from the interviews that I conducted. Planner-5 indicated that funding poses a primary constraint for municipalities. To initiate climate adaptation planning,

municipalities must conduct feasibility studies, usually carried out by external consultants who require funding for support, contingent upon the council approving the budget. Although the council also allocates funds for community reforms, adaptation planning often gets sidelined. Planner 1 also supported this:

> You need expertise from outside, like technical support, and you need funding that allows these things actually to happen.

Another important resource indicated in the literature is the lack of municipal staff or capacity building dedicated to adaptation planning (Rogers et al., 2023, p.1334). This was also discussed in detail in the interviews. Consultant 3 indicated that they started strong in Selkirk with the implementation of climate adaptation strategies, such as the urban forest program. However, they are still facing a significant hurdle due to a lack of resources and staffing to execute the plans and policies. This applies not only to creating adaptation plans and strategies but also to implementation, monitoring, and evaluation. Consultant 1 noted that every municipality is eager to develop an adaptation plan and complete the task, but lacks the capacity to effectively implement and monitor these strategies, which are more crucial than simply creating documents.

5.2.2 Lack of Political Support

Another barrier discussed in the interviews and supported by the literature is the lack of political support and the willpower to implement such strategies (Rogers et al., 2023, p. 1334). Kristianssen and Granberg (2021) also indicate that climate adaptation is not a priority for the municipality's politicians, who often favour growth over environmental and climate change issues. Almost all the interview participants supported this.

The most necessary element discussed here is the political support from the province and municipal council. Planner 5 indicated that decisions for adaptation strategies are often contingent on the four-year cycle of the elected officials of the council. This political tenure impacts all the decisions of the council, which are geared to short-term plans that can be immediately implemented and are highly visible within the community. Planner 2 indicated that:

> There needs to be an overall commitment from the beginning with leadership as well as a commensurate amount of focus and commitment on the staff side. It is important to have somebody in the organization who is kind of singularly committed to it, a champion of sorts, but they also need buy-in from decision-makers, that being City Council, but also an understanding throughout the organization, public works and anybody that would be touched by climate change and would benefit from adaptation protocols would need to be involved and that is where the challenge exists.

Planners 1 and 3 also indicated that if the municipalities do not have the interest and willpower, none of the policies and plans "*see the light of day*", which highlights how Selkirk was successful in implementing the adaptation plan due to:

> I think there was strong buy-in from Selkirk because the CEO, all of the Council, the mayor, and other staff believed in the plan and thought it was important.

Consultant 1 also supported the argument that Selkirk successfully developed adaptation strategies, as they acknowledged the significance of climate change adaptation policies and were open to adopting them.

5.2.3 Lack of Federal and Provincial Support

Another interesting barrier that was identified was the lack of provincial support in terms of providing support through funding, technical expertise and education.

Rogers et al. (2023, p. 1334) highlighted that the lack of political backing for mainstreaming adaptation planning, along with the absence of local government statutory requirements from the provincial government, represents a significant challenge to adaptation planning at the local level. This was also evident from the interviews conducted.

Planner 1 stated that plans and policies viewed through a climate lens are not mandatory requirements, allowing municipalities to disregard specific strategies not promoted by the provincial government. He also stated that it is a voluntary action that is not stipulated in the Planning Act legislation. Planner 4 also supported the argument that all levels of government, whether federal or provincial, play a significant role in assisting municipalities through funding, infrastructure support, and knowledge sharing, which they fail to provide sometimes.

> The different levels of government have to see that through the programming we develop, right? Inputs are absent, and there is hardly any influence.

Planner 4 also indicated that there is a lack of intergovernmental collaboration. For instance, when the federal or provincial government issues funding for climate change adaptation work, they do not necessarily consider whether the municipalities align their work with land use planning policies. As indicated by Planner 3, federal and provincial governments can be very influential when it comes to funding projects for municipalities. However, a gap still exists in effectively using that influence to motivate municipalities to integrate climate adaptation planning into their land use planning documents and strategies. This deficiency in support from various levels of governance and administration can hinder incorporating adaptation policies into land use plans moving forward.

5.3 Recommendations to planners for developing effective land use plans incorporating climate change adaptation planning

5.3.1 Incorporate Climate data in land use decisions

Developing effective land use plans incorporating climate change adaptation requires thoughtful integration of various factors, including sensitivity to the issue, improved communication skills to influence decisions, competency in handling complex matters, and much more. Consultant 2 and Planner 3 proposed that to stay updated and use the correct climatic data and tools for policy decisions, planners must be well-versed in utilizing the resources prepared by the federal government or provincial authorities. For instance, climatic data can be extracted from the Climate Atlas, the Climate Data Extraction Tool available on the federal website, The Prairie Climate Centre and others.

The climate data should serve as the foundation for all land use plans and policy decisions that must be implemented in any municipality. Planner 1 noted that planners must consider the connection between climate change data and land use policies intended to address the current challenges of adaptation planning. It is crucial not only to analyze the data but also to contemplate its effective use in the planning process and to develop climate-sensitive planning policies. Planner 2 also indicated that:

> Make adaptation planning a core competency for land use and community planners. Ensure they have the knowledge and skills to understand climate change projections and their impacts on land use choices.

Consultant 1 also emphasized that close collaboration with climate experts and researchers is vital for effectively integrating climate change projections into land use planning decisions. These partnerships allow planners to utilize scientific data

practically, ensuring that land use decisions, zoning laws, and infrastructure are designed to be resilient and adaptable to shifting climate conditions.

5.3.2 Integrate Adaptation Planning in Core Planning Decisions

Integrating adaptation planning into core planning decisions involves embedding climate adaptation strategies into the fundamental processes of urban and regional planning. This means climate change considerations should not be treated as an afterthought but as a key component of every planning decision. Planner 2 and Planner 3 supported this statement. They recommended that adaptation planning be a core competency for community planners and their decisions.

It is paramount that planners have the expertise and competences to understand climate change projections and their implications and be capable of integrating them into planning policies. Moreover, adaptation considerations should be integrated into land use policy development concurrently with other planning efforts rather than as a separate or isolated task. Planner 3 suggests:

> So, we have adaptation policies in place and actually use them in our decisions, though they are standalone policies. They all need to be integrated into land use policy, development planning, development agreements, and so on.

This involves embedding climate change adaptation strategies into every stage of the policy development process. A strategic, step-by-step approach is essential to ensure adaptation recommendations are seamlessly incorporated into existing planning documents, such as zoning regulations, land-use maps, and urban development plans. Planner 2 says:

> Climate change adaptation planning is a base of knowledge for our work, and we should not necessarily treat it as something completely separate. Stand-alone adaptation plans are valuable, but not in themselves.

Planner 5 and Consultant 2 also suggested that planners must ensure that climate adaptation standards and requirements are directly embedded into the land use by-laws, development agreements and other regulatory documents, ensuring consistent application across all departments and documents. Consultant 2 also offers an interesting perspective in which the planner must recognize that if they begin to treat planning decisions as separate from adaptation planning, it becomes an additional task, making it difficult for decision-makers to grasp its implications. Therefore, it is imperative for planners to establish systems where land use policies are not created in a new way but are instead integrated seamlessly with adaptation planning.

He explains interestingly to imagine land use policies as a box. When planning decisions are taken separately, they become something out of the box. It might work once, but it's difficult for decision-makers to consistently approve out-of-the-box concepts. Therefore, planning policies and adaptation planning should be combined within the box to expand it. What is in the box will then be understood and considered by decision-makers. Ultimately, this is how planners must be reactive in providing solutions.

> Change what's inside that box because what's inside that box will get done. If you do something outside the box, all you will have is one decision at a time for a project—that is one initiative.
>
> But, by changing the box, by changing the decisions and processes inside that box, you will consistently get projects done that are better than the old way of doing things.

5.3.3 Bridge the gap between the community and decision-makers

Planners must present their decisions in a way that is easily understandable by both the community members and decision-makers, particularly regarding climate

change adaptation. They need to bridge the gap between these groups by clearly explaining how land use policies and plans will impact the municipality in light of changing climate conditions. This helps ensure everyone is informed about the long-term effects and the necessary adaptation actions. Planner 1 indicates that planners must ensure that planning decisions secure strong support and promise from local decision-makers and municipal staff. Their willingness to prioritize climate change adaptation is key to successfully implementing adaptation strategies and ensuring their effective integration into planning processes.

> The key is to think how to take the information on how the climate is going to change and tie it to policies that might actually work to address these things. I think the planners can only do so much, but what happens if it's not coming from the decision-makers at the local level? The buy-in is not going to happen.

Planner 4 emphasizes the importance of continuously engaging and educating municipal staff, community members, and elected officials about the significance of adaptation planning. This ongoing process helps build their capacity to understand and recognize the value of adaptation efforts. In this context, the planner plays a key role in fostering this understanding, warranting that all stakeholders are well-informed and aligned in their support for climate change adaptation. Moreover, planners must ensure that they bring the greatest practices from around the world into the planning decisions.

> Oftentimes, the challenge is that it's not necessarily triggered by what we know, what we think. It's proactive work. Planners need to do that proactive work to really scan across not only Canada, but maybe other countries for the best practices to adapt into our own regulatory framework.

Planners 3 and 5 indicate that planners should advocate for integrating adaptation planning into land use plans at all levels. Planners must share their expertise with all stakeholders involved in the decision-making process and in developing land use

policies and plans. They must also connect with other municipalities and planning organizations to exchange knowledge and learn from best practices in mainstreaming climate adaptation into land use policies.

> So, we planners are advocates, definitely in educating and sharing our knowledge with the stakeholders, with members of the public, with the council, with the development community, the home builders. But make sure that that advocacy is directed in a way that it can then later influence.

Planner 3 suggests:

> One of the biggest things is having the communication skills to influence decision-makers, like the ability to talk to them at a local level and relate to them in their context.

Consultant 1 also indicated that planners have the knowledge and capacity to understand climate data and its implications, but they need to find effective ways to communicate climate-based planning decisions to the community. It sometimes becomes very difficult for the community members to understand the technical data and its implications on land use planning decisions. Hence, the role of planners is to ensure that they make the information accessible to a community.

5.4 Recommendations to the municipalities to streamline the adoption of adaptation strategies into land use plans.

5.4.1 Awareness

Planner 1 indicated that one of the most important recommendations to municipalities will be to create more awareness. Municipalities must understand the threat climate change poses to the community and its infrastructure and expand their knowledge regarding the matter.

> I think the recommendation to municipalities is to learn more. Look out there, try to learn more about what you might do in terms of redesign, like rethinking

> about the way they build, build things in order to actually be more adaptable to the changing climate.

Planner 5 also corresponds with Planner 1, which states that municipalities must prioritize raising awareness about climate change adaptation among planners, decision-makers, and the general public. However, this should be backed by a clear understanding of the goals, benefits, and potential impacts of adaptation measures, especially as they impact land use policies and associated decisions.

Planner 3 states that climate adaptation should not be isolated to the planning department but should be made known to all the stakeholders, including municipal staff. It must be a whole-of-municipality approach, where all departments, from budgeting to construction, consider climate change impacts in their decisions and actions. This ensures that adaptation becomes an integral part of every municipal operation.

5.4.2 Inclusion of Climate data in policies and plans

Consultant 1 suggests municipalities must base their planning decisions on climate data and projections. They need to incorporate climate adaptation into their planning decisions quickly, as they are already aware of the impacts of climate change on their communities. Furthermore, they should utilize resources and build their capacity to address such issues.

> The only recommendation is sort of thinking through how to integrate and think about future projections and not use historic ones.

Consultant 3 and Planner 3 indicated that municipalities must seek out climate data and projections before developing climate adaptation strategies. They must collaborate with organizations like the Prairie Climate Centre or other climate-focused

organizations to develop their own plans and mainstream adaptation plans in land use policies.

5.4.3 Collaboration and Knowledge Sharing

Planner 5 indicates that municipalities must collaborate with colleagues from other municipalities to share insights and learn from each other. Leveraging broader policies and adapting them to local contexts can help avoid redundant efforts and enhance efficiency.

> It's important to work together and collaborate with colleagues. There is so many competing priorities of municipal planners, and we don't need to reinvent the wheel. We can learn from each other and take broad policies and apply them to certain municipalities.

5.4.4 Adopt a Long-Term Perspective

Planner 5 and Planner 3 both suggest municipalities should be patient and adopt a long-term perspective when implementing climate adaptation planning. Successive councils and community members must be able to recognize the ongoing benefits of these policies, as the positive impacts may take time to fully materialize. For instance, Selkirk faced some pushback from residents while planning for bike lanes, with complaints that no one would use them and that it was a waste of money. However, as parking prices increase and road congestion rises, people have begun to see the value of bike lanes. Thus, this demonstrates that a long-term perspective is very important for tackling climate change.

> We don't see the changes immediately. They come two to ten years later. So, we kind of have to keep pushing the change so that successive councils or community members can see the impacts.

In conclusion, municipalities must focus on raising awareness about climate change and how it affects their communities and infrastructure. This means educating

planners, decision-makers, and the general public so everyone understands why adaptation is important and how it can help. Planning decisions should be based on climate data that looks ahead, not just on past trends.

It is also important for municipalities to work together, share ideas, and learn from each other to make the process more efficient. It is important for municipalities to build their capacity to address funding issues and integrate adaptation planning in their land use plans. Finally, they need to think long-term, as the benefits of climate adaptation take time to show. By doing all of this, municipalities can better prepare for the impacts of climate change and build more resilient communities.

6.0 CONCLUSION

6 Chapter 6: Conclusion

This chapter discusses how the policy analysis and interview results address this project's research questions. The following section answers the research questions and provides recommendations. I also discussed how further research could help understand municipalities' readiness for adaptation planning mainstreamed in land use plans.

6.1 Revisiting Research Questions

- **Question-1: To what extent do Selkirk's land use planning policies and strategies consider and integrate climate adaptation principles?**

To examine the extent to which Selkirk has integrated climate adaptation principles into land use planning policies and documents, I conducted a policy analysis of four documents. The documents examined in this analysis include the Red River Planning District, Development Plan By-law No. 272/19 (August 19, 2020), the City of Selkirk Zoning By-law 4968 (updated on October 24, 2024), the City of Selkirk West End Concept Plan (April 2020), and the Climate Change Adaptation Strategy (CCAS) 2019-2029.

The policy analysis utilized the framework I created based on the literature review, which features indicators for evaluating the incorporation of climate change adaptation in land use planning documents. The analysis revealed that the City of Selkirk had not incorporated the strategic drivers mentioned in the framework in their land use policies and plans. According to Rumbach and Kudva (2011), the present adaptation policies are designed to reduce global GHG emissions and create mitigation plans to avoid catastrophic events. But they fail to incorporate the vulnerable community to climate change hazards based on their social and economic traits and interaction with the built environment.

The city of Selkirk has also not incorporated vulnerable populations into their adaptation planning. Their land use planning policies may consider the specific goals and policies related to various sectors like housing, transportation, energy efficiency, hazard reduction, and more, but they do not address the impact of climate change on the municipality and its vulnerable populations. Furthermore, the literature review and interviews indicated that risk assessment and climate data must underpin any land use policy; however, the City of Selkirk does not integrate these aspects into their policy design.

Rao et al. (2025) indicate that, as the effects of climate change become increasingly immediate, risk and vulnerability assessments can assist us in developing adaptation strategies that are tailored to the municipal or local context, effectively addressing the most pressing risks in targeted ways. Even though the City of Selkirk has created adaptation strategies and is implementing them, they have not incorporated risk assessment as part of their land use policies.

According to Chu et al. (2015), cities face challenges when making adaptation a regular part of their work. These challenges include coordinating the efforts between departments and integrating the implementation plan consistently within the City's adaptation plans and strategies. The study of the City of Selkirk's land use plans also indicated that they lack implementation strategies within their governance. The plans do not outline the process to implement these policies explicitly, whereas no priorities and responsibilities are outlined within the documents.

The review revealed that the Enforcement drivers indicated in the assessment framework are not present in the land use policies of Selkirk, which indicates that the city does not have a clear hierarchy of prioritized actions, goals and strategies, as well as roles and responsibilities of different departments and individuals clearly mentioned. Moreover, the city does not have a categorical monitoring and evaluation

process, and criterions outlined in the documents establish the effectiveness of their policies for catering to climate change.

Lastly, the evaluation of guiding drivers indicates that the City of Selkirk has somewhat aligned the documents with the governance levels. The plans have originated from development documents and contain policies showing their linkages to the higher-level plans. While public engagement is part of the planning process necessary for any plan to be implemented in a community, Selkirk lacks policies to involve various stakeholders in keeping those plans updated regularly. Although some documents are considered living documents, meaning they would be updated regularly based on climate assessments conducted by the city, no specific policies are present.

Overall, the City of Selkirk has done a commendable job of integrating sustainability aspects, considering climate change implications, and adaptation planning strategies within its climate change adaptation plan. While most of the plans express an intent to adapt, some fall short of fully addressing these issues. During the interviews, I learned about Selkirk's ongoing efforts to develop and implement their adaptation strategies within the community; however, the land use plans and policies are lagging behind.

Selkirk needs to start incorporating adaptation strategies into its land use policies, so that future development is better prepared for climate challenges and the community is more resilient to the changing climate. This integration will ensure that adaptation is a consistent part of planning and decision-making processes moving forward.

- **How can current gaps and barriers be addressed to enhance Selkirk's capacity to become a climate-resilient municipality through improvements to its land use planning?**

This research question was answered by the professionals that I interviewed, who are directly engaged in land use planning within the municipalities or the City of Selkirk. The interviews revealed that resource constraints, lack of political support, and lack of federal and provincial support are the main barriers to mainstreaming adaptation strategies into municipalities' land use plans.

According to Rogers et al. (2023, pp. 1333-1334), the reported barriers from 131 articles evaluated in the study are broadly classified as lack of the authority to adopt, non-prioritized activity for the municipalities, limited access to funding and staff specializing in adaptation planning, limited access to the data and absence of motivation. Based on my analysis of the interviews, one of the major enablers for integrating mainstream adaptation plans into land use plans is the authority that influences the decisions, whether it is the council with decision-making power or community leaders like the CAO or other figures in authority who consider the interests of the municipalities.

Interview participants commonly indicated that the willingness and enthusiasm shown by the municipal council or executive leadership are crucial for developing more resilient land use plans. When they are eager to integrate adaptation issues into the land use policy cycles, the process tends to run smoothly. Moreover, they are the centre point of community engagement and have the power to influence the attitude and mood of the community members by illustrating the benefits of adaptation strategies implemented within the community. However, to achieve this, elected leaders and their leadership must engage in evaluating the outcomes of climate change and understand its necessity for future generations.

A municipality's capacity to integrate the adaptation plans depends on many factors, like access to resources, both educational and monetary, and presence or lack of specialized professionals who can guide the policy cycle and support from community stakeholders. It is often observed that even though municipalities overcome these barriers, their tendency to utilize the resources towards community economic development and infrastructure building takes priority over adaptation planning, especially in land use planning.

During the interview, professionals mentioned that even though the municipalities have access to funding from the federal and provincial governments, they tend to ignore the climate adaptation work and focus more on creating more economic development, as the community views these efforts as a sign of progress. However, in this process, they tend to forget that climate change is real and its implications are most devastating when some climate event happens. It's not just about the lack of capacity in municipalities; it is sometimes the attitude toward adaptation planning. Many participants revealed that some smaller municipalities still do not believe in the concept of climate change and do not feel the need for climate change adaptation in land use plans.

In my opinion, that is where the problem lies, and it falls on the shoulders of the municipal leadership and the provincial and federal governments. Although the literature highlights the consequences of climate change, municipalities are not required by any regulatory framework to incorporate mainstream adaptation strategies into their land use plans and policies. Therefore, it is crucial for intergovernmental decisions to guide and compel municipalities to integrate adaptation policies into their land use plans in a mandatory manner.

Finally, I suggest increasing awareness of adaptation strategies and their impact on land use policies, making it a priority for municipalities. This includes educating the

community about how climate change affects them, particularly vulnerable groups like the elderly, homeless, and women and children. It is also important to help municipalities understand and use federal and provincial tools, like the Prairie Climate Centre, to analyze climate data and create strong land use plans for the future.

6.2 Recommendations

A. Mandatory Regulatory Framework for the Municipalities

Selseng and Gjertsen (2024) suggest that the role of higher levels of government and their ability to assist municipalities and local governments are crucial factors in adopting climate adaptation strategies. They can provide strong mandates to support municipalities. While Canada has a National Adaptation Strategy, it does not offer the necessary push for municipalities. Additionally, the absence of a clear climate change adaptation framework or policy from provincial governments further complicates the integration of climate policies into land use plans.

Municipalities are often the first to feel the impacts of climate change, including flooding, water shortages, wildfires, and storm surges (Vogel & Henstra, 2015, pp. 110–111). Therefore, it is urgent that provincial and federal governments develop a public policy or adaptation framework that clearly defines the municipalities' responsibilities and sets clear indicators to measure the success of integrating these efforts.

Additionally, the policy framework should incorporate strategies such as integrating climate change data and forecasting to support informed decision-making and clarifying the roles of various departments and stakeholders in designing, updating, implementing, and monitoring these strategies within land use plans and policies. The framework must also clearly define indicators to assess the mainstreaming process, similar to the framework I have prepared and utilized for this study. These indicators should not only measure the extent to which climate

adaptation plans are integrated into land use policies but also evaluate the level of implementation and establish improved monitoring strategies.

B. Direct Funding mechanism for Municipalities for Climate Change adaptation policies

A direct funding mechanism for municipalities is essential to help local governments effectively implement climate change adaptation policies in their land use planning documents. As discussed above, municipalities lack the funding resources to implement such strategies. My recommendation is to propose a direct funding mechanism supported by the federal and provincial governments, which could assist the municipalities to develop their own comprehensive climate adaptation strategies based on the framework proposed in the previous section.

The planner plays a central role in ensuring adaptation strategies are well-designed, aligned with the community's needs, and integrated effectively into land use policies. They would lead efforts in assessing vulnerabilities, identifying suitable adaptation measures, and ensuring that projects are in line with long-term land use planning goals. Planners would also work with other stakeholders to prioritize projects that are both feasible and effective in reducing climate risks.

The governments, in collaboration, can start a direct stream of funding in the forms of grants, funds dedicated to capacity building, support for training governmental staff and providing resources for education campaigns for the community as well as conducting a robust monitoring and evaluation procedure to track the progress of mainstreaming the adaptation planning. Moreover, as discussed in the barriers, municipalities lack the expertise and staff to conduct such tasks; I would recommend streamlining the process through a dedicated department so that the municipalities do not face the complexities of the procedure.

C. Education Pathways for the Community

Hugel and Davies (2024) state that involving the community in decision-making projects cultivates a sense of ownership and responsibility, which is essential for successfully implementing adaptation strategies in communities where economic development is prioritized. Moreover, education is the pathway which leads to successful community engagement. From the previous discussions on barriers and challenges, lack of education is identified as one of the most undermined challenges with a considerable impact.

I recommend that there be a dedicated educational pathway that educates not only the community members but also the municipal staff, the leadership, and the council. Establishing structured educational pathways will enable communities to comprehend the impacts of climate change better and actively participate in sustainability efforts practices. There must be a dedicated education pathway designed in collaboration with the provincial government, business entities, NGOs and indigenous knowledge keepers. They could offer mandatory training sessions for the leadership and staff and informational sessions for the community members.

Education in schools regarding climate adaptation and sustainable practices is also necessary. For instance, Hugel and Davies (2024) discuss a model in Dublin, an online-based Climate Smart educational platform for students. Such online platforms could also be developed for municipalities to access their climatic data, the progress of climate adaptation strategies and feedback on the current land use policies and plans.

6.3 Summary

In conclusion, this research highlights the barriers and challenges municipalities face when integrating adaptation policies into land use planning. Through a comprehensive review of the literature and document analysis, several key issues

emerged, such as the lack of political support, limited capacity, inadequate funding, and the absence of regulatory policies. These challenges were examined in detail to propose potential recommendations. Interviews with professionals in the field provided valuable first-hand insights, helping me better understand the real obstacles and strategies for overcoming them based on the analysis of literature, interviews, and documents.

The study also emphasized the crucial role of planners in creating a streamlined process for incorporating adaptation planning into land use policies. Planners' ability to influence stakeholders, including decision-makers, is vital to this effort. Additionally, planners are key in fostering interdepartmental and intergovernmental collaboration to ensure the successful implementation of these strategies. The study also highlights that adaptation planning should be made a core competency of planners, equipping them with the necessary skills to understand and implement climate projections in practical ways.

Bridging the gap between decision-makers and the community is another critical element in successfully integrating adaptation strategies. Planners play a key role in communicating complex climate data in a way that is accessible and understandable for both local stakeholders and the general public. By fostering a shared understanding of climate change adaptation, planners can ensure that municipal staff, elected officials, and community members are all aligned in their support for effective adaptation planning in land use plans and policies.

Ultimately, the research emphasizes the crucial role of planners in incorporating climate change adaptation into land use planning. By centralizing climate adaptation in the planning process, planners can foster significant change that improves municipalities' resilience and sustainability against climate challenges.

6.4 Future Research

Future research on mainstreaming adaptation planning in land use planning should take a more comprehensive approach by exploring how these strategies are embedded explicitly within land use plans and policies across different municipalities. A key aspect of such research would be to assess the level to which adaptation strategies are integrated into existing planning frameworks, providing a deeper understanding of how well these strategies are operationalized at the local level. This would facilitate identifying gaps in the adaptation process, highlight areas where integration is incredibly challenging, and provide insights into effective practices that have been successfully implemented in some regions but may not be broadly adopted. Future research could be based on *"To what extent are climate adaptation strategies explicitly integrated into land use plans and policies across municipalities, and what factors influence the effectiveness of their implementation at the local level?"*

Moreover, examining the specific barriers and challenges to mainstreaming adaptation strategies into land use planning would be valuable. While this study has outlined some barriers, such as lack of political support, insufficient funding, and limited regulatory frameworks, there may be other contextual and localized issues that hinder the full integration of climate change adaptation. For instance, a more granular analysis could reveal differences in how municipalities of varying sizes, capacities, or levels of political engagement address these challenges, providing a more nuanced understanding of the obstacles faced by different communities.

Additionally, this study is confined to analyzing a single municipality, which limits its applicability to other regions with different contexts. Expanding the research to include multiple municipalities, ideally from diverse regions, would help uncover how varying local conditions influence the mainstreaming of adaptation strategies. Such a

multi-case study approach would allow for comparisons across municipalities with different resources, priorities, and levels of adaptation readiness. It could also highlight how adaptation planning processes may need to be tailored to specific local needs, challenges, or vulnerabilities, offering lessons that can be applied in other regions. Hence, the question for future researchers remains, "*How are climate adaptation strategies integrated into land use plans and policies across municipalities with varying local contexts, and what factors influence the effectiveness and adaptability of these strategies in different regional settings?*"

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8 Image Sources

Cover Page Figure: City of Selkirk, (n.d.). *Untitled*. [Photograph]. https://www.myselkirk.ca/wp-content/uploads/2019/07/Climate-Change-Adaptation-Strategy-Final-May2019.pdf

Figure 1: Brooks, G.R. [Photographer]. (1997). *Severe flooding in the Red River Valley near Rosenort, 1997*. [Photograph]. https://www.manitoba.ca/iem/geo/pflood/photo1.html

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Figure 4: The Red River Planning District Development Plan By-law No. 272/19. (2020) *Map showing the Development Plan of the City of Selkirk* [Map]. Red River Planning District. https://selkirknow.ca/wp-content/uploads/2021/06/RRPD-Development-Plan-Aug-2020.pdf

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8.0 APENDIXES

Appendix-1: Climate Change Adaptation Assessment Framework

Strategic Drivers

Drivers	Indicator No.	Indicator	Description
F*actual foundation*	1	Impact of Climate Change	Does the document discuss the impacts of global climate change on broad issues, such as rising temperatures, heatwaves, the urban heat island effect, wildfires, tornadoes, hurricanes, and other related phenomena?
	2	Specific impact on Municipality	Does the document state that specific sectors, such as infrastructure, services, buildings, etc., will be uniquely impacted by climate change?
	3	Risk Assessment	Does the document mention risk assessment?
	4	Vulnerability Assessment	Does the document identify vulnerable populations in any way?
	5		Does the document mention the impacts of climate change on vulnerable populations?
	6	Legislative Context	Does the document comply with any acts or legislation related to climate change or climate change adaptation?
	7	Creating Awareness	Does the document help raise awareness about the impacts of climate change and adaptation strategies?
	8	Current & Forecasted Data	Does the document discuss current climatic data?
	9		Does the document discuss future/forecasted climatic data?
	10		Does the document discuss scenario planning?
	11	Current land availability	Does the document describe the land availability for future development?
	12	Land use	Does the document describe the current land use planning, including maps?

	13	Infrastructure	Does the document mentioned, how climate change will impact future road infrastructure, community facilities, water, and sewer systems?
	14		Does the document provide details on how future buildings will be affected by climate change?
	15		Does the document provide details on how future water bodies will be impacted by climate change?
Goals	16	Vulnerability reduction	Does the document include at least one goal aimed at reducing vulnerabilities caused by climate change?
	17	Land use	Does the document include at least one goal related to land use?
	18	Housing	Does the document include at least one goal related to housing?
	19	Transportation	Does the document include at least one goal related to transportation?
	20	Waste Management	Does the document include at least one goal related to waste management?
	21	Building Type	Does the document include at least one goal related to building type?
	22	Sewer and Wastewater	Does the document include at least one goal related to sewer and wastewater?
	23	Energy efficiency	Does the document include at least one goal related to energy efficiency?
	24	Parks, open spaces and community spaces	Does the document include at least one goal related to parks, open spaces and community spaces?
	25	Natural and man-made hazard	Does the document include at least one goal related to natural and man-made hazard?
Policies	26	Efficient land use	Does the document's policy focus on efficient or compact land use, infill development, brownfield redevelopment, or flood zone management?

	27		Connection to land use planning	Does the document establish a connection between climate change and land use planning?
	28		Transportation	Does the document address transportation strategies, including pedestrian-friendly designs, transit-oriented development, cycle-friendly infrastructure, and transportation designs that are age- and child-friendly?
	29		Energy Efficiency	Does the document include policies related to energy reduction, energy efficiency standards, green buildings, renewable energy, or electric vehicles?
	30		Waste management	Does the document include policies related to waste management, waste reduction, zero-waste initiatives, recycling, or similar strategies?
	31		Water management	Does the document include policies related to water conservation, reducing supply and demand, water metering, stormwater management, or similar strategies?
	32		Hazard reduction (Built environment)	Does the document include policies related to hazard-resistant buildings, impervious designs, energy-efficient retrofitting, rainwater harvesting, or similar strategies?
	33		Communication	Does the document include policies related to education and public participation initiatives?
	34			Does the document include policies aimed at raising public awareness about climate change, its effects, and adaptation strategies?
		Enforcement Drivers		
Implementation	36		Process	Does the document include a specific section outlining the process for implementing policies related to adaptation?

	37	Priorities	Does the document prioritize actions, goals, or policies for implementation?
	38	Responsibilities	Does the document identify the roles and responsibilities of different departments or individuals?
	39	Timelines	Does the document indicate any timelines for the implementation of policies/goals?
	40	Reference	Does the document reference any adaptation or mitigation plans?
Monitoring and Evaluation	41	Process	Does the document outline a process for monitoring and evaluation (M&E) of policies or goals?
	42	Responsibility	Does the document outline any responsible parties for M& E?
	43	Updates	Does the document include any timelines or milestones for updating or revising policies based on the results from monitoring and evaluation (M&E)?
	44	Indicators	Does the document include any key performance indicators (KPIs) or quantifiable indicators related to adaptation?
	Guiding Drivers		
Coordination	45	Multi-level governance	Does the document align with federal, provincial, or regional adaptation plans?
	46	Other plans	Does the document align with any other official adaptation plans and policies?
Participation	47	Stakeholder engagement	Does the document mention stakeholder or public engagement in creating and implementing plans?
	48	Evolution	Does the document discuss the engagement of the public, private sector, and stakeholders in updating plans?

Organization and presentation	49	Summary	Does the document clearly summarize goals and policies that align with climate change adaptation planning?
	50	Glossary/Definition	Does the document include a glossary or definitions of terms related to adaptation?
	51	Illustrations	Does the document include processes, illustrations, diagrams, or flowcharts that explain the goals and policies for adaptation?

Appendix-2 Information Sheet for Interviews

INFO SHEET

CITY 7050 CITY PLANNING CAPSTONE PROJECT
Department of City Planning, Faculty of Architecture
Course Instructor: Dr. Rae St. Clair Bridgman

Name of Student: Neha Prakash

Title of Project: Assessing Climate Change Adaptation Readiness of Small Municipalities: A Case Study of Land Use Planning in Selkirk, Manitoba.

Summary of Project: Municipalities across Canada are under growing pressure to address global climate change, which includes dealing with severe flooding, extreme heat waves, and the rapid onset of wildfires. Although climate change mitigation has gained more attention at the federal and provincial levels, adaptation has received less emphasis, especially at the local level where the impacts are most directly experienced. There is a notable gap in understanding how prepared municipalities are to adapt, particularly through land-use planning.

The capstone's objective is to assess the capacity of local governments to build resilience to climate impacts through robust and inclusive land use planning tools and strategies. This study aims to explore how ready our municipalities are for climate change and how effectively climate adaptation strategies have been incorporated into land use planning through a case study of the City of Selkirk, Manitoba. As part of this study, professionals from the provincial level and municipal level (City of Selkirk, Manitoba) will be interviewed who have been involved in developing & implementing the adaptation framework for local government. This will help me identify the current gaps and barriers in mainstreaming the adaptation strategies into land-use planning at the municipal level.

Specific Activities to be Completed by Project Participant and Time Frame: Interviews will take place either in-person or via phone/video conference and are expected to last approximately 1-1.5 hours. Timeframe for interviews: January to February 2025.

CONTACT INFORMATION:

Student Name: Neha Prakash

Student's University Contact Information: Department of City Planning
Faculty of Architecture
201 John A. Russell Building
84 Curry Place
University of Manitoba (Fort Garry campus)
Winnipeg, MB R3T 2M6
prakashn@myumanitoba.ca

Course Instructor: Dr. Rae St. Clair Bridgman, Professor
Department of City Planning, University of Manitoba
Telephone: 204-474-7179 e-mail: rae.bridgman@umanitoba.ca

Appendix-3 Informed Consent Form

University of Manitoba

Participant Informed Consent Form

Study Title: Assessing Climate Change Adaptation Readiness of Small Municipalities: A Case Study of Land Use Planning in Selkirk, Manitoba.

Student Principal Investigator: Neha Prakash, master's in city planning, Department of City Planning, Faculty of Architecture, University of Manitoba. Email: prakashn@myumanitoba.ca

Student Advisor: Dr. Rae St. Clair Bridgman, Department of City Planning, University of Manitoba. Telephone: 204-474-7179. Email: rae.bridgman@umanitoba.ca

Conflicts of Interest and Undue Influence: I, Neha Prakash, does not have/ have any conflicts of interest in this study/research. You are being invited to participate in a research study. This consent form, a copy of which has been given to you, is only part of the process of informed consent. If you want more details about something mentioned here, or information not included here, feel free to ask any of the people named above. Please take the time to read this document and any accompanying information carefully. It is very important that you understand:

- what is being asked of you,
- what the risks and benefits of participation are, and
- how the information you provide will be used and stored

Purpose of the Study: I am doing this research for a capstone project under the supervision of Dr. Rae St. Clair Bridgman. This research study is about exploring how ready our municipalities are for climate change and how e9ectively climate adaptation strategies have been incorporated into land use planning through a case study of the City of Selkirk.

Study Procedures: If you decide to take part in the study, we will meet for a 1- 1.5-hour interview through UM Zoom. With your consent, I will audio and video record our meeting. I will set aside time at the beginning of the interview to explain the project, review the consent form and make sure that you are comfortable with the interview process. You may return digital copies of your consent form via email to me. If you are unable to provide a

signed copy of the consent form before the interview, the consent form will be read aloud to you over the Zoom/Team platform and verbal consent will be requested. You will also be allowed to ask questions or to seek clarification before the interview commences.

Study Risks: This survey is minimal risk, meaning that the risks are no greater than what you might encounter in your daily life.

Study Benefits: Here are no direct benefits to you by participating in this study.

Compensation: There is no compensation for this study.

Use and Storage of Information: All the information you provide as a participant in this study is confidential which means we as the research team must keep it safe. We will do our best,however, it is not possible to guarantee absolute confidentiality. We will only share your personal information if required (court order or law).

Your information will be stored on a secure platform approved by the University of Manitoba. We will have a file that links your name to your information using a code. We will keep the file with your name, contact information, and code separate from the research information you share with us. When we share the results of this study, we will combine everybody's responses. We may use some of your information through quotes. The quotes will not include your name. The researchers will keep the personal information separate from any research information. Only people on the research team will see your personal information and/or responses. We will destroy any information that identifies you (name, contact information) by June 2025. The rest of the information may be kept indefinitely. Your research information may be shared outside of the University of Manitoba with researchers, other organizations, and/or made publicly available. The information is being shared for further analysis or testing, as part of the research study, and/or because it is required by a funder or journal. It will not include your name or any information that could identify you.

Dissemination: The study results will be shared through

1) the publication of a master's thesis.
2) journal publications and presentations in relevant academic fields; and/or
3) a summarized report of the study results to be sent to interested participants.

Withdrawing: Your participation in this research study is voluntary. You can choose to do only the activities and/or answer only the questions that you are comfortable with. You may withdraw from the study for any reason. You do not have to explain why. You will not be penalized in any way. Should you withdraw partway through the study, all of your information will be destroyed unless you have consented to allowing us to keep it. You may withdraw from the study until February 15th, 2025. After this date, we will start to analyze the information so it may not be possible to withdraw your information. To withdraw, please contact Neha Prakash at the phone number or email above.

Questions or Concerns: Designated University of Manitoba personnel may check that this study is being done safely and properly. To do this, they may visit the study site or review the research records. We will tell you if someone outside the research team will be there while you are participating. If this makes you uncomfortable, please tell a member of the research team, who will ask the personnel to return at another time. This study has been reviewed and approved by a Research Ethics Board at the University of Manitoba. However, this does not mean that participation is risk-free. If you have questions about your rights as a research participant, you may contact the Office of Human Research Ethics at humanethics@umanitoba.ca or 204-474-7122. If you have any questions, concerns, or complaints about this study, you may contact any members of the research team listed on the first page or the Office of Human Research Ethics.

Consent:

By signing this document, I agree that:

- I have read the above information or had it read to me.
- I have had the opportunity to ask and have answered all of my questions.
- I understand what is being asked of me.

Notice Regarding Collection, Use, and Disclosure of Personal Information

Your personal information is being collected under the authority of The University of Manitoba Act. The University of Manitoba is committed to preserving your right to privacy. The information you provide will be used by the University to support our research. Your personal information will not be used or disclosed for other purposes, unless permitted by The Freedom of Information and Protection of Privacy Act or The Personal Health Information Act. If you have any questions about the collection of personal information: Ph: 204-474-9462 or Email: fippa@umanitoba.ca.

I agree to participate in this study.	☐YES	☐NO
I agree to be audio-recorded in this study.	☐YES	☐NO
I agree to be video-recorded in this study.	☐YES	☐NO
I agree to have (check one): ☐ a general descriptor used instead of my name when results are shared for this study. ☐ my first name used when the results are shared for this study. ☐ my full name used when the results are shared for this study. ☐ a pseudonym (fake name) used when the results are shared for this study. I would like my pseudonym to be: _____		
I agree that my first/full name may be shared outside the University of Manitoba, with researchers, other organizations, and/or made publicly available. *If you say no, your personal information will not be shared but your research information may still be shared.*	☐YES	☐NO
I agree that the research team can use photos and videos I have produced for this study when they share the study results.	☐YES	☐NO

_____ _____ _____

Name of Participant Participant's Signature Date

Summary of Results: Please provide an email address below if you would like to be sent a summary of the study results and/or my individual results. Email address: _____

Appendix-4 Interview Questions

Interview Questions

CITY 7050 CITY PLANNING CAPSTONE PROJECT
Department of City Planning, Faculty of Architecture
Course Instructor: Dr. Rae St. Clair Bridgman

Name of Student: Neha Prakash

Title of Project: Assessing Climate Change Adaptation Readiness of Small Municipalities: A Case Study of Land Use Planning in Selkirk, Manitoba.

Before the interview begins, the interviewer will explain the project, review the consent form and make sure the participant is: comfortable with the process, aware of their right to withdraw at any time during the interview, and can withdraw from the study up to February 15th, 2025. The interviewer will also ask the research participant to not make any references to information that would identify specific individuals or households but to speak in general terms about their client base.

Questions for Interview.

Getting to know: Roles and Responsibilities

1. Do I have your permission to record this interview? YES/NO
2. What is your position in your organization?
3. Please tell me about your role and responsibilities within the organization.
4. Can you describe your experience with climate change adaptation planning?
    a. Probe: Please expand on your specific experiences that relate to municipalities. Which municipalities have you worked with and in what capacity?

5. **Have you ever worked with the City of Selkirk in any capacity related to Climate change adaptation planning?**
    a. **If yes, refer to questions: 6-15 (10 questions)**
    b. **If no, refer to questions: 16-24 (9 questions)**

Kindly note that this questionnaire is divided into two sections.

For the professionals who have worked with City of Selkirk in any capacity will answer to the questions 1-4 & 6-15 (Total:14 questions)

For the professionals who have not worked with City of Selkirk in any capacity will answer to the questions 1-4 & 16-25 (Total:13 questions)

Challenges & Barriers for the City of Selkirk, Manitoba.

6. Based on your experience with adaptation planning in the City of Selkirk, how ready are they to incorporate adaptation into their policies and plans?
7. What do you consider as important challenges and barriers Selkirk is facing in adaptation planning?
    a. Probe: If possible, please share an example.
8. Based on your experience, do you believe that different stakeholders within Selkirk's governance play a significant role in influencing the adoption of adaptation plans into land use policies?
    a. Probe: Probe: If yes, can you give an example?
    b. If not, then are there any other influencing factors?
9. Overall, how would you describe the current state of adaptation planning within the context of municipal land use planning in Selkirk?
    a. Probe: Would you say it is satisfactory or unsatisfactory and why?

Streamlining Adaptation Plans in the City of Selkirk, Manitoba.

10. What factors do you consider most critical for mainstreaming Selkirk's adaptation plans within land-use policies?
11. Do the City of Selkirk incorporate local climate data or projections when making land-use planning decisions?
    a. Probe: Can you give an example?
12. Based on your experience, what recommendations would you provide to planners for developing more effective land use plans and policies that facilitate the integration of adaptation planning?
13. In your expert opinion, what recommendations do you want to give to other municipalities to increase their adaptability?
14. Can you provide an example of a case study other than the City of Selkirk that serves as a valuable reference for understanding the barriers and best practices adopted?
15. Do you have anything you would like to add to your responses?

Challenges & Barriers for Municipalities

16. In your experience working in adaptation planning in municipalities, how prepared are most municipalities to integrate adaptation into their plans and policies?
17. What do you consider as important challenges and barriers municipalities face in adaptation planning?
    a. Probe: If possible, please share an example
18. Based on your experience, do you believe that different stakeholders within the governance levels play a significant role in influencing the adoption of adaptation plans into land use policies?
    b. Probe: Probe: If yes, can you give an example?
    c. If not, then are there any other influencing factors?

2. Overall, how would you describe the current state of adaptation planning within the context of municipal land use planning in Manitoba?
    a. Probe: Would you say it is satisfactory or unsatisfactory and why?

Streamlining Adaptation Plans in Municipalities

19. What factors do you consider most critical for mainstreaming adaptation plans within land-use policies?
20. Do the municipalities incorporate local climate data or projections when making land-use planning decisions?
    b. Probe: Can you give an example?
21. Based on your experience, what recommendations would you provide to planners for developing more effective land use plans and policies that facilitate the integration of adaptation planning?
22. In your expert opinion, what recommendations do you want to give to municipalities to increase their adaptability?
23. Can you provide an example of a case study that serves as a valuable reference for understanding the barriers and best practices adopted by municipalities?
24. Do you have anything you would like to add to your responses?