The Relationship between

Property Taxes and Built Form:

Mapping the City of Winnipeg

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April 4, 2019


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Acknowledgement

I want to thank the Department of City Planning and the University of Manitoba for accepting me in the program and giving me the opportunity to discover a new country. After applying for admission at several universities around the globe, I decided to come to Winnipeg and fulfill my dream of study abroad.

This project would not be possible without the assistance and encouragement of people, family, and organizations. The current capstone is a combination of personal interests, and directions from my friends, professors, and professional planners. I thank my advisory committee, Dr. Orly Linovski, Dr. Sarah Cooper, and Michael Robinson for their time and encouragement during the research and writing process.

Also, I would like to thank the Manitoba Professional Planners Institute for giving the Thomas B. Yauk -MPPI Scholarship, the Faculty of Architecture for giving me the Price Industries Limited Faculty of Architecture Recruitment Award, the Faculty of Graduate Studies, and the Department of City Planning for giving me the University of Manitoba Graduate Fellowship (UMGF), International Graduate Student Entrance Scholarship (IGSES), International Graduate Student Scholarship (IGSS).

Finally, I would like to thank my DAD's community for their time, dedication and for adopting me as part of their families. Gracias a mis cuatro grandes amigos por las aventuras, risas y frustraciones compartidas.

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Cities are complex mixtures of political and fiscal institutions that provide public services for their citizens.

(Lynch, 1984, p. 8-9; Tassony et al., 2017, p. 4).

Executive Summary

Planners and city officials can often forget that property taxes shape our cities. Through different property tax policies, city officials create a context to which development and residents adapt. For example, residents may desire municipal services, but do not want to pay enough taxes to finance these services (Fischel, 2001, p. 158). These adaptations, have resulted in the creation of different urban and architectural forms. An example of this was seen in Paris where property taxation was determined by the square footage of all floors, but attics were excluded (McCabe, 2000, p. 161). As a result, mansard roofs were invented.

Also, considering that the municipal property tax is the primary source of revenue for the City of Winnipeg, representing almost 53 percent of its income on average between 2014 and 2018, it plays a significant role in both funding capital projects and shaping the urban form. Moreover, city reports show that the City is facing an important deficit in infrastructure that needs to be solved (City of Winnipeg, 2018, p. 9). Therefore, city officials need to identify aspects of the current taxation system that might influence the urban form to reduce the gap between total capital investment requirements and estimated future capital funding.

Through the use of secondary data, this capstone maps and analyses elements of the municipal property tax and urban form that influence the spatial arrangement of people, goods, information and physical features in the City of Winnipeg. It identifies the amount of revenue different neighbourhoods provide to the City through the municipal property tax and compares this with the resultant effects in the urban form.

This study aims to provide both a better understanding of municipal property tax and relevant aspects of urban form. By identifying the urban form of neighbourhoods that provide more revenue to the City, City officials and policymakers could encourage private developers to create new neighbourhoods that have similar characteristics. Therefore, planning and taxation could be used as tools that will help to reduce the current infrastructure deficit in the City of Winnipeg.

Introduction

"Politicians and officials at all levels of government seem to agree with most citizens that Canada's urban infrastructure needs to be repaired and extended" (Bird & Slack, 2017, p. 3). In Winnipeg for example, city reports show that the City is facing a deficit of 6.9 billion dollars on capital investment in infrastructure over the next ten years 2018 to 2027 (City of Winnipeg, 2018, p. 9).

Even though city officials are taking some measures to reduce the gap between total capital investment requirements and estimated future capital funding, there is something else that city officials have not explored yet: the relationship between property tax and urban form. For some authors, the relationship between property taxes, city expenditures, and urban form is ambiguous and even controversial, as some studies suggest that the cost of public services increases with density (Carruthers & Ulfarsson, 2003, p. 506). However, by analysing the relationship between municipal property tax and urban form, cities might find other ways to reduce the deficit of infrastructure while creating policies promote a more financially sustainable built form.

Canadian municipalities should explore the relationship between property tax and built form because the municipal property tax is the primary source of revenue for municipalities as it represents almost 57 percent of their incomes, on average, in 1998 among all Canadian cities (Slack, 2002, p. 8) . Therefore, it pays for most of the capital investments and operation of a city. For example, it is common to see in the private sector that developers keep track of every square foot and dollar spent on any development. As a result, indirect costs such as permits, designs, and marketing are considered during the life of the project. However, in the public sector, it is highly unlikely to see a continuous revision on every infrastructure and planning project that the city develops. If city officials had created policies through a cost-benefit analysis while approving subdivisions, Winnipeg's urban form could have been different, and the current infrastructure deficit would be lower.

However, cities cannot be considered a private company. Instead, cities are a complex mixture of political and fiscal institutions, a combination of public (infrastructure and services), and private capital, that provides public services which affect the urban form. Therefore, our current urban form is the result of on-going battles and agreements between political and economic interests between the public and private sectors. For Lynch (1984) the result of these battles are short term policies which are most of the time are fragmented and biased (Lynch, 1984, p. 40). Policies that force citizens to change and adapt their way of living by creating innovative ideas that have direct implications in the urban form.

Adaptation is a characteristic of human nature and cities, as a glorious expression of human pride, relief, and wonder, reflect that fact. Throughout history, there have been several examples that show the ability of human adaptation. For Fischel (2001), urban adaption occurs when residents may desire municipality's services, but do not want to pay enough tax to finance these services (Fischel, 2001, p. 158). The idea of desire for services without paying for them has created innovative strategies to avoid paying taxes. For example, for a brief period, Paris property taxation was determined by the square footage of all floors, but attics were excluded (McCabe, 2000, p. 161). As a result, architects designed buildings that include useful spaces on the ceiling known as mansards that were tax-free. Also, between 1696 and 1798 a Window Tax was collected in England to get more revenue, but the immediate effect was that some residents closed their windows to avoid paying more taxes (McCabe, 2000, p. 161).

The City of Winnipeg is facing a fiscal dilemma. On the one hand, the City has a severe deficit for maintaining the current infrastructure and alocating resources to build new infrastructure. On the other hand, critical constitutional constraints prevent the City from getting new sources of revenue to solve the current infrastructure deficit. To reduce this gap, Winnipeggers need to understand in a more fine-grained basis the possible relationship between urban form and property tax. By considering the relationship between property tax and urban form, city officials will be able to use planning and taxation tools to influence business location and housing density in specific areas of the city. Therefore, planning and taxation tools could help reduce the current infrastructure deficit and create an urban form more sustainable and feasible form the economic, social

and environmental perspective.

This capstone explores the relationship between property tax and urban form, as it has influenced people's behaviour. For example, over-taxation in some areas of the city may result in migrations to other municipalities, or if condominiums are taxed higher than single detached houses, there is a possibility that more people will prefer living in single-family homes rather than in apartment buildings. By mapping and analysing the relationship between property tax and built form, and city expenditures, I found the current property tax system and capital project investments promote low-density neighbourhoods.

Structure of the Document

This capstone is divided into seven sections. The first section provides a general context about the City of Winnipeg, as a winter and slow-growing city. Also, the context section provides information about local government funding constraints and a general explanation about Winnipeg's infrastructure deficit.

The second section of this capstone includes a literature review, which shows a variety of views about the relationship between property tax and urban form. Also, these views show possible ramifications in areas like public finance and politics that affect the urban form and the way of living in urban settings.

In the research methods section, I show the research questions that the document tries to explore and solve. Also, this section shows how the information was gathered, data sources, and finally the process of analysing and mapping the data.

The fourth section is the context section. This section provides a general understanding of urban form, sprawl developments, and Winnipeg's property tax that help the reader to understand the following section.

In the finding section, is divided into two main sections . The first category focuses on municipal property tax and city expenditures. Here, through graphs, charts, and maps, I

show sources of revenue, a list of neighbourhoods that provide more and less revenue through municipal property tax, property tax raised per square meter by neighbourhood, and capital project expenditures between 2014 and 2018. The second part of the findings section discusses how relevant aspects of the urban form can be mapped to establish a possible relationship between property tax raised, expenditures and urban form.

The discussion section compares maps (found in Appendix A) and information displayed in the finding section. By comparing maps and data that relate to aspects of the urban form with the municipal property tax, I discovered some planning contradictions that indicate that the municipal property tax and urban form are indeed related. Finally, the conclusion section summarizes lessons learned from the research, and informs the reader that there is a direct relationship between the municipal property tax and aspects of the urban form. For example, some of the implications include the importance of integrating tax policies into land use planning and need to work collaboratively with other City departments.

Research Methods

This capstone explores a possible relationship between urban form and municipal property tax in the City of Winnipeg. For Lynch (1984), urban form is the spatial arrangement of persons, goods, information and physical features such as buildings, streets, utilities, and natural elements which modify a permanent space (Lynch, 1984, p. 48). By using the method of spatial analysis of secondary data, this capstone maps and analyses elements of the municipal property tax and the urban form that influence the spatial arrangement of persons, goods, information and physical features in the City of Winnipeg.

The study uses secondary data that include official reports, data sets, and documents. These data were available at the open data portal on the City of Winnipeg website. Also, the present research contains Geographic Information System (GIS) data that were obtained from the University of Manitoba Library. This GIS information provides a base layer to do the spatial analysis to answer part of my research questions and show and analyse findings.

Research Questions

The present document maps and analyses the relationship between urban form and the municipal property tax in the City of Winnipeg by answering the following questions:

1. How much revenue does the City of Winnipeg raise in property taxes from each neighbourhood versus how much was spent in each neighbourhood in the 2014 to 2018 capital budgets?
2. What are the variations of the capital budget from 2014 to 2018?
3. How does density influence revenue?
4. What are the implications and relationships between property tax increases and urban form?

Research Process

I started the research process by doing a literature review to understand what scholars have found about the relationship between urban form and property tax. The literature review is an essential element that helped me understand how municipal property taxes influence the urban form. After reviewing what scholars have found about the relationship between property tax and urban form in cities across North America, I understood the contradictions and gaps that are present in the current literature.

After doing the literature review, I provided a general context about the City of Winnipeg, funding limitations, infrastructure deficit in the City of Winnipeg, and definitions of urban form and property tax. By providing these general definitions, the reader can understand the reasons that give merit to the study. The current study reveals planning and policy contradictions among City departments and political decisions that affect Winnipeg's urban form.

After the general framework was set, I expanded in the explanation of Winnipeg's property tax system by showing the method of calculation that the Assessment and Taxation Department uses. Then, I illustrated Winnipeg's revenue and infrastructure situation, by showing maps and charts from secondary data that is publicly available on the city's website. The information collected was organized and reclassified in maps, graphs, and charts to provide a better understanding of capital investments, revenue, and urban amenities in the City of Winnipeg. To show the reader this information in a simple way, I used the method of spatial analysis using GIS, as maps are the best way to show relationships and communicate ideas (Sheinberg & Sheinberg, 2015, p. 4).

The findings section shows and compares the analysed data that were collected between September and December 2018. Finally, the conclusion section shows how property tax, relevant features of urban form and politics have direct influence in Winnipeg's built form.

Spatial Analysis

GIS is a powerful tool that helps investigators to collect, organize, explore and analyse data that assists researchers in multiple ways. By using GIS, researchers can understand an issue, draw parallels and relate factors based on spatial relationships (Sheinberg & Sheinberg, 2015, p. 4).

For this research, the most common tool used was the spatial join tool. This tool "joins attributes from one feature to another based on the spatial relationship" (Esri, 2019). When Sheinberg and Sheinberg (2015) refer to spatial information, they mean data that are linked to a specific location (coordinates) and have attributes that help researchers to link object characteristics (Sheinberg & Sheinberg, 2015, p. 5). By using GIS, researchers can locate and analyse information using a spatial advantage to make better decisions (Sheinberg & Sheinberg, 2015, p. 10). GIS also facilitates the research process as GIS integrates different types of data and presents information more realistically and visually (Sheinberg & Sheinberg, 2015, p. 11).

By incorporating GIS into the research, researchers can examine data from multiple sources at different points in time, space, and place. Therefore, GIS is a tool that provides a holistic approach for data analysis as well as a better way to communicate the outcomes of a study (Sheinberg & Sheinberg, 2015, p. 19).

Data Sources

The project relies on three different sources of information to establish relationships between Winnipeg's urban form and the municipal property tax, these sources illustrate aspects of Winnipeg's urban form and Winnipeg's property tax revenue in 2018. The following table (Table 1) shows sources and documents consulted during the process of the research.

Source Name	Type of Document	Description	URL	Date
University of Manitoba	GIS Data	Street Network	N/A	September 26th, 2018
		Park and Open Spaces Network		
		Assessment Parcels		
		Neighbourhoods		
		City of Winnipeg Boundary		
		City of Winnipeg Boundary		
		Wards		
City of Winnipeg website Open Data Portal	Data Set	This data set lists projects that the Department of Public Works built (between 2014 and 2018).	http://openbudget.winnipeg.ca/#!/year/2014/capital/o/department/Public+Works/o/project_description?vis=pieChart	October 20th, 2018
		This data set lists projects that the Department of Public Works built (between 2014 and 2018).	https://data.winnipeg.ca/browse?Department_Department=Public+Works&limitTo=blob	October 20th, 2018
		This data set provides information about the municipal property tax and assessed value of each property in the city.	https://data.winnipeg.ca/Assessment-Taxation-Corporate/Assessment-Parcels/d4mq-wa44	November 11th, 2018
		Census Data from 2011	https://winnipeg.ca/census/2011/	December 1st, 2018
City of Winnipeg Website	Capital Budget information	Capital budgets (between 2014 and 2018) adopted by the Council that described investment in infrastructure.	https://winnipeg.ca/finance/documents_page.stm#Budgets	October 20th, 2018
	Report	City of Winnipeg 2018 State of the Infrastructure Report	https://www.winnipeg.ca/infrastructure/asset-management-program/state-of-infrastructure-report.stm	September 16th, 2018

Table 1: Data Sources

Process of Analysis

The final goal of this empirical analysis is to establish a correlation between Winnipeg's municipal property tax and urban form by answering the research questions, previously shown. Therefore, this capstone relies on datasets and GIS maps, that were downloaded from the city's website and then, recategorized, organized, and analysed by me.

The first research question tries to understand how much revenue the city receives per neighbourhood every year, to establish a possible relationship between revenue and services received from the city. To answer this question, I downloaded a dataset that contained information about each property in the City (2018). The database contained detailed information that included address, neighbourhood, area of the property, number of rooms, year of construction, water pipe and sewer frontages, and assessed value. This information was vital to create maps that show total revenue by neighbourhood, and the contribution of the municipal property tax per square metre by neighbourhood.

Part of the first question also refers to the amount of money that the City of Winnipeg collects via property tax per neighbourhood every year. To answer this question, I found a dataset on the City's website (see Table 1 for details) that showed the assessment value of each parcel in the city according to its land use. However, this dataset does not include two variables that were vital to calculate the municipal property tax of each property in Winnipeg. Therefore, GIS allowed me to establish the same method to calculate the municipal property tax by using queries that include variables and percentages of each land use (see Table 5).

To answer the question that explored capital infrastructure expenditure between 2014 and 2018, I found a dataset on the City's website that showed projects that the Department of Public Works has developed during those years. However, that dataset did not include summarized information, instead it contained monthly reports of each project that the City has invested between 2014 and 2018. In fact, this data set included more than thirty thousand rows of information that were repetitive and confusing to understand. Therefore, I needed to reorganize the entire dataset to get the final report of each project and then mapped each of those projects. To get the last report of each project, I reviewed

each of the thirty thousand cells, and then I filtered and reclassified the information to create a new dataset that summarized the capital expenditures of the Department of Public Works between 2014 and 2018.

The following table (Table 2) contains the categories before and after my re-classification:

Original Classification		New Classification
Category	Subcategory	Category
Regional Streets	Active transportation facilities	Active Transportation
		Master Plan
		Roads
		Sidewalk
	Developers payback s	Payback
	Sidewalk and curb repair	Sidewalk
	Street improvements	Road s
	Street renewals	Roads
		Parks
		Roads
		Sidewalk
	Traffic engineering improvements	Roads
Parks and Open Spaces	Athetic field improvements	Parks
	Community park amenities	Parks
		No Information
	Community park	Parks
	Insect control	Insect Control
	Parks improvements	Parks
	Parthway/roadway/tennis court upgrading	Parks
		Roads
	Reforestation, streets and aesthetic improvements	Reforestation
Other Street projects	New Transportation	Roads
	Assset management	Assset Management
		Reforestation
	Land acquisition	Land Acquisition
	Land drainage sewer	Land Drainage Sewer

Original Classification		New Classification
Category	Subcategory	Category
Local Streets	Disraeli bridge	Roads
	Lane renewals	Lane Renewals
	Sidewalks	Sidewalk
	Streets renewals	Parks
		Active Transportation
		Lane Renewals
		Roads
		No Information
	Waterway crossing and grade separation	Roads
No informantion	No information	Active Transportation
		Assset Management
		Land Acquisition
		Land Drainage Sewer
		Lane Renewals
		Master Plan
		Parks
		Payback
		Reforestation
		Roads
		Sidewalk
		Supply
		No Information
	Parks improvements	Parks
	Assset management	Assset Management

Table 2: Original Data Classification and Reclassification

The result of this process of reclassification was a new data set that contained 428 projects (which represent all the data) that the City developed from 2014 to 2018. The second stage included mapping those projects using GIS. However, after a rigorous process of cross-checking information with other five documents that contained city's capital budgets (between 2014 and 2018), I found that I was only able to map 155

projects in their precise location, and 36 projects in an approximate location (either in the neighbourhood or electoral ward). Therefore, I was only able to map 44 per cent of capital expenditure of the Department of Public Works between 2014 and 2018, and the remaining 56 per cent did not include any information about the location or characteristics that help me locate them within the City boundaries.

The second research question tries to establish changes in the city's capital budget between 2014 and 2018. By answering this question, I was able to understand how the City has been facing the current infrastructure deficit situation between 2014 and 2018. Also, by identifying changes in Winnipeg's capital budget, I was able to understand what portion of the city's capital budget goes to the Department of Public Works to the built capital projects listed in official documents.

The third research question examines and compares neighbourhoods using maps that were created using GIS. These maps showed different features of the urban form that were related to density and how density could be shown in different ways. By showing different ways to show and calculate density, the reader will understand how political decisions influence or even manipulate the urban form.
Table 3 shows the list of maps that were created as part of this research.

Map Name	Map Number	Origin of the Data	Year of the Data
Occupied Dwellings per Neighbourhood	Map 5	Data provided by the University of Manitoba Library and edited using the Spatial Join tool in GIS	Neighbourhood data 2018 Census data 2011
Dwellings per acre per Neighbourhood	Map 6		
Ratio of Kilometres of Roads per Neighbourhood	Map 7		Neighbourhood data 2018 Roads data 2018
Percentage of Public and Open Spaces per Neighbourhood	Map 8		Neighbourhood data 2018 Public parks and open spaces data 2018
Number of Public Amenities per Neighbourhood	Map 9		Neighbourhood data 2018 Public Facilities data 2018

Table 3: Original Data Classification and Reclassification

To create the maps that Table 3 shows, I used the Spatial Join tool that GIS includes, that help me relate different sets of information using the location of the features. The spatial join tool is a powerful instrument that helped me to classify and analyse the information shared in the findings section of the document.

Limitations

There are various limitations to this study as some information did not match, were missing or even were incomplete.

First, the information that was publicly available on the open data portal under the Department of Public Works was extremely difficult to classify and understand due to the lack of details on it. For example, a data set that clearly states capital expenditures from 2014 to 2018, shows projects and expenses from the capital and operating budget in the same dataset.

Finding, organizing and mapping information regarding expenditures from the Department of Public Works from 2014 to 2018 was a difficult task. The information that the Department of Public Works provided for the public is a combination of data, as it includes capital and operational budget projects from 2014 to 2018. Moreover, this information does not include complete information about the capital, characteristics of location and detailed descriptions of capital projects. As a result, I was able to map only 191 projects; this is just 44.6 per cent of capital projects from 2014 to 2018 (see Maps 3 and 4). Furthermore, during the process of investigation and categorization of capital investments between 2014 and 2018, I found that the information was not completed, did not correspond to the project ID or some information was missing, as data from one document did not match data a different report. The fact that different documents show different projects and investments raises an important issue of information reliability.

Due to time constraints, the research looked at investments in capital projects from the Department of Public Works from 2014 to 2018. Looking at just projects that were built in the last five years is a significant limitation of the project as it does not provide enough evidence that can show the relationship between revenue and expenditure. Furthermore,

the lack of publicly available detailed information about capital projects puts additional challenges to the research, as I could not establish which projects affected specific neighbourhoods. Therefore, I was not able to compare revenue versus expenditures by neighbourhood, as there is no public information that shows capital projects with this level of detail.

Finally, I used information from two different years, one from 2018 and one from 2011. All GIS data is from 2018, but I was forced to use the 2011 census data, as census data from 2016 is not publicly available on the City's website. The fact that I am using data from different years has direct implications on the four maps show the relationships between population and roads, and population density per neighbourhood. For that reason, there is a substantial risk that some results and conclusions of this research might change in the future as more recent census data becomes available.

Literature Review

Urban Form and Finance

Cites are glorious expression of human pride, relief, and wonder. As an expression of human civilization, cities are living entities that evolve with human political, social and economic systems. At first, cities appeared as warehouses and breakpoints in trade, then cities became administrative centres for managing complex and centralized public works such as irrigation systems, and now cities are considered as complex mixtures of political and fiscal institutions that provide urban public services for their citizens (Lynch, 1984, p. 8-9; Tassony et al., 2017, p. 4).

A city can be defined as a complex mixture of political and fiscal institutions, or as a combination of public capital (infrastructure), and private equity that provide urban public services which affect the urban form. It is precisely this interaction, between the private and public capital, that reflects the values of a society that we live in, creating differences and similarities between cities around the globe (Tassony et al., 2017, p. 4; Burchell, 1997, p. 159; Blais, 2010, p. 85). On the one hand, the public capital "includes the capital improvements needed by growth encompassing roads, utilities, schools, and other facilities (e.g., town hall, fire and rescue stations)" (Burchell, 1997, p. 159). On the other hand, private capital has the form of housing, offices, and industries (Burchell, 1997, p. 159).

Therefore, there are many factors and values to consider while planning a city. Some planners focus their attention on placemaking, others on building stronger communities, and others on resilience, values that according to Lynch have a direct connection with the city form (Lynch, 1984, p. 54) However, there is one part that most planners often forget: money. Money and politics are some of the main factors that shape our urban form, in something that Lynch (1984) describes as continuous bargaining between actors (Lynch, 1984, p. 40). These actors, who shape the urban form of cities, have their political and economic interests that push city officials to create short-term policies that are fragmented and bias resulting in urban planning policies that might be against public interests (Lynch, 1984, p. 40).

During this continuous bargaining process, between public and private actors, the only agency that controls the evolving spatial structure and city form might be the planning agency. However, this agency is one of the weakest actors in shaping the physical environment of a city, as it might be biased by political views, economic interests (Lynch, 1984, p. 41). As an example, some planning agencies assume that budget problems can be solved by creating more urban growth, resulting in a rapid expansion of metropolitan areas into rural areas, where large tracts of land are developed in a "leapfrog low-density pattern" (Frumkin, 2002, p. 201). Low-density developments consume fertile farm land next to urban centres. Sprawling developments waste resources by expanding cities, segregating land uses and increasing public expenditures to provide infrastructure services (Song and Zenou, 2006, p. 520). Also, urban sprawl increases travel distances and commuting time, as it reduces the ability to provide efficient public transit in these areas (Song and Zenou, 2006, p. 520). These aspects of low density developments are characteristics of something that I identify as "sprawl sickness ."

The Role of Property Taxes Shaping our Cities

From an economic approach, property tax could be considered a form of revenue that property owners pay every year. From a taxpayer perspective, a property tax could be considered as a duty that only property owners pay for owning a property. However, Oates (1999) says that renters also pay property tax as part of the monthly rent and it is a hidden fee included in their rent.

Fischel (2001) and Oates (1999) agree that the property tax is a good tax, as it could be considered as a benefit tax because it encompasses benefits received from local services and can influence personal choices, where people locate or act. (Fischel, 2001, p. 158; Oates, 1999). Moreover, Song and Zenou (2006) found through an empirical analysis in 448 urban centres in the United States, that higher property tax can make cities smaller. In their, study they found that cities will decrease 0.4% if property tax increases by 1% (Song and Zenou, 2006, p. 533). In contrast, Skaburski and Tomalty (2000) argue that reliance solely in property taxes can delay higher density developments and encourage fiscal zoning that favours lower density projects (Skaburski and Tomalty, 2000, p. 311).

Possible Relationship between Property Tax and Urban Form in the Twenty-First Century

There is no consensus about the relationship between property tax and urban form. Some scholars claim that "the property tax encourages undesirable sprawl" (Slack, Municipal Finance and Pattern of Urban Growth, 2002, p. 8) as, in some provinces, apartments are overtaxed relative to single-family homes. In contrast, some "economists have long argued that a land value tax is an efficient tax" (Yang, 2018, p. 33), as it reflects the "differences of various types of land use" (Yang, 2018, p. 33). However, Slack (2002) argues that the property tax system "discourages investment in apartment buildings and reduces the density of development" (Slack, Municipal Finance and Pattern of Urban Growth, 2002, p. 12). For her, the current property tax system does not differentiate housing types. For example, the current system does not distinguish single detached houses, from semi-detached houses, or townhouses, as all housing types are treated alike. Therefore, there is a distortion in the property tax system, as the current property tax penalizes multifamily residential compare with single-family houses, as both have the same rate (Slack, 2002, p. 12).

Furthermore, a market value property tax does not differentiate among different housing types, as all types of properties are taxed equally, creating no incentive to live in a denser neighbourhood. Yang (2018) says that Brueckner (1986) created a model that "showed that the impact of two-rate property taxation on land value depends on the market demand for land tax" (Brueckner in Yang, 2018, p. 34). In his study, Brueckner (1986) uses municipality-level panel data, to show that raising the tax rate on land while lowering the tax rate on buildings leads to an increase in assessed land value per taxable acre. He shows that "residential land appears to be more responsive to changes in the tax differential than commercial and industrial land" (Yang, 2018, pp. 34-38). This model could help city officials to create policies and incentives that will promote a more compact residential neighbourhoods while raising more money to support public infrastructure.

Most scholars agree that property tax is the primary source of revenue for urban municipalities, accounting almost 57 per cent of their income , on average, in 1998 among all Canadian municipalities (Slack, 2002, p. 8). Also, Slack (2002) argues that the property

tax does not match with the services received from the city. Instead, property taxes distort the location of new businesses (Slack, 2002, p. 8), showing that property taxes might have an influence the urban form. Under this statement, it is possible to say that property tax promotes sprawl and that there is a disconnection between tax policies and planning policies in North American cities. However, Oates (1999) states that municipalities consider the property tax as a highly visible tax, which provides a reasonable indication of public costs (Oates, 1999). However, Oates (1999) implies that "if taxes are hidden or do not reflect the cost of public services" (Oates, 1999), there is a substantial risk that taxes cannot provide the necessary information to make good fiscal decisions.

City officials think of property tax as revenue rather than the result of providing public services. This disconnection between charges levied and costs incurred by public services is what have been shaping our urban form in recent years. Moreover, Blais (2010) thinks that there is no connection between the contribution from a property owner and expenses associated with linear infrastructure, including roads, streets, snow removal, and cleaning, public transit, water and sewer, and garbage collection and recycling. For Blais (2010), a property tax based on market values creates market distortions affecting our urban development in a way that might contradict planning goals. She argues that one of the most important failures is that "improvements to a property will add to the assessed value and will cause property taxes to increase" (Blais, 2010, p. 102) Therefore, the property tax acts as a disincentive to intensify the use of land and promotes sprawl (Slack, Municipal Finance and Pattern of Urban Growth, 2002, p. 8). Blais (2010) and Slack (2002) agree that property tax could include planning principles for urban growth management, as property tax can influence and change people's behaviour. In fact, Donald Shoup (1978) found, in two cases, that if taxes on improvements are eliminated a building will be eight per cent bigger in the first case, and seventeen per cent bigger in the second case. However, he mentioned in his paper that this finding could not be generalized as his study has some limitations (Shoup, 1978, p. 129). Furthermore, Pollock and Shoup (1977), found tentative evidence that shifting from a general property tax system to a site valuation regime can help to increase the revenue of property tax up to 25 per cent in the long run. (Pollock & Shoup, 1977, p. 75).

Additionally, Grieson (1974) found some mathematical evidence using data from the

Department of Housing and Urban Development in 1970, that housing density would increase by 23 per cent if a 3 per cent property tax were replaced by a tax no related to the property (Grieson, 1974, p. 377). However, Grieson (1974) suggests in his finding, that reducing property taxes by 3 per cent might have an influence of raising property values by 10 per cent (Grieson, 1974, p. 377). Grieson's evidence might apply under certain circumstances and need to be updated as more variables could have changed.

Blais suggests that a market-value based property tax that reflects people's wealth, "violates one fundamental economic principle for efficiency and allocation of resources that is, that the price should reflect the marginal cost" (Blais, 2010, p. 106). She agrees with Brueckner and Kim that the property tax contributes to an inefficient spatial expansion of cities. For her, a market value-based tax system encourages inefficient development patterns and urban sprawl, contrary to general urban planning policies that aim to have compact and dense cities (Blais, 2010, p. 106). However, in 2000 (Slack, 2002, p. 9) found , through interviews and surveys that property taxes have little or no impact on urban form.

Furthermore, Slack add a new ingredient to the discussion claiming that "the property tax system generally favours single-family residential property, largely for political reasons" (Slack, Municipal Finance and Pattern of Urban Growth, 2002, p. 10). However, there is not clear evidence of this fact. For Slack, in many provinces, the assessment process favours "property by assessing it at a lower percentage of market value than other property types" (Slack, 2002, p. 10) or only a fraction of residential assessment is taxable, or the tax rate is lower on single-family residential properties (Slack, 2002, p. 10). For Blais, the current property tax system does not reflect the local context or land uses, creating skewed decision making on both the demand and supply sides of the equation. "This causes homebuyers to demand a more inefficient form of development (sprawl) that they otherwise might and causes developers to supply them more often than they otherwise might" (Blais, 2010, p. 85).

For Burchell, one of the main problems with sprawl developments is density, as lower density means that each yard of linear infrastructure such as roads, water and sewer networks serves fewer households. This fact makes sprawl developments very expensive to maintain. In contrast, denser and "more compact developments would allow the

same amount of infrastructure to serve more households" (Robert W. Burchell, 2005, p. 50). He mentioned that sprawl developments do not "capitalize on pockets of surplus infrastructure capacity that may already be present in and around existing development" places (Robert W. Burchell, 2005, p. 51). In fact, he found that road costs for sprawl developments were 35 per cent higher than compact places (Robert W. Burchell, 2005, p. 59).

The relationship between property tax and urban form is an area where most Canadian municipalities and scholars had explored broadly, and empirical studies reflect different outcomes. However, something that is clear is that economists, city planners and tax authorities seem to work without any coordination to fight against sprawl developments while trying to find new sources of revenue that can help municipal finance. Studying the possible relationship between property tax and urban form in any city may inform city officials from different departments about possible strategies to fight sprawl developments, improve transit viability, and reduce environmental and health problems in Canadian municipalities. Then, property tax should not be seen merely as the main source of revenue of a city. Instead, property tax should reflect real benefits and costs of a property location within the municipality. By shifting the way property tax is perceived today from an essential source of revenue of the city, to a planning tool that could shape city's urban form, city officials will be able to create policies that align with the economic and political factors that define the urban form.

Infrastructure Deficit and the Political Price of Raising Property Taxes

Politicians and officials at all levels of government seem to agree with most citizens that Canada's urban infrastructure needs to be repaired and extended (Bird, & Slack, 2017, p. 3). As mentioned above, municipalities as creatures of provinces have constitutional constraints to get extra sources of revenue (Bird, & Slack, 2017, p. 114). Therefore, the lack of pricing for urban infrastructure in Canadian municipalities has created the current underfunding of municipal infrastructure. The absence of infrastructure pricing leads to the over-utilization of public infrastructure, elevation of the demand for private transport

and sprawling suburban developments resulting in a not optimal or inefficient public infrastructure (Bazel & Mintz, 2014, p. 30). These demands create pressure to municipal officials to allocate resources for capital projects and essential services to satisfy the desires of users who do not pay the full cost of their demands (Bazel & Mintz, 2014, p. 30). Around Canada, local governments are looking for various revenue sources to pay for infrastructure. However, "property taxes are politically challenging since they fall more heavily on the urban core where taxpayers demand less infrastructure spending" (Bazel & Mintz, 2014, p. 25). Furthermore, an increase in property taxes to fund infrastructure in a city could result in a migration of businesses and residents to other municipalities where taxes are lower, increasing congestion and contamination in an entire region. Therefore, Canadian municipalities need to find different strategies and revenue sources with lower political costs, who could include user fees or development fees that affect the urban form directly. However, implementing these types of fees could be a challenging endeavor as relevant actors, that play key roles in shaping the urban form, could lobby city or provincial officials to avoid new policies that aim to manage growth and create more compact urban environments .

A review of the literature indicates that there is certainly a relationship between property tax and urban form. Some think that property tax promotes sprawl. In contrast, others argue that is a beneficial tax, as it supports cities' infrastructure. However, the relationship between property tax and urban form is not as simple as it seems to be from a high level perspective. As it was shown in this section, different authors have found different results, showing that there is not a clear and magical answer to this relationship. This paper seeks to understand the relationship between the municipal property tax and urban form in the City of Winnipeg, by collecting, mapping and analysing data publicly available in 2018.

Context

Winnipeg, Manitoba

Winnipeg is the largest city and the capital of the Province of Manitoba, with a population of approximately 749,500 people (City of Winnipeg, 2018, p. 5). Although, since 1998 Winnipeg has experienced a steady population growth, in general Winnipeg can be considered a slow-growing city compared with other municipalities in Canada.

Winnipeg is located in the Canadian prairies, right at the intersection of the Assiniboine River with the Red River. Winnipeg's location gives the city continental weather, with temperatures that contrast between -35 degrees Celsius in winter and +35 degrees Celsius in the summer.

The area where Winnipeg is located is an extremely fertile zone suitable for agriculture purposes. However, Winnipeg's soil is considered by geotechnical engineers as an expansive soil. "In general, expansive soil problems are related to highly over-consolidated clays and weathered shales" (Miller & Nelson, 1992, p. 4). These types of soils have humidity sensitivity that affects the way how geotechnical engineers design building foundations in Winnipeg. Therefore, Winnipeg's built form is affected by many factors, some of them are listed below:

- Fertile land that should be preserved for agricultural purposes.
- Slow demand (growth) for new developments,
- High foundation cost, especially for tall buildings
- The municipal property tax.

Winnipeg Funding Limitations

Also, Winnipeg as any other Canadian municipalities (CMs) has a very restricted way to get revenue and to finance their capital and operational budget on an annual basis. In constitutional terms, Canadian municipalities are considered nothing more than mere creatures of a province, and thus, CMs are bound by legal constraints to what the Province agreed to the Municipal Act. In Manitoba, the Province has a Municipal Act that provides a general framework for municipalities to run and operate local (municipal) governments. However, Winnipeg, as the biggest city in Manitoba, has a different type of regulation called The Winnipeg Charter Act (WCA). The Winnipeg Charter Act is a detailed framework that determines Winnipeg's boundaries, administration and taxation systems, composition of council, etc. Therefore, the Winnipeg Charter Act is a document that forces Winnipeg's officials to run and operate the city in a certain way.

The WCA gives the authority to city council to pass by-laws regarding:

- Health, safety and well-being,
- Activities in public places,
- Streets control and management, parking,
- Activities of businesses,
- Buildings, equipment and materials,
- Construction in flood ways and floodway fringe areas, waterways,
- Water and waste management,
- Public transportation,
- Ambulance services, fire protection, and police.

However, the Winnipeg Charter Act restricts Winnipeg's ability to collect taxes from a limited number of sources. The Winnipeg Charter Act defines taxes as "real property taxes, personal property taxes, business taxes and licence fee for a license in lieu of business tax" (The City of Winnipeg Charter, SM 2002, c 39, s.217). Also, the Winnipeg Charter Act allows the City to get extra sources of revenue by establishing a tax increment financing program that may assist private developments in areas previously designated by a by-law (The City of Winnipeg Charter, SM 2002, c 39, s.222). But, there are no additional sources of revenue that the City can implement under the current legislation. The Winnipeg Charter

Act not only constrains Winnipeg' sources of revenue, also puts pressure on how to support public services for its citizens with a limited number of sources. Furthermore, the Winnipeg Charter Act restricts Winnipeg's ability to run in deficit as "council must ensure that the estimated expenditures for a fiscal year do not exceed the estimated revenues for the year" (The City of Winnipeg Charter, SM 2002, c 39, s. 285(2)).

In addition to the previous constraints that the Winnipeg Charter Act impose to Winnipeg officials to finance and operate the City, in recent years local governments have experienced a dramatic cut in intergovernmental transfers from the Provincial and Federal governments and higher interest rates (Slack, 2002, p. 1). Moreover, constitutional constraints to raise additional funds that help support public services have created a dichotomy between keeping lower taxes while maintain and building infrastructure (Slack, 2002, p. 1).

Winnipeg's Infrastructure Deficit

Although Winnipeg's officials have received more autonomy to operate the City compared with other urban centres in the Province, the City of Winnipeg, like any other municipality in Canada, is a creature of the Province, which indicates that the City of Winnipeg does not have constitutional recognition.

Currently, the City of Winnipeg faces an infrastructure deficit of 6.9 billion dollars (City of Winnipeg, 2018, p. 9). The City itself admits that its "current funding model is unsustainable," (City of Winnipeg, 2018, p. 10) as most of the revenue comes from property tax, which represents 54 per cent of total income in 2018 (City of Winnipeg, 2018, p. 28). Under this financial situation, the City of Winnipeg needs to have a more basic understanding of revenue and expenses on a more fine-grained basis, and the relationship between urban form and revenue collected from property tax. This understanding will help city officials and decision makers to create policies that can improve Winnipeg's infrastructure financial sustainability and urban form.

According to the 2017 Financial Report (City of Winnipeg, 2017, p. 28), the City has a

significant deficit in tax-supported operating and capital budget, as there has been a political decision to "keep taxes affordable for all" (City of Winnipeg, 2017, p. 28). Moreover, in recent years, the City of Winnipeg has experienced a period of growth that has increased the pressure on the operating and capital budget, resulting in an important infrastructure deficit. This deficit "is based on capital investment needs from 2018 to 2027" (City of Winnipeg, 2017, p. 28).

What is Urban Form?

This paper takes Lynch's definition of urban (settlement) form, as these definitions help frame the current fiscal situation of the City of Winnipeg. For Lynch (1984), the term city form is defined as the spatial arrangement of persons, goods, information and physical features such as buildings, streets, utilities, and natural elements which modify a permanent space (Lynch, 1984, p. 48). Also, Lynch (1984) defines urban form as the result of a bargaining process between different agents. Agents such as investors, politicians, subsidizing agencies, industrial firms or powerful families that have special interests in planning decisions (Lynch, 1984, p. 40). The urban form is important for people who live, work and spend time in cities as it affects the livability, property values transportation alternatives and other aspect of the urban environment (Carruthers & Ulfarsson 2003, p. 505). Planning can find common ground between agents and values of citizens of a city, as planning is a discipline that embrases people from different backgrounds to create policies that help investors, politicians and communities to create a city for all.

Therefore, the urban form is dynamic, responds to the need of its residents, and produces net benefits for the public at large while reducing negative externalities (Carruthers & Ulfarsson 2003, p. 505). However, the urban form is continuously affected by planning decisions that are, most of the time, the result of bargaining processes between the private and public sector.

What is Sprawl?

Sprawl is a land-use pattern that can be defined in many ways. Some scholars say that it is an inefficient land-use pattern, as it embodies a misallocation of resources (Blais, 2010, p.

84; Burchell, 1997, p. 160). For Blais (2010) and Burchell (1997), sprawl occurs when prices for urban goods, infrastructure, and services do not reflect marginal costs as they vary with urban form (Blais, 2010, p. 86; Burchell, 1997, p. 160).
For Slack (2002), sprawl is a result of technological advances that decentralized employment. Sprawl "is a result of land-use policies and financing decisions that have provided incentives for low-density developments outside the urban core" (Slack, Municipal Finance and Pattern of Urban Growth, 2002, p. 2). General characteristics of sprawl are that it has low-density development that consumes agricultural lands around the urban core, a segregation of uses, an important reliance on the automobile, and "expands in an unlimited and non-contiguous (leapfrog) way outward from the solidly built-up core of a metropolitan area" (Slack, 2002, p. 2).

From an economic point of view, sprawl is considered as a market failure, because those who enjoy the benefits of big yards, and ample houses do not pay the higher costs associated with this type of urban form. Some studies support that sprawl does not generally address the higher local and environmental costs associated with it (Slack, Municipal Finance and Pattern of Urban Growth, 2002, p. 3). Moreover, the general perception of sprawl among property owners is that sprawl developments are clean, safe, less congested, and inexpensive than more dense areas. In contrast, opponents think that it is an inefficient use of urban development, as it requires excessive infrastructure costs to extend water, sewer and road networks. Sprawl neighbourhoods affect the necessity of owning a private automobile, increasing congestion and pollution. Furthermore, sprawl developments impose costs on the youth, elder and low-income population who do not drive, and decrease farmland, green spaces and environmental sensitive areas (Slack, Municipal Finance and Pattern of Urban Growth, 2002, p. 3).

Density

Density is a vital indicator of the urban form. As it can be measured in several ways, the term density can have a broad definition that even planning professionals have trouble understanding. For the purposes of this paper, if we think of density as the result of calculating the number of dwellings in an area of land, density could be expressed as dwellings per hectare or acre. In the urban setting, density could be calculated in two

different ways: net density and gross density. The net density refers to the number of dwellings on land devoted solely to residential development; it does not include public infrastructure such as roads or parks. In contrast, gross density refers to the number of dwellings on a neighbourhood area, including public and open spaces (University of Idaho, 2019; English Partnerships and the Housing Corporation, 2000, p. 47).

From an economic approach, density measure in dwellings per acre is a key indicator for public authorities and private investors to create and establish new amenities that could be used by members of the community and be financially viable. Facilities like libraries, cinemas, grocery stores, schools, and shopping centres are some examples that need a minimum number of dwellings per acre to exist. Therefore, as density increases, urban amenities expand to satisfy human aspirations and needs, because more people are living or working in the same area. As a result, higher density neighbourhoods tend to attract more commercial and public amenities since more customers are concentrated in the same area . However, other aspects such as property values, rent prices, block sizes and population income are other aspects that play an important role while attracting commercial and public amenities.

Table 4 shows that urban amenities tend to be available as density increases.

Dwelling Units Per Acre	Supermarket	Retail	Large Retail	Regional Park	Public Plazas	Pocket Parks	Public Transportation	Elevated or Underground Parking	Employment	Cultural Amenities	Infrastructure	Aesthe tic Appeal
High (100+)	X	X	X	X	X	X	X	X	X	X	X	X
Medium (50-100)	X	X	X	X	X	X	X	X	X	X	X	X
Low (20-50)	X	X			X	X	X		X		X	X
Multifamily (8-20)	X	X				X			X		X	X
Single Family (4-5)	X	X				X			X		X	X

Table 4: Urban Amenities and Density; Source: University of Idaho. (2019, January 18). Lectures. Retrieved from Housing Density : https://www.webpages.uidaho.edu/larc301/lectures/housing.htm

People tend to have misconceptions of density, arguing that density means poor urban quality, overcrowding neighbourhoods and a considerable reduced in open space standards (English Partnerships and The Housing Corporation, 2000, p. 47). However, lower density neighbourhoods tend to have fewer amenities as there is a high number of people to support such activities and get an economic return. As a result, density plays an important role in shaping the built environment of a city, but it is not the only aspect that helps create a good city form. In fact, Lynch (1984) mentioned that cities should be evaluated based on 5 dimensions (vitality, sense, fit, assess and control) and two metacriteria aspects (efficiency and justice) (Lynch, 1984, p. 111). However, these four dimensions and two metacriteria aspects might not be enough to evaluate the urban form.

What is the Property Tax?

The property tax is collected by the municipal government for general purposes based on property tenure, and it is levied on all properties of a city on the basis of the assessed value of real property. It is an essential financial tool used by municipalities to finance urban expenditures, as it pays for an important portion of linear services, such as roads, streets, snow removal, and cleaning, public transit, water and sewer, and garbage collection and recycling (Blais, 2010, p. 101). The property tax does not have a flat calculation rate. In fact, the municipal property tax is the result of a regression analysis that involves a series of steps for its calculation. First, city administrators need to set an annual budget to run the city. Then, they review other sources of revenue that help to reduce the gap between the capital needed to operate the city and revenues to be raised from tax payers. Once other sources of revenue have been calculated, city officials proceed to establish the amount of money that will be collected through property taxes to cover city expenses. During this process of calculating the property tax, city officials need to keep in mind that property taxes must include aspects of equity and ability to pay .

Understanding Winnipeg's Property Tax

In the City of Winnipeg, the Assessment and Taxation Department "is responsible for the valuation and classification of all real property, personal property and business occupancies within the city boundaries" (Assessment and Taxation Department, 2019, p 1) . The Assessment and Taxation Department collects the municipal property tax to support capital and operational budgets to redistribute services equitably among city's citizens . In Winnipeg, property taxes are calculated using two main variables: Mill rates, and a portioned value of the property. According to the Assessment and Taxation Department (2019), a mill is a one-thousandth part, that represents one dollar of taxes for every thousand dollars of portioned assessed value of a property (Assessment and Taxation Department, 2019). Under this definition, mill rates could be considered as a coefficient; Therefore, mill rates can vary every fiscal year, according to the general budget necessary to run the city.

Another component that influences the calculation of property tax is the assessed value of a property. This value varies according to the market location, property classification, and characteristics of the property. The Department of Assessment and Taxation has divided the city into seven different districts to predict the full market value for each property to help determine the assessed (real) value of properties in the City of Winnipeg. Under this approach, the commercial value of a property is developed using multiple regression analysis that can determine potential income, vacancy rates, operating expenses and capitalization rates (City of Winnipeg, 2018, p. 1). Also, the way a property is classified plays an important role in the equation as different property categories have different percentages of assessed value.

From a revenue perspective, the Department of Assessment and Taxation has divided city land uses into nine different property classifications (see Table 5).

Portioned Percentages of Assessment Value per Land Use	
Property Classification	% of the Assessed Value
Residential 1: 1-4 dwelling units per building	45%
Residential 2: 5 or more dwelling units per building	
Residential 3- Owner Occupied Condominium and Co-operative Housing	
Farm Property	26%
Institutional	65%
Pipeline	50%
Railway	25%
Other	65%
Designated Recreational Property	10%

Table 5: Portioned Percentages of Assessment Value per Category; Source: Summarized information by author; Assessment and Taxation Department; How are Taxes Calculated - Tax Rates. Retrieved from Assessment and Taxation Department: http://www.winnipegassessment.com/AsmtTax/English/Property/TaxRates.stm; 2019 Jan 06.

However, the municipal property tax is not the only tax that Winnipeggers pay every year. In fact, what is known as property tax is a group of three taxes: municipal property tax, frontage levy, and school/education tax (see Figure 1).

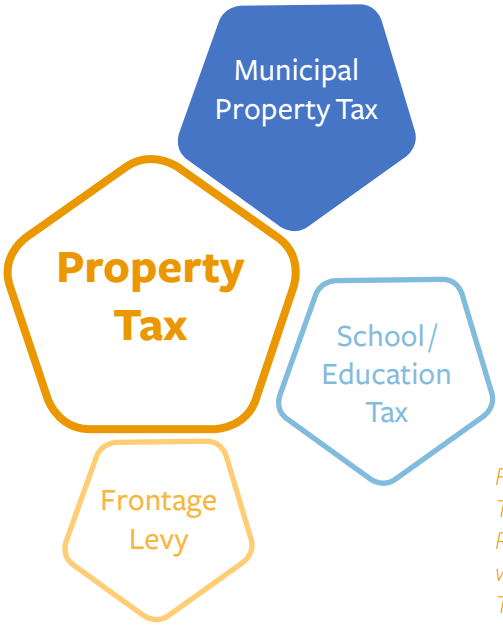

Figure 1: Property Tax Composition; Source: Assessment and Taxation Department. How are Taxes Calculated - Tax Rates. Retrieved from Assessment and Taxation Department: http://www.winnipegassessment.com/AsmtTax/English/Property/TaxRates.stm, 2019 Jan 6.

The municipal property tax does not have a specific purpose, it goes directly to the City's revenue to fund urban hard and soft services. In contrast, the frontage levy is a tax that has a specific purpose, the frontage levy was created exclusively to repair and replace water, sewer mains, streets and sidewalks in residential areas. Finally, the City of Winnipeg has the ability to collect resources from the school and education tax. However, these funds go directly to the Province to fund school divisions in the City.

I focused on the municipal property tax, becuase it is the main sources of revenue to the City's budget, and it does not have a specific purpose . The municipal property tax is based on property ownership, and it is calculated based on three main components: property classification, market value, and a mill rate. Under this approach, it seems to be the property tax is more a reflection of the market value of a property, rather than adequate representation of the degree to which different types of properties contribute to the costs of public services.

This capstone shows the possible relationship between property tax and urban form by mapping elements of the municipal property tax and critical elements of urban form in the city of Winnipeg. The reader will be able to identify which neighbourhoods provide more revenue to the city through property tax and compare those neighbourhoods with key aspects of their urban form. This study provides a better understanding of municipal property tax and aspects of the urban form. By identifying the urban form of the neighbourhoods that provide more revenue to the city, city officials and policymakers could encourage private developers to create neighbourhoods that have similar characteristics to the ones identified in this study. Therefore, planning could be used as a tool that will help to reduce, instead of increase,the current infrastructure deficit in the City of Winnipeg.

Findings

The findings section shows the results of analyzing city documents and reports. In this section, I summarized information into tables, graphs, and maps that help the reader to understand more graphically the relationship between the municipal property tax an urban form.

Sources of Revenue in the City of Winnipeg from 2014 to 2018

After reviewing several documents that contain the city's budget from 2014 to 2018, I was able to summarize main sources of revenue into ten different categories. Table 6 and Figure 2 demonstrate that Winnipeg, like any other Canadian municipality, relies mainly on property tax revenues to support public services. In the last five years, revenues from the municipal property tax represent on average 52 per cent of total revenue to support public services and infrastructure.

Revenues (Millions of $)	2014		2015		2016		2017		2018	
	$	%	$	%	$	%	$	%	$	%
Property Tax	$510,569	53%	$529,168	53%	$549,345	52%	$569,316	53%	$585,584	54%
Government Transfer	$113,763	12%	$118,290	12%	$123,619	12%	$127,789	12%	$133,530	12%
Street Renewal Frontage Levy	$41,731	4%	$49,129	5%	$62,374	6%	$62,837	6%	$63,017	6%
Sale of Goods and Services	$64,486	7%	$59,008	6%	$63,170	6%	$62,796	6%	$54,477	5%
Business Tax	$59,688	6%	$58,366	6%	$57,267	5%	$57,484	5%	$56,916	5%
Transfer from other Funds	$56,787	6%	$45,779	5%	$55,203	5%	$41,512	4%	$23,969	2%
Regulation Fees	$43,227	4%	$45,329	5%	$50,758	5%	$59,210	5%	$58,072	5%
Other Taxation	$25,390	3%	$24,290	2%	$24,955	2%	$25,342	2%	$25,602	2%
Interest	$11,228	1%	$13,387	1%	$17,102	2%	$18,102	2%	$20,202	2%
Other	$42,315	4%	$51,351	5%	$51,337	5%	$55,121	5%	$60,719	6%
TOTAL	**$969,184**	**100%**	**$994,097**	**100%**	**$1,055,130**	**100%**	**$1,079,509**	**100%**	**$1,082,088**	**100%**

Table 6: Sources of Revenue from 2014 to 2018; Source: Summarized data by author; "Capital Budget Reports (2014 to 2018)", City of Winnipeg.

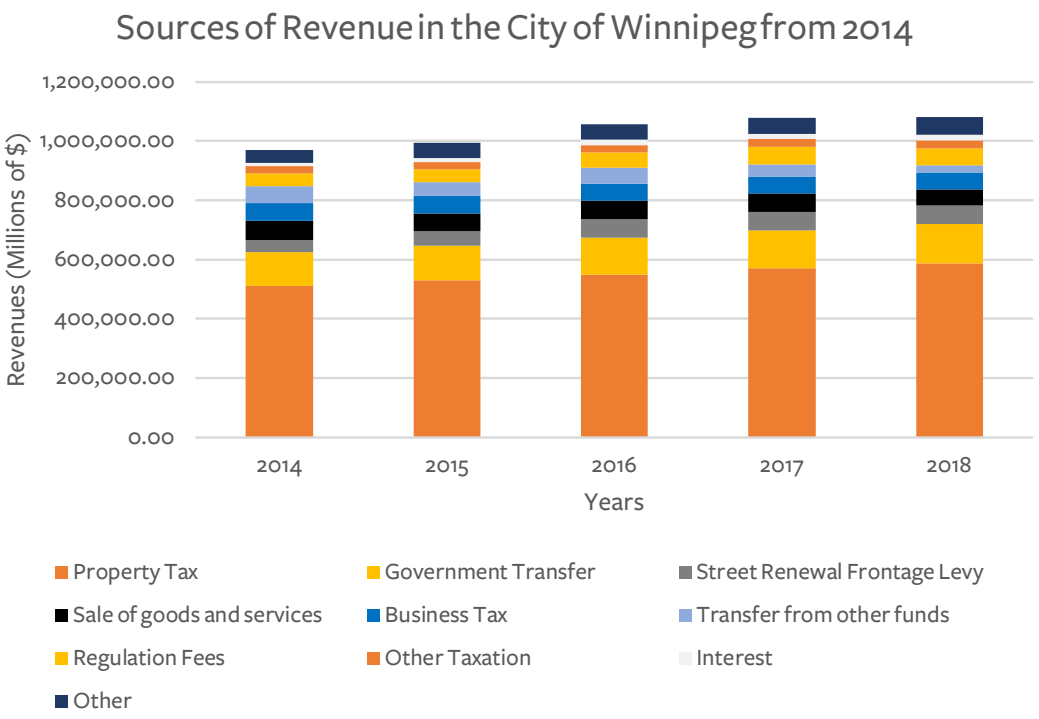

Figure 2: Sources of Revenue from 2014 to 2018; Source: Summarized data by author; "Capital Budget Reports (2014 to 2018)"; City of Winnipeg.

Mapping Winnipeg's Municipal Property Tax

Previously, I described the system of how property tax is collected in the City by the Assessment and Taxation Department every year. Also, I showed that the municipal property tax in Winnipeg represented 52 per cent of city's revenue in 2018. However, to determine which neighbourhoods provide more revenue to the city, I decided to map the current situation using the data that was available on the City of Winnipeg's website using Geographical Information System (GIS). I was able to map on a city scale how much revenue each neighbourhood provided to the city in 2018 considering all property classifications. The following map (Map 1) shows the number of dollars collected from municipal property tax in 2018 per neighbourhood. Map 1 shows that just five neighbourhoods provide 14.3 per cent of total revenue, fluctuating between 5 million dollars and 9.4 million dollars.

In contrast, there are other five neighbourhoods which provide just 0.081 per cent of total revenue, ranging from 2,300 dollars to 82,000 dollars per year. Table 7 summarizes five neighbourhoods, which provide the highest contitution of municipal property tax and five neighbourhoods that provide the lowest contribution of municipal property tax to the City of Winnipeg in 2018. The reason behind the difference between higher and lower contribution of municipal property tax is the type of land uses that are located in those neighbourhoods. For example, neighbourhoods like The Mint do not have any other land uses besides the Royal Canadian Mint. Also, the neighbourhood of Kildonan Park is mainly a public park which does not pay taxes to the City. In contrast, the neighbourhood of St. James Industrial has warehouses and industries that contribute 65 per cent of the assessed value of a property to the municipal property tax.

Neighbourhoods with the highest contribution of municipal property tax	St. James Industrial	14.3%
	Polo Park	
	South Portage	
	Tuxedo Industrial	
	Regent	
Neighbourhoods with the lowest contribution of municipal property tax	The Mint	0.081%
	La Barriere	
	West Perimeter South	
	Transcona North	
	Kildonan Park	

Table 7: Neighbourhoods that provide the Highest and the Lowest Revenue; Source: Adapted GIS data (2018) by author; "https://data.winnipeg.ca/Assessment-Taxation-Corporate/Assessment-Parcels/d4mq-wa44"; Department of Assessment and Taxation; City of Winnipeg; 2018, Nov 8.

However, to understand on a more fined grained basis the relationship between the municipal property tax and urban form, it is necessary to show the number of dollars raised from the municipal property tax per square meter, by neighbourhood. Map 2 shows dollars raised from the municipal property tax per square metre, by neighbourhood, showing a different picture than the previous map (Map 1).

Map 2 shows that 225 neighbourhoods contribute less than 10 dollars per square metre of municipal property taxes to the City. In other words, 96 per cent of Winnipeg's neighbourhoods provide less than 10 dollars per square metre of municipal property taxes to support city services. In contrast, 9 out of 234 neighbourhoods provide more than 10 dollars per square metre of municipal property taxes to support city services. Moreover, seven of these nine neighbourhoods, that provide more than 10 dollars per square metre of municipal property taxes to support city services are located in the downtown core. Table 8 shows the list of these nine neighbourhoods and the number of dollars that they provide of municipal property tax per square metre.

List of neighbourhoods that contribute more than 10 dollars per square meter of taxable area		
	Neighbourhoods	Dollars per Square Metre
1	Portage & Main	44.38
2	Portage-Ellice	29.88
3	South Portage	26.836
4	Colony	21.269
5	Exchange District	19.84
6	Broadway-Assiniboine	19.23
7	Central Park	13.04
8	Roslyn	11.79
9	Polo Park	10.20

Table 8: Neighbourhoods that Contribute with More than 10 Dollars per Square Meter of Taxable Area; Source: Adapted GIS data (2018) by author; "https://data.winnipeg.ca/Assessment-Taxation-Corporate/Assessment-Parcels/d4mq-wa44"; Department of Assessment and Taxation; City of Winnipeg; 2018, Nov 8

Also, Map 2 shows that other areas of downtown Winnipeg such as Portage South and Broadway and Assiniboine, which have mixed-use developments, condominiums , rental apartment buildings, and office buildings, contribute from 13 dollars to 30 dollars per square meter to the city's budget. The amount of money that the City collects in these neighbourhoods is higher than other significant commercial and retail clusters in the city such as St. Vital Centre and Polo Park.

The third distinction is between areas of the city that have important differences in urban form. On the one hand, there are areas like Polo Park, St. Vital Centre, which have an important concentration of retail and commercial spaces, but few areas dedicated for residential uses. The concentration of commercial spaces in an area creates pressure to city officials as high impact commercial areas demand traffic control measures, wider roads, intersections, and overpasses. On the other hand, areas like Osborne, West-Broadway, and Roslyn are neighbourhoods that contribute as much as Polo Park, St. Vital Centre (from 5 dollars to 13 dollars per square metre to the city's Budget). These areas have a variety of uses, and a variety of building types (apartment buildings, single detached houses, and condominiums) on a grid pattern that provide a more pedestrian-friendly environment.

In the fourth place, there zones of the city that are near the downtown core, that contribute from 2 to 5 dollars per square metre to the city's budget. Neighbourhoods like Central St. Boniface, Spence and the North End, are some examples that have a higher variety of building types and land uses based on a grid pattern.

The fifth place include neighbourhoods that contribute twice as much as other areas like Sage Creek or Waverly West, which have strict segregation of uses, leapfrog sprawl pattern, and low-density developments.

Previously, I described how much revenue each neighbourhood provided to the City in 2018 considering all property classifications. Also, I showed how different neighbourhoods contribute to different amounts of money to Winnipeg's budget, according to aspects of the urban form and land uses. However, there is another way to show how the municipal property tax is raised. Map 1A shows Winnipeg Wards' contribution to the municipal property tax in 2018. Also, Table 9 lists all Winnipeg's Wards according to the amount of money that each of these political and administrative divisions provide to the city's budget.

List of Wards that Contribute 2018 Winnipeg's Budget (In Ascending Order)		
	Wards	Revenue Raised (in millions of Dollars)
1	Mynarski	7.2
2	Elmwood – East Kildonan	9.08
3	St. Norbert -Seine River	10.05
4	Old Kildonan	10.97
5	North Kildonan	11.19
6	Daniel McIntyre	12.47
7	St. Boniface	15.57
8	Waverley West	16.91
9	Transcona	18.20
10	St. Vital	19.91
11	Point Douglas	22.78
12	River Heights – Fort Garry	24.73
13	Charleswood – Tuxedo	26.83
14	Fort Rouge – East Fort Garry	27.19
15	St. James	33.77

Table 9: List of Wards that contribute 2018 Winnipeg's Budget; Source: Adapted GIS data (2018) by author; "https://data.winnipeg.ca/Assessment-Taxation-Corporate/Assessment-Parcels/d4mq-wa44"; Department of Assessment and Taxation; City of Winnipeg; 2018, Nov 8

City Expenditures in Capital Projects from 2014 to 2018

After summarizing a variety of documents and data from the Department of Public Works and capital budget reports, which contain information about expenditure on capital projects from 2014 to 2018, I was able to map 191 projects out of the 428 projects that were found in city documents; this is only 45% of the projects that the City built from 2014 to 2018. Figure 3 shows the percentage of

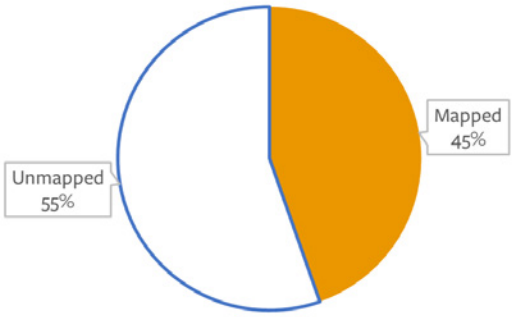

Figure 3: Number of Capital Projects from 2014 to 2018; Source: Adapted information by author; "http://openbudget.winnipeg.ca/#!/year/2014/capital/0/department/Public+Works/0/project_description?vis=pieChart"; City of Winnipeg; 2018, Oct 20

projects mapped and not mapped in this process. Also, Map 3 shows the location of these 191 that were possible to map.

However, I found that some projects the Department of Public Works did between 2014 and 2018 included expenditures related to the operational budget. Projects like insect control or gravel supply are some examples that should not be under the capital expenditures chapter. Furthermore, I found that some projects did not fall under a specific category and represent a notable percentage of the total capital expenditure between 2014 and 2018. Table 10 summarizes the amount of money adopted in capital budgets, amended budget and real costs of projects from 2014 to 2018 according to reports from the Department of Public Works.

	Adopted Budget		Amended Budget		Actual Costs to Report Date	
	Dollars	%	Dollars	%	Dollars	%
Active Transportation	$19,900,000.00	2.51%	$38,809,363.03	4.41%	$23,548,003.60	4.14%
Asset Management	$989,000.00	0.12%	$2,481,362.64	0.28%	$1,003,346.97	0.18%
Insect Control	$300,000.00	0.04%	$300,000.00	0.03%	$253,973.64	0.04%
Land Adquisition	$900,000.00	0.11%	$900,000.00	0.10%	$657,556.17	0.12%
Land Drainage Sewer	$4,500,000.00	0.57%	$4,485,275.00	0.51%	$3,326,302.78	0.58%
Lane Renewals	$29,329,217.00	3.69%	$32,510,390.10	3.70%	$25,929,733.20	4.56%
Master Plan	$500,000.00	0.06%	$390,000.00	0.04%	$110,744.01	0.02%
No Information	$249,908,011.00	31.48%	$263,894,366.03	30.02%	$200,785,078.57	35.30%
Parks and Community Centres	$31,937,000.00	4.02%	$31,191,085.86	3.55%	$18,481,872.33	3.25%
Payback	$22,833,000.00	2.88%	$24,743,163.72	2.81%	$7,221,354.75	1.27%
Reforestation	$12,915,000.00	1.63%	$12,994,617.00	1.48%	$4,147,492.61	0.73%
Roads	$402,457,479.48	50.69%	$448,021,549.73	50.96%	$268,096,487.01	47.13%
Sidewalk	$17,460,000.00	2.20%	$18,288,518.00	2.08%	$15,236,787.79	2.68%
Supply	$-	0.00%	$90,000.00	0.01%	$30,000.00	0.01%
Total	$793,928,707.48	100.00%	$879,099,691.11	100.00%	$568,828,733.43	100.00%

Table 10: Resources Adopted in Capital Budgets, Amended Budget and Real Costs of Projects from 2014 to 2018; Source: Adapted information by author; "http://openbudget.winnipeg.ca/#!/year/2014/capital/0/department/Public+Works/0/project_description?vis=pieChart"; City of Winnipeg; 2018, Oct 20

Figure 4 shows real expenses on capital projects from 2014 to 2018 according to the Department of Public Works reports. Figure 4 shows that roads and projects which do not fit under any of these categories represent two hundred million dollars of capital budget expenses during the last five years. The Category labeled as No Information shows the number of dollars spent on capital projects from 2014 to 2018, that I was not able to re-classify as the information did not contain the location of purpose of the investment. Also, Figure 4 shows that the Department of Public Works is investing more than two hundred and fifty million dollars in roads, representing 47 per cent of capital expenses from 2014 to 2018.

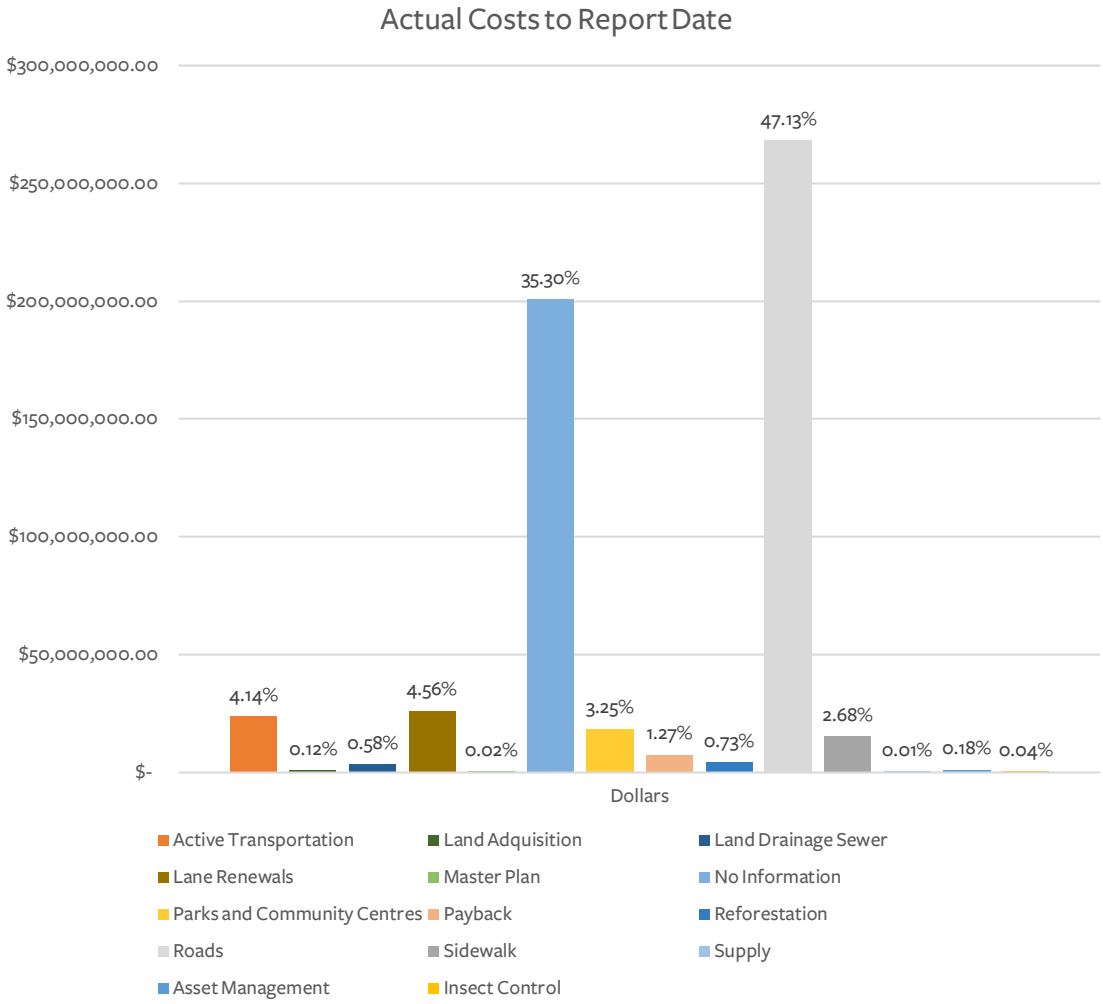

Figure 4: Real Capital Expenses from 2014 to 2018; Source: Adapted information by author; http://openbudget.winnipeg.ca/#!/year/2014/capital/0/department/Public+Works/0/project_description?vis=pieChart"; City of Winnipeg; 2018, Oct 20.

Map 4 illustrates which wards have received more capital investment from 2014 to 2018. However, the limitation of this map is that it shows only 44.6 per cent of capital project investments from 2014 to 2018, due to the lack of information from the Department of Public Works.

Map 4 shows that St. James and Mynarski have received relevant investments in the last five years. In contrast, neighbourhoods like Elmwood-East Kildonan and Transcona have received no more than 5 million dollars in capital projects over the previous five years; this is no more than one million dollars per year of capital projects in these areas.

Different Ways to Calculate Density

Density is a broad and controversial term that can be confusing for professionals and decision makers. It seems to be that there is a lack of clarity about what counts when considering density, and about how to measure it (University of Minnesota, 2003, p. 2). The following maps show different scenarios of how density could be interpreted and calculated.

Number of Dwellings per Neighbourhood

Map 5 shows occupied dwellings per neighbourhood, according to the 2011 census; the darker the colour, the higher the number of occupied homes is in a neighbourhood. In 2011, 86 neighbourhoods in Winnipeg had fewer than 1000 occupied dwellings, and just six neighbourhoods had more than 4000 occupied dwellings. Neighbourhoods like Rossmere-A, The Maples, River Park South, Chalmers, and Fort Richmond are examples that have the highest number of occupied dwellings reaching almost 5850 units. The following table (Table 11) shows five neighbourhoods that have the highest number of occupied dwellings versus five neighbourhoods which have the lowest number of occupied dwellings in the city according to the 2011 census.

Highest Number of Occupied Dwellings		Lowest Number of Occupied Dwellings	
Neighbourhood	Number of Occupied Dwellings	Neighbourhood	Number of Occupied Dwellings
Rossmere-A	5850	Ridgewood South	65
The Maples	4575	Kildonan Crossing	65
River Park South	4565	Holden	50
Fort Richmond	4325	Tissot	45
Chalmers	4240	Mission Industrial	40

Table 11: Neighbourhoods than Have the Highest and Lowest Number of Occupied Dwellings; Source: Adapted from GIS data (2018) and Census Data information (2011) by author; "https://winnipeg.ca/census/2011/and University of Manitoba Library"; City of Winnipeg; 2018, Dec 1.

Number of Dwellings per Acre by Neighbourhood

Density can be calculated by using a number of dwellings per unit of area; Map 6 shows the number of dwellings per acre by neighbourhood, including public parks and roads (gross density). Map 6 shows a very different density situation of Winnipeg's residential neighbourhoods compared with the previous map (Map 5). Map 6 illustrates that neighbourhoods that are located close to the downtown core such as Roslyn, Osborne, River-Osborne, Spence, Broadway and Assiniboine, and Chinatown have the highest number of dwellings per acre among non-downtown neighbourhoods in the City of Winnipeg. However, Alpine Place highlights in the map (Map 6), as it is the only neighbourhood that is not located in the core area of the city that has a similar number of dwellings per acre as the downtown neighbourhoods.

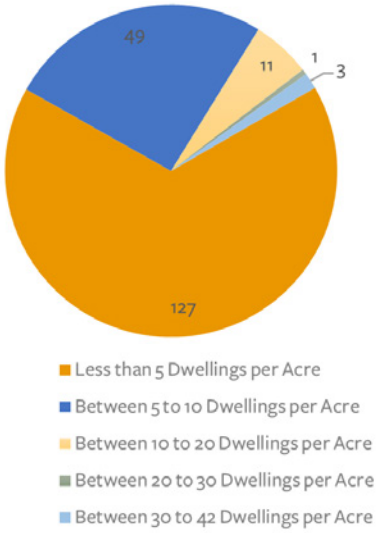

Figure 5: Number of Dwellings per Acre by Neighbourhood; Source: Adapted from GIS data (2018) and Census Data information (2011) by author; "https://winnipeg.ca/census/2011/and University of Manitoba Library"; City of Winnipeg; 2018, Dec 1.

Figure 5 shows the number of neighbourhoods that have a certain number of dwellings per acre. It is important to highlight that more than 50% of the neighbourhoods in Winnipeg have fewer than five dwellings per acre and just three neighbourhoods have between 30 and 42 dwellings per acre.

The following table (Table 12) summaries the five most and least dense neighbourhoods in the City of Winnipeg, using the method of dwellings per acre by neighbourhood.

Highest Number of Occupied Dwellings per acre		Lowest Number of Occupied Dwellings per acre	
Neighbourhood	Number of Dwellings per acre	Neighbourhood	Number of Dwellings per acre
Broadway-Assiniboine	41.57	Ridgewood South	0.086
Roslyn	38.78	St Vital Perimeter S	0.066
Central Park	31.63	Mission Industrial	0.042
Alpine Place	29.67	Wilkes South	0.038
West Broadway	17.36	Rosser-Old Kildonan	0.021

Table 12: Neighbourhoods than Have the Highest and Lowest Number of Dwellings per Acre; Source: Adapted from GIS data (2018) and Census Data information (2011) by author; "https://winnipeg.ca/census/2011/and University of Manitoba Library"; City of Winnipeg; 2018, Dec 1.

Kilometres of Roads by Neighbourhood

Density does not necessarily mean people or houses in an area; density can also be measured by kilometres of roads in an area of land. Map 7 shows the total number of kilometres of roads of each neighbourhood divided by the neighbourhood area in the City of Winnipeg. Therefore, Map 7 shows the ratio of kilometres of roads of each neighbourhood compared with each neighbourhood size. Map 7 indicates that old areas of the city like the downtown core and Old Transcona have the highest number of kilometres of roads compared with more recent neighbourhoods like River Park South or Bridge Water Trails.

The following table (Table 13) summarizes five neighbourhoods which have the highest and the lowest ratio of kilometres of roads.

Highest Number of Occupied Dwellings per acre		Lowest Number of Occupied Dwellings per acre	
Neighbourhood	Ratio of Kilometres of Roads per Neighbourhood	Neighbourhood	Ratio of Kilometres of Roads per Neighbourhood
China Town	23.73	La Barriere	0.99
Rockwood	18.53	Symington Yards	0.91
Portage-Ellice	18.33	The Mint	0.43
Colony	17.83	Trappistes	0.35
Earl Grey	17.40	West Perimeter South	0.32

Table 13: Neighbourhoods with the Highest and Lowest ratio of Kilometres of Roads; Source: Adapted information from GIS data by author; University of Manitoba Library; 2018.

Percentage of Parks and Open Spaces by Neighbourhood

Map 8 shows the percentage of parks and open spaces registered in the city inventory in each neighbourhood. Also, Map 8 shows that there is a significant number of neighbourhoods that have less than 10 per cent of their area dedicated to parks and open spaces. However, Map 8 does not show a specific area of the city that has less than 10 per cent of its area dedicated to parks and open spaces. In fact, Map 8 shows that neighbourhoods that fall under this category seem to be spread over the city, including old and more recent neighbourhoods of the city such as the downtown and Canterbury Park.

The second category includes neighbourhoods that have between 11 per cent and 25 per cent of parks and open spaces. Map 8 shows that many neighbourhoods are located between regional roads such as Bishop Grandin Boulevard and the South Perimeter Highway, and between Chief Peguis Trail and the North Perimeter Highway. These two areas create a cluster that holds almost 50 per cent of the number of neighbourhoods that fall under this category.

The last category includes eleven neighbourhoods in Winnipeg that have from 25 per cent to 50 per cent of their land dedicated to parks and open spaces. Map 8 shows that the eastern boundary of this category is the Seine and Red River. However, there is no specific location in the city for these eleven neighbourhoods that fall under this classification. This map does not include four major parks in the City of Winnipeg (Assiniboine Park, Maple Grove Park, Kilcona Park and Kildonan Park) as the boundary of these parks are the same as the neighbourhood boundary and there are no demographics associated with these areas.

Table 14 shows five neighbourhoods which have the highest and lowest percentage of parks and open spaces, registered in the city inventory including neighbourhoods like Assiniboine Park, Maple Grove Park which have limited or no dwellings within their boundaries.

Highest Percentage of Parks and Open Spaces by Neighbourhood Area		Lowest Percentage of Parks and Open Spaces by Neighbourhood Area	
Neighbourhood	Percentage of Parks and Open Spaces	Neighbourhood	Percentage of Parks and Open Spaces
Jameswood	36%	University	0.031%
Worthington	32%	Stock Yards	0.020%
North St. Boniface	30%	Montcalm	0.014%
Marlton	29%	Kildonan Crossing	0.005%
Heritage Park	29%	Mcleod Industrial	0.008%

Table 14: Neighbourhoods with the Highest and Lowest Percentage of Parks and Open Spaces; Source: Adapted information from GIS data by author; University of Manitoba Library; 2018.

Number of Public Amenities by Neighbourhood

Another aspect that affects the urban form is the number of public amenities that are located within neighbourhood boundaries. Public amenities like community centres, gyms, pools, and libraries are some of them. In Winnipeg, there are ten different types of facilities that are identified in the city inventory and are shown in Table 15.

These amenities are all over the city and are funded through the municipal property tax. However, after conducting a spatial analysis of these amenities, I found that there are 126 neighbourhoods which do not have any of these facilities, 35 neighbourhoods which have just one facility, 33 neighbourhoods which have two facilities, 15 neighbourhoods which have three facilities, 13 neighbourhoods which have four facilities, 12 neighbourhoods which have five facilities, and only 3 neighbourhoods have six facilities (see Map 9).

Public amenities registered in the city inventory	Arenas
	Community Centres
	Fitness Centres
	Indoor Pools
	Indoor Soccer
	Libraries
	Outdoor Pool
	Skate Park
	Spray Pad
	Wading Pool

Table 15: Neighbourhoods with the Highest and Lowest Percentage of Parks and Open Spaces; Source: Adapted information from GIS data by author; University of Manitoba Library; 2018.

Appendix B contains the list of neighbourhoods in the city that have zero, one, two, three, four, five and six public amenities.

Also, the following figure (Figure 6) summaries the current number of facilities per neighbourhood in the City of Winnipeg.

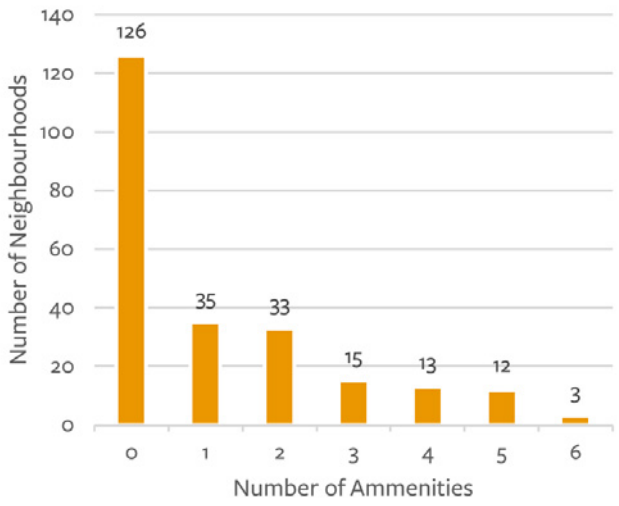

Figure 6: Number of Public Amenities per Neighbourhood; Source: Summarized information from GIS data by author; University of Manitoba Library; 2018.

Analysis and Discussion

The following section provides an analysis of the data findings presented in the previous section. This analysis explores trends and relationships between municipal property tax and urban form in the City of Winnipeg in 2018. Results from this study can inform city officials and policymakers about how planning and taxation can become tools to reduce the current infrastructure deficit.

Municipal Property Tax and Urban Form

Most scholars argue that property tax can promote sprawl, as there is no rate differentiation among different housing types. Through this empirical research, I found that Winnipeg's property tax tends to encourage sprawl as there are no tax benefits or differentiation rate among housing types. The current property tax system imposes 45 per cent of the assessed value of a property to any residential property, showing that for taxation purposes, housing types are not considered.

Also, while comparing the municipal property tax, measured in dollars per square metres (Map 2), with density, measured by dwellings per acre (Map 6), the study shows that the relationship between dollars raised and number of dwellings per acre is surprisingly similar. For example, neighbourhoods that provide more than 13 dollars per square metre have at least ten dwellings per acre. Therefore, the correlation between the municipal property tax and density (an aspect of the urban form) might indicate that the relationship between taxation and urban form does exist in the City of Winnipeg.

Another aspect that Map 2 shows is that mixed-use neighbourhoods contribute more to Winnipeg's budget than do important commerce and retail clusters. For example, neighbourhoods such as Portage South and Broadway and Assiniboine, which have mixed-use developments, condominiums, rental and office buildings, contribute from 13 dollars to 30 dollars per square metre to the city's budget. In contrast, commercial areas like St. Vital Centre and Polo Park contribute between 5 dollars to 13 dollars per square metre to Winnipeg's budget.

The study seems to indicate that promoting mixed-use developments can increase the number of resources that the City of Winnipeg receives from the municipal property tax every year. This empirical analysis also indicates that a high number of commercial and retail spaces in a specific area do not necessarily mean a higher contribution to the City's budget. In contrast, it might indicate that a denser neighbourhood with a variety of building types and land uses could improve the revenue that the city collects through the municipal property tax.

Furthermore, benefits of mixed-use neighbourhoods go beyond city's revenue. Mixed-use developments also create other benefits to communities. For example, mixed-use developments promote a variety of building types (apartment buildings, single detached houses, and condominiums) that enrich the experience of walking on a grid pattern, providing a more pedestrian-friendly environment and encouraging active transportation. In contrast, the concentration of retail and commercial spaces, where there are few areas dedicated for residential purposes promotes the use of private cars and reduces the changes to use public transit. Therefore, areas of the city like Polo Park and St. Vital Centre demand special attention from city authorities, as traffic control measures, wider roads, intersections, and overpass are needed to avoid congestion.

In addition, Map 2 shows other areas of the city that are near the downtown and have mixed-use developments with lower densities. Neighbourhoods like Central St. Boniface, Spence and the North End, are some examples of neighbourhoods that have a higher variety of building types and land uses based on a grid pattern. These areas contribute between 2 and 5 dollars per square metre to the city's budget. In contrast, other areas of the city which have strict segregation of land uses, in a leapfrog sprawl pattern, and low-density developments contribute to less than a dollar per square metre to the city's budget. Surprisingly, these developments are some of the newest neighbourhoods in Winnipeg areas like Sage Creek or Waverly West are some example of these new developments.

Finally, results from this study seem to indicate that there is a direct correlation between density of roads, density of units (dwellings or commercial), variety of uses, and revenue raised. These factors of the urban form seem to indicate that the more density of roads,

the more units per acre, the more variety of uses in a neighbourhood, the more revenue from the municipal property tax this neighbourhood will provide for the capital budget. Therefore, the traditional form of planning that includes a mixture of land uses in dense neighbourhoods on a grid pattern helps to get more revenue from the municipal property taxes. The Exchange District is the perfect example of this traditional form of planning, as the neighbourhood has mixed use buildings, that varied in height from two to eight floors, and has a grid pattern (high density of roads, see Map 7). However, it is important to highlight that the areas of the city that provide more revenue to the city's budget are also areas that have the oldest infrastructure that need to be repaired, maintained or improved by the city.

However, findings of this capstone indicate that although the city has made important investments in the last 5 years in capital projects, city officials are not balancing the revenue raised from the municipal property tax with the expenditures. As a result, old areas of the city that have the older infrastructure, but provide an important portion of revenue to city's budget (measured in dollars per square metre) seem to be subsidizing newer developments that provide less revenue (measured in dollars per square metre). The fact that city officials are not considering factors of the built form, that affect revenue from the municipal property tax and allocation of expenses, is a manifestation that the city is not considering the general policies and the vision that OurWinnipeg includes as a city with sustainable growth and high quality of life (City of Winnipeg, 2011, p. 2).

City Expenditures

There are various limitations on Winnipeg's capital investment data between 2014 and 2018. The information gathered outlines areas of the city where important capital investments have occurred in the last five years. For example, while comparing Map 1A with Map 4, the reader can find that in general there is not a correlation between the number of dollars raised from the municipal property tax and investments in capital projects between 2014 and 2018. For example, the Ward of Mynarski provides less than 10 million dollars in municipal property tax, but it the Ward of Mynarski that has received the most investment on capital projects in the last five years compared with any other ward in the city. Also, the

Ward of Charleswood provided an important amount of money to Winnipeg's budget in 2018. However, the city has invested no more than 10 million dollars in capital projects between 2014 and 2018.

Nonetheless, other wards provide an important percentage of revenue to Winnipeg's budget and have received important capital investments in the last five years. The Ward of St. James is an example, as it contributed between 30 to 34 million dollars of municipal property tax to city's budget in 2018 and has received fifty million dollars in capital investments between 2014 and 2018. Also, the Ward of Fort Rouge-East Fort Garry was the second biggest contributor of municipal property tax to city's budget, reaching 30 million dollars in 2018. The Ward of Fort Rouge-East Fort Garry has received 20 million dollars in capital investments between 2014 and 2018.

Map 1A and Map 4 show that in general, there is not a direct correlation between the revenue raised from the municipal property tax in 2018 (Map 2) and capital investments made between 2014 – 2018. The study found an ambiguous relationship between revenues and expenditures. For example, the Ward of Mynarski provided less than 10 million dollars in 2018 of municipal property tax, but it has received between 30 to 61 million dollars of capital investments in the last five years. In contrast, the Ward of Charleswood – Tuxedo provided between 25 to 30 million dollars of municipal property tax and has received less than 10 million dollars in capital investments in the last 5 years. However, there are some wards like Old Kildonan and Elmwood-East Kildonan that seem to have a closer relationship between revenue raised and investments in capital projects. Therefore, by comparing Map 1A and Map 4 the study did not provide a clear conclusion of the correlation between capital investments and revenue from the municipal property tax.

Density

One of the most important aspects that affect the revenue that is collected through the municipal property tax is density. Findings of this capstone agree with Carruthers and Ulfarsson's (2003) statement that describe density as the most relevant indicator of the urban form and "the most common measure used to describe urban form" (Ulfarsson,

2003, p. 505). However, density can be measured in several ways; the term is broad that even planning professionals have trouble understanding it. Density maps in the finding section show that density can be expressed in several ways. For example, density can be expressed by number of dwellings in a neighbourhood, number of dwellings per acre by neighbourhood, ratio of kilometres of roads by neighbourhood, percentage of parks per neighbourhood and concentration of public amenities by neighbourhood. Those different ways to represent density do not indicate that there is a right or wrong way to show density. Nonetheless, each representation of density shows different data that might be more suitable for one specific case rather than another. Although density can be defined and expressed in several ways, it is commonly known that for planning purposes, the most relevant way to express density is by dwellings per unit of area. However, politicians and decision-makers tend to use the term density a different way, by just addressing the number of people.

In fact, the study indicates that there is a direct correlation between density of dwellings per acre and density of roads, Map 6 and Map 7 show that almost the same neighbourhoods that have more dwellings per acre have more percentage of roads. Moreover, these neighbourhoods that have more dwellings per acre and more percentage of roads, provide more dollars per square metre to the city's budget than more recent developments showing that the there is also a relationship between urban form and revenue.

Number of Dwellings by Neighbourhood versus Number of Dwelling per acre by Neighbourhood

There are various ways to calculate density; one example is by using number of dwellings per neighbourhood or number of dwelling per acre by neighbourhood. These two options are one of the most commonly used by city officials and decision makers for political and planning purposes. However, these two methods of calculating density show a disconnection and even contradiction between political decisions and planning policies, as both imply and communicate different things.

On the one hand, calculating density using the method of number of dwellings per neighbourhood helps politicians to plan and run their campaigns. Under this method, politicians create strategies that help them approach and respond to more people in a short period to win a seat on council. Therefore, this method of calculating density plays an important role in politics. On the other hand, density can be calculated by the number of dwellings per acre or hectare, showing, most of the time, a different scenario than the method previously described. By calculating the number of dwellings per acre, planners can identify "how intensly a site is used" (City of Hamilton, 2019, p. 4) and compare it with other aspects of the urban form to create policies that provide better services and manage growth. By calculating density using the method of number of dwellings per acre, city officials and private investors can provide more amenities in an area that can be sustained over time and response to the values and necessities of a community. However, it seems to be that there is a disconnection between political power and policies that aim to shape the urban form. By using one method of density calculation over the other, politicians affect the liability, property values, transportation alternatives, and many other aspects of the urban environment that is vital to the planning process (Ulfarsson, 2003, p. 505).

Map 6 shows that the City of Winnipeg is a very low-density city, as most of the city has less than seventeen dwellings per acre. For example, recent developments such as Sage Creek (that have no more than six dwellings per acre) shows that City officials are approving new neighbourhoods that do not satisfy the vission of compact city that OurWinnipeg inc. Moreover, if Map 6 and Map 2 are compared, neighbourhoods that have six dwellings per acre or less, contribute with no more than one dollar per square metre in municipal property tax. These maps (Map 2 and Map 6) show that low-density neighbourhoods are not viable from a revenue and urban form perspective.

Density of Roads

Density of roads by neighbourhood does not necessarily indicate that these areas have a higher maintenance cost. Density of roads in older areas of the city such as Downtown Winnipeg and Old Transcona, which have a grid pattern, provide a simple urban structure,

increasing the level of accessibility of pedestrians and offering the opportunity to restrict car access in some streets (English Partnerships and The Housing Corporation, 2000, p. 38). Also, these old areas of the city provide a more suitable environment for multiple types of uses and building types.

Map 7 shows that not all neighbourhoods have the same number of kilometres of roads showing that there might be a spectrum or degree of suburbanization in the City of Winnipeg. This spectrum of suburbanization shows that neighbourhoods that have similar sizes can have different street layouts which create dissimilar types of parcels and building types. These lots and building types might have important implications in the urban form as well as in the city budget as more or fewer roads need to be maintained over time.

However, while comparing Map 6 and Map 7, some neighbourhoods have higher densities but a low number of kilometres of roads. Neighbourhoods like Roslyn and Broadway and Assiniboine are examples of this fact. Neighbourhoods that have a low number of kilometres of roads and a high number of dwellings per acre might indicate that more dwellings in an area do not necessarily indicate a higher number of roads to support it. In contrast, having more dwellings in a neighbourhood seems to be directly related to more revenue collected through the municipal property tax.

The following table (Table 16) shows how the density of roads and density dwellings (measured in dwelling per acre) seem to have a direct correlation. Also, Table 16 shows that these areas provide more revenue to Winnipeg's budget through revenue from the property tax (measured in dollars per square metre) than more recent developments.

Moreover, Map 10 shows a contradiction. Neighbourhoods like South Point Douglas, which has a significant number of kilometres of roads but does not have enough population or commercial activities to support the maintenance of public roads. However, South Point Douglas provides twice as much revenue through municipal property tax (measured in dollars per square metre) than more recent developments like Sage Creek of Waverly West. This fact might indicate that there is an opportunity to develop policies that can encourage infill developments in central areas of the city.

Density of Roads, Dwellings and the Municipal Property Tax Revenue by Neighbourhood				
		Roads (%)	Dwellings (units per sq. acre)	Municipal Property Tax Revenue ($ per sq. metre)
Neighbourhoods with the Highest Percentage of Public Roads	China Town	23%	12.87	7.58
	Rockwood	18%	8.82	2.05
	Portage-Ellice	18%	12.77	29.85
	Colony	17%	14.67	21.69
	Early Grey	17%	9.01	3.03

Table 16: Density of roads, dwellings, and the municipal property tax revenue

Central areas of the city like South Point Douglas have most of the infrastructure in place, therefore these areas do not require new construction of roads or sidewalks. Instead these areas require maintenance of the current infrastructure that has not been considered in recent capital budgets. By promoting infill developments in central areas of the city, city officials will increase the density of some areas and the revenue that the city receives through the municipal property tax. Also, by redeveloping industrial areas, city officials will promote a more compact city and create complete communities that have access to parks, schools, public transit and other types of amenities. In contrast, infill strategies and the redevelopment of old industrial areas have some negative aspects like gentrification that could result in migration within the city. However, there are some strategies that city officials can provide to reduce this effect that this capstone does not address. For example, use fiscal tools such as the Tax Increment Incentive (TIF) to encourage the dvelopment of central areas of the city.

Density and Percentage of Parks and Open spaces per Neighbourhood

When comparing Map 6 and Map 8, I find that there is no direct correlation between density measured as dwellings per acre and the percentage of parks by neighbourhood. The result of this comparison shows that neighbourhoods which have less than ten dwellings per acre have an important percentage of parks (from 25 to 50 per cent). Furthermore, while comparing Map 2, Map 6 with Map 8, I found that the neighbourhoods which provide no more than one dollar of municipal property tax, are neighbourhoods which have more parks and open spaces. In contrast, neighbourhoods of the inner city which provide more revenue to the city through municipal property tax (from five to thirty dollars per square metre of municipal property tax) and have a higher number of dwellings per acre (from seventeen to forty dwellings per square acre) have less than 10% of their land dedicated to parks. This fact indicates that there is an inverse correlation, as the more municipal property tax pay correlates with less park and open spaces available. Also, while comparing Map 8 and Map 2, I found that having more parks in a neighbourhood does not indicate that the properties in the neighbourhood will provide more revenue to the city through the municipal property tax. In contrast, neighbourhoods which have more parks contribute with no more than one dollar to the city's budget.

The following table (Table 17) shows five neighbourhoods that have the highest percentage of parks and open spaces according to the city inventory. Also, Table 17 shows the disconnection between density of parks, dwellings per acre and revenue (measured in dollars per square metre) by neighbourhood in the City of Winnipeg in 2018.

Density of Parks, Dwellings and the Municipal Property Tax Revenue			
Neighbourhood	Parks (%)	Dwellings (units per sq. acre)	Municipal Property Tax Revenue ($ per sq. metre)
Jameswood	36%	2.85	0.91
Worthington	32%	6.9	2.34
North St. Boniface	30%	2.39	2.32
Marlton	29%	2.21	0.96
Heritage Park	29%	7.01	2.05

Table 17: Density of parks, dwellings and the municipal property tax revenue.

However, while comparing Map 8 and Map 5, I found there is a relationship between the percentage of parks and open spaces with the number of dwellings per neighbourhood. Most of the neighbourhoods that have more occupied dwellings also have more areas dedicated to public parks and open spaces. The close relationship between the percentage of parks and the number of dwellings by neighbourhood seems to confirm that politicians tend to create by-laws and regulations interpreting density in terms of people who live in an area and not on dwellings per acre. The misconception of density ignores basic planning principles that other cities use to regulate and manage growth.

Density and Public Facilities per Neighbourhood

While comparing Map 9 with Map 6, I found that there is no connection between the number of public facilities per neighbourhood and the number of dwellings per acre. Some of the densest neighbourhoods in Winnipeg have zero or one facility, while less dense neighbourhoods have up to six facilities. Moreover, while comparing Map 9 with Map 2, I found that neighbourhoods that have more facilities are the ones that contribute less to the city's budget.

However, while comparing Map 5 with 9, I found that there is a direct link between the number of dwellings per neighbourhood and number of public facilities per neighbourhood. Once again, politicians are using only one interpretation of density as a

tool to shape Winnipeg's built environment to answer their political aspirations, but not to responses to planning needs.

The following table (Table 18) show the inverse relationship between the number of public amenities, dwellings (measured in dwellings per acre), and revenue (measured in dollars per square metre) from the municipal property tax.

Number of Public Amenities, Dwellings and the Municipal Property Tax Revenue			
Neighbourhood	Parks (%)	Dwellings (units per sq. acre)	Municipal Property Tax Revenue ($ per sq. metre)
Centennial	6	6.64	2.75
Jefferson	6	6.69	0.87
Sargent Park	6	4.63	1.24
The Maples	6	6.3	0.73
Munroe East	5	6.93	0.92

Table 18: Density of public amenities, dwellings, and the municipal property tax revenue.

Conclusion

Fischel (2001) argues that the property tax could be considered as a benefit tax, as it encompasses the benefits received from local services. However, this empirical research shows that Winnipeg's municipal property tax does not reflect services and amenities that the city provides. Instead, this study confirms what Slack (2002) argues about property tax, as a system that promotes sprawl developments. In fact, Winnipeg's municipal property tax system seems to subsidize low-density neighbourhoods and single-family houses, as the percentage of the assessed value is the same for all types of housing.

The study shows that density is a relevant aspect of the urban form. Therefore, density can measure a variety of features of cities and can help planners and private developers to create policies and plans that provide public and private services (Ulfarsson, 2003, p. 505). This capstone indicates that in Winnipeg, there is a direct relationship between urban form and revenue collected from the municipal property tax as denser neighbourhoods provide more revenue (measured in dollars per square metre) to Winnipeg's budget.

The document shows evidence of how different ways of interpreting density can affect the urban form of the City of Winnipeg. The method used to determine density plays a vital role in politics and planning. On the one hand, politicians interpret density as the number of people who live in a neighbourhood, because of their focus on the number of constituents or voters. On the other hand, planners see density as the number of dwellings per acre or hectare in a neighbourhood. This research shows that both approaches could be valid, but indicate different aspects of a situation. Therefore, the misunderstanding between politicians and planners has created policies that go against the political interest or planning goals, that affect the urban environment. In Winnipeg, investments in capital projects in the last five years (2014 to 2019) highlight the conceptual gap between politicians and planners and show that the relationship between the municipal property tax and urban form has not been sufficiently onsidered.

The evidence presented in this capstone seems to indicate a disconnection between planning goals, and investments. On the one hand, planning goals try to create a smart

growth city in a development plan called OurWinnipeg (2011). Direction three of OurWinnipeg (2011) "Promote(s) compact urban form and manage(s) the extension of municipal services for new growth" (City of Winnipeg, 2011, p. 30). However, capital investments that the city has created in the last five years reflect that the general vision of OurWinnipeg (2011) has not been followed.

Throughout the document, the reader can identify planning contradictions, that confirm the urgent need to think collectively and holistically of how the municipal property tax can re-shape Winnipeg's urban form. For example, some of the planning contradictions are neighbourhoods that have a higher percentage of parks and open spaces, and lower dwellings per acre contribute with no more than a dollar per square meter of private property. In contrast, neighbourhoods in the inner city which have a lower percentage of parks and open spaces, but a higher number of dwellings per acre, contribute twice as much as newer developments. The fact that higher density neighbourhoods are the highest contributors to the city's budget seem to indicate that density plays an important role in the city's revenue. However, these old areas of the city, have fewer amenities, less land dedicated to parks and open spaces, and a high number of kilometres of roads, seem to subsidize new developments.

This empirical research has important implications for the City of Winnipeg as, it tries to open a conversation among city departments, politicians, private developers, and the public. By understanding the relationship between the municipal property tax and urban form city officials from different departments, private developers and the public can find common grounds and establish policies that follow Winnipeg's development plan, OurWinnipeg (2011).

Implications for the City of Winnipeg

The research indicates that there are not clear policies across city's departments as the current taxation system does not promote planning goals set in Winnipeg's development plan, OurWinnipeg (2011). Therefore, the disconnection between Winnipeg's municipal property tax, capital budget investments and planning objectives is clear, as property tax

seems to promote and even subsidize sprawl developments in the city.

Also, there is a disconnection among the city's departments. First, the Department of Public Works focuses on road improvements and other infrastructure in the city without any coordination with other departments. Also, this department does not provide accurate information about the projects developed, as the information varies from source to the other, creating uncertainty and making impossible to map capital projects developed from 2014 to 2018.

The Department of Planning, Property and Development, needs to work closely with other departments such as Assessment and Taxation and Public Works to understand the economic impact and infrastructure implications of any new subdivision. By doing this, planners and other city officials will be able to educate politicians about how planning and property taxes can manage growth and promote density.

There are different strategies to promote denser neighbourhoods. My research found that the ideal way to encourage denser neighbourhoods is by including a variety of policies that involve the commitment from different City departments. Some of these policies are listed below:

- The current taxation system does not differentiate housing types. By creating a differentiation of the percentage of the assessed value of property tax of apartment buildings, townhouses, and single detached houses, policymakers can encourage denser neighbourhoods.

- Implementing development fees in low-density neighbourhoods can encourage denser areas in the city. My research shows that in the City of Winnipeg low-density neighbourhoods provide less revenue to the City. Therefore, if developers want to develop low-density neighbourhoods and if city officials do not want these types of developments, an extra fee should be implemented to encourage denser areas.

- Both the taxation and planning department (of any city) should work together to create policies that can benefit revenue and the development of a city.

There are a variety of options for encouraging dense neighbourhoods that involve fiscal and planning tools. However, there is not a magic formula that works for every city, because cities are living entities that reflect people's values and culture. Therefore, before implementing fees and taxes, planners and city officials should understand the dynamics and issues that affect the urban form of their cities. By identifying these unique dynamics that each city has, planners and city officials can create a clear vision in their development (community) plan and the customize fiscal and planning tools to encourage specific developments that reflect the vision and values of the city.

Implications for Planning Practice

This research shows that density (an aspect of the urban form) and the municipal property tax might be related, as denser neighbourhoods provide more revenue to the city's budget. However, the City of Winnipeg has not explored this relationship yet. By understanding the relationship between aspects of the urban form and the municipal property tax, policymakers could manage growth, promote the vision of current or new development plans in cities across Canada.

Planners need to keep in mind that planning is a discipline that deals with property rights and values. Therefore, planners should understand the fiscal impact of their decisions while approving a re-zoning or subdivision applications. However, urban economics and taxation tools are aspects that are rarely taught in planning schools, planners should study these features as the current study provides evidence that urban economics and the municipal property tax have consequences in the urban form. In fact, by exploring the relationship between urban economics, the municipal property tax, and urban form, planners can create scenarios to discuss the benefits and disadvantages of new subdivisions. These scenarios of discussion can provide a path to get real and comprehensive smart growth in Canadian municipalities and could influence the way the public and politicians preserve planning.

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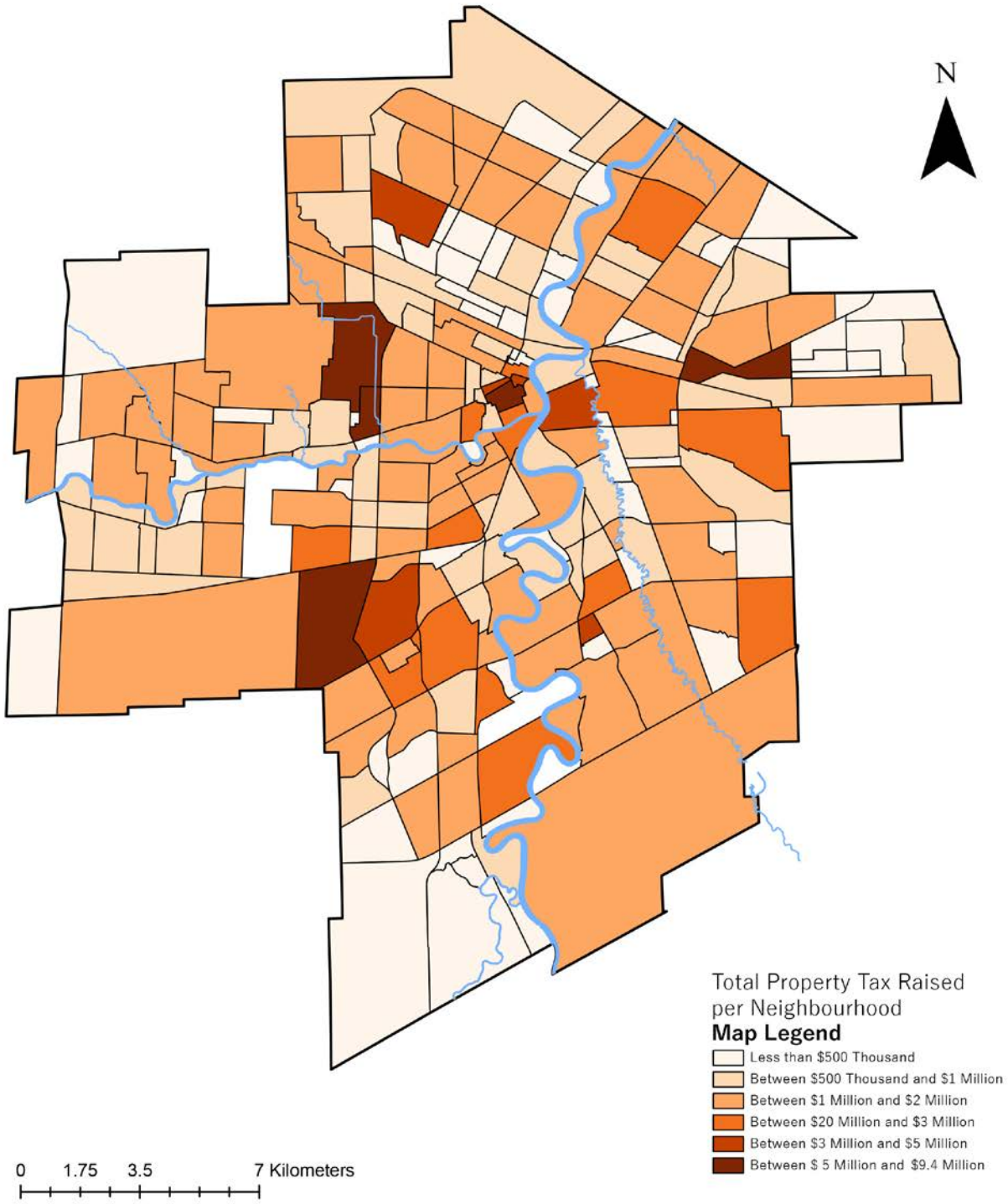
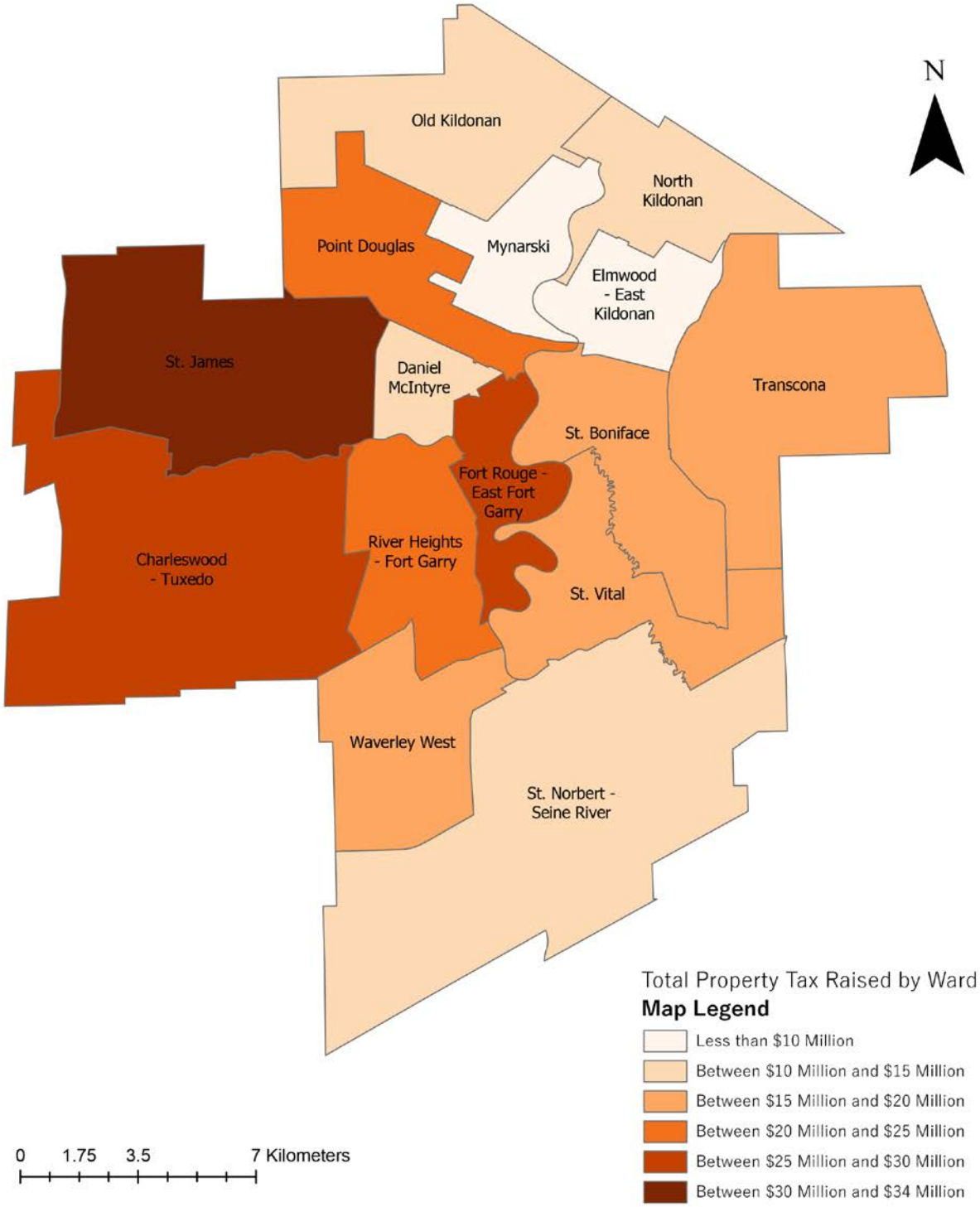
Appendix A: Maps

Map 1: Total Property Tax Raised by Neighbourhood in 2018



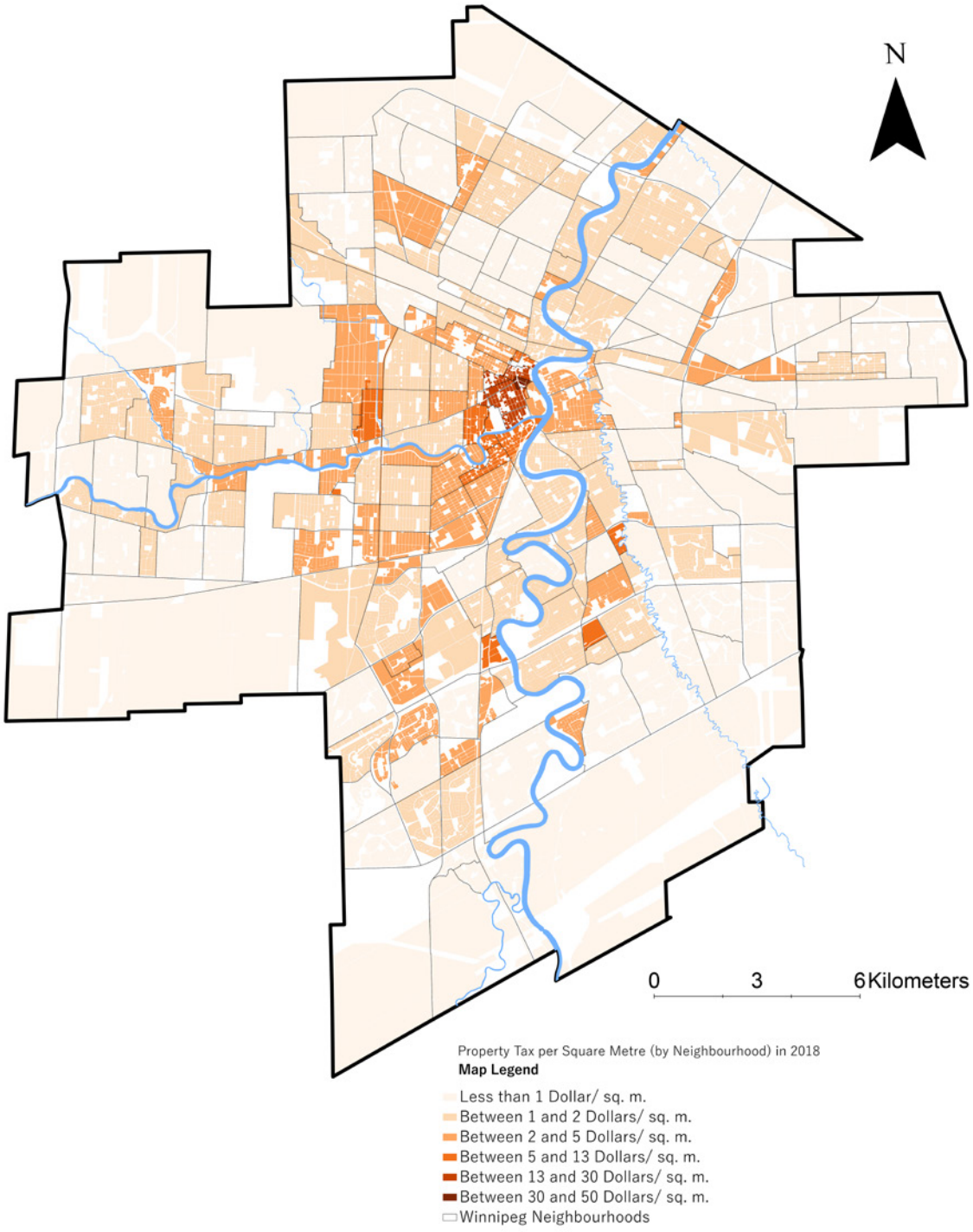
Source: Summarized information by author; "https://data.winnipeg.ca/Assessment-Taxation-Corporate/Assessment-Parcels/d4mq-wa44"; City of Winnipeg; 2018, Nov 11.

Map 1A: Total Property Tax Raised by Ward in 2018



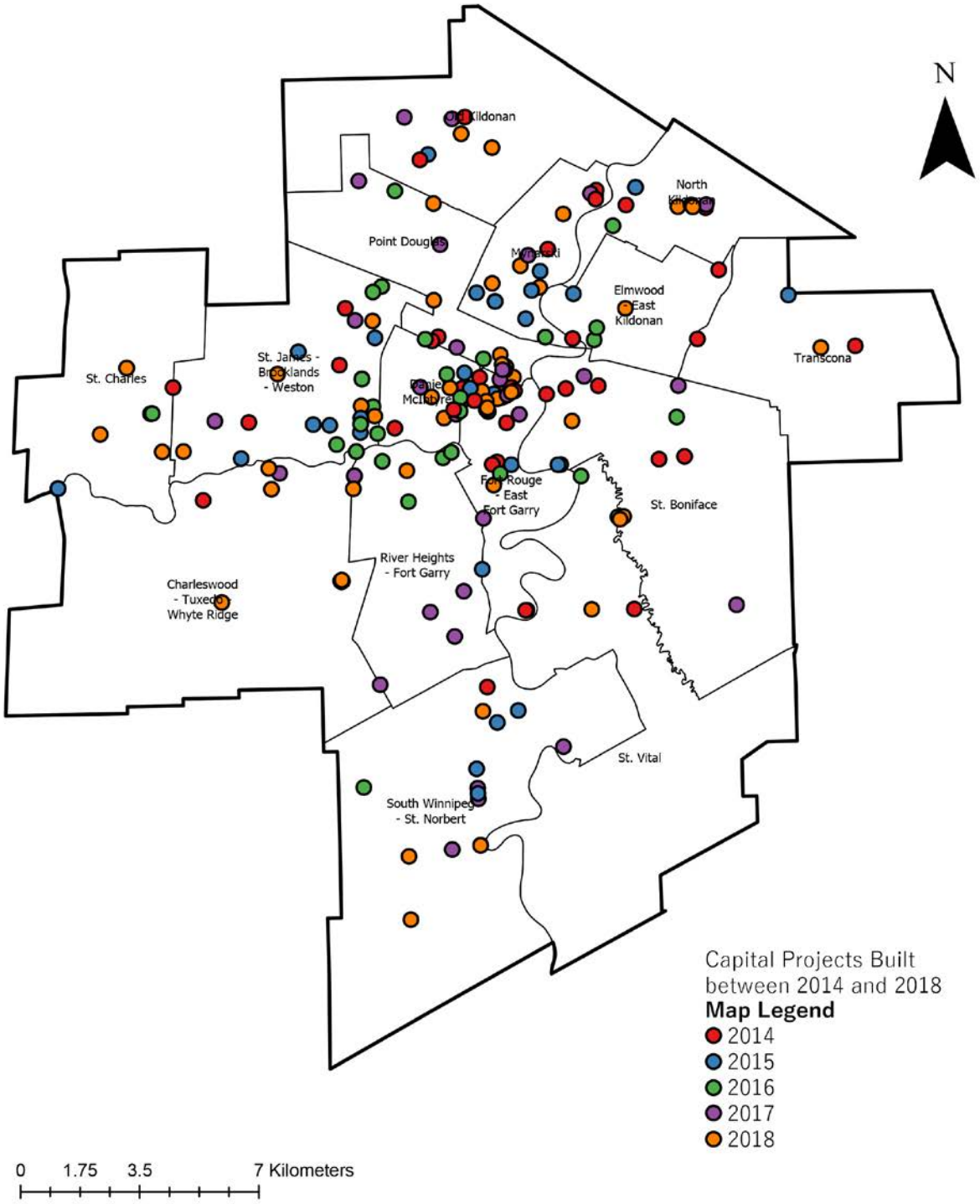
Source: Summarized information by author; "https://data.winnipeg.ca/Assessment-Taxation-Corporate/Assessment-Parcels/d4mq-wa44"; City of Winnipeg; 2018, Nov 11.

Map 2: Property Tax per Square Metre (by Neighbourhood) in 2018



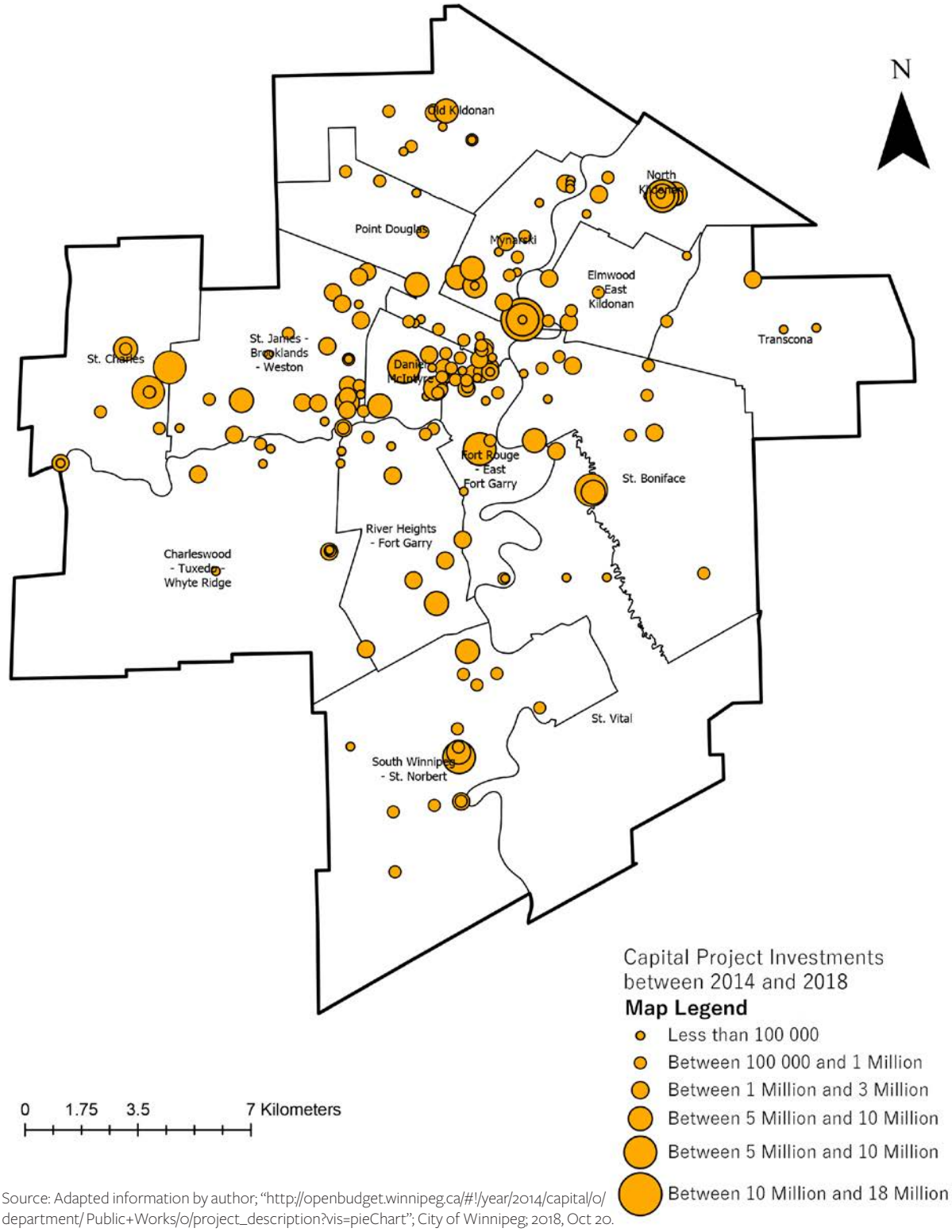
Source: Adapted information by author; "http://openbudget.winnipeg.ca/#!/year/2014/capital/o/department/ Public+Works/o/project_description?vis=pieChart"; City of Winnipeg; 2018, Oct 20.

Map 3: Capital Projects between 2014 and 2018 (by Year)



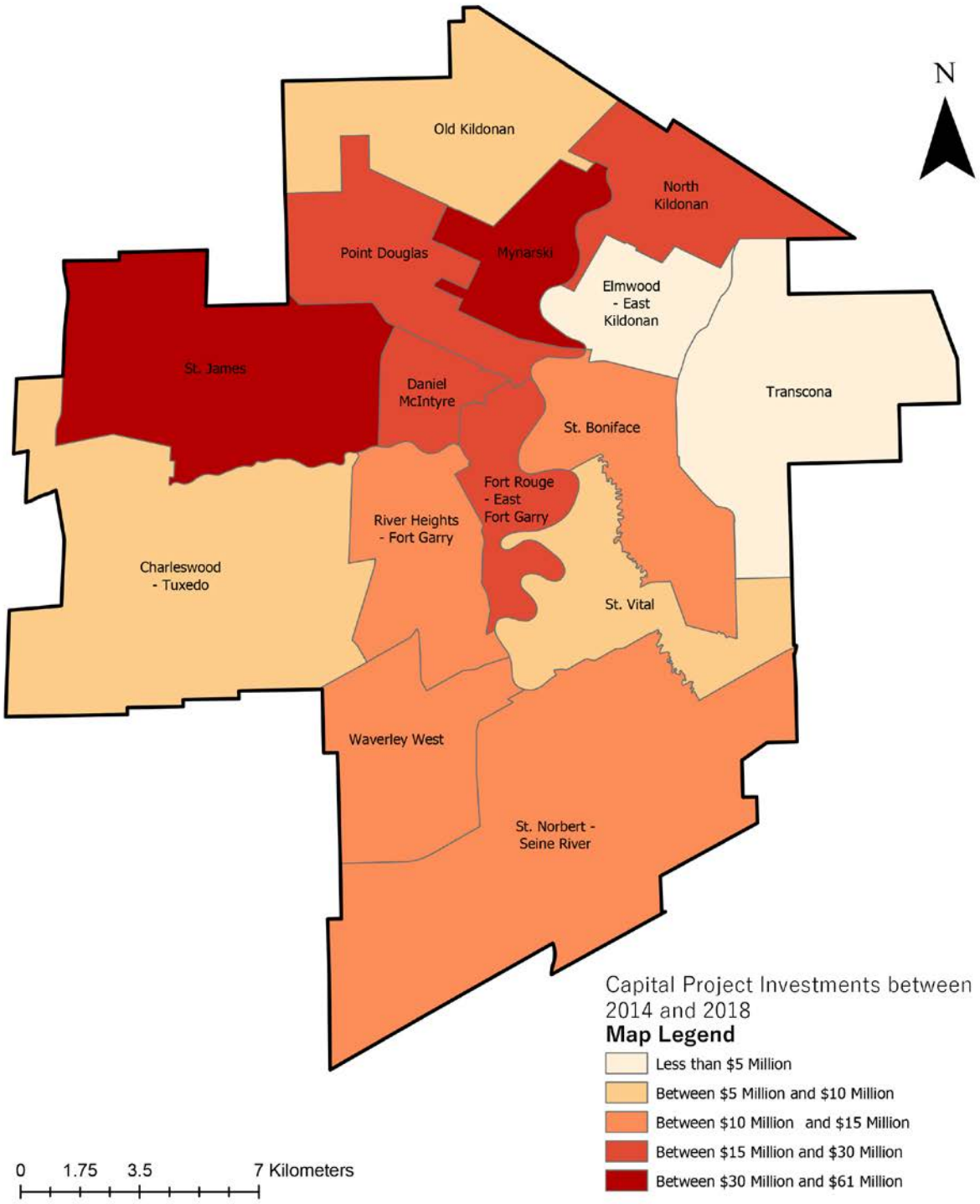
Source: Adapted information by author; "http://openbudget.winnipeg.ca/#!/year/2014/capital/o/department/ Public+Works/o/project_description?vis=pieChart"; City of Winnipeg; 2018, Oct 20.

Map 3A: Capital Projects Between 2014 and 2018 (by Dollars Invested)



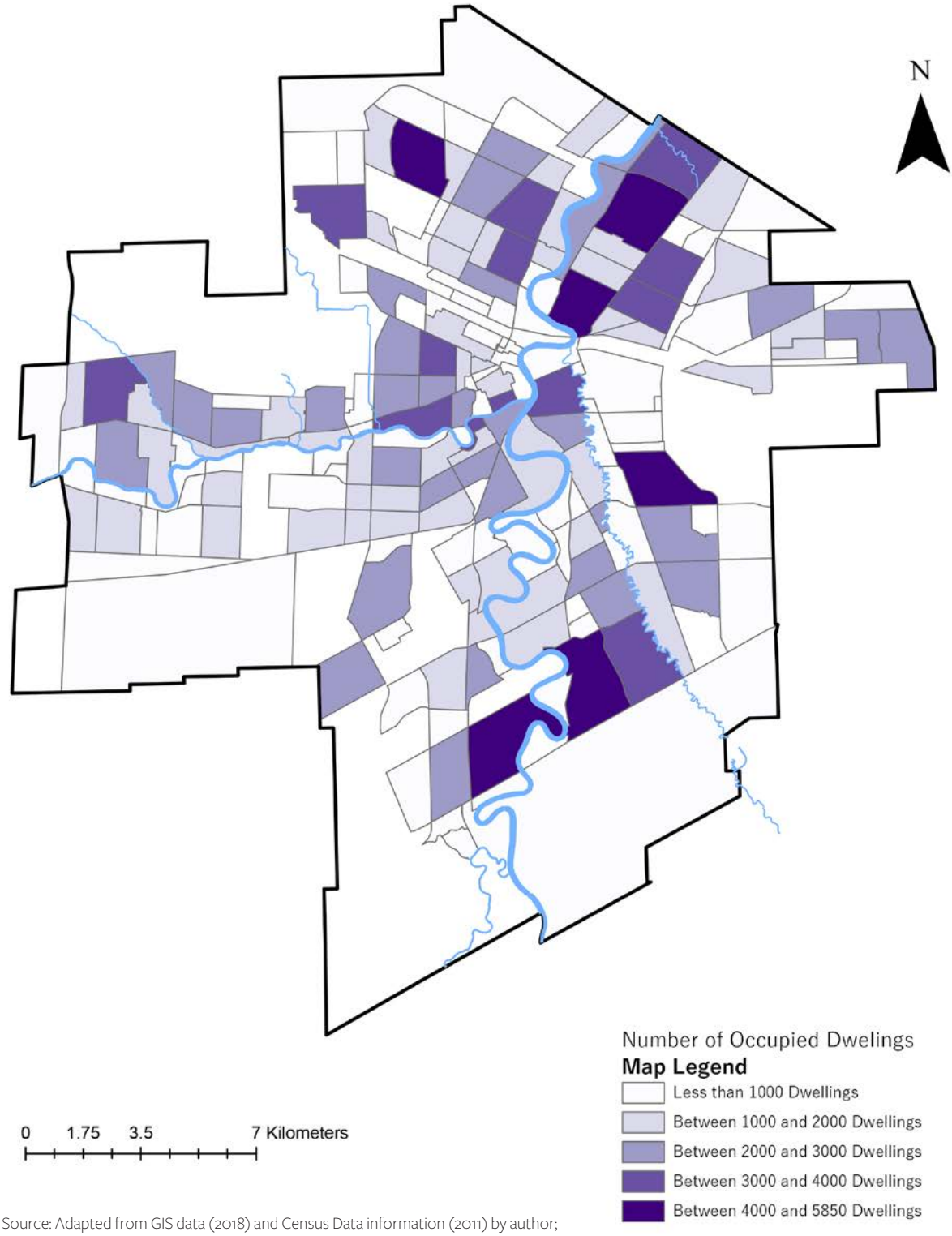
Source: Adapted information by author; "http://openbudget.winnipeg.ca/#!/year/2014/capital/o/department/ Public+Works/o/project_description?vis=pieChart"; City of Winnipeg; 2018, Oct 20.

Map 4: Capital Investments by Ward Between 2014 and 2018



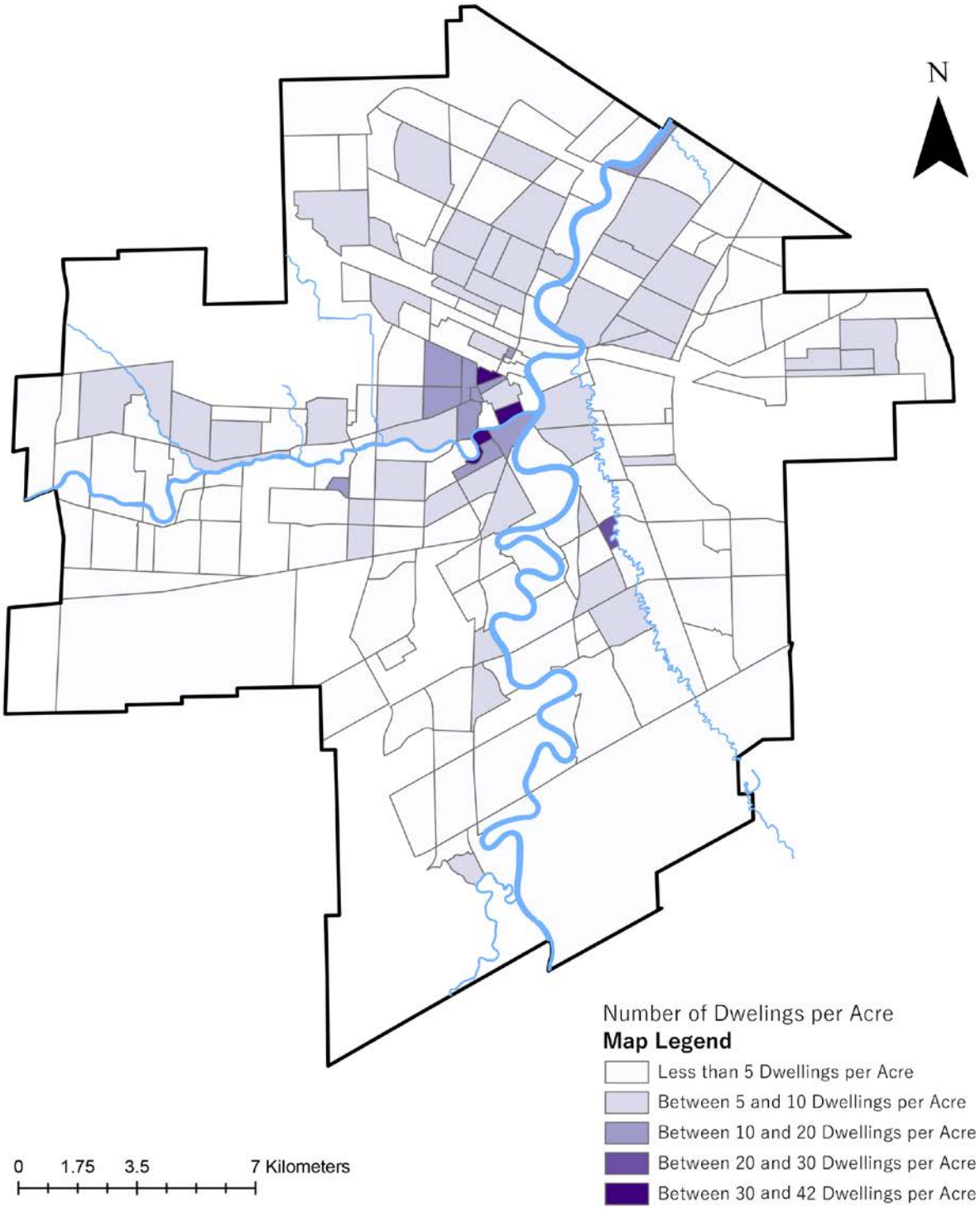
Source: Adapted information by author; "http://openbudget.winnipeg.ca/#!/year/2014/capital/o/department/ Public+Works/o/project_description?vis=pieChart"; City of Winnipeg; 2018, Oct 20.

Map 5: Occupied Dwellings by Neighbourhood



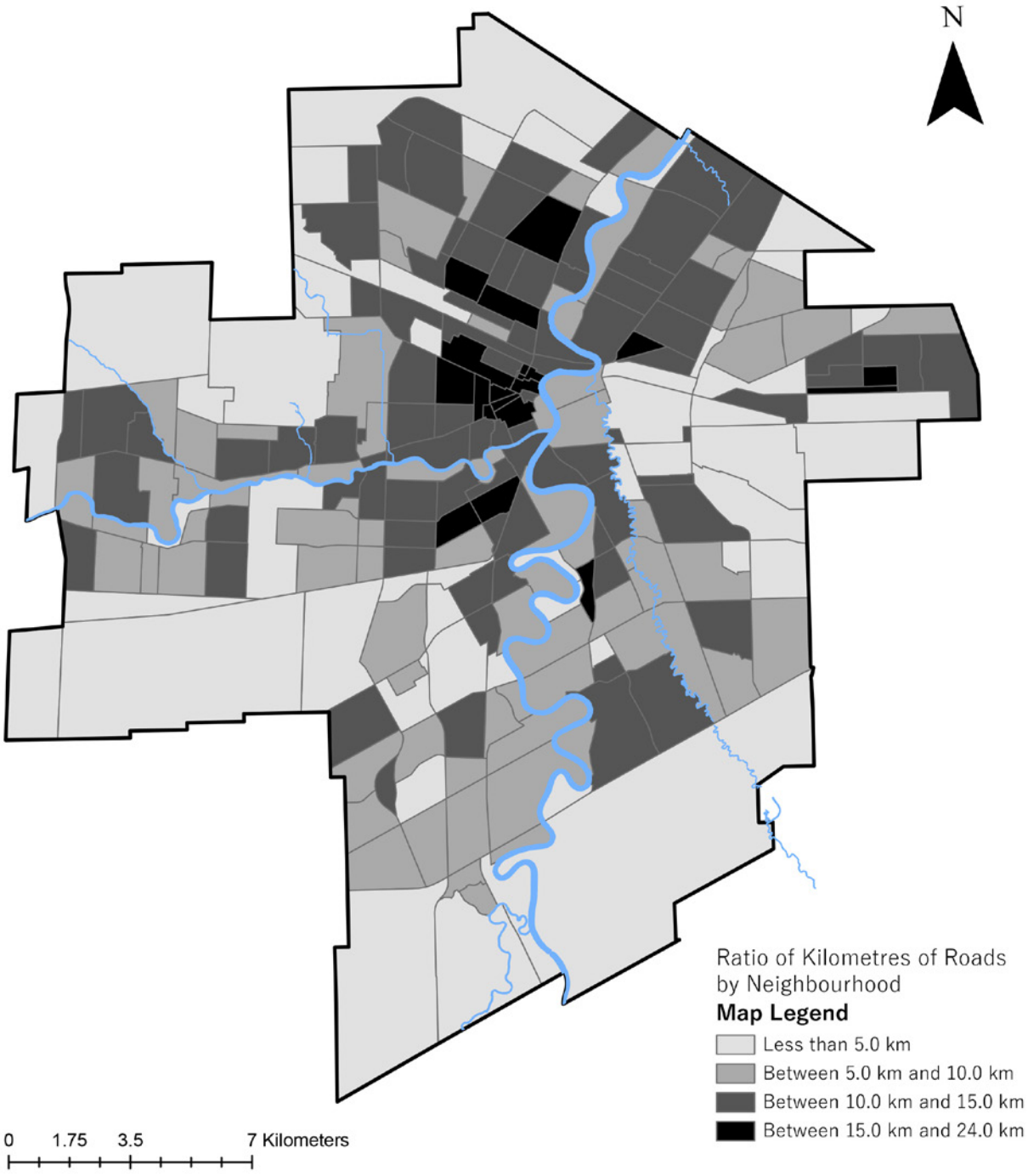
Source: Adapted from GIS data (2018) and Census Data information (2011) by author; "https://winnipeg.ca/census/2011/ and University of Manitoba Library"; City of Winnipeg; 2018, Dec 1.

Map 6: Number of Dwellings per Acre by Neighbourhood



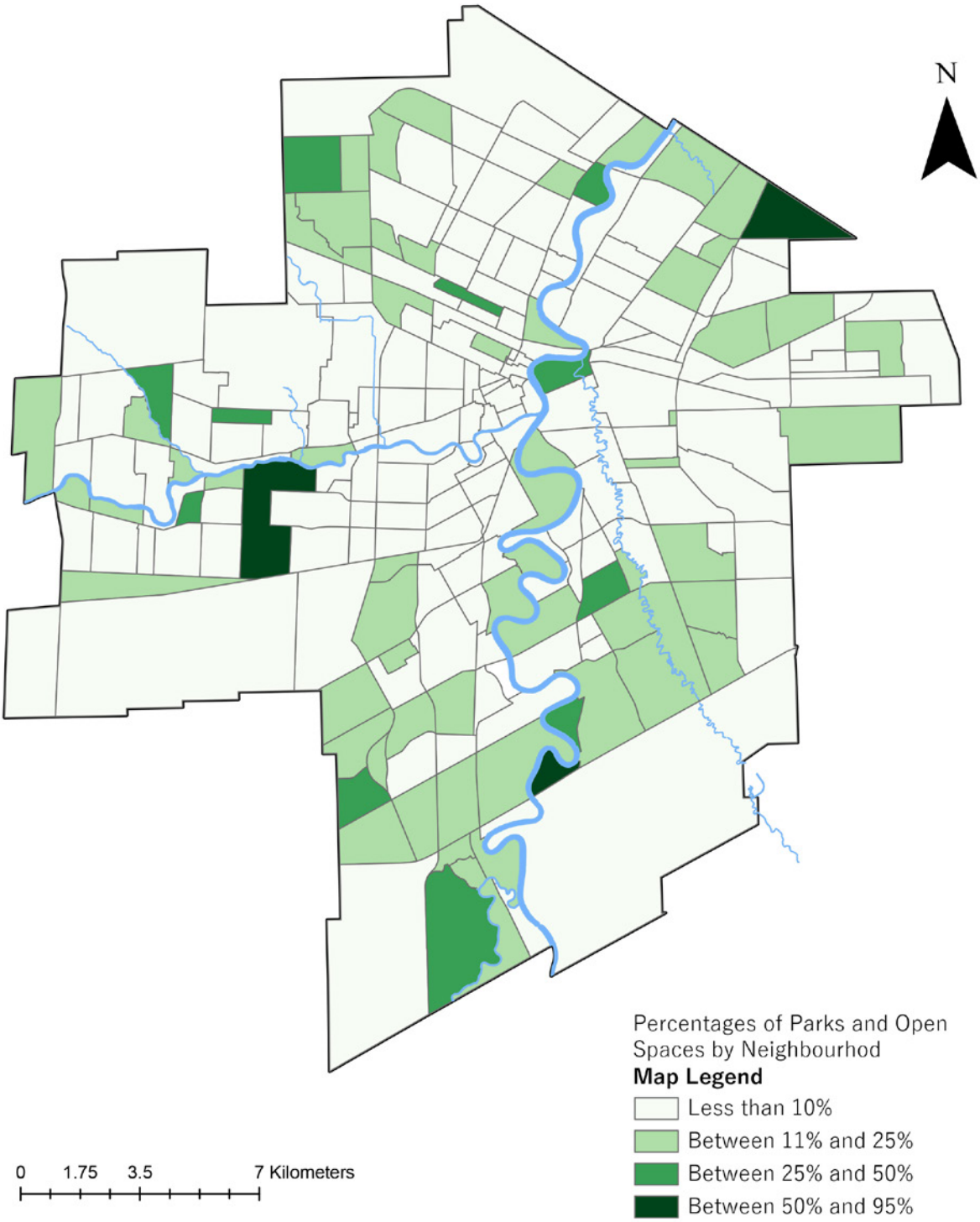
Source: Adapted from GIS data (2018) and Census Data information (2011) by author; "https://winnipeg.ca/census/2011/ and University of Manitoba Library"; City of Winnipeg; 2018, Dec 1.

Map 7: Ratio of Kilometres of Roads by Neighbourhood in 2018



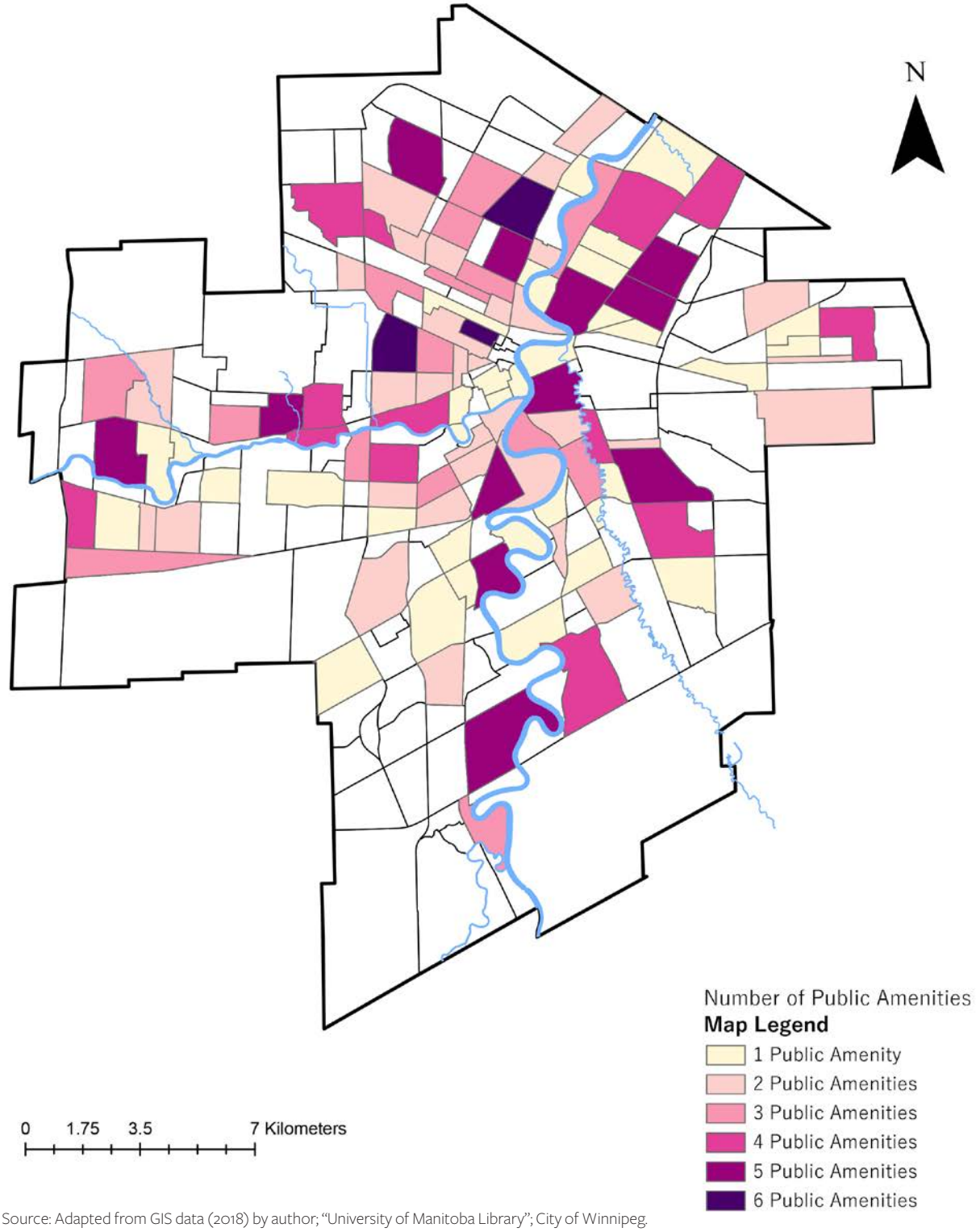
Source: Adapted from GIS data (2018) by author; "University of Manitoba Library"; City of Winnipeg.

Map 8: Percentage of Parks and Open Spaces by Neighbourhood in 2018



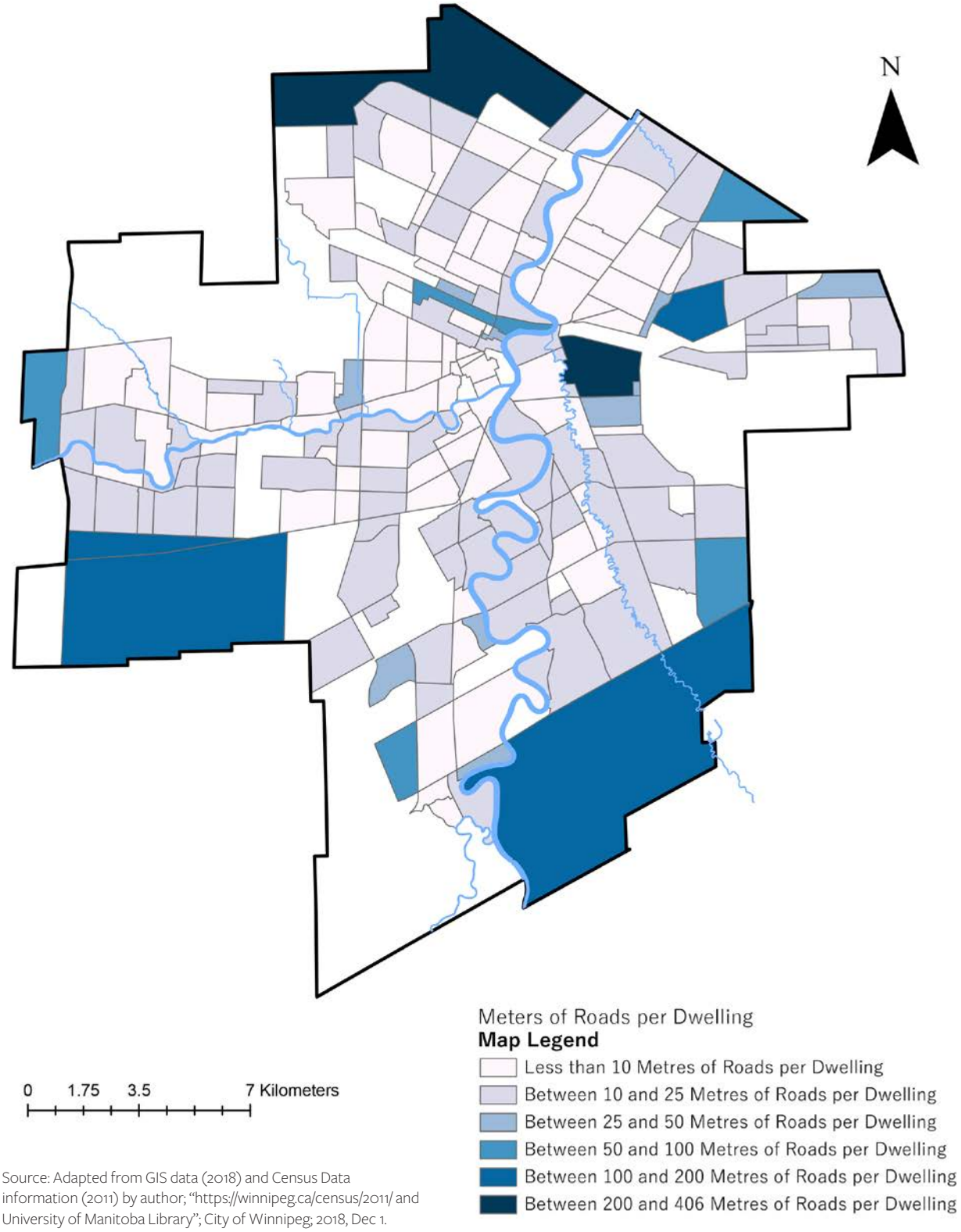
Source: Adapted from GIS data (2018) by author; "University of Manitoba Library"; City of Winnipeg.

Map 9: Public Amenities per Neighbourhood in 2018



Source: Adapted from GIS data (2018) by author; "University of Manitoba Library"; City of Winnipeg.

Map 10: Metres of Roads per Dwelling



Source: Adapted from GIS data (2018) and Census Data information (2011) by author; "https://winnipeg.ca/census/2011/ and University of Manitoba Library"; City of Winnipeg; 2018, Dec 1.

Appendix B: Number of Public Amenities Per Neighbourhood in 2018

Neighbourhood	# of Amenities
Agassiz	0
Airport	0
Alpine Place	1
Amber Trails	0
Archwood	4
Armstrong Point	1
Assiniboia Downs	0
Assiniboine Park	0
Beaumont	1
Betsworth	1
Birchwood	0
Booth	0
Bridgwater Centre	0
Bridgwater Forest	0
Bridgwater Lakes	0
Bridgwater Trails	0
Broadway-Assiniboine	1
Brockville	0
Brooklands	2
Bruce Park	4
Buchanan	0
Buffalo	0
Burrows Central	2
Burrows-Keewatin	4
Canterbury Park	0
Centennial	6
Central Park	2
Central River Heights	2
Central St. Boniface	5
Chalmers	5
Chevrier	1

Neighbourhood	# of Amenities
China Town	0
Civic Centre	0
Cloutier Drive	0
Colony	0
Crescent Park	5
Crescentwood	0
Crestview	3
Dakota Crossing	0
Daniel Mcintyre	3
Deer Lodge	5
Dufferin	3
Dufferin Industrial	0
Dufresne	0
Dugald	0
Eaglemere	0
Earl Grey	2
East Elmwood	1
Ebby-Wentworth	0
Edgeland	0
Elm Park	1
Elmhurst	0
Eric Coy	2
Exchange District	0
Fairfield Park	0
Fort Richmond	5
Fraipont	0
Garden City	3
Glendale	0
Glenelm	1
Glenwood	3
Grant Park	2

Neighbourhood	# of Amenities
Grassie	0
Griffin	0
Heritage Park	2
Holden	0
Inkster Gardens	0
Inkster Industrial Park	2
Inkster-Faraday	0
Island Lakes	1
J. B. Mitchell	0
Jameswood	0
Jefferson	6
Kensington	0
Kern Park	0
Kil-Cona Park	0
Kildare-Redonda	4
Kildonan Crossing	0
Kildonan Drive	3
Kildonan Park	1
King Edward	4
Kingston Crescent	0
Kirkfield	1
La Barriere	0
Lavalee	0
Legislature	0
Leila North	0
Leila-Mcphillips Triangle	0
Linden Ridge	0
Linden Woods	2
Logan-C.p.r.	1
Lord Roberts	5
Lord Selkirk Park	2

Neighbourhood	# of Amenities
Luxton	2
Maginot	2
Mandalay West	0
Maple Grove Park	0
Margaret Park	2
Marlton	0
Mathers	0
Maybank	1
Mcleod Industrial	0
Mcmillan	2
Meadowood	2
Meadows	2
Melrose	2
Minnetonka	1
Minto	2
Mission Gardens	1
Mission Industrial	0
Montcalm	0
Munroe East	5
Munroe West	1
Murray Industrial Park	0
Mynarski	0
Niakwa Park	1
Niakwa Place	0
Norberry	2
Normand Park	0
North Inkster Industrial	0
North Point Douglas	2
North River Heights	4
North St. Boniface	1
North Transcona Yards	0

Neighbourhood	# of Amenities
Norwood East	2
Norwood West	3
Oak Point Highway	0
Old Tuxedo	0
Omand's Creek Industrial	0
Pacific Industrial	0
Parc La Salle	0
Parker	0
Peguis	0
Pembina Strip	0
Perrault	0
Point Road	0
Polo Park	0
Portage & Main	0
Portage-Ellice	0
Pulberry	0
Radisson	1
Regent	0
Richmond Lakes	0
Richmond West	0
Ridgedale	0
Ridgewood South	3
River East	1
River Park South	4
River West Park	0
Riverbend	2
Rivergrove	0
River-Osborne	2
Riverview	2
Robertson	3

Neighbourhood	# of Amenities
Roblin Park	2
Rockwood	3
Roslyn	0
Rosser-Old Kildonan	0
Rossmere-A	4
Rossmere-B	1
Royalwood	0
Sage Creek	0
Sargent Park	6
Saskatchewan North	0
Seven Oaks	0
Shaughnessy Park	2
Silver Heights	3
Sir John Franklin	3
South Point Douglas	0
South Pointe	0
South Pointe West	0
South Portage	1
South River Heights	1
South Tuxedo	0
Southboine	0
Southdale	4
Southland Park	0
Spence	2
Springfield North	4
Springfield South	0
St. Boniface Industrial Park	0
St. George	0
St. James Industrial	0
St. John's	5

Neighbourhood	# of Amenities
St. John's Park	1
St. Matthews	2
St. Norbert	3
St. Vital Centre	0
St. Vital Perimeter South	0
Stock Yards	0
Sturgeon Creek	2
Symington Yards	0
Talbot-Grey	1
Templeton-Sinclair	0
The Forks	1
The Maples	5
The Mint	0
Tissot	0
Transcona North	0
Transcona South	2
Transcona Yards	0
Trappistes	0
Turnbull Drive	0
Tuxedo	1
Tuxedo Industrial	0
Tyndall Park	4
Tyne-Tees	0
University	0
Valhalla	0
Valley Gardens	5
Varennes	0
Varsity View	1
Vialoux	0
Victoria Crescent	0

Neighbourhood	# of Amenities
Victoria West	1
Vista	0
Waverley Heights	2
Waverley West B	0
Wellington Crescent	0
West Alexander	2
West Broadway	1
West Fort Garry Industrial	0
West Kildonan Industrial	0
West Perimeter South	0
West Wolseley	0
Westdale	4
Weston	3
Weston Shops	0
Westwood	5
Whyte Ridge	1
Wildwood	1
Wilkes South	0
William Whyte	3
Windsor Park	5
Wolseley	4
Woodhaven	1
Worthington	1