Winnipeg Fire Paramedic Service

Manitoba

COMMUNITY RISK ASSESSMENT STANDARDS OF COVER

2018

Emergency Services Consulting International

Providing Expertise and Guidance that Enhances Community Safety

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INTRODUCTION

The following report serves as the Winnipeg Fire Paramedic Service (WFPS) Community Risk Assessment: Standards of Cover Report. It follows closely the Center for Fire Public Safety Excellence (CPSE) Community Risk Assessment: Standards of Cover, Sixth Edition model that develops written procedures to determine the distribution and concentration of a fire and emergency service agency's fixed and mobile resources. The purpose for completing such a document is to assist the agency in ensuring a safe and effective response force for fire suppression, emergency medical services, and specialty response situations.

Creating a Community Risk Assessment and Standards of Cover Plan document requires that a number of areas be researched, studied, and evaluated. This report will begin with an overview of both the community and the agency. Following this overview, the plan will evaluate and quantify the community risk and develop critical task analyses for the various major emergency response types, using National Fire Protection Association Standard 1710 (*Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments*, 2016 Edition) as the benchmark. The most recent historical response performance of WFPS is quantified and compared to these same benchmarks. The report concludes with policy and operational recommendations.

The reader of this report should also be aware that there is a companion document, the Winnipeg Fire Paramedic Service Master Plan (published concurrent to this report), which should be reviewed for additional context, supporting information, and data related to the effective deployment of resources in WFPS.

ESCI extends its appreciation to the elected officials and members of the City of Winnipeg, the Winnipeg Fire Paramedic Service, and all others who contributed to this report.

TABLE OF CONTENTS

TABLE OF FIGURES

EXECUTIVE SUMMARY

This document describes Winnipeg Fire Paramedic Service's (WFPS) Community Risk Assessment: Standards of Cover report. Community risks, response resources, deployment strategies, and service levels have been evaluated in this study. It establishes response time objectives and standards for measuring the effectiveness of WFPS services and the deployment of its resources. The document generally follows the format recommended by the Center for Public Safety Excellence, *Community Risk Assessment: Standards of Cover, 6th Edition*.

The Winnipeg Fire Paramedic Service is a department of the City of Winnipeg and receives general policy direction from fifteen City Council members. The Council appoints a Chief Administrative Officer (CAO) to manage the day-to-day affairs and activities of the City on behalf of the Council. Each department head, including the Fire Paramedic Chief, reports to the Chief Corporate Services Officer (CCSO). The department's service area encompasses all of the City of Winnipeg.

With a population of 718,400[1] (in 2015), Winnipeg represents just over 56 percent of Manitoba's 1,278,365 population. Within the 475.5 square kilometers that make up the WFPS service area[2], there are 292,127 residential units and 10,030 businesses protected. At a population density of 1,510.83[3] persons per square kilometer, the city is 100 percent urban in character. Winnipeg is a culturally diverse city with more than 100 languages and nationalities represented throughout the region.

The City is served by 30 emergency services facilities (not including Station 40); three paramedic ambulance-only stations, eight fire-only stations, and 19 combined fire-paramedic ambulance stations. This does not include the headquarters/fire prevention offices, nor the training facility. The agency has over eighty emergency response and support vehicles providing a full array of emergency services, including fire suppression, emergency medical services (and patient transportation), hazardous materials response, technical rescue, and water rescue services. The City's 9-1-1 calls are answered by the Winnipeg Police Service, and calls appropriately handled by WFPS are transferred to their Communication Centre.

There are 1,401 full-time personnel involved in delivering services to the City, whether direct emergency response or in support of the department in a non-response role. For immediate response, no less than 167 firefighter personnel are on-duty at all times. These fire resources are staffed with a minimum of 35 dual role firefighter-primary care paramedics (PCPs) who work shifts on one of four platoons. Additional single-role, certified Advanced Care Paramedics (ACPs), Intermediate Care Paramedics (ICPs) and Primary Care Paramedics (PCPs) staff ambulances and work shifts on two additional, EMS exclusive platoons.

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[1] Municipal Benchmarking Network Canada, 2015 Performance Measurement Report, EMDS001, FIRE001. Municipal Benchmarking Network Canada (MBNCanada), c/o City of Hamilton, 71 Main Street West, Hamilton, ON L8P 4Y5.
[2] Municipal Benchmarking Network Canada, 2015 Performance Measurement Report, EMDS005. Municipal Benchmarking Network Canada (MBNCanada), c/o City of Hamilton, 71 Main Street West, Hamilton, ON L8P 4Y5.
[3] Municipal Benchmarking Network Canada, 2015 Performance Measurement Report, EMDS008, FIRE008. Municipal Benchmarking Network Canada (MBNCanada), c/o City of Hamilton, 71 Main Street West, Hamilton, ON L8P 4Y5.

The analysis completed during this study revealed a number of important findings. These include:

- The 9-1-1 call processing time between the phone being answered at WPS and handed off to the WFPS Communications Centre is not captured in a reliable manner.
- There were approximately 15,700 unique emergency incidents (Delta and Echo responses) in 2015, and 15,800 in 2016. Between 2014 and 2016, service demand grew by 7.8 percent.
- Approximately 81.4 percent of all responses are requests for emergency medical service.
- In 2016, a unit from Station 10 was first to arrive at only 52 percent of the emergency incidents in its first due area, which is 20.6 percent lower than the year before.
- The current fire department services utilization rate is 130 incidents per 1,000 population. This is higher than typical.
- WFPS call processing time exceeds the 90-second NFPA 1710 recommendation by 52 seconds, at the 90th percentile.
- WFPS personnel required 2 minutes, 12 seconds to assemble and go en route to an emergency in 2015 and 2016, which is longer than the NFPA 1710 standard of 60 seconds for medical and 80 seconds for fire.
- The first WFPS unit required 5 minutes, 2 seconds travel time to arrive on the scene of an emergency incident, 90 percent of the time, which is longer than the NFPA 1710 standard of 4 minutes, 90 percent of the time.
- In 2016, total response time for Fire emergency incidents was 7 minutes, 13 seconds and 8 minutes, 4 seconds for Other emergencies, 90 percent of the time.
- In 2016, total response time for EMS emergencies was 8 minutes, 23 seconds or less, 90 percent of the time. This corresponds with the lengthy call processing (EMS call processing is 28 seconds longer than fires).
- There is a 4 minute, 58 second difference in response performance between the first arriving unit and the second unit on scene for medical emergencies.
- In 2016, WFPS required 8 minutes, 51 seconds travel time for an effective response force to arrive to emergency fire/rescue incidents at the 90th percentile, which is 51 seconds longer than NFPA 1710 calls for.
- There is a 4-minute, 4-second difference between the arrival of the first WFPS unit and the fifth unit on scene for fires.

This report has identified a number of opportunities to improve service. The following recommendations are offered for consideration. These specific recommendations for each are described in more detail at the end of this report.

Recommendations

Formally Adopt Response Performance Objectives

In order to provide a solid basis for planning future service delivery, specific response performance objectives should be adopted by the City of Winnipeg. Reasonable measures should be employed to achieve each of the response performance elements outlined in NFPA 1710, but the agency must first adopt the performance objectives as the target. Resources must follow adoption of these objectives to increase the likelihood of achievement.

The following elements are specifically recommended for adoption:

Recommended Response Performance Objectives

Incident Interval	Performance Standard
9-1-1 call answer time (time from first ring to answer)	Within 15 seconds, 95% of the time Within 40 seconds, 99% of the time
Call transfer time (time from answer to acceptance at the secondary dispatch centre)	Within 30 seconds, 95% of the time
Call process time (time from acceptance at the dispatch centre until notification of response units)	Within 64 seconds, 90% of the time Within 106 seconds, 95% of the time
• Emergency medical dispatch questioning and pre-arrival medical instructions • Calls requiring language translation • Calls requiring the use of a TTY/TDD device or audio/video relay services • Calls of criminal activity that require information vital to emergency responder safety prior to dispatching units • Hazardous material incidents • Technical rescue • Calls that require determining the location of the alarm due to insufficient information • Calls received by text message	• When addressing these types of response requests or additional challenges, alarm processing shall be completed within 90 seconds, 90% of the time and within 120 seconds, 99% of the time.
Turnout time (time from notification of response personnel until the initiation of movement towards the incident) Fire and Special Operations incidents	Within 80 seconds, 90% of the time
Turnout time (time from notification of response personnel until the initiation of movement towards the incident) EMS incidents	Within 60 seconds, 90% of the time
First engine company at a fire suppression incident (time from initiation of response until arrival at the incident)	Within 4 minutes, 90% of the time
First unit with first responder with automatic external defibrillator (AED) or higher-level capability at an emergency medical incident	Within 4 minutes, 90% of the time
Arrival of an advanced life support (ALS) unit at an emergency medical incident, provided a first responder with AED or basic life support (BLS) unit arrived within 4 minutes	Within 8 minutes, 90% of the time
Full effective response force travel time for fire suppression incidents other than high rise	Within 8 minutes, 90% of the time
Full effective response force travel time for high rise fire suppression incidents	Within 10 minutes, 10 seconds, 90% of the time

Improve Call Processing Performance

Winnipeg Police Services, the agency that initially receives 9-1-1 calls, should develop the capability to evaluate and report the amount of time it takes to answer and then transfer a request for services to the WFPS Communication Centre.

WFPS should consider implementation of early notification of responders (pre-alert) in order to shorten the time taken to process and dispatch an emergency, especially those delayed due to Medical Priority Dispatch (MPDS) triaging of callers.

Annual Performance Reporting

NFPA 1710 and ESCI recommend the City Council task the fire department to annually report to the Council and the community actual performance for the preceding year as compared to the performance objectives; describe the causal factors for failure to achieve any objectives not met; quantify the likely consequences of continued failure to meet those objectives it is not currently meeting; and identify steps planned to address the gaps, if any. This annual reporting should follow a format similar to Appendix A of this report.

Compilation of multiple annual reports following the same format year over year will allow the agency to establish trends once the data has been compiled for five years or more. At that time, the agency should evaluate the data for trends, making deployment adjustments as necessary. It is important that the format and data collection remain consistent year over year to ensure comparability.

Facility Improvements

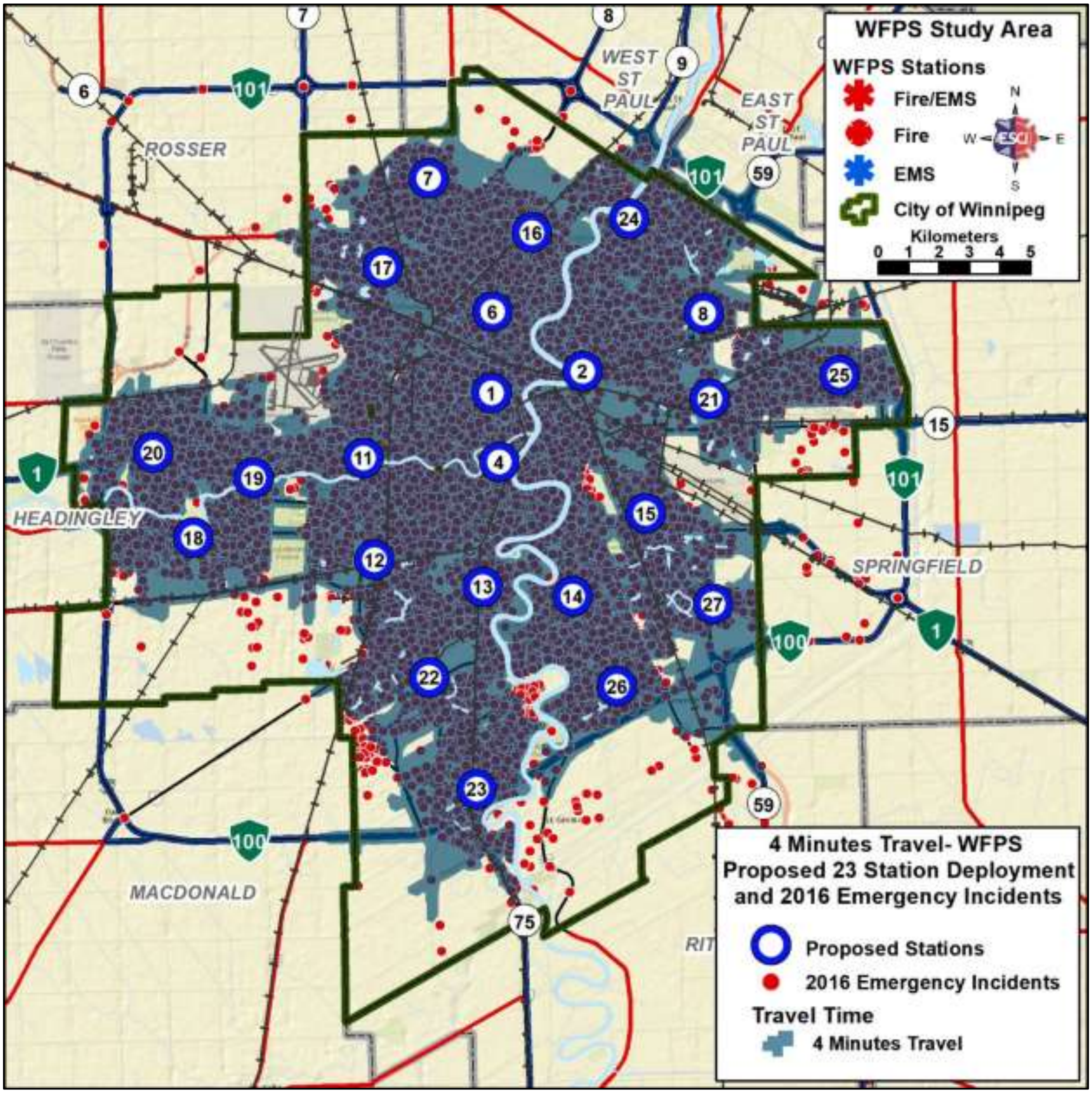
As addressed in greater detail in the companion to this report (WFPS Master Plan), ESCI has determined that fewer fire stations (23 stations), properly positioned and configured, can actually slightly improve response performance over the current 30 fire and EMS response facilities. The repositioning of the facilities provides greater balance in travel time coverage over the current deployment, and the opportunity to remodel, reconfigure, or rebuild stations with a focus on egress from all areas of the station for improved turnout time. Both improve total response time. There are significant opportunities to capture several efficiencies, such as:

- Many of the WFPS facilities are in need of significant remodeling or total replacement as determined by ESCI's site assessment, thus any reconfiguration consideration is timely;
- Modern fire station design can be factored into these facilities, reducing turnout time for responding crews just by improving work flow within the station;
- While facility reconstruction is an expensive and complicated logistical endeavor, it is a one-time cost. Reducing the number of facilities that require maintenance is an ongoing cost avoidance strategy;
- Existing fire station sites are utilized as much as practical to capture as much efficiency as possible and reduce expense;
- Existing inventory of facilities that become surplus to the needs of the City as a result of implementing this recommendation are able to be liquidated, with the proceeds of the sale of these properties reinvested to offset the capital costs.

Multiple locations were evaluated to arrive at the station locations modeled in the following graphic. The model presented represents a mix of existing station locations and new locations. The proposed station locations are labeled with the number of the existing station they replace.

The following figure overlays the proposed station travel time model and 2016 emergency service demand.

Proposed 23 Station Deployment Model and Service Demand, 4 Minutes Travel



Nearly 98 percent (97.7 percent) of 2016 emergency incidents are within four minutes travel or less (NFPA 1710 criteria) of a WFPS station using the 23-station deployment model displayed in this figure. Note that the preceding figure demonstrates potential travel time over the existing street network, assuming that apparatus are in quarters and available to respond, not actual performance.

This represents a slight improvement over the current WFPS station deployment, which is within four minutes travel or less of approximately 97 percent (97.2 percent) of 2016 emergency service demand. It is important to note that the proposed model achieves slightly better emergency service demand coverage than the current station deployment and reduces the number of WFPS stations from 30 to 23.

ESCI also used Fire Underwriters Survey (FUS) criteria in evaluating the 23-station configuration. In the FUS criteria, the proposed station deployment model provides a somewhat higher level of coverage. Ninety-nine percent (99 percent) of both the PFPC (commercial, industrial, and multifamily residential) and DPG (one or two family detached residential) properties are within five kilometers driving distance of a proposed fire station location.

Finally, ESCI calculated resource concentration impacts with the 23-station configuration. Appropriately, the greatest concentration of stations occurs in the central core of Winnipeg. Up to 11 stations are within eight minutes travel or less of the downtown core and the surrounding area. Over 40 percent of 2016 emergency service demand occurred in the area around Stations 1, 2, 4, and 6. It is essential that a high concentration of resources be available to handle the service demand in this area. As with the current deployment of stations, most of the portions of Winnipeg within the Highway 100/101 corridor around the city are within eight minutes travel time of four to seven stations.

As mentioned at the beginning of this recommendation, redesigning the fire stations for greater efficiency also improves turnout times. By orienting all living spaces toward the apparatus bays and providing quick ingress to the bays for an immediate response can reduce turnout times significantly.

DESCRIPTION OF COMMUNITY SERVED

Organization Overview

The first French officer, Sieur de La Vérendrye, arrived in what is now Winnipeg in 1738, and built the first fur trading post on the site (Fort Rouge). The French traded in the area for several decades before Hudson's Bay Company traders arrived, increasing activity in the area. Growth continued until the City incorporated on November 8, 1873, with a population of 1,869 and was named after the nearby Lake Winnipeg, which is the Western Cree word for *muddy water*. The city experienced a 30-year period of growth and prosperity with the arrival of the Canadian Pacific Railway in 1885. Winnipeg became a financial centre in Western Canada thanks to a flood of immigrants, high wheat prices, and improved farming techniques. Winnipeg faced financial difficulty, however, when the Panama Canal opened in 1914. The canal reduced reliance on Canada's rail system for international trade, and the increase in ship traffic helped Vancouver surpass Winnipeg to become Canada's third-largest city in the 1960s.

The City of Winnipeg is now the seventh largest city by population in Canada, and the fifth largest city by population of the eleven cities reporting to the Municipal Benchmarking Network Canada (MBNC) 2015 Performance Measurement Report. Winnipeg is in the south-centre of the province of Manitoba, and geographically near the centre of North America (267 km southwest of Winnipeg). With a 2015 population of 718,400, Winnipeg represents just over 56 percent of Manitoba's 1,278,365 population.

The fire department got its start the year following incorporation on September 24, 1874. Business owners in the city gathered together and established a Volunteer Fire Brigade. Eight years later, on May 17, 1882, Winnipeg established a full-time, paid fire department (prior to the advent of paramedic service). William Orme McRobie was appointed the first official Fire Chief of the department. The City is provided the authority to levy taxes and raise revenue for operating the Winnipeg Fire Paramedic Service (WFPS).

Governance and Lines of Authority

Policy direction for WFPS is provided by fifteen City Council members. These Council members are individually elected by the wards they represent. Council meetings are presided over by the mayor who is elected at large. The Mayor and City Council appoint a Chief Administrative Officer (CAO) to manage the day-to-day affairs and activities of the City on behalf of the Council. Each department head, including the Fire Paramedic Chief, reports to the Chief Corporate Services Officer (CCSO).

Organizational Finance

The Winnipeg Fire Paramedic Service is one of several departments residing in the City's General Fund, comprising approximately 18.5 percent of the total expenditure budget in FY 2017. The City operates on a fiscal year coincident with the calendar year, with the budget process normally culminating in an adopted budget by the end of December. Annual audits of City finances are performed by KPMG and the City follows Canadian Public-Sector Accounting Standards. The department contains an imbedded finance section, headed by a Comptroller with a dual-reporting relationship to the Fire Paramedic Chief and City CFO. This department-level, direct financial expertise and oversight provides the Fire Paramedic Chief with budgetary control and planning assistance not normally available to municipal fire services. This close relationship allows the department to recognize and implement cost-saving measures more rapidly than might normally occur.

Similar relationships are present in Human Resources and IT services. These combined support services reside in funds wholly separate from the Municipal General Fund. WFPS funds these services directly within their expenditure budget. Staff members providing these services also maintain dual-reporting relationships to the Fire Paramedic Chief and their discipline-specific department head. This affords a high degree of budgetary transparency for each of these services by ensuring that the full costs of providing direct fire paramedic service as well as all the corresponding support service ("back office") costs are readily understood.

City Council and department leadership have implemented certain cost-saving measures with respect to fire paramedic services over the years and the department has continued to provide high levels of service while successfully managing those changes. Through the ongoing integration of fire and paramedic services, the City has eliminated duplication of administrative and support function staff and associated costs required for two separate departments, while maintaining the core services within the community. Consolidation has streamlined costs and allowed the City to maintain and even improve upon its prior level of service as seen with respect to its peer group in the 2015 benchmarking study. WFPS leadership continues to work towards more fully integrating these major emergency services functions.

Deferred capital facility projects and lack of long-range capital improvement planning have created a capital funding deficit that grows larger each year. Winnipeg uses bond funding for major capital projects, so there will need to be careful consideration of funding the debt service expense on such a significant capital improvement plan.

Revenue

The following figure shows fire department-specific recurring and non-recurring revenue sources in the General Fund used for annual operating and capital expenses respectively. Revenues classed as recurring are those reasonably expected to occur year-to-year with some degree of predictability, such as ambulance user fees and various other fees. Provincial grants are also included as recurring revenue as they are ongoing in nature or governed by negotiated agreements and are expected to continue in some form. In 2017, the Winnipeg Regional Health Authority stepped away from the long-established funding formula for emergency ambulance services. As a result, the WFPS and the Health Authority are in negotiations to establish a new funding framework for 2018, and future years. This will provide funding certainty for all parties and establish the totality of funding available to provide services. Non-recurring revenue sources are those such as bond proceeds, certain grants, and other funds used for one-time capital expenditures or programs.

Figure 1: WFPS Revenue Sources, 2012 Actual through 2018 Adopted

REVENUE	2012 Actual	2013 Actual	2014 Actual	2015 Actual	2016 Actual	2017 Actual	2018 Adopted
Ambulance	$27,377,674	$27,141,250	$27,191,227	$28,292,387	$28,602,367	$30,784,843	$27,997,000
Other	$1,078,211	$1,371,256	$1,143,324	$1,196,930	$904,021	$853,732	$1,729,000
Province	$12,390,586	$12,321,451	$12,344,951	$12,655,700	$12,655,700	$12,656,000	$12,986,000
Building Manitoba Fund	*$5,035,600*	*$5,035,700*	*$5,035,700*	*$0*	*$0*	*$0*	*$0*
Fire Paramedics	*$0*	*$0*	*$0*	*$5,035,700*	*$5,035,700*	*$5,036,000*	*$5,036,000*
Fire Based EMS Grant	*$500,000*	*$500,000*	*$500,000*	*$500,000*	*$500,000*	*$500,000*	*$500,000*
EMS	*$5,250,000*	*$5,250,000*	*$5,250,000*	*$5,250,000*	*$5,250,000*	*$5,250,000*	*$5,250,000*
Amb. Oper. Grant[1]	*$1,604,986*	*$1,535,751*	*$1,559,251*	*$1,870,000*	*$1,870,000*	*$1,870,000*	*$2,200,000*
WRHA	$4,228,200	$9,738,506	$11,531,709	$12,692,797	$15,753,890	$17,199,305	$19,541,417
Base Grant	*$3,798,451*	*$7,928,053*	*$9,083,402*	*$14,277,724*	*$12,186,702*	*$13,517,049*	*$11,718,168*
Special Grant	*$1,538,999*	*$2,487,385*	*$2,831,132*	*$2,458*	*$5,437,193*	*$3,682,256*	*$5,227,249*
Amb. Oper. Grant adj.	*-$1,559,250*	*-$1,559,246*	*-$1,559,251*	*-$1,870,000*	*-$1,870,000*		*$0*
Fee stabilization	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*	*$2,596,000*
MSP (Main Street Project)	*$450,000*	*$882,314*	*$1,176,426*	*$282,615*	*-$5*	*$0*	*$0*
Recurring Revenue	$45,074,670	$50,572,463	$52,211,211	$54,837,814	$57,915,978	$61,493,879	$62,253,417
Misc. Regulation Fees	$847	$1,277	$1,303	$2,504	$1,020,529	$649,275	$350,000
Misc. Sales of G&S	$1,783	$5,356	$1,640	$64,789	$31,249	$130,023	$0
Other revenue	$98,220	$97,167	$104,983	$235,272	$53,678	$236,640	$63,000
Non-Recurring Revenue	$100,850	$103,799	$107,926	$302,565	$1,105,456	$1,015,938	$413,000
Revenue Total	**$45,175,520**	**$50,676,262**	**$52,319,137**	**$55,140,379**	**$59,021,434**	**$62,509,817**	**$62,666,417**

[1]Ambulances provided by provincial government – this is a value-in-kind accounting adjustment to reflect the notional value of receiving ambulances for free and is offset by an equivalent cost in operating expenses

Total recurring revenues available each year are shown in orange rows and have steadily grown, ranging from $45,074,670 in 2012, to a high of $61,493,879 in 2017. WFPS recurring revenue has grown by $16,419,209 or 36.4 percent over the five-year period, or an average annual growth rate of 6.5 percent. Ambulance revenue, while growing from $27,377,674 to $30,784,843 (12.4 percent growth), has declined from 61 percent of the recurring revenue stream in 2012, to 50 percent as of 2017. This is primarily due to significant increases in WRHA grant funding ($4,228,200 to $17,199,305) as service level increased. WFPS receives significant grant funding from both the provincial government and the Winnipeg Regional Health Authority (WRHA).

WFPS provides paramedic services under contract with WRHA and the base and special grants are effectively payment for services provided. WFPS invoices WRHA both on a biweekly basis for services provided (base grant) and annually (special grant). The department receives annual grant funding from the Manitoba provincial government for both paramedic ambulance and integrated first responder EMS services. Through consolidation of fire and paramedic services, provincial grant funding of just over $5.5 million is provided annually to partially offset personnel costs of fire operations staff cross-trained to perform medical services prior to arrival of ambulance units, significantly improving the level of medical services available to citizens and visitors of Winnipeg.

Expense

The following figure shows actual departmental expenses from 2012 through 2017, and adopted for 2018. Major budgetary categories are employee expenses for all departmental functions (Fire Paramedic Operations, Administration, Finance, IT, Communications, and Human Resources), operating expense, and debt service. Major capital expense is accounted for in fleet rental charges (the Fleet Management Agency purchases apparatus) and debt service or transfer to general capital fund and cash to capital (described in greater detail in the discussion following Figure 2).

Figure 2: WFPS Expenditures, 2012 Actual through 2018 Adopted

EXPENSES	2012 Actual	2013 Actual	2014 Actual	2015 Actual	2016 Actual	2017 Actual	2018 Adopted
Salaries	$107,378,342	$114,841,099	$120,874,675	$125,454,059	$131,077,353	$134,025,414	$141,332,271
Overtime	$3,011,519	$5,335,300	$3,121,166	$4,489,254	$5,090,099	$3,273,387	$2,179,000
Salaries Subtotal	$110,389,861	$120,176,398	$123,995,841	$129,943,313	$136,167,453	$137,298,801	$143,511,271
Retirement (Pension)	$15,252,927	$18,073,388	$17,816,523	$19,007,480	$20,208,600	$21,389,872	$20,451,557
Insurance	$1,743,492	$2,093,338	$2,168,260	$2,045,272	$2,120,862	$1,906,558	$1,640,155
Workers Compensation	$3,155,636	$3,255,749	$2,766,982	$2,873,983	$3,150,733	$3,028,304	$1,664,091
Medical benefits	$1,612,715	$1,703,537	$1,734,498	$1,777,665	$1,856,769	$1,850,460	$1,865,897
Other	$214,785	$158,342	$260,542	$271,710	$283,038	$286,682	$250,000
Benefits Subtotal	$21,979,555	$25,284,354	$24,746,805	$25,976,111	$27,620,002	$28,461,876	$25,871,700
Employee Expenses	**$132,369,416**	**$145,460,752**	**$148,742,646**	**$155,919,423**	**$163,787,454**	**$165,760,676**	**$169,382,971**
Operating Services	$4,188,921	$4,718,263	$5,149,256	$5,222,825	$5,820,571	$6,444,243	$6,985,981
Operating Commodities	$6,988,253	$6,840,935	$6,895,935	$6,451,696	$7,171,580	$7,848,024	$5,888,000
Fleet Rental	$3,395,998	$4,133,709	$4,583,432	$4,838,393	$5,277,134	$5,309,073	$6,302,000
Fleet Maintenance	$1,025,871	$1,039,483	$708,902	$887,417	$882,356	$898,621	$901,000
Motor Fuels/Lubricants	$808,675	$743,891	$846,305	$631,282	$574,055	$678,913	$640,000
Accommodation Rental	$1,755,908	$1,796,540	$1,775,020	$1,775,018	$1,760,193	$1,760,193	$1,890,869
Transfers - Other	$0	$731,317	$332,432	$89,308	$295,355	$99,817	$92,745
Operating Expenses	**$18,163,626**	**$20,004,139**	**$20,291,282**	**$19,895,938**	**$21,781,245**	**$23,038,884**	**$22,700,595**
Principal	$2,261,596	$6,714,677	$1,003,636	$3,996,799	$5,065,298	$5,989,443	$912,732
Principal	*$1,161,685*	*$1,192,886*	*$772,058*	*$648,799*	*$692,391*	*$733,852*	*$808,818*
Tsf to General Capital fund	*$705,443*	*$521,791*	*$231,579*	*$0*	*$39,907*	*$44,590*	*$0*
Tsf to GCF - cash to capital	*$0*	*$5,000,000*	*$0*	*$3,348,000*	*$4,333,000*	*$5,211,000*	*$0*
Internal Financing-Principal	*$394,468*	*$0*	*$0*	*$0*	*$0*	*$0*	*$103,914*
Interest	$954,543	$465,949	$424,513	$401,587	$435,392	$441,125	$431,648
Interest	*$648,017*	*$465,949*	*$424,513*	*$401,587*	*$435,392*	*$441,125*	*$396,060*
Internal Financing-Interest	*$306,526*	*$0*	*$0*	*$0*	*$0*	*$0*	*$35,588*
Debenture Issue Expense	$4,532	$24,760	$9,065	$4,707	$12,290	$11,487	$29,265
Debt Servicing	**$3,220,671**	**$7,205,386**	**$1,437,214**	**$4,403,093**	**$5,512,980**	**$6,442,055**	**$1,373,645**
Expense Total	**$153,753,712**	**$172,670,276**	**$170,471,142**	**$180,218,454**	**$191,081,679**	**$195,241,615**	**$193,457,211**

Overall departmental expenditures have increased from 2012 through 2017, rising from $153,753,712 to $195,241,615 over the period (an increase of $41,487,903 or 27 percent), which averages 5 percent annually. Employee costs comprise the majority of the WFPS annual operating budget, ranging from a low of near 84 percent to a high of almost 88 percent and averaging almost 86 percent of the total operating budget throughout the period. The major factor affecting growth of the employee expenditure budget is an overall increase in salary and benefits.

Operating expenses in general have increased from $18,163,626 in 2012, to $23,038,884 in 2017. This represents an increase of $4,875,258 or 26.8 percent over the period for an average annual increase of 5 percent.

Capital expense for facility construction and fleet acquisition/replacement are not budgeted directly. Rather, apparatus are purchased by the Fleet Management Agency using a scheduled replacement program through funds acquired from WFPS via an annual apparatus lease payment (an operating expense). Some capital equipment and all major facilities expenses are funded through debt servicing (principal, transfer to general capital fund, GCF cash to capital, and internal financing). Debt Service (which includes transfers to the General Capital Fund—cash to capital), while variable, has increased over the period from approximately $3.2 million in 2012, to $6.4 million in 2017.

An efficiency gained by combining fire and paramedic services is the operation of paramedic units out of strategically placed fire stations (fire paramedic stations). However, some ambulance-only stations continue. This represents an inefficiency in that duplicate facilities are maintained where fire and paramedic units could be combined into one. This duplication increases annual maintenance and repair costs as well as renovation costs as facilities age. Further, many of the current fire stations are in poor condition and need major renovation or replacement while routine maintenance costs have remained static. The City has undertaken some major capital renovation and expansion projects, although no long-range facility capital improvement plan (CIP) exists, nor has a funding source been identified.

Service Area Overview

Within the 475.5 square kilometers that make up the WFPS service area, there are 292,127 residential units and 10,030 businesses protected. At a population density of 1,510.83[4] persons per square kilometer, the city is 100 percent urban in character. Winnipeg is a culturally diverse city with more than 100 languages and nationalities represented throughout the region. Winnipeg is known for its unique winter experiences, flourishing arts scene, colourful festivals, and character neighbourhoods, as well as its green spaces and access to outdoor activities. The city features more than 1,100 restaurants as well as numerous world-class attractions, museums, theatres, sports venues, and night clubs.[5]

Industries and employment opportunities exist in Aerospace, Transportation & Distribution, Energy & Environment, Agribusiness, Life Sciences, Information, Communications and Technology, Advanced Manufacturing, Tourism, Creative Industries, and the Financial Sector. As the largest city in the province, it is a major transportation hub with an international airport (Winnipeg James Armstrong Richardson International Airport), and a very large transnational, national, and regional hub for freight and passenger rail traffic. Winnipeg is surrounded by Provincial Trunk Highways (PTH) 100 and 101 (locally known as the Perimeter Highway). This allows travelers to bypass heavier commuter traffic within the city. There are no freeways through the city.

[4] Municipal Benchmarking Network Canada, 2015 Performance Measurement Report, EMDS008, FIRE008. Municipal Benchmarking Network Canada (MBNCanada), c/o City of Hamilton, 71 Main Street West, Hamilton, ON L8P 4Y5.

[5] *Tourism Winnipeg*. https://www.tourismwinnipeg.com/media/media-kit/winnipeg-facts; accessed 7-05-2017 at 1528.

REVIEW OF SERVICES PROVIDED

Services Provided

The WFPS service area includes all the City of Winnipeg. The WFPS provides a variety of response services, including fire suppression, advanced life support level emergency medical care (including ambulance transportation), and entrapment extrication. WFPS also provides technical rescue services including high-angle, trench, water/ice rescue, and confined space. Finally, WFPS provides fully capable hazardous materials emergency response.

WFPS also provides non-response services in support of the department, including the Professional Development, Support Services, and Emergency Management & Public Information divisions. Non-response, administrative assistance also includes Information Technology, Finance, and Human Resources functions which are fully funded from the WFPS budget but have a dual reporting relationship to both the Fire & Paramedic Chief and their discipline-specific corporate officers. Fire investigations are conducted by specialists assigned to each shift and are quasi response functions, although are typically in support of emergency activities.

The WFPS Communications Centre is responsible for coordinating and dispatching all emergency and non-emergency calls for service for EMS and fire calls originating in Winnipeg. The Centre is a secondary public safety access point. Winnipeg Police Service triages all initial 9-1-1 calls and routes them to WFPS for fire or EMS assistance. The Centre is staffed 24 hours a day, seven days a week, 365 days a year. The minimum number of personnel on duty at any one time is five; typical shift staffs seven with one Communications Supervisor. This does not include interfacility transfer coordinators (IFTC).

There are 1,401 full-time personnel involved in delivering services to the jurisdiction, whether direct emergency response or in support of the department in a non-response role. Staffing coverage for emergency response is with career firefighters on alternating 10-hour day, 14-hour night shifts for a 42-hour work week. For immediate response, no less than 167 firefighter personnel are on-duty at all times. These fire resources are staffed with a minimum of 38 dual role firefighter-primary care paramedics (PCPs). Additional single-role, certified Advanced Care Paramedics (ACPs), Intermediate Care Paramedics (ICPs), and Primary Care Paramedics (PCPs) staff ambulances and work shifts on one of six platoons. One tour of duty consists of four days, working two 12-hour day shifts and two 12-hour night shifts. This is followed by four days off.

The following figure provides basic information on each of the department's core services, its general resource capability for that service, and information regarding staff resources for that service.

Figure 3: Core Services Summary

Service	General Resource/Asset Capability	Basic Staffing Capability per Shift
Fire Suppression	29 staffed engines 5 staffed ladder trucks 6 rescue trucks 1 Safety officer 3 2-person squads	167 suppression-trained personnel
Emergency Medical Services	29 engines with minimum 1 PCP 6 Rescues with minimum 1 PCP 3 Squads with minimum 1 PCP 17 24-hour ambulances 2 IFT ambulances 7 Peak hour ambulances 1 peak IFT	54 ambulance-based paramedics, of which 38 are on 24 hour shifts and 16 are peak hour Minimum 38 fire-based paramedics
Vehicle Extrication	6 trucks equipped with hydraulic rescue tools, hand tools, air bags, cutting torch, stabilization cribbing, and combination cutter-spreader hydraulic rescue tool	All firefighters are vehicle rescue trained
High-Angle Rescue	E11, R11, L11 equipped with rescue-rated rope and all associated hardware	All personnel trained to the operations level
Trench and Collapse Rescue	E11, R11, L11 trench trained with trailer available equipped with pneumatic shoring jacks, cribbing, limited lumber, and hand tools for initial stabilization	All personnel trained to the operations level
Swift-Water Rescue	3 cross-staffed water rescue vehicles with light boats and one rescue boat	All personnel trained to the operations level; Staff on R4, E3, E13, E23, and E231 all Water Rescue certified
Confined Space Rescue	Staff on E11, R11, and L11 confined space certified and equipped with tripod, cribbing, pneumatic shores, air monitoring equipment, basket stretchers, rescue-rated rope	All personnel trained to the operations level
Hazardous Materials Response	Hazardous Materials response vehicle equipped with personal protective equipment, gas & radiation monitoring equipment, containment supplies, and non-sparking tools; HM 9, HM7 cross staffed. 2 Decontamination trailers available at mechanical services branch	All personnel trained to the technician level on E9 and R9. HM7 provides staffing for the decontamination function at a hazardous materials event.

Assets and Resources

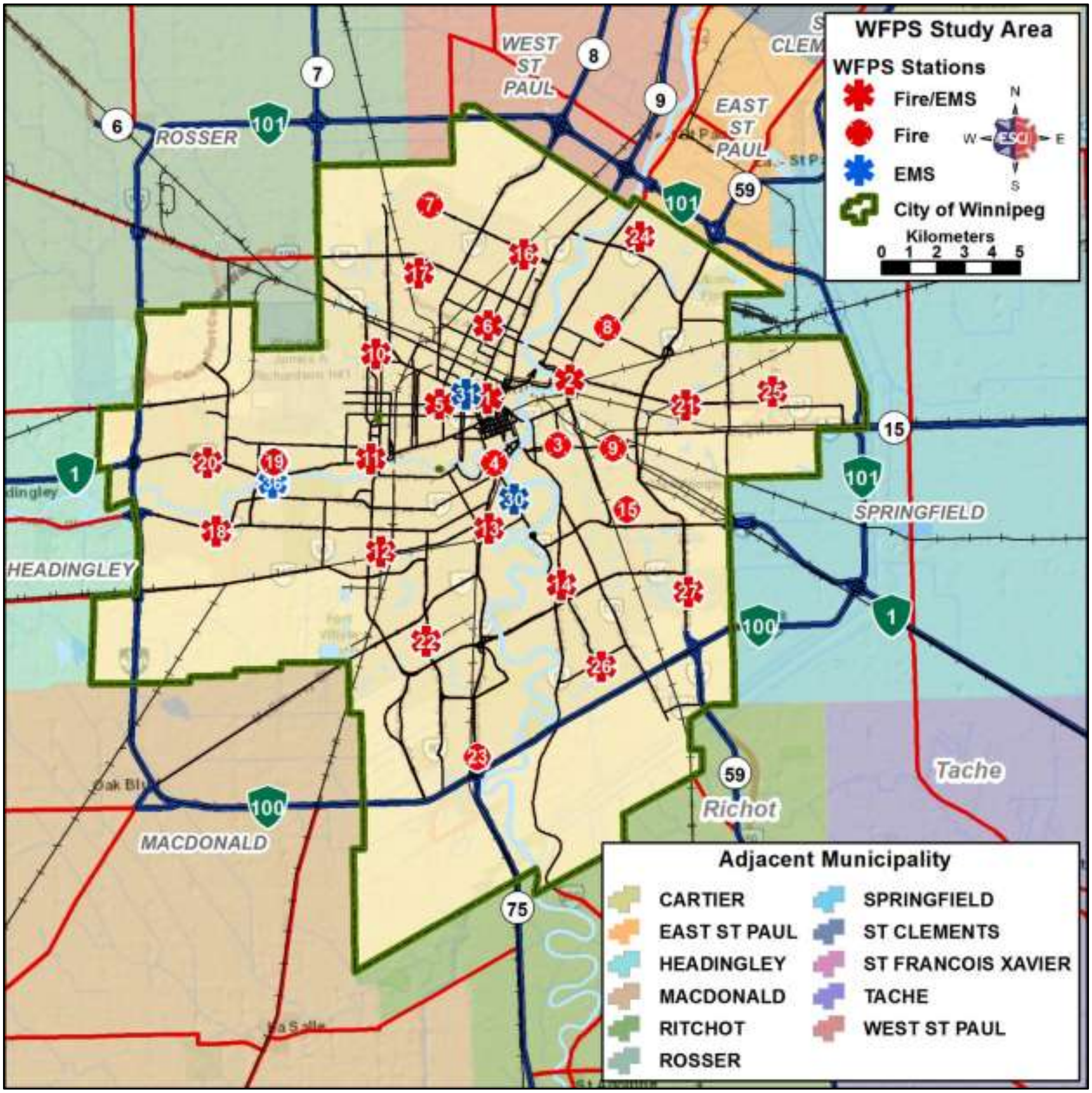
The locations of emergency response facilities (fire and ambulance stations) will influence to a large degree the response times possible for an emergency services agency. Presuming these facilities are the primary base from which they respond, their ability to get to an emergency is a simple matter of physics. Finally, the staffing and competency of the crews assigned to these resources has a direct bearing on the effectiveness of the response. Together, properly placed facilities with the right type and number of apparatus, staffed with sufficient numbers of competent personnel combine to provide the greatest likelihood of a positive outcome for an emergency.

Station Location and Deployment

The City is served by 30 emergency services facilities; three paramedic ambulance-only stations, eight fire-only stations, and 19 combined fire-paramedic ambulance stations. This does not include the headquarters/fire prevention offices, nor the training facility.

These facilities are strategically distributed throughout the jurisdiction, as depicted in the following figure.

Figure 4: Current Facility Deployment



A survey of these fire department facilities was conducted January 23–27, 2017, to determine suitability for their intended mission. The survey included the City's fire stations, ambulance quarters, the Emergency Mechanical Services Branch (EMSB), and fire department training facilities. During the facility tours, interviews were conducted with available personnel assigned to a majority of the buildings to gather specific facility information.

The City's fire stations range in age from less than two years to over 100 years with the average station age at 38 years. Twenty-three Winnipeg fire stations are over 45 years of age, which is 74 percent of the existing facilities. A more detailed assessment of WFPS facilities was conducted and included as part of the agency's master plan, compiled simultaneous to this report.

Most of the fire stations are of masonry construction with a brick veneer. The stations vary greatly in design with differing floor plans. The older station designs are generally not conducive to efficient emergency response egress. Living quarters are in many cases located remotely from the apparatus bay and requiring circuitous personnel travel routes to get to the apparatus bays, which adds to the crew turnout time. Many of the stations have multiple floors with stairs, which are a factor in injuries due to slips, trips, and falls. Stations often have rooms which combine sleeping areas with the dayroom and may also include workout facilities and equipment. This can be an unsanitary situation.

Generally, the truck bay areas appeared to have adequate depth, however many did not provide enough width to safely maneuver around the apparatus. All City of Winnipeg fire stations are equipped with vehicle exhaust extraction systems. Two of the ambulance-only stations were not equipped with these systems and should be. Stations are also equipped with extraction washers for turnouts and had decontamination sinks available. Clothing washers and dryers are not available in most stations. Employees may be taking contaminated clothing and bedding home to be laundered, potentially transferring carcinogens to their homes and loved ones.

Discoloration in the ceilings of many stations indicated roof leakage had occurred. Due to the freezing weather conditions, any active leakage was unobservable. With the age of many of the structures and the construction materials used, it is likely that many buildings have materials containing asbestos. Asbestos warning labels were noted in some stations. Many fire stations have basements, which are low points where radon gas may collect. Testing for radon has not been conducted.

Except for Station 11 (the newest station), none of the City fire stations are protected by an automatic fire sprinkler system. The older stations were built prior to consideration of sprinkler systems, however, Winnipeg has stations that are less than five years old that were constructed without sprinkler systems. Only two fire stations are equipped with auxiliary power equipment (an emergency generator). Stations are not equipped with cooking appliance (electric or gas) shut offs, which would automatically activate at the time of dispatch. It is common to have kitchen fires occur in fire stations while crews are out of quarters.

ESCI is unaware of any energy audits being performed for existing fire facilities. Energy audits are often performed at no cost by the power utility provider. These audits can reveal areas of concern, which may be easily addressed to assist with lowering energy costs. Power utility providers may also have programs that cover or dramatically reduce the cost of upgrading lighting or heating equipment to support energy savings.

Many of the Winnipeg fire stations do not have adequate facilities to support a mixed gender workforce. The addition of designated female washrooms, locker areas, and sleeping quarters should be a high priority. Few of the stations include public meeting or training rooms. Community support for this type of space is generally a very positive feature of fire facilities. Training rooms are invaluable resources for crew development.

The fire training tower is co-located with Emergency Mechanical Services Branch (EMSB). The tower is of modern design and provides training opportunities that replicate those encountered on emergency calls in the City of Winnipeg. The tower was originally designed to use natural gas to simulate heat and flame rather than burning Class A fuels. Due to safety concerns, the natural gas system is no longer in use. The department currently does not offer a way to provide live fire training to recruits or as a refresher for current firefighting personnel. The City of Winnipeg does not allow the burning of donated structures due to insurance risks. A remodel of the existing training facilities or the addition of another Class A training facility is strongly recommended. This is further addressed in the WFPS Master Plan.

Numerous kitchen spaces are in extremely poor condition. Cabinet doors are missing or mismatched, drawers are broken and/or missing, and some counter tops are worn through. Mold was noted in some kitchen cabinets. Washrooms were in fair condition. One station has a wooden step in front of the urinal due to its excessive height. This appeared unsanitary. Nearly all the fire stations would benefit from interior paint and new flooring in some areas as well as stair step traction surfaces.

The EMSB is co-located with training, stores, SCBA repair, turnout repair, and reserve apparatus storage. The shop area allows for approximately five apparatus to be worked on simultaneously. Given the size of the Winnipeg fleet the area is quite small. One or more units in for a lengthy repair will create significant workspace issues. Additional space is needed for storage of parts and equipment as well as an office-type area for recordkeeping. One section of the shop does not allow the use of vehicle lifts due to the unevenness of the floor.

The shop air compressor does not have the capability to fill apparatus tires to the recommended pressure. Air lines to portions of the shop are not usable due to the amount of rust inside the lines.

Key Recommendations

- Condition of the facilities roofs and gutters should be evaluated when snow is not hiding potential issues. Maintenance needs should be addressed prior to the return of winter weather. Missing and stained ceiling tiles should be replaced.
- Radon testing should be conducted for stations with basements or low areas.
- Retrofit an uninterruptable power supply, such as backup generators. All future stations should incorporate auxiliary power.
- Consider adding automatic fire sprinkler systems to the newest fire stations with the possibility of sprinkling at least the living quarters of existing stations, especially those likely to remain in service for more than 10 years. All new stations, regardless of size, should include automatic fire sprinkler systems.
- Alarm (response) activated kitchen appliance shut-offs (gas and electric) should be installed for all fire facilities. Cooking appliances left unattended are a significant contributor to fire station fires.
- Clothes washers and dryers should be added to stations to avoid employees inadvertently exposing family members to contaminants from laundering uniforms and bedding at home.
- Research the availability of no-cost energy audits and the possibility of low or no cost energy saving upgrades to existing stations.
- Incorporate a multi-purpose training/public meeting room as a part of new station design. The room could be made available to the public for neighborhood meetings and may also be used by the fire department for fire and EMS training or for other City training.
- Create personal space that is gender specific in existing facilities. Sleeping areas, locker rooms, and washrooms should be evaluated and modified. All new stations should include gender specific areas.
- Modifications to the training tower should be investigated to allow for Class A material fire training.
- Repair, remodel, or replace stations in poor condition (see detailed facilities assessment in WFPS Master Plan).
- Hire facilities maintenance crew to maintain existing facilities.
- Remove derelict appliances and electronics currently stored in existing fire stations.

Apparatus

Beyond facility location, matching apparatus type to the risk served and deploying them in sufficient numbers has a significant bearing on the efficiency of the response. The apparatus must be reliable to ensure that it arrives to the emergencies it responds to. If apparatus are not appropriately matched to the risk profile of the response area it is assigned or is not reliable to arrive without delay or malfunction, it reduces the efficiency of the unit and therefore compromises the outcome of the emergency.

A survey of the City of Winnipeg, Manitoba, Canada fire department apparatus fleet was conducted January 23–27, 2017, to determine suitability for their intended mission. The survey included an interview with the emergency mechanical services branch supervisors and several captains, lieutenants, and firefighters regarding their assigned apparatus. An inspection was completed on each fire apparatus apart from two that were out to vendors for repair. Inspected apparatus included engines, ladders, squads, rescues, and a variety of specialized units. Staff vehicles and ambulances were not included in the survey as they were consistently unavailable.

Winnipeg apparatus receive maintenance based on calendar days with each apparatus scheduled four times per year. Fire department personnel conduct daily inspections and note any issues, which are submitted via computer. Anything requiring immediate repair is submitted to the Emergency Mechanical Services Branch (EMSB) at that time. Minor issues are compiled and resolved during the next scheduled preventative maintenance.

EMSB operates one shift from 0730 to 1600, Monday through Friday. There are currently five full-time technicians with two being Emergency Vehicle Technicians with Master Certification. EMSB technicians work exclusively on the fire department's heavy fleet. Light duty vehicles and staff vehicles are not serviced by EMSB. EMSB is authorized for seven positions but has been operating with five for approximately two years.

EMSB appears to be fairly-well equipped and able to handle most of fire apparatus repairs. Several local commercial truck repair facilities are available to handle warranty issues. Specialized apparatus repair centers are also available for repairs the City technicians are not trained to complete.

Annual pump testing is conducted by either firefighters assigned to assist EMSB or an EMSB technician. A mobile pump test unit is utilized for this testing. A sampling of the pump test records was reviewed. Testing appears to utilize standard fire pump test criteria. Apparatus failing a pump test are repaired prior to returning to service. Aerial ladder testing is conducted by a certified contract agent. A sampling of ladder test records was reviewed. Testing and associated documentation follow nationally recognized aerial device testing requirements. Repairs are completed as necessary before returning to service.

Replacement of the fire fleet has not been consistent. Replacement is generally based on age, kilometers, hours, condition, and functionality. An apparatus may only be a few years old but meet the replacement criteria based on hours and kilometers. Ten-thousand (10,000) hours and or 161,000 kilometers is generally held as the industry standard for fire apparatus replacement. Numerous apparatus currently meet or exceed this standard and several others are rapidly approaching these criteria. Using this standard, 25 Winnipeg units meet replacement criteria based on hours, 17 apparatus meet replacement criteria based on kilometers, and nine apparatus meet the criteria in both hours and kilometers. This is a significant portion of the existing fire fleet. Due to the department's high call volume, apparatus age, for all but the specialty response units, is not a practical replacement factor.

Many of the apparatus are in fair or good condition mechanically; though the harsh weather and road conditions have caused extensive corrosion and paint damage. Virtually all the existing apparatus show signs of this type of damage along with a number of dents, scratches, bent bumpers, and loose interior parts. In discussion with EMSB, they indicate that these repairs are often not completed if they appear to be cosmetic wear. If the damage appears to be more than cosmetic, they remove the unit from service for repair. Line crews indicate the current design of apparatus is functional.

The following figure lists apparatus and personnel assignments for each of the 30 facilities within the Winnipeg Fire Paramedic Service and their relative condition, if applicable.

Figure 5: WFPS Stations, Apparatus, & Personnel Assignments

Station	Apparatus or Assignment	Year Built	Condition	Minimum on Duty Staffing
Station 1	Engine 101	2015	Good	4
	Engine 103	2013	Good	4
	Ladder 1	2016	Good	2
	Squad 101	2008	Fair	2
	Squad 102	2001	Fair	2
	Platoon Chief	—	—	1
	EMS Superintendent	—	—	1
	MIRV	—	—	1
	PU91	2016	28,636 kms	2
	PU31	2015	43,407 kms	2
Station 2	Engine 2	2015	Good	4
	Fire Investigator	—	—	1
	PU02	2016	28,013 kms	2
	PU40	2016	78,211 kms	2
Station 3	Engine 3	2008	Good	4
	Water 3	1988	Fair	0
	DC3	—	—	2
Station 4	Engine 4	2013	Good	4
	Rescue 4	2015	Good	4
	DC4	—	—	2

Station	Apparatus or Assignment	Year Built	Condition	Minimum on Duty Staffing
Station 5	Engine 5	2015	Good	4
	Rescue 5	2013	Good	4
	PSO	—	—	1
	PU05	2015	83,306 kms	2
	PU92	2016	31,667 kms	2
Station 6	Engine 6	2015	Good	4
	Rescue 6	2013	Good	4
	Squad 6	2006	Fair	2
	PU06	2015	93,360 kms	2
Station 7	Engine 7	2008	Good	2
	HazMat 7	1997	Fair	0
	Rehab Unit 7	1984	Fair	0
Station 8	Engine 8	2008	Good	4
	Rescue 8	1994	Fair	4
Station 9	Engine 9	2005	Good	4
	Rescue 9	2001	Fair	4
	HazMat 9	1996	Fair	0
Station 10	Engine 10	2008	Good	4
	DC10	—	—	2
Station 11	Engine 11	2013	Good	4
	Rescue 11	2005	Good	4
	Ladder 11	2008	Good	2
	PU11	2016	44,485 kms	2
	MS75	—	—	1
Station 12	Engine 12	2013	Good	4
	PU12	2016	57,116 kms	2
Station 13	Engine 13	2008	Good	4
	Ladder 13	2001	Good	2
	PU13	2016	33,612 kms	2
	W131 Boat	2009	Good	0
Station 14	Engine 14	2008	Good	4
	PU14	2016	40,019	2
Station 15	Engine 15	2004	Good	4
Station 16	Engine 16	2008	Good	4
	Ladder 16	2005	Good	2
	PU16	2015	70,498 kms	2
Station 17	Engine 17	2004	Good	4
Station 18	Engine 18	2013	Good	4
	PU18	2016	35,212 kms	2
Station 19	Engine 19	2001	Good	4
Station 20	Engine 20	2008	Good	4
	PU20	2015	78,328 kms	2
Station 21	Engine 21	2013	Good	4
	Ladder 21	2005	Good	2
	PU49	2015	55,837 kms	2
Station 22	Engine 22	2008	Good	4
	PU22	2016	30,226 kms	2

Station	Apparatus or Assignment	Year Built	Condition	Minimum on Duty Staffing
Station 23	Engine 23	2006	Good	4
	Engine 231	2006	Good	4
	W23 Boat	1987	Fair	0
	T23	—	—	0
Station 24	Engine 24	2008	Good	4
	D4	—	—	2
	PU24	2016	32,479 kms	2
Station 25	Engine 25	2008	Good	4
	PU25	2014	102,854 kms	2
	Snuffer 25	1995	Good	0
Station 26	Engine 26	2005	Good	4
	PU26	2014	72,734 kms	2
Station 27	Engine 27	2006	Good	4
	PU27	2016	41,996 kms	2
Station 30	PU 17	2016	47,407 kms	2
	PU 43	2010	171,989 kms	2
	EPIC	—	—	1
Station 31	PU 01	2016	26,329 kms	2
	PU 41	2014	123,745 kms	2
	PU 45	2011	132,450 kms	2
Station 36	PU 36	2015	55,905	2
Main Street Project (not a WFPS Facility)	Community Paramedics	—	—	2
			Total Shift Strength	**49**

The following are descriptors for each type of unit listed in the previous figure.

Engine – Primary response unit from each station for most types of service requests. Each is equipped with a pump and carries water.

Ladder – A specialized apparatus equipped with long ladders, salvage, overhaul equipment, and rescue tools. Used for structure fires, rescues, and other service requests.

HazMat – A vehicle that carries specialized equipment for use on hazardous materials emergencies.

Rehab Unit – A vehicle that supports personnel at sustained incidents.

Squad – A vehicle that primarily responds to medical calls but can be deployed as support for fire ground operations. Two of these units also have Compressed Air Foam Systems (CAFS) for wildland urban interface fire structure protection.

Paramedic Unit – A vehicle that responds to medical incidents and transports patients.

MIRV – Major Incident Response Vehicle; the MIRV is equipped with the capability to handle five patients on standard transport stretchers and three patients on portable stretchers.

Snuffer – Compressed air foam unit for structure protection in interface fires.

EPIC – Emergency Program in the Community; the primary objective of EPIC is to reduce the substantial number of unnecessary emergency responses from 9-1-1 calls, but also seeks to ensure that patients receive services more appropriate than ambulance transport to a local emergency department, including case management and advocacy.

W3, W23, W131, or W132 – W3 is a water rescue stepvan equipped to support water rescue operations. W23 is a water rescue unit with a traditional rescue body, carrying a zodiac boat and outboard inside that can be deployed at various launch points along the river or retention ponds. W131 is a jet boat that provides access to shallow sections of the river. W132 is a twin outboard boat that is in the river from approximately May through November.

Rescue – A heavy rescue truck typically carrying a complement of ground ladders, water, foam, and extrication equipment to support complicated rescue operations and large incidents.

DC – District Chief vehicle.

PSO – Platoon Safety Officer.

T23 – A 3,500-gallon water tender at Station 23 for response to unhydranted or poorly hydranted areas.

Key Recommendations

- Fully staff EMSB with seven technicians; and a full-time Parts Clerk should be hired. Mechanical Supervisors obtaining parts, maintaining inventory, and receiving deliveries are all taking away from their core mission. All EMSB staff should obtain Emergency Vehicle Technician (EVT) certification status.
- Consider establishing a preventative maintenance schedule based on hours of operation (300 hours are generally considered the industry standard). Annual service is the recommended minimum for all apparatus regardless of hours.
- With more than 70 percent of Winnipeg's fire apparatus currently meeting industry standard replacement criteria and additional units soon to meet the criteria (in kilometers and hours), an aggressive fully funded replacement schedule needs to be established.
- Addition of ladder trucks strategically placed throughout the city is warranted. Straight stick ladders are generally less expensive. A mix of ladder types will provide for different capabilities. An evaluation of the apparatus ladder type best suited should be conducted prior to replacement.
- The current practice of moving apparatus from a busy station to a slower station to even out the kilometers and hours should be re-evaluated. While this practice may extend the life of the fleet, it could come at significant cost as all apparatus come due for replacement at approximately the same time. Replacing busy units more frequently than slower units provides for a much more consistent replacement schedule and spreads the costs out more evenly.
- Current practice is to replace all loose equipment at the time new apparatus is purchased. An evaluation of the loose equipment should be conducted, and only worn or outdated equipment should be considered for replacement. Equipment with remaining service life should be re-used in the new apparatus to help minimize costs. Evaluate the feasibility of replacing pre-plumbed foam systems with eductor systems on future apparatus.
- Dents, scrapes, and corrosion damage should be repaired as quickly as feasible. These repairs will extend the life of the apparatus and inspire the crews to be more diligent in the care of the equipment. Overall engine design should be continually re-evaluated to assure that the current configuration continues to meet the needs of the department.

Staffing Distribution

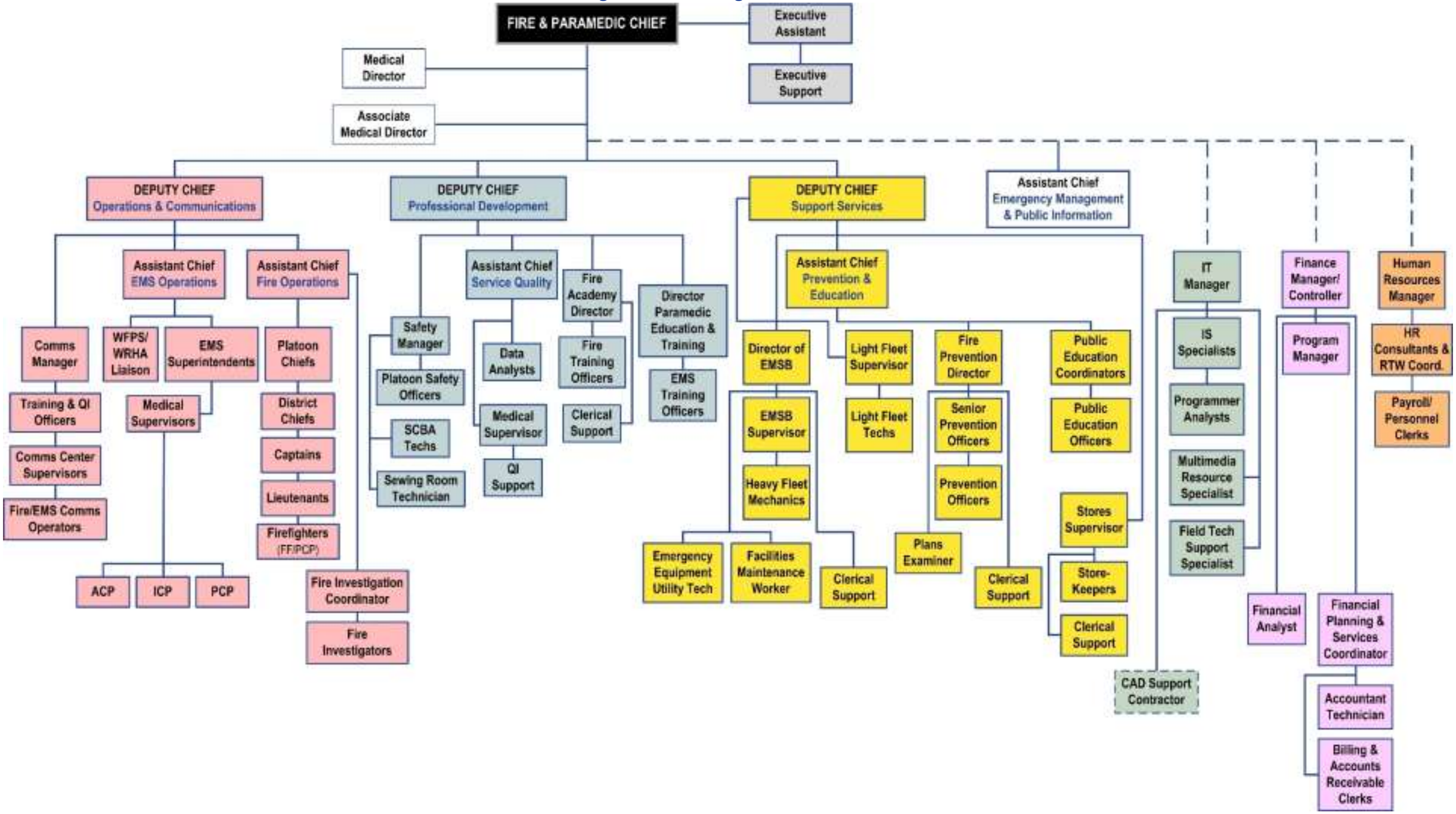
The staffing within WFPS is distributed into four main areas: administration; operations and communications; support services; and emergency management and public information.

Organizational Design

WFPS is structured in a traditional top-down hierarchy, which is typical in the fire service and lends itself to a clear chain of command for information flow and decision-making. The position descriptions for each classification of employee is clearly defined, and follows the "one person, one boss" philosophy, with the notable exceptions of IT Manager, Finance Manager/Comptroller, and Human Resources Manager. In these latter cases, the incumbents have a dual reporting relationship; one to the Fire & Paramedic Chief and one to the functional department head of their respective disciplines. Close and frequent communication is required between and among the subordinate and the two superiors to avoid placing the employees in untenable circumstances and to avoid misunderstanding or missteps.

Span of control appears to be within industry standards and normal limits. A proper span of control is three to seven, with three-to-five optimum, depending on the complexity of the assignments and the criticality of the work performed. The following figure illustrates the reporting relationships, chain of command, and span of control for WFPS.

Figure 6: WFPS Organization Chart



Administration

Effective organizational leadership requires an administrative team with a clear focus on the mission, vision, and value of the organization, and an understanding of the leader's intent. Armed with this information, a member of the administrative team can make independent decisions confident that the effort aligns with other decisions being made within the administrative team. When alignment is seamless, an effective administrative team is in place. Conversely, when there is misalignment by one member of the team, either a team member is unclear on the mission, vision, values, or the leader's intent, or the team member lacks the judgment to execute decisions that properly align with these elements. If large segments of the administrative team are misaligned, then either the leader is unclear on intent, or has not reinforced or established an effective mission, vision, or values. ESCI did not see any evidence that there is misalignment anywhere within the administrative team at WFPS.

The administration is made up of the positions illustrated in the following figure.

Figure 7: WFPS Administrative Team

Position Title	No. of Positions[1]
Fire & Paramedic Chief	1
Deputy Chief, Operations & Communications	1
Deputy Chief, Professional Development	1
Deputy Chief, Support Services	1
Assistant Chief, Fire Operations	1
Assistant Chief, EMS Operations	1
Assistant Chief, Prevention & Education	1
Assistant Chief, Service Quality	1
Assistant Chief, Emergency Management & Public Information	1
Total Executive Management Positions:	**9**
Percent Executive Management to Total FTEs[2]	**1%**

[1]Does not necessarily represent one FTE. [2]Figure is rounded.

Administrative Support

Support for the administration and for the organization is critical. Administration officials and operational activities require appropriate clerical and logistical support to achieve their mission. Reliance upon uniformed or sworn personnel to perform these support functions, unless closely associated technical skills are required, is a mismatch of job assignment. The general principles used to determine which skills match what functions are listed as follows:

- Civilianize positions and functions that are appropriately civilian. If a position or function exists in other industries outside of the fire service, it will be more cost effective and produce the deepest candidate pool if the job search is expanded beyond the fire service. Incumbents who are trained as emergency responders should be reassigned to emergency response or technical support positions whenever possible.
- Concentrate supervisory functions in the portfolios of supervisors. It is not uncommon for personnel within an organization to fall into the habit of blurring the responsibilities of supervisory versus non-supervisory staff. This tendency can take the form of support personnel falling into the role of supervising other staff. Blurring responsibilities can also take place when supervisors avoid managerial responsibilities in favor of non-supervisory or technical work with which employees are more familiar and, therefore, more comfortable. Best practice is to recognize these situations when they occur through regular analysis of roles and functions by Human Resources Specialists.

Figure 8: Administrative Assistance & Other Support Staff

Position Title	No. of Positions[1]
Executive Assistant	1
Senior Clerks	2
Clerks (A, B, & C)—assigned to various divisions	27
Fire & EMS Training Academies (combined)	13
Service Quality	1
Safety (includes Air Room staff)	4
Light Fleet & EMSB	10
Prevention & Education	26
Emergency Management & Public Information	2
Human Resources	4
Finance	5
IT (System Specialists/Programmer Analysts)	8
Total Other Administrative/Support Staff Positions:	**103**
Percent Other Administrative/Support Staff to Total FTEs[2]	**7%**

[1]Does not necessarily represent one FTE. [2]Figure is rounded.

Emergency Operations

Emergency operations, used here to describe emergency medical services and firefighting, is often referred to as "the tip of the spear." This is a military term that has been expanded to include the working end (or dangerous end) of an organization achieving its mission. The men and women who make up this group are where the mission is accomplished, which is serving the citizens of—and visitors to—Winnipeg during their emergencies.

Figure 9: WFPS Fire & EMS Operations Staffing

Position Title	No. of Positions
Assistant Chief	2
EMS Superintendents	4
Platoon Chiefs	4
District Chiefs	16
District Chief of Paramedic Operations (Medical Supervisors)	21
Platoon Safety Officers	4
Captains & Captain PCPs (includes Training Captain)	108
Lieutenants & Lieutenant PCPs	68
Senior (I & II) Firefighters & Firefighters	662
Paramedics (ACP/ICP/PCP); includes MSP & EPIC	292
Lead MSP Community Paramedics	2
Fire Investigation Personnel	5
Total EMS only Operations Positions:	**319**
Total Fire Operations Positions:	**869**
Percent Operational Staff to Total FTEs[1]	**85%**

[1]Figure is rounded.

Each individual engine company and rescue company in WFPS is staffed with four firefighters, many of whom are also certified paramedics. These companies meet NFPA 1710 for staffing levels, which is an industry best practice.

COMMUNITY RISK ASSESSMENT

This section provides information about community characteristics, hazards, and risks as determined from information provided by Winnipeg Fire Paramedic Services (WFPS) and others. The intent of this assessment is to assist the City of Winnipeg in its development of the standards of cover for Winnipeg Fire Paramedic Services (WFPS). It was developed from a broad base of information, including:

- Current hazard classification, planning, and mitigation measures from various sources;
- Specific information provided by WFPS about target hazards and land use; and
- Planning zones established by WFPS.

As such, it provides information to help the community (1) identify hazards and risks for each planning zone in the community; (2) prioritize risks in order to develop a community risk reduction strategy; and (3) determine the appropriate WFPS resources necessary to reduce fire-related risks and attain desired outcomes. This assessment relies on the use of both quantitative and qualitative data to describe the fire/EMS protection needs of the community. This report is intended to provide insight into *what* needs exist, *where* those needs exist, and *how* those needs are expected to change in the future.

How to Use this Chapter

The ultimate goal of this report is to assist the WFPS to identify, deliver, and sustain the services needed to help make the City of Winnipeg a safer and more hazard-resistant community. The information has been written and grouped in a manner to be consistent with the guidelines found in:

- City and regional planning initiatives;
- The Manitoba Hazard Analysis and Risk Assessment Manual;[6]
- The Community Risk Assessment: Standards of Cover Manual, 6th Edition;[7] and
- The Fire and Emergency Service Self-Assessment Manual, 9th Edition.[8]

There are five elements in this section, grouped by topic. Therefore, this section may be read in its entirety, or any element may be accessed directly and independently. In order of presentation, the elements are:

- Methodology
- Community Characteristics
- Community Hazards and Risks
- Summary of Key Findings
- Conclusions and Recommendations

[6] Office of the Manitoba Fire Commissioner (2007); *Hazard Analysis and Risk Assessment*, Brandon, MB.
[7] Center for Public Safety Excellence, Inc. (2016); Community Risk Assessment: Standards of Cover Manual, 6th Edition.
[8] Center for Public Safety Excellence, Inc. (2015); Fire and Emergency Service Self-Assessment Manual, 9th Edition.

A Cautionary Note

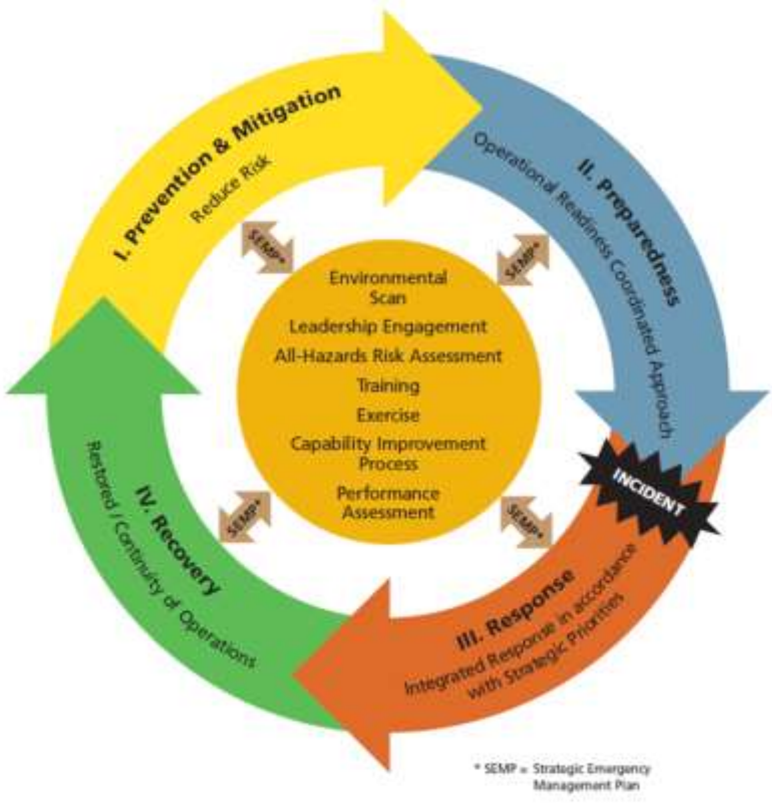
It should be understood that it is impossible to include or predict all aspects and indicators of hazards and risk. There are simply too many variables of weather, human behaviour, and systems malfunction. ESCI recommends that WPFS routinely and consistently review and update this Community Risk Assessment. In this way, WFPS can ensure the assessment contains the most accurate and up-to-date information available about community hazards, risks, and needs.

Risk Assessment Methodology

Risk assessment is a tool to define risk and provide measures for the likelihood of incident occurrence and impact in a given area. Long used to identify and describe processes and procedures for critical activities such as nuclear reactor and aircraft operation, risk assessment is now used by many industries and organizations to control loss.

Simply stated, community risk assessment (CRA) is "the identification of potential and likely risks within a particular community, and the process of prioritizing those risks."[9] Thus, CRA is the critical first step in the emergency management process: prevent, prepare, respond, and recover, as shown in Figure 10.[10]

Figure 10: The Emergency Management Continuum



[9] Vision 20/20 (2016); Community Risk Assessment: A Guide for Conducting a Community Risk Assessment, Revision 1.5; Warrenton, VA; page 2; retrieved from http://riskassessment.strategicfire.org/

[10] Public Safety Canada (2010); Emergency Management Planning Guide 2010–2011; Quebec, ON; page 4; retrieved from https://www.publicsafety.gc.ca/cnt/rsrcs/pblctns/mrgnc-mngmnt-pnnng/index-en.aspx

Categorizing Risk [11, 12]

There are many analysis models from which to develop hazard risk analyses. It is important to use the same source and methodology for the entire analysis for consistency. Examples include:

- By Hazard Type
- By Frequency
- By Overall Impact
- By Maximum Impact
- By Preparedness

Primary sources of information for quantifying risk used in this analysis were the *Hazard Analysis and Risk Assessment Manual*, published in 2007 by the Office of the Manitoba Fire Commissioner and the 6th Edition of the *Community Risk Assessment: Standards of Cover Manual*, published in 2016 by the Center for Public Safety Excellence, Inc. Other sources include reports published by various national, regional, and local organizations. Where differences in methodology or time frame exist between the model used in this document and another model, the differences are noted and explained.

HAZARDS

A hazard is described as "a potential or existing condition that may cause harm to people or damage to property or the environment." Therefore, a hazard analysis is the systematic collection of past and present information relating to natural and human made emergencies or disasters aimed at estimating the future likelihood of an emergency.

Often, hazards are interrelated, such as fires causing injuries that require medical intervention. Others contain elements that create a chain of events that may lead to "incidents within an incident"—severe storms may cause flooding that causes electrical outages that lead to unplanned release of reactive materials that requires a fire or hazardous materials response; while at the same time the flooding has stranded motorists that require water rescues and sheltering.

It should also be noted that some hazards, such as wildfire in remote areas, may impact a large area yet cause little damage. On the other hand, other hazards like a tornado or structure fire may impact a relatively small area, yet cause extensive property damage. For these reasons, ESCI recommends classifying hazards according to the greatest threat presented, as listed in Figure 11.[13]

[11] Source: Province of Manitoba Municipal Emergency Plan 2017 Template, Appendix A. Manitoba Emergency Measures Organization, 2017.
[12] Source: *Composite Hazard and Vulnerability Assessment Tool*, Emergency Services Consulting International, 2000.
[13] This approach is consistent with that recommended by CPSE and allows WFPS to characterise hazards with "all hazard" terms commonly-used in emergency management, yet use the NFIRS 5 codes for "incident type found."

Figure 11: Hazard Classification by Primary Threat

Hazard Classification by Primary Threat	
Medical Hazards • EMS • Rescue—Mass Casualty Trauma • Hospitals—Pandemic/Public Health	**Technological Hazards** • Transportation • Dangerous Goods • Utility failure
Natural Hazards • Winter Storm/Blizzard • Tornado • Thunderstorms/Lightning • Flooding • Drought • Heat event	**Human Hazards** • Business Interruption • Communication/Cyber Incident • Terrorism • VIP/Hostage Situation • Civil Disturbance/Labor Action • Bomb Threat
Fire Hazards • Structure Fires • Non-Structure Fires • Wildfires	

Risk

For the purposes of this report, risk is defined as "human behaviour, systems malfunctions, or an event that results in an ignition or other detrimental incident leading to a negative impact to life, property and/or natural resources." Simply stated, risk is the potential or likelihood of an emergency to occur. Thus, risk may be quantified as the combination of the **probability** (or likelihood) of an event, and its **consequence** (or impact) as shown in Figure 12.

Figure 12: Calculation of Risk

Risk = Probability x Consequence, or:

$$R = P_h \times C_h$$

The resulting computation of risk provides a single-axis determination; that is, it plots risk as a product of probability and consequence. The benefit of this approach is its simplicity. However, the primary drawback is that there is no differentiation between probability or consequence; they are equally important. This creates challenges for emergency planners when there is a need to differentiate between probability and consequence.

As an example, consider two risks; one risk has very high probability, but minor impact—a single passenger vehicle fire with no entrapment or exposure, for example; the other risk is less likely, but has higher consequences—a liquid fuel tank trailer cargo fire, with entrapment and close to a nursing home in a congested area. The resultant risk score may be the same, but the resources needed, and the amount of planning required are significantly different. To compensate for this difference and allow a more detailed analysis, emergency planners have developed the concept of the risk rating matrix.

The Risk Rating Matrix

From an emergency management perspective, the main component of modern risk assessment lies in the construction of a risk rating matrix. Use of a matrix allows differentiation beyond a single numerical value to characterize risk. Most risk matrix models use both quantitative and qualitative measures to determine risk in terms of probability (likelihood) and consequences (impact) on the community.[14]

For this analysis, ESCI used a two-axis model, the Manitoba Hazard Risk Matrix, and its definitions of risk to provide consistency with regional fire risk plans.[15] The Manitoba Hazard Risk Matrix is a two-axis matrix that shows **impact** on the vertical axis (from insignificant to catastrophic), and **likelihood** on the horizontal axis (from rare to highly probable). The matrix is defined by separate cells which are based on the amount of risk present—ranging from low to very high—as shown in Figure 13.

Figure 13: The Manitoba Hazard Risk Matrix[16]

Impact \ Likelihood	Rare (1)	Unlikely (2)	Possible (3)	Probable (4)	Highly Probable (5)
Catastrophic (5)	Medium	High	Very High	Very High	Very High
Significant (4)	Medium	High	Very High	Very High	Very High
Moderate (3)	Medium	Medium	High	High	High
Minor (2)	Low	Low	Medium	Medium	Medium
Insignificant (1)	Low	Low	Low	Low	Low

Risk Definitions[17]

Very High (VH) Risk. These risks are classed as critical risks requiring immediate attention. They may have a high or probable likelihood of occurrence and their potential consequences are such that they must be treated as a high priority. This may mean that (1) strategies should be developed to reduce or eliminate the risks; (2) mitigation in the form of multi-agency planning, exercising, and training for these hazards should be put in place; and (3) consideration should be given to specific planning for this risk.

[14] Recently, the Center for Public Safety Excellence (CPSE) has described a three-axis matrix that includes the impact on the agency itself. According to the CPSE, either a two- or three-matrix approach is acceptable when developing a CRA/SOC document.
[15] Office of the Manitoba Fire Commissioner (2007); *Hazard Analysis and Risk Assessment*, Brandon, MB, page 7–9.
[16] *Ibid*.
[17] *Ibid*.

High (H) Risk. These risks are classed as significant. They may be unlikely or highly probable to occur, however their potential consequences are sufficiently serious to warrant appropriate consideration, after those risks classed as "very high" are addressed. Consideration should be given to the development of strategies to reduce or eliminate the risks, and that mitigation in the form of (multi-agency) generic planning, exercising, and training should be put in place and monitored on a regular basis.

Medium (M) Risk. These risks are less significant, however, may cause upset and inconvenience in the short-term. These risks should be monitored to ensure that they are appropriately managed, and consideration given to their management under generic emergency planning arrangements.

Low (L) Risk. These risks are both unlikely to occur and not significant in their impact. They should be managed using normal or generic planning arrangements and require minimal monitoring and control unless subsequent risk assessments show a substantial change, prompting a move to another risk category.

Likelihood (Probability) Scoring Scale: Quantitative and Qualitative Measures

The likelihood scoring scale indicates the probability, or chance of occurrence, in a five-year period is shown in Figure 14.

Figure 14: Likelihood Scoring Scale

Level	Descriptor	Chance	Description
1	Rare	1% or less	May occur only in exceptional circumstances; may occur once every five hundred or more years.
2	Unlikely	2–25%	Is not expected to occur; and/or no recorded incidents or anecdotal evidence; and/or no recent incidents in associated organizations, facilities or communities; and/or little opportunity, reason or means to occur; may occur once every one-hundred years.
3	Possible	26–50%	Might occur at some time; and/or few, infrequent, random recorded incidents or little anecdotal evidence; and/or very few incidents in associated or comparable organizations, facilities or communities; and/or some opportunity, reason or means to occur; may occur once every twenty years.
4	Probable	51–75%	Likely to or may occur/recur every 5–7 years; regular recorded incidents and strong anecdotal evidence; will probably occur in many circumstances.
5	Highly Probable	76–100%	Likely to or may occur/recur every 5 years or less; high level of recorded incidents and/or strong anecdotal evidence.

Impact (Consequence) Scoring Scale: Qualitative Measures

The impact scoring scale indicates the impact, or the amount of damage or other consequence as shown in Figure 15.

Figure 15: Community Consequence Scoring Scale

Level	Descriptor	Category	Description
1	Insignificant	Human Welfare	• No fatalities, injuries, or impact on health. • No persons displaced, and no personal support required. • No damage to properties. • No disruption to community services or infrastructure.
		Environment	• No impact on environment.
2	Minor	Human Welfare	• Small number of people affected (<10), no fatalities, and small number of minor injuries with first aid treatment. • Minor displacement of people for <6 hours and minor personal support required. • Minor localized disruption to community services or infrastructure <6 hours.
		Environment	• Minor impact on environment with no lasting effects. • Environment—Significant long-term impact on environment and/or permanent damage.
3	Moderate	Human Welfare	• Limited number of people affected (11–50), no fatalities, but some hospitalization and medical treatment required. • Localized displacement of small number of people for 6 –24 hours. Personal support satisfied through local arrangements. • Localized damage that is rectified by routine arrangements. • Normal community functioning with some inconvenience.
		Environment	• Some impact on environment with short-term effects or small impact on environment with long-term effects.
4	Significant	Human Welfare	• Significant number of people (51–100) in affected area impacted with multiple fatalities, multiple serious or extensive injuries, significant hospitalization. • Large number of people displaced for 6–24 hours or possibly beyond. External resources required for personal support. • Significant damage that requires external resources. • Community only partially functioning, some services unavailable.
		Environment	• Significant impact on environment with medium to long-term effects.
5	Catastrophic	Human Welfare	• Very large number of people (>100) in affected area impacted, significant number of fatalities, and people requiring hospitalization with serious injuries with long-term effects. • General and widespread displacement for prolonged duration and extensive personal support required. • Extensive damage to properties requiring major demolition. • Serious damage to infrastructure causing significant disruption to, or loss of, key services for prolonged period. • Community unable to function without significant support.
		Environment	• Significant long-term impact on environment and/or permanent damage.

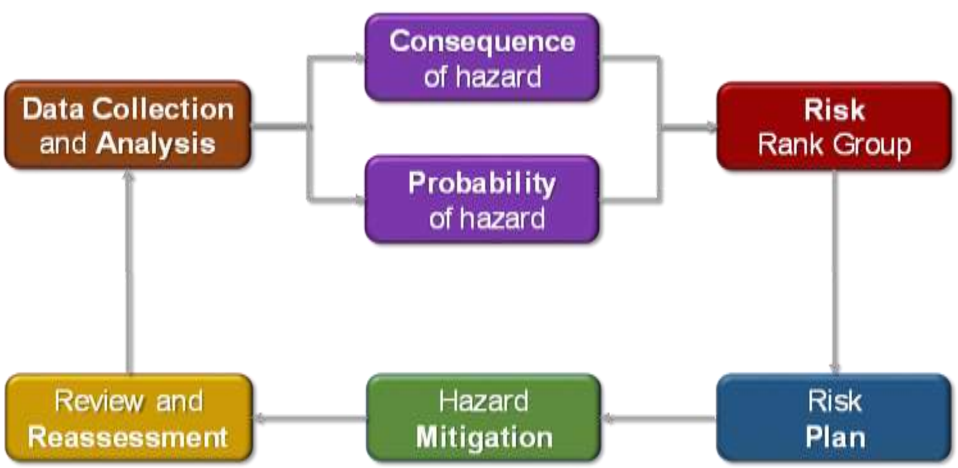
The Risk Analysis Process

WFPS acknowledges there are hazards in the community, that these hazards pose a risk to life and property, and these hazards vary in likelihood and impact, both on the community and the agency. Identified hazards that directly influence WFPS planning and response include medical hazards, fire hazards, natural hazards, technological hazards, and human hazards. At times, potential hazards result in emergency incidents that require the intervention of public safety resources to minimize loss or harm.

For this assessment, the ESCI assessment team used information provided by WFPS and publicly-available reports. Where possible, information from public sources was used to provide the most consistent and latest available information. In addition to probability and consequence, data collection and analysis included type and grouping of risk—medical, fire, natural, technological, or human—and community characteristics. The intent of the risk assessment process is to provide information to be used by WFPS in future planning efforts. This is a continuous, five-step process as shown in Figure 16.[18]

- Collect and analyse data;
- Define, rank, and group risks, including development of risk-specific characteristics;
- Develop plans to prepare for and mitigate hazards and risks;
- Respond to incidents and mitigate risks; and
- Review and evaluate results to address changing or emergent conditions.

Figure 16: The Risk Analysis Process[19]



[18] The primary basis of the methodology used for this assessment was derived from the FEMA Inventory Assets Worksheet and Estimated Losses Worksheet identified in FEMA 386-2: Understanding Your Risks – Identifying Hazards and Estimating Losses. The results were then revised to be consistent with those identified in the Manitoba "Hazard Analysis and Risk Assessment," published by the Office of the Fire Commissioner in 2007.

[19] Adapted from "Risk Based Inspection." R. Patel, Qatargas Operating Company, Ltd., 2006.

ESCI has expanded the basic risk analysis process to match the "all hazards—all risk" methodologies common to emergency management. These include the added factors of cascading potential, historical occurrence, vulnerability, affected area, and a survey of WFPS professionals, as shown in Figure 17.

Figure 17: Risk Calculation Tool[20]

Incident Characteristics

Another product of this assessment is a table for each hazard risk that identifies incident characteristics specific and common to emergency incidents of that hazard type. In addition to the traditional characteristics of likelihood and community impact, this approach provides qualitative data about the location and duration of the incident, plus additional information about time patterns, onset speed, and warning time.[21]

- Likelihood
- Community Impact
- Location
- Duration
- Time pattern
- Speed of Onset
- Availability of Warning

Key Recommendation

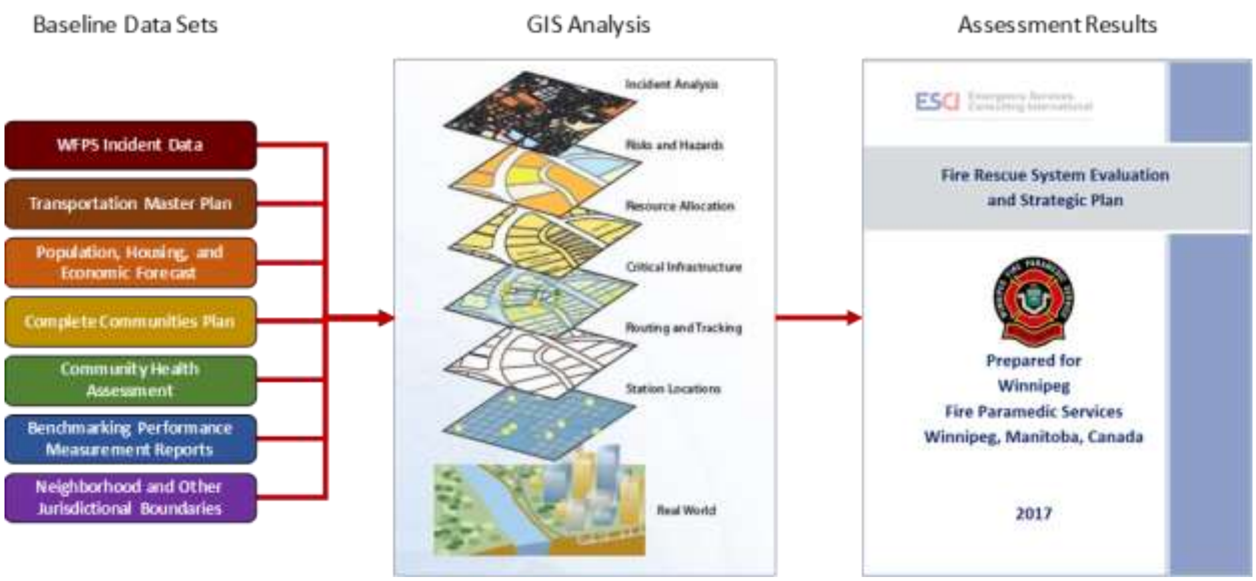
- WFPS should add agency impact to the list of incident characteristics for each hazard.

[20] Adapted from the Harris County, TX "Multi-Hazard Mitigation Plan," published June 2015.
[21] Adapted from "Hazard Analysis and Risk Assessment," Office of the Fire Commissioner, Province of Manitoba, 2007.

GIS Technology

ESCI used Geographic Information Systems (GIS) technology and historic reporting tools to visualise the data and provide the information needed to provide an *approximation* of relative risk and potential loss for significant hazards. From this, the team determined areas of greatest risk and vulnerability. Using the information provided, the ESCI team determined that all data would be focused into three categories for this analysis: community characteristics and demographics, general hazard risks, and relative risk by planning zone. It is important to note that there are uncertainties in any assessment of this type—incomplete data, scientific uncertainty, and the inherent simplification of information required for the more comprehensive analysis that is beyond the scope of this study. Figure 18 illustrates the conceptual GIS methodology as applied to this risk assessment.[22]

Figure 18: GIS Methodology



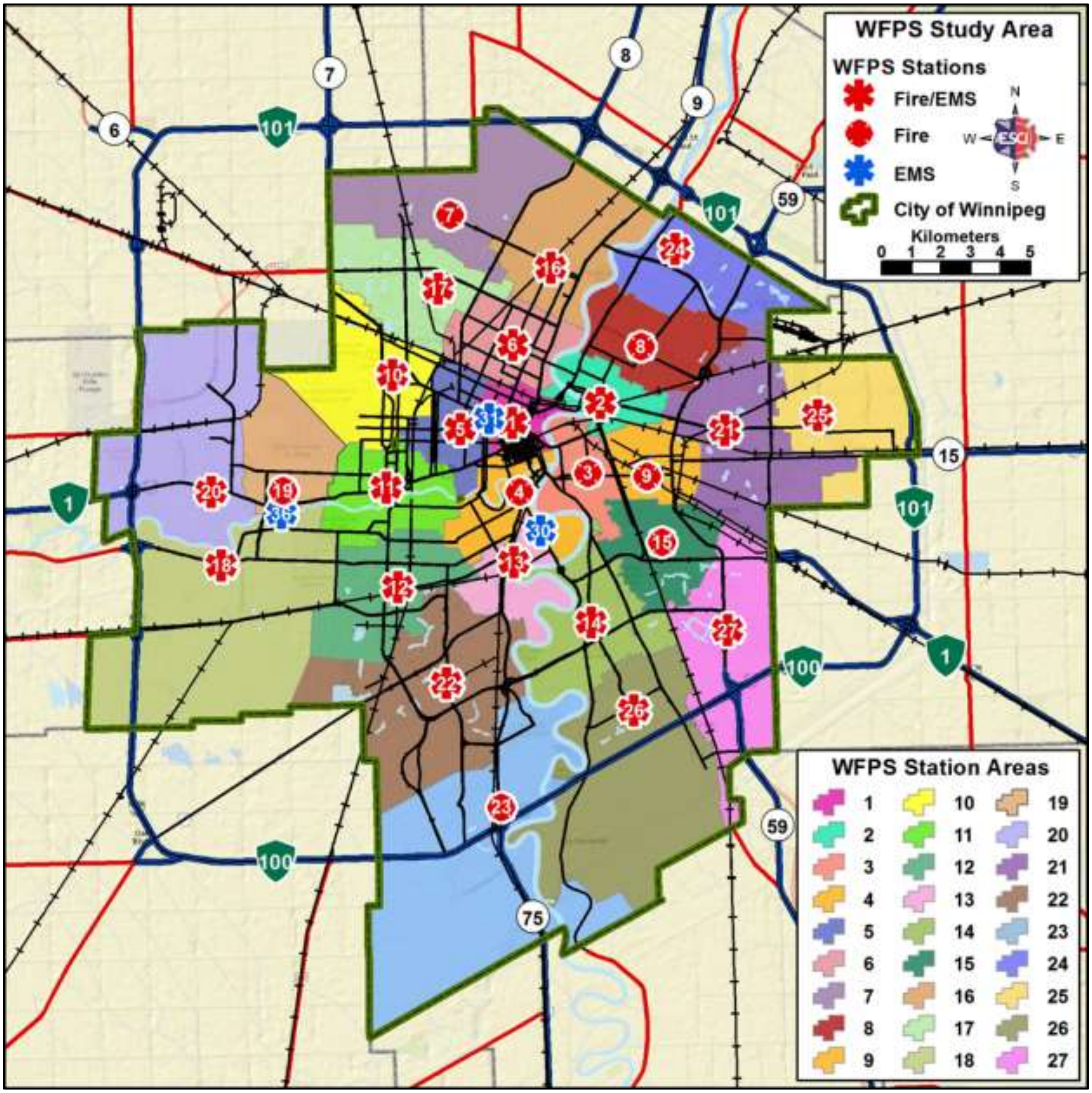
Geographic Planning Zones

WFPS uses first-due station districts as geographic planning zones to analyze risk, resource allocation, and results. Station district areas may be influenced by natural barriers like terrain or rivers, by community characteristics like land use and target hazards, and by standards of cover goals like response time and service demand. This approach directly links all aspects of station response, *e.g.,* location, staffing, response time, call volume, apparatus, and special operations, to community risk and needs.[23] Current WFPS Planning Zones are shown in the following figure.

[22] GIS layer image adapted from Alekhya Datta, 2014; retrieved from geospatialworld.net, "Applying Geospatial Technology for Women Safety and Crime Mapping in India."

[23] The disadvantage is that community characteristics and statistics that rely on census data or other area definitions must be adjusted to fit station areas. GIS technology was used to link available statistical information to the desired geographic planning zones.

Figure 19: City of Winnipeg Planning Zones



Key Recommendation

- WFPS should continue to use first-due station districts for geographic planning zones.

Community Characteristics

A Brief History of Winnipeg, Manitoba, Canada

Winnipeg is the largest city in, and the capital city of the province of Manitoba, Canada. According to the 2016 census, Winnipeg is the seventh largest city in Canada. It is located in the Canadian prairie, near the longitudinal centre of North America and is 110 kilometres (68 mi) from the U.S. border. The city is named after nearby Lake Winnipeg; from the Western Cree words for *muddy water*. Now known as the "Gateway to the West," Winnipeg is a railway and transportation hub with a diversified economy.[24]

Winnipeg is vibrant, growing, and diverse—and a study in urban change. "Winnipeg is a prairie city, a winter city, a sunshine city, and a river city. The diversity of weather, along with our topography, creates unique planning and development opportunities and challenges."[25]

Geography

The City of Winnipeg is located in south Manitoba at latitude and longitude 49°53'58"N, 97°08'21"W. It is characterized as the wide Red River Valley at the confluence of the Red and Assiniboine Rivers, a location now known as "The Forks." The city is characterized by extremely flat topography, heavy clay soils, and substantial snowfall. Winnipeg is at an altitude of 232 metres (760 feet) above sea level, and lies in a low-lying flood plain in the Red River basin. As such, the city is subject to flooding, particularly in the spring following winter snow melt.

Climate

Winnipeg experiences a continental climate characterized by four distinct seasons. Average temperatures range between -12° Celsius (+10.4° Fahrenheit) in the winter months to +26° Celsius (+78.8° Fahrenheit) in the summertime. Due to its northern location, Winnipeg residents enjoy 2,300 hours of sunlight annually and up to 16 hours of sunlight daily during the summer months. Winnipeg averages approximately 51.4 centimetres (20.2 inches) of precipitation each year.[26]

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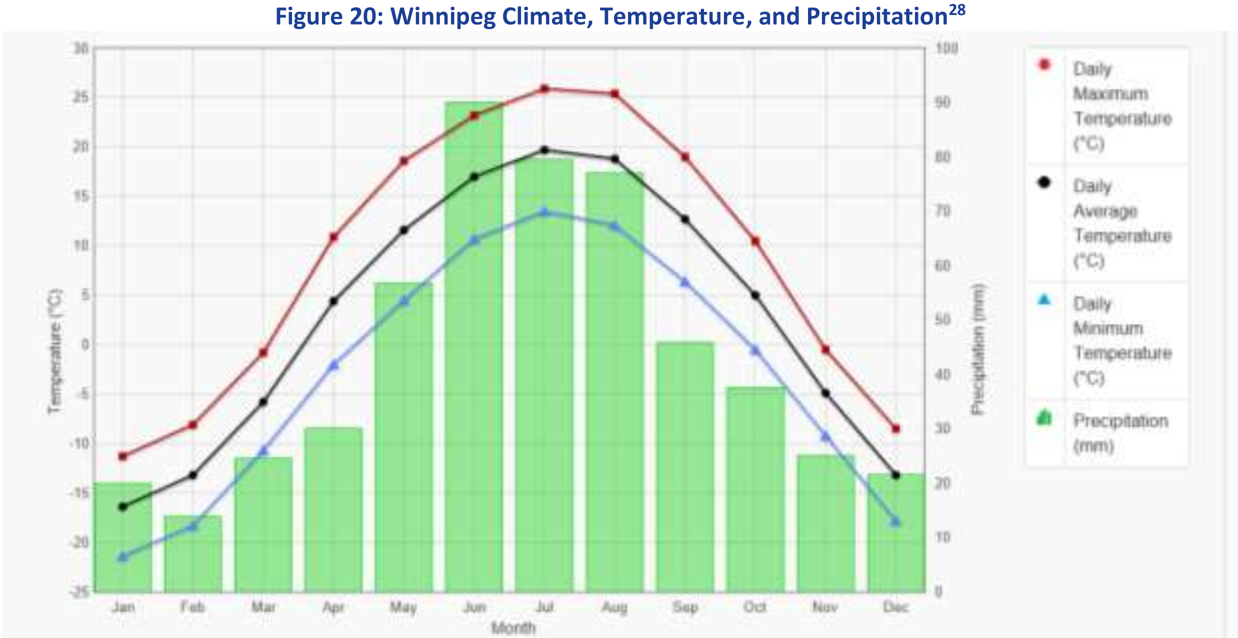
[24] Wikipedia (2017); "Winnipeg," retrieved from: https://en.wikipedia.org/w/index.php?title=Winnipeg&oldid=794886022
[25] City of Winnipeg (2015); "Our Winnipeg: It's Our City, It's Our Plan, It's Our Time," retrieved from: http://www.winnipeg.ca/interhom/CityHall/OurWinnipeg
[26] "Environment and Climate Change Canada," retrieved from: http://www.ec.gc.ca

Due to its location, Winnipeg experiences very windy, long, cold, and occasionally severe winters. In an average year, more Canadians die from exposure to winter cold than from lightning, wind storms, and tornadoes combined. Snowstorms, blizzards, freezing rain, ice, fog, snow, and winter driving are common hazards. The combination of low temperatures and windy conditions can lead to dangerous, even life-threatening, wind chill in the wintertime. Snow depths of greater than 1 centimetre are seen on about 132 days each year in Winnipeg, compared with about 10 days each year in Vancouver, 35 days in Penticton, 65 days in Toronto, 88 days in Calgary, and 120 days in Ottawa.

Winnipeg has a short, but warm summer and some of the clearest skies and sunny weather in Canada. It can also experience severe weather during the spring and summer, including thunderstorms, heat waves, floods, tornadoes, wind, heat, and humidity. Lightning does occur, usually accompanied by thunderstorms, with an average of less than 33 days with lightning occurring within 25 kilometres of the city every year.[27] Figure 20 shows the average temperature and precipitation.

Figure 20: Winnipeg Climate, Temperature, and Precipitation[28]



[27] By comparison, the area with the greatest average number of days with lightning is near Harrow, Ontario with 32.3 lightning days a year. The most lightning days in a single year occurred in Windsor, Ontario, with 47 days of lightning in 2006.
[28] Source: Canadian Climate Normals, 1981–2010 Station Data, http://climate.weather.gc.ca/climate_normals/

Jurisdictional Area

The WFPS service area is the city limits of the City of Winnipeg for fire, but the ambulance service extends to the Perimeter Highway and slightly beyond in some areas. The City was first incorporated in 1873, with a population of 1,869 and an area of about 7.8 square kilometres (2 mi^2).[29] In 2015, Winnipeg is home to 718,400 people living in an area of 464 square kilometres (179 mi^2) as shown in Figure 21.

Figure 21: The City of Winnipeg

Local Government

The original City of Winnipeg, several rural communities, and Greater Winnipeg were unified by the City of Winnipeg Charter Act into a single city system that has evolved, for electoral purposes, into the current system of 15 wards and 237 neighbourhoods.[30] By Charter, each ward is represented by a Councillor who, together with the Mayor, form the City Council. Also included in the Charter is a requirement that the City adopt long-term development plans for physical, social, environmental, and economic objectives; sustainable land uses and development; and measures for implementing the plan.[31]

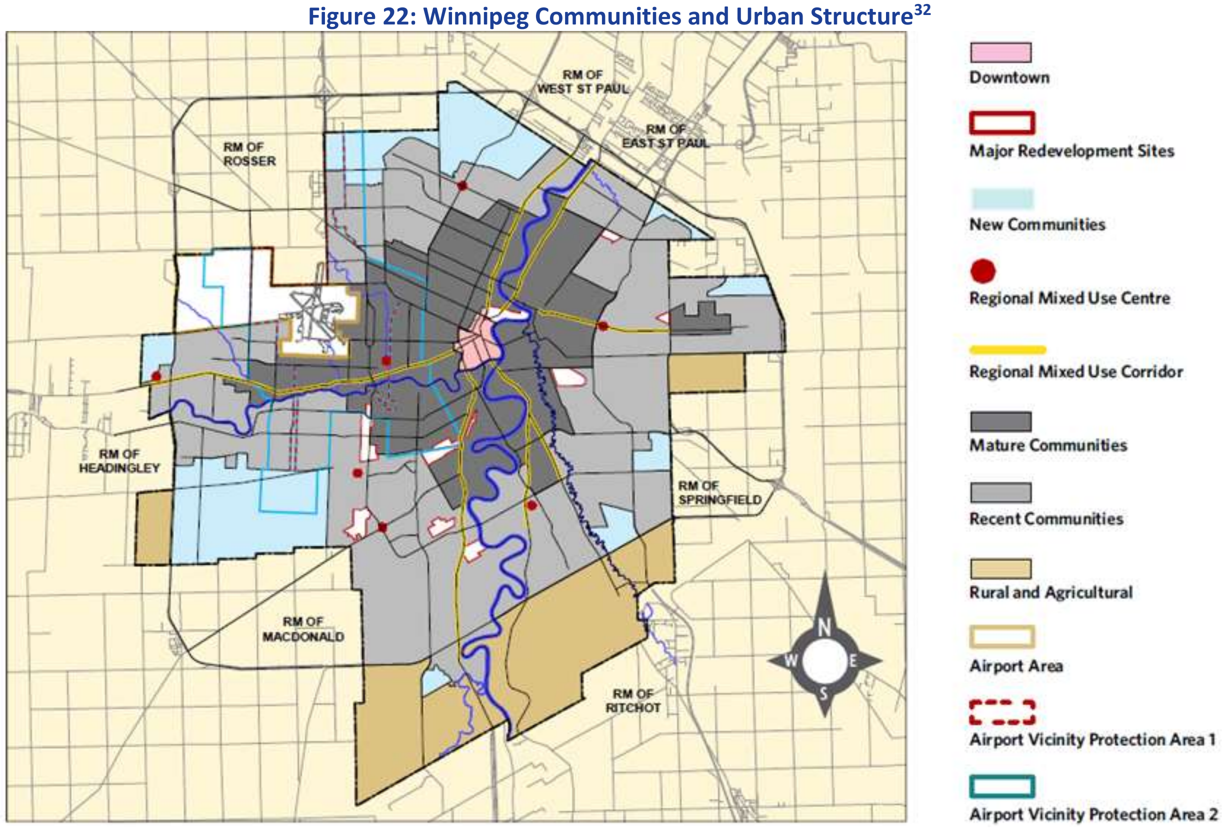
[29] City of Winnipeg (2016); “Historical Profile of Winnipeg;” Winnipeg, MB; retrieved from http://winnipeg.ca/History/HistoricalProfile.stm
[30] Wikipedia (2017); “Amalgamation Winnipeg;” retrieved from https://en.wikipedia.org/wiki/Amalgamation_of_Winnipeg
[31] City of Winnipeg (2015); “Our Winnipeg: It’s Our City, It’s Our Plan, It’s Our Time;” Winnipeg, MB; page 3; retrieved from http://www.winnipeg.ca/interhom/CityHall/OurWinnipeg/

Land Use

Today, the City of Winnipeg may be characterized by current land use. At the city's core is downtown, with a mix of mid-rise and high-rise buildings. Within the downtown area is The Exchange District, an area located north of the intersection of Portage and Main, and home to some of the about fifty of the most-historic buildings in Winnipeg. Surrounding downtown are mature communities, with little open space, older buildings, industrial parks, petroleum storage tanks, and large rail classification yards. The rail lines and industrial areas effectively split the city just north of downtown, generally in a northwest-to-southeast direction. West of downtown is the main airport.

Newer communities, more suburban in nature, form a ring around the core city and extend all the way to the city limits on the north, east, and west. The entire area is surrounded by a perimeter road that separates the urban and sub-urban communities from rural and agricultural areas, primarily to the south, and to a lesser extent to the east and west of the city. These major land use areas are shown in Figure 22.

Figure 22: Winnipeg Communities and Urban Structure[32]



[32] Map Source: "Our Winnipeg: It's Our City, It's Our Plan, It's Our Time."

Neighbourhoods

Within the boundaries of Winnipeg are 237 neighbourhoods. Approximately 186 of these may be considered residential, with the remainder classified as industrial or commercial neighbourhoods. Many of Winnipeg's neighbourhoods have a unique heritage and historic identity, with natural or man-made boundaries, such as roads, railroads, bridges, and rivers.

According to the City's economic development department, Winnipeg's neighbourhoods are much more than a mix of housing, commercial, and public service facilities. Neighbourhoods "are a large part of what makes up our home and provides us with a sense of belonging. The opportunity to work together to identify local issues and develop successful solutions that sustain a healthy neighbourhood is a source of pride for many Winnipeggers."[33] Neighbourhoods are often used as planning zones and a convenient way to benchmark statistics such as population growth, income, walkability, crime, and public health.

Surrounding Area

The Winnipeg CMA (Census Metropolitan Area) includes the City of Winnipeg, ten rural municipalities, and one First Nations Reserve.[34] The Winnipeg CMA includes the following census subdivisions (CSDs):

- Winnipeg City
- Springfield Rural Municipality
- Taché Rural Municipality
- St. Clements Rural Municipality
- East St. Paul Rural Municipality
- Macdonald Rural Municipality
- Ritchot Rural municipality
- West St. Paul Rural municipality
- Headingley Rural municipality
- St. François Xavier Rural municipality
- Rosser Rural municipality
- Brokenhead 4 First Nations Reserve

Over 90 percent of the population of the Winnipeg CMA resides within the City of Winnipeg, which is in the urban and geographical center, as shown in Figure 23.

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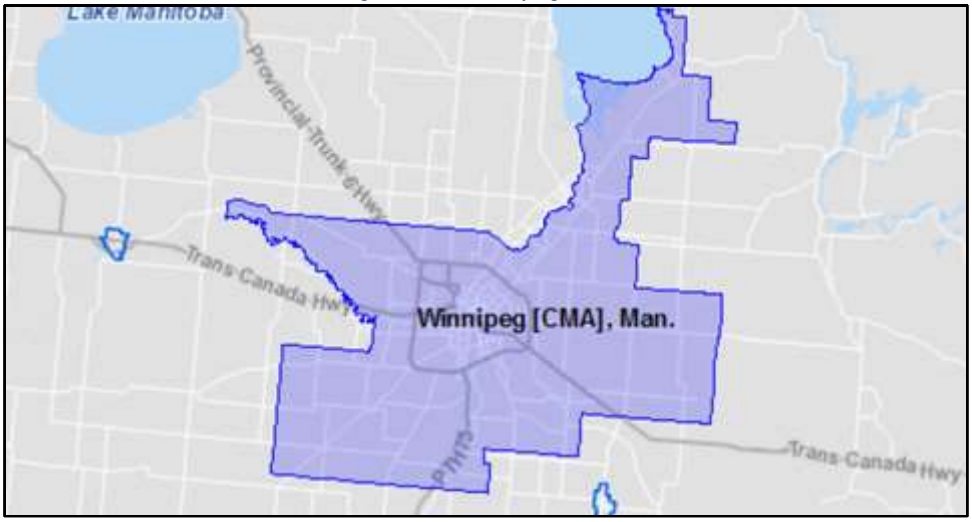
[33] Economic Development Winnipeg Inc. (2017); "Welcome to the Neighbourhood!" Winnipeg, MB; Retrieved from http://www.economicdevelopmentwinnipeg.com/why-winnipeg/living-here/lifestyle/neighbourhoods
[34] Statistics Canada (2017). Focus on Geography Series, 2016 Census. Statistics Canada Catalogue no. 98-404-X2016001. Ottawa, ON. Analytical products, 2016 Census. Retrieved from http://www12.statcan.gc.ca/census-recensement/2016/as-sa/fogs-spg/Facts-cma-eng.cfm?LANG=Eng&GK=CMA&GC=602

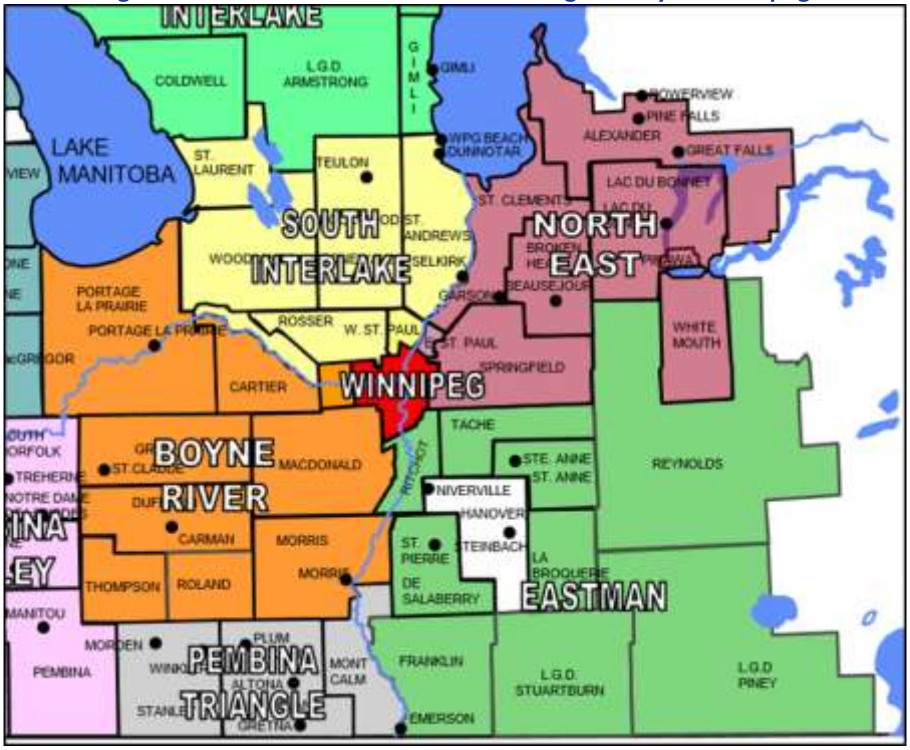
Figure 23: Winnipeg CMA



Mutual aid fire protection outside city limits is provided in accordance with Manitoba's Mutual Aid Districts as shown in the next figure.[35] WFPS does not as yet have mutual aid agreements with any Rural Municipalities. Aid, however, is occasionally provided on a case-by-case basis. The provinces of Manitoba and Saskatchewan also share mutual aid resources in accordance with the provisions of a memorandum of understanding on mutual aid.[36]

[35] The Province of Manitoba (2011); Mutual Aid District Map, Brandon, MB, retrieved from http://www.firecomm.gov.mb.ca/support_districts_map.html
[36] The Province of Manitoba (2011); Mutual Aid Agreements, Brandon, MB, retrieved from http://www.firecomm.gov.mb.ca/docs/mou_sk_emergency_response_2011.pdf

Figure 24: Mutual Aid Districts Surrounding the City of Winnipeg



Transportation Network[37]

Winnipeg is a major transportation hub for central Canada and Manitoba. The city and surrounding areas are well-served by road, railroad, air, and pipeline.

Highways and Roads

Over 75 percent of Manitoba’s merchandise trade with U.S. is shipped by truck. The primary east-west highway is the Trans-Canada Highway (Highway 1), and the primary north-south highway is Provincial Highway 75.

Trans-Canada Highway (Highway 1). The Trans-Canada Highway provides primary over-the-road transportation across Canada from coast-to-coast. On either side of Winnipeg, Highway 1 has an interchange with the Perimeter Road—Provincial Trunk Highway 100 to the south and Provincial Trunk Highway 101 to the north—that allows thru traffic to bypass the city centre.

[37] Source: https://www.gov.mb.ca/jec/invest/busfacts/transport

The Trans-Canada Highway between Victoria (BC) and St. John's (NF) is the world's longest national highway with a length of 7,821 km (4,860 mi). The midpoint of the highway is at Batchwana Bay, about 65 kilometres north of Sault Ste. Marie, Ontario. The highway links several provincial highways, some of which are four-lane divided, but many stretches (much through isolated wilderness and agricultural land) are still two lanes. Construction of the highway formally began in 1950 and would continue for several more years. The Trans-Canada Highway was officially opened by Prime Minister John Diefenbaker at a ceremony in Roger's Pass, British Columbia on September 3, 1962. Newfoundland was the last province to complete its highway, in 1967. The route is now almost entirely a four-lane divided expressway, with interchanges and at-grade intersections, including bypasses around Winnipeg and other major cities.[38]

Provincial Highway 75. Provincial Highway 75 leads south to link with the U.S. National Highway System via North Dakota and provides access to a transportation corridor centred on U.S. Interstate highways I-29 and I-35. This route connects Canada to a central North American market of 100 million people. Goods can be shipped by truck from Canada to Mexico and all points between. Major border crossings to the U.S. are open 24 hours per day, and an automated border crossing at Emerson, Manitoba, enables standard wait times of 10 minutes or less. Approximately 65 percent of Manitoba's exports to NAFTA partners (U.S. and Mexico) are transported by truck through the Emerson/Pembina crossing. The border crossing at Emerson processes over $15 billion in trade traffic annually (2013), more than any other border crossing in Western Canada, and fifth largest in Canada. An estimated 400,000 commercial trucks crossed the border through Emerson in 2013.

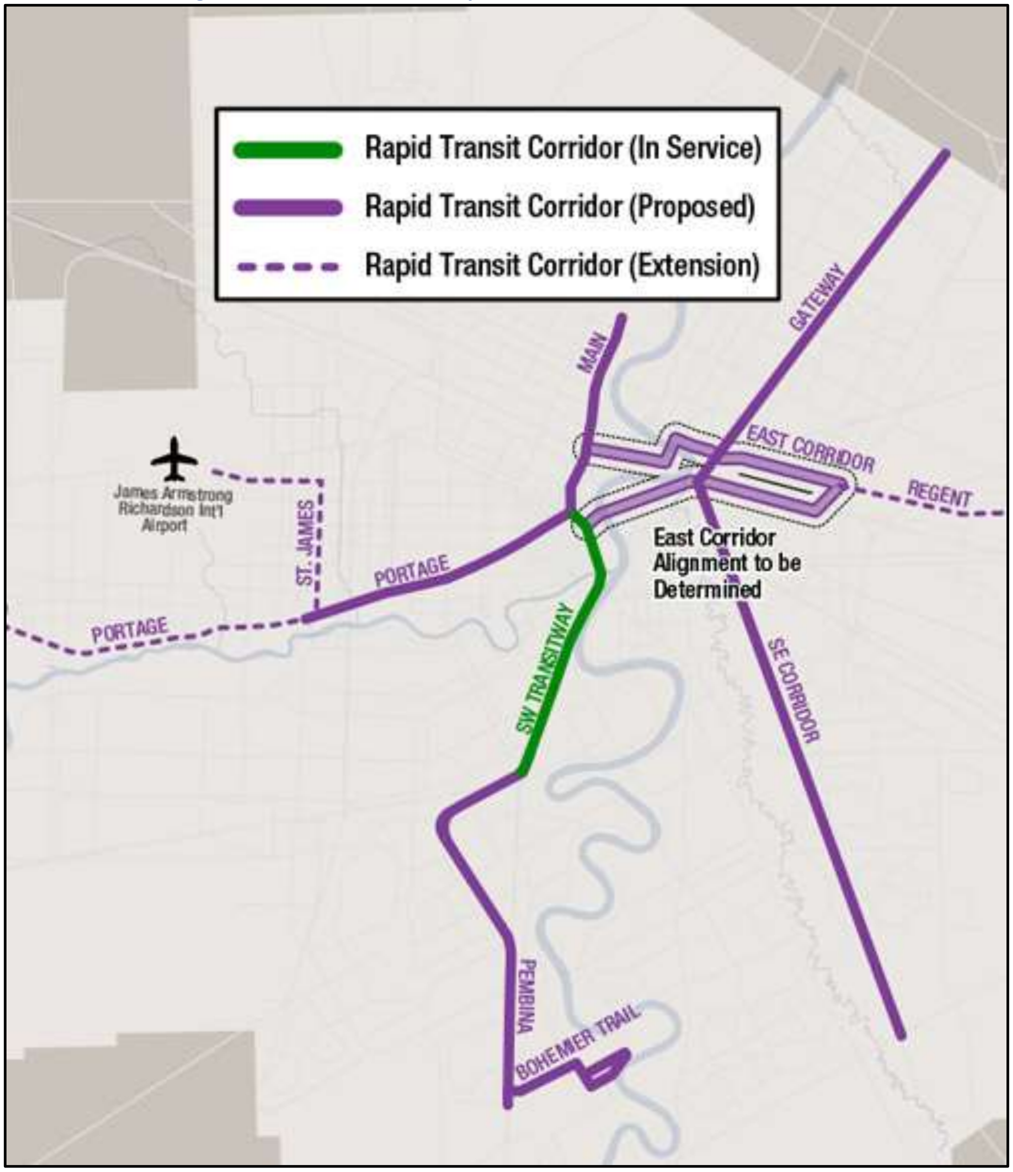
City Road System

The city road system contains a mix of arterial, or major, roadways and connectors, plus a grid plan within neighbourhoods. However, there are several different grids in place, a legacy of the original thirteen separate municipalities that comprise the City of Winnipeg. There is also no universal address numbering system in place. Address numbers usually increase as the distance from either the Red or Assiniboine rivers increases, but this is by no means uniform, even within a specific district.[39]

The planning report on transit-oriented development (TOD) program has recommended that communities within the city be developed along mass transit corridors that link each community with others.[40] As shown in Figure 25, this plan would add transit corridors to the city and provide communities with an alternative to over-the-road travel by car.

[38] TransCanada FoundLocally Inc. (1999–2017); "History of the Trans-Canada Across Manitoba," retrieved from https://transcanadahighway.com/manitoba/Manitoba-Trans-Canada_Highway_History.htm
[39] City of Winnipeg (2012); "Transit-Oriented Development Handbook, Winnipeg, ON," retrieved from http://www.winnipeg.ca/interhom/CityHall/OurWinnipeg/
[40] *Ibid*.

Figure 25: Current and Proposed Mass Transit Corridors



RAILROADS[41]

Winnipeg is a rail hub to both the Canadian National (CN) and the Canadian Pacific Railway (CP) railways. Other rail lines that operate in the area include the Burlington Northern-Santa Fe (BNSF), Central Manitoba Railway (CEMR), Greater Winnipeg Water District Railway (GWWD), Boundary Trail Railway (BTR), and Via Rail Canada (VIA) as shown in Figure 26.

[41] Source: https://www.gov.mb.ca/jec/invest/busfacts/transport/railyards.html

Figure 26: Rail Lines in Winnipeg Manitoba[42]

Both CN and CP maintain extensive and modern marshalling yards with major service facilities. At CN's Symington Yards, over 3,000 cars can be handled in a day. CP's yard processes an average of 2,500 cars per day. Both CN and CP have intermodal terminals in Winnipeg where both trailers and containers are transferred between the rail and road modes. Intermodal traffic is a major part of each company's business. CP Rail System's intermodal terminal can handle an average of 105,000 lifts per year. CN's Winnipeg Intermodal Terminal can handle 100,000 lifts per year.

The rail lines and larger classification yards essentially split the City of Winnipeg into two parts, north and south of the track. At one point, there was a plan to move rail lines and classification yards out of Winnipeg, but that plan has been halted. The plan was to relieve traffic congestion and convert the reclaimed land into housing, parks, and restaurants. The amount of money required, and lack of funding effectively have killed the project for the foreseeable future.

[42] Source: http://www.proximityissues.ca/asset/image/reference/maps/pdf/MB_rail_map.pdf

Figure 27: View of the Rail Yards in Central Winnipeg from the Arlington Bridge (Brett Purdy/CBC)

Airport[43]

Winnipeg James Armstrong Richardson International Airport (YWG) is Canada's longest serving international airport, and is Canada's only major international airport between Toronto and Calgary. It is located on the city's west side and 7 km (4.5 miles) from the city's downtown. YWG offers both air passenger and cargo services, and over 3.6 million passengers annually. Passenger carriers include major carriers Air Canada, Westjet, Delta, and United Airlines, plus several regional carriers. Three major cargo carriers—Federal Express, Purolator, and UPS—occupy more than 127,000 square feet of on-site sorting facilities and distribution centres. Economic output was $3.6 billion, with 175,000 tonnes of cargo shipped, in 2014.

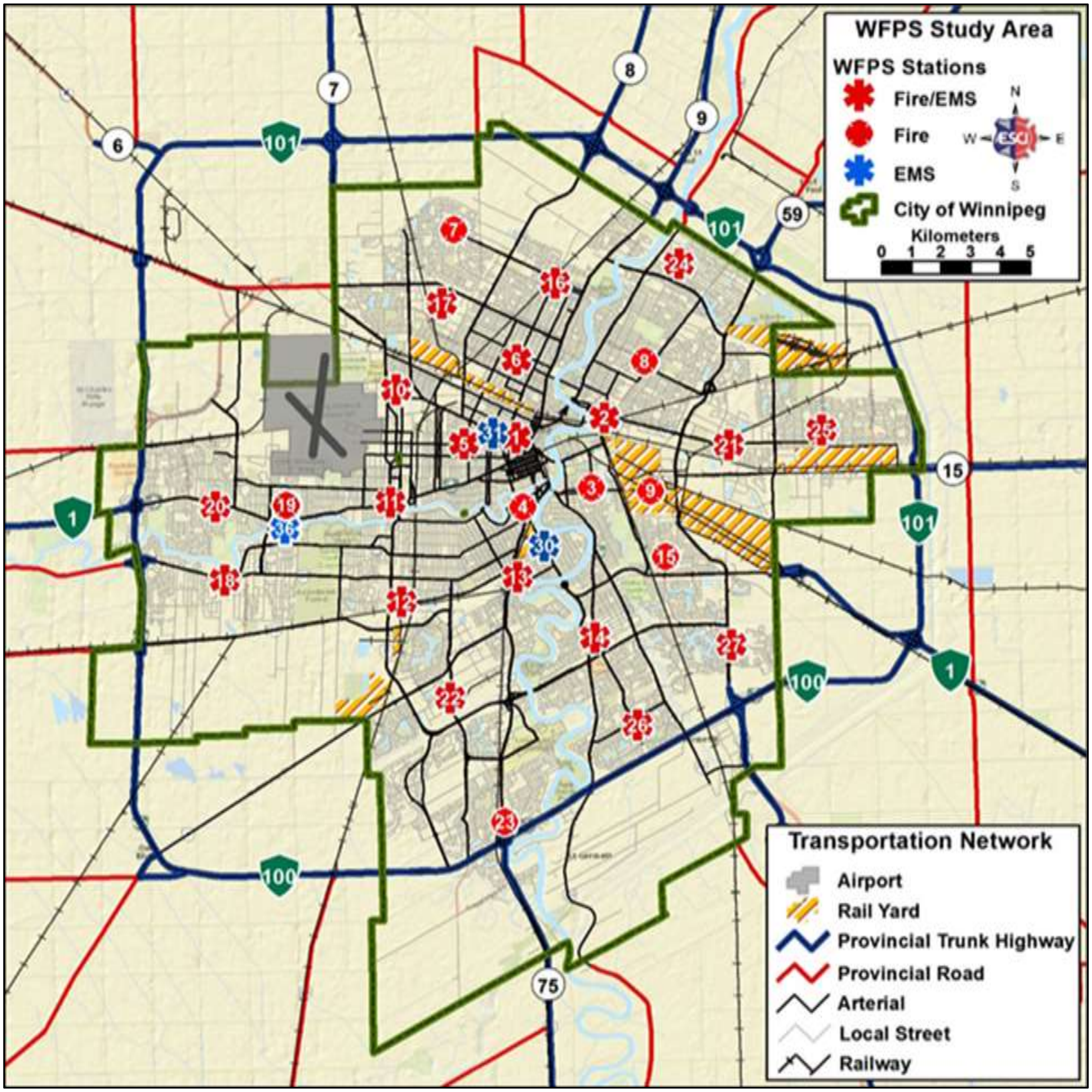
CentrePort Canada is a 20,000-acre inland distribution and warehousing depot that links air, ground, and rail transport and offers greenfield investment opportunities to take advantage of the existing cargo capabilities of Richardson International, plus large tracts of serviced land, Manitoba's mid-continent location, and a well-established multi-modal network of highways, railways, air, and sea connections. Currently, CentrePort Canada is the only tri-modal distribution hub in Canada.

[43] Source: https://www.gov.mb.ca/jec/invest/busfacts/transport/wiairport.html

Figure 28: Proposed CentrePort Canada Land Use[44]

44 Source: centreportcanada.ca

Figure 29: Primary Transportation Features in the Winnipeg Region

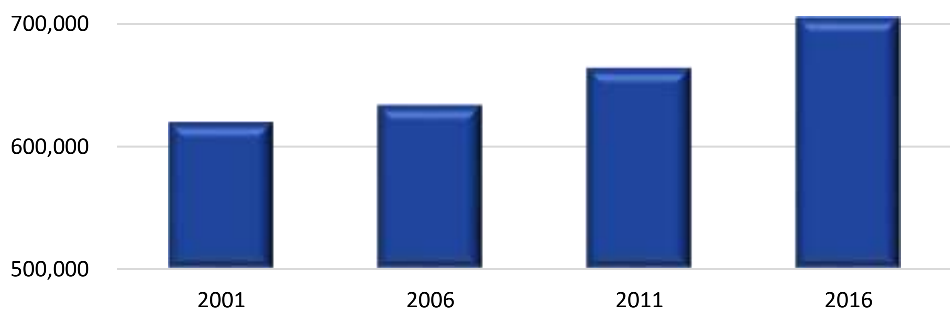


Demographics

Current Population

Over 53 percent of the population of Manitoba lives in Winnipeg. According to the 2016 census, the population of Winnipeg increased by 41,627 people, or 6.3 percent, over five years as shown in Figure 30.[45, 46]

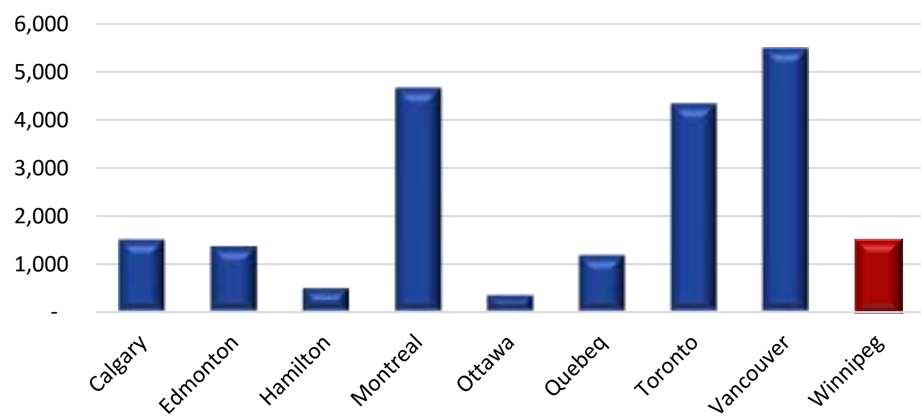
Figure 30: Population of Winnipeg, 2001–2016



Population Density[47]

The average population density for Winnipeg is 1,519 people/km^2. This compares with other major Canadian cities as shown in Figure 31. Population density was not the same across the entire city.

Figure 31: Population Density/km^2



[45] Statistics Canada (2017); Winnipeg, CY [Census subdivision], Manitoba and Division No. 11, CDR [Census division], Manitoba (table). Census Profile. 2016 Census. Statistics Canada Catalogue no. 98-316-X2016001. Ottawa. Retrieved http://www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/index.cfm?Lang=E

[46] As compared to a growth rate of 6.6 percent for the Winnipeg census metropolitan area (CMA); 5.8 percent for Manitoba; and 5.0 percent for Canada.

[47] Thomas Brinkhoff (2017); City Population, Oldenburg (Oldb.), Germany; Retrieved from https://www.citypopulation.de/php/canada-metro-winnipeg.php

Population Categories

To assist with strategic planning and definition of geographic planning zones, CPSE recommends that jurisdictions use 2010 U.S. Census Bureau definitions of urban and rural areas to describe risk based on population density within a jurisdiction. According to this definition:

> An urban area is comprised of a densely settled core of census tracts and/or census blocks that meet minimum population density requirements, along with adjacent territory containing non-residential urban land uses as well as territory with low population density included to link outlying densely settled territory with the densely settled core. To qualify as an urban area, the territory identified according to criteria must encompass at least 2,500 people, at least 1,500 of which reside outside institutional group quarters… The term "rural" encompasses all population, housing, and territory not included within an urban area.[48]

This two-tiered system is used to distinguish fire operations between urban and rural areas. The assumption is that the areas have different probability and consequence of risk, different resource levels, and different number and impact of emergency incidents.

By this definition, all WFPS planning zones are urban areas. However, further analysis identified significant differences from community to community, and from neighbourhood to neighbourhood, in both population and population density. The highest population density is in the central core, or mature communities, with the lowest concentration of people living in rural and agricultural areas as shown in Figure 32.

Figure 32: Population Density by Land Use

Population Density by Land Use, Number of People/km^2		
Land Use	**Low**	**High**
Central Core	5,940	12,118
Mature Communities	1,652	5,975
Recent Communities	179	4,504
New Communities	390	2,273
Rural and Agricultural	24	391
Rural Communities Outside City Limits	3	223

For this reason, ESCI used a more detailed definition to differentiate between planning zones and to provide a level of detail that would otherwise be lost using standard census definitions.[49] ESCI calculated population density based on geographic planning zones—in this case, first-due station districts—using 2016 Statistics Canada Census dissemination area data.

[48] Center for Public Safety Excellence, Inc (2016); *Community Risk Assessment: Standards of Cover Manual, 6th Edition*; Chantilly, VA, pages 11, 12.
[49] Jim Silvernail (2013), *Suburban Fire Tactics*, PennWell Corporation, Tulsa, OK; page 309.

The population categories used for this analysis are:[50]

- **Metropolitan**—Geography with populations of over 200,000 people in total and a population density predominately over 1,158 people per square kilometre (3,000 people per square mile). These areas are distinguished by inner city neighborhoods and numerous mid-rise and high-rise buildings often interspersed with smaller structures.
- **Urban**—Geography with a population of over 30,000 people and/or a population density predominately over 772 people per square kilometre (2,000 people per square mile). These areas are characterized by significant commercial and industrial development, dense neighborhoods, and some mid-rise or high-rise buildings.
- **Suburban**—Geography with a population of 10,000 to 29,999 and/or a population density predominately between 368 and 772 people per square kilometre (between 1,000 and 2,000 people per square mile). These areas are characterized by single and multifamily neighborhoods and smaller commercial developments.
- **Rural**—Geography with a total population of less than 10,000 people or with a population density of less than 368 people per square kilometre (less than 1,000 people per square mile). These areas are characterized by low density residential, little commercial development, and significant farm or open space uses.
- **Wilderness/Frontier/Undeveloped**—Geography that is both rural and not readily accessible by a publicly or privately maintained road.

Several factors have been considered in assigning these categories:

- District population densities were originally calculated from 2016 Census Canada data, and adapted to match WFPS Planning Zones.
- Population flow between various land use types varies from day to night.
- Some areas have a mixture of high and low-density areas, so there may be further differences within planning zones.
- Highly industrialized areas will have lower population density; however, there is significant risk, even though incident frequency is low.
- It should be understood that less populous areas do not necessarily have **lower** risk; rather, they should be viewed as having potentially **different** risks.

[50] To calculate population per square kilometer, multiply the population per square mile by 0.3861 (source: U.S. Census Bureau).

Figure 33 and Figure 34, respectively, show population and population density by WFPS Planning Zone.

Figure 33: WFPS Population per Planning Zone (First-In District), 2016 Census Data

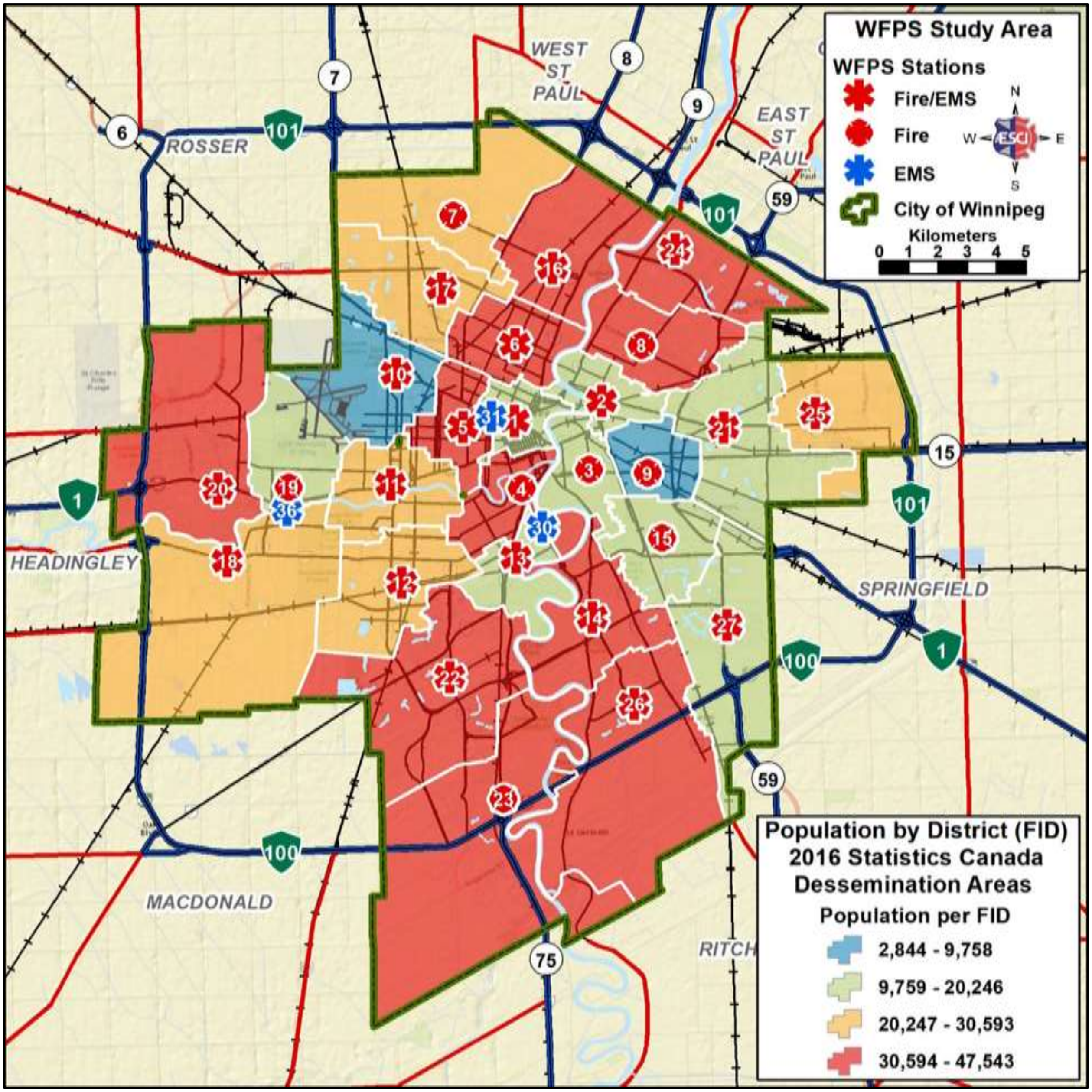
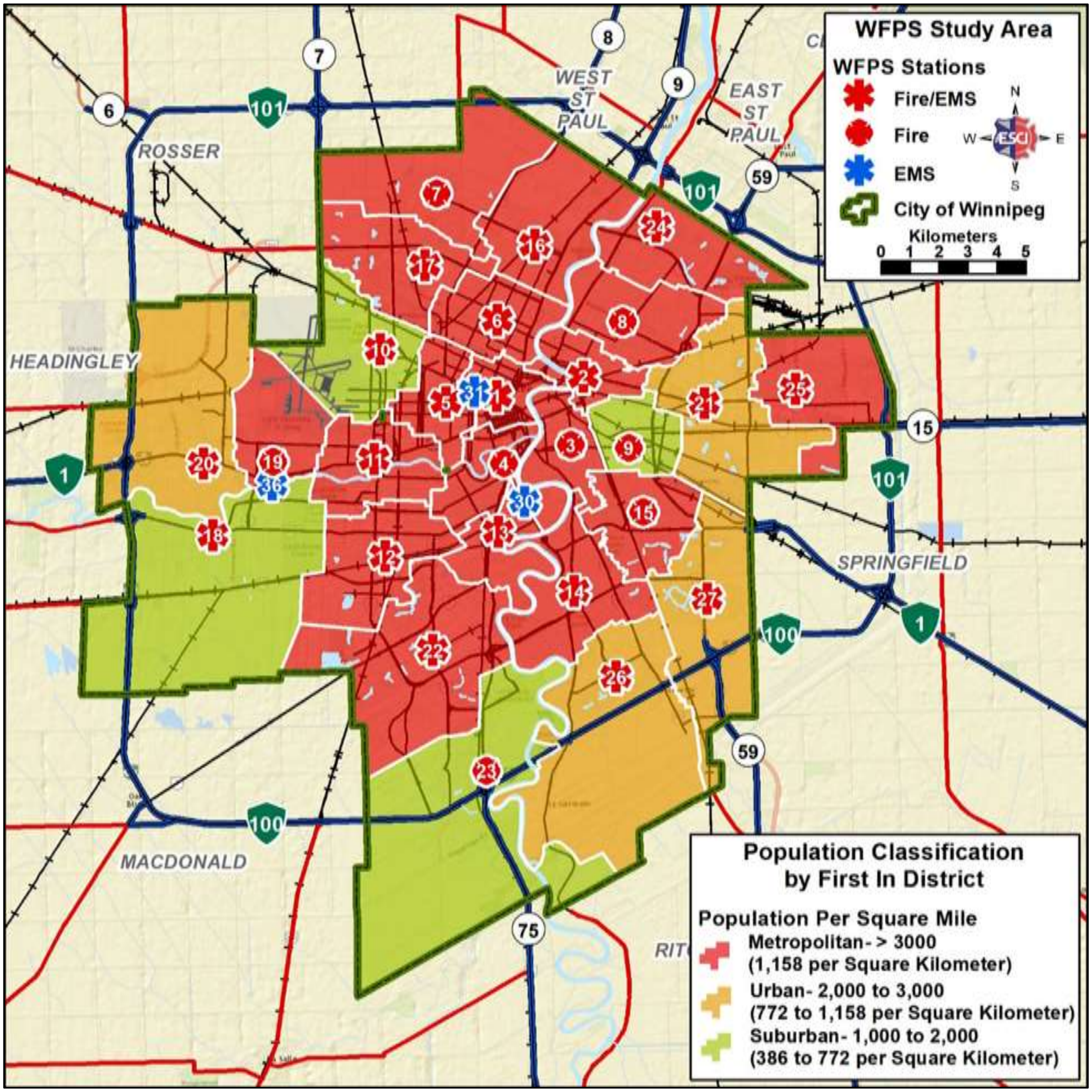


Figure 34: Population Density per Planning Zone (First-Due District), 2016 Census Data



POPULATION GROWTH

The population growth trend is expected to continue through 2040, with a population over 900,000 people in the City of Winnipeg and over 1 million in the Winnipeg CMA as shown in Figure 35. Figure 36 shows population growth over the past five years by census subdivision.

Figure 35: Expected Population Growth for Winnipeg

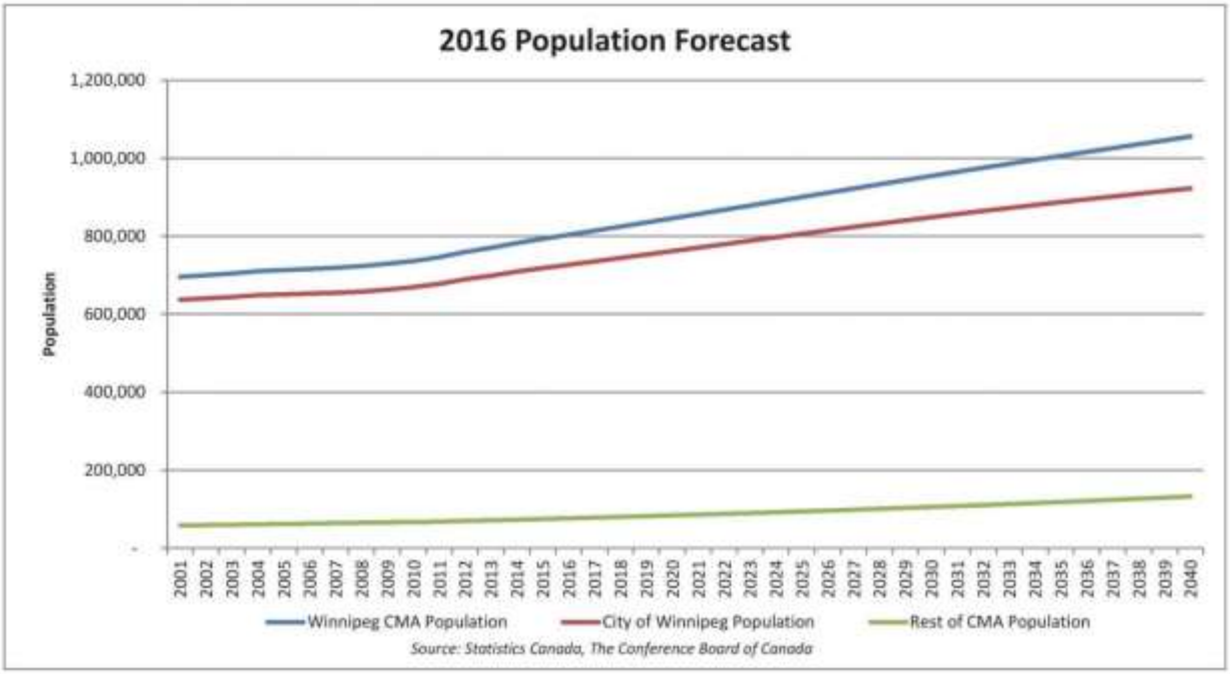


Figure 36: Winnipeg CMA Population by Census Subdivision[51]

Winnipeg CMA Population by Census Subdivision (CSD)				
CSD Name	**Type**	**2016**	**2011**	**% Change**
Winnipeg	City	705,244	663,617	6.3
Springfield	Rural Municipality	15,342	14,069	9.0
Taché	Rural Municipality	11,568	10,284	12.5
St. Clements	Rural Municipality	10,876	10,505	3.5
East St. Paul	Rural Municipality	9,372	9,046	3.6
Macdonald	Rural Municipality	7,162	6,280	14.0
Ritchot	Rural Municipality	6,679	5,478	21.9
West St. Paul	Rural Municipality	5,368	4,932	8.8
Headingley	Rural Municipality	3,579	3,215	11.3
St. François Xavier	Rural Municipality	1,411	1,240	13.8
Rosser	Rural Municipality	1,372	1,352	1.5
Brokenhead 4	First Nations Reserve	516	N/A	N/A

[51] *Ibid*.

The fastest rates of growth—over 4 percent per year—are in neighbourhoods characterized as "recent communities," and include the neighbourhoods listed in Figure 37. These census tracts are areas where land use is changing from rural or industrial to suburban residential. It should be expected that the number and type of calls for service will change with land use.

Figure 37: Population Growth by Neighbourhood

Population Growth by Neighbourhood				
Neighbourhood	**Census Tract**	**2011 Population**	**2016 Population**	**% Change**
Bridgwater Centre, Bridgwater Forest, Bridgwater Lakes, Bridgwater Trails, Chevrier, Fairfield Park, South Pointe, South Point West, Waverly Heights, Waverly West	CT 0500.06	8,733	20,465	+ 18.6
Dugald, Holden, Maginot, Mission Industrial, St. Boniface Industrial, Stock Yards, Symington Yards	CT 0110.01	1,317	2,824	+ 16.5
Fraipoint, Royalwood, Sage Creek, Southland Park,	CT 0110.07	6,624	10,380	+ 9.4
Rosser-Old Kildonan East	CT 0560.06	8,734	13,246	+ 8.7
Eaglemere, Grasse, Kelowna Park, Kildonan Crossing, North Pugios, Regent, Tran Scona Yards	CT 0140.03	8,827	11,936	+ 6.2
Rosser-Old Kildonan West	CT 0051.01	4,218	5,475	+ 5.4

At-Risk Populations

From a risk perspective in urban cities, several factors have been identified that place groups of people at risk. A study by the Canadian Red Cross identified Canada's ten high-risk populations as: seniors with disabilities, aboriginal residents, medically dependent persons, low-income residents, children and youth, persons with low literacy levels, women, transient populations, and new immigrants and cultural minorities.[52] A similar report published by the National Fire Protection Association identified the groups that face a higher risk of being injured or killed in a fire as:[53]

- Children;
- Older adults;
- People with disabilities;
- Immigrants; and
- People in low-income communities.

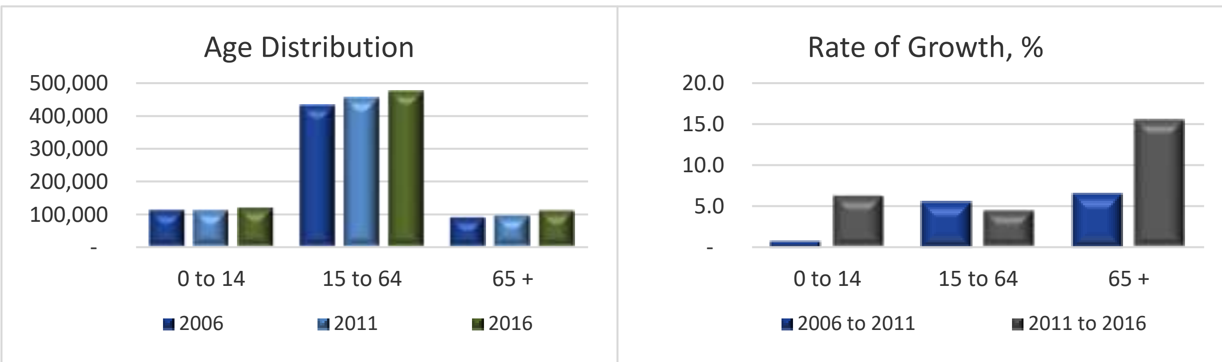
This report looks at those most at risk due to age—children under 5 years of age and people 65 and older.

[52] Canadian Red Cross (2007); *Integrating Emergency Management and High-Risk Populations: Survey Report and Action Recommendations*, Brandon, MB; retrieved from http://www.redcross.ca/cmslib/general/dm_high_risk_populations.pdf
[53] National Fire Protection Association, 2007; Urban Fire Safety Project, Emmitsburg, MD; retrieved from http://www.nfpa.org/public-education/by-topic/people-at-risk/urban-fire-safety/reports-and-presentations

Age: The average age of the population of Winnipeg is 39.9 years old. This compares to an average age for the population of Manitoba of 39.2 years old, and 41.0 years old for Canada.[54] Most of the population, over 66.5 percent, is 15–64 years old, but the greatest rate of change—15.5 percent—is people 65 and older, followed by children under 15 years old as shown in Figure 38. The highest concentration of people 65 and older—51.3 percent—live in the Valhalla neighbourhood in north Winnipeg. Other concentrations of people 65 and greater than 30 percent are centered around the Kirkfield and Tuxedo neighbourhoods.

The rate of growth among children is increasing; however, the greatest rate of change—and one that should be considered in response planning, especially emergency medical services—is people 65 and older. People are living longer, and medical advances are expected to continue this trend. Quality of life issues and increased reliance on assisted living could affect service delivery and number of resources required.

Figure 38: Age Distribution and Rate of Growth in Broad Age Groups, 2006–2016



Effect of Population Growth and At-Risk Populations on WFPS Emergency Response

Other demographic factors—disabilities and medically dependent persons, low-income residents, transient populations, and language/cultural barriers—create challenges for emergency planners and responders alike. It is not the intent of this study to be a definitive authority for the projection of future at-risk populations in the WFPS service area, but rather to base recommendations for future WFPS emergency services needs on a reasonable association with projected service demand. Although these projections can vary, and may change over time; it is clear that demand for emergency services in Winnipeg will continue to increase.

Key Recommendations

- WPFS should identify and consider other at-risk populations as part of the planning process.
- Planning should begin now to identify and sustain the WFPS resources needed to meet the continuing demand for services, especially for at-risk populations.

[54] Source: http://www12.statcan.gc.ca/census-recensement/2016

Physical Assets Protected

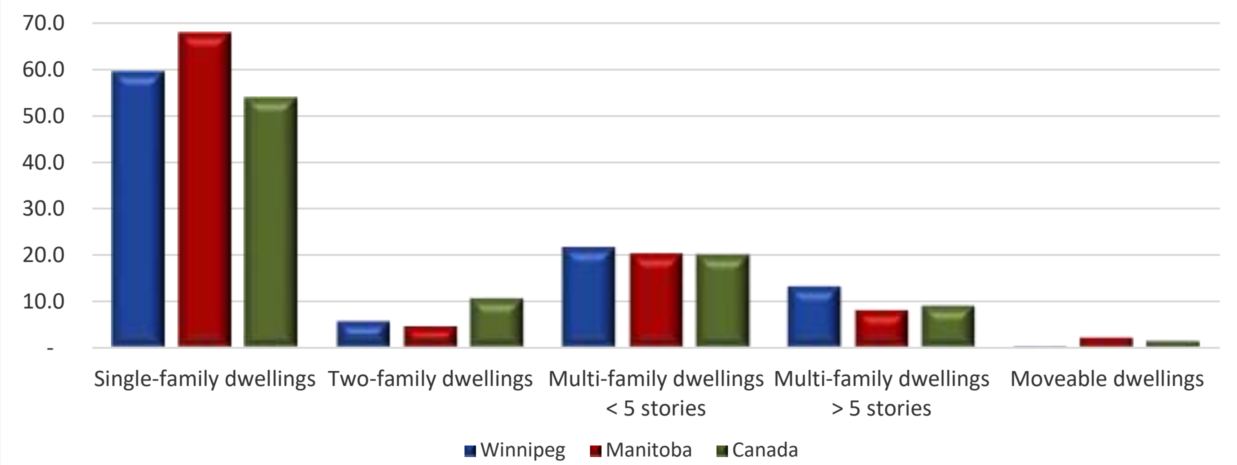
Housing Types

The 2016 census recognized eight housing types. For this report, these have been grouped as follows.

- Two-family dwellings, or duplexes.
- Multi-family dwellings < 5 stories, including row houses and semi-detached houses.
- Multi-family dwellings > 5 stories.
- Moveable dwellings.

Single-family dwellings and apartments account for over 94 percent of all housing in Winnipeg—59.5 percent for single family dwellings, and 34.7 percent for apartments, respectively. Less than 6 percent of Winnipeggers live in duplexes or moveable buildings. Figure 39 shows the mix of housing types for Winnipeg, with comparisons to Manitoba and Canada.

Figure 39: Mix of Housing Types



Property Classifications[55]

The City of Winnipeg uses ten classifications of property to determine tax assessments and portions based on the Municipal Assessment Act. Each class is determined by the type, use, size, and ownership of land or buildings. Each class is assigned a percentage of the assessed value that applies to each class of property. This portioned value is used for taxation purposes; *e.g.*, residential dwelling units pay taxes on 45 percent of their market value assessment. Some property types pay taxes on as much as 65 percent of their market value assessment. The classification types and number of identified parcels are listed in Figure 40; Figure 41 lists the non-portioned assessed values for 2017.[56]

[55] City of Winnipeg (2017); Property Classifications, Winnipeg, MB; retrieved from http://www.winnipegassessment.com/AsmtTax/English/Property/Prop_Classifications.stm
[56] City of Winnipeg (2017); Statistical Financial Information 2017: Assessment and Portioning, Assessment and Taxation Department; Winnipeg, MB; retrieved from http://www.winnipegassessment.com/AsmtTax/English/SelfService/Statistics.stm

Figure 40: Property Classifications

Class	Description	Portion	Number of Parcels
10	Residential 1: 1–4 dwelling units per building	45%	209,462
20	Residential 2: 5 or more dwelling units per building	45%	
80	Residential 3: Owner Occupied Condominium and Co-operative Housing	45%	
30	Farm Property (Current Value Assessment)	26%	Not reported
40	Institutional	65%	Not reported
41	Designated Higher Education Property	0%	Not reported
51	Pipeline	50%	Not reported
52	Railway	25%	Not reported
60	Other Commercial and Rental Property	65%	5,210
70	Designated Recreational Property (formerly Golf Course)	10%	Not reported

Figure 41: 2017 Assessment, Non-Portioned by Property Classification

Class	Description	Taxable & Payments-In-Lieu	Exempt	Total
10	Residential 1	$ 54,683,261,299	$ 136,649,435	$ 54,819,910,734
20	Residential 2	7,887,663,931	10,547,610	7,898,211,541
80	Residential 3	4,496,261,900	291,000	4,496,552,900
30	Farm Property	217,513,439	240,130,226	457,643,665
40	Institutional	1,402,554,841	2,744,998,202	4,147,553,043
41	Designated Higher Education Property	426,602,842	12,414,039	439,016,881
51	Pipeline	31,675,620	—	31,675,620
52	Railway	326,806,550	—	326,806,550
60	Other Commercial and Rental Property	15,689,099,329	2,390,544,232	18,079,643,561
60	Legislative Building	14,535,200	—	14,535,200
70	Designated Recreational Property	152,064,459	25,407,696	177,472,155
	Total	**$ 85,328,039,410**	**$ 5,560,982,440**	**$ 90,889,021,850**

Target Hazards

A critical part of conducting a community risk assessment is to identify specific target hazards within the service area. ESCI uses the FEMA definition of target hazards as "facilities in either the public or private sector that provide essential products and services to the public, are otherwise necessary to preserve the welfare and quality of life in the community, or fulfill important public safety, emergency response, and/or disaster recovery functions."[57]

[57] Vision 20/20 (2016); Community Risk Assessment: A Guide for Conducting a Community Risk Assessment, revision 1.5, John Stouffer. Retrieved from http://strategicfire.org/community-risk-reduction/community-risk-assessment/

Examples of target hazards could include hospitals; assisted living centres; community shelters; schools; airports; government offices; emergency operations centers and communications systems; hazardous materials sites; and water/sewage treatment facilities. Other buildings to consider listing as target hazards could include buildings with a potential for large loss of life—such as places of public assembly, schools and child care centres, medical and congregate care facilities, residential care facilities, multi-family dwellings, and high-rise office buildings—or those with substantial value to the community—economic loss, replacement cost, or historic significance—that, if damaged or destroyed, would have a significant negative impact. Examples of identified target hazards, along with observations by the ESCI assessment team, appear in the series of figures which follow. For the most part, WFPS resources, including specialty apparatus and special operations, appear to be well-spaced to provide coverage into these areas. Detailed recommendations appear in the *Standards of Cover* section.

It is not the intent of this study to be a definitive authority for the identification and location of target hazards or projection of future land use in the WFPS service area, but rather to base recommendations for future WFPS emergency services needs on a reasonable association with projected service demand. Although these projections can vary and may change over time; it is clear that demand for emergency services in Winnipeg will continue to increase.

Key Recommendation

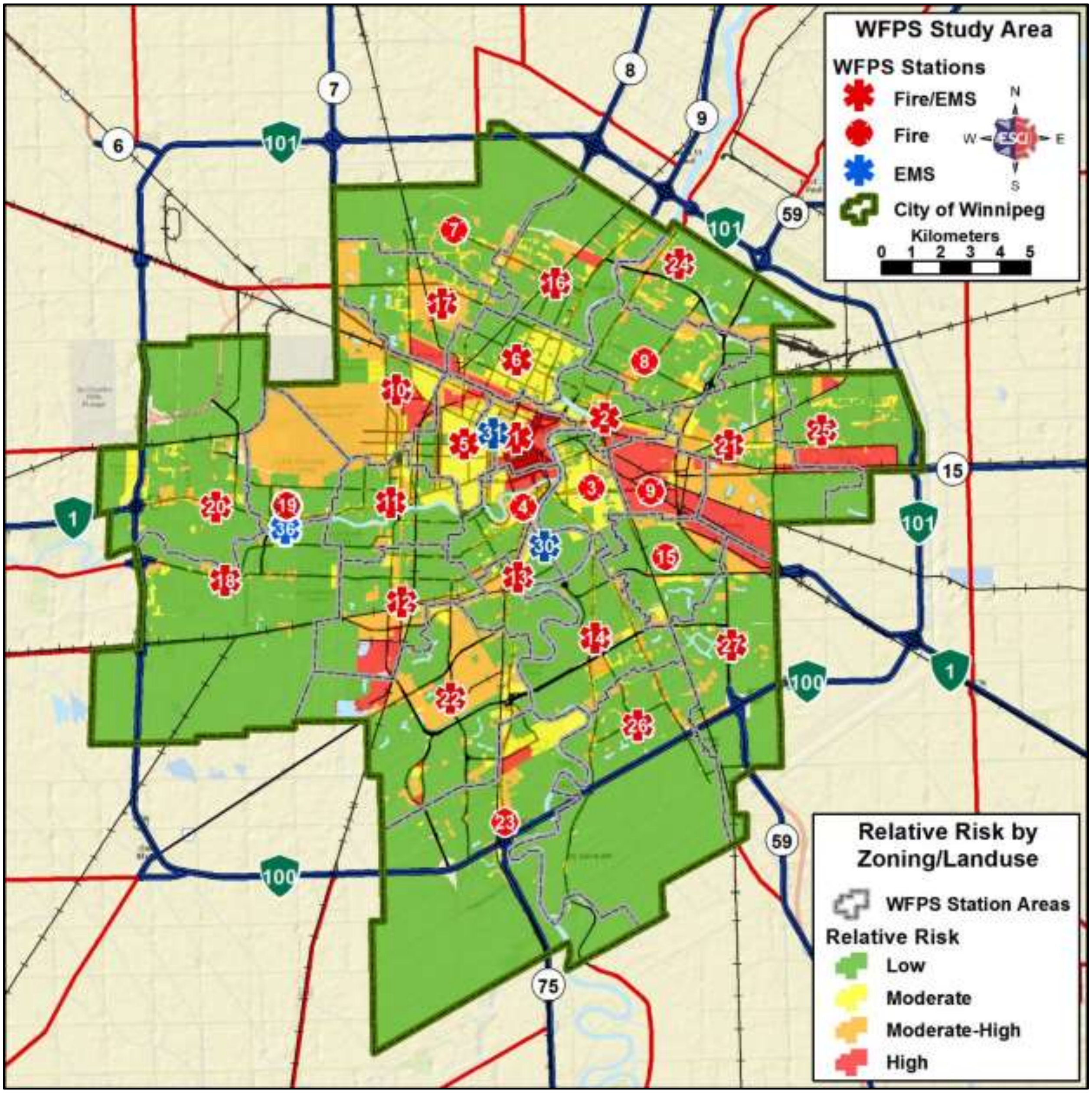
- WFPS should develop an inventory of target hazard locations based on occupancy type, historic responses, historic inspection and pre-plan records, and formal risk reduction processes.

Land Use

Risk by land use is characterized by relative degree of hazard, from low to high. As shown in Figure 42, most of the land use in Winnipeg is considered low risk. Exceptions include:

- High hazard
  - Rail lines and classification yards
  - City centre
- Moderate-high hazard
  - Airport
  - Large hazmat sites
  - Industrial sites
- Moderate hazard
  - Places of assembly
  - Shopping centres
  - Multi-family housing
- Low hazard
  - All other, not classified as moderate, moderate-high, or high hazard.

Figure 42: WFPS Study Area Relative Risk by Land Use



Critical Infrastructure and Key Resources

The term "critical infrastructure and key resources" (CIKR) describes resources that are essential for the functioning of a society and/or economy. Critical infrastructure is defined as a sector whose assets, systems, and networks, whether physical or virtual, are considered so vital that their incapacitation or destruction would have a debilitating effect on security, economic security, public health or safety, or any combination thereof. There are ten defined Critical Infrastructure Sectors (CIS):[58]

- Energy and Utilities
- Food
- Finance
- Government
- Health
- Information and Communication Technology
- Manufacturing
- Transportation
- Safety
- Water

As a transportation and finance hub, Winnipeg has several CIS locations; the city is also home to one of the Royal Canadian Mint manufacturing facilities. The ESCI assessment team included three CIS for study: Water Systems, Energy, and Healthcare. **Beyond that, a detailed study of CIKR should be limited and closely held to maintain CIKR security.** Protection of, and adequate response to, critical infrastructure systems (CIS) locations is critical to the City.

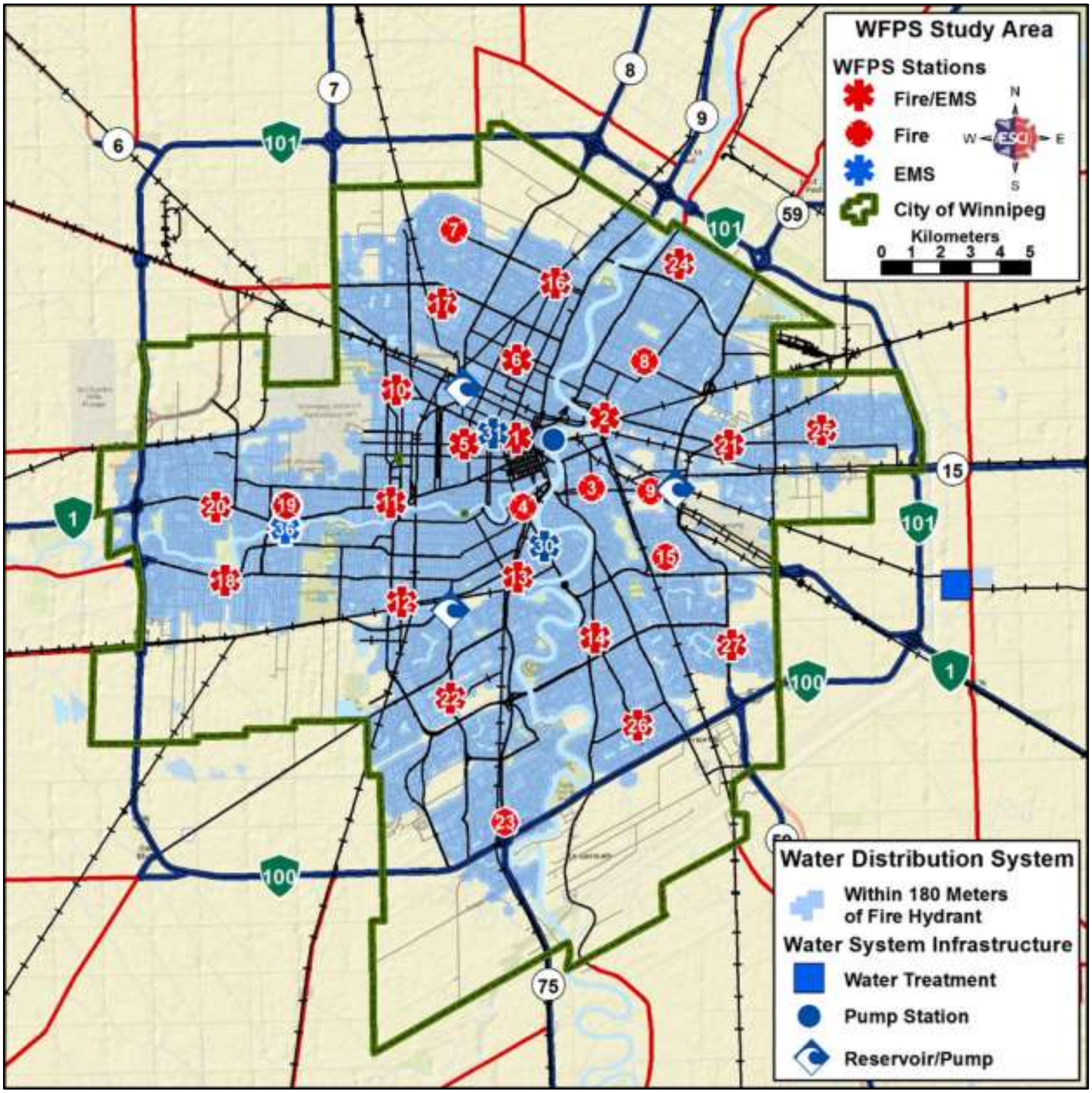
Key Recommendations

- WFPS should conduct a detailed study of critical infrastructure and key resources beyond this report, but should hold the results closely to be sensitive to local, regional, and national security.
- WFPS should consider any redeployment of assets to provide adequate response to CIS locations.

[58] Public Safety Canada. Retrieved from https://www.publicsafety.gc.ca/cnt/ntnl-scrt/crtcl-nfrstrctr/index-en.aspx

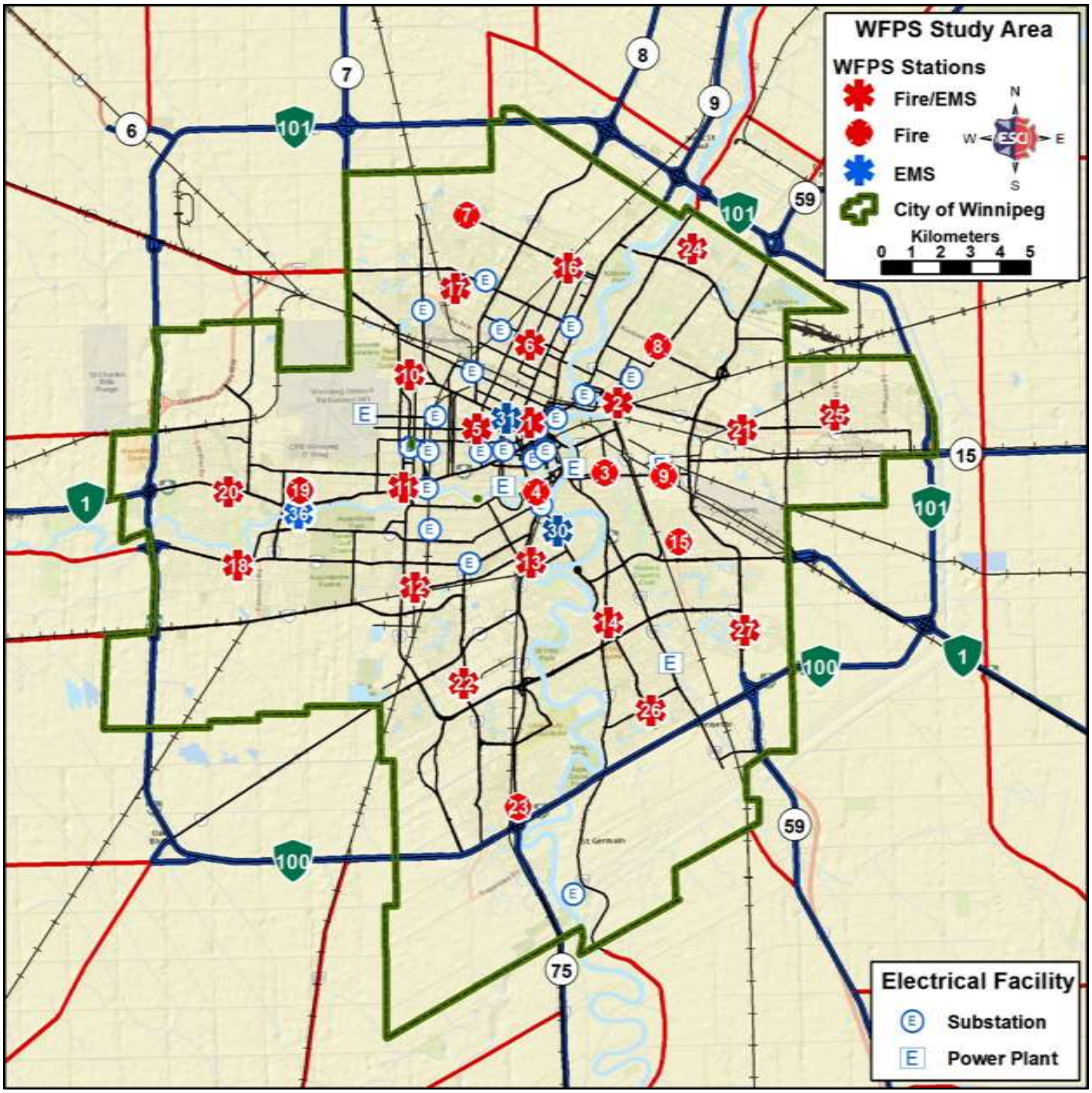
Water Systems. The City of Winnipeg has a centralised water supply system, with most areas within 180 metres of a fire hydrant. Figure 43 shows the location of reservoirs, pump stations, and water treatment plants. An area not shown on this map is the Red River Floodway system to the south and east of the city (discussed in more detail under "Hazard: Flooding").

Figure 43: Water Distribution System



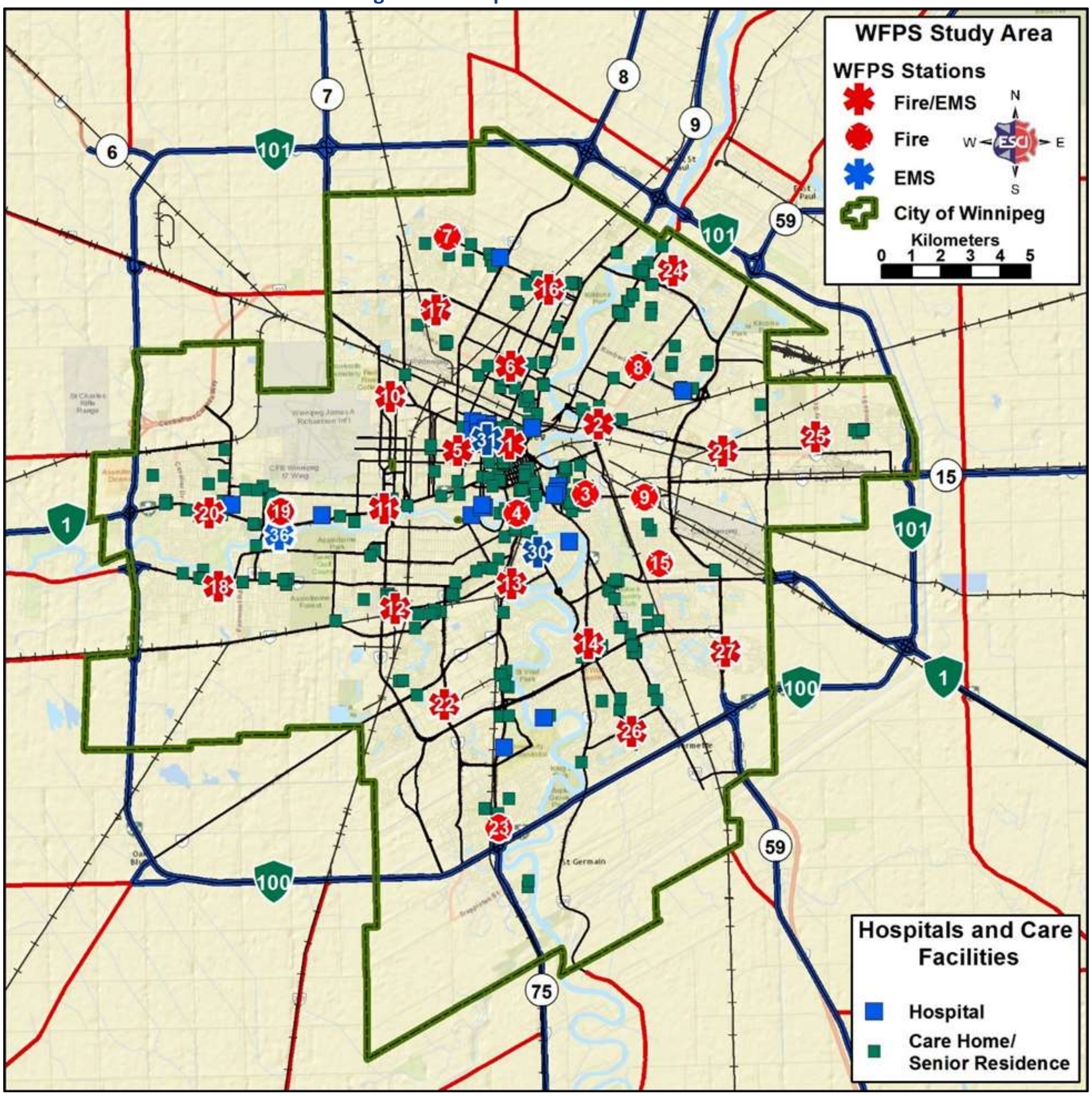
Energy Systems. Figure 44 shows the location of electrical power plants and substations. Protection of, and adequate response to, these locations is critical to the City. Given the high risk of flooding, some of these assets located along the Assiniboine River and the Red River may be subject to interruption unless adequately protected. WFPS should continuously review the location and training of special operations units—swift water, confined space, and hazmat—to ensure the capability to provide adequate response to these CIS locations.

Figure 44: Electrical Infrastructure



Hospitals and Health Care. Figure 45 shows the location of hospitals and health care facilities, including care homes and senior residences. In addition to their criticality during and after mass care incidents, these locations are of concern due to the potential for large loss of life, difficulty of self-preservation during an emergency that requires evacuation, and the presence of medical gases and bio-hazards. Protection of, and adequate response to, these locations is critical to the City. WFPS should continuously review the location and training of fire, EMS, and hazmat units to ensure adequate response to these CIS locations.

Figure 45: Hospitals and Care Facilities

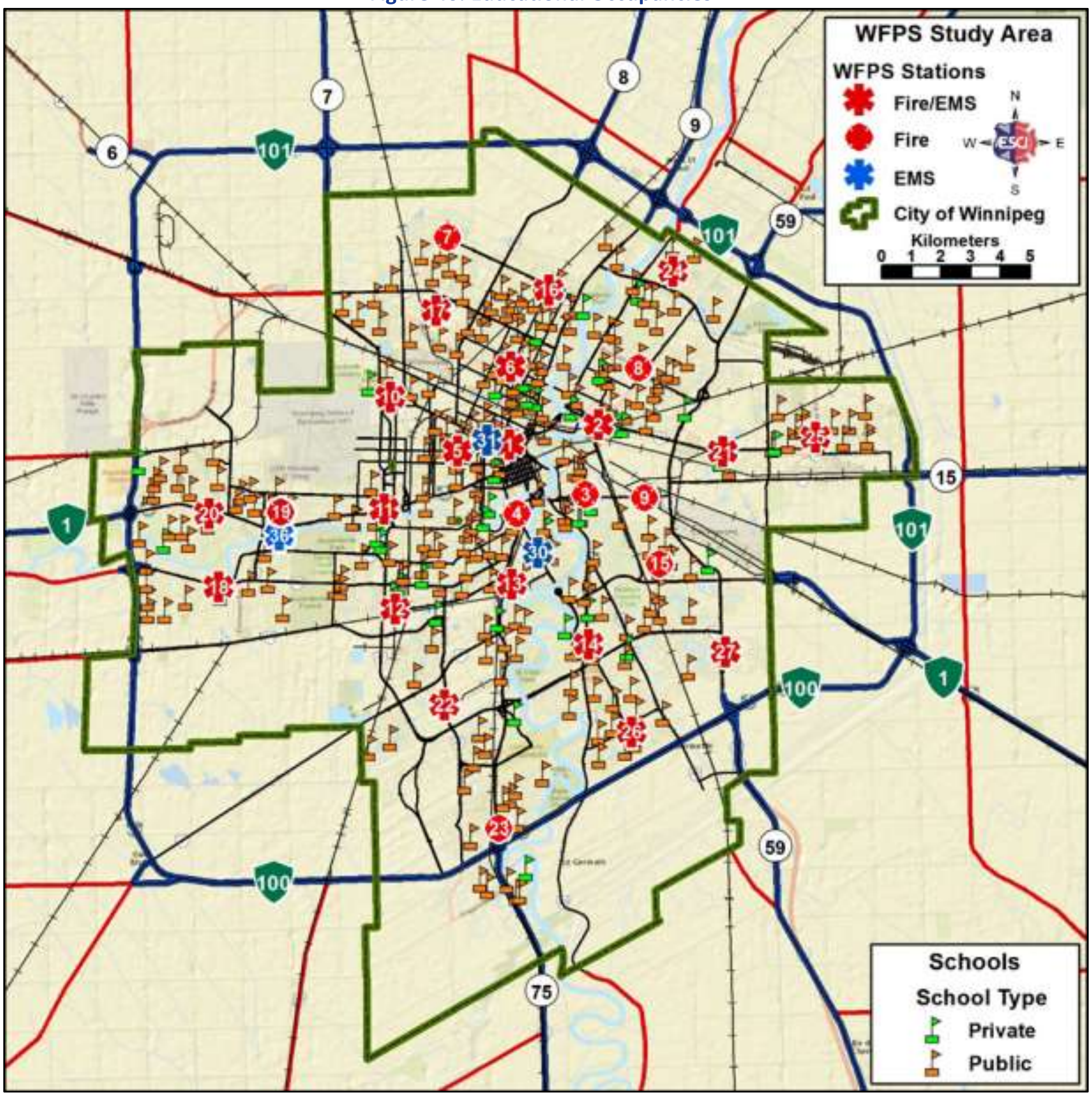


Other Target Hazards

Winnipeg has many other target hazards where the potential for large loss of life, economic impact, and/or historical significance exist. For this report, the ESCI assessment team included two occupancy risk categories—educational and industrial—for study.

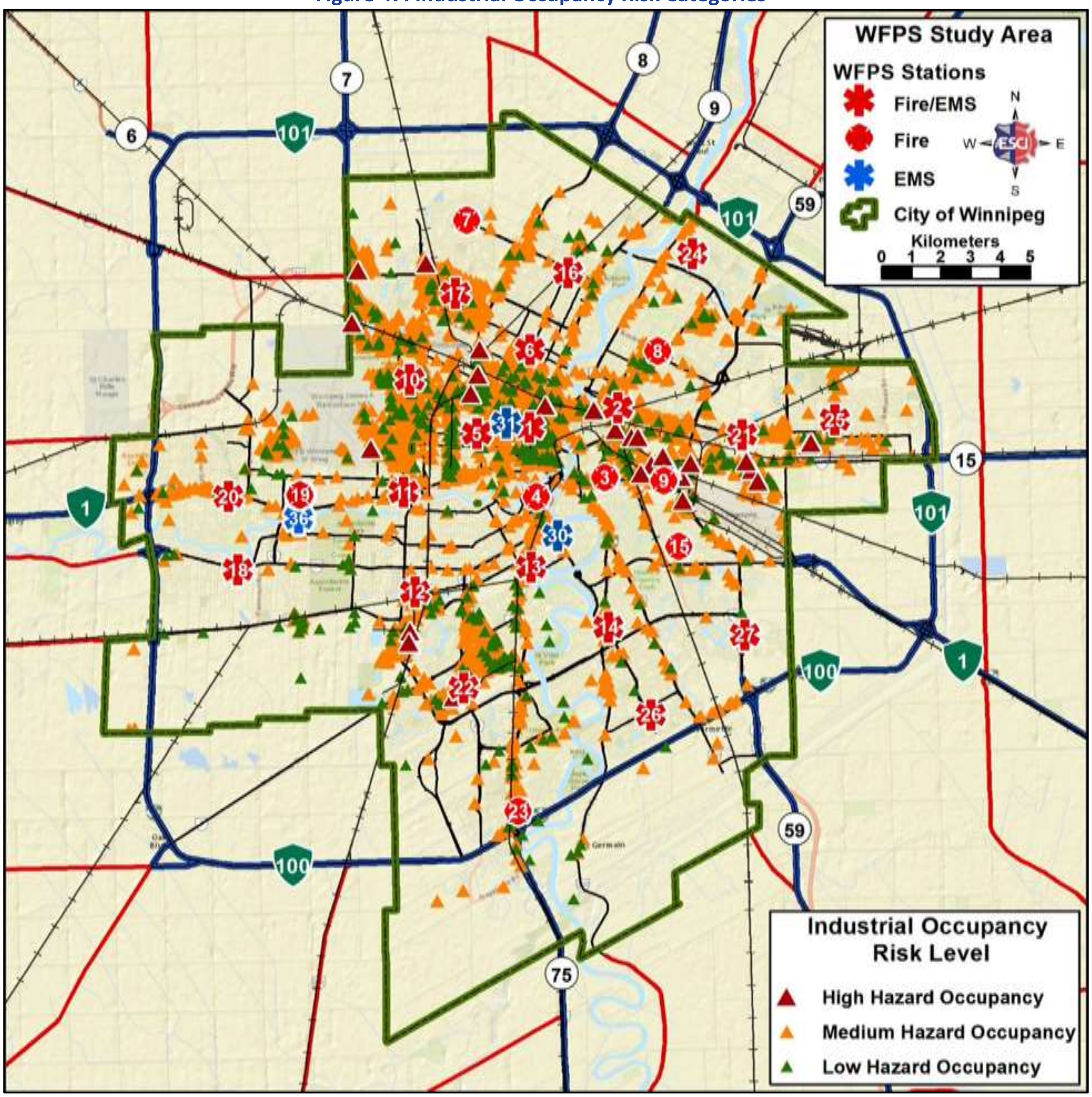
Educational Occupancies. The location of schools, both public and private, is shown in Figure 46. These locations are of concern due to the potential for large loss of life, including children. Adequate response to schools is critical to the City. WFPS should continuously review the location and training of fire and EMS units to ensure the capability to provide adequate response.

Figure 46: Educational Occupancies



Industrial Occupancies. As shown in Figure 47, identified high-hazard industrial occupancy sites are concentrated along the northwest-southeast rail corridor operated by CN and CP. Moderate hazard locations exist along arterial roadways, with concentration in industrial parks. Low hazard locations may be located virtually anywhere not zoned for residential use. Risks, such as the presence of hazardous materials, may be universal or may be specific to the location or activity. Response to these locations could be limited to the employees of the facilities or could include the risk of offsite impact. WFPS should continuously review the location and training of all resources to ensure the capability to provide adequate response, especially to high risk occupancies.

Figure 47: Industrial Occupancy Risk Categories



Assessing Vulnerability and Risk

Emergency Management

The City has an Emergency Plan, last updated in 2012. The aim of the plan is "to provide a prompt and coordinated response by the City of Winnipeg to major emergencies and disasters, thus ensuring the minimization of the effects of an emergency or disaster on the City of Winnipeg and its inhabitants; the protection and preservation of health and property, and the maintenance and restoration of essential services."[59]

Emergency Plan

Two standing committees—Emergency Control Committee (ECC) and the Emergency Preparedness and Coordination Committee (EPCC)—are integral to the planning process. The Emergency Control Committee is responsible for the direction and control of all phases of a comprehensive emergency management plan including mitigation, preparedness, response, and recovery. The Committee advises the Council on all matters pertaining to emergencies or disasters; provides direction and guidance to the Emergency Preparedness and Coordination Committee; obtains outside assistance from the provincial, federal, private, and commercial sources, as required; and prepares release of approved emergency-related information and instruction to the media.

The Emergency Preparedness and Coordination Committee coordinates the activities of City departments, outside agencies, the public sector, and volunteer group during an emergency. It is also responsible for creation of a comprehensive emergency response plan; advises the Emergency Control Committee; prepares information for release to the public; staffs the Emergency Operations Centre on a full or part-time basis; and reviews and updates the City's Emergency Plan.

Plans outlining standard operating procedures for mitigating various emergency situations are maintained by the Sector Coordinators under the general direction of the Emergency Preparedness Coordinator. A complete set of sector plans will be kept in the Emergency Operations Center (EOC) and the alternate EOC. WFPS, in coordination with the Manitoba Office of the Fire Commissioner, should continue to seek, develop, and sustain relationships with partnering agencies as part of the emergency planning process, including the timely renewal of desired interlocal agreements.

ROLE OF THE WFPS

Responsibility for the plan, along with the function of emergency preparedness planning and response coordination, is maintained within Winnipeg Fire Paramedic Service. Although it is beyond the scope of this assessment to discuss those plans and procedures in detail, it is appropriate to take an all-hazards approach and include the aim of the City's Emergency Plan as a prelude to the discussion about community risk.

[59] Source: Emergency Plan, The City of Winnipeg, 2012.

WFPS is responsible for coordinating and supporting overall emergency preparedness activities including research, training and education, disaster exercises, public information, and the response to an emergency event, to include:

- Risk analysis to identify and analyze the effects of real or possible hazards in the city;
- Working with appropriate departments on risk mitigation programs;
- Developing inventories of resources;
- Identifying resource deficiencies and recommending corrective actions;
- Establishing and maintaining communications and alerting systems;
- Developing plans and procedures with the aim of enhancing emergency preparedness; and
- Providing advice to City Council on planning for, and responding to, major emergencies or disasters.

Historical Catastrophic Events[60]

The Canadian Disaster Database (CDD) contains detailed information on "significant disaster events" that meet specific criteria.[61] The CDD has recorded 128 disasters that have affected southern Manitoba since 1900. Some were wide-spread, affecting all Canada, or the prairie provinces including Manitoba; others were more local in nature, affecting parts of Manitoba including Winnipeg, or the Winnipeg CMA.[62] These include:

- Natural disasters
  - 33 flood events
  - 32 drought events
  - 17 storms/thunderstorms
  - 7 winter storms
  - 6 tornados
  - 5 cold events
  - 2 heat events
- Biologic health events
  - 4 epidemics
  - 2 pandemics
  - 1 infestation
- Fire events
  - 11 wildfires
- Technological disasters
  - 8 dangerous goods incidents

Most notable in Winnipeg's history is the 1950 Red River Flood. Seasonal floods are common to the area, but the 1950 Red River Flood was particularly devastating. About 100,000 residents, over one-third of the city's population at the time, had to be evacuated, and four of the City's eleven bridges were destroyed. One man died; 5,000 buildings were destroyed; and flood waters covered more than 550 square miles. Property losses were estimated at $100 million, over $600 million in today's dollars.[63]

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[60] Source: Canadian Disaster Database. CDN disaster database https://www.publicsafety.gc.ca/cnt/rsrcs/cndn-dsstr-dtbs/index-en.aspx

[61] Ten or more people killed; 100 or more people affected (injured, infected, evacuated, or homeless); an appeal for national or international assistance; historical significance; and/or damage or interruption of processes such that the affected community cannot recover on its own.

[62] The entire list is located in Appendix D of this report.

[63] The 1997 Red River Flood released more water and caused more damage over a wider area, estimated at 1 billion dollars CDN, but Winnipeg was spared catastrophic flooding by activation of the Red River Floodway and the diversion of a significant amount of water around the City.

To mitigate similar damage in the future, the government constructed the Red River Floodway, an artificial flood control waterway. Construction was completed in 1968. When activated, it takes part of the Red River's flow—up to 4,000 cubic metres per second (140,000 ft^3/s)—around the east side of the City of Winnipeg, and discharges it back into the Red River below the dam at Lockport. Over the years, the floodway has been credited with preventing over $100 billion in cumulative flood damage.[64, 65] Other historic disasters in and around Winnipeg are listed in Figure 48, sorted by event type.

Figure 48: Historic Winnipeg Disasters[66]

Event Type	Place	Year	Description	Comments
Dangerous goods	Winnipeg MB	2016	A natural gas leak was caused by a contractor who accidently severed a gas line at a construction site; intersection of Keewatin St and Paramount Rd.	200 evacuated
Flood	Winnipeg MB	2010	Heavy rains over a week caused significant flooding in Winnipeg and the surrounding area. Of the 180,000 residential properties in Winnipeg, 619 reported being flooded; 420 by overland flooding, 199 suffered sewage backups.	$ 7,731,772
Flood	Red River MB	2004	Severe flooding in the Winnipeg area of the Red River.	1000+ evacuated $ 2,302,473
Flood	Southern Manitoba	2001	Southern Manitoba suffered significant losses during spring flooding. Highway infrastructures, businesses, and private and public properties were extensively damaged.	$ 16,710,626
Flood	Assiniboine, Red and Winnipeg Rivers MB	1997	The province of Manitoba declared a state of emergency. Over 7,000 military personnel were employed for 36 days to assist in preventing flood damage and in relocating evacuees.	25,447 evacuated $ 498,513,577
Flood	Winnipeg MB	1993	The City of Winnipeg was declared a disaster area because of flooding caused by prolonged heavy rainfall; three severe rainstorms in a five-week period caused sewer backups and other extensive damage to homes, power lines, and agricultural land infrastructure in Winnipeg and surrounding areas. Wettest summer in Winnipeg in 120 years.	$ 214,807,255
Flood	Red River Region MB	1979	A major flood, close to flood levels of the 1950 flood, hit the Red River region; most of the damage occurred in the valley; no communities were flooded as the dykes protecting them were temporarily raised.	10,000 evacuated $ 18,557,303
Flood	Assiniboine River MB	1976	Record flooding was reported.	$ 4,545,103

[64] Source: https://en.wikipedia.org/wiki/Red_River_Floodway
[65] As development expands into rural communities, especially those to the south, along the Red River, some have expressed concern that activation of the Floodway could have the effect of diverting water into communities that were once farmland or open prairie.
[66] Source: Canadian Disaster Database. CDN disaster database https://www.publicsafety.gc.ca/cnt/rsrcs/cndn-dsstr-dtbs/index-en.aspx

Event Type	Place	Year	Description	Comments
Flood	Winnipeg MB	1970	Severe flooding, Winnipeg area of the Red River.	
Flood	Winnipeg MB	1969	Severe flooding, Winnipeg area of the Red River.	
Flood	Winnipeg MB	1966	Spring runoff and heavy rains caused extensive damage.	
Flood	Winnipeg MB	1960	Severe flooding of the Red River.	
Flood	Winnipeg MB	1950	Heavy rainfall caused the river to stay above flood stage for 51 days; the water reached 4.6 metres in depth in low lying areas; 5000 buildings damaged; resulted in construction of the Red River Floodway.	1 fatality 107,000 evacuated
Flood	Winnipeg MB	1923	Severe flooding in the Winnipeg area of the Assiniboine River.	
Flood	Winnipeg MB	1916	Severe flooding in the Winnipeg area of the Red River.	
Storm	Winnipeg and Steinbach MB	2009	Powerful thunderstorms, spectacular lightning strikes, and baseball-sized hail hammered a wide area. More than 7,000 instances of damage to houses and vehicles were reported, and losses ranged between $50–75 million. The storm also knocked out power to approximately 4000 homes	$ 50,000,000
Storm	Winnipeg MB	1996	Gale force winds, torrential rains, funnel clouds, one tornado, and tennis ball-sized hailstones caused significant crop damage and property damage.	$105,000,000
Storm	Winnipeg MB	1978	No additional information	
Tornado	Winnipeg MB	2008	Wind caused havoc across Winnipeg and eastern Manitoba, including one area that may have been hit by a tornado. Up to 5000 homes lost power.	
Tornado	Winnipeg MB	1987	A thunderstorm with at least two tornadoes, strong winds; and 40 mm of rain in 2-1/2 hours caused flash flooding and considerable property damage.	
Wildfire	Vita MB	2012	High winds and extremely dry conditions forced immediate evacuations; three homes and one bridge were destroyed.	420 evacuated
Wildfire	East of Lake Winnipeg MB	1999	Forests in Ontario and Manitoba were consumed by this event.	
Winter Storm	Winnipeg MB	1986	A major storm dumped 30 cm of snow on Winnipeg; winds gusting to 90 km/h produced severe blowing snow and zero visibility.	2 fatalities
Winter Storm	Prairie Provinces	1983	Storm forced Winnipeg International Airport to close for two days, toppled television towers. Freezing rain caused other extensive damage.	
Winter Storm	Winnipeg MB	1966	A storm brought 35 cm of snow and 120 km/h winds, paralysing the city for two days.	

Community-Wide Risks

ESCI considered three factors in the calculation of community-wide risks for this assessment to be consistent with related studies. These are:

- The likelihood (probability) of an incident occurring;
- The consequence to the community; and
- The impact to the department.

Other factors should be considered in future work. These factors may include—as assessment techniques become more sophisticated—the following:

- Parcel-based assessment, using data from the Winnipeg Assessment and Taxation Department;
- Weighted risk categories as defined by WFPS for each factor;
- Weighted risk categories as defined for WFPS for each occupancy use or building characteristic.

Medical Hazards

EMERGENCY MEDICAL SERVICE (EMS)

Refers to pre-hospital medical care, usually delivered on-site by trained specialists with transport by WFPS ambulance. Common responses include sick calls, vehicular incidents, difficulty breathing, injuries due to trauma, and heart attacks. The number of patients is small, and symptoms are within the capabilities of first arriving units. Some calls require only first aid; others require basic life support (BLS), advanced life support (ALS), or mobile intensive care (MIC). Overall, EMS responses account for 81 percent of all WFPS calls for service.

Figure 49: Incident Characteristics, Medical—EMS

Characteristic	Conditions
Likelihood	• Highly Probable
Impact	• Minor
Location	• Can occur at any location, but are highly concentrated in the central core, and moderately concentrated along transportation corridors.
Duration	• Usually one hour or less, including transport time (not including ER wait time).
Time Pattern	• Fairly steady year-round; lowest month is February. • Lowest demand on Tuesday; highest on Friday and Saturday. • Lowest from 2 AM to 6 AM; highest from 4 PM to 12 PM.
Speed of Onset	• Depends on medical condition and demographics. • May progress rapidly without intervention.
Availability of Warning	• Virtually impossible to predict the time and extent of occurrence.

MASS CASUALTY

Mass casualty trauma calls involving multiple patients and requiring additional units include commercial bus, aircraft, or passenger train crashes; release of hazardous materials in a congested area; or evacuations of schools, office buildings, shopping centers, hospitals, or other health care facility.

Figure 50: Incident Characteristics, Medical—Mass Casualty

Characteristic	Conditions
Likelihood	• Possible
Impact	• Significant
Location	• Can occur at any location but are most likely to occur in locations where people congregate and with mass transit.
Duration	• May take several hours or longer.
Time Pattern	• Virtually impossible to predict the time and extent of occurrence. • Often is the result of some other emergency.
Speed of Onset	• Usually overwhelms initial response. • May progress rapidly without intervention.
Availability of Warning	• Virtually impossible to predict the time and extent of occurrence.

MEDICAL OUTBREAK/EPIDEMIC/PANDEMIC

Although these terms are often used interchangeably, there are distinctions.

- An *outbreak* is defined as an infectious disease that occurs in greater numbers than expected;
- An *epidemic* occurs when an infectious disease spreads rapidly to many people; and
- A *pandemic* is a global disease outbreak or epidemic.

Figure 51: Incident Characteristics: Medical—Medical Outbreak/Epidemic/Pandemic

Characteristic	Conditions
Likelihood	• Rare to unlikely
Impact	• Significant to catastrophic
Location	• Can occur at any location, but are most likely to initiate in locations with poor personal hygiene or preventive medical care.
Duration	• May take several days, weeks, or longer.
Time Pattern	• Virtually impossible to predict the time and extent of occurrence. • Often is the result of some other emergency.
Speed of Onset	• Usually begins with isolated case. • Can overwhelm initial, local response. • May progress rapidly without intervention.
Availability of Warning	• Virtually impossible to predict the initial occurrence or spread. • Depends on severity of effects/rate of spread, may be weeks to months.

Fire Hazards

RESIDENTIAL FIRES

This category refers to fires located in structures erected for sleeping and eating. The full involvement of these structures is within the capacity of responding agencies. It includes, but is not limited to the following:

- Mobile homes and manufactured housing;
- Single-family dwellings; and
- Duplexes.

Figure 52: Incident Characteristics: Fire—Residential

Characteristic	Conditions
Likelihood	• Highly probable
Impact	• Minor
Location	• Located throughout the community.
Duration	• Depending on the size, may last up to several hours.
Time Pattern	• Higher during the winter months.
Speed of Onset	• Depends on building conditions and materials. • Depends on time from ignition to discovery and alarm. • Will progress rapidly without intervention.
Availability of Warning	• Virtually impossible to predict the time and extent of occurrence.

LARGE STRUCTURE FIRES

This category refers to fires located in large structures erected for community use, commercial enterprise, or multi-family dwelling. They are usually accompanied by a potential for large loss of life, and may require special extinguishment techniques. It includes, but is not limited to the following:

- Places of assembly
- Shopping centres
- Mid-rise/high-rise office buildings
- Multi-family dwellings
- Assisted living facilities
- Hotels
- College dormitories
- Hospitals
- Schools

Figure 53: Incident Characteristics: Fire—Large Structure

Characteristic	Conditions
Likelihood	• Possible
Impact	• Significant
Location	• Identified on target hazard list.
Duration	• Depending on the size, may last up to several hours.
Time Pattern	• Higher during the winter months.
Speed of Onset	• Depends on building conditions, materials, and presence of fixed fire suppression systems. • Depends on time from ignition to discovery and alarm. • Will progress rapidly without intervention.
Availability of Warning	• Virtually impossible to predict the time and extent of occurrence.

AGRICULTURAL STRUCTURE FIRES

This category refers to fires associated with agricultural operations. The full involvement of these structures is within the capacity of the responding agency. Includes, but is not limited to the following:

- Large animal barns;
- Grain elevators; and
- Feed stores.

Figure 54: Incident Characteristics: Fire—Agricultural Structure

Characteristic	Conditions
Likelihood	• Possible
Impact	• Moderate
Location	• Primarily in rural areas.
Duration	• Depending on the size, may last up to several hours.
Time Pattern	• Higher during the winter months.
Speed of Onset	• Depends on building conditions and materials. • Depends on time from ignition to discovery and alarm. • Will progress rapidly without intervention.
Availability of Warning	• Virtually impossible to predict the time and extent of occurrence.

INDUSTRIAL MANUFACTURING/WAREHOUSE FIRES

This category refers to fires associated with industrial, manufacturing, or storage operations. Large amounts of hazardous materials, lumber, or other combustible materials are usually present. The full involvement of these structures is within the capacity of the responding agency. It includes, but is not limited to the following:

- Manufacturing facilities;
- Chemical storage facilities;
- Bulk fuel facilities; and
- Tire storage facilities.

Figure 55: Incident Characteristics: Fire—Industrial Manufacturing/Warehouse Fires

Characteristic	Conditions
Likelihood	• Possible
Impact	• Significant
Location	• Primarily in industrial or rural areas.
Duration	• Depending on the size, may last up to several hours.
Time Pattern	• Virtually impossible to predict the time and extent of occurrence • Some products, *e.g.*, Anhydrous Ammonia (NH_3) increase risk due to increased agricultural demand in spring and fall.
Speed of Onset	• Chemical releases may occur within minutes depending on the type and size of container breached and products involved. • Depends on building conditions and materials. • Depends on time from ignition to discovery and alarm. • Will progress rapidly without intervention.
Availability of Warning	• Virtually impossible to predict the time and extent of occurrence. • Little to no pre-warning; releases are usually due to operator error or mechanical failure.

VACANT/ABANDONED STRUCTURE FIRES

This category refers to fires associated with vacant structures, both short- and long-term. The full involvement of these structures is within the capacity of the responding agency. It may include any type of structure.

Figure 56: Incident Characteristics: Fire—Vacant/Abandoned Structure Fires

Characteristic	Conditions
Likelihood	• Highly Possible
Impact	• Minor
Location	• Primarily in mature communities and blighted industrial areas.
Duration	• Depending on the size, may last up to several hours.
Time Pattern	• Virtually impossible to predict the time and extent of occurrence. • More prevalent in winter if subject to use by transient population.
Speed of Onset	• Depends on building conditions and materials. • Depends on time from ignition to discovery and alarm. • Will progress rapidly without intervention.
Availability of Warning	• Virtually impossible to predict the time and extent of occurrence. • Little to no pre-warning; ignition often caused by transient warming fires.

VEHICLE FIRES

This category refers to fires associated with vehicles. The full involvement of vehicles usually does not exceed the capacity of the responding agency. Tanker transports hauling chemicals or large, specialized vehicles where the cargo may contribute to the fire can be an exceptional risk. Includes the following:

- Passenger vehicles and trucks;
- Personal watercraft and small boats; and
- Recreational vehicles.

Figure 57: Incident Characteristics: Fire—Vehicle Fires

Characteristic	Conditions
Likelihood	• Highly Probable
Impact	• Minor
Location	• Anywhere people require personal transportation.
Duration	• Depending on the size, may last up to several hours.
Time Pattern	• Virtually impossible to predict the time and extent of occurrence.
Speed of Onset	• Depends on time from ignition to discovery and alarm. • Will progress rapidly without intervention.
Availability of Warning	• Virtually impossible to predict the time and extent of occurrence.

WILDFIRES OR WILDLAND URBAN INTERFACE (WUI) FIRES

Generally, this refers to fires in areas that include at least one, but are not limited to, the following attributes:

- Structures situated in lightly populated agricultural areas;
- Low-density housing communities or subdivisions located next to rural areas; and
- Cottages, cabins, and recreational and industrial facilities located in rural areas.

Figure 58: Incident Characteristics: Fire—Wildland Urban Interface Fires

Characteristic	Conditions
Likelihood	• Probable
Impact	• Significant
Location	• Anywhere in the wildland urban interface.
Duration	• Depending on the size, may last up to several hours or days.
Time Pattern	• Virtually impossible to predict the time and extent of occurrence. • Peak seasons occur during drought conditions.
Speed of Onset	• Can be extremely fast based on fire weather and fuel dryness. • Will progress rapidly without intervention on windy days.
Availability of Warning	• Fire patterns and behaviour are monitored daily, and warnings issued during periods of potentially dangerous fire weather and fuel dryness.

Winnipeg is situated just south of Canada's Boreal Forest, noted for its larger conifer trees, some deciduous trees, and a diversity and abundance of nesting birds, and surrounded by the Aspen Parkland, a transition zone from forest to prairie grassland.[67] As such, large forest fires occur more often in the densely wooded areas of Northern Manitoba, but are less likely around Winnipeg. For reference, forest fires are broken into three main classifications:[68]

[67] Source: https://www.wildernesscommittee.org/manitoba/what_we_do/protecting_wild_lands/boreal_forest
[68] Source: "Hazard Analysis and Risk Assessment," published by the Office of the Fire Commissioner, Province of Manitoba, 2007.

- **Surface Fires**: Fires burning in fuels near to the ground, such as dead leaves and twigs, fallen trees, grass, and duff.[69] These can be spread at a rate of 1–5 metres per minute.
- **Intermittent Crown Fires**: Fires consuming the crowns (tops) of some of the trees. These can burn at a rate of 25–50 metres per minute.
- **Continuous Crown Fires**: Fires consuming the crowns of all or most of the trees. These can burn at a rate of 25–80 metres per minute.

Fire danger is monitored and mapped daily for planning purposes and information is readily available from the Canadian Wildland Fire Information System.

LARGE STRUCTURE COLLAPSE

Large structure collapse is predominantly a problem in mature communities where several large structures predating modern building codes are still in use by the public, or conversely, abandoned buildings or buildings under construction, that have not been secured or destroyed. Occurs when a building or structure collapses due to:

- Engineering or construction problems;
- Metal fatigue;
- Changes to the load bearing capacity of the structure;
- Human operating error or other causes such as flood, fire, explosions, earthquake, snow or ice build-up; or
- Intentional act.

Figure 59: Incident Characteristics: Fire—Large Structure Collapse

Characteristic	Conditions
Likelihood	• Possible
Impact	• Significant
Location	• Usually in mature communities, abandoned buildings, or buildings under construction.
Duration	• May last up to several hours or days.
Time Pattern	• May occur at any time of year, but increased risk in winter based on snow load accumulating on the roof of a structure.
Speed of Onset	• Extremely fast, collapse will take place within seconds.
Availability of Warning	• Noticeable signs such as stress cracks in structure or foundation may be present in cases such as snow loading.

[69] Duff is loosely-compacted organic material of moderate depth below the forest floor.

TECHNICAL RESCUE INCIDENTS

This category refers to the specialized rescue of victims from water, water-related, confined space, or similar environments. Responders utilize various specialized equipment based on the type of situation. WFPS has the necessary training and equipment to complete a successful rescue. If needed, additional equipment could be requested for CAN-TF4 from Brandon, which is several hours away.

Figure 60: Incident Characteristics: Fire—Water Related Incidents

Characteristic	Conditions
Likelihood	• Highly Probable
Impact	• Moderate
Location	• Risk is present wherever utilized waterways are found. • Risk is present wherever there is potential for collapse or entrapment.
Duration	• May last up to several hours.
Time Pattern	• Higher risk in warm weather; unique challenge in winter.
Speed of Onset	• Generally speaking, incidents escalate very quickly.
Availability of Warning	• There is no way to predict the time or circumstances of the incident.

Natural Hazards

Of all emergencies, natural disasters are the most frequent and have the most devastating consequences, primarily due to the lack of advanced warning or inability to mitigate it—as in the case of a large-scale flooding event.

FLOODING

This category refers to the prolonged or excessive inundation of water over land. From the information provided, it became clear to the ESCI assessment team that Winnipeg is most at risk from natural disasters, primarily floods. The effects of widespread flooding can be of long-duration, leading to mass evacuations, power outages, and significant damage to property and infrastructure. The vast majority of flooding incidents stem from spring flooding caused by exceptionally fast snowmelt or large amounts of precipitation coinciding with melting temperatures. Large inundations occur mainly on the Red River watershed because of its level topography and diminished slope. Flooding also occurs in the Assiniboine and Saskatchewan River watersheds. The flow values of both the 1826 and 1997 floods exceeded the 100-year recurrence interval.

Figure 61: Stream Gages in the Red River Basin from the International Border to Lake Winnipeg, Manitoba

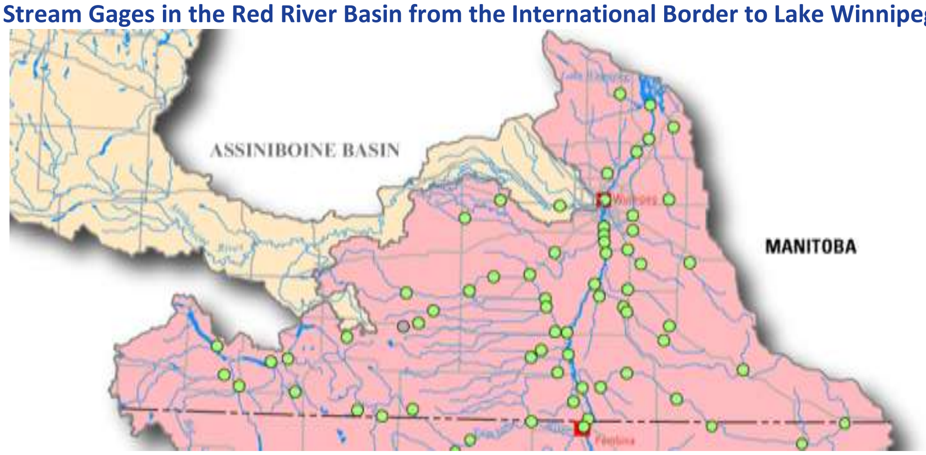


Figure 62: Incident Characteristics: Natural Hazards—Flooding

Characteristic	Conditions
Likelihood	• Highly Probable
Impact	• Catastrophic
Location	• Red River Watershed, including the Red River and its tributaries. • Assiniboine Watershed, including the Assiniboine River and its tributaries.
Duration	• During large events, timeframes run from early to mid April and last until late May or early June.
Time Pattern	• Snowmelt Flooding: April through June. • Severe Weather Events: May through September.
Speed of Onset	• Relative to other hazards large events generally progresses slowly.
Availability of Warning	• Regarding spring flooding, ample warning time is usually provided in order to properly plan a response. Accurate forecasting can be obtained as early as two months prior to an expected event.

SEVERE WEATHER

This category refers to blizzards, heavy rain, thunderstorms, tornados, hail, extreme wind, or extreme heat/cold. In an average year, more Canadians die from exposure to winter cold than from lightning, wind storms, and tornadoes combined. There have been nine confirmed tornado touchdowns within the City of Winnipeg, with another ten events that are considered possible tornadoes. One death occurred on June 4, 1900, when a tornado touched down in the downtown area of Winnipeg.[70]

Figure 63: Incident Characteristics: Natural Hazards—Severe Weather

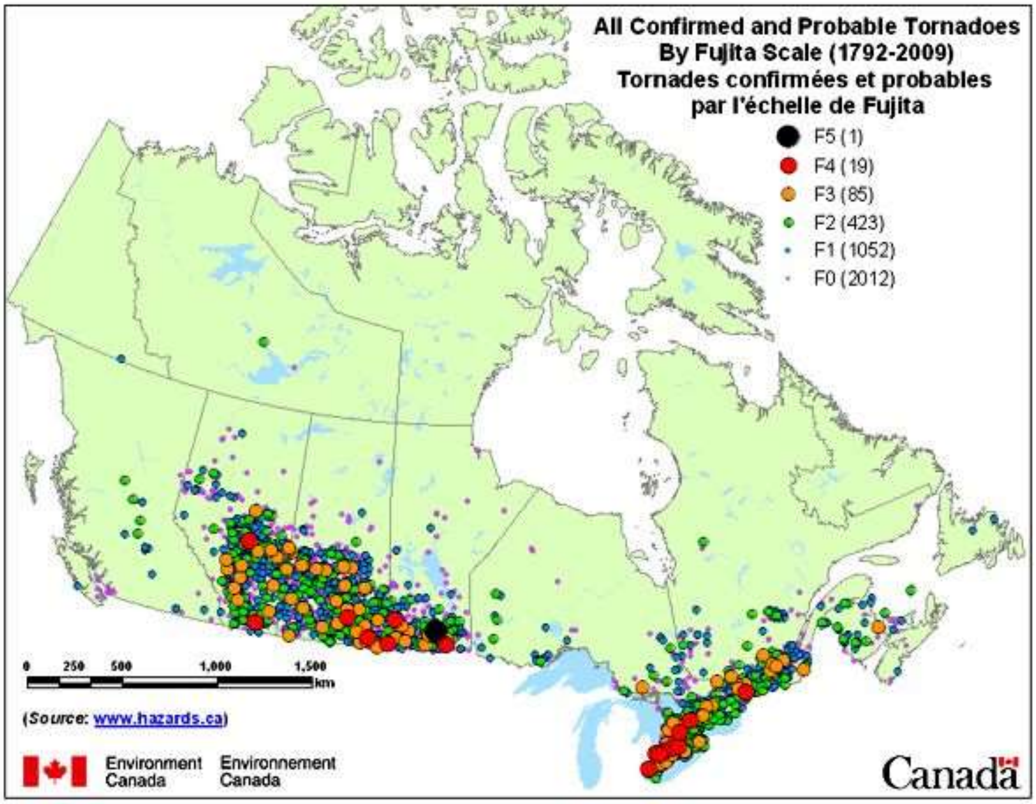
Characteristic	Conditions
Likelihood	• Highly Probable
Impact	• Significant
Location	• Throughout the Winnipeg region.
Duration	• Extreme heat/cold may last several days; wind events may last minutes to days.
Time Pattern	• Winter weather: November through March. • Extreme heat: July through August. • Other severe weather: Year-round, with tornados and thunderstorm most likely during May through July.
Speed of Onset	• Rapid onset is typical with many severe weather events, in some cases less than 10 minutes.
Availability of Warning	• There are usually telltale precursors leading to a severe climatic event, may be present as much as 24 hours in advance. However, the actual event itself is extremely difficult to pinpoint and mitigate against.

Figure 64: F-5 Tornado, 2007

[70] Retrieved from https://www.uwinnipeg.ca/emergency-guidelines/weather/tornadoes.html

The tornado in Elie, Man., on June 22, 2007, was the first record F-5 tornado in Canada.[71]

Figure 65: History of Tornados in Canada



DROUGHT

Drought is a natural climatic condition caused by an extended period of limited rainfall that occurs naturally in a broad geographic area. High temperature and wind speed, coupled with low humidity can heighten drought conditions and make areas more susceptible to wildfire. Human actions can also accelerate drought-related impact. In south Manitoba, droughts can occur over large areas and can last for months or even years. The Canadian Drought Monitor (CDM) uses a variety of federal, provincial, and regional data sources to establish a drought rating across Canada as shown in Figure 66.[72]

[71] Retrieved from http://www.cbc.ca/news/canada/manitoba/elie-tornado-anniversary-1.4173662; Photo credit: Justin Hobson.
[72] Retrieved from http://www.agr.gc.ca/eng/programs-and-services/list-of-programs-and-services/drought-watch/?id=1461263317515

Figure 66: Example of Canadian Drought Monitor

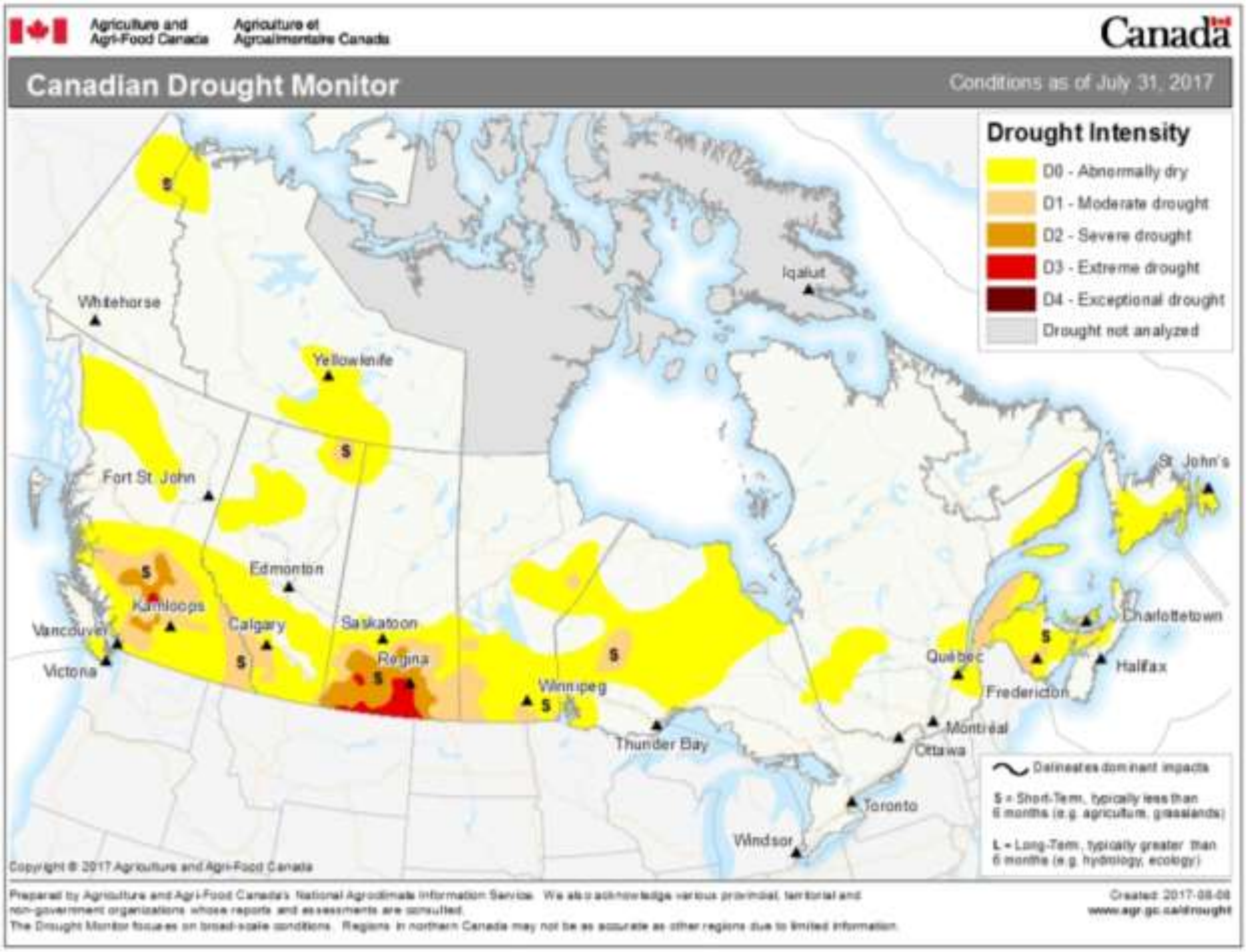


Figure 67: Incident Characteristics: Natural Hazards—Severe Weather

Characteristic	Conditions
Likelihood	• Possible
Impact	• Moderate
Location	• Throughout the Winnipeg region, mostly to the west.
Duration	• Drought may be persistent and last several days or months.
Time Pattern	• Usually during summer months.
Speed of Onset	• Slow to develop.
Availability of Warning	• Long advance notice, but the event itself is difficult to pinpoint.

OTHER NATURAL DISASTERS

This category refers to natural events not listed above, including earthquakes, subsidence, or landslides. All these events are rare to unlikely in and around Winnipeg, with little or no impact on life or property.

Figure 68: Incident Characteristics: Natural Hazards—Other natural disasters

Characteristic	Conditions
Likelihood	• Rare
Impact	• Insignificant
Location	• No recent history
Duration	• No recent history
Time Pattern	• No recent history
Speed of Onset	• No recent history
Availability of Warning	• No recent history

Technological Hazards

DANGEROUS GOODS INCIDENTS

Dangerous goods are substances which pose risk to health, safety, property, or the environment during operation and/or transportation. These substances are divided in classes in accordance to the specific chemical characteristics resulting in a degree of danger.

DANGEROUS GOODS INCIDENT—ROAD

Figure 69: Incident Characteristics: Technological Hazards—Dangerous Goods Incident, Road

Characteristic	Conditions
Likelihood	• Highly Probable
Impact	• Significant
Location	• All areas are susceptible to dangerous goods incidents. • Greatest risk is along major roadways; Provincial Highway 1, 16, 75, 6 and 10 are of particular importance.
Duration	• Span of time ranges from less than 24 hours to several days.
Time Pattern	• Releases may occur at any time. • Risk is fairly constant throughout the year, although some products such as Anhydrous Ammonia (NH3) provide increased risk based on agricultural demand in spring and fall.
Speed of Onset	• Releases may occur within minutes depending on the type and size of container breached.
Availability of Warning	• There is little to no pre-warning of incident occurrence as releases are usually the fault of operator or mechanical failure.

DANGEROUS GOODS INCIDENT—RAIL

Figure 70: Incident Characteristics: Technological Hazards—Dangerous Goods Incident, Rail

Characteristic	Conditions
Likelihood	• Highly Probable
Impact	• Significant
Location	• All areas are susceptible to dangerous goods incidents. • Greatest risk is along major railways and in classification yards.
Duration	• Span of time ranges from less than 24 hours to several days.
Time Pattern	• Releases may occur at any time. • Risk is fairly constant throughout the year, although some products such as Anhydrous Ammonia (NH3) provide increased risk based on agricultural demand in spring and fall.
Speed of Onset	• Releases may occur within minutes depending on the type and size of container breached.
Availability of Warning	• There is little to no pre-warning of incident occurrence as releases are usually the fault of operator or mechanical failure.

DANGEROUS GOODS INCIDENT—FIXED FACILITY

This category includes fires, intentional releases, unintentional releases, and industrial accidents at manufacturing, storage, or production facilities which produce or store dangerous goods.

Figure 71: Incident Characteristics: Technological Hazards—Dangerous Goods Incident, Fixed Facility

Characteristic	Conditions
Likelihood	• Highly Probable
Impact	• Moderate to Significant
Location	• All areas are susceptible to dangerous goods incidents. • Greatest risk is in industrial areas.
Duration	• Span of time ranges from less than 24 hours to several days.
Time Pattern	• Releases may occur at any time. • Risk is fairly constant throughout the year, although some products such as Anhydrous Ammonia (NH3) provide increased risk based on agricultural demand in spring and fall.
Speed of Onset	• Releases may occur within minutes depending on the type and size of container breached.
Availability of Warning	• There is little to no pre-warning of incident occurrence as releases are usually the fault of operator or mechanical failure.

AIRCRAFT ACCIDENT

This category refers to all instances of aircraft involved with a declared emergency, risk of collision, engine failure, smoke or fire, collision, crash, or other operational abnormalities. WFPS does not conduct ARFF operations; the responsibility for ARFF is with Winnipeg Airports Authority. WFPS provides mutual aid and is the primary responder to off-airport incidents inside city limits.

Figure 72: Incident Characteristics: Technological Hazards—Aircraft Accident

Characteristic	Conditions
Likelihood	• Rare outside the airport
Impact	• Significant
Location	• Most often, at or near airport. Rare outside the airport.
Duration	• Span of time ranges from less than 24 hours to several days.
Time Pattern	• May occur at any time.
Speed of Onset	• Extremely fast, depending on problem.
Availability of Warning	• There is little to no pre-warning of incident occurrence.

PIPELINE EXPLOSION

This category refers to a pipeline, valve component, or pumping station that experiences a rupture or release caused by operator error, mechanical failure, or corrosion. The following products represent most products flowing in pipelines across the Province of Manitoba: gasoline, crude oil, propane, and natural gas.

Figure 73: Incident Characteristics: Technological Hazards—Pipeline Explosion

Characteristic	Conditions
Likelihood	• Possible
Impact	• Moderate
Location	• Main gas pipelines go from west to east through Miniota to Winnipeg then east to Kenora. • Main branch runs from Winnipeg south through Niverville for service to the United States (TransCanada Pipelines Ltd.).
Duration	• Releases may last a varied amount of time depending on where it occurs in relation to the remote shut off valve.
Time Pattern	• Not seasonally effected, may happen at any time.
Speed of Onset	• Extremely fast and volatile, caused by explosive products such as propane or natural gas.
Availability of Warning	• Little to no warning occurs to signify a pipeline breach.

UTILITIES OUTAGE

This category refers to any outage of electrical, natural gas, steam, water, or public works; often related to natural or other incident. Most common is electrical blackout or power outage: refers to a regional or municipal area without electrical power for a period exceeding 15 minutes. Power outages may have one or more of the following causes: severe weather (tornado, ice, snow, wind), mechanical failure, operator error, or an intentional act.

POWER OUTAGE

This category refers to regional or municipal power loss; not province wide.

Figure 74: Incident Characteristics: Technological Hazards—Power Outage

Characteristic	Conditions
Likelihood	• Probable
Impact	• Moderate
Location	• Risk is present in all parts of Manitoba.
Duration	• The vast majority of blackouts last for less than 8 hours.
Time Pattern	• Occur at all times of the year.
Speed of Onset	• Instant. Power loss occurs once supply is disrupted.
Availability of Warning	• Little warning is possible; however, repair is usually timely.

DAM (CONTROL GATE) FAILURE

This category refers to a breach in the dam (control gate) itself, its foundations, abutments, or spillway which results in a large or rapidly increasing uncontrollable release of water into the city from the Red River.

Figure 75: Incident Characteristics, Technological Hazards—Dam (Control Gate) Failure

Characteristic	Conditions
Likelihood	• Rare
Impact	• Catastrophic
Location	• Risk is limited to entrance to Red River Floodway. • Smaller levees exist throughout Winnipeg along the Red River and other rivers.
Duration	• Inundation from a dam burst may last anywhere from several hours to days, depending on terrain and slope.
Time Pattern	• Can occur at all times of the year.
Speed of Onset	• Residents near the release may see effects in minutes while down stream regions may take hours to be affected.
Availability of Warning	• There would likely be some warning present regarding the lack of structural integrity.

Figure 76: Red River Floodway; How It Works[73]

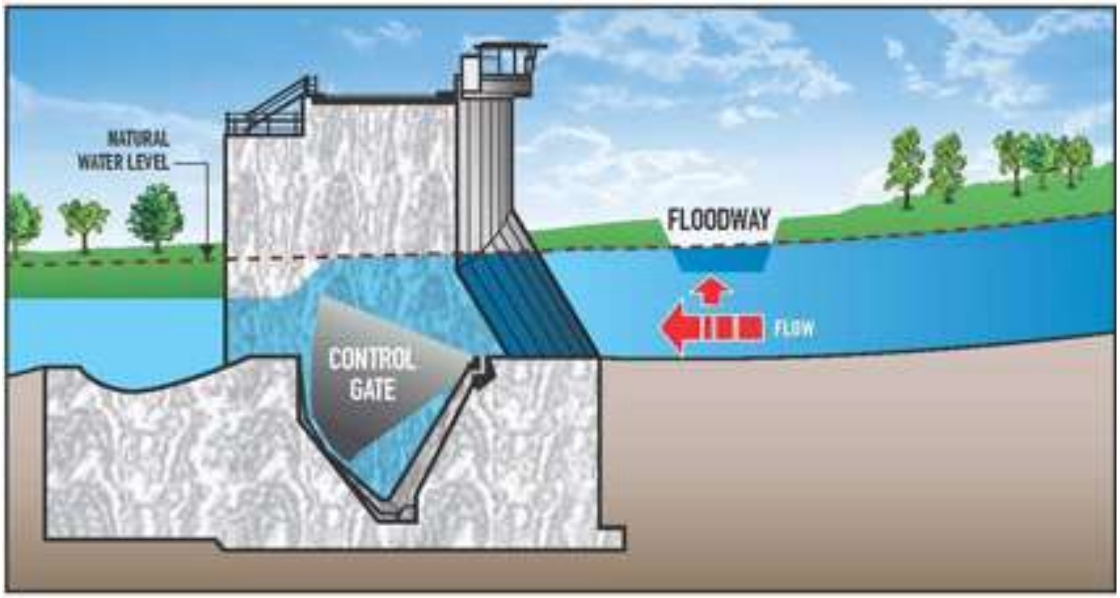
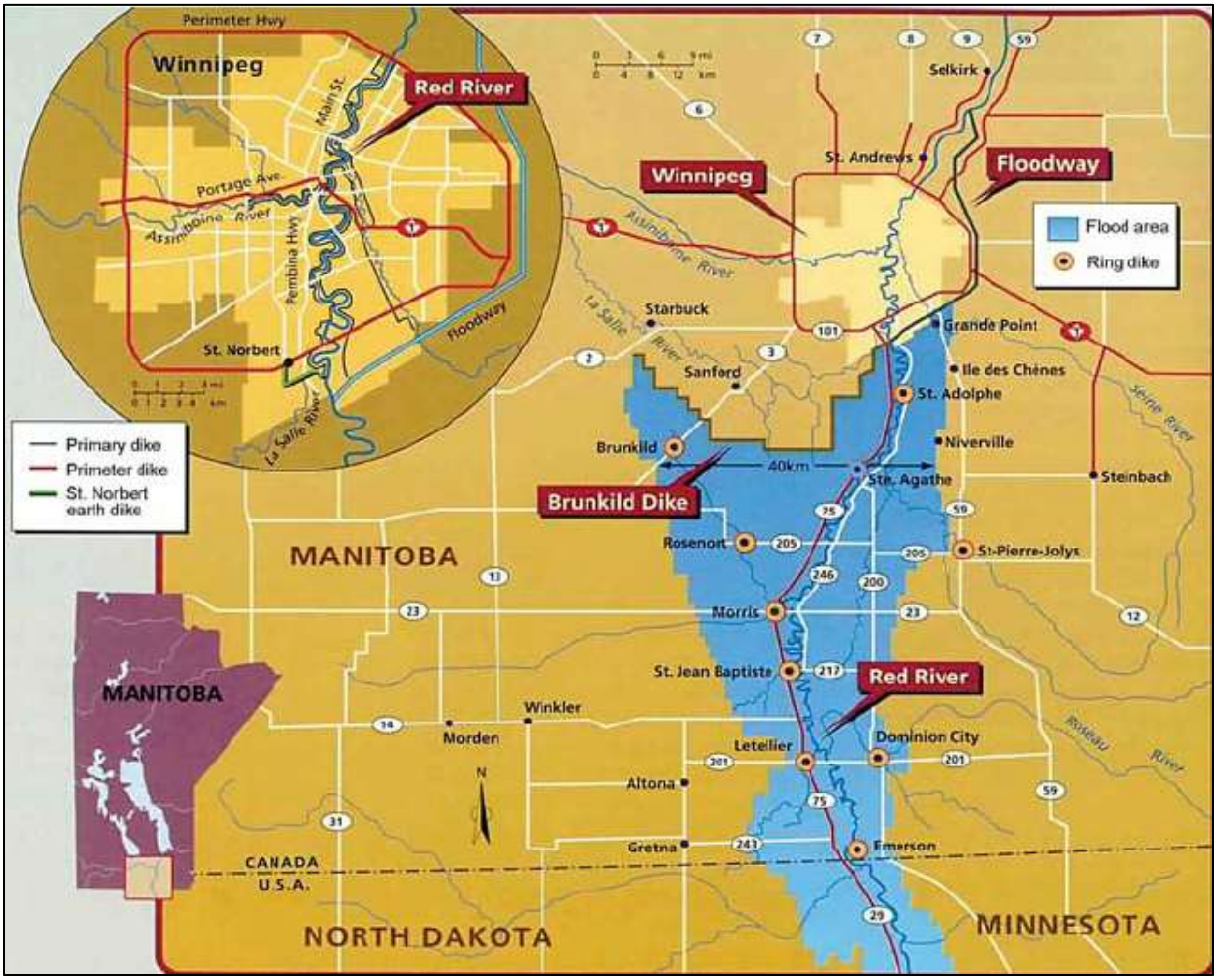


Figure 77: Winnipeg Levee System[74]

[73] Manitoba; *Red River Floodway: Background and Description*; retrieved from https://www.gov.mb.ca/mit/wms/rrf/index.html
[74] City of Winnipeg (2017); Winnipeg's Primary Dike System; retrieved from http://www.winnipeg.ca/emergweb/Flood/PrimaryDike.stm

The primary dike system is typically defined as the closest road to the river. After the 1950 flood, all roads below 8 metres (26.5 ft) were built up to this elevation, many roads are above this minimum elevation. A secondary dike is any permanent dike built between the primary dike and the river.

Figure 78: Effect of Dikes on Red River Flood Plain[75]



[75] Ahmad, Sajjad and Slobodan Simonovic, "An Intelligent Decision Support System for Management of Floods," *Water Resources Management*, 20: 391-410 (2006). Retrieved from https://www.researchgate.net/publication/226337535_An_Intelligent_Decision_Support_System_for_Management_of_Floods

Human Hazards

HUMAN-CAUSED INCIDENTS

This category refers to the intentional actions of an adversary, such as a threatened or actual chemical attack, biological attack, or cyber incident.[76] It may include: business interruption, communications/cyber incident, terrorism, VIP situation, hostage situation, civil disturbance, labor action, and bomb threats.

Figure 79: Incident Characteristics: Human Hazards—Human-Caused Incidents

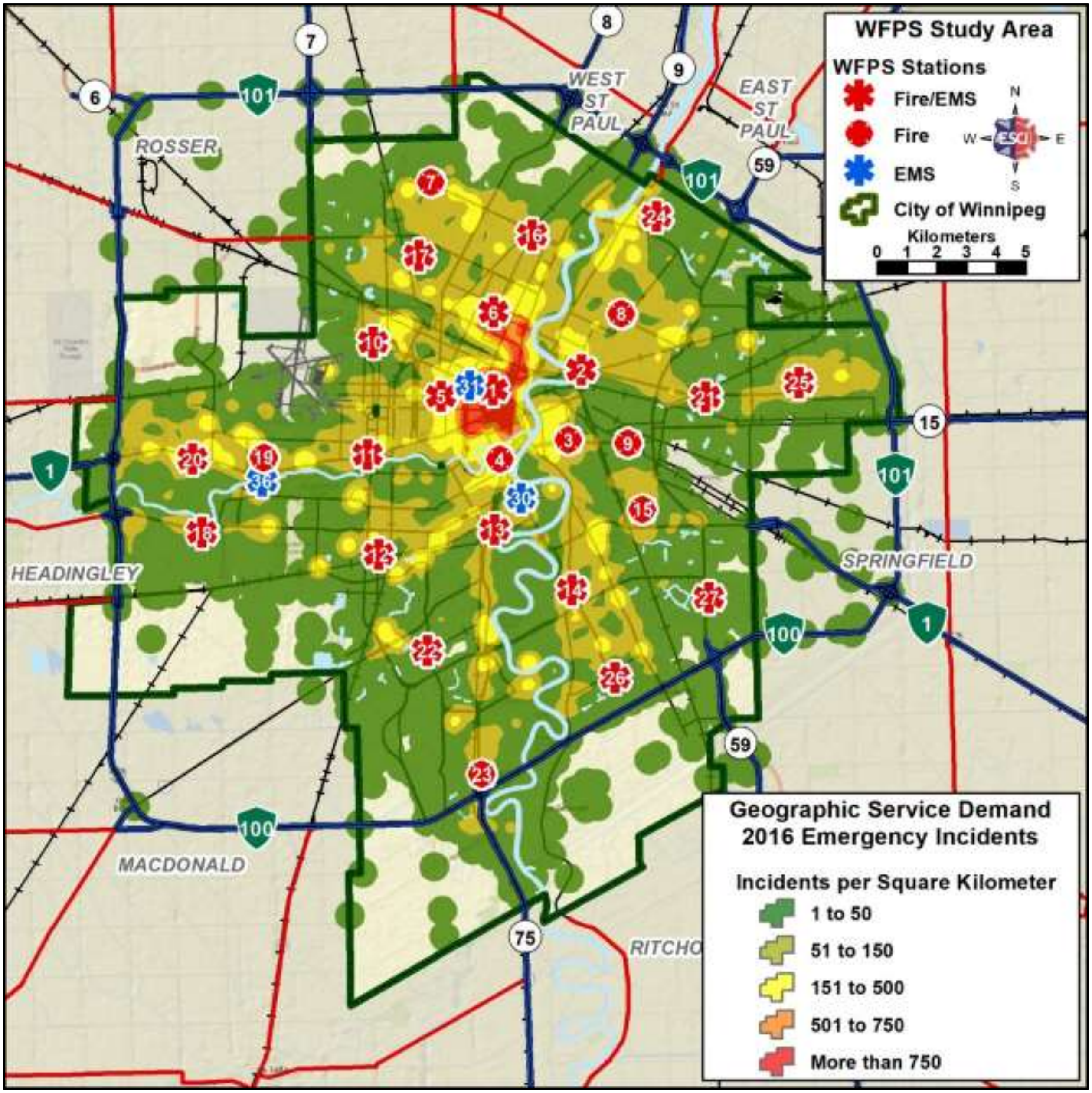
Characteristic	Conditions
Likelihood	• Rare
Impact	• Moderate to Catastrophic
Location	• May occur anywhere.
Duration	• May last for hours or days.
Time Pattern	• Could occur at all times of the year.
Speed of Onset	• Could be slow to take effect (biological incident) or by instantly (bomb blast).
Availability of Warning	• There could be some warning, but most likely will be with no prior notice.

Risk Analysis by Major Call Type

ESCI also reviewed historic responses to determine risk by major call type. This allows WFPS to evaluate a visual perspective on response patterns throughout the jurisdiction. To assess risk by call type, ESCI reviewed WFPS responses, grouped them into one of three categories—fire, EMS, or other—and plotted each response on a jurisdictional map. This pattern analysis in shown in Figure 80 to Figure 83.

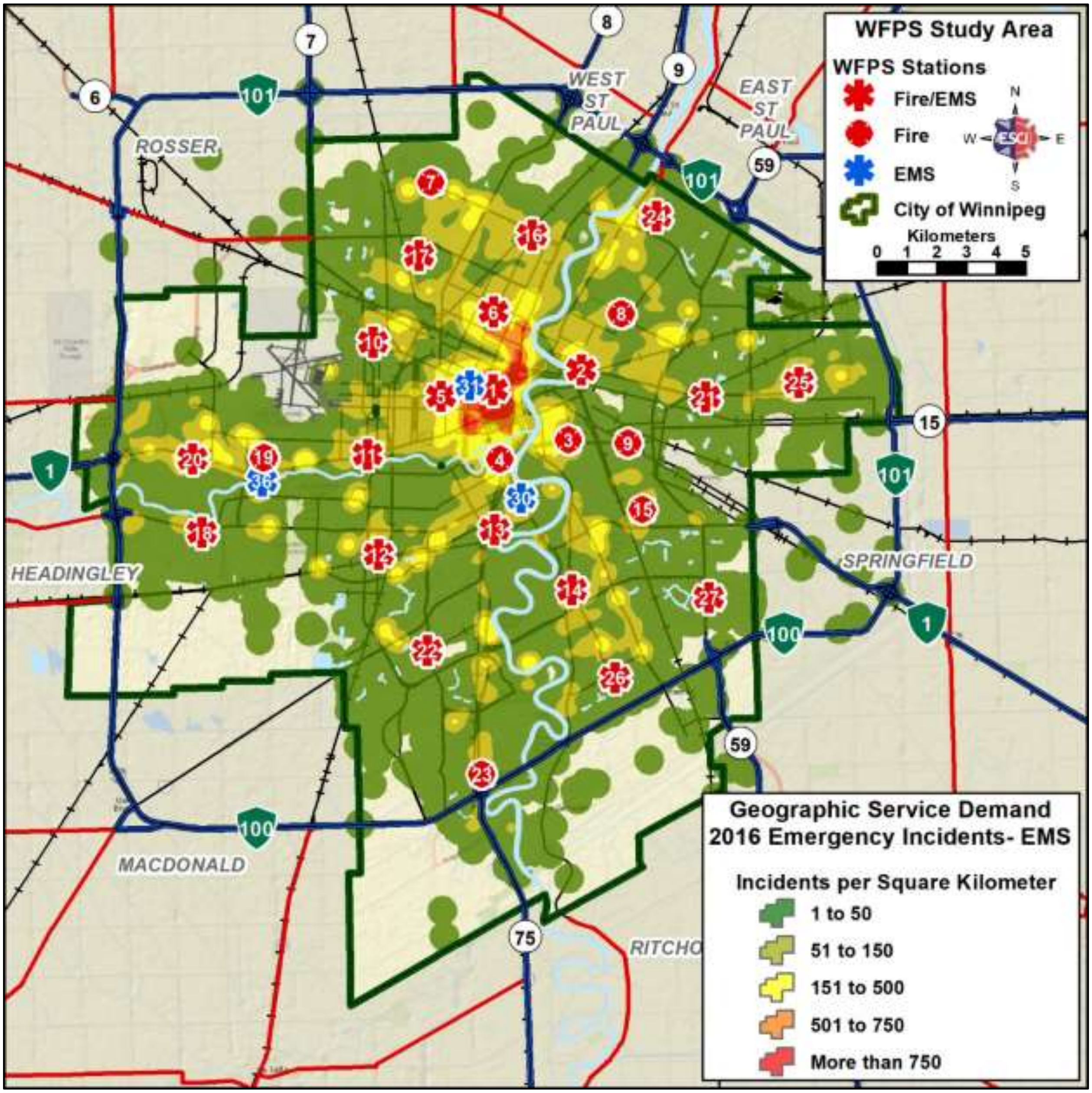
[76] Louisiana Governor's Office of Homeland Security & Emergency Preparedness (2017); Retrieved from http://gohsep.la.gov/ABOUT/LOUISIANA-HAZARDS-THREATS/Human-caused-Hazards

Figure 80: WFPS Geographic Service Demand—All Emergency Incidents, 2016



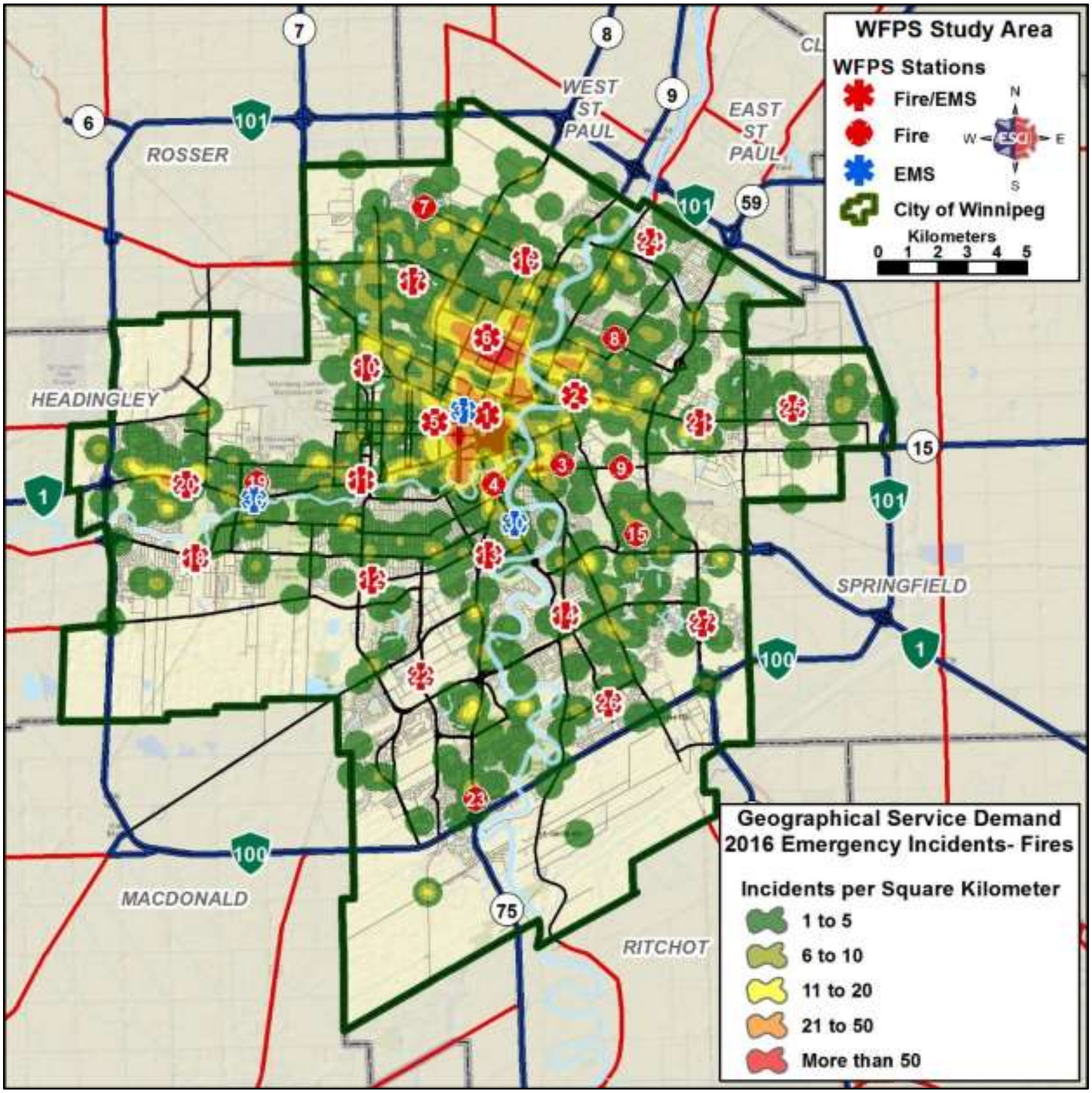
As shown in Figure 80, the core downtown area experienced the highest incident density in 2016, with additional concentration patterns along primary roadways and commercial areas.

Figure 81: WFPS Geographic Service Demand—Emergency EMS Incidents, 2016



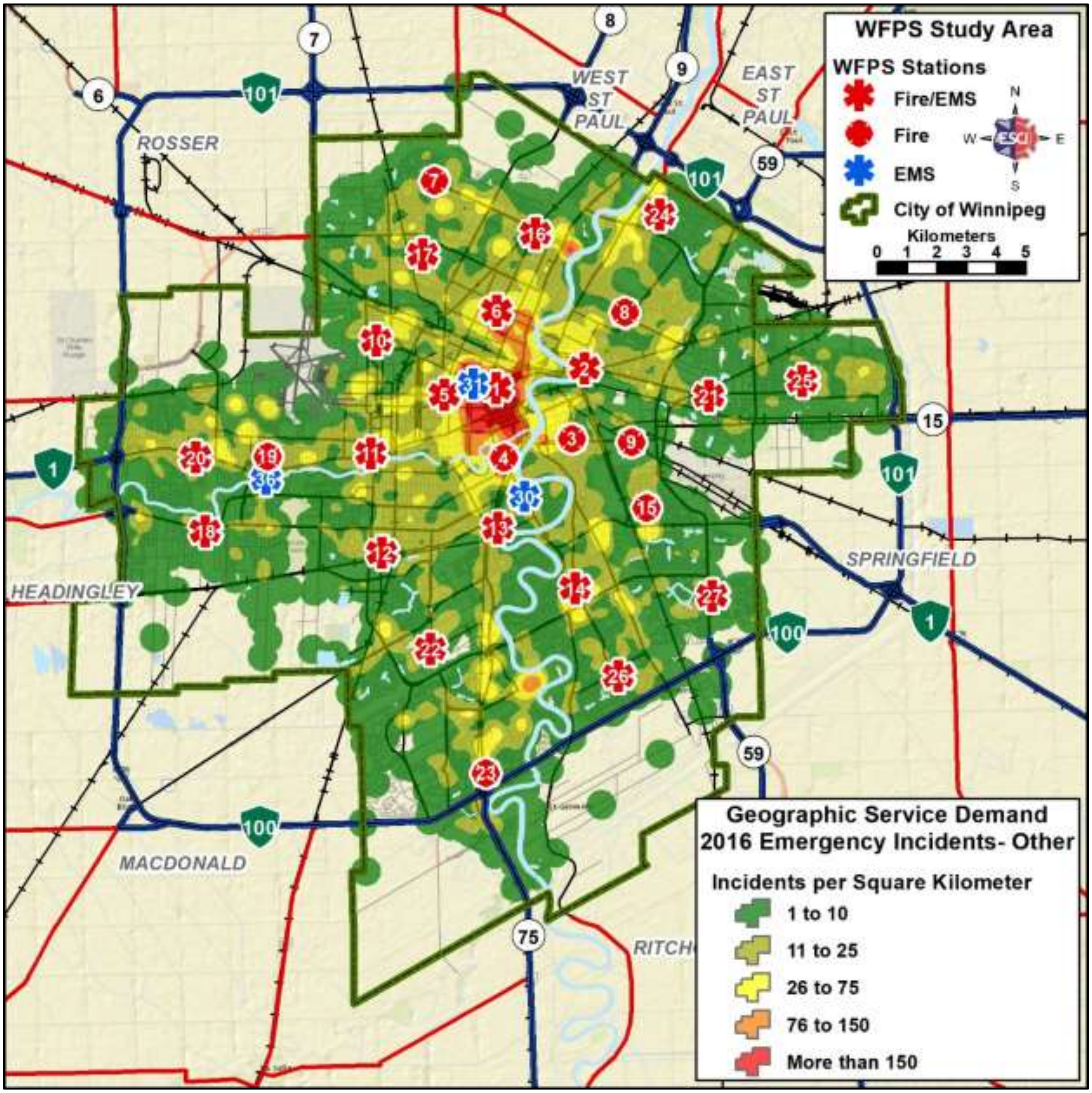
Given that EMS response comprises the majority of WFPS calls for service, it should be no surprise that EMS response patterns shown in Figure 81 are similar to overall response patterns density displayed in Figure 80.

Figure 82: WFPS Geographic Service Demand—Emergency Fire Incidents, 2016



While the number of fires per square kilometre is much lower than the overall or EMS incident density, fire incidents shown in Figure 82 are distributed in a similar pattern to those displayed in the previous figures.

Figure 83: Other Responses



"Other" responses—primarily alarm system activations and miscellaneous service calls, including accidental and false alarms—are shown in Figure 83.

The scale used for the foregoing figures was adjusted to reflect the frequency and density of call locations within that call type. When compared using the same scale for all incidents (incidents per square kilometer), the relatively large number of EMS incidents is clear. The same data is illustrated in the following three figures but using the same incidents per square kilometer scale for each call type. This highlights the frequency of EMS incidents as compared to fire or other incident types.

Figure 84: Same-Scale Comparison Of Incident Types – EMS

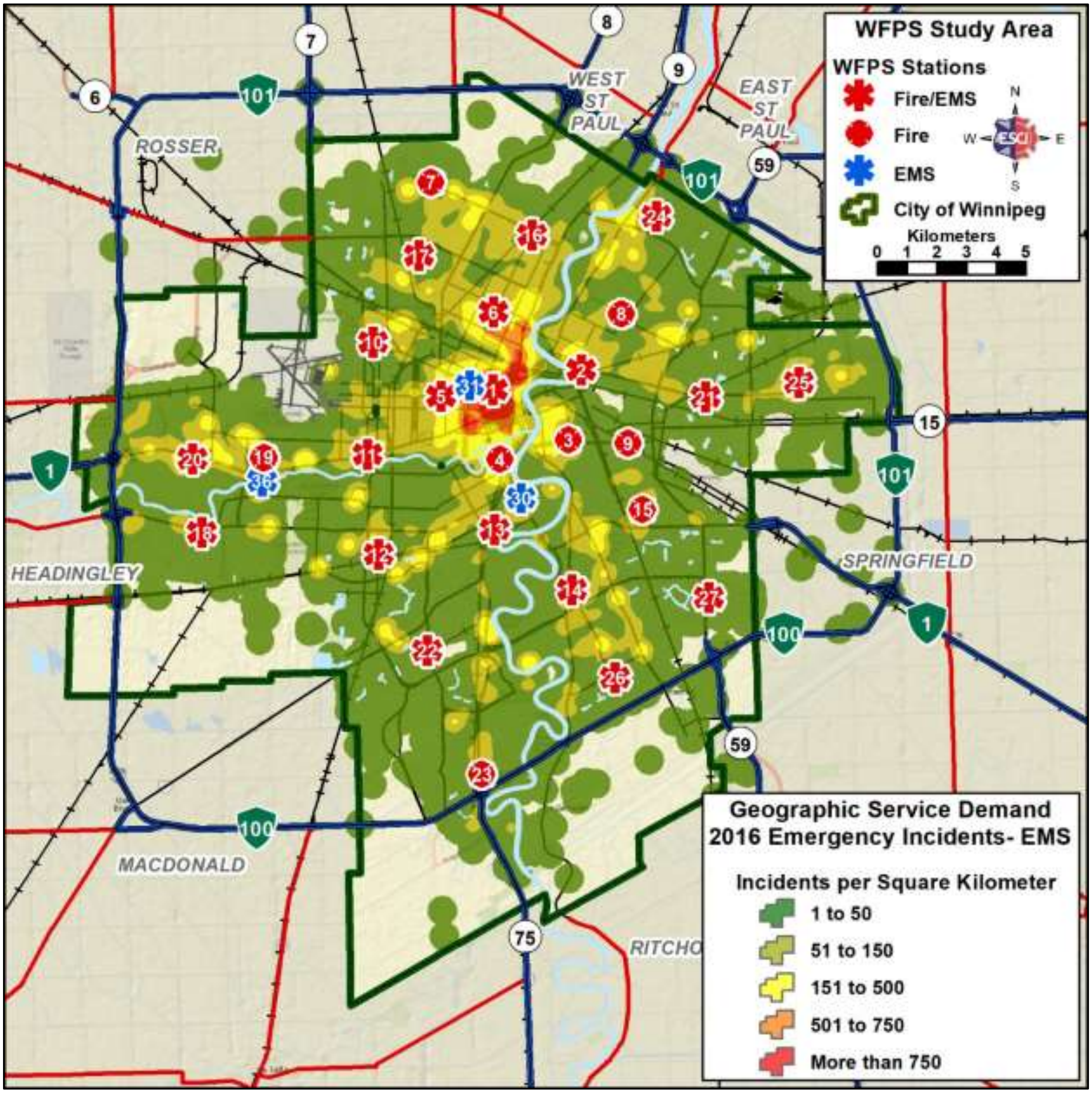


Figure 85: Same-Scale Comparison Of Incident Types – Fire

Figure 86: Same-Scale Comparison Of Incident Types – Other

Risk Analysis by Management Zone

ESCI also reviewed risk and response performance fire station first due area, which ESCI refers to as management zones. This allows WFPS to evaluate the relative risk of locations and their alignment with available resources, including personnel, apparatus, and specialized equipment to effectively mitigate an incident. Since units can respond to an emergency only if they are available (reliability), service demand has a large impact on risk. ESCI compared the typical risk, the maximum risk, and response performance for the units assigned within each management zone (station). These are depicted in the following Management Zone figures. The abbreviation PAU refer to peak activity unit, which ambulances assigned during peak demand for service.

Figure 87: Management Zone 1 – FID 1

Station Apparatus
Engine 101
Engine 103
Ladder 1
Squad 101
Squad 102
Paramedic Unit 91
Paramedic Unit 31 (PAU)
Station 31 Units: PU 1, PU 45, PU 45 (PAU)

FID Reliability (Emergency Incidents)	
2015	**2016**
81.7%	80.7%

In 2015, 81.7 percent of emergency incidents in FID 1 were answered by a Station 1 unit (first unit on scene).

In 2016, 80.8 percent of emergency incidents in FID 1 were answered by a Station 1 unit (first unit on scene).

CHARACTERISTICS	
FID Area	5.2 square km
Estimated Population (2016)	20,246
Population Density	3,798 per square km (Metropolitan)

Total Incidents in FID (Priority 3 and 4)				Emergency Incidents in FID (Priority 4, No IFT or Community Paramedic Incidents)			
Call Type	**2015**	**2016**	**Percent Change**	**Call Type**	**2015**	**2016**	**Percent Change**
Medical	12,049	13,260	10.1%	Medical	6,203	6,563	5.8%
Fire/Rescue	2,175	2,205	1.4%	Fire/Rescue	1,868	1,790	-4.2%
Total	14,224	15,465	8.7%	Total	8,071	8,353	3.5%

RESPONSE PERFORMANCE 2015 AND 2016 EMERGENCY INCIDENTS (DELTA AND ECHO RESPONSES)

2015 (time = mm:ss)				2016 (time = mm:ss)			
Call Type	**Turnout**	**Travel**	**Response**	**Call Type**	**Turnout**	**Travel**	**Response**
Medical	02:16	04:23	07:54	Medical	02:28	04:37	08:09
Fire/Rescue	02:09	03:41	06:51	Fire/Rescue	02:09	03:29	06:39

DESCRIPTION

FMZ 1 is in the core downtown area of Winnipeg. The primary occupancies in this zone are mainly high and moderately high commercial, educational, institutional, multifamily residential, and high-rise occupancies. Based on population density the overall nature of FMZ 1 is metropolitan.

Typical Risk: High occupancy buildings, Multi-story commercial buildings.

Maximum Risk: High rise buildings, hospital, large assembly occupancies.

Figure 88: Management Zone 2 – FID 2

Station Apparatus
Engine 2
Fire Investigator
Paramedic Unit 2
Paramedic Unit 40 (IFT/PAU)

FID Reliability (Emergency Incidents)

2015	2016
67.4%	65.0%

In 2015, 67.4 percent of emergency incidents in FID 2 were answered by a Station 2 unit (first unit on scene).

In 2016, 65 percent of emergency incidents in FID 2 were answered by a Station 2 unit (first unit on scene).

CHARACTERISTICS

FID Area	6.8 square km
Estimated Population (2016)	17,776
Population Density	2621 per square km (Metropolitan)

Total Incidents in FID (Priority 3 and 4)				Emergency Incidents in FID (Priority 4, No IFT or Community Paramedic Incidents)			
Call Type	**2015**	**2016**	**Percent Change**	**Call Type**	**2015**	**2016**	**Percent Change**
Medical	1,820	1,842	1.2%	Medical	974	1,010	3.7%
Fire/Rescue	565	733	29.7%	Fire/Rescue	459	460	0.2%
Total	2,385	2,575	8.0%	Total	1,433	1,470	2.6%

RESPONSE PERFORMANCE 2015 AND 2016 EMERGENCY INCIDENTS (DELTA AND ECHO RESPONSES)

2015 (time = mm:ss)				2016 (time = mm:ss)			
Call Type	**Turnout**	**Travel**	**Response**	**Call Type**	**Turnout**	**Travel**	**Response**
Medical	01:58	04:38	07:56	Medical	02:03	04:26	07:58
Fire/Rescue	02:05	04:03	07:26	Fire/Rescue	02:03	04:07	07:23

DESCRIPTION

FMZ 2 is east of the Red River in an area considered a mature community. The primary occupancies in this zone are single and multi-family residential, neighborhood and community commercial, educational and senior living, and some heavy and general industrial occupancies. Based on population density the overall nature of FMZ 2 is metropolitan.

Typical Risk: Single family homes, multi-family apartments, commercial.

Maximum Risk: Heavy industrial, multi-story/high occupancy apartments, schools.

Figure 89: Management Zone 3 – FID 3

Station Apparatus
Division Chief 3
Engine 3
Additional apparatus – Water 3

FID Reliability (Emergency Incidents)

2015	2016
65.0%	68.5%

In 2015, 65.0 percent of emergency incidents in FID 3 were answered by a Station 3 unit (first unit on scene).

In 2016, 68.5 percent of emergency incidents in FID 3 were answered by a Station 3 unit (first unit on scene).

CHARACTERISTICS

FID Area	7.6 square km
Estimated Population (2016)	18,956
Population Density	2,487 per square km (Metropolitan)

Total Incidents in FID (Priority 3 and 4)				Emergency Incidents in FID (Priority 4, No IFT or Community Paramedic Incidents)			
Call Type	**2015**	**2016**	**Percent Change**	**Call Type**	**2015**	**2016**	**Percent Change**
Medical	2,116	2,207	4.3%	Medical	1,230	1,204	-2.1%
Fire/Rescue	519	527	1.5%	Fire/Rescue	424	401	-5.4%
Total	2,635	2,734	3.8%	Total	1,654	1,605	-3.0%

RESPONSE PERFORMANCE 2015 AND 2016 EMERGENCY INCIDENTS (DELTA AND ECHO RESPONSES)

2015 (time = mm:ss)				2016 (time = mm:ss)			
Call Type	**Turnout**	**Travel**	**Response**	**Call Type**	**Turnout**	**Travel**	**Response**
Medical	02:16	04:35	07:56	Medical	02:10	04:23	07:35
Fire/Rescue	02:03	04:05	07:48	Fire/Rescue	02:02	03:29	07:07

DESCRIPTION

FMZ 3 is east of the Red River and downtown. The primary occupancies in this zone are mainly one and two family residential occupancies with some primarily commercial occupancies, which primarily serve the residents of this area. Culturally significant historical structures are present in the St. Boniface neighborhoods. Based on population density overall nature of FMZ 3 is metropolitan.

Typical Risk: Single family residential and neighborhood commercial occupancies.

Maximum Risk: Hospital.

Figure 90: Management Zone 4 – FID 4

Station Apparatus
Division Chief 4
Engine 4
Rescue 4
EMS Station 30 Units: MS 74, PU17 (IFT), PU 43 (PAU), PU 93, EPIC 1

FID Reliability (Emergency Incidents)	
2015	**2016**
65.8%	69.0%

In 2015, 65.8 percent of emergency incidents in FID 4 were answered by a Station 4 unit (first unit on scene).

In 2016, 69.0 percent of emergency incidents in FID 4 were answered by a Station 4 unit (first unit on scene).

CHARACTERISTICS	
FID Area	9.7 square km
Estimated Population (2016)	42,211
Population Density	4,332 per square km (Metropolitan)

Total Incidents in FID (Priority 3 and 4)			
Call Type	**2015**	**2016**	**Percent Change**
Medical	5,332	5,613	5.3%
Fire/Rescue	1,526	1,522	-0.3%
Total	6,858	7,135	4.0%

Emergency Incidents in FID (Priority 4, No IFT or Community Paramedic Incidents)			
Call Type	**2015**	**2016**	**Percent Change**
Medical	2,944	3,135	6.5%
Fire/Rescue	1,262	1,227	-2.8%
Total	4,206	4,362	3.7%

RESPONSE PERFORMANCE 2015 AND 2016 EMERGENCY INCIDENTS (DELTA AND ECHO RESPONSES)

2015 (time = mm:ss)				2016 (time = mm:ss)			
Call Type	**Turnout**	**Travel**	**Response**	**Call Type**	**Turnout**	**Travel**	**Response**
Medical	02:29	05:01	08:24	Medical	02:21	04:53	08:19
Fire/Rescue	02:09	03:57	07:07	Fire/Rescue	02:10	04:06	07:28

DESCRIPTION

FMZ 4 is south of downtown and contains many of the same types of risk. The primary occupancies in this zone are mainly high and moderately high governmental, institutional, multifamily residential, and high occupancy apartments. This FMZ contains the provincial legislature neighborhood. The portion of FMZ 4 south of the Assiniboine River is more residential in nature. Based on population density overall nature of FMZ 4 is metropolitan.

Typical Risk: Multi-family residential, governmental and institutional offices, commercial, single family residential.

Maximum Risk: High occupancy mid-rise apartments, high occupancy governmental structures.

Figure 91: Management Zone 5 – FID 5

Station Apparatus
Engine 5
Rescue 5
PSO
Paramedic Unit 5
Paramedic Unit 92

FID Reliability (Emergency Incidents)

2015	2016
76.2%	76.8%

In 2015, 76.2 percent of emergency incidents in FID 5 were answered by a Station 5 unit (first unit on scene).

In 2016, 76.8 percent of emergency incidents in FID 5 were answered by a Station 5 unit (first unit on scene).

CHARACTERISTICS

FID Area	7.8 Square km
Estimated Population (2016)	32,605
Population Density	4,205 per square km (Metropolitan)

Total Incidents in FID (Priority 3 and 4)				Emergency Incidents in FID (Priority 4, No IFT or Community Paramedic Incidents)			
Call Type	**2015**	**2016**	**Percent Change**	**Call Type**	**2015**	**2016**	**Percent Change**
Medical	3,936	4,367	11.0%	Medical	2,326	2,427	4.3%
Fire/Rescue	1,051	1,038	-1.2%	Fire/Rescue	870	790	-9.2%
Total	4,987	5,405	8.4%	Total	3,196	3,217	0.7%

RESPONSE PERFORMANCE 2015 AND 2016 EMERGENCY INCIDENTS (DELTA AND ECHO RESPONSES)

2015 (time = mm:ss)				2016 (time = mm:ss)			
Call Type	**Turnout**	**Travel**	**Response**	**Call Type**	**Turnout**	**Travel**	**Response**
Medical	02:15	04:09	07:37	Medical	02:17	04:03	07:32
Fire/Rescue	01:59	03:36	06:35	Fire/Rescue	02:04	03:22	06:25

DESCRIPTION

FMZ 5 is located west of downtown and consists of a mix of residential and commercial occupancies; with some heavy, general, and light industrial properties. There are a significant number of multi-family residential occupancies in the eastern portion of FMZ 5. Based on population density overall nature of FMZ 5 is metropolitan.

Typical Risk: Single and multifamily residential, community commercial.

Maximum Risk: Heavy industrial, high occupancy multifamily residential, schools, senior living occupancies.

Figure 92: Management Zone 6 – FID 6

Station Apparatus
Engine 6
Rescue 6
Squad 6
Paramedic Unit 6

FID Reliability (Emergency Incidents)	
2015	2016
83.2%	83.3%

In 2015, 83.2 percent of emergency incidents in FID 6 were answered by a Station 6 unit (first unit on scene).

In 2016, 83.3 percent of emergency incidents in FID 6 were answered by a Station 6 unit (first unit on scene).

CHARACTERISTICS	
FID Area	10.1 Square km
Estimated Population (2016)	38,315
Population Density	3,793 per square km (Metropolitan)

Total Incidents in FID (Priority 3 and 4)				Emergency Incidents in FID (Priority 4, No IFT or Community Paramedic Incidents)			
Call Type	**2015**	**2016**	**Percent Change**	**Call Type**	**2015**	**2016**	**Percent Change**
Medical	6,642	6,960	4.8%	Medical	3,798	3,958	4.2%
Fire/Rescue	1,392	1,732	24.4%	Fire/Rescue	991	1,151	16.1%
Total	8,034	8,692	8.2%	Total	4,789	5,109	6.7%

RESPONSE PERFORMANCE 2015 AND 2016 EMERGENCY INCIDENTS (DELTA AND ECHO RESPONSES)

2015 (time = mm:ss)				2016 (time = mm:ss)			
Call Type	**Turnout**	**Travel**	**Response**	**Call Type**	**Turnout**	**Travel**	**Response**
Medical	02:15	04:54	07:59	Medical	02:09	04:42	08:12
Fire/Rescue	02:01	03:03	06:10	Fire/Rescue	01:56	03:25	06:10

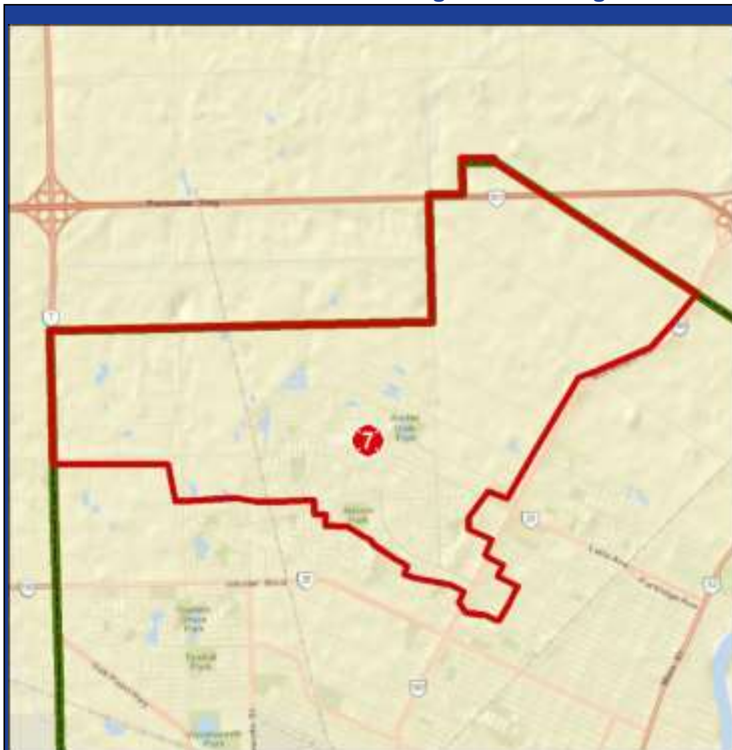
DESCRIPTION

FMZ 6 is located north of downtown and west of the Red River. The CPR railyards and the Weston Shops neighborhood form the southern boundary of FMZ 6. The primary occupancies in this zone are primarily residential, with commercial properties and schools serving the residents in this FMZ. Based on population density, the overall nature of FMZ 6 is metropolitan.

Typical Risk: Single family residential, commercial, some general and light industrial

Maximum Risk: Bulk Storage facility, schools, senior living occupancies, casino

Figure 93: Management Zone 7 – FID 7



Station Apparatus
Engine 7
Additional apparatus – Hazmat 7, Rehab 7

FID Reliability (Emergency Incidents)

2015	2016
64.2%	65.4%

In 2015, 64.2 percent of emergency incidents in FID 7 were answered by a Station7 unit (first unit on scene).

In 2016, 65.4 percent of emergency incidents in FID 7 were answered by a Station 7 unit (first unit on scene).

CHARACTERISTICS

FID Area	21.0 Square km
Estimated Population (2016)	26,240
Population Density	1,250 per square km (Metropolitan)

Total Incidents in FID (Priority 3 and 4)				Emergency Incidents in FID (Priority 4, No IFT or Community Paramedic Incidents)			
Call Type	**2015**	**2016**	**Percent Change**	**Call Type**	**2015**	**2016**	**Percent Change**
Medical	1,760	1,806	2.6%	Medical	906	921	1.7%
Fire/Rescue	305	355	16.4%	Fire/Rescue	230	256	11.3%
Total	2,065	2,161	4.6%	Total	1,136	1,177	3.6%

RESPONSE PERFORMANCE 2015 AND 2016 EMERGENCY INCIDENTS (DELTA AND ECHO RESPONSES)

2015 (time = mm:ss)				2016 (time = mm:ss)			
Call Type	**Turnout**	**Travel**	**Response**	**Call Type**	**Turnout**	**Travel**	**Response**
Medical	02:13	04:33	08:03	Medical	02:15	04:45	08:18
Fire/Rescue	02:06	05:56	09:55	Fire/Rescue	02:21	04:55	08:47

DESCRIPTION

FMZ 7 is in the northwest corner of Winnipeg. Much of this FMZ (Rosser-Old Kildonan) is currently undeveloped or zoned for agricultural use. New development is scheduled in this area. FMZ 7 is primarily single family and multifamily residential properties, with community commercial, schools, and senior living facilities. Based on population density overall nature of FMZ 7 is metropolitan.

Typical Risk: Residential, community commercial.

Maximum Risk: High occupancy apartments, schools, senior living facilities, hospital.

Figure 94: Management Zone 8 – FID 8

Station Apparatus
Engine 8
Rescue 8

FID Reliability (Emergency Incidents)	
2015	2016
73.4%	75.2%

In 2015, 73.4 percent of emergency incidents in FID 8 were answered by a Station 98 apparatus (first unit on scene).

In 2016, 75.2 percent of emergency incidents in FMZ 8 were answered by a Station 8 unit (first unit on scene).

CHARACTERISTICS	
FID Area	12.7 Square km
Estimated Population (2016)	33,618
Population Density	2,637 per square km

Total Incidents in FID (Priority 3 and 4)				Emergency Incidents in FID (Priority 4, No IFT or Community Paramedic Incidents)			
Call Type	**2015**	**2016**	**Percent Change**	**Call Type**	**2015**	**2016**	**Percent Change**
Medical	2,410	2,533	5.1%	Medical	1,375	1,450	5.5%
Fire/Rescue	543	580	6.8%	Fire/Rescue	428	401	-6.3%
Total	2,953	3,113	5.4%	Total	1,803	1,851	2.7%

RESPONSE PERFORMANCE 2015 AND 2016 EMERGENCY INCIDENTS (DELTA AND ECHO RESPONSES)

2015 (time = mm:ss)				2016 (time = mm:ss)			
Call Type	**Turnout**	**Travel**	**Response**	**Call Type**	**Turnout**	**Travel**	**Response**
Medical	02:14	05:28	08:53	Medical	02:06	05:16	08:47
Fire/Rescue	02:07	05:11	08:03	Fire/Rescue	02:07	05:13	09:00

DESCRIPTION

FMZ 8 is east of the Red River and west of Lagimodiere Boulevard. The primary occupancies in this zone are single and multifamily residential, occupied with community commercial and schools. Based on population density the overall nature of FMZ 8 is metropolitan.

Typical Risk: Single and multifamily residential, community commercial.

Maximum Risk: High occupancy apartments, schools, hospital.

Figure 95: Management Zone 9 – FID 9

Station Apparatus
Engine 9
Rescue 9
Additional apparatus – Hazmat 9

FID Reliability (Emergency Incidents)	
2015	**2016**
72.5%	63.3%

In 2015, 72.5 percent of emergency incidents in FID 9 were answered by a Station 9 unit (first unit on scene).

In 2016, 63.3 percent of emergency incidents in FID 9 were answered by a Station 9 unit (first unit on scene).

CHARACTERISTICS	
FID Area	7.2 Square km
Estimated Population (2016)	2,844
Population Density	396 per square km (Suburban)

Total Incidents in FID (Priority 3 and 4)				Emergency Incidents in FID (Priority 4, No IFT or Community Paramedic Incidents)			
Call Type	**2015**	**2016**	**Percent Change**	**Call Type**	**2015**	**2016**	**Percent Change**
Medical	97	95	-2.1%	Medical	68	61	-10.3%
Fire/Rescue	148	129	-12.8%	Fire/Rescue	124	112	-9.7%
Total	245	224	-8.6%	Total	192	173	-9.9%

RESPONSE PERFORMANCE 2015 AND 2016 EMERGENCY INCIDENTS

2015 (time = mm:ss)				2016 (time = mm:ss)			
Call Type	**Turnout**	**Travel**	**Response**	**Call Type**	**Turnout**	**Travel**	**Response**
Medical	01:47	04:25	07:34	Medical	02:04	05:36	08:10
Fire/Rescue	02:08	04:43	09:05	Fire/Rescue	02:09	05:22	08:11

DESCRIPTION

FMZ 9 is located mainly between Archibald Street and Lagimodiere Boulevard. FMZ 9 consists of primarily industrial occupancies. Based on population density the overall nature of FMZ 9 is Suburban.

Typical Risk: Industrial, bulk storage occupancies.

Maximum Risk: High hazard industrial occupancies, bulk storage facility, chemical manufacturing facility.

Figure 96: Management Zone 10 – FID 10

Station Apparatus
Division Chief 10
Engine 10
Paramedic Unit 95

FID Reliability (Emergency Incidents)	
2015	2016
72.6%	52.0%

In 2015, 72.6 percent of emergency incidents in FID 10 were answered by a Station 10 unit (first unit on scene).

In 2016, 52.0 percent of emergency incidents in FID 10 were answered by a Station10 unit (first unit on scene).

CHARACTERISTICS	
FID Area	15.3 Square km
Estimated Population (2016)	9,758
Population Density	639 per square km (Suburban)

Total Incidents in FID (Priority 3 and 4)				Emergency Incidents in FID (Priority 4, No IFT or Community Paramedic Incidents)			
Call Type	2015	2016	Percent Change	Call Type	2015	2016	Percent Change
Medical	1,502	1,741	15.9%	Medical	896	915	2.1%
Fire/Rescue	573	538	-6.1%	Fire/Rescue	494	441	-10.7%
Total	2,075	2,279	9.8%	Total	1,390	1,356	-2.4%

RESPONSE PERFORMANCE 2015 AND 2016 EMERGENCY INCIDENTS (DELTA AND ECHO RESPONSES)							
2015 (time = mm:ss)				2016 (time = mm:ss)			
Call Type	Turnout	Travel	Response	Call Type	Turnout	Travel	Response
Medical	02:18	05:33	08:43	Medical	02:10	05:54	09:23
Fire/Rescue	02:07	05:02	07:51	Fire/Rescue	02:05	05:29	08:32

DESCRIPTION

FMZ 10 encompasses the area east of Winnipeg James A. Richardson International Airport. Risk in FMZ 10 is primarily commercial and industrial properties, with a small area of single and multifamily residential properties northeast of Station 10. Based on population density overall nature of FMZ 10 is suburban.

Typical Risk: Commercial and industrial, residential-single and multifamily.

Maximum Risk: Airport, heavy industrial facilities.

Figure 97: Management Zone 11 – FID 11

Station Apparatus
Engine 11
Rescue 11
Ladder 11
Paramedic Unit 11
Medic Supervisor 75

FID Reliability (Emergency Incidents)	
2015	2016
82.6%	79.1%

In 2015, 82.6 percent of emergency incidents in FID 11 were answered by a Station 11 unit (first unit on scene).

In 2016, 79.1 percent of emergency incidents in FID 11 were answered by a Station 11 unit (first unit on scene).

CHARACTERISTICS	
FID Area	12.1 Square km
Estimated Population (2016)	25,757
Population Density	2,132 per square km (Metropolitan)

Total Incidents in FID (Priority 3 and 4)				Emergency Incidents in FID (Priority 4, No IFT or Community Paramedic Incidents)			
Call Type	**2015**	**2016**	**Percent Change**	**Call Type**	**2015**	**2016**	**Percent Change**
Medical	1,867	2,104	12.7%	Medical	1,115	1,273	14.2%
Fire/Rescue	752	794	5.6%	Fire/Rescue	600	595	-0.8%
Total	2,619	2,898	10.7%	Total	1,715	1,868	8.9%

RESPONSE PERFORMANCE 2015 AND 2016 EMERGENCY INCIDENTS (DELTA AND ECHO RESPONSES)

2015 (time = mm:ss)				2016 (time = mm:ss)			
Call Type	**Turnout**	**Travel**	**Response**	**Call Type**	**Turnout**	**Travel**	**Response**
Medical	02:11	04:18	07:26	Medical	02:09	04:39	08:07
Fire/Rescue	02:09	03:56	07:12	Fire/Rescue	02:13	04:13	07:49

DESCRIPTION

The Red River and Portage Avenue transect FMZ 11. FMZ 11 is a mix of residential (both single family and multifamily), commercial, and some industrial properties. A regional shopping centre is located in FMZ 11. Based on population density overall nature of FMZ 11 is metropolitan.

Typical Risk: Residential including senior living facilities and commercial.

Maximum Risk: Regional shopping centre, bulk storage facility, schools.

Figure 98: Management Zone 12 – FID 12

Station Apparatus
Engine 12
Paramedic 12 (IFT)

FID Reliability (Emergency Incidents)	
2015	**2016**
71.5%	68.0%

In 2015, 71.5 percent of emergency incidents in FID 12 were answered by a Station 12 unit (first unit on scene).

In 2016, 68.0 percent of emergency incidents in FID 12 were answered by a Station 12 unit (first unit on scene).

CHARACTERISTICS	
FID Area	15.2 Square km
Estimated Population (2016)	23,121
Population Density	1,522 per square km

Total Incidents in FID (Priority 3 and 4)				Emergency Incidents in FID (Priority 4, No IFT or Community Paramedic Incidents)			
Call Type	**2015**	**2016**	**Percent Change**	**Call Type**	**2015**	**2016**	**Percent Change**
Medical	1,930	1,994	3.3%	Medical	1,153	1,201	4.2%
Fire/Rescue	464	412	-11.2%	Fire/Rescue	364	321	-11.8%
Total	2,394	2,406	0.5%	Total	1,517	1,522	0.3%

RESPONSE PERFORMANCE 2015 AND 2016 EMERGENCY INCIDENTS (DELTA AND ECHO RESPONSES)							
2015 (time = mm:ss)				**2016 (time = mm:ss)**			
Call Type	**Turnout**	**Travel**	**Response**	**Call Type**	**Turnout**	**Travel**	**Response**
Medical	02:15	05:13	08:10	Medical	02:13	05:19	08:42
Fire/Rescue	02:09	04:57	08:21	Fire/Rescue	02:14	05:21	08:19

DESCRIPTION

FMZ 12 is primarily residential and community commercial occupancies in the area north of Station 12 and the Wilkes Avenue. The area south of Station 12 is composed of mainly mixed used industrial and heavy industrial properties. Based on population density the overall nature of FMZ 12 is metropolitan.

Typical Risk: Residential and commercial north of Station 12, Industrial and mixed-use south of Station 12.

Maximum Risk: Bulk plant, warehousing, schools.

Figure 99: Management Zone 13 – FID 13

Station Apparatus
Engine 13
Ladder 13
Paramedic Unit 13
Additional apparatus – Water 131
EMS Station 30 Units : MS 74, PU17 (IFT), PU 43 (PAU), PU 93, EPIC 1

FID Reliability (Emergency Incidents)	
2015	**2016**
64.4%	64.1%

In 2015, 64.4 percent of emergency incidents in FID 13 were answered by a Station 13 unit (first unit on scene).

In 2016, 64.1 percent of emergency incidents in FID 13 were answered by a Station 13 unit (first unit on scene).

CHARACTERISTICS	
FID Area	7.9 Square km
Estimated Population (2016)	13,877
Population Density	1,764 per square km (Metropolitan)

Total Incidents in FID (Priority 3 and 4)				Emergency Incidents in FID (Priority 4, No IFT or Community Paramedic Incidents)			
Call Type	**2015**	**2016**	**Percent Change**	**Call Type**	**2015**	**2016**	**Percent Change**
Medical	936	981	4.8%	Medical	582	562	-3.4%
Fire/Rescue	262	326	24.4%	Fire/Rescue	211	240	13.7%
Total	1,198	1,307	9.1%	Total	793	802	1.1%

RESPONSE PERFORMANCE 2015 AND 2016 EMERGENCY INCIDENTS (DELTA AND ECHO RESPONSES)							
2015 (time = mm:ss)				**2016 (time = mm:ss)**			
Call Type	**Turnout**	**Travel**	**Response**	**Call Type**	**Turnout**	**Travel**	**Response**
Medical	02:15	05:37	08:54	Medical	02:10	05:09	08:29
Fire/Rescue	02:00	05:22	07:36	Fire/Rescue	02:09	04:52	08:09

DESCRIPTION	
FMZ 13 is in the centre of the city. FMZ 13 is primarily residential with several schools. There are some commercial properties, mostly along the Pembina Highway. The CNR Fort Rouge railyard is in this FMZ. Based on population density overall nature of FMZ 13 is metropolitan.	**Typical Risk**: Residential-single and multifamily. **Maximum Risk**: Railyard industrial, schools.

Figure 100: Management Zone 14 – FID 14

Station Apparatus
Engine 14
Paramedic Unit 14

FID Reliability (Emergency Incidents)

2015	2016
73.9%	72.5%

In 2015, 73.9 percent of emergency incidents in FID 14 were answered by a Station 14 unit (first unit on scene).

In 2016, 72.5 percent of emergency incidents in FID 14 were answered by a Station 14 unit (first unit on scene).

CHARACTERISTICS

FID Area	15.9 Square km
Estimated Population (2016)	35,506
Population Density	2,236 per square km

Total Incidents in FID (Priority 3 and 4)

Call Type	2015	2016	Percent Change
Medical	2,758	2,985	8.2%
Fire/Rescue	717	687	-4.2%
Total	3,475	3,672	5.7%

Emergency Incidents in FID (Priority 4, No IFT or Community Paramedic Incidents)

Call Type	2015	2016	Percent Change
Medical	1,771	1,791	1.1%
Fire/Rescue	588	546	-7.1%
Total	2,359	2,337	-0.9%

RESPONSE PERFORMANCE 2015 AND 2016 EMERGENCY INCIDENTS (DELTA AND ECHO RESPONSES)

2015 (time = mm:ss)				2016 (time = mm:ss)			
Call Type	**Turnout**	**Travel**	**Response**	**Call Type**	**Turnout**	**Travel**	**Response**
Medical	02:03	05:12	08:27	Medical	01:57	05:06	08:19
Fire/Rescue	01:54	04:51	08:24	Fire/Rescue	02:03	04:49	07:32

DESCRIPTION

FMZ 14 is just east of the Red River, north of the Perimeter Highway. The area is primarily a mix of single family and multifamily residential, with a high concentration of multifamily properties. A significant number of the multifamily occupancies are senior living facilities. The Saint Vital Regional Shopping Centre is just south of Station 14. Based on population density overall nature of FMZ 14 is metropolitan.

Typical Risk: Residential – single family and high occupancy apartments.

Maximum Risk: St. Vital Shopping Centre, hospital.

Figure 101: Management Zone 15 – FID 15

Station Apparatus
Engine 15

FID Reliability (Emergency Incidents)	
2015	**2016**
73.1%	75.6%

In 2015, 73.1 percent of emergency incidents in FID 15 were answered by a Station 15 unit (first unit on scene).

In 2016, 75.6 percent of emergency incidents in FID 15 were answered by a Station 15 unit (first unit on scene).

CHARACTERISTICS	
FID Area	10.9 Square km
Estimated Population (2016)	19,016
Population Density	1,750 per square km

Total Incidents in FID (Priority 3 and 4)				Emergency Incidents in FID (Priority 4, No IFT or Community Paramedic Incidents)			
Call Type	**2015**	**2016**	**Percent Change**	**Call Type**	**2015**	**2016**	**Percent Change**
Medical	1,092	1,044	-4.4%	Medical	672	661	-1.6%
Fire/Rescue	277	319	15.2%	Fire/Rescue	226	229	1.3%
Total	1,369	1,363	-0.4%	Total	898	890	-0.9%

RESPONSE PERFORMANCE 2015 AND 2016 EMERGENCY INCIDENTS (DELTA AND ECHO RESPONSES)							
2015 (time = mm:ss)				**2016 (time = mm:ss)**			
Call Type	**Turnout**	**Travel**	**Response**	**Call Type**	**Turnout**	**Travel**	**Response**
Medical	02:09	05:12	08:03	Medical	02:07	04:15	07:24
Fire/Rescue	02:00	04:46	07:41	Fire/Rescue	02:01	03:46	07:14

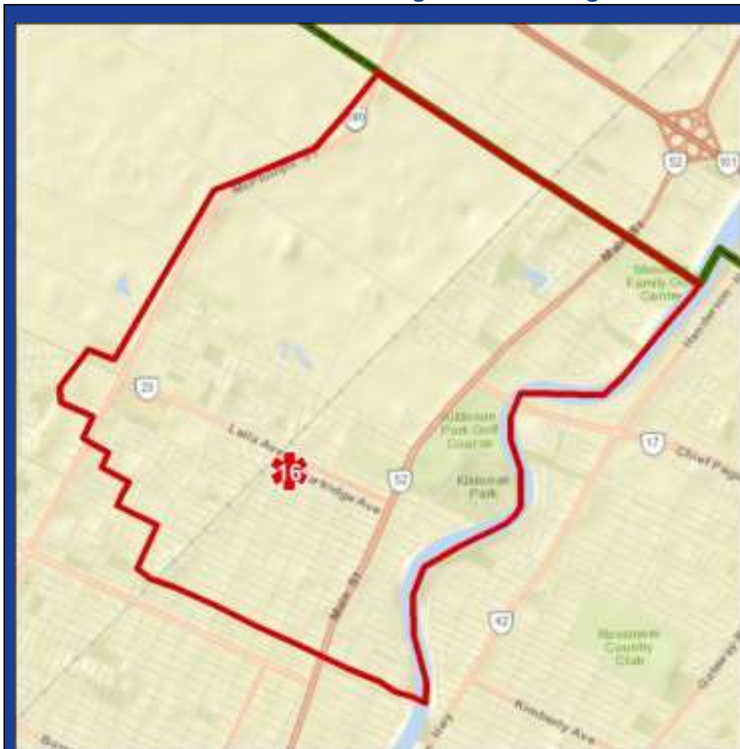
DESCRIPTION

FMZ 15 is mainly a residential neighborhood (Windsor Park). The primary occupancies in this area are primarily residential, with several schools. There is a concentration of multifamily residential properties in the northern portion of FMZ 15. A portion of the CNR Symington railyard is the eastern boundary of the Station 15 service area. Based on population density overall nature of FMZ 15 is metropolitan.

Typical Risk: Single and multifamily residential.

Maximum Risk: Schools, Railyard.

Figure 102: Management Zone 16 – FID 16



Station Apparatus
Engine 16
Ladder 16
Paramedic Unit 16

FID Reliability (Emergency Incidents)	
2015	**2016**
75.2%	75.2%

In 2015, 75.2 percent of emergency incidents in FID 16 were answered by a Station 16 unit (first unit on scene).

In 2016, 75.2 percent of emergency incidents in FID 16 were answered by a Station 16 unit (first unit on scene).

CHARACTERISTICS	
FID Area	17.4 Square km
Estimated Population (2016)	32,717
Population Density	1,877 per square km (Metropolitan)

Total Incidents in FID (Priority 3 and 4)				Emergency Incidents in FID (Priority 4, No IFT or Community Paramedic Incidents)			
Call Type	**2015**	**2016**	**Percent Change**	**Call Type**	**2015**	**2016**	**Percent Change**
Medical	2,332	2,293	-1.7%	Medical	1,382	1,369	-0.9%
Fire/Rescue	629	675	7.3%	Fire/Rescue	495	507	2.4%
Total	2,961	2,968	0.2%	Total	1,877	1,876	-0.1%

RESPONSE PERFORMANCE 2015 AND 2016 EMERGENCY INCIDENTS (DELTA AND ECHO RESPONSES)

2015 (time = mm:ss)				2016 (time = mm:ss)			
Call Type	**Turnout**	**Travel**	**Response**	**Call Type**	**Turnout**	**Travel**	**Response**
Medical	02:08	05:20	08:30	Medical	02:10	05:29	08:33
Fire/Rescue	02:16	05:01	08:22	Fire/Rescue	02:15	04:11	07:40

DESCRIPTION

FMZ 16 is west of the Red River on the northeast perimeter of Winnipeg. The area is primarily residential with associated commercial occupancies and schools. The northwest corner of FMZ 16 consists of an industrial neighborhood (West Kildonan) and a largely undeveloped rural area that has been identified for future development. Based on population density the overall nature of FMZ 16 is metropolitan.

Typical Risk: Single and multifamily dwellings.

Maximum Risk: Regional shopping centre, industrial occupancies, schools.

Figure 103: Management Zone 17 – FID 17

Station Apparatus
Engine 17
Paramedic Unit 17
Paramedic Unit 48 (PAU)

FID Reliability (Emergency Incidents)	
2015	**2016**
68.8%	73.8%

In 2015, 68.8 percent of emergency incidents in FID 17 were answered by a Station 17 unit (first unit on scene).

In 2016, 73.8 percent of emergency incidents in FID 17 were answered by a Station 17 unit (first unit on scene).

CHARACTERISTICS	
FID Area	14.4 Square km
Estimated Population (2016)	30,593
Population Density	2,120 per square km

Total Incidents in FID (Priority 3 and 4)				Emergency Incidents in FID (Priority 4, No IFT or Community Paramedic Incidents)			
Call Type	**2015**	**2016**	**Percent Change**	**Call Type**	**2015**	**2016**	**Percent Change**
Medical	1,552	1,599	3.0%	Medical	944	942	-0.2%
Fire/Rescue	516	494	-4.3%	Fire/Rescue	433	389	-10.2%
Total	2,068	2,093	1.2%	Total	1,377	1,331	-3.3%

RESPONSE PERFORMANCE 2015 AND 2016 EMERGENCY INCIDENTS (DELTA AND ECHO RESPONSES)							
2015 (time = mm:ss)				**2016 (time = mm:ss)**			
Call Type	**Turnout**	**Travel**	**Response**	**Call Type**	**Turnout**	**Travel**	**Response**
Medical	02:11	05:23	08:33	Medical	02:08	06:00	09:02
Fire/Rescue	02:02	05:02	07:23	Fire/Rescue	02:06	04:21	07:38

DESCRIPTION

FMZ 17 is north of the Winnipeg Airport along the northwestern boundary of the city. FMZ 17 is comprised of the Inkster and North Inkster Industrial Parks and a residential neighborhood west of Keewatin Street and south of Inkster Boulevard. Based on population density the overall nature of FMZ 17 is metropolitan.

Typical Risk: Single and multifamily residential, light industrial and distribution occupancies.

Maximum Risk: Flour mill, general manufacturing, schools.

Figure 104: Management Zone 18 – FID 18

Station Apparatus
Engine 18
Paramedic Unit 18

FID Reliability (Emergency Incidents)	
2015	**2016**
86.5%	86.6%

In 2015, 86.5 percent of emergency incidents in FID 18 were answered by a Station 18 unit (first unit on scene).

In 2016, 86.6 percent of emergency incidents in FID 18 were answered by a Station 18 unit (first unit on scene).

CHARACTERISTICS	
FID Area	44.7 Square km
Estimated Population (2016)	26,835
Population Density	600 per square km (Urban)

Total Incidents in FID (Priority 3 and 4)				Emergency Incidents in FID (Priority 4, No IFT or Community Paramedic Incidents)			
Call Type	**2015**	**2016**	**Percent Change**	**Call Type**	**2015**	**2016**	**Percent Change**
Medical	1,243	1,409	13.4%	Medical	802	939	17.1%
Fire/Rescue	343	370	7.9%	Fire/Rescue	265	278	4.9%
Total	1,586	1,779	12.2%	Total	1,067	1,217	14.1%

RESPONSE PERFORMANCE 2015 AND 2016 EMERGENCY INCIDENTS (DELTA AND ECHO RESPONSES)							
2015 (time = mm:ss)				**2016 (time = mm:ss)**			
Call Type	**Turnout**	**Travel**	**Response**	**Call Type**	**Turnout**	**Travel**	**Response**
Medical	02:12	05:06	08:14	Medical	02:02	05:17	08:46
Fire/Rescue	01:56	06:07	09:21	Fire/Rescue	02:14	07:01	09:50

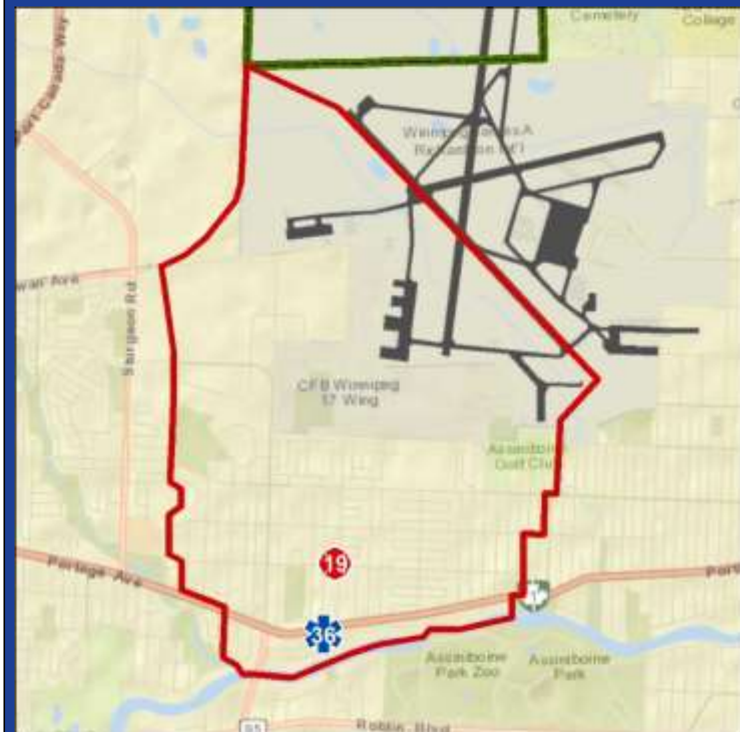
DESCRIPTION

FMZ 18 is on the western perimeter of Winnipeg, south of the Assiniboine River. Approximately half the zone is primarily residential, while the area south of Wilkes Avenue is largely rural or undeveloped. Future development is planned in this area. Based on population density overall nature of FMZ 18 is urban.

Typical Risk: Single family residential, multifamily residential including some high occupancy senior living facilities.

Maximum Risk: High occupancy senior living facilities, schools.

Figure 105: Management Zone 19 – FID 19



Station Apparatus
Engine 19
EMS Station 36 units – Paramedic Unit 36 (PAU)

FID Reliability (Emergency Incidents)	
2015	2016
64.9%	65.2%

In 2015, 64.9 percent of emergency incidents in FID 19 were answered by a Station 19 unit (first apparatus on scene).

In 2016, 65.2 percent of emergency incidents in FID 19 were answered by a Station 19 unit (first apparatus on scene).

CHARACTERISTICS	
FID Area	11.3 Square km
Estimated Population (2016)	14,799
Population Density	1,306 per square km (Metropolitan)

Total Incidents in FID (Priority 3 and 4)				Emergency Incidents in FID (Priority 4, No IFT or Community Paramedic Incidents)			
Call Type	**2015**	**2016**	**Percent Change**	**Call Type**	**2015**	**2016**	**Percent Change**
Medical	1,389	1,704	22.7%	Medical	795	897	12.8%
Fire/Rescue	336	341	1.5%	Fire/Rescue	280	283	1.1%
Total	1,725	2,045	18.6%	Total	1,075	1,180	9.8%

RESPONSE PERFORMANCE 2015 AND 2016 EMERGENCY INCIDENTS (DELTA AND ECHO RESPONSES)							
2015 (time = mm:ss)				**2016 (time = mm:ss)**			
Call Type	**Turnout**	**Travel**	**Response**	**Call Type**	**Turnout**	**Travel**	**Response**
Medical	02:02	03:56	07:08	Medical	01:58	03:56	07:14
Fire/Rescue	01:51	03:44	06:23	Fire/Rescue	02:07	04:42	07:22

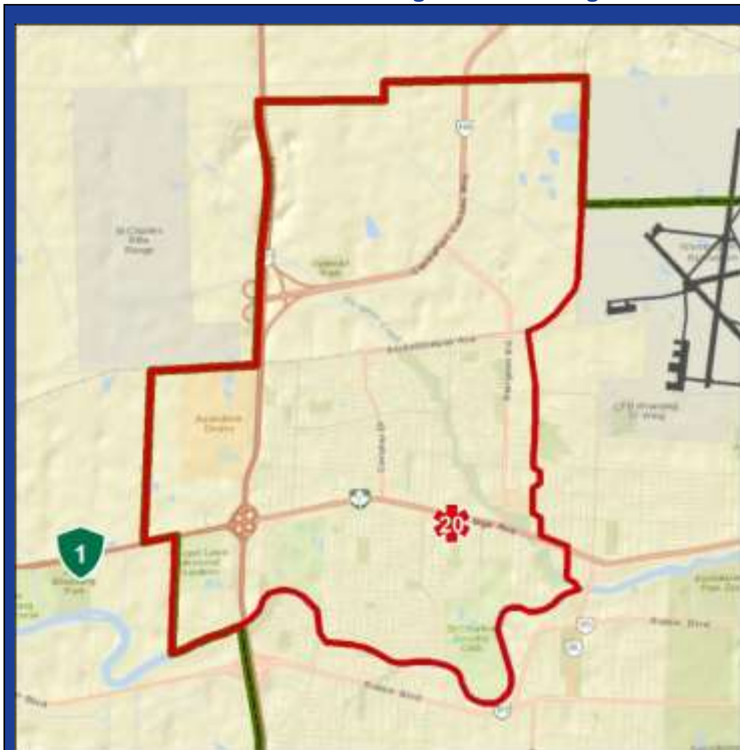
DESCRIPTION

FMZ 19 located north of the Assiniboine River and south of the Winnipeg airport. The area south of the airport is primarily residential with some community commercial properties and schools. The area to the west of the airport (Murray Industrial Park) is largely general and light industrial occupancies, with some governmental offices. Based on population density the overall nature of FMZ 19 is metropolitan.

Typical Risk: Single and multifamily residential, industrial occupancies, high occupancy senior living facilities.

Maximum Risk: Airport and surrounding industrial area, hospitals.

Figure 106: Management Zone 20 – FID 20



Station Apparatus
Engine 20
Paramedic Unit 20

FID Reliability (Emergency Incidents)	
2015	**2016**
82.4%	82.3%

In 2015, 82.4 percent of emergency incidents in FID 20 were answered by a Station 20 unit (first unit on scene).

In 2016, 82.3 percent of emergency incidents in FID 20 were answered by a Station 20 unit (first unit on scene).

CHARACTERISTICS	
FID Area	32.1 Square km
Estimated Population (2016)	35,118
Population Density	1,096 per square km (Urban)

Total Incidents in FID (Priority 3 and 4)				Emergency Incidents in FID (Priority 4, No IFT or Community Paramedic Incidents)			
Call Type	**2015**	**2016**	**Percent Change**	**Call Type**	**2015**	**2016**	**Percent Change**
Medical	2,806	3,053	8.8%	Medical	1,670	1,775	6.3%
Fire/Rescue	603	610	1.2%	Fire/Rescue	457	455	-0.4%
Total	3,409	3,663	7.5%	Total	2,127	2,230	4.8%

RESPONSE PERFORMANCE 2015 AND 2016 EMERGENCY INCIDENTS (DELTA AND ECHO RESPONSES)

2015 (time = mm:ss)				2016 (time = mm:ss)			
Call Type	**Turnout**	**Travel**	**Response**	**Call Type**	**Turnout**	**Travel**	**Response**
Medical	02:13	05:08	08:12	Medical	02:16	05:06	08:14
Fire/Rescue	02:08	06:10	09:28	Fire/Rescue	02:09	05:09	08:25

DESCRIPTION

FMZ 20 is north of the Assiniboine River on the western edge of Winnipeg. The primary occupancies in this zone are mainly residential with associated commercial occupancies primarily along Portage Avenue, and schools. The portion of FMZ 20 west of the Perimeter Highway is generally rural currently, but identified for future development. The CentrePort Trimodal Inland Port adjacent to the airport is also in the Station 20 service area. Based on population density the overall nature of FMZ 20 is urban.

Typical Risk: Single and multifamily residential, community commercial.

Maximum Risk: Hospital, CentrePort Trimodal Inland Port.

Figure 107: Management Zone 21 – FID 21

Station Apparatus
Engine 21
Ladder 21
Paramedic Unit 49 (PAU)
Medic Supervisor 72

FID Reliability (Emergency Incidents)

2015	2016
71.7%	72.1%

In 2015, 71.7 percent of emergency incidents in FID 21 were answered by a Station 21 unit (first apparatus on scene).

In 2016, 72.1 percent of emergency incidents in FID 21 were answered by a Station 21 unit (first apparatus on scene).

CHARACTERISTICS

FID Area	21.3 Square km
Estimated Population (2016)	18,322
Population Density	861 per square km (Urban)

Total Incidents in FID (Priority 3 and 4)				Emergency Incidents in FID (Priority 4, No IFT or Community Paramedic Incidents)			
Call Type	**2015**	**2016**	**Percent Change**	**Call Type**	**2015**	**2016**	**Percent Change**
Medical	1,204	1,171	-2.7%	Medical	742	702	-5.4%
Fire/Rescue	379	375	-1.1%	Fire/Rescue	295	278	-5.8%
Total	1,583	1,546	-2.3%	Total	1,037	980	-5.5%

RESPONSE PERFORMANCE 2015 AND 2016 EMERGENCY INCIDENTS (DELTA AND ECHO RESPONSES)

2015 (time = mm:ss)				2016 (time = mm:ss)			
Call Type	**Turnout**	**Travel**	**Response**	**Call Type**	**Turnout**	**Travel**	**Response**
Medical	02:04	05:11	08:07	Medical	02:02	05:22	08:25
Fire/Rescue	01:54	06:10	08:42	Fire/Rescue	02:09	05:06	08:03

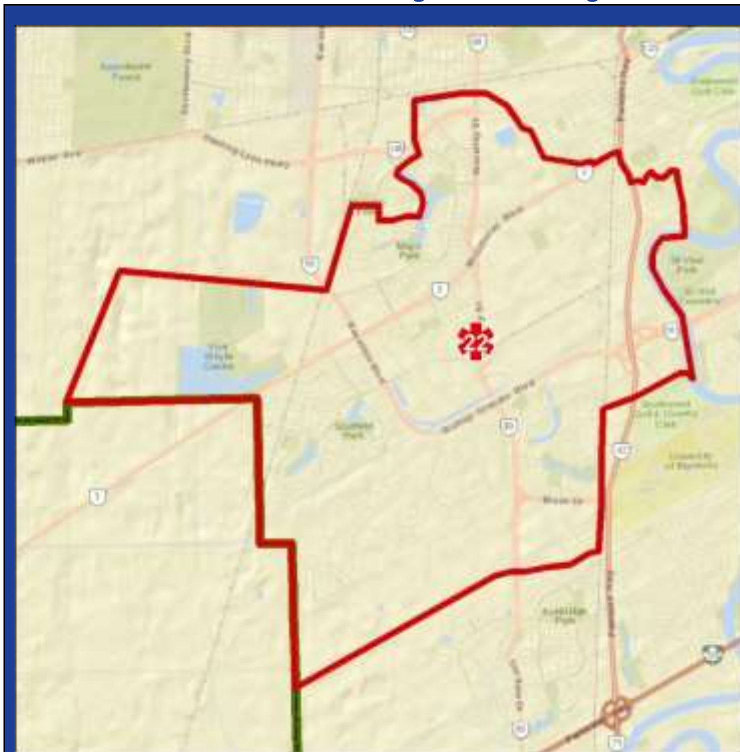
DESCRIPTION

FMZ 21 is on the east side of Winnipeg, Regent Avenue and Dugald Road are main routes through the area. This zone is a mix of residential and industrial occupancies. Residential properties are largely north of the CNR Mainline and industrial properties are located south of the CNR Mainline in and around the portions of the Symington Railyard in the Station 21 service area. Based on population density the overall nature of FMZ 21 is urban.

Typical Risk: Single and multifamily residential, business park, shopping centre.

Maximum Risk: Industrial occupancies, high hazard occupancies (bulk plant, chemical manufacturing).

Figure 108: Management Zone 22 – FID 22



Station Apparatus
Engine 22
Paramedic Unit 22

FID Reliability (Emergency Incidents)

2015	2016
68.0%	68.7%

In 2015, 68.0 percent of emergency incidents in FID 22 were answered by a Station 22 unit (first unit on scene).

In 2016, 68.7 percent of emergency incidents in FID 22 were answered by a Station 22 unit (first unit on scene).

CHARACTERISTICS

FID Area	30.2 Square km
Estimated Population (2016)	47,543
Population Density	1,574 per square km (Metropolitan)

Total Incidents in FID (Priority 3 and 4)				Emergency Incidents in FID (Priority 4, No IFT or Community Paramedic Incidents)			
Call Type	**2015**	**2016**	**Percent Change**	**Call Type**	**2015**	**2016**	**Percent Change**
Medical	2,519	2,624	4.2%	Medical	1,546	1,573	1.7%
Fire/Rescue	868	798	-8.1%	Fire/Rescue	737	651	-11.7%
Total	3,387	3,422	1.0%	Total	2,283	2,224	-2.6%

RESPONSE PERFORMANCE 2015 AND 2016 EMERGENCY INCIDENTS (DELTA AND ECHO RESPONSES)

2015 (time = mm:ss)				2016 (time = mm:ss)			
Call Type	**Turnout**	**Travel**	**Response**	**Call Type**	**Turnout**	**Travel**	**Response**
Medical	02:13	06:02	09:28	Medical	02:17	05:51	09:14
Fire/Rescue	02:07	05:17	08:27	Fire/Rescue	02:18	06:09	09:32

DESCRIPTION

FMZ 22 in the southwestern perimeter of Winnipeg, west of Pembina Highway. FMZ 22 contains primarily residential occupancies, with many multifamily residential buildings. Additionally, there is a large industrial/business area in the Station 22 service area. The Bridgewater Centre area (still being developed) is zoned for mixed use and will represent a higher level of risk in the future. Based on population density the overall nature of FMZ 22 is metropolitan.

Typical Risk: Single and multifamily residential, manufacturing/business occupancies.

Maximum Risk: High hazard industrial occupancies.

Figure 109: Management Zone 23 – FID 23

Station Apparatus
Engine 23
Engine 231
Additional apparatus – Water 23, Tanker 3

FID Reliability (Emergency Incidents)	
2015	**2016**
85.3%	83.7%

In 2015, 85.3 percent of emergency incidents in FID 23 were answered by a Station 23 unit (first apparatus on scene).

In 2016, 83.7 percent of emergency incidents in FID 23 were answered by a Station 23 unit (first apparatus on scene).

CHARACTERISTICS	
FID Area	49.8 Square km
Estimated Population (2016)	33,074
Population Density	664 per square km (Suburban)

Total Incidents in FID (Priority 3 and 4)				Emergency Incidents in FID (Priority 4, No IFT or Community Paramedic Incidents)			
Call Type	**2015**	**2016**	**Percent Change**	**Call Type**	**2015**	**2016**	**Percent Change**
Medical	1,513	1,575	4.1%	Medical	840	825	-1.8%
Fire/Rescue	652	697	6.9%	Fire/Rescue	556	556	0.0%
Total	2,165	2,272	4.9%	Total	1,396	1,381	-1.1%

RESPONSE PERFORMANCE 2015 AND 2016 EMERGENCY INCIDENTS (DELTA AND ECHO RESPONSES)							
2015 (time = mm:ss)				**2016 (time = mm:ss)**			
Call Type	**Turnout**	**Travel**	**Response**	**Call Type**	**Turnout**	**Travel**	**Response**
Medical	02:10	05:24	08:38	Medical	02:18	05:37	09:02
Fire/Rescue	02:12	06:05	10:00	Fire/Rescue	02:16	05:45	09:25

DESCRIPTION

FMZ 23 is on western perimeter of Winnipeg, between the Red River and the city boundary. This management zone is comprised of single and multifamily residential occupancies, with associated schools and commercial occupancies. The University of Manitoba campus is located north and east of Station 23. The La Barriere neighborhood is a large area zoned for agricultural use in the western portion of FMZ 23. Based on population density the overall nature of FMZ 23 is suburban.

Typical Risk: Single and multifamily residential, community commercial.

Maximum Risk: University of Manitoba, hospital.

Figure 110: Management Zone 24 – FID 24

Station Apparatus
Division Chief 24
Engine 24
Paramedic Unit 24

FID Reliability (Emergency Incidents)	
2015	**2016**
80.3%	80.5%

In 2015, 80.3 percent of emergency incidents in FID 24 were answered by a Station 24 unit (first unit on scene).

In 2016, 80.5 percent of emergency incidents in FID 24 were answered by a Station 24 unit (first unit on scene).

CHARACTERISTICS	
FID Area	14.0 Square km
Estimated Population (2016)	30,723
Population Density	2,195 per square km (Metropolitan)

Total Incidents in FID (Priority 3 and 4)				Emergency Incidents in FID (Priority 4, No IFT or Community Paramedic Incidents)			
Call Type	**2015**	**2016**	**Percent Change**	**Call Type**	**2015**	**2016**	**Percent Change**
Medical	2,259	2,140	-5.3%	Medical	1,400	1,338	-4.4%
Fire/Rescue	460	494	7.4%	Fire/Rescue	390	390	0.0%
Total	2,719	2,634	-3.1%	Total	1,790	1,728	-3.5%

RESPONSE PERFORMANCE 2015 AND 2016 EMERGENCY INCIDENTS (DELTA AND ECHO RESPONSES)							
2015 (time = mm:ss)				**2016 (time = mm:ss)**			
Call Type	**Turnout**	**Travel**	**Response**	**Call Type**	**Turnout**	**Travel**	**Response**
Medical	02:06	05:07	08:20	Medical	02:04	05:38	08:47
Fire/Rescue	02:18	05:03	08:22	Fire/Rescue	01:59	04:53	08:04

DESCRIPTION

FMZ 24 east of the Red River on the northern boundary of Winnipeg. The primary occupancies in this zone are mainly single family residential occupancies, with associated schools and commercial occupancies. There is land available for future development in the Kil-Cona Park neighborhood. There are some general manufacturing/ industrial occupancies in the North Transcona Yard neighborhood. Based on population density the overall nature of FMZ 24 is metropolitan.

Typical Risk: Single family residential.

Maximum Risk: Schools, General manufacturing occupancies.

Figure 111: Management Zone 25 – FID 25

Station Apparatus
Engine 25
Paramedic Unit 25
Additional apparatus – Snuffer 25

FID Reliability (Emergency Incidents)	
2015	**2016**
86.5%	88.8%

In 2015, 86.5 percent of emergency incidents in FID 25 were answered by a Station 25 unit (first unit on scene).

In 2016, 88.8 percent of emergency incidents in FID 25 were answered by a Station 25 unit (first unit on scene).

CHARACTERISTICS	
FID Area	15.8 Square km
Estimated Population (2016)	24,865
Population Density	1,575 per square km (Metropolitan)

Total Incidents in FID (Priority 3 and 4)				Emergency Incidents in FID (Priority 4, No IFT or Community Paramedic Incidents)			
Call Type	**2015**	**2016**	**Percent Change**	**Call Type**	**2015**	**2016**	**Percent Change**
Medical	1,177	1,264	7.4%	Medical	768	829	7.9%
Fire/Rescue	352	318	-9.7%	Fire/Rescue	261	221	-15.3%
Total	1,529	1,582	3.5%	Total	1,029	1,050	2.0%

RESPONSE PERFORMANCE 2015 AND 2016 EMERGENCY INCIDENTS (DELTA AND ECHO RESPONSES)							
2015 (time = mm:ss)				**2016 (time = mm:ss)**			
Call Type	**Turnout**	**Travel**	**Response**	**Call Type**	**Turnout**	**Travel**	**Response**
Medical	02:01	05:18	08:01	Medical	02:05	05:03	08:03
Fire/Rescue	02:02	05:59	09:11	Fire/Rescue	01:48	05:46	08:23

DESCRIPTION

FMZ 25 on the eastern perimeter of Winnipeg, primarily north of Dugald Road. FMZ 25 consists of an area of largely residential occupancies with associated commercial properties and schools, between the Transcona Railyard to the south and currently undeveloped land to the north. There is land identified for future development in this FMZ. There are several senior living facilities in this area. Some manufacturing/industrial and high hazard occupancies are present. Based on population density the overall nature of FMZ 25 is metropolitan.

Typical Risk: Residential and commercial occupancies.

Maximum Risk: High occupancy senior living facilities and high hazard industrial/manufacturing occupancies.

Figure 112: Management Zone 26 – FID 26

Station Apparatus
Engine 26
Paramedic Unit 26

FID Reliability (Emergency Incidents)	
2015	**2016**
79.6%	79.7%

In 2015, 79.5 percent of emergency incidents in FID 26 were answered by a Station 26 unit (first unit on scene).

In 2016, 79.7 percent of emergency incidents in FID 26 were answered by a Station 26 unit (first unit on scene).

CHARACTERISTICS	
FID Area	37.4 Square km
Estimated Population (2016)	31,915
Population Density	853 per square km (Urban)

Total Incidents in FID (Priority 3 and 4)				Emergency Incidents in FID (Priority 4, No IFT or Community Paramedic Incidents)			
Call Type	**2015**	**2016**	**Percent Change**	**Call Type**	**2015**	**2016**	**Percent Change**
Medical	1,445	1,396	-3.4%	Medical	914	918	0.4%
Fire/Rescue	330	308	-6.7%	Fire/Rescue	253	227	-10.3%
Total	1,775	1,704	-4.0%	Total	1,167	1,145	-1.9%

RESPONSE PERFORMANCE 2015 AND 2016 EMERGENCY INCIDENTS (DELTA AND ECHO RESPONSES)							
2015 (time = mm:ss)				**2016 (time = mm:ss)**			
Call Type	**Turnout**	**Travel**	**Response**	**Call Type**	**Turnout**	**Travel**	**Response**
Medical	02:03	05:44	08:26	Medical	02:08	05:29	08:39
Fire/Rescue	01:49	06:33	09:53	Fire/Rescue	01:58	07:15	10:17

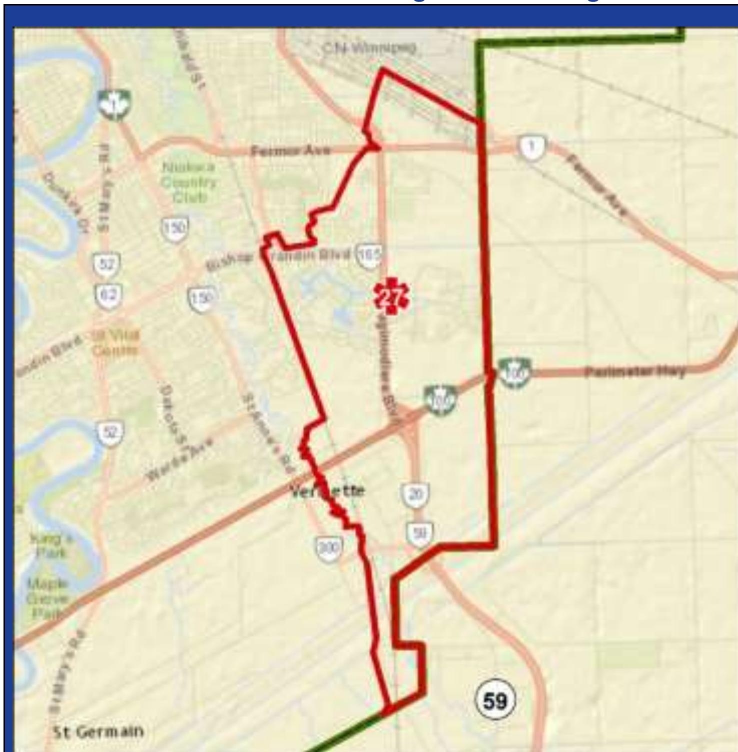
DESCRIPTION

FMZ 26 is east of the Red River, along the southeastern boundary of Winnipeg. The area is bisected by the Perimeter Highway. The area is largely residential occupancies, with associated commercial occupancies and schools to the north of the Perimeter Highway; and rural residential and agricultural land to the south. Based on population density the overall nature of FMZ 26 is urban.

Typical Risk: Single and multifamily residential.

Maximum Risk: Schools, senior living facilities.

Figure 113: Management Zone 27 – FID 27



Station Apparatus
Engine 27
Paramedic Unit 27

FID Reliability (Emergency Incidents)

2015	2016
87.2%	87.6%

In 2015, 87.2 percent of emergency incidents in FID 27 were answered by a Station 27 unit (first unit on scene).

In 2016, 87.6 percent of emergency incidents in FID 27 were answered by a Station 27 unit (first unit on scene).

CHARACTERISTICS

FID Area	21.4 Square km
Estimated Population (2016)	16,913
Population Density	790 per square km (Urban)

Total Incidents in FID (Priority 3 and 4)				Emergency Incidents in FID (Priority 4, No IFT or Community Paramedic Incidents)			
Call Type	**2015**	**2016**	**Percent Change**	**Call Type**	**2015**	**2016**	**Percent Change**
Medical	431	438	1.6%	Medical	280	266	-5.0%
Fire/Rescue	204	227	11.3%	Fire/Rescue	161	170	5.6%
Total	635	665	4.7%	Total	441	436	-1.1%

RESPONSE PERFORMANCE 2015 AND 2016 EMERGENCY INCIDENTS (DELTA AND ECHO RESPONSES)

2015 (time = mm:ss)				2016 (time = mm:ss)			
Call Type	**Turnout**	**Travel**	**Response**	**Call Type**	**Turnout**	**Travel**	**Response**
Medical	02:13	06:03	09:18	Medical	02:13	05:19	08:25
Fire/Rescue	02:33	06:53	10:00	Fire/Rescue	01:48	06:58	10:39

DESCRIPTION

FMZ 27 is located on the eastern boundary of Winnipeg and is bisected by the Perimeter Highway. FMZ 27 is primarily residential in nature. Most of the residential properties are north of the Perimeter Highway, the area south of the Highway is rural residential or agriculture land. There is land available for development in the Southland Park and Fraipont neighborhoods. Based on population density the overall nature of FMZ 27 is urban.

Typical Risk: Single and multifamily residential.

Maximum Risk: Royal Canadian Mint.

COMMUNITY RISK REDUCTION

Reducing Risk

A formal community risk reduction plan (CRRP) is outside the scope of this report. However, ESCI has presented the community risk assessment found in this section in a manner consistent with the development of a CRRP by the WFPS. It includes the primary elements of causal factors, at-risk populations, and target hazards. The definition of target hazards will vary among jurisdictions and will be partially defined by your organization. ESCI proposes to define these as: "facilities in either the public or private sector that provide essential products and services to the public, are otherwise necessary to preserve the welfare and quality of life in the community, or fulfill important public safety, emergency response, and/or disaster recovery functions."

Community Risk Priorities

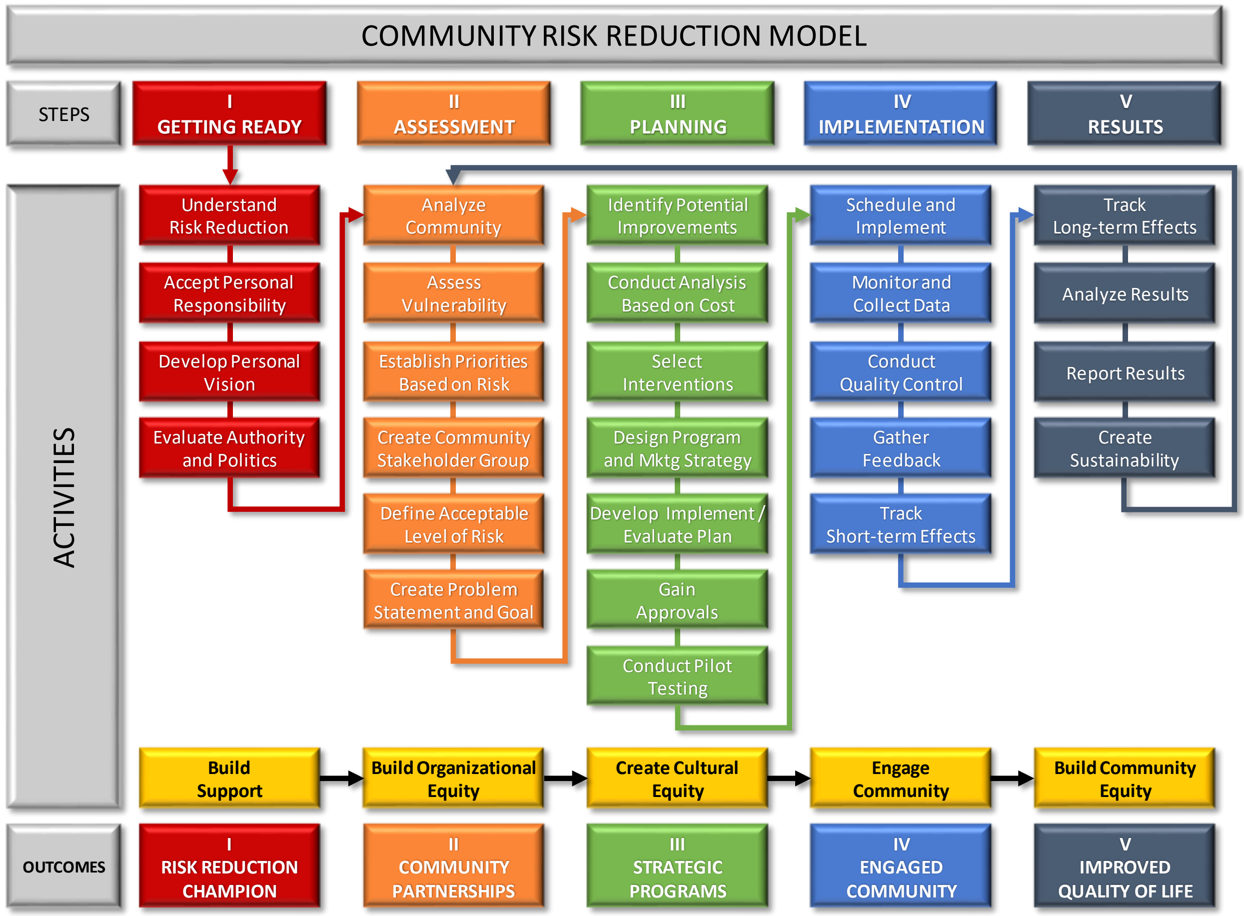
Based on the assessment of incident and demographic data, it is possible to identify and prioritize the top three priorities for community risk. These are potential risks that can ultimately be mitigated through various strategies; which will be addressed through a comprehensive community risk reduction plan.

Community Risk Assessment Summary

Utilizing the results of this risk assessment, the Winnipeg Fire Paramedic Service will begin the next steps in the community risk reduction planning process. This will start with the development of strategies and tactics to mitigate risks, followed by the preparation and implementation of a CRR plan. After implementation, the department will monitor, evaluate, and modify the plan as necessary.

The Community Risk Reduction Model

Figure 114: Community Risk Reduction (CRR) Model



The key findings included in this risk assessment are based on the information provided by WFPS and the observations of the ESCI assessment team. As provided in this report, the information does not necessarily reflect the WFPS organizational opinion or policy; it is up to the City of Winnipeg to identify those risks that should take priority for future planning efforts. Hazard risks are listed in descending order of resultant risk, from Very High to Low, in Figure 115. This figure uses the Manitoba Hazard Risk Matrix to provide consistency with regional fire risk plans. The Manitoba Hazard Risk Matrix is a two-axis matrix that shows **impact** on the vertical axis (from insignificant to catastrophic), and **likelihood** on the horizontal axis (from rare to highly probable). See Figure 13 for an illustration of this matrix.

Figure 115: Overall Hazard Risks for the City of Winnipeg

Identified Hazard	Likelihood/Impact	Risk
Flooding	Highly Probable/Catastrophic	Very High
Severe Weather	Highly Probable/Significant	Very High
Dangerous Goods Incident—Road	Highly Probable/Significant	Very High
Dangerous Goods Incident—Rail	Highly Probable/Significant	Very High
Dangerous Goods Incident—Fixed Facility	Highly Probable/Significant	Very High
Wildfires or WUI fires	Probable/Significant	Very High
Mass Casualty	Possible/Significant	Very High
Large Structure Fire	Possible/Significant	Very High
Industrial/Warehouse Fire	Possible/Significant	Very High
Large Structure Collapse	Possible/Significant	Very High
Medical Outbreak/Epidemic/Pandemic	Unlikely/Catastrophic	High
Technical Rescue Incident	Probable/Moderate	High
Agricultural Building Fire	Possible/Moderate	High
Drought	Possible/Moderate	High
Utilities Outage	Possible/Moderate	High
Pipeline Explosion	Possible/Moderate	High
Residential Fire	Highly Probable/Minor	Medium
Vehicle Fires	Highly Probable/Minor	Medium
Emergency Medical Response	Highly Probable/Minor	Medium
Vacant/Abandoned Structure Fires	Possible/Minor	Medium
Dam (Control Gate) Failure	Rare/Catastrophic	Medium
Human-caused Event	Rare/Catastrophic	Medium
Aircraft Accident	Rare/Significant	Medium
Other natural disasters[77]	Rare/Insignificant	Low

In addition to this list, there is a grouping of hazards that would affect the entire province. These include province-wide electrical blackouts and a major hydro-dam failure. According to one report, the "scope and nature of these hazards is such that the entire province would be affected by an incident of this magnitude. It would be futile for municipal entities to plan for these catastrophes as mitigation attempts would be far beyond the capabilities of local responders. It is, however, imperative for provincial entities to be aware of these possible hazards and plan accordingly to ensure proper mitigation of any occurrences."[78]

[77] Includes events where the expectation of occurrence in the Winnipeg region is so low as to be considered non-significant based on historical evidence: earthquakes, sinkholes, subsidence, landslides, or tsunami.
[78] Office of the Manitoba Fire Commissioner (2007); Hazard Analysis and Risk Assessment, Brandon, MB.

Key Recommendations

- The Community Risk Assessment should be routinely reviewed and updated to provide the most accurate information about community hazards and risks as part of the City's emergency management planning process.
- Continue to use first-in station districts for geographic planning zones.
- Consider the use of a three-axis risk matrix that adds impact on the agency as a component of risk analysis and the strategic mitigation planning process.
- Planning should begin now to sustain the WFPS resources needed to meet the continuing demand for services, especially for at-risk populations.
- Develop an inventory of target hazard locations based on occupancy type, historic responses, historic inspection and pre-plan records, and develop formal risk reduction processes.
- Maintain a separate assessment of Critical Infrastructure and Key Resources (CIKR) and incorporate that assessment as part of the Emergency Management Planning mission.
- Continuously review and update the location of special operations units—swift water, confined space, and hazmat—to ensure the capability to provide adequate response to these CIS locations.

It is evident from the findings of this assessment that the hazards posing the greatest threat to the City of Winnipeg are riverine flooding; severe weather, especially winter storms; and large fire-related incidents, including those involving dangerous goods. The remaining identified hazards listed are moderate to low risk in comparison.

The assessment described in this section is meant to be an initial planning tool for the City of Winnipeg. As such, it is intended to be reviewed and updated periodically to ensure use of the most up-to-date and accurate information. The function of emergency preparedness planning and response coordination is maintained within Fire Paramedic Service. ESCI recommends that any Community Risk Assessment: Standards of Cover Plan be routinely and consistently reviewed and updated to provide the most accurate information about community hazards and risks as shown in Figure 116.

Figure 116: Recommended CRA/SOC Review Cycle

Plan Component	Review Cycle
Review the ability of the delivery system to meet expected outcomes.	Quarterly
Identify the remedial actions most in need of attention.	Quarterly
Monitor, assess, and internally report the ability to meet expected outcomes and identify most-needed remedial actions.	Quarterly
Identify future external influences, altering conditions, growth and development trends, and new or changing risks.	Annually
Analyze the balance of service capabilities with new conditions or demands.	Annually
Ensure performance-monitoring methodology supports the annual assessment of the efficiency and effectiveness of each service program in relation to industry research.	Annually
Consider and assess the impacts of incident mitigation program efforts.	Annually
Determine performance gaps such as inadequacies, inconsistencies, and negative trends.	Annually
Develop a continuous improvement plan.	Annually
Notify the authority having jurisdiction (AHJ) of gaps in capabilities and capacity listed in the standards of cover.	Annually
Notify the AHJ of gaps between capabilities, capacity, and the approved level of service.	Annually
Interacts with external stakeholders and the AHJ to determine expectations for types and levels of services provided by the agency.	Three Years

Source: Adapted from Community Risk Assessment: Standards of Cover, 6th Edition

CRITICAL TASK ANALYSIS

The WFPS service area has a densely populated urban environment and, as such, contains an elevated number, density, and distribution of risk. The fire department should have the resources needed to effectively mitigate the incidents that have the highest potential to negatively impact the community. As the actual or potential risk increases, the need for higher numbers of personnel and apparatus also increases. With each type of incident and corresponding risk, specific critical tasks need to be accomplished and certain numbers and types of apparatus should be dispatched. This section considers the community's identified risks and illustrates the number of personnel that are necessary to accomplish the critical tasks at an emergency.

Tasks that must be performed at a fire can be broken down into two key components: life safety and fire flow. Life safety tasks are based on the number of building occupants, and their location, status, and ability to take self-preservation action. Life safety-related tasks involve the search, rescue, and evacuation of victims. The fire flow component involves delivering sufficient water to extinguish the fire and create an environment within the building that allows entry by firefighters.

The number and types of tasks needing simultaneous action will dictate the minimum number of firefighters required to combat different types of fires. In the absence of adequate personnel to perform concurrent action, the command officer must prioritize the tasks and complete some in chronological order, rather than concurrently. This has a significantly negative consequence to successful mitigation of the emergency. These tasks include:

- Command
- Scene safety
- Search and rescue
- Fire attack
- Salvage/Overhaul
- Water supply
- Pump operation
- Ventilation
- Backup/rapid intervention
- Environmental protection

Critical task analyses also apply to non-fire type emergencies including medical, technical rescue, and hazardous materials emergencies. Numerous simultaneous tasks must be completed to effectively control an emergency. The department's ability to muster needed numbers of trained personnel quickly enough to conduct concurrent operations and therefore make a difference is critical to successful incident outcomes.

The following figure breaks down the preprogrammed response by protocol (type) and identifies the staffing levels each represents. The staffing is assigned by the initial incident commander to perform the tasks required to mitigate the emergency. These critical tasks are approximated based the relative level of risk, except that in some cases, are prescribed by NFPA 1710. The following definitions apply:

Low Risk—Minor incidents involving small fires (fire flow less than 250 gallons per minute), single patient non-life threatening medical incidents, minor rescues, small fuel spills, and small wildland fires without unusual weather or fire behavior, standbys.

Moderate Risk—Moderate risk incidents involving fires in single-family dwellings (2,000 square feet, two-story home) or an equivalent-sized commercial office property (fire flow between 250 gallons per minute to 1,000 gallons per minute), life threatening medical emergencies, hazardous materials emergencies requiring specialized skills and equipment, rescues involving specialized skills and equipment, and larger wildland fires.

High Risk—High risk incidents involving fires in large commercial properties with sustained attack (fire flows more than 1,000 gallons per minute), multiple patient medical incidents, major releases of hazardous materials, high risk rescues, and wildland fires with extreme fire behavior.

Figure 117: Staffing Assignment by Type/Level of Risk

Protocol/Incident Type	High Risk	Moderate Risk	Low Risk
Protocol 51 – Aircraft Emergency	49	20	2
Protocol 52 – Alarms	20	17	4
Protocol 53 – Citizen Assist	4	4	4
Protocol 54 – Confined Space/Collapse	43	22	18
Protocol 55 – Electrical Hazard	4	4	4
Protocol 56 – Elevator/Escalator Rescue	4	4	4
Protocol 57 – Explosion	25	21	4
Protocol 58 – Extrication/Entrapment	11	8	4
Protocol 59 – Fuel Spill/Odour	27	23	4
Protocol 60 – Gas Leak/Gas Odour	24	16	4
Protocol 61 – Hazardous Materials	27	18	4
Protocol 62 – High Angle Rescue	25	17	17
Protocol 63 – Lighting Strike Investigation	20	16	16
Protocol 64 – Marine/Boat Fire	25	21	19
Protocol 66 – Odour/Unknown	4	4	4
Protocol 67 – Outside Fire	73	33	4
Protocol 68 – Smoke Investigation	4	4	4
Protocol 69 – Structure Fire	28	16	4
Protocol 70 – Train Collision/Derailment	37	20	16
Protocol 71 – Vehicle Fire	15	15	4
Protocol 72 – Water Rescue	15	15	15
Protocol 73 – Watercraft in Distress	15	15	12
Protocol 74 – Suspicious Package	27	27	27
Protocol 75 – Train & Rail Fire	21	21	4
Protocol 76 – Bomb Threat	11	11	11
Protocol 77 – Motor Vehicle Collision	27	27	4

ESCI has developed the following Critical Task Analyses using the WFPS current deployment methodology listed in the dispatch protocols (department run cards). WFPS refines call types by virtually any contingency. Using current staffing levels, ESCI has listed the critical tasks required to successfully mitigate each incident type. These are further categorized as low-, moderate-, and high-risk incident types. ESCI's review of the Critical Task Analyses concludes that all response levels are generally keeping with industry standards and best practices, providing the minimum number of personnel needed for effective incident operations. The lone exception is for high-rise structure fires, which provides two personnel less than required by NFPA 1710. While the incident commander can at any time bolster the initial response, any delays in initial dispatch negatively impact the assembly of the resources necessary to mitigate the incident.

Establishing resource levels needed for various types of emergencies is a uniquely local decision. Factors influencing local decisions for incident staffing include national standards (NFPA 1710), the type of equipment operated, training levels of responders, operating procedures, geography, traffic, and the nature of risks protected. WFPS should closely evaluate the critical tasks listed and modify them as appropriate to fit actual operational nuances within the department as the community profile evolves.

Tasks By Incident Type

Critical tasks are those identifiable activities that must be conducted early on and in a timely manner by firefighters at emergency incidents in order to control the situation, stop loss, and to perform necessary tasks required for a fire, medical, or other emergency. WFPS is responsible for assuring that responding companies are capable of performing all the described tasks in a prompt, efficient, and safe manner. These are the minimum number of personnel needed by incident type. More personnel will be needed for incidents of increased complexity or size. Very high risks (identified in the Community Risk Assessment portion of this report) will require scenario-based timed drills to determine what additional resources or specialized apparatus/skills will be necessary.

Protocol 51—Aircraft Emergency

Task	High Risk	Moderate Risk	Low Risk
Dispatch:	**7P, 2L, 2R, 2DC, MV, TKR, TKR-Trans., S30, MCU**	**2P, L, R, DC, MV, TKR, TKR-Trans**	**DC**
Command/Safety	4	2	2
Aircraft Fire Suppression	12	4	0
Pump Operations	3	2	0
Attack	8	2	0
Back-up	8	2	0
Rapid Intervention	4	4	0
Emergency Medical Care	2	2	0
Water Supply	3	2	0
Utility	1	0	0
Rehab	2	0	0
Crisis Response Van	2	0	0
Total Personnel	**49**	**20**	**2**
WFPS does not have primary responsibility for aircraft incidents except as an aircraft incident occurs within WFPS jurisdiction; WFPS is otherwise requested to assist WAA ERS at James Armstrong Richardson IA, who is the lead agency.			

Protocol 52—Alarms

Task	High Risk	Moderate Risk	Low Risk
Dispatch:	**3P, L, R, DC**	**2P, L, R, DC, S30**	**P**
Investigate	0	0	3
Command/Safety	2	1	1
Pump Operations	1	4	0
PIO	1	2	0
Attack	4	2	0
Back-up	4	2	0
Search and Rescue	2	4	0
Ventilation	2	2	0
Rapid Intervention	2	0	0
Treatment	2	0	0
Total Personnel	**20**	**17**	**4**

Protocol 53—Citizen Assist

Task	High Risk	Moderate Risk	Low Risk
Dispatch:	**P or R or SQ**	**P or R or SQ**	**P or R or SQ**
Assist Citizen	4	4	4
Total Personnel	**4**	**4**	**4**

Protocol 54—Confined Space/Collapse

Task	High Risk	Moderate Risk	Low Risk
Dispatch:	**2P, 2TR, TRT-CREW, HZ2-CREW, HZR, DC, HZ1, MV, TRT, DCT, HZ2, S30**	**P, 2TR, TRT-Crew, DC, WATER**	**P, 2TR, TRT-Crew, DC**
Command	3	2	2
Rescue	8	4	2
Safety	2	2	2
Backup/Support	8	4	2
Patient Care	4	2	2
Attendant	4	2	2
Rigger	4	2	2
Ground Support	4	2	2
Hazard	2	0	0
Shoring	4	2	2
Total Personnel	**43**	**22**	**18**

Protocol 55—Electrical Hazard

Task	High Risk	Moderate Risk	Low Risk
Dispatch:	**P**	**P**	**P**
De-energize source	4	4	4
Total Personnel	**4**	**4**	**4**

Protocol 56—Elevator/Escalator Rescue

Task	High Risk	Moderate Risk	Low Risk
Dispatch:	**R or P**	**R or P**	**R or P**
Lockout-tagout controls	2	2	2
Extricate trapped occupants	2	2	2
Total Personnel	**4**	**4**	**4**

Protocol 57—Explosion

Task	High Risk	Moderate Risk	Low Risk
Dispatch:	**3P, L, R, DC, MV, S30**	**2P, L, R, DC, MV, S30**	**P**
Command/Safety	3	3	2
Investigation	0	0	2
Pump Operations	2	2	0
Attack	4	4	0
Back-up	4	4	0
Rescue	4	2	0
Emergency Medical Care	4	2	0
Water Supply	2	2	0
Utility	2	2	0
Total Personnel	**25**	**21**	**4**

Protocol 58—Extrication/Entrapment

Task	High Risk	Moderate Risk	Low Risk
Dispatch:	**P, R, DC, S30**	**P, R**	**P**
Command/Safety	3	2	2
Cribbing/shoring	2	2	0
Protection Line	2	0	0
Rescue	2	2	2
Emergency Medical Care	2	2	0
Total Personnel	**11**	**8**	**4**

Protocol 59—Fuel Spill/Odour

Task	High Risk	Moderate Risk	Low Risk
Dispatch:	**P, DC, S30, HZR, HZ1, HZ1-CREW, HZ2, HZ2-CREW, DCT, WATER**	**P, DC, S30, HZR, HZ1, HZ1-CREW, HZ2, HZ2-CREW, DCT**	**P**
Investigate	0	0	4
Command/Safety	3	2	0
Sampling/Modeling	2	2	0
Pump Operations	2	1	0
Attack Line/Vapor Control	4	4	0
Back-up Line	4	4	0
Isolate/Evacuate	4	4	0
Emergency Medical Care	4	2	0
Dike/Boom/Run-off Containment	2	2	0
Utility	2	2	0
Total Personnel	**27**	**23**	**4**

Protocol 60—Gas Leak/Gas Odour

Task	High Risk	Moderate Risk	Low Risk
Dispatch:	**3P, L, R, DC, MV**	**2P, L, R, DC**	**P**
Investigate	0	2	4
Command/Safety	4	4	0
Sampling/Modeling	2	2	0
Pump Operations	2	2	0
Attack Line/Vapor Control	2	2	0
Back-up Line	2	2	0
Isolate/Evacuate	4	2	0
Emergency Medical Care	4	0	0
Utility	4	0	0
Total Personnel	**24**	**16**	**4**

Protocol 61—Hazardous Materials

Task	High Risk	Moderate Risk	Low Risk
Dispatch:	**P, HZR, HZ1, HZ2, DCT, MV, DC, S30**	**2P, HZ1, HZ1-CREW, R, DC**	**P**
Investigate	0	0	4
Command	4	4	0
Decontamination	4	4	0
Research Support/Modeling	4	2	0
Staging	3	2	0
Evacuation	4	2	0
Entry	4	2	0
Back-up/Rescue	4	2	0
Total Personnel	**27**	**18**	**4**

Protocol 62—High Angle Rescue

Task	High Risk	Moderate Risk	Low Risk
Dispatch:	**P, 2TR, L, ARU, TRW, DC, S30**	**P, 2TR, L, DC, S30**	**P, 2TR, L, DC, S30**
Command	3	2	2
Rescue	6	4	4
Recon	2	2	2
Safety	2	1	1
Treatment	2	2	2
Belay	6	4	4
Rigger/Anchor	4	2	2
Total Personnel	**25**	**17**	**17**

Protocol 63—Lightning Strike/Investigation

Task	High Risk	Moderate Risk	Low Risk
Dispatch:	**3P, L, R, DC**	**2P, L, R, DC**	**2P, L, R, DC**
Command/Safety	2	2	2
Investigate	2	2	2
Pump Operations	2	2	2
Attack	4	2	2
Back-up	4	2	2
Salvage/Overhaul	2	2	2
Rapid Intervention	2	2	2
Ventilation	2	2	2
Total Personnel	**20**	**16**	**16**

Protocol 64—Marine/Boat Fire

Task	High Risk	Moderate Risk	Low Risk
Dispatch:	**2P, L, R, ARU1-CREW, ARU1, DC, S30, TRW**	**2P, L, R, ARU1-CREW, ARU1, DC, S30**	**P, R, ARU1-CREW, ARU1, DC, S30**
Command/Safety	3	1	1
Dewatering Support	4	4	2
Shoreside Support	4	2	2
Watercraft Operation	2	2	2
Distressed Vessel Support	4	4	4
Rescue Swimmers	2	2	2
Emergency Medical Care	2	2	2
Boom/Containment	4	4	4
Total Personnel	**25**	**21**	**19**

Protocol 66—Odour/Unknown

Task	High Risk	Moderate Risk	Low Risk
Dispatch:	**P**	**P**	**P**
Investigate	4	4	4
Total Personnel	**4**	**4**	**4**

Protocol 67—Outside Fire

Task	High Risk	Moderate Risk	Low Risk
Dispatch:	**10P 2SQ 2DC S30 2TKR+CREW WILDLAND_ATV+CREW PC SN+CREW ATVF+CREW REHAB+CREW**	**3P, SQ, TKR, DC, S30, WFU, REHAB, ATV**	**P**
Investigate	0	0	2
Command/Safety	5	3	2
Structure Protection	20	6	0
Fire Attack, Direct	20	12	0
Fire Attack, Indirect	12	4	0
Evacuation	4	4	0
Water Supply	4	2	0
Rehab	4	0	0
Division/Group Supervisors	4	2	0
Total Personnel	**73**	**33**	**4**

Protocol 68—Smoke Investigation

Task	High Risk	Moderate Risk	Low Risk
Dispatch:	**P**	**P**	**P**
Investigate	4	4	4
Total Personnel	**4**	**4**	**4**

Protocol 69—Structure Fire

Task	High-Rise ≥ 75 Feet	High Risk[79]	Moderate Risk	Low Risk
Dispatch:	**Double the first alarm of 3P, L, R, DC, 2TR**	**3P, L, R, DC, 2TR**	**2P, L, R, DC**	**P**
Investigate	0	0	0	4
Command/Safety	3	2	2	0
Water Supply/Pump Operations	2	2	2	0
Attack	6	6	2	0
Back-up/Line Support	0	3	2	0
Search & Rescue	6	4	2	0
Ventilation	4	4	2	0
Aerial Operations	0	1	2	0
Rapid Intervention	6	4	2	0
EMS	4	2	0	0
Exposure Above Fire Floor	2	0	0	0
Stairwell Support	4	0	0	0
Evacuation	4	0	0	0
Elevator Control	1	0	0	0
Interior Staging	1	0	0	0
Rehab	2	0	0	0
Lobby Control	1	0	0	0
Equipment Transportation	2	0	0	0
Base Operations	1	0	0	0
Total	**49[80]**	**28**	**16**	**4**

Protocol 70—Train Collision/Derailment

Task	High Risk	Moderate Risk	Low Risk
Dispatch:	**2P, L, R, DC, TKR, 2TR, ARU, ARU-CREW, S30, TRW**	**2P, L, R, DC, TKR**	**2P, L, R, DC**
Command/Safety	3	2	2
Cribbing/Shoring	4	4	4
Protection Line	6	4	2
Treatment	6	4	2
Triage	6	0	0
Backup	4	2	2
Extrication	4	2	2
Spill Containment	4	2	2
Total Personnel	**37**	**20**	**16**

[79] NFPA 1710 – 2016 Edition prescribes a minimum of 28 personnel on strip mall and apartment fires, which is equivalent to WFPS standard assignment for these types of structure fires.
[80] NFPA 1710 – 2016 Edition prescribes a minimum of 43 personnel on a high-rise fire (in excess of 75 feet). WFPS assigns a 2nd alarm automatically if confirmation of a working incident, which doubles the first alarm resources for a total of 49 personnel for high rise structure fires (Protocol 69-D-2). The separate "High-Rise" column reflects the recommended critical task assignments.

Protocol 71—Vehicle Fire

Task	High Risk	Moderate Risk	Low Risk
Dispatch:	**2P, R, DC, S30**	**2P, R, DC, S30**	**P**
Command/Safety	2	2	0
Investigate	0	0	4
Pump Operations	1	1	0
Attack	4	4	0
Back-up	4	4	0
Cribbing/Shoring	2	2	0
Spill Control	2	2	0
Total Personnel	**15**	**15**	**4**

Protocol 72—Water Rescue

Task	High Risk	Moderate Risk	Low Risk
Dispatch:	**ARU, TRW, P, DC, S30**	**ARU, TRW, P, DC, S30**	**ARU, TRW, P, DC, S30**
Command/Safety	3	3	3
Rescue	2	2	2
Backup	2	2	2
Patient Care	2	2	2
Rope Tender	2	2	2
Upstream	2	2	2
Downstream	2	2	2
Total Personnel	**15**	**15**	**15**

Protocol 73—Watercraft in Distress

Task	High Risk	Moderate Risk	Low Risk
Dispatch:	**ARU, TRW, P, DC, S30**	**ARU, TRW, P, DC, S30**	**ARU, TRW, P**
Command/Safety	3	3	2
Dewatering Support	2	2	2
Shoreside Support	2	2	2
Watercraft Operation	2	2	2
Distressed Vessel Support	4	4	2
Boom/Containment	2	2	2
Total Personnel	**15**	**15**	**12**

Protocol 74—Suspicious Package

Task	High Risk	Moderate Risk	Low Risk
Dispatch:	**HRZ, HZ1, HZ2, HZ1-CREW, HZ2-CREW, DCT, P, R, DC, S30**	**HRZ, HZ1, HZ2, HZ1-CREW, HZ2-CREW, DCT, P, R, DC, S30**	**HRZ, HZ1, HZ2, HZ1-CREW, HZ2-CREW, DCT, P, R, DC, S30**
Command	3	3	3
Decontamination	4	4	4
Research Support/Modeling	2	2	2
Staging	2	2	2
Isolate/Evacuate	4	4	4
Entry	4	4	4
Rescue	4	4	4
Standby Line	4	4	4
Total Personnel	**27**	**27**	**27**

Protocol 75—Train & Rail Fire

Task	High Risk	Moderate Risk	Low Risk
Dispatch:	**2P, L, R, DC, S30, TKR**	**2P, L, R, DC, S30, TKR**	**P**
Investigate	0	0	4
Command/Safety	2	2	0
Research Support/Modeling	1	1	0
Spill Containment	4	4	0
Attack	4	4	0
Back-up	4	4	0
Rapid Intervention	4	4	0
Water Supply	2	2	0
Total Personnel	**21**	**21**	**4**

Protocol 76—Bomb Threat

Task	High Risk	Moderate Risk	Low Risk
Dispatch:	**P, R, DC, S30**	**P, R, DC, S30**	**P, R, DC, S30**
Command	2	2	2
Staging	1	1	1
Isolate/Evacuate	2	2	2
Search Support	2	2	2
Rescue	2	2	2
Standby Line	2	2	2
Total Personnel	**11**	**11**	**11**

Protocol 77—Motor Vehicle Collision

Task	High Risk	Moderate Risk	Low Risk
Dispatch:	**2P, HZR, HZ1, HZ2, HZ1-CREW, HZ2-CREW, DCT, DC, S30**	**2P, HZR, HZ1, HZ2, HZ1-CREW, HZ2-CREW, DCT, DC, S30**	**P**
Command/Safety	3	3	0
Investigate	0	0	4
Cribbing/shoring	6	6	0
Protection Line	4	4	0
Extrication	6	6	0
Spill Control	4	4	0
Patient Care	4	4	0
Total Personnel	**27**	**27**	**4**

BENCHMARK PERFORMANCE OBJECTIVES

Effectiveness and success on emergency scenes can be distilled into three major factors: facilities and equipment in the right places, sufficient numbers of trained and capable personnel to perform the necessary tasks, and the time it takes to deliver these services. If any of these elements is missing or compromised, so too is the potential for successful mitigation of an emergency. Previous sections of this report have focused on facilities and equipment deployment in the right places, and the numbers of personnel and the tasks they are required to perform. This section focuses on the element of time, and illustrates how this one factor directly correlates to outcome at an emergency.

Dynamics of Fire in Buildings

Most fires within buildings develop in a predictable fashion, unless influenced by highly flammable material. Ignition, or the beginning of a fire, starts the sequence of events. It may take several minutes or even hours from the time of ignition until a flame is visible. This smoldering stage is very dangerous, especially during times when people are sleeping, since large amounts of highly toxic smoke may be generated during this phase.

Once flames do appear, the sequence continues rapidly. Combustible material adjacent to the flame heat and ignite, which in turn heats and ignites other adjacent materials if sufficient oxygen is present. As the objects burn, heated gases accumulate at the ceiling of the room. Some of the gases are flammable and highly toxic.

The spread of the fire from this point continues quickly. Soon the flammable gases at the ceiling as well as other combustible material in the room of origin reach ignition temperature. At that point, an event termed "flashover" occurs; the gases and other material ignite, which in turn ignites everything in the room. Once flashover occurs, damage caused by the fire is significant and the environment within the room can no longer support human life. Flashover usually occurs about five to eight minutes from the appearance of flame in typically furnished and ventilated buildings. Since flashover has such a dramatic influence on the outcome of a fire event, the goal of any fire agency is to apply water to a fire before flashover occurs.

Although modern codes tend to make fires in newer structures more infrequent, today's energy-efficient construction (designed to hold heat during the winter) also tends to confine the heat of a hostile fire. In addition, research has shown that modern furnishings generally ignite more quickly and burn hotter (due to synthetics). In the 1970s, scientists at the National Institute of Standards and Technology found that after a fire broke out, building occupants had about 17 minutes to escape before being overcome by heat and smoke. Today, that estimate is as short as three minutes.[81] The necessity of effective early warning (smoke alarms), early suppression (fire sprinklers), and firefighters arriving on the scene of a fire in the shortest span of time is more critical now than ever.

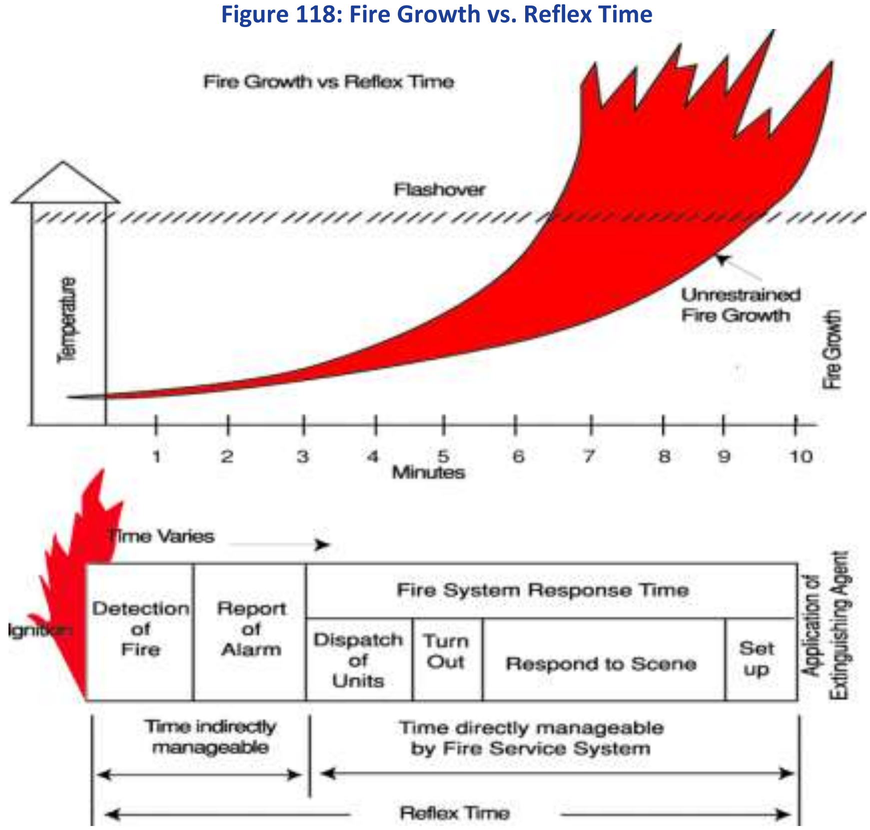
[81] Richard Bukowski, et al., *National Institute of Standards and Technology, Performance of Home Smoke Alarms, Analysis of the Response of Several Available Technologies in Residential Fire Settings*.

Perhaps as important as preventing flashover is the need to control a fire before it does damage to the structural framing of a building. Materials used to construct buildings today are often less fire resistive than the heavy structural skeletons of older frame buildings. Roof trusses and floor joists are commonly made with lighter materials that are more easily weakened by the effects of fire. "Light weight" roof trusses fail after five to seven minutes of direct flame impingement. Plywood I-beam joists can fail after as little as three minutes of flame contact. This creates a dangerous environment for firefighters.

In addition, the contents of buildings today have a much greater potential for heat production than in the past. The widespread use of plastics in furnishings and other building contents rapidly accelerate fire spread and increase the amount of water needed to effectively control a fire. These factors make the need for early application of water essential to a successful fire outcome.

Several events must take place quickly to make it possible to achieve fire suppression prior to flashover. Figure 118 illustrates the sequence of events.

Figure 118: Fire Growth vs. Reflex Time

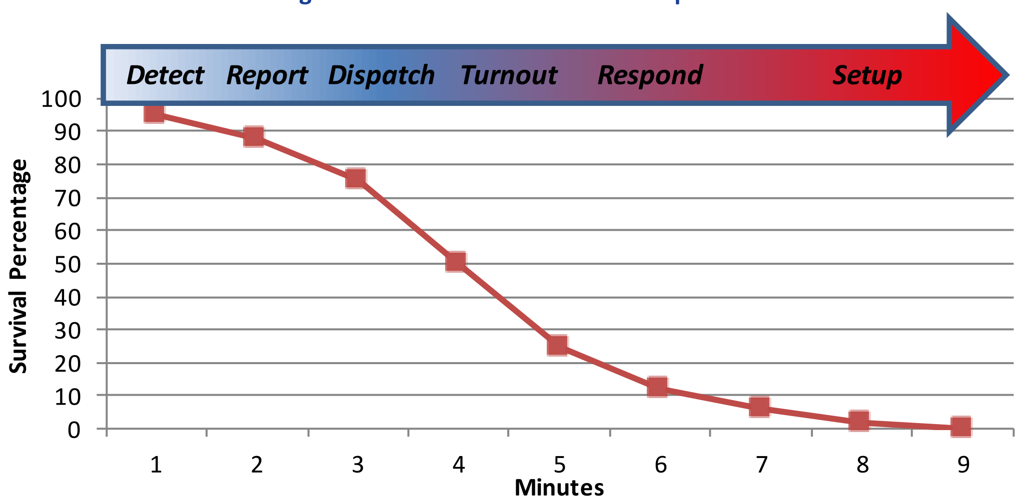


As is apparent by this description of the sequence of events, application of water in time to prevent flashover is a serious challenge for any fire department. It is critical, though, as studies of historical fire losses can demonstrate.

Cardiac Arrest Event Sequence

Cardiac arrest is the most significant life-threatening medical event in emergency medicine today. A victim of cardiac arrest has mere minutes in which to receive lifesaving care if there is to be any hope for resuscitation without deficit. The American Heart Association (AHA) issued a set of cardiopulmonary resuscitation guidelines designed to streamline emergency procedures for heart attack victims, and to increase the likelihood of survival. The AHA guidelines include goals for the application of cardiac defibrillation to cardiac arrest victims. Cardiac arrest survival chances fall by seven to 10 percent for every minute between collapse and defibrillation. Consequently, the AHA recommends cardiac defibrillation within five minutes of cardiac arrest. As with fires, the sequence of events that lead to emergency cardiac care can be graphically illustrated, as in the following figure.

Figure 119: Cardiac Arrest Event Sequence



The percentage of opportunity for recovery from cardiac arrest drops quickly as time progresses. In four minutes, without intervention, a cardiac arrest patient's survival is statistically reduced to 50 percent. The stages of medical response are very similar to the components described for a fire response. Recent research stresses the importance of rapid cardiac defibrillation and administration of certain medications as a means of improving the opportunity for successful resuscitation and survival. Survival can be enhanced with early implementation of citizen CPR and automatic external defibrillation.

NFPA 1710

As the scope of National Fire Protection Association Standard 1710 (NFPA 1710) states, "This standard contains minimum requirements relating to the organization and deployment of fire suppression operations, emergency medical operations, and special operations to the public by substantially all career fire departments." Further, its purpose is to, "[act as] a ***benchmark*** for most common responses and a platform for developing the appropriate plan for deployment of resources for fires in higher hazard occupancies or more complex incidents." The time elements for the chronology of events included in a response are summarized in the following figure and should serve as benchmarks for the various performance components.

Figure 120: Summary of NFPA Performance Standards[82]

Incident Interval	Performance Standard
9-1-1 call answer time (time from first ring to answer)	Within 15 seconds, 95% of the time Within 40 seconds, 99% of the time
Call transfer time (time from answer to acceptance at the secondary dispatch centre)	Within 30 seconds, 95% of the time
Call process time (time from acceptance at the dispatch centre until notification of response units • Emergency medical dispatch questioning and pre-arrival medical instructions • Calls requiring language translation • Calls requiring the use of a TTY/TDD device or audio/video relay services • Calls of criminal activity that require information vital to emergency responder safety prior to dispatching units • Hazardous material incidents • Technical rescue • Calls that require determining the location of the alarm due to insufficient information • Calls received by text message	Within 64 seconds, 90% of the time Within 106 seconds, 95% of the time • When addressing these types of response requests or additional challenges, alarm processing shall be completed within 90 seconds, 90% of the time and within 120 seconds, 99% of the time.
Turnout time (time from notification of response personnel until the initiation of movement towards the incident) Fire and Special Operations incidents	Within 80 seconds, 90% of the time
Turnout time (time from notification of response personnel until the initiation of movement towards the incident) EMS incidents	Within 60 seconds, 90% of the time
First engine company at a fire suppression incident (time from initiation of response until arrival at the incident)	Within 4 minutes, 90% of the time
First unit with first responder with automatic external defibrillator (AED) or higher-level capability at an emergency medical incident	Within 4 minutes, 90% of the time
Arrival of an advanced life support (ALS) unit at an emergency medical incident, provided a first responder with AED or basic life support (BLS) unit arrived within 4 minutes	Within 8 minutes, 90% of the time
Full effective response force travel time for fire suppression incidents other than high rise	Within 8 minutes, 90% of the time
Full effective response force travel time for high rise fire suppression incidents	Within 10 minutes, 10 seconds, 90% of the time

[82] NFPA 1710 – 2016 Edition, Chapter 4.

RESPONSE PERFORMANCE

In this response performance section, ESCI examines emergency response performance in the WFPS service area during 2015 and 2016.

The 2015 and 2016 data used in this analysis is extracted from electronic records management system (RMS) data provided by WFPS. Non-emergency incidents, incidents outside the WFPS service area, data outliers, and invalid data are removed from the data set whenever discovered. To prevent outliers from skewing the results ESCI applied the following filters to the data set:

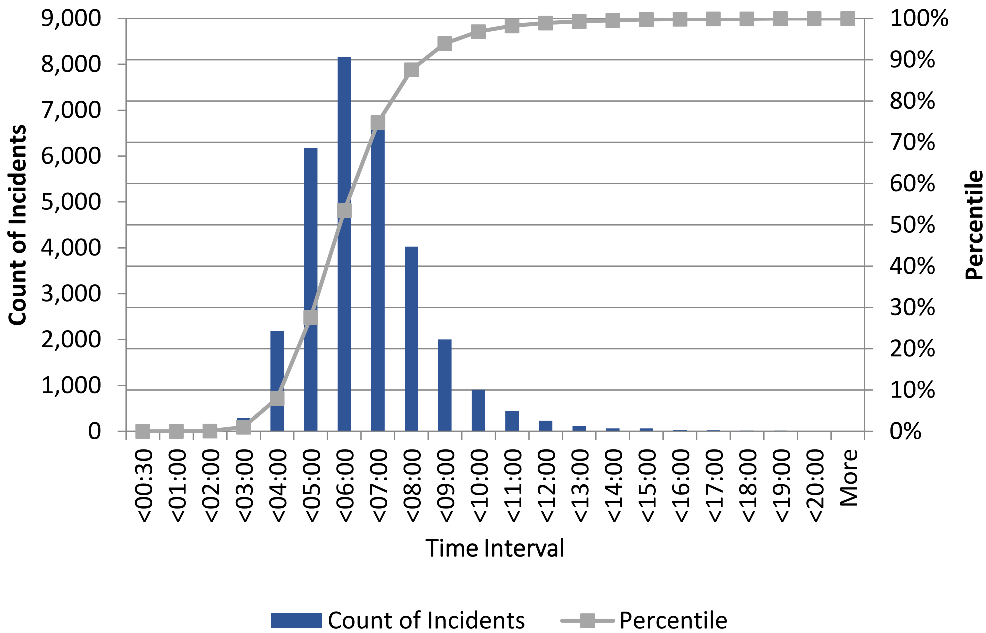
- Call Processing Time – greater than 0 and less than five minutes
- Turnout Time – greater than 0 and less than five minutes
- Travel Time – greater than 0 and less than 20 minutes
- Response Time – greater than 0 and less than 30 minutes

In addition, all interfacility transfers, community paramedic phone consults and follow ups, and pre-arranged standbys are removed from the data set. Only Emergency responses to truly life-threatening incidents (delta and echo responses) are included. This results in a data set consisting of approximately 15,700 unique emergency incidents in 2015 and 15,800 in 2016. ESCI calculates 90th percentile emergency response performance for these emergency incidents. The 90th percentile means that 10 percent of the values are greater than the standard calls for, and all other data is at or below this level. It is also referred to as "90 percent reliability." The use of percentile measurement of the components of emergency response time performance follows the recommendations of the NFPA 1710 Standard and the Center for Public Safety Excellence (CPSE) *Community Risk Assessment: Standards of Cover*.[83]

The following figure demonstrates the overall total response time (call received at dispatch centre to first unit on scene) frequency in the WFPS service area from January 2015 through December 2016.

[83] National Fire Protection Association, *Standard for Organization and Deployment of Fire Suppression Operations, EMS Operations, and Special Operations to the Public by Career Fire Departments*; and the Center for Public Safety Excellence (CPSE) *Community Risk Assessment: Standards of Cover, 6th Edition*.

Figure 121: WFPS Overall Total Response Time Frequency, January 2015 through December 2016 Emergency Incidents



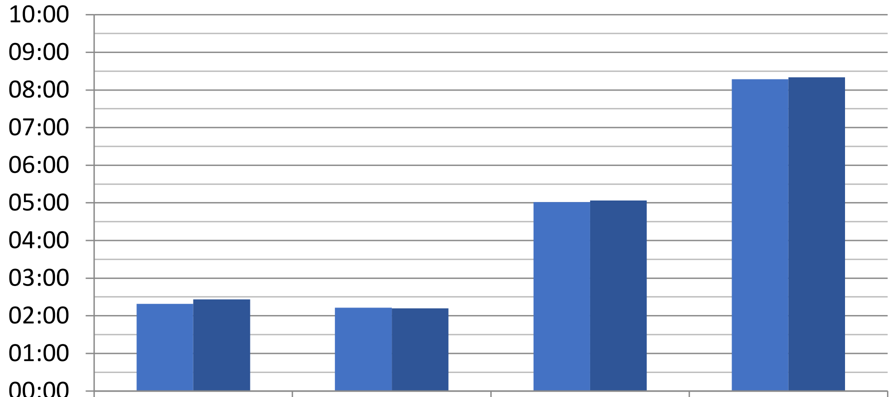
The most frequently recorded WFPS total response time is between five and six minutes. The mean or average total response time during the study period is 6 minutes, 7 seconds. During 2015 and 2016, the first WFPS apparatus arrived at 90 percent of emergency incidents in 8 minutes, 19 seconds or less from the time the call was received at the 9-1-1 centre. The previous figure measures total response time. Total response time is comprised of the following components:

- **Call Processing Time:** The amount of time between when a dispatcher answers the emergency call and resources are dispatched.
- **Turnout Time:** The time interval between when units are notified of the incident and when the apparatus are en route.
- **Travel Time:** The amount of time the responding unit spends travelling to the incident.
- **Total Response Time:** Total Response Time equals the combination of "Call Processing Time," "Turnout Time," and "Travel Time."

WFPS appropriately tracks all the components listed above in their response performance measures. Tracking the individual pieces of total response time enables jurisdictions to identify deficiencies and areas for improvement. In addition, knowledge of current performance for the components listed above is an essential element for developing response goals and standards that are relevant and achievable.

The following figure displays WFPS emergency response performance (first apparatus on scene) for the components of total response time.

Figure 122: WFPS Components of Response Performance (90th Percentile), 2015–2016



	Call Processing	Turnout Time	Travel Time	Total Response Time
2015	02:19	02:13	05:01	08:17
2016	02:26	02:12	05:04	08:20

There is a slight increase in all the components of total response time between 2015 and 2016. Overall emergency total response time response performance increased by just 3 seconds between 2015 and 2016. WFPS performance for the various components of total response time remained relatively consistent between 2015 and 2016.

The NFPA 1710, Standard for Career Fire Departments is a fire service consensus standard for career staffed urban fire departments.[84] The standard is not mandated or codified; however, this NFPA standard is an industry best practice that is based on current research and data that is periodically reviewed and updated. The NFPA 1710 standard is referenced by fire and EMS jurisdictions throughout North America. The key elements are outlined in the previous section, but are condensed below for easy reference.

Figure 123: NFPA 1710 Emergency Response Performance Recommendations

Response Element	NFPA Recommendation
Call Processing*	64 Seconds @ 90th Percentile
*Exception for EMD questioning and pre-arrival medical instructions	90 seconds @ 90th Percentile
Turnout Time	60 Seconds @ 90th Percentile for EMS 80 Seconds @ 90th Percentile for Fire
Travel Time – First unit on scene-Fire/Special Ops or EMS	4 Minutes @ 90th Percentile
Travel Time – First arriving ALS unit	8 Minutes @ 90th Percentile
Travel Time – Full First Alarm (Fire Suppression Incident)	8 Minutes @ 90th Percentile

For comparison, the following figure displays overall WFPS response performance from January 2015 to December 2016.

[84] NFPA 1710, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments* (National Fire Protection Association 2016).

Figure 124: WFPS Components of Response Performance (90th Percentile), January 2015 through December 2016

Total Response Time Continuum				
	Call Processing	**Turnout Time**	**Travel Time**	**Total Response Time**
90th Percentile	02:22	02:12	05:02	08:17

Call Processing Time

Comparing Figure 123 to Figure 124 reveals that WFPS call processing time exceeds the 90-second NFPA 1710 recommendation by 52 seconds. ESCI notes that the WFPS Communications Centre is not the primary Public Safety Answering Point (PSAP) for 9-1-1 calls in Winnipeg. During ESCI's site visit, WFPS reported that call processing performance may be skewed by an inability to collect accurate data from the primary PSAP operated by the Winnipeg Police Service (WPS).

As discussed previously, call processing time stamps greater than five minutes were removed from the WFPS data set used in this section of the report. ESCI notes that the WFPS Dispatch Centre effectively utilizes the Medical Priority Dispatch system (MPDS) software to triage medical calls and provide pre-arrival instructions.

Key Recommendation

- Work with WPS to identify a method to accurately track, maintain, and report on call processing performance as it relates to call transfers to WFPS.

Turnout Time

The second component of the response continuum, and one that can be directly affected by response personnel, is turnout time. Turnout is the time it takes personnel to receive the dispatch information, move to the appropriate apparatus, and proceed to the incident.

The NFPA 1710 performance standard for turnout time is within 80 seconds, 90 percent of the time for fire and special operations incidents, and within 60 seconds, 90 percent of the time for EMS incidents. As displayed in Figure 124, WFPS personnel required 2 minutes, 12 seconds to assemble and go en route to an emergency in 2015 and 2016.

While WFPS turnout time performance does not meet the NFPA 1710 standard, it is ESCI's experience that the NFPA standard is difficult to achieve and turnout time standards of 90 to 120 seconds for career staffed fire jurisdictions are more reasonable and achievable. This is affirmed in a study published in 2010 by the NFPA research foundation.[85] ESCI recommends that WFPS routinely monitor turnout time performance, identify deficiencies, and take steps to reduce turnout time. Turnout time is an area of total response performance that field personnel have some ability to control, given adequate information. This component of response time is also significantly affected by station alerting and station layout, thus recommendations made for new or remodeled facilities should be considered as a partial solution to turnout time performance. Facilities that allow for rapid and efficient movement of personnel can significantly improve turnout times.

Key Recommendations

- Monitor and report out frequently to crews on turnout times by station and by shift to reinforce individual crew performance expectations.
- When considering new or remodeling of existing fire stations, factor in rapid and efficient movement of personnel as an additional justification.

[85] Quantitative Evaluation of Fire and EMS Mobilization Times, May 2010, available at www.nfpa.org/foundation.

Travel Time

The NFPA 1710 standard calls for a travel time of 4 minutes for the arrival of the first arriving unit to an emergency incident (Fire/Special Operations or EMS). Travel time is potentially the longest component of total response time.

Again, comparing Figure 123 to Figure 124 reveals that WFPS emergency travel time performance does not meet the NFPA 1710 standard. During 2015 through 2016, the first WFPS unit arrived on the scene of an emergency incident in 5 minutes, 2 seconds, 90 percent of the time. As discussed in the Winnipeg Master Plan's Distribution Analysis, nearly 97 percent of 2016 emergency service demand occurred within 4 minutes travel distance of a WFPS station, based on the GIS travel time model. However, incident response data for 2016 reveals that only 72 percent of emergency incidents were reached in 4 minutes travel or less.

Factors that can affect travel time performance include traffic flow during morning and evening peak traffic periods, concurrent incidents which call for units from a more distant station to respond, or inadequate distribution of resources to cover the geographic service area. Many of these factors may to some degree affect travel time performance in the WFPS service area. Travel time can effectively by improved by using a Traffic Signal Pre-emption (TSP) system. TSP is a technological solution which allows fire apparatus to control traffic signals through a device mounted on the apparatus. This not only improves travel time performance, but also reduces the risk of collision. WFPS should consider initiating a study of the possible benefits and cost of a TSP system in Winnipeg as part of the solution for overall improvement in response performance.

Key Recommendation

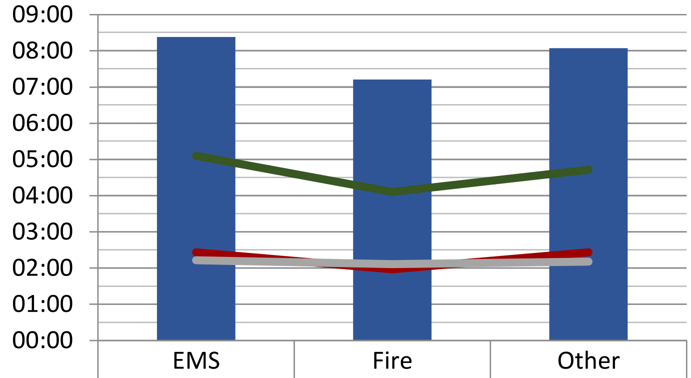
- Advocate for the installation of a Traffic Signal Pre-emption (TSP) system in the City of Winnipeg. This not only has the potential to improve travel performance for WFPS, but also for Winnipeg Police Services, and improves safety for competing response units approaching the same intersection.

Total Response Time—First Unit on Scene

The following figures examine 2016 WFPS emergency total response time performance. The NFPA 1710 standard does not identify a specific performance goal for ***total*** response time. However, combining the components of response time cited in the standard results in a total response time for the first arriving unit with first responder with automatic external defibrillator (AED) or higher-level capability at an emergency medical incident of 6 minutes or less (90th percentile) for EMS emergencies and 6 minutes, 20 seconds (90th percentile), for the first arriving engine company for fires and all other emergency incidents.

The following figure displays total response time summarized as Fire, EMS, and Other emergencies in 2016. In this figure, "Fire" refers to any incident coded as a fire in the WFPS data. The "EMS" category includes emergency calls for medical service including motor vehicle accidents and rescue calls where an ambulance was dispatched. The "Other" category includes Haz-Mat incidents, alarms (no fire), gas/odor investigations, and any other miscellaneous emergency incident (bomb threat, explosion—no fire, good intent calls, controlled burning, and weather-related emergencies, etc.).

Figure 125: WFPS Response Time Performance (90th Percentile), 2016



	EMS	Fire	Other
Total Response Time	08:23	07:13	08:04
Call Processing	02:26	01:58	02:26
Turnout Time	02:13	02:07	02:11
Travel Time	05:06	04:06	04:43

In 2016, the first WFPS unit arrived at **all emergency incidents** in 8 minutes, 20 seconds or less, 90 percent of the time. Total response time for Fire and Other emergencies was 7 minutes, 13 seconds or less for fires, 90 percent of the time; and 8 minutes, 4 seconds or less for other types of emergencies, 90 percent of the time. Total response time for EMS emergencies was 8 minutes, 23 seconds or less, 90 percent of the time. The figure also demonstrates that lengthy call processing time for EMS incidents coupled with longer travel times cumulatively cause an increase in total response time for these types of emergency incidents.

The next figure displays WFPS emergency response time performance, measured at the 90th percentile and summarized by hour of the day.

Figure 126: WFPS Response Time Performance by Hour of the Day (90th Percentile), 2016

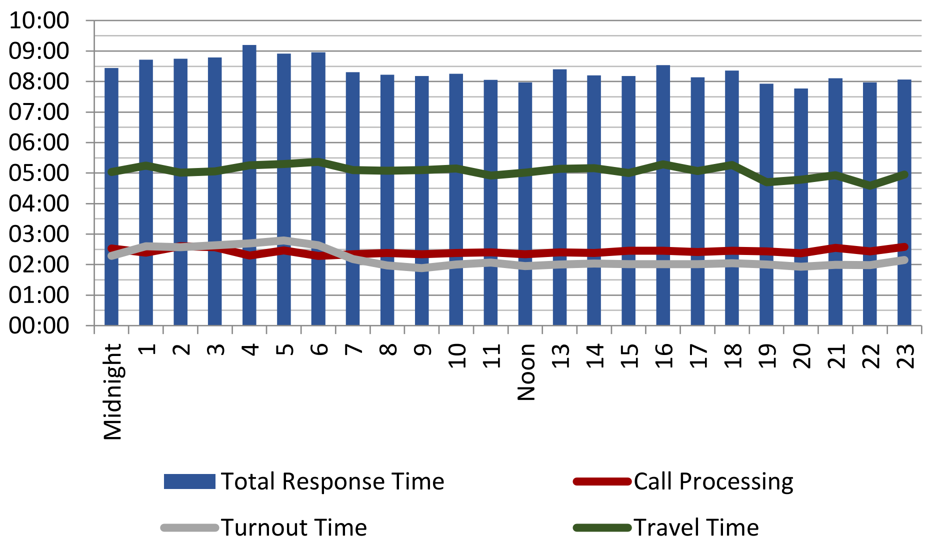
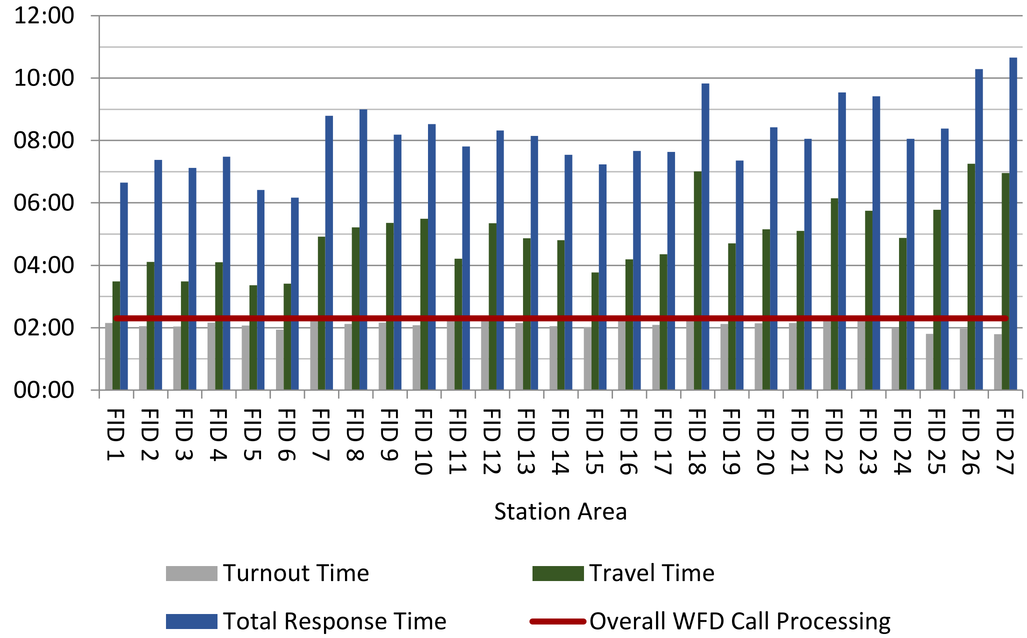


Figure 126 shows that emergency response times increase in the late evening and early morning hours and decrease during the day. The longest response times occur between 3 AM and 4 AM; while the best response time performance occurs in the evening around 8 PM.

The following figure demonstrates fire/rescue emergency response time performance in 2016 for each of the WFPS first in districts (FID).

Figure 127: WFPS 90th Percentile Fire/Rescue Response Time Performance by First Due District (FID), 2016



In Figure 127, the horizontal red line indicates a 2 minute, 18 second call processing time for all first responses for fire/rescue emergencies. This figure graphically illustrates that station areas with the longest travel times demonstrate the longest total response times, while stations with shorter travel times usually display the better total response time performance.

The following figure displays emergency response time performance for medical incidents in 2016.

Figure 128: WFPS 90th Percentile Medical Response Time Performance by First In District (FID), 2016

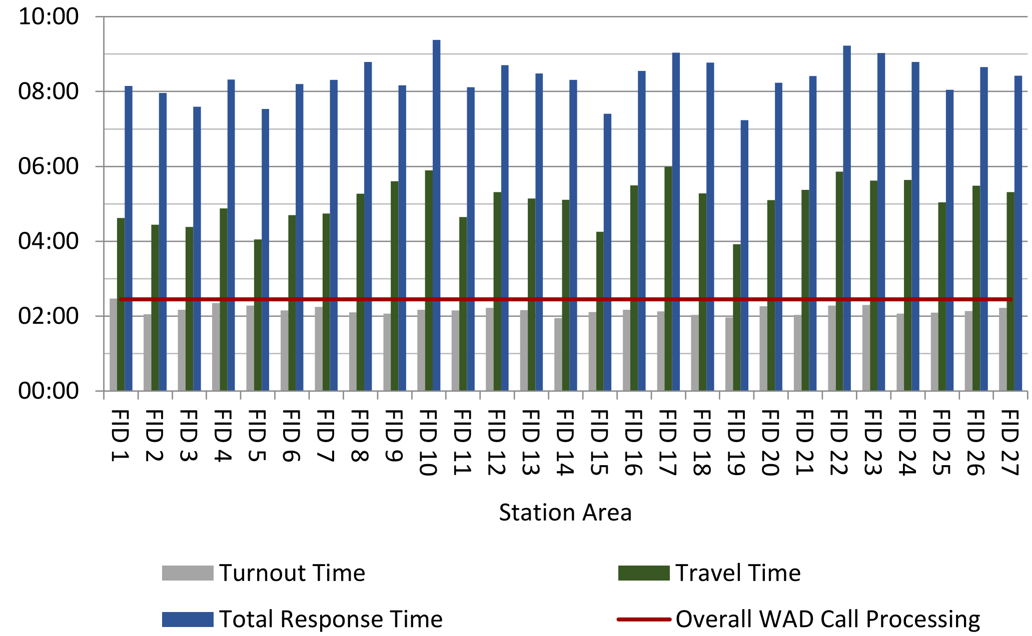


Figure 128 graphically illustrates that the medical call processing time of 2 minutes, 27 seconds lags behind the fire/rescue call processing time of 2 minutes, 18 seconds in 2016. No doubt, the longer call processing time required to properly triage and provide pre-arrival instructions affects medical total response time performance; however, travel time performance appears to have the greatest effect on response performance, when summarized by station area.

As would be expected, call processing time is relatively uniform when summarized by call type (medical or fire/rescue) and FID. Call processing time is at 2 minutes, 18 seconds for fire/rescue responses, and 2 minutes, 27 seconds for medical responses, both at the 90th percentile. This is a range of approximately 11 seconds for call processing time between medical and fire/rescue, which as mentioned previously, is a function of call triage and not a lack of performance.

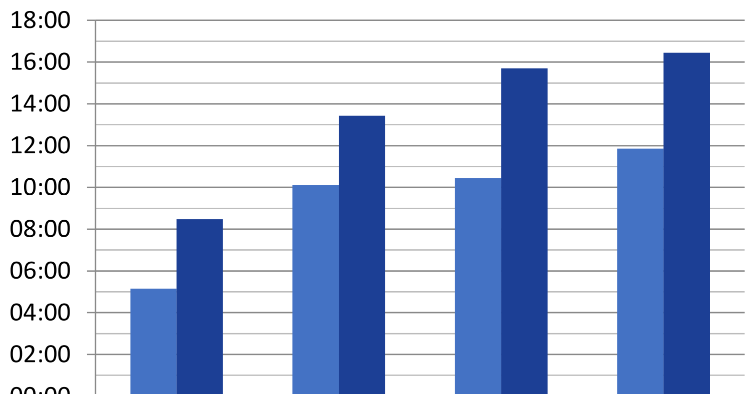
Turnout times summarized by station area, ranged from a high of approximately 2 minutes, 21 seconds to a low of just less than 1 minute, 48 seconds, whether fire/rescue or medical; resulting in a range of approximately 33 seconds for this component of total response time. The variation in emergency travel time performance and total response time performance are greater. Travel time varies by slightly less than 4 minutes (03:53) for fire/rescue incidents. Medical incidents display a range of just over two minutes (02:04). In 2016, fire/rescue total response time by station area fluctuated in a range of approximately 4 and a half minutes (04:29); and medical total response time by station area ranged from a low of 7 minutes, 14 seconds to a high of 9 minutes 23 seconds, which is a range of 2 minutes, 9 seconds (02:09).

Effective Response Force Response Time Performance

Effective Response Force (ERF) is the number of personnel and apparatus required to be present on the scene of an emergency incident to perform the critical tasks in such a manner to effectively mitigate the incident without unnecessary loss of life and/or property. The ERF is specific to each individual type of incident, as are the critical tasks that must be performed. For the purposes of this analysis, the travel time and total response time performance for assembly of multiple resources is summarized by WFPS medical and fire/rescue emergencies.

The first figure displays the time necessary to assemble up to four apparatus at an incident identified as a medical emergency incident in the 2016 WFPS data.

Figure 129: Medical Emergency Incident ERF Response Time Performance (90th Percentile), 2016

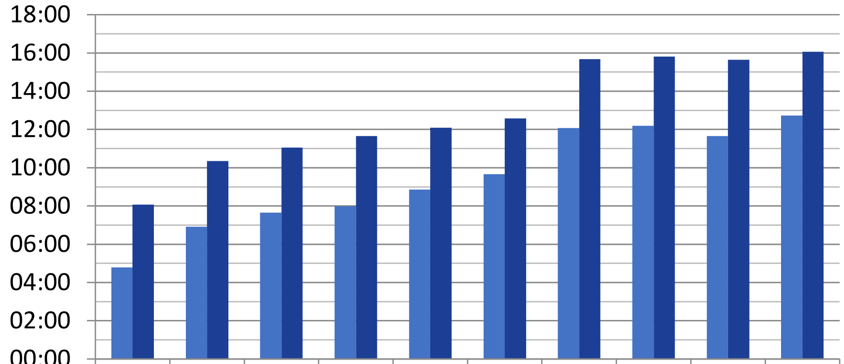


	First on Scene	2	3	4
Travel Time	05:09	10:07	10:27	11:51
Total Response Time	08:28	13:26	15:42	16:26

WFPS medical emergency responses are typically handled by one or two units. Fire/rescue apparatus are the first unit on scene at approximately 78 percent of medical emergency incidents. There is a 4-minute, 58-second difference in response performance between the first arriving unit and the second unit on scene. Approximately 10 percent of medical incidents required three or more units in 2016.

The next figure displays WFPS response time performance for the assembly of multiple resources at incidents categorized as fire/rescue incidents in the 2016 incident data.

Figure 130: Fire/Rescue Emergency Incident ERF Response Time Performance (90th Percentile), 2016



	First on Scene	2	3	4	5	6	7	8	9	10
Travel Time	04:47	06:55	07:39	07:59	08:51	09:40	12:04	12:11	11:39	12:44
Total Response Time	08:04	10:21	11:04	11:39	12:05	12:35	15:40	15:49	15:38	16:04

The NFPA 1710 travel time performance standard for the delivery of the full first alarm (ERF) to a moderate risk building fire is within eight minutes, 90 percent of the time. The WFPS full first alarm for a moderate risk structure fire calls for two pumpers, one rescue/pumper, one ladder truck, and a District Chief with aid. This alarm assignment would require five apparatus to arrive in eight minutes travel or less. Figure 130 demonstrates that WFPS requires 8 minutes, 51 seconds travel time for the fifth apparatus to arrive at an emergency fire/rescue incident, measured at the 90th percentile, which is 51 seconds longer than the NFPA 1710 standard calls for.

There is a 4 minute, 4 second difference in travel time between the first unit and the fifth unit on scene. The fifth apparatus arriving at a fire/rescue incident requiring multiple apparatus arrived in 12 minutes, 5 seconds total response time, which is a difference of just over 4 minutes after the arrival of the first fire/rescue apparatus (total response time). Examination of structure fire incident data reveals that five to eight WFPS apparatus arrived at over 81 percent of structure fires in 2016. Travel time for the eighth apparatus on scene in 2016 was 12 minutes, 11 seconds, 90 percent of the time; and total response time performance was 15 minutes, 49 seconds, 90 percent of the time.

COMPLIANCE METHODOLOGY

Compliance Methodology requires that service level objectives and performance measures are evaluated, and efforts are made to reach or maintain the established levels. The CFAI/CPSE offers the following model to monitor compliance with established performance goals and standards. These steps are further defined below the figure.

Figure 131: Compliance Methodology

Phase 1—Establish/Review Performance Measures
Adopt and review performance goals regularly

- Identify services provided
- Define levels of service
- Categorize levels of risk
- Develop performance objectives and measures:
    - By incident type
    - By geographic demand zone
    - Distribution (First on scene)
    - Concentration (Arrival of full first alarm)

Phase 2—Evaluate Performance
Performance measures are applied to actual service provided:

- System level
- Regional level
- First Due Area level
- Unit level

Phase 3—Develop Compliance Strategies
Determine issues and opportunities:

- Determine what needs to be done to close the gaps
- Determine if resources can/should be reallocated
- Seek alternative methods to provide service at desired level
- Develop budget estimates as necessary
- Seek additional funding commitment as necessary

Phase 4—Communicate Expectations to the Organization

Communicate expectations:

- Explain method of measuring compliance to personnel who are expected to perform services
- Provide feedback mechanisms
- Define consequences of noncompliance

Train personnel:

- Provide appropriate levels of training/direction for all affected personnel
- Communicate consequences of noncompliance
- Modify (remediate) business processes, business application systems, and technical infrastructure as necessary to comply

Phase 5—Validate Compliance

Develop and deploy verification tools and/or techniques that can be used by sub-sections of the organization on an ongoing basis to verify that they are meeting the requirements:

- Monthly evaluation:
  - Performance by unit
  - Overall performance
  - Review of performance by division/section management
- Quarterly evaluation:
  - Performance by unit
  - Performance by first due
  - Overall performance
  - Review of performance by executive management

Phase 6—Make Adjustments/Repeat Process

Review changes to ensure that service levels have been maintained or improved. Develop and implement a review program to ensure ongoing compliance.

- Annual review and evaluation
  - Performance by unit
  - Performance by first due
  - Overall performance
  - Review of performance by governing body
  - Adjustment of performance standards by governing body as necessary

WFPS utilizes a robust records management software (RMS) to collect, record, and report incident response data. Incident data (location, time stamps, etc.) is transferred from the WFPS Dispatch Centre to the RMS for use by operational personnel in an electronic incident reporting software. The department employs data analysts to extract and analyze incident data; which is used at various levels throughout the fire department. WFPS is well equipped to utilize the methodology outlined above to monitor performance. Once performance goals, standards, and monitoring practices are established, the department should institute quarterly and annual compliance reports. Consideration should be given to creating and publishing a performance dashboard for all personnel to access and review.

OVERALL EVALUATION, CONCLUSIONS, AND RECOMMENDATIONS

This Community Risk Assessment: Standards of Cover, which is based on the Commission on Fire Accreditation International (CFAI) *CRA: SOC*, 6th Edition process, required the completion of an intensive analysis on all aspects of the WFPS deployment practices. The analysis used various tools to review historical performance, evaluate risk, validate response coverage, and define critical tasking as it relates to equipment and staffing. The analysis relied on reference materials provided by WFPS, the Municipal Benchmarking Network (MBN) Canada, and information gleaned from interviews with staff officers and their historical perspective, combined with incident data captured by both the dispatch centre and WFPS's records management system.

The *Description of Community Served* section provided a general overview of the organization, including governance, lines of authority, finance, and capital and human resources, as well as an overview of the service area including population and geography served. The *Review of Services Provided* section detailed the core services the organization provides based on general resource/asset capability and basic staffing complements.

The *Community Risk Assessment* section outlined the methodology used to quantify the risks present in the community/service area. This section reviewed risk from a variety of perspectives: by geography, by weather, by demography, by specific target hazards, by transportation network risks, by physical assets, and by at-risk (vulnerable) populations. The risks were then segregated by response type—specifically fire or medical. Finally, the risks were analyzed by management zones—specifically by station area.

Each of the twenty-six separate response protocols managed by the WFPS Communications Centre were evaluated by resources assigned and their staffing levels. These were then compared to NFPA 1710 standards for minimum response deployment by call type or structure type, where specified. From this, critical tasks which must be done concurrently were listed and staff assignments made. These critical tasks are strongly correlated to incident outcome, since tasks that performed consecutively (as a result of insufficient personnel) delay incident mitigation and most often result in a poorer result. These tasks ultimately determine the resource allocation necessary to achieve a successful operation.

The *Benchmark Performance Objectives* section lays out the standards established by NFPA 1710, which is a North American consensus standard for the deployment of fire department resources and establishes response performance standards based on time intervals and numbers of personnel assigned. The *Response Performance* section evaluates WFPS performance for each of the response elements identified in the benchmarks. These included call processing time, turnout time, travel time, and total response time for first arriving unit, and for the assembly of an effective response force.

Based on the analysis, recommendations are offered to improve the delivery of fire and emergency services to the community service by WFPS. It is not expected that all will be implemented in the short-term. Some may wait until economic conditions allow their implementation. However, all the recommendations offered chart a course to improved capability and service.

Recommendations

The WFPS is a highly professional, dedicated, and focused agency whose primary purpose is to save lives and property of those who work and live within its borders. Based on the foregoing analysis of the community, its risks, and resources, the following recommendations are offered by ESCI to increase the likelihood of WFPS to achieve the benchmarks listed herein.

Formally Adopt Response Performance Objectives

While NFPA 1710 is a consensus standard that establishes response performance requirements, it also recognizes the role of the authority having jurisdiction (AHJ – policy-makers). In Appendix A of NFPA 1710, it states the AHJ has the responsibility to determine the scope and level of service provided by the fire department, the necessary level of funding, and the necessary level of personnel and resources, including facilities.[86] It goes on to state that, "Most fire departments are responsible to a governing body. The governing body has the right and should assert its authority to set the specific services and the limits of the services the fire department will provide. It also has the responsibility to furnish the necessary resources for delivery of the designated services."

Call Processing Time

Call processing time includes all elements associated with answering a 9-1-1 generated phone call at the primary Public Safety Answering Point (PSAP), transferring the call to the secondary dispatch centre, processing the call to obtain pertinent information, and notifying the appropriate response units.

The NFPA 1710 standard for answering the 9-1-1 call (from first ring to answer) at the primary PSAP (located at WPS) is within 15 seconds or less, 95 percent of the time, and within 40 seconds or less, 99 percent of the time. The NFPA 1710 standard for transferring the call (time from answer at the primary PSAP to acceptance at the secondary dispatch centre) is within 30 seconds or less, 95 percent of the time.

The NFPA 1710 Standard for processing the call (time from acceptance at the secondary dispatch centre until notification of response units) is within 64 seconds or less, 90 percent of the time, and within 106 seconds, 95 percent of the time. However, when certain criteria are included, alarm processing time shall be completed within 90 seconds or less, 90 percent of the time and within 120 seconds or less, 99 percent of the time. Those criteria include:

- Emergency medical dispatch questioning and pre-arrival medical instructions
- Calls requiring language translation
- Calls requiring the use of a TTY/TDD device or audio/video relay services
- Calls of criminal activity that require information vital to emergency responder safety prior to dispatching units
- Hazardous material or technical rescue incidents
- Calls that require determining the location of the alarm due to insufficient information
- Calls received by text message

[86] National Fire Protection Association (NFPA) 1710, 2016 Edition, Appendix A, section A.4.1.1, page 17.

Turnout Time

Turnout time is one area over which the fire department has some ability to control and is not affected by outside influences other than poor station design, alerting, and flow. Turnout time, or the time between when the call is received by the response units (dispatched) and when the unit is actually en route to the scene (responding), affects overall response times. Reducing turnout time reduces total response time.

The NFPA 1710 standard for turnout time is 80 seconds or less for fire and special operations response and 60 seconds or less for all other priority responses, such as emergency medical responses.

Travel Time

Once a unit is notified by dispatch of an emergency and begins its response until the arrival of that first unit is referred to as travel time. The NFPA 1710 standard for travel time for the first engine company at a fire suppression incident or the first unit with a medically trained first responder with automatic external defibrillator (AED) or higher-level capability at an emergency medical incident is within 4 minutes or less, 90 percent of the time. Arrival of an advanced life support (ALS) unit at an emergency medical incident (a tiered response in support of the first responder with AED unit which arrived within 4 minutes) is to arrive within 8 minutes or less, 90 percent of the time.

Effective Response Force

A fire department's concentration is the spacing of multiple resources close enough together so that an initial "Effective Response Force" (ERF) for a given risk can be assembled on the scene of an emergency within the specific time frame identified in the community's performance goals for that risk type. An initial effective response force is defined as the number of personnel on appropriate apparatus necessary to perform all foreseeable critical tasks for that emergency concurrently, which will most likely stop the escalation of the emergency.

The minimum ERF travel time for fire suppression incidents other than high rise fires is within 8 minutes or less, 90 percent of the time. For high-rise fires, the minimum ERF travel time is within 10 minutes, 10 seconds or less, 90 percent of the time. Additional engines, ladders, or other specialty companies may be assigned as greater alarms in order to accomplish additional critical tasks that are necessary beyond the initial attack and containment.

Each of the risk types/dispatch protocols for WFPS are listed within this report, and contain the minimum numbers of personnel by risk type/protocol. In each response protocol, WFPS dispatches an appropriate number of personnel on the appropriate types of apparatus to address the critical tasks concurrently, except for high-rise fires. In this case, WFPS needs to add an additional 15 personnel to meet the NFPA 1710 Standard for minimum staffing on a high-rise fire.

Annual Performance Reporting

NFPA 1710 and ESCI recommend the City Council task the fire department to annually report to the Council and the community actual performance for the preceding year as compared to the performance objectives; describe the causal factors for failure to achieve any objectives not met; the likely consequences of continued failure to meet those objectives it is not currently meeting; and identify steps planned to address the gaps, if any. This annual reporting should follow a format similar to the appendix in this report.

Compilation of multiple annual reports following the same format year over year will allow the agency to establish trends once the data has been compiled for five years or more. At that time, WFPS should evaluate the data for trends, making deployment adjustments as necessary. It is important that the format and data collection remain consistent year over year to ensure comparability.

Improve Call Processing Performance

Winnipeg Police Services (WPS) answers all 9-1-1 calls and transfers those that are a request for fire department services to the WFPS Communication Centre. At present it does not have the ability to quantify the amount of time this sequence adds to overall call processing time. The transfer should be seamless and should be time-stamped in order to fully evaluate the amount of time it takes from the receipt of the 9-1-1 call until the call is handed off to the WFPS Communication Centre, where the additional time elements are tracked for a thorough and complete record of all call processing time elements.

Additionally, the WFPS call processing performance exceeds national standards. There are opportunities to reduce the time required to notify response personnel of an incident that should be explored.

In the process used by WPS, the caller is immediately questioned to determine the nature of the emergency (police, fire, or medical). Once gathered, that information is transferred to a WFPS dispatcher who further interrogates the reporting party for the specifics of the call type, location, and circumstances of the emergency. If medical, the WFPS dispatcher uses the Medical Priority Dispatch System (MPDS), which is an algorithm used to categorize medical incidents, and provide pre-arrival instructions to the reporting party and to responding units, such as CPR coaching. Once sufficient information has been gathered from the reporting party, the appropriate unit(s) is/are dispatched. Many caller queries cause substantial delay in dispatching. Other improvements are as follows:

- ProQA: a software adjunct to CAD which automates medical call triaging much more rapidly than use of manual cardsets.
- CAD: newer engineered call taking and dispatch screens, including these additional features:
  - Automated resource deployment, which automatically manages resource allocation.
  - Automated voice dispatching (e.g., *Locution* or similar product) which frees up dispatchers to perform support tasks without being tied up manually dispatching and voicing call information.

Additional information, discussion, and recommendations regarding call processing can be found in the companion Master Plan document.

Improving Turnout Times

Currently, there is no station-wide voice alert announcing the call type, location, or other pertinent data. Instead, a crewmember must go to the floorwatch to retrieve a hard copy printout of the response, then return to the appropriate unit for response. There are many new technologies that can be employed which will have a dramatic effect on turnout times, such as:

- Audible, station-wide alerting with voice announcement of call type, unit(s) dispatched, and location—eliminating the need for a hard copy of the dispatch.
- Automated station lighting, bay door activation, appliance shut-off programmed for the appropriate unit(s) and crew(s)—physical and visual safety systems activated automatically.

ESCI recommends that in addition to these improvements, WFPS should routinely monitor and report to all personnel turnout time performance by station, but unit, and by shift, identify deficiencies, and take steps to reduce turnout time.

Additional information, discussion, and recommendations regarding improving turnout times can be found in the companion Master Plan document.

Facility Improvements

The overall response performance by the WFPS system can be improved in two ways: by addressing the individual facility configuration for greater efficiency of turnout time, and by the deployment of those facilities within the community. As addressed in greater detail in the companion to this report (2017 WFPS Master Plan), ESCI has determined that fewer fire stations (23 stations), properly positioned and configured, can actually improve response performance over the current 30 fire and EMS response facilities. The repositioning of the facilities provides greater balance in travel time coverage over the current deployment, and the opportunity to remodel, reconfigure, or rebuild stations with a focus on egress from all areas of the station for a more responsive turnout time. Both improve total response time.

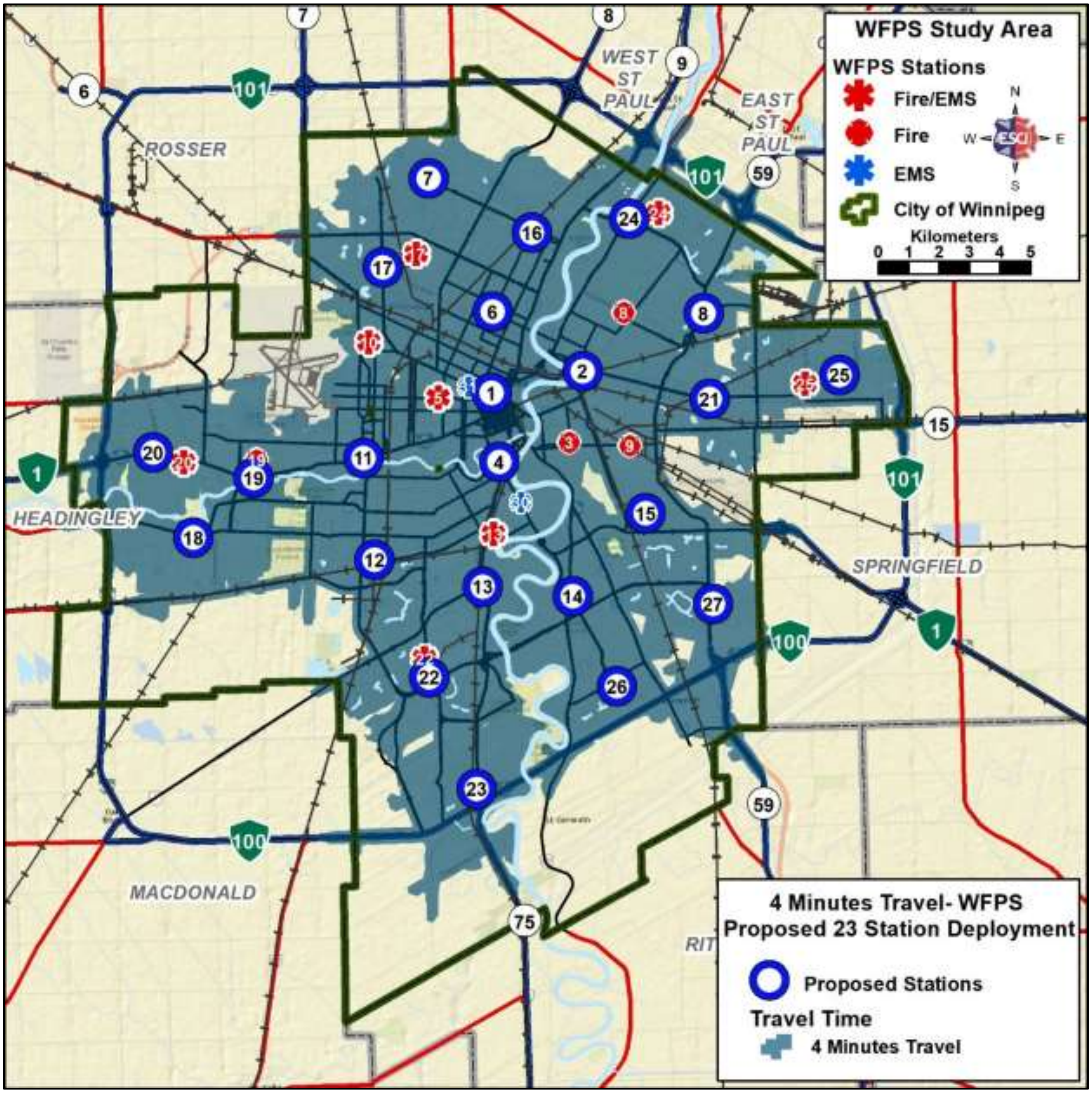
As discussed in the 2017 WFPS Master Plan, ESCI believes that reconfiguring the deployment of the 23 fire/EMS stations will improve the level of service provided. There are significant opportunities to capture several efficiencies, such as:

- Many of the WFPS facilities are in need of significant remodeling or total replacement as determined by ESCI's site assessment, thus any reconfiguration consideration is timely;
- Modern fire station design can be factored into these facilities, reducing turnout time for responding crews just by improving work flow within the station;
- While facility reconstruction is an expensive and complicated logistical endeavor, it is a one-time cost. Reducing the number of facilities that require maintenance is an ongoing cost avoidance strategy;
- Existing fire station sites are utilized as much as practical to capture as much efficiency as possible and reduce expense;
- Existing inventory of facilities that become surplus to the needs of the City as a result of implementing this recommendation are able to be liquidated, with the proceeds of the sale of these properties reinvested to offset the capital costs.

As stated in the 2017 WFPS Master Plan, it is important to recognize that while ESCI is recommending the consolidation of certain fire stations—which includes the current EMS-only stations—ESCI is ***not*** recommending a reduction of apparatus or staff assigned to those stations. Instead, existing apparatus and crew deployment would be moved to the consolidating stations, adding to the resource concentration within the City.

The following figure illustrates the proposed redeployment of WFPS facilities.

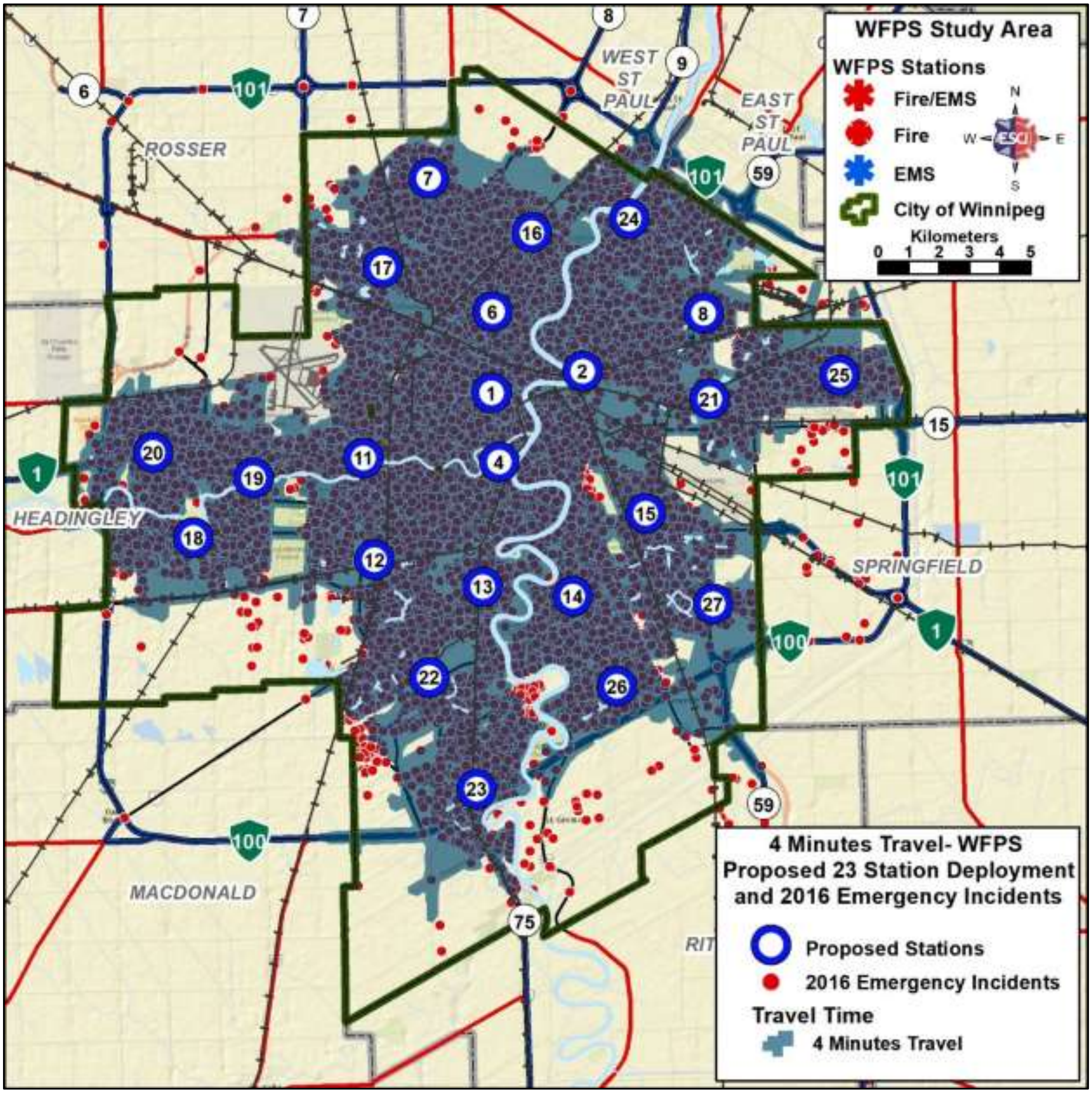
Figure 132: WFPS Proposed 23-Station Deployment



Multiple locations were evaluated to arrive at the station locations modeled in this figure. The model presented in this figure represents a mix of existing station locations and new locations. The proposed station locations are labeled with the number of the existing station they replace.

The following figure overlays the proposed station travel time model and 2016 emergency service demand.

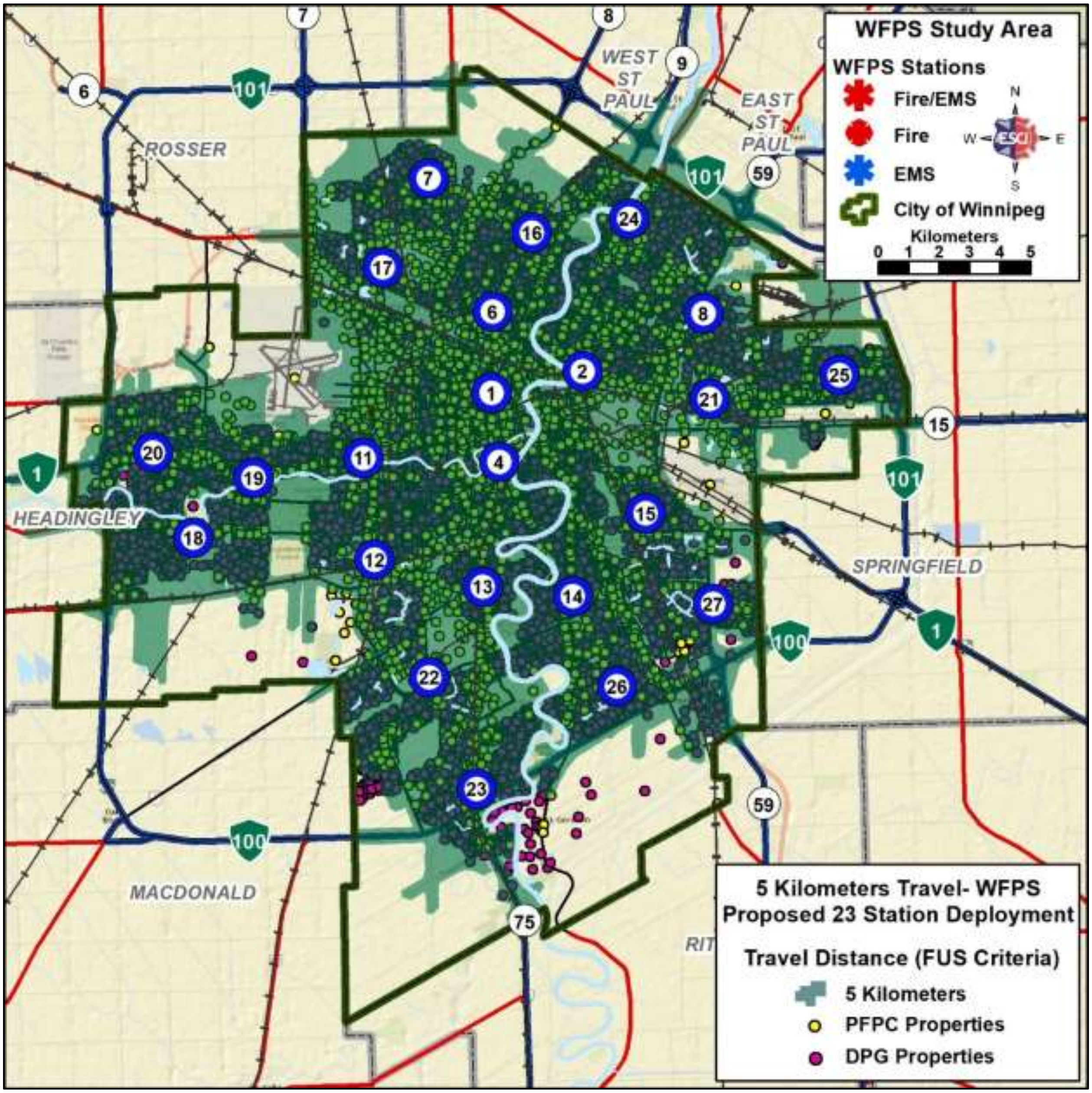
Figure 133: Proposed 23 Station Deployment Model and Service Demand, 4 Minutes Travel



Nearly 98 percent (97.7 percent) of 2016 emergency incidents are within four minutes travel or less (NFPA 1710 criteria) of a WFPS station using the 23-station deployment model displayed in this figure. This represents a slight improvement over the current WFPS station deployment, which is within four minutes travel or less of approximately 97 percent (97.2 percent) of 2016 emergency service demand. It is important to note that the proposed model achieves slightly better emergency service demand coverage than the current station deployment and reduces the number of WFPS stations from 30 to 23.

The following figure examines the distribution of WFPS stations based on the Fire Underwriters Survey (FUS) rating criteria.

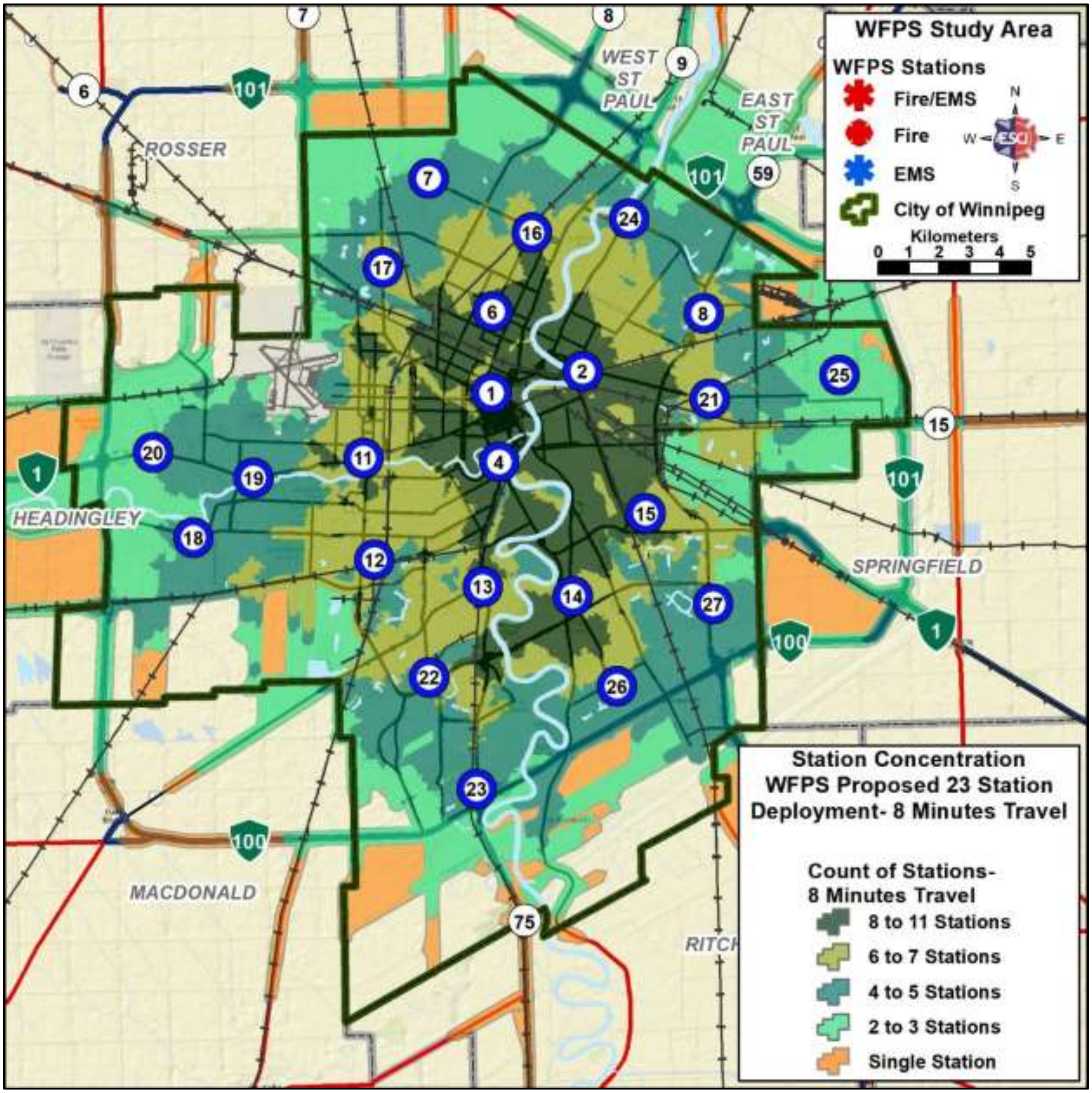
Figure 134: Proposed 23 Station Deployment Model—PFPC and DPG Properties, 5 Kilometers Travel Distrance



As in the previous figure, this figure demonstrates that based on the Fire Underwriters Survey (FUS) criteria; the proposed station deployment model provides a somewhat higher level of coverage. Ninety-nine percent (99%) of both the PFPC (commercial, industrial, and multifamily residential) and DPG (one or two family detached residential) properties are within five kilometers driving distance of a proposed fire station location.

The next figure models the proposed 23-station deployment at eight minutes travel; and displays the concentration of stations available in the WFPS service area.

Figure 135: Proposed 23-Station Deployment Station Concentration, 8 Minutes Travel Time



Appropriately, the greatest concentration of stations occurs in the central core of Winnipeg. Up to 11 stations are within eight minutes travel or less of the downtown core and the surrounding area. Over 40 percent of 2016 emergency service demand occurred in the area around Stations 1, 2, 4, and 6. It is essential that a high concentration of resources be available to handle the service demand in this area. As with the current deployment of stations, most of the portions of Winnipeg within the Highway 100/101 corridor around the city are within eight minutes travel of four to seven stations.

As mentioned at the beginning of this recommendation, redesigning the fire stations for greater efficiency also improves turnout times. By orienting all living spaces toward the apparatus bays and providing quick ingress to the bays for an immediate response can reduce turnout times significantly.

APPENDIX A—ANNUAL PERFORMANCE REPORT TEMPLATE

Fire Department Annual Performance Report

Call Processing Time: the period of time from answering a 9-1-1 generated phone call at the primary Public Safety Answering Point (PSAP), transferring the call to the secondary dispatch centre, processing the call to obtain pertinent information, and notifying the appropriate response units.

Performance Objective:

- *The WFPS will achieve a call processing time as follows:*
  - *answering the 9-1-1 call (from first ring to answer) at the primary PSAP (located at WPS) is within 15 seconds or less, 95 percent of the time, and within 40 seconds or less, 99 percent of the time.*
  - *transferring the call (time from answer at the primary PSAP to acceptance at the secondary dispatch centre) is within 30 seconds or less, 95 percent of the time.*
  - *alarm processing time (time from acceptance at the secondary dispatch centre until notification of response units) is within 64 seconds or less, 90 percent of the time, and within 106 seconds, 95 percent of the time.*
  - *alarm processing time is extended be completed within 90 seconds or less, 90 percent of the time and within 120 seconds or less, 99 percent of the time for the following circumstances:*
    - *Emergency medical dispatch questioning and pre-arrival medical instructions.*
    - *Calls requiring language translation.*
    - *Calls requiring the use of a TTY/TDD device or audio/video relay services.*
    - *Calls of criminal activity that require information vital to emergency responder safety prior to dispatching units.*
    - *Hazardous material or technical rescue incidents.*
    - *Calls that require determining the location of the alarm due to insufficient information.*
    - *Calls received by text message.*

Actual Fire Department Performance For Review Period	Causal Factors & Predictable Consequences For Failure to Achieve Objective
____ Met Objective ____Did Not Meet Objective Achieved PSAP Answering Time ___% of the time. Achieved Call Transfer Time ___% of the time. Achieved Call Processing Time ___% of the time. Achieved Call Processing Time Extensions ___% of the time.	

Planned Steps to Address Gaps, if any.
[Add additional pages if necessary.]

Turnout Time: the period of time from initial dispatch to initiation of travel towards the incident.

Performance Objective:

- *The WFPS will achieve a turnout time of 80 seconds or less for fire and special operations responses and 60 seconds or less for all other priority responses, both 90 percent of the time.*

Actual Fire Department Performance For Review Period	Causal Factors & Predictable Consequences For Failure to Achieve Objective
____ Met Objective ____Did Not Meet Objective Achieved **Fire** Turnout Time ___% of the time. Achieved **Special Ops** Turnout Time ___% of the time. Achieved **EMS** Turnout Time ___% of the time.	

Planned Steps to Address Gaps, if any.

Travel Time:The time interval that begins when a unit (first engine company at a fire suppression incident or first medical unit at a medical emergency) is en route to the emergency incident and ends when the unit arrives at the scene.

Performance Objective:

- *The WFPS will achieve a travel time objective of four minutes (4:00) or less for the **first arriving fire engine for fire incidents**, 90 percent of the time.*
- *The WFPS will achieve a travel time objective of four minutes (4:00) or less for the **first arriving medical unit for medical emergencies**, 90 percent of the time.*
- *The WFPS will achieve a travel time objective of eight minutes (8:00) or less for the **first advanced life support (ALS-advanced care paramedic) unit** at an emergency medical incident, 90 percent of the time.*

Actual Fire Department Performance For Review Period	Causal Factors & Predictable Consequences For Failure to Achieve Objective
____ Met Objective ____Did Not Meet Objective Achieved Travel Time for **1st Engine** ___% of the time. Achieved Travel Time for **1st Medical Unit** ___% of the time. Achieved Travel Time for **1st ACP Medical Unit** ___% of the time.	

Planned Steps to Address Gaps, if any.

Effective Response Force: The time interval that begins when all units initially dispatched to an emergency incident are en route to the incident and ends when the units arrive at the scene. The combined units deliver the minimum number of personnel identified for that risk type.

Performance Objective:

- *The WFPS shall achieve an **effective response force** of 16 personnel for moderate **risk structure fires** within eight minutes (8:00) or less, 90 percent of the time.*
- *The WFPS shall achieve an **effective response force** of 28 personnel for high **risk apartment and strip mall fires** within eight minutes (8:00) or less, 90 percent of the time.*
- *The WFPS shall achieve an **effective response force** of 43 personnel for **high rise fires** within ten minutes, ten seconds (10:10) or less, 90 percent of the time.*

Actual Fire Department Performance For Review Period	**Causal Factors & Predictable Consequences For Failure to Achieve Objective**
____ Met Objective ____Did Not Meet Objective Achieved **Travel Time** and **Effective Response Force** for moderate risk structure fires ___% of the time. Achieved **Travel Time** and **Effective Response Force** for high risk apartment and strip mall fires ___% of the time. Achieved **Travel Time** and **Effective Response Force** for high rise fires ___% of the time.	

Planned Steps to Address Gaps, if any.

APPENDIX B—SIGNIFICANT DISASTER EVENTS

Figure 136: Major Manitoba Disasters Since 1900

Event Type	Place	Year	Description	Comments
Cold Event	Yukon to Ontario	1989	Freezing caused pipes to burst; temperature plummeted from +3°C to -26°C in 7 hours; pipes burst, schools closed, ferries were cancelled, roads closed, and airports were shut down; extensive agricultural damage.	13 fatalities 128 injured 20,000 affected
Cold Event	Across Canada	1982	Three-week cold spell; trucks and trains failed and were abandoned until milder weather came; a damaged steel bridge forced a 200-km detour of the Alaskan highway; more than 25 highways in Ontario were closed in areas due to blowing snow and poor visibility. In the northern Prairies, temperatures as low as -47°C were recorded.	
Cold Event	Prairies Provinces and Ontario	1992	Unseasonable snow and frost caused massive damage to agricultural crops.	$ 2,000,000
Cold Event	Yukon to Ontario	1979	Weather slowed TransCanada and Alaska oil flow to one fourth its normal flow, causing furnaces to break down from lack of oil; pipes burst across Metro Toronto; Feb. 20, 1979 the first time in recorded history, all five Great Lakes froze over, ceasing all water traffic; a snowstorm in Iqaluit, Northwest Territories caused temperatures to reach -40°C, winds as high as 100 km/h, and snow kept residents indoors for 10 days.	
Dangerous Goods Event	Winnipeg, MB	2016	A natural gas leak was caused by a contractor who accidently severed a gas line at a construction site in the intersection of Keewatin St and Paramount Rd.	200 evacuated
Dangerous Goods Event	Brookdale, MB	2002	A rupture occurred on the 914-mm natural gas transmission Line 100-3 (main line) of TransCanada Pipelines 2 km from the village of Brookdale, Manitoba.	100 evacuated
Dangerous Goods Event	Portage la Prairie, MB	1998	The last eight cars of an eastbound CN Rail freight train jackknifed near the TransCanada and Hwy 16 junction, 12 km west of Portage la Prairie. The eight cars derailed and spilled glycol (antifreeze) into a creek which leads to Lake Manitoba. The toxic spill forced the evacuation of area residents. No one was injured.	evacuation
Dangerous Goods Event	St. Lazare, MB	1991	25 cars in an 88-car train jumped the tracks near the village of St. Lazare; two cars of acetic anhydride and two cars of methanol ruptured, causing a toxic cloud; Respiratory masks were required in the contaminated area, reservoirs to confine the waste were dug, the crops within 200 m were contaminated with acetic vapours.	400 evacuated 500 affected

Event Type	Place	Year	Description	Comments
Drought	Prairie Provinces	1993	Severe and widespread surface water droughts.	
Drought	Prairie Provinces	1992	Livestock yields were low due to dry conditions; severe and widespread surface water droughts; coldest July since 1884.	$ 580,597,523
Drought	Prairie Provinces	1991	Severe and widespread surface water droughts.	$ 146,557,019
Drought	Prairie Provinces	1990	Cereal crop drought.	$ 581,891,545
Drought	Prairie Provinces	1989	Cereal crop drought; severe and widespread surface water droughts.	
Drought	Prairie Provinces	1986	Severe and widespread surface water droughts.	
Drought	Prairie Provinces	1984	The worst agricultural drought since the 1930s to occur in the Prairies; severe and widespread surface water droughts reported on the Prairies.	10,000 farms affected
Drought	Prairie Provinces	1983	Cereal crop drought occurred in parts of the Prairies; production declined in western Canada by 7.5 percent due to the onset of drought during the growing season.	
Drought	Prairie Provinces	1981	Prairie Provinces, 1981. Severe and widespread surface water droughts reported on the Prairies.	
Drought	Prairie Provinces	1981	Severe and widespread surface water droughts reported on the Prairies.	
Drought	Prairie Provinces	1977	Cereal crop drought occurred in parts of the Prairies; among the most severe and widespread surface water droughts ever to occur on the Prairies; severe drought in southern Alberta and western Saskatchewan.	
Drought	Prairie Provinces	1974	Cereal crop drought.	
Drought	Prairie Provinces	1969	Cereal crop drought.	
Drought	Prairie Provinces	1968	Cereal crop drought; severe and widespread surface water droughts.	
Drought	Prairie Provinces	1967	Cereal crop drought; extensive drought from the Peace River, Alberta, to southern Manitoba.	
Drought	Prairie Provinces	1964	Cereal crop drought; severe and widespread surface water droughts.	
Drought	Prairie Provinces	1963	Severe and widespread surface water droughts.	
Drought	Prairie Provinces	1962	Severe and widespread surface water droughts.	
Drought	Prairie Provinces	1961	One of the worst agricultural droughts to occur in the Prairies; among the most severe and widespread surface water droughts ever to occur on the Prairies; total net farm income dropped by 48 percent compared to 1960. The worst drought year this century for prairie wheat.	

Event Type	Place	Year	Description	Comments
Drought	Prairie Provinces	1960	Cereal crop drought.	
Drought	Prairie Provinces	1959	Severe and widespread surface water droughts.	
Drought	Prairie Provinces	1958	Cereal crop drought; severe and widespread surface water droughts were reported.	
Drought	Prairie Provinces	1931	1931–1938. The "dirty thirties;" dust storms, plant rust, heat waves, grasshopper plagues, and water shortages plagued western Canada for almost a decade causing immense social and economic hardship.	1,180 fatalities 250,000 relocated
Drought	Prairie Provinces	1929	Cereal crop drought.	
Drought	Prairie Provinces	1924	Cereal crop drought.	
Drought	Prairie Provinces	1920	Cereal crop drought.	
Drought	Prairie Provinces	1919	Cereal crop drought.	
Drought	Prairie Provinces	1918	Cereal crop drought.	
Drought	Prairie Provinces	1917	Cereal crop drought.	
Drought	Prairie Provinces	1914	Cereal crop drought.	
Drought	Prairie Provinces	1910	Cereal crop drought.	
Epidemic	Across Canada	2008	Listeria monocytogenes spread by contaminated Maple Leaf food products produced at its Bartor Road plant. At-risk segment of the population had most people exposed.	22 fatalities 57+ affected
Epidemic	Manitoba	1983	An encephalitis outbreak occurred.	$ 4,444,275
Epidemic	Across Canada	1953	Polio epidemic.	481 fatalities 8,000 affected
Epidemic	Across Canada	1927	Typhoid. The Canadian Red Cross assisted by donating medical supplies/money to help victims.	Unknown fatalities
Flood	Southern Manitoba	2014	After a relatively quiet spring flood season, heavy rainfall in Western Manitoba and Saskatchewan led to record flows and flooding; Up to 200 mm of rain fell in some municipalities. Over 43 local states of emergency were declared followed by a provincial state of emergency and formal request for federal assistance. 300 CAF personnel deployed from CFB Shilo to help flood recovery efforts. The Portage Diversion was opened near Portage la Prairie to direct flows from the Assiniboine river into Lake Manitoba. Over 920,000 acres of farm land went unseeded for the 2014 season, 25 percent of arable acres in Manitoba.	650 evacuated $ 1,000,000,000

Event Type	Place	Year	Description	Comments
Flood	Assiniboine, Roseau and Red Rivers, MB	2011	Flooding resulted in 32 community-declared states of emergency.	2,543 evacuated 1,547 indigenous $ 699,884,000
Flood	Southern Manitoba	2011	Extensive flooding, followed by release of a large amount of water from the Tobin Lake Dam. 42 local declared States of Emergency with 13 of these being First Nations communities. On July 9, evacuation orders were lifted for Portage La Prairie, Souris, Wawanesa, and Glenwood.	2,937 evacuated
Flood	Winnipeg, MB	2010	Heavy rains over the course of a week caused significant flooding in Winnipeg and the surrounding area. Out of the 180,000 residential properties in Winnipeg, 619 reported being flooded. As a result, 420 were damaged by overland flooding, while 199 suffered sewage backups. The province offered disaster financial assistance for the flood event alongside other events which occurred over the spring and summer.	$ 7,731,772
Flood	Selkirk, MB	2007	Ice buildup and bad weather caused the Red River to breach its banks flooding the City of Selkirk. A two-kilometre ice jam caused water levels to raise 60 cm. The subsequent flooding resulted in sewage spilling into the river and the evacuation of the Kiwanis I and II condominium buildings where 100 seniors were evacuated. In addition, numerous basements were flooded as well as the Marine Museum of Manitoba.	100 evacuated
Flood	Manitoba	2005	Severe flooding. Major problems of seepage and basement flooding, damage to municipal roads and overland flooding of agricultural lands. 44 provincial highways, over 100 municipal roads were damaged. Thirteen municipalities declared a local state of emergency; more than 100 requested disaster financial assistance.	1,197 evacuated $ 370,000,000
Flood	Red River, MB	2004	Severe flooding in the Winnipeg area of the Red River.	
Flood	South Central Manitoba	2004	A combination of spring runoff and heavy rainfall brought flooding to Manitoba's South-Central region. Some affected communities include: Pembina, Morris, Winnipeg, Selkirk, and Lac du Bonnet. States of emergency were declared in the rural municipalities of Franklin, Tache, and St. Clements. Twenty-one people were evacuated from the Dakota Plains and Peguis First Nations. More than 1,000 were evacuated when the Red River overflowed.	1,000+ evacuated $ 2,302,473

Event Type	Place	Year	Description	Comments
Flood	Southeast Manitoba	2002	Ten communities declared a state of emergency following severe flooding of homes and roads. About 240 mm of rain fell, causing the worst flooding southeast Manitoba had seen in 45 years. Levels of the Roseau River declined for a few days; however, additional flooding was expected the following week given the record water levels in the American portion of the river and the expected crest in southeast Manitoba. Residents and flood workers built dikes and laid sandbags as a preventative measure in the event of further flooding. Several roads were closed and some of these washed out or were covered with water. Crops were severely damaged because fields were submerged under water, and homes were inundated.	$ 10,376,248
Flood	Southern Manitoba	2001	Southern Manitoba suffered significant losses during spring flooding. Highway infrastructures, businesses and private and public properties were extensively damaged.	$ 16,710,626
Flood	Southern Manitoba	2000	Heavy rains occurred throughout July, washing out roads and flattening crops. Winds reached almost 125 km/h, and lightning strikes reached up to 1,000 hits an hour. The prolonged rainfall resulted in saturated soil, and overland flooding across the province with reports of flooded basements, blocked drainage systems, and backed-up sewers.	$ 2,917,561
Flood	Assiniboine, Red and Winnipeg Rivers, MB	1997	The province of Manitoba declared a state of emergency. Over 7,000 military personnel were employed for 36 days to assist in preventing flood damage and in relocating evacuees.	25,447 evacuated $ 498,513,577
Flood	Red River, Souris River, Assiniboine River, and Pembina River, MB	1996	Heavy rainfall in the winter, high soil moisture levels and an unseasonably cool spring led to flooding. Thick ice flows and flood water caused damage to bridges, telephone cables, small businesses, roads, agricultural lands, and other community infrastructure. Small communities inundated. Thousands of customers went without telephone service.	285 evacuated $ 6,816,377
Flood	Winnipeg, MB	1993	The City of Winnipeg was declared a disaster area because of flooding caused by prolonged heavy rainfall; three severe rainstorms in a five-week period caused sewer backups and other extensive damage to homes, power lines, and agricultural land infrastructure in Winnipeg and surrounding areas including Selkirk, Springfield, and Beausejour. Wettest summer in Winnipeg in 120 years.	$ 214,807,255

Event Type	Place	Year	Description	Comments
Flood	Red River Region, MB	1979	A major flood, close to flood levels of the 1950 flood, hit the Red River region; most of the damage occurred in the valley; no communities were flooded as the dykes protecting them were temporarily raised.	10,000 evacuated $ 18,557,303
Flood	Assiniboine River, MB	1976	Record flooding was reported.	$ 4,545,103
Flood	Central and Southern Manitoba	1974	Severe flooding occurred in central and southern Manitoba on practically all rivers and river systems; many people had to be evacuated; although the natural discharge of water was greater than the flood in 1966, the City of Winnipeg avoided major damage due to the Red River Floodway, the portage Diversion, and the Shellmouth Dam, which were flood control programs intentionally set-up to reduce flooding in Winnipeg.	$ 14,523,061
Flood	Winnipeg, MB	1970	Severe flooding in the Winnipeg area of the Red River.	
Flood	Winnipeg, MB	1969	Severe flooding in the Winnipeg area of the Red River.	
Flood	Winnipeg, MB	1966	Spring runoff and heavy rains caused extensive damage.	
Flood	Winnipeg, MB	1960	Severe flooding of the Red River.	
Flood	Manitoba and Saskatchewan	1955	Most damage to rural areas. Roads and bridges were washed out or damaged and sowing of fields was inhibited due to water cover.	
Flood	Winnipeg, MB	1950	Heavy rainfall caused the river to stay above flood stage for 51 days; the water reached 4.6 metres in depth in low lying areas; 5,000 buildings damaged; resulted in construction of the Red River Floodway.	1 fatality 107,000 evacuated
Flood	Winnipeg, MB	1923	Severe flooding in the Winnipeg area of the Assiniboine River.	
Flood	Winnipeg, MB	1916	Severe flooding in the Winnipeg area of the Red River.	
Heat Event	Ontario and Manitoba	1988	Six afternoon highs >35°C; air pollution levels soared, power and water consumption soared to record levels. Rotating black-outs eased the power drain with the potential of a complete power failure. Ice companies were overwhelmed with order and quickly sold out. Great Lakes water levels the lowest in more than a decade, with an expected further drop of 12.5 cm.	14 fatalities $100,000,000
Heat Event	Across Canada	1936	A two-week heat wave; greater than 32°C in western and central Canada; from southern Saskatchewan to the Ottawa Valley temperatures were higher than 32°C for one and a half weeks.	1,180 fatalities
Pandemic	Across Canada	2009	A new strain of pandemic influenza. The first cases seen in Mexico; spread quickly across the globe.	425 fatalities 8,582 hospitalized

Event Type	Place	Year	Description	Comments
Pandemic	Across Canada	1918	More than 50,000 dead, two million affected; as part of a world-wide outbreak, Spanish Influenza hit Canadians hard, affecting more than one quarter of the population. The Canadian Red Cross assisted 230 communities in 1918.	50,000 fatalities 2 MM affected
Storm	Prairie Provinces	2016	Southern regions of the Prairie provinces were overwhelmed by severe storms after weeks of bad weather. A storm system entered northward into southern Alberta with hail, heavy rain, and strong winds as well as tornado warning; the storm system moved across Saskatchewan and Manitoba producing softball-sized hail and tornados.	
Storm	Prairie Provinces	2016	Severe storms swept through the Prairies, with hail, heavy rain, and flash flooding. Up to 130 mm of rain fell in Estevan Saskatchewan, causing significant flooding and reports of numerous funnel clouds. The storm dropped over 88 mm of rain and hail in other places, with strong winds with gusts over 100 km/h and lightning; causing power outages, and severe infrastructure damage.	
Storm	Prairie Provinces	2016	Multiple thunderstorms hit as a warm front moved into the prairies with hail, heavy rain, flooding, strong winds, tornados, and lightning. Two house fires after lightning strikes.	
Storm	Alberta, Saskatchewan, Manitoba and Ontario	2016	Widespread and severe thunderstorms caused heavy rain, strong winds, hail, and lighting, uprooted trees downed power lines, flooded roads, homes, and businesses.	
Storm	Prairie Provinces	2015	A massive storm system moved through the prairies causing severe thunderstorms, hail, and strong winds and extensive damage.	
Storm	Southern Manitoba	2015	A low-pressure system moved north into Manitoba and merged with an Artic front to create a storm that produced strong winds, heavy rain, ice pellets, snow, and hail. 5,000 people lost power; there was flooding in agricultural lands and sewage backups in Winnipeg.	
Storm	South-Central Manitoba	2008	Manitoba experienced damaging winds that caused extensive impacts to the public-sector drainage system across a wide area.	$ 314,496
Storm	Winnipeg and Steinbach, MB	2009	Powerful thunderstorms, spectacular lightning strikes, and baseball-sized hail hammered a wide area. More than 7,000 instances of damage to houses and vehicles were reported, and losses ranged between $50–75 million. The storm also knocked out power to approximately 4,000 homes.	$ 50,000,000
Storm	Winnipeg, MB	1996	Gale force winds, torrential rains, funnel clouds, one tornado, and tennis ball-sized hailstones caused significant crop damage and property damage.	$105,000,000

Event Type	Place	Year	Description	Comments
Storm	Southern Alberta	1995	No additional data provided	$ 28,103,000
Storm	Southern Manitoba	1995	No additional data provided	$ 9,018,000
Storm	Southern Manitoba	1994	No additional data provided	$ 14,196,201
Storm	Southwestern Manitoba	1984	Hailstorm caused significant damage.	1,000 affected $ 3,189,873
Storm	Southern Manitoba	1994	No additional data provided	$ 9,074,000
Storm	Southern Manitoba	1984	Severe rainstorms with hail, thunder, and lightning, and tornadoes. Extensive crop damage and flooding.	$ 1,656,780
Storm	Winnipeg, MB	1978	No additional data provided	
Tornado	Winnipeg, MB	2008	Wind caused havoc across Winnipeg and eastern Manitoba, including one area that may have been hit by a tornado. Up to 5,000 homes lost power.	
Tornado	Winnipeg, MB	1987	A thunderstorm with at least two tornadoes, strong winds; and 40 mm of rain in 2-1/2 hours caused flash flooding and considerable property damage.	
Tornado	Amaranth, MB	1958	No additional data provided	
Tornado	Portage la Prairie, MB	1922	No additional data provided	5 fatalities
Wildfire	Vita, MB	2012	High winds and extremely dry conditions forced immediate evacuations; three homes and one bridge were destroyed.	420 evacuated
Wildfire	South Indian Lake, MB	2007	Mostly in northern Manitoba, over 250 wildfires burned 147,473 hectares of land in 2007. The largest fire burned 85,000 hectares near South Indian Lake. Numerous communities were in danger and had to be evacuated. 450 firefighters, 27 helicopters, nine water bombers, and five firefighting crews from British Columbia assisted local firefighters.	963 evacuated
Wildfire	Manitoba	2003	The province of Manitoba experienced 1,148 wildfires during the 2003 season. Initial fire was caused by a lightning strike near Thompson	1,642 evacuated $5,286,253
Wildfire	East of Lake Winnipeg, MB	1999	Forests in Ontario and Manitoba were consumed by this event.	
Winter Storm	Winnipeg, MB	1986	A major storm dumped 30 cm of snow on Winnipeg; winds gusting to 90 km/h produced severe blowing snow and zero visibility	2 fatalities
Winter Storm	South, Central, and Western Manitoba	1984	Snow, freezing rain, and strong wind gusts caused damage to roads, hydro poles, and drainage facilities.	$ 2,686,465

Event Type	Place	Year	Description	Comments
Winter Storm	Prairie Provinces	1983	Storm forced Winnipeg International Airport to close for two days, toppled television towers. Freezing rain caused other extensive damage.	
Winter Storm	Winnipeg, MB	1966	A storm brought 35 cm of snow and 120 km/h winds, paralysing the city for two days.	
Winter Storm	Southern Prairies	1964	Referred to as the "Great Blizzard," it produced heavy snows, 90 km/h winds, -34°C temperatures; thousands of animals died.	3 fatalities
Winter Storm	Prairie Provinces	1941	A severe blizzard producing a storm called an "Alberta Low," lasted 7 hours and produced winds exceeding 100 km/h.	76 fatalities
Winter Storm	Manitoba	1935	Record snowfall reached 51.8 cm.	

APPENDIX C—COMMUNITY RISK ANALYSIS AND STANDARD OF COVERAGE CHECKLIST

This appendix is included to assist those departments that are seeking accreditation through the Center for Public Safety Excellence and the Commission on Fire Accreditation International.[87, 88]

Figure 137: Documentation of Area Characteristics

Documentation of Area Characteristics				
Criterion	**CC**	**Description**	**Complete**	**Date of Completion**
2A.1		Service area boundaries for the agency are identified, documented, and legally adopted by the authority having jurisdiction.		
2A.2		Boundaries for other service responsibility areas, such as automatic aid, mutual aid, and contract areas, are identified, documented, and appropriately approved by the authority having jurisdiction.		
2A.3	*	**The agency has a documented and adopted methodology for organizing the response area(s) into geographical planning zones.**		
2A.4	*	**The agency assesses the community by planning zone and considers the population density within planning zones and population areas, as applicable, for the purpose of developing total response time standards.**		
2A.5		Data that includes property, life, injury, environmental, and other associated losses, as well as the human and physical assets preserved and or saved, are recorded for a minimum of three (initial accreditation agencies) to five (currently accredited agencies) immediately previous years.		
2A.6		The agency utilizes its adopted planning zone methodology to identify response area characteristics such as population, transportation systems, area land use, topography, geography, geology, physiography, climate, hazards and risks, and service provision capability demands.		
2A.7		Significant socio-economic and demographic characteristics for the response area are identified, such as key employment types and centers, assessed values, blighted areas, and population earning characteristics.		

87 Source: Community Risk Assessment: Standards of Cover, 6th Edition, Center of Public Safety Excellence, 2016.
88 Source: Fire and Emergency Service Self-Assessment Manual, 9th Edition, Center of Public Safety Excellence, 2015.

Documentation of Area Characteristics				
Criterion	CC	Description	Complete	Date of Completion
2A.8		The agency identifies and documents all safety and remediation programs, such as fire prevention, public education, injury prevention, public health, and other similar programs, currently active within the response area.		
2A.9		The agency identifies critical infrastructure within the planning zones.		
2B.1	*	**The agency has a documented and adopted methodology for identifying, assessing, categorizing, and classifying risks throughout the community or area of responsibility.**		
2B.2		The historical emergency and non-emergency service demands frequency for a minimum of three immediately previous years and the future probability of emergency and non-emergency service demands, by service type, have been identified and documented by planning zone.		
2B.3		Event consequence loss and save data that includes property, life, injury, environmental, and other losses and saves are assessed for three (initial accreditation agencies) to five (currently accredited agencies) immediately previous years.		
2B.4	*	**The agency's risk identification, analysis, categorization, and classification methodology has been utilized to determine and document the different categories and classes of risks within each planning zone.**		
2B.5		Fire protection and detection systems are incorporated into the risk analysis.		
2B.6		The agency assesses critical infrastructure within the planning zones for capabilities and capacities to meet the demands posed by the risks.		
2C.1	*	**Given the levels of risks, area of responsibility, demographics, and socio-economic factors, the agency has determined, documented, and adopted a methodology for the consistent provision of service levels in all service program areas through response coverage strategies.**		

Documentation of Area Characteristics				
Criterion	**CC**	**Description**	**Complete**	**Date of Completion**
2C.2	*	**The agency has a documented and adopted methodology for monitoring its quality of emergency response performance for each service type within each planning zone and total response area.**		
2C.3		Fire protection systems and detection systems are identified and considered in the development of appropriate response strategies.		
2C.4	*	**A critical task analysis of each risk category and risk class has been conducted to determine the first-due and effective response force capabilities, and a process is in place to validate and document the results.**		
2C.5	*	**The agency has identified the total response time components for delivery of services in each service program area and found those services consistent and reliable within the entire response area.**		
2C.6		The agency has identified the total response time components for delivery of services in each service program area and assessed those services in each planning zone.		
2C.7	*	**The agency has identified efforts to maintain and improve its performance in the delivery of its emergency services for the past three (initial accreditation agencies) to five (currently accredited agencies) immediately previous years.**		
2C.8		The agency's resiliency has been assessed through its deployment policies, procedures, and practices.		
2D.1	*	**The agency has documented and adopted methodology for assessing performance adequacies, consistencies, reliabilities, resiliencies, and opportunities for improvement for the total response area.**		
2D.2		The agency continuously monitors, assesses, and internally reports, at least quarterly, on the ability of the existing delivery system to meet expected outcomes and identifies the remedial actions most in need of attention.		

Documentation of Area Characteristics				
Criterion	CC	Description	Complete	Date of Completion
2D.3	*	**The performance monitoring methodology identifies, at least annually, future external influences, altering conditions, growth and development trends, and new or changing risks, for purposes of analyzing the balance of service capabilities with new conditions or demands.**		
2D.4		The performance monitoring methodology supports the annual assessment of the efficiency and effectiveness of each service program at least annually in relation to industry research.		
2D.5		Impacts of incident mitigation program efforts, (such as community risk reduction, public education, and community service programs), are considered and assessed in the monitoring process.		
2D.6	*	**Performance gaps for the total response area, such as inadequacies, inconsistencies, and negative trends, are determined at least annually.**		
2D.7	*	**The agency has systematically developed a continuous improvement plan that details actions to be taken within an identified timeframe to address existing gaps and variations.**		
2D.8		On at least an annual basis, the agency formally notifies the authority having jurisdiction (AHJ) of any gaps in the operational capabilities and capacity of its current delivery system to mitigate the identified risks within its service area, as identified in its standards of cover.		
2D.9		On at least an annual basis, the agency formally notifies the AHJ of any gaps between current capabilities, capacity, and the level of service approved by the AHJ.		
2D.10		The agency interacts with external stakeholders and the AHJ at least once every three years, to determine the stakeholders' and AHJ's expectations for types and levels of services provided by the agency.		