DILLON CONSULTING

Corporation of the City of Oshawa

Community Risk Assessment

2022 Update

October 2022 – 21-2856

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1.0 Introduction

This Community Risk Assessment (CRA) has been developed for the City of Oshawa to comply with **Ontario Regulation 378/18: Community Risk Assessments (O. Reg. 378/18)**. O. Reg. 378/18 was made under the authority of the Fire Protection and Prevention Act, 1997 (FPPA) and came into effect on July 1, 2019. It requires all municipalities in Ontario to develop a CRA prior to July 1, 2024. This regulation also requires municipalities to **"use its community risk assessment to inform decisions about the provisions of fire protection services"[1].** The original CRA, completed in November 2020, was included as an appendix to the City's Fire Master Plan as a companion document. The 2020 CRA was reviewed and updated in 2022 to prepare this version of the CRA as a stand-alone document. The revisions made to the CRA during the 2022 update are denoted with **this colour of text**. The City of Oshawa is dedicated to sustaining compliance with O. Reg. 378/18 by conducting annual reviews of the CRA and updating the document when necessary, and formally at least every five years.

In addition to this CRA, the FPPA requires that municipalities must provide fire protection programs that "**must include public education with respect to fire safety and certain components of fire prevention, and provide such other fire protection services as it determines may be necessary in accordance with its needs and circumstances"[2]**. The recent introduction of O. Reg. 378/18 is now a core component of developing an in-depth analysis of a community's fire related risks through a comprehensive analysis of nine mandatory profiles.

The FPPA also assigns duties to the Office of the Fire Marshal (OFM) to **"advise municipalities in the interpretation and enforcement of this Act and the regulations"[3]**. The OFM has developed Technical Guideline-02-2019 (TG-02-2019), revised in February 2022, to assist municipalities and fire departments in the process to develop a CRA and to utilize the completed CRA to inform the municipality's decisions with regard to complying with the FPPA.

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[1] Ontario Regulation 378/18: Community Risk Assessments, Mandatory Use, Section 1 (b).
[2] Fire Protection and Prevention Act, 1997 Part II Responsibility for Fire Protection Services, Section 2.1 (a) (b).
[3] Fire Protection and Prevention Act, 1997, Part III Fire Marshal, Section 9.2(b).

At a minimum, the regulation outlines a standard set of information profiles that must be considered when conducting a community risk assessment. The Guideline provides suggestions for recording and analyzing the data/information and provides sample worksheets to assist municipalities. A leading practice in Ontario would see the City of Oshawa's Community Risk Assessment report maintained as a living document by the Oshawa Fire Services. This would include regular (e.g. annual) reviews and updates to the CRA's data and information. Through the 2022 update of CRA, the City is applying this leading practice.

The methodology and analysis used to develop this CRA has been directly informed by TG-02-2019 that recognizes the value of understanding the fire risk within a community, and the importance of developing fire risk reduction and mitigation strategies in addition to providing fire suppression services.

1.1 Methodology

In addition to TG-02-2019, the methodology applied to develop this CRA has been informed by other current industry standards and best practices. These include:

1. OFM Comprehensive Fire Safety Effectiveness Model: Fire Risk Sub-Model;
2. OFM Public Fire Safety Guideline (PFSG) 04-40A-03: Simplified Risk Assessment;
3. NFPA 1300, Standard on Community Risk Assessment and Community Risk Reduction Plan Development (2020 Edition);
4. NFPA 1730, Standard on Organization and Deployment of Fire Prevention Inspection and Code Enforcement, Plan Review, Investigation, and Public Education Operations (2019 Edition);
5. Vision 20/20 Community Risk Assessment: A Guide for Conducting a Community Risk Assessment (Version 1.5, 2016); and
6. Vision 20/20 Community Risk Reduction Planning: A Guide for Developing a Community Risk Reduction Plan.

In our view, these documents collectively represent the most current industry best practices related to the applicable methodology and process to develop a CRA for the City of Oshawa as required by O. Reg. 378/18. The information presented within these documents is, in many cases, complementary. For example, the NFPA 1730 Standard

Community Risk Assessment Guide, Annex B is based on the OFM Public Fire Safety Guideline on Simplified Risk Assessments (04-40A-03).

The methodology presented within this CRA has also been reviewed by the OFM and the NFPA Risk Analysis Sub-Committee as part of other projects completed by Dillon Consulting Limited. This includes the Corporation of the City of Mississauga Comprehensive Community Risk Assessment.[4]

As required by O. Reg. 378/18, this CRA includes a comprehensive analysis of the nine mandatory profiles including:

- Geographic Profile
- Building Stock Profile
- Critical Infrastructure Profile
- Demographic Profile
- Public Safety and Response Profile
- Community Services Profile
- Hazard Profile
- Economic Profile
- Past Loss and Event History Profile

Within each of the nine profiles, there are a number of sub-topics examined. These sub-topics are illustrated in **Figure 1**. These profiles are based on an analysis of several sources of information, including data provided by the City of Oshawa, Oshawa Fire Services (OFS), Statistics Canada, the OFM, and desktop research.

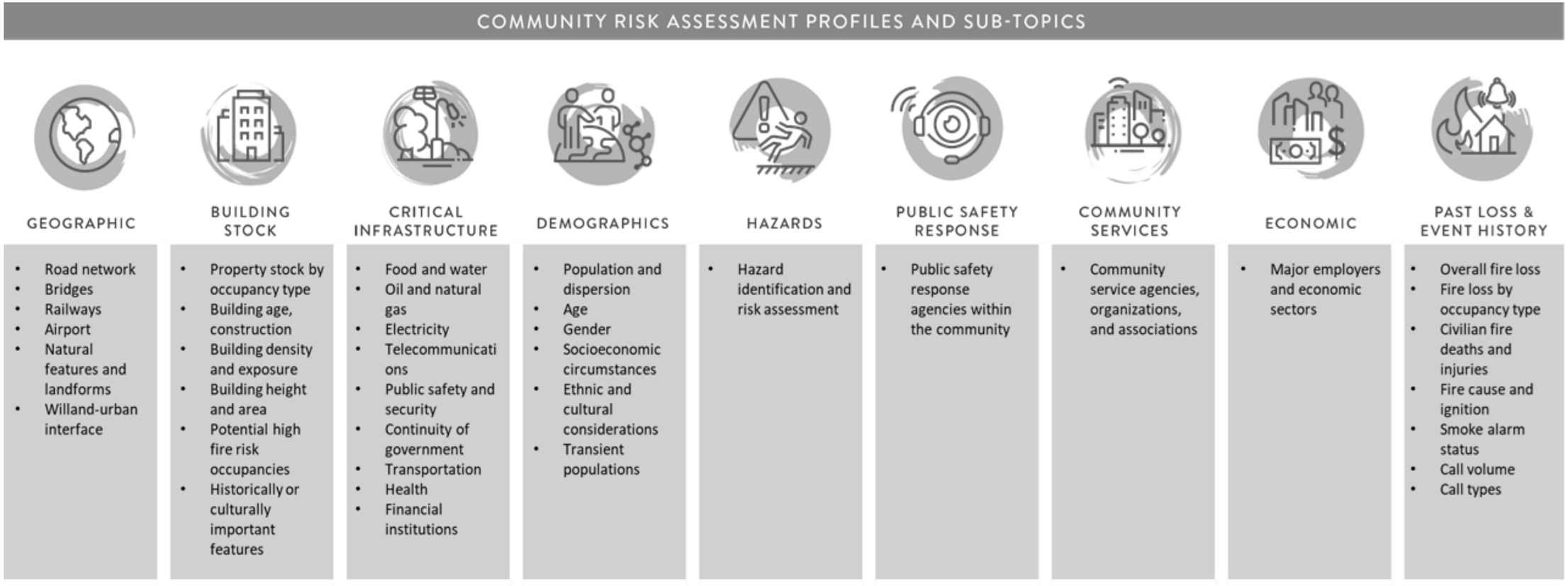
The mandatory profile analyses result in a series of risk related conclusions that will be used to inform service levels or other strategies in alignment with the three lines of defence through a risk treatment process. These are referred to as a '**key finding**' or an '**identified risk**'. Those findings referred to as an 'Identified Risk' are taken through a risk assignment process to assist with risk prioritization as referred to within TG-02-2019. In specific circumstances, being those that involve additional jurisdictional or legislative considerations, a risk-related conclusion is referred to as a Special Consideration. All risk-related conclusions will be taken through a risk treatment process

[4] OFMEM TG-02-2019 End Notes (2)

and aligned with the three lines of defence in order to inform the City's decisions regarding the provision of fire protection services.

The analysis presented within this CRA has been informed by a wide range of data sources. Where applicable all numerical data has been rounded to the nearest 1/100 (hundredths) decimal point to provide consistency in the analysis. As a result, the numerical totals presented within each analysis although presented as reflecting 100% may actually reflect a minor variance based on the use of only the nearest 1/100 (hundredths) decimal points.

Figure 1: Community Risk Assessment Profiles and Sub-Topics



2.0 Geographic Profile

As referenced in **O. Reg. 378/18**, the geographic profile assessment includes analysis of the physical features of the community, including the nature and placement of features such as highways, waterways, railways, canyons, bridges, landforms and wildland-urban interfaces. These physical features may present inherent risks or potentially have an impact on fire department access or emergency response time. The following sections consider these geographic characteristics within the City of Oshawa.

2.1 Geographical Snapshot of Oshawa

The City of Oshawa is one of eight municipalities comprising Durham Region, located east of the Greater Toronto Area, at the northwestern shoreline of Lake Ontario. It is bordered by the Municipality of Clarington to the east, the Town of Whitby to the west and the Township of Scugog to the north. The City contains major transportation corridors that facilitate the movement of commuting populations as well as a large volume of goods and products throughout the region. The land area of Oshawa represents a fire suppression response area of 145.72 square kilometres (2021 Census, Statistics Canada) and includes key natural heritage and water features including the Oak Ridges Moraine, the Oshawa Creek watershed, Lake Ontario, as well as numerous wetlands, watercourses, forests and woodlots. The City contains a Major Urban Area boundary as shown in the Schedule 'A' – Land Use of the City's Official Plan. The south half of the City is shown in **Figure 1** and the north half in **Figure 3**.

Figure 2: City of Oshawa – Schedule 'A' – Land Use – South Half

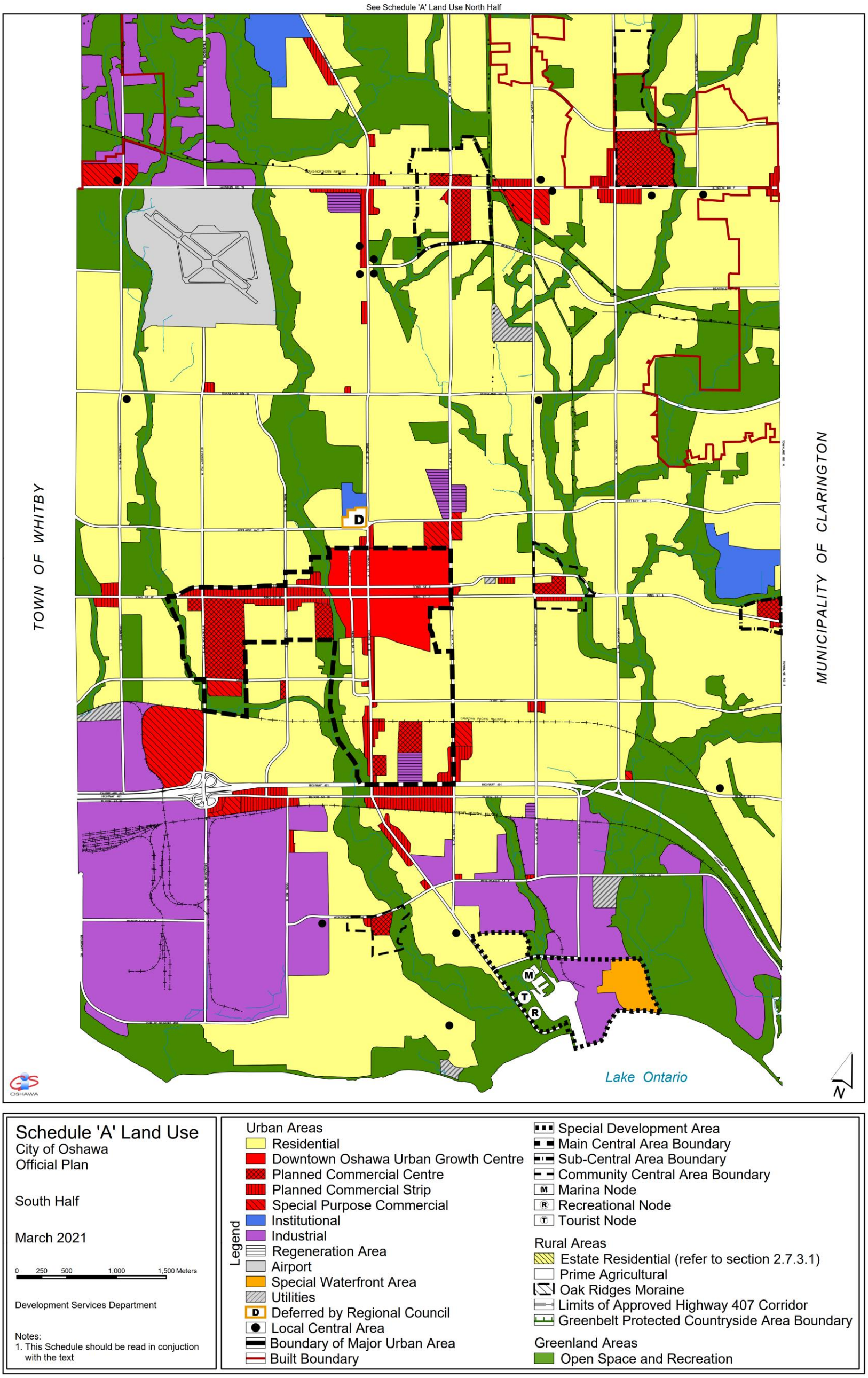


Figure Source: City of Oshawa Official Plan, Schedule 'A' Land Use (updated August 2022)

Figure 3: City of Oshawa – Schedule 'A' – Land Use – North Half

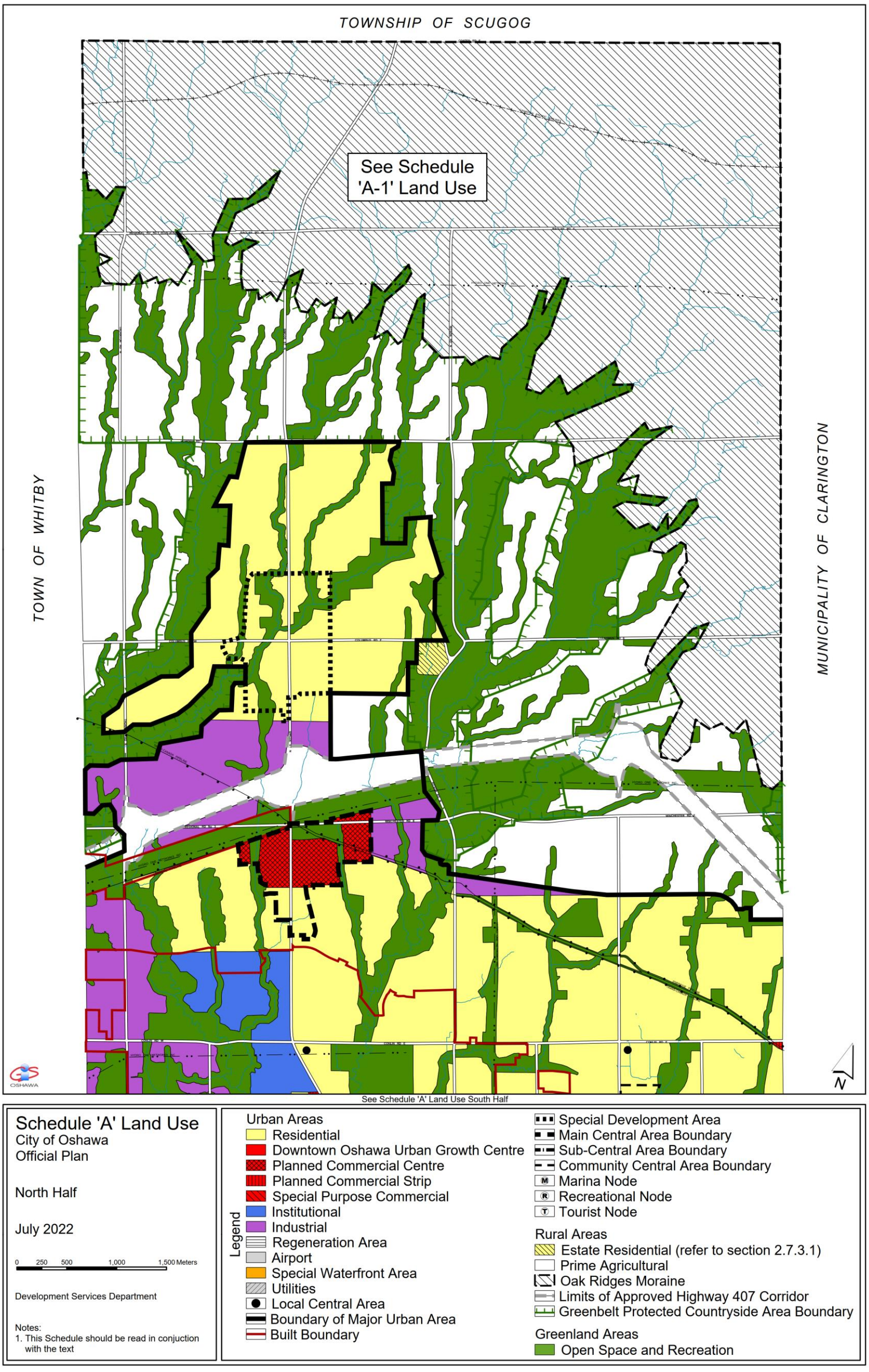


Figure Source: City of Oshawa Official Plan, Schedule 'A-1' Land Use (updated August 2022)

2.2 Roads, Transit, Bridges and Rail

2.2.1 Road Network

Road networks and transportation systems provide fire services with access throughout a community when responding to emergency calls. The road network is how fire apparatus travel through a municipality; and therefore, it is valuable to consider where there may be a lack of connectivity due to road network design as well as other natural (e.g. rivers, lakes, etc.) or human-made barriers (e.g. rail lines, traffic calming measures, etc.). Road networks can also contribute to vehicle congestion causing delays in emergency response travel times. Where possible, the City's transportation planning processes should include the OFS as a stakeholder to provide consideration to emergency services needs and challenges relating to the road network, traffic congestion, traffic calming and related topics.

Roads are also important from a risk and emergency response perspective because motor vehicle-related incidents are often a common source of emergency call volume within a municipality.

The road hierarchy of the south half of Oshawa is presented within **Figure 4** and the north half is illustrated in **Figure 5** as found within the City's Official Plan. Oshawa is well connected by a number of provincial highways, arterial roads, collector roads, and local roads. There are two provincial freeways located within the City namely: Provincial Highway 401 and Provincial Highway 407 East running east/west through the City.

Public transit in Oshawa is provided by Durham Region Transit (DRT) and GO Transit. DRT also provides transportation to the residents of Oshawa and area that have special needs or mobility issues through a specialized transit service. The existing GO Transit network in Oshawa consists of two 'mobility hubs', or major transit stations, with one located in Downtown Oshawa and the other at the Oshawa Train Station. Mobility hubs, according to Metrolinx, are points of connectivity where different modes of transportation converge, promoting mobility around concentrations of housing, employment and recreational activities.[5]

[5] Metrolinx. (n.d.). About Mobility Hubs. Retrieved from Metrolinx Website

The Oshawa Integrated Transportation Master Plan (ITMP) (2015) indicates that the City's residents will see increased amounts of congestion related to projected growth. This presents a challenge to the City that will not be eliminated through roadway expansion alone.[6] The ITMP supports the alternative that as congestion increases, the City should encourage a shift in modal split by considering supporting strategies that improve mobility options and enable residents to choose modes of travel, such as public transit, that reduce the number of vehicles on the road at any given time. This approach is also echoed in the City of Oshawa Active Transportation Plan which promotes active lifestyles opportunity while also reducing the number of vehicles on the road by making active transportation more accessible to the public. A disruption to a major roadway could cause further congestion within the City and therefore result in delayed emergency response times both within the urban and rural areas.

The road network can also contribute to emergency response call volume due to incidents involving motor-vehicle collisions and accidents. As described in **Section 10.2.2.2 – Spatial Modelling - Rescue Incidents** of this CRA, 3,765 emergency calls responded to by OFS from 2016 to 2020 pertain to motor-vehicle related incidents (vehicle collisions and vehicle extrication combined). This represents 93.8% of rescue calls and approximately 17.3% of all calls responded to by OFS during that five year period.

The presence of major highways and transportation routes have the potential for a transport incident involving dangerous goods, given the municipality's complex transportation network connecting rail, road, air and marine transportation modes. The Port of Oshawa (discussed further in **Section 2.3.1.1**) is a major gateway for the shipment of a wide range of goods including those classified by Transport Canada as dangerous goods. Due to the Port's close proximity to the provincial highway network, many of these goods are then transported by truck through Oshawa to their destination. This warrants special consideration as an accident involving the goods being transported could occur, requiring hazardous materials response from OFS.

There are also several private or restricted (e.g. gated / locked) emergency access routes used by fire apparatus and personnel throughout the City. However, as part of the data collection process for this CRA, it was identified that these routes are not

[6] M.M.M. Group. (2015, September). Oshawa Integrated Transportation Master Plan (PDF File). Retrieved from City of Oshawa Website

always well-maintained, especially during the winter season when they will often accumulate snow. At present, the City does not possess an inventory of these emergency access routes or the maintenance schedules/capacity of site owners or developers. The development of such an inventory would benefit the OFS when attempting to access sites that are not accessible via the regular road network.

Identified Risk: Increasing traffic congestion on the existing road network presents the potential for a delay in emergency response times.

Identified Risk: Motor vehicle-related incidents on the existing road network represent 17.3% (3,765) of the historical emergency responses of the Oshawa Fire Services.

Key Finding: There are several private or restricted (e.g. gated / locked) emergency access routes located throughout the City used by fire apparatus. It was identified that these routes are not always well-maintained and currently, the City does not possess an inventory of these emergency access routes.

Figure 4: City of Oshawa Road Network – South Half

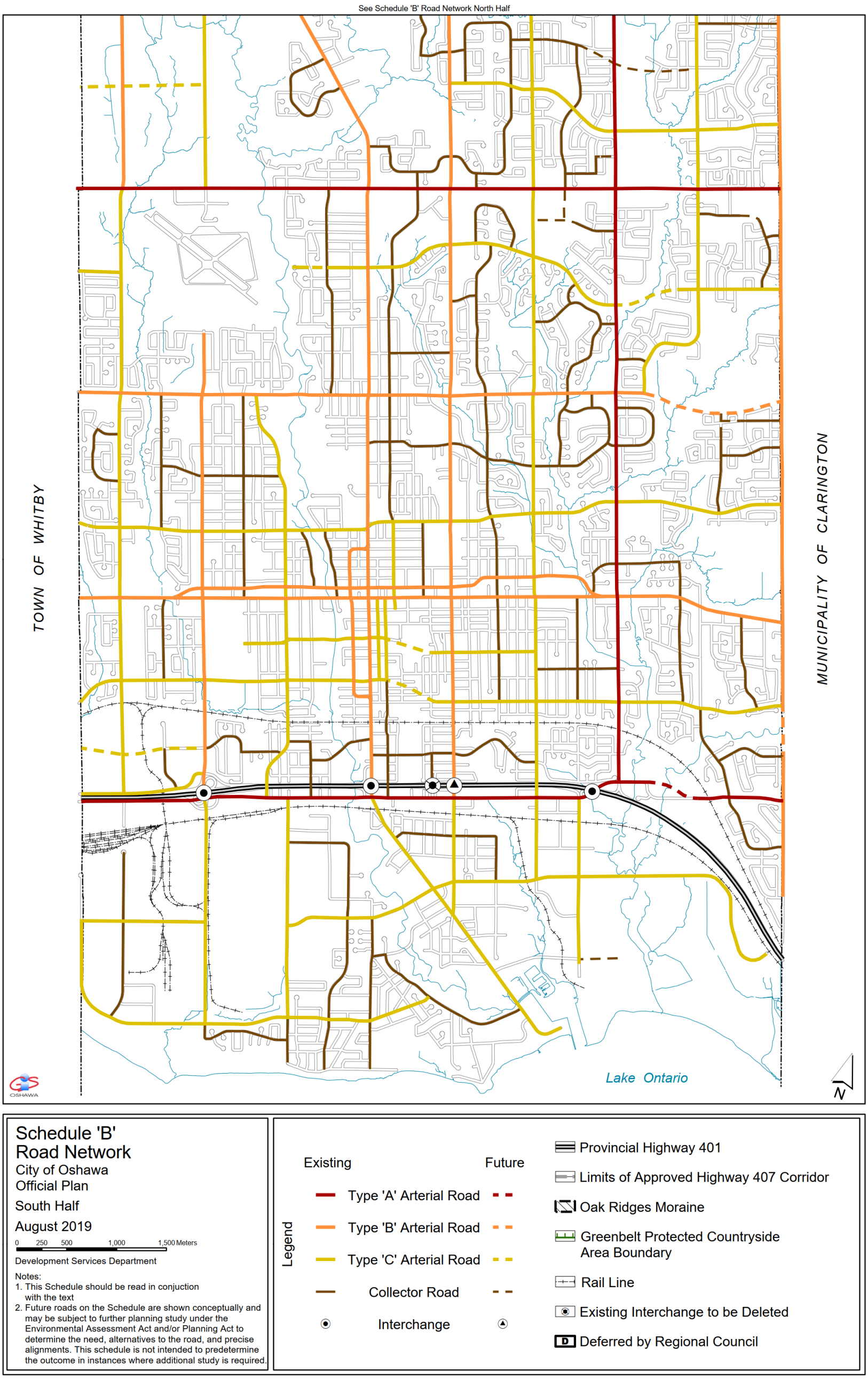


Figure Source: City of Oshawa Official Plan, Schedule 'B' Road Network (updated August 2022)

Figure 5: City of Oshawa Road Network – North Half

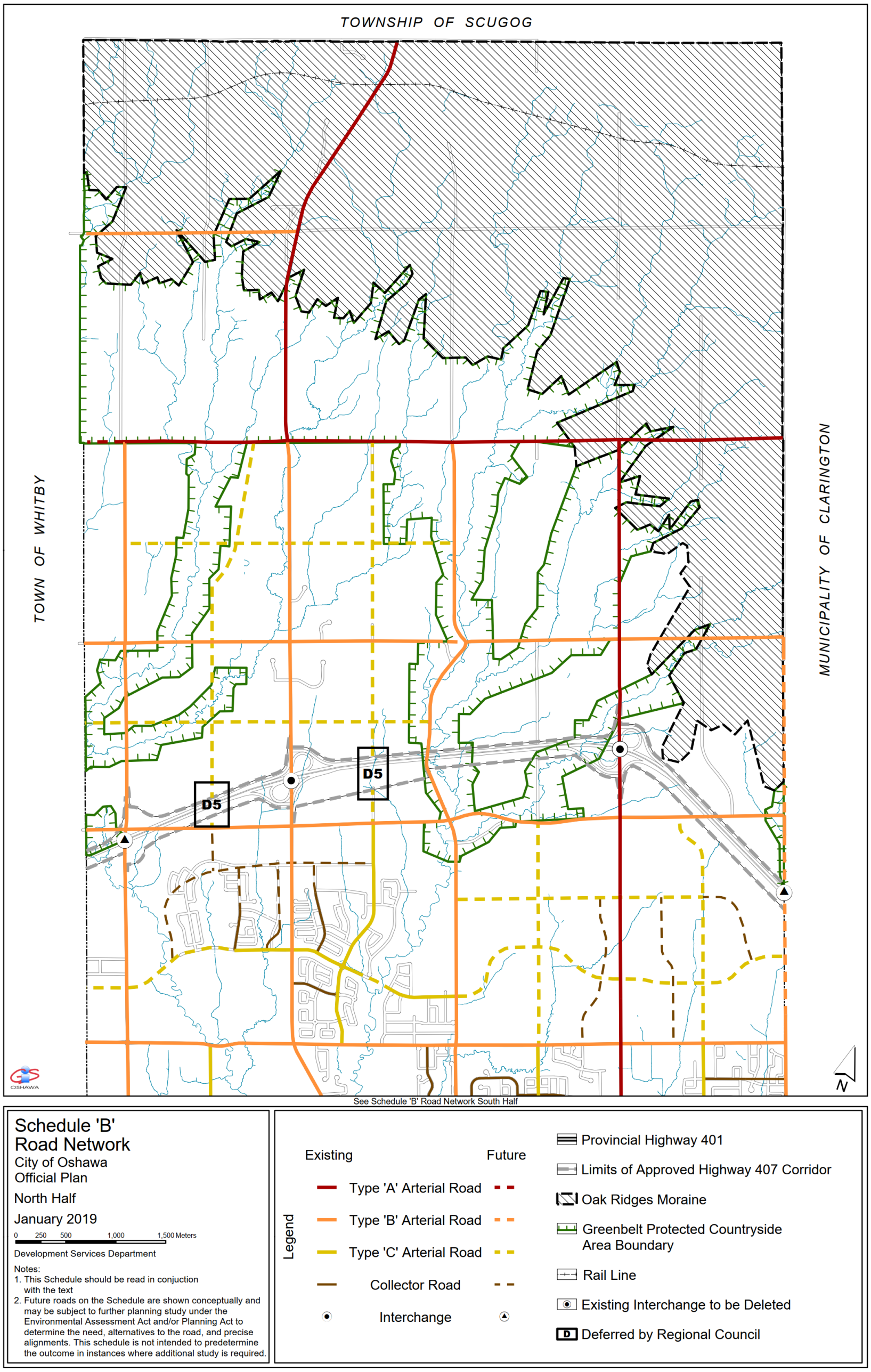


Figure Source: City of Oshawa Official Plan, Schedule 'B' Road Network (updated August 2022

2.2.2 Bridges

Bridges are considered within a CRA for two main considerations: the potential for crossing restrictions for fire apparatus due to weight (i.e. load restrictions); and potential for impact on road network connectivity in the event that a bridge is out of service.

There are several bridges across the City which overpass rail lines, roads, or water features. Based on a desktop review, it appears that there is a potential for the road connectivity to be impacted should one or more of these bridges be rendered out of service. This could result in the potential for delays in emergency response times.

As part of the review for this CRA, it was identified that there is an existing load restriction on the Albert Street Bridge, located on Albert Street north of Provincial Highway 401, and west of Ritson Road South. The bridge is constructed of wood panels preventing fire apparatus from crossing this bridge, which may affect OFS emergency response travel times to surrounding neighbourhoods.

Key Finding: Bridges, with restrictions or closures, have the potential to reduce the connectivity of the City's road network resulting in the potential for delays in emergency response times.

2.2.3 Rail

Within Oshawa, there are three rail lines running east/west through the City, one in the northern half and two in the southern half of Oshawa. The Canadian Pacific Railway (CP) operates the rail line in the north end of Oshawa, connecting Toronto to Peterborough, while both CP and the Canadian National Railway Company (CN) offer freight services and operate switching facilities on separate rails line north and south of Highway 401, respectively in the City's southern half.[7] Passenger rail service is provided by VIA Rail Canada and GO Transit south of Highway 401. An announcement by the Province in February 2020 confirmed the expansion of the GO Train with service to Bowmanville with a plan for two additional stations in Oshawa.[8]

Rail lines are considered in this CRA for a few key reasons related to emergency services. The potential for a rail-based transportation incident is a relevant

[7] City of Oshawa. (n.d.). Transportation Logistics. Retrieved from City of Oshawa Website
[8] Municipality of Clarington. (n.d.). GO East Clarington. Retrieved from Municipality of Clarington GO East Clarington Page

consideration, as a derailment or accident involving dangerous goods transport has the potential to occur. An event such as this would require specialized emergency response. At this time, OFS is provided detailed confidential information (via the Fire Chief) by both CN and CP as to the contents of their rail containers which pass through City boundaries. Information sharing practices such as this ensures that OFS can provide informed and appropriate response to incidents involving the release of dangerous goods. Also, the physical barrier created by the rail infrastructure itself, such as a rail yards or the placement of rail infrastructure (e.g. tracks, grade separations, grade level crossings, etc.) within and throughout a municipality can impact emergency services travel and overall emergency response times.

At-grade rail crossings (an intersection at which a road crosses a rail line at the same level) can create delays in emergency response by inhibiting emergency response vehicles and apparatus from accessing a road. Desktop research indicates there are eight at-grade rail crossings throughout the City. At-grade rail crossings can be found in both the urban and rural areas including in the following locations:

- Wilson Road South, south of Bloor Street East
- Thornton Road South, south of Gibb Street
- Bloor Street East, west of Grandview Street South
- Wentworth Street East, west of Wilson Road South
- Thornton Road North, south of Coates Road West
- Stevenson Road North, south of Coates Road West
- Ritson Road North, south of Coates Road East; and,
- Harmony Road North, south of Coates Road East

The locations of these grade level crossings are further illustrated in **Figure 6**.

Figure 6: At-Grade Rail Crossings

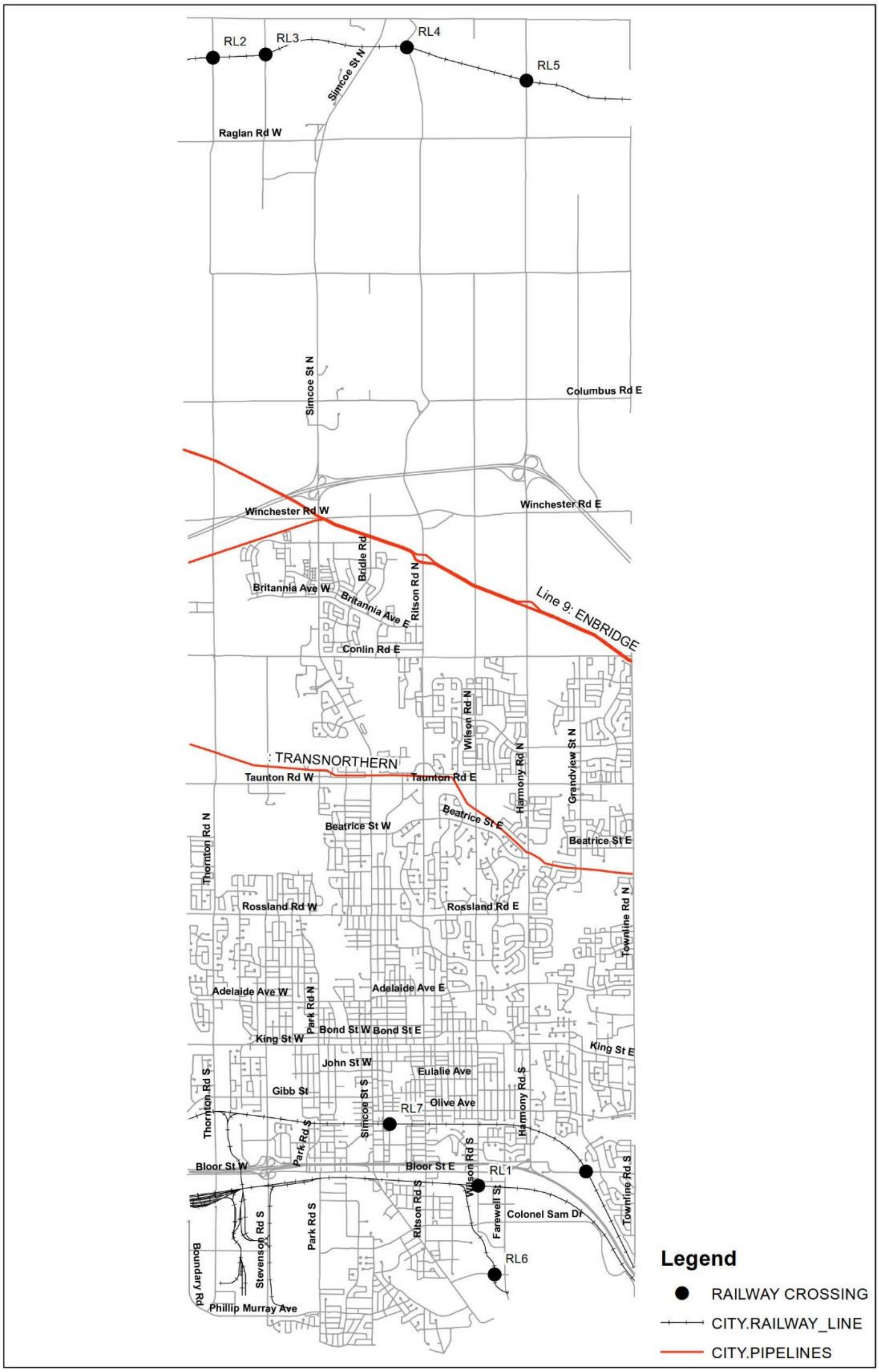


Figure Source: City of Oshawa

Key Finding: Grade level rail crossings could create a physical barrier to the connectivity of the City's road network that can potentially result in a delays in emergency response times.

2.3 Waterways and Conservation Areas

2.3.1 Waterways

Waterways are important from a risk perspective, in part, due to the recreational activities that take place in these settings and the natural hazards that they present, which could require specialized technical rescue emergency responses. There may also be natural hazards, such as flooding, associated with waterways.

The City of Oshawa is situated on the northwestern shoreline of Lake Ontario with a waterfront that supports the Port of Oshawa, and other marine activities. The Oshawa Creek Watershed, which encompasses the Montgomery Creek and Goodman Creek subwatersheds and the Black/Harmony/Farewell watershed, extends from the Oak Ridges Moraine to Lake Ontario at the Port of Oshawa. It traverses the City of Oshawa but also flows throughout parts of the Municipality of Clarington, Town of Whitby, and the Township of Scugog.[9]

The City of Oshawa lists creek flooding as one of its most common forms of flooding[10] which can present a potential risk to local residents. Creeks and rivers are also a risk consideration during the winter months, as the frozen streams and rivers can be associated with emergency incidents requiring ice rescue services.

All watershed resources in Oshawa are closely monitored by the Central Lake Ontario Conservation Authority (CLOCA). CLOCA is responsible for monitoring stream flow, lake and river water levels, ice conditions, ground saturation levels. CLOCA also distributes flood and water quality warnings to local municipalities and agencies as needed.

Identified Risk: The presence of waterways within the City of Oshawa creates a potential need for specialized technical ice and water rescue services.

[9] Central Lake Ontario Conservation. (2013, February). Oshawa Creek Watershed Plan (PDF File). Retrieved from Central Lake Ontario Conservation Watershed Plans Page.
[10] City of Oshawa. (nd). Flooding. Retrieved from City of Oshawa Website

2.3.1.1 The Port of Oshawa

The Port of Oshawa is a deep-sea port connecting Durham Region to major economic markets worldwide via the Great Lakes St. Lawrence Seaway System. It is a major driver of the local economy in Oshawa generating 6 million dollars annually in federal and provincial taxes and securing close to 300 jobs.[11] The port's loading dock is conveniently located two kilometres from Highway 401 and in close proximity to other modes of circulation and distribution, including the Oshawa Executive Airport and CN and CP operated rail lines. Over the past decade, the port has handled more than three million metric tonnes of cargo and averages 23 million dollars' worth of cargo on an annual basis.[12] Types of cargo shipped annually include, but are not limited to, a wide range of agricultural products such as liquid asphalt, calcium chloride, potash, road salt and cement.

Like any major port centre, goods delivered by vessel can contain dangerous goods in addition to ordinary goods. In Canada, regulations made under the Canada Shipping Act or under the Transportation of Dangerous Goods Act apply to the movement of dangerous goods. With respect to the movement of dangerous goods, the Hamilton Oshawa Port authority, in conjunction with Transport Canada, are responsible for the inspection of any and all sea containers registered as holding these types of materials. Close monitoring of dangerous goods by these agencies is a significant factor in the prevention of dangerous goods incidents that could be harmful to human health, safety, property and the environment. Unlike the transport of goods by rail, the fire department is not typically provided with key information as to the types and quantities of dangerous goods passing through the port. Access to this type of pertinent information would assist the department in delivering the appropriate response to incidents involving dangerous goods at the Port of Oshawa.

In addition to the presence of dangerous goods, there are other safety considerations at the port that OFS would need to be aware of prior to accessing the site (e.g. steel beams, overhanging wires, etc.). Pre-incident planning at this site by Oshawa Fire Services would facilitate building familiarization with the port and its complexities in the instance of a fire or dangerous goods related incident prompting specialized emergency

[11] Hamilton Oshawa Port Authority. (n.d.). Oshawa Facts and Stats. Retrieved from Port Authority Website
[12] Ibid.

response. Pre-incident planning is discussed in greater depth within the 2020 Fire Master Plan.

The City of Oshawa currently holds an agreement with the Oshawa Harbour Commission (OHC) for the purpose of facilitating and promoting cooperation between the two parties and establishing an ongoing interface between them with the intention to resolve issues and achieve the greatest degree of compatibility. It is important that the City of Oshawa and the OHC continue to strive towards cultivating a cooperative relationship to promote the ongoing safety of residents of the City of Oshawa and its first responders.

Special Consideration: Activities at the Port of Oshawa have been identified as including the potential for dangerous goods transportation that may present a risk to the community.

2.3.2 Conservation Areas

There are four conservation areas in the City of Oshawa: Purple Woods Conservation Area, Cedar Valley Conservation Area, Harmony Valley Conservation Area, and Oshawa Valleylands Conservation Area. Conservation areas are typically included in the assessment of community risk due to the activities that take place within them which may require specialized rescue services. For example, the presence of an escarpment might facilitate activities such as rock climbing that could, at some point, require high angle rescue from fire service personnel. Conservation areas and landforms covering a large area, with few internal roadways, also have the potential to impact emergency response times, as they may require emergency vehicles to travel longer distances around them.

The McLaughlin Bay Wildlife Reserve, located adjacent to Lake Ontario is open to the public, offering outdoor recreational activities such as hiking and canoeing in the warmer months and cross-country skiing and skating during winter. The presence of water activities necessitates consideration of water-related hazards. Waterways are discussed further in **Section 2.3.1.**

2.4 Wildland-Urban Interface

NFPA 1730 identifies wildland-urban interface as geography-based risk for consideration. This interface refers to the area of transition between unoccupied land and human development. This transition area can be comprised of a mix of woodlots, bush or grass.

Many residential neighbourhoods in Oshawa are located adjacent to wildland areas, specifically in the northern half of the City.

However, based on review of fire loss data for the City for the period of 2016 to 2020, there were only 13 outdoor fires. There does not appear to be a high risk of wildfire in the City of Oshawa.

3.0 Building Stock Profile

As referenced in **O. Reg. 378/18**, the building stock profile assessment includes analysis of the types and uses of the building stock within the municipality. Important considerations include the number of buildings of each type, the number of buildings of each use and any building-related risks known to the fire service. There are potential fire risks associated with different types or uses of buildings given the presence or absence of fire safety systems and equipment at the time of construction and maintenance thereafter. This section considers these building characteristics within the City of Oshawa.

3.1 Ontario Building Code Occupancy Classifications

OFM TG-02-2019 encourages fire departments to consider the potential fire related risks associated with different building occupancy types and building uses. This includes consideration of their prevalence within a community and the presence of fire and life safety systems and equipment. The Ontario Building Code (OBC) categorizes buildings by major occupancy classification to distinguish it from other occupancy classifications. Utilizing the OBC major building occupancy classifications is consistent with the intent of TG-02-2019 to provide a recognized definition and baseline for developing a community risk assessment.

The OBC is divided into six major building occupancy classifications (groups). Within each group the occupancies are further defined by division. The OBC major classification groups and divisions are presented in **Table 1**.

Table 1: OBC Major Occupancy Classifications

Group	Division	Description of Major Occupancies
Group A	1	Assembly occupancies intended for the production and viewing of the performing arts
Group A	2	Assembly occupancies not elsewhere classified in Group A
Group A	3	Assembly occupancies of the arena type
Group A	4	Assembly occupancies in which occupants are gathered in the open air
Group B	1	Detention occupancies
Group B	2	Care and treatment occupancies
Group B	3	Care occupancies
Group C	---	Residential occupancies
Group D	---	Business and personal services occupancies
Group E	---	Mercantile occupancies
Group F	1	High-hazard industrial occupancies
Group F	2	Medium-hazard industrial occupancies
Group F	3	Low-hazard industrial occupancies

Source: Ontario Building Code[13]

3.2 OFM Fire Risk Sub-Model Occupancy Classifications

The Fire Risk Sub-model developed by the OFM utilizes the major group classifications (i.e. Group A, B, C, D, E, F), but does not use the detailed division classifications as included in the OBC. This strategy provides the ability to assess buildings within a community comparatively by major occupancy groups, thus providing a consistent and recognized definition for each major occupancy type. This strategy provides the opportunity for further analysis of a specific occupancy group. Subject to any site specific hazards or concerns, occupancies within this group can be assessed individually and then included where required within the scope of the broader Community Risk Assessment. The OFM Fire Risk Sub-Model OBC classifications, definitions and associated fire related risks are presented in **Table 2** along with potential proactive measures to reduce risk within these occupancy types.

[13] Ontario Regulation 332/12: Building Code, Part III Fire Protection, Occupant Safety and Accessibility, Section 3.1.2.1.

Table 2: OFM Fire Risk Sub-Model Major Building Classifications

OBC Occupancy Classification	OFM Fire Risk Sub-Model Major Building Classifications	OFM Definitions	OFM Fire Related Risks	Proactive Measures for Reducing Risk
Group A	Assembly Occupancies	An assembly occupancy is defined as one that is used by a gathering of persons for civic, political, travel, religious, social, educational, recreational or like purposes or for the consumption of food or drink.	Assembly buildings are often occupied by a large number of people and may contain high quantities of combustible furnishings and decorations. Occupants are generally unfamiliar with the building's exit locations and may not know how to react in the event of an emergency. Low light conditions are inherent to some of these occupancies and can contribute to occupant confusion during an evacuation. Numerous examples exist of disastrous events that have occurred throughout the world, resulting in multiple fire fatalities in these occupancies. Therefore, these facilities warrant special attention. Accordingly, it is paramount to ensure that maximum occupant load limits are not exceeded, detection is available, an approved fire safety plan is in place and adequate unobstructed exits/means of egress are readily available.	• Regular fire prevention inspection cycles • Automatic fire detection and monitoring systems • Approved fire safety plan and staff training • Pre-planning by fire suppression staff
Group B	Care or Detention Occupancies	A care or detention occupancy means the occupancy or use of a building or part thereof by persons who: Are dependent on others to release security devices to permit egress; Receive special care and treatment; or Receive supervisory care.	In addition to the presence of vulnerable occupants, these occupancies may contain quantities of various flammable/combustible liquids and gases, oxidizers and combustible furnishings that will impact the intensity of the fire if one should occur. The evacuation or relocation of patients, residents or inmates to an area of refuge during an emergency poses additional challenges in these facilities. It is essential to ensure that properly trained staff is available and prepared to quickly respond according to the facility's approved fire safety plan.	• Regular fire prevention inspection cycles • Automatic fire detection and monitoring systems • Approved Fire Safety Plan and staff training • Pre-planning by fire suppression staff

OBC Occupancy Classification	OFM Fire Risk Sub-Model Major Building Classifications	OFM Definitions	OFM Fire Related Risks	Proactive Measures for Reducing Risk
Group C	Residential Occupancies	A residential occupancy is defined as one that is used by persons for whom sleeping accommodation is provided but who are not harboured or detained to receive medical care or treatment or are not involuntarily detained.	In Ontario, residential occupancies account for 70% of all structural fires and 90% of all fire deaths. Residential units that are located in multi-unit buildings, including secondary units in a house, pose additional risks due to egress and firefighting accessibility challenges.	• Home smoke alarm programs • Public education programming including home escape planning • Retro-fit and compliance inspection cycles for OFC compliance • Pre-planning by fire suppression staff • Fire Drills as required by the OFC
Group D	Business & Personal Services	A business and personal services occupancy is defined as one that is used for the transaction of business or the rendering or receiving of professional or personal services.	Many office buildings are occupied by a large number of people during business hours and contain high combustible content in the form of furnishings, paper, books, computers and other office equipment/supplies. Those that are located in a high-rise building pose additional risks due to egress and firefighting challenges.	• Regular fire prevention inspection cycles to maintain OFC compliance • Targeted fire prevention inspections for OFC retro-fit compliance • Staff training in fire prevention and evacuation procedures • Public education programs • Pre-planning by fire suppression staff
Group E	Mercantile	A mercantile occupancy is defined as one that is used for the displaying or selling of retail goods, wares or merchandise.	Larger mercantile occupancies such as department stores are generally occupied by a large number of people and contain high quantities of combustibles in the form of merchandise, furnishings and decorations. Customers may be unfamiliar with the building's exit locations and not know how to react in the event of an emergency. Additional hazards will be present in "big box" type stores that sell and store large volumes of combustible materials in bulk. These stores generally have similar properties to industrial warehouses with the additional hazard of higher number of occupants.	• Regular fire prevention inspection cycles • Automatic fire detection and monitoring systems • Approved Fire Safety Plan and staff training • Pre-planning by fire suppression staff

OBC Occupancy Classification	OFM Fire Risk Sub-Model Major Building Classifications	OFM Definitions	OFM Fire Related Risks	Proactive Measures for Reducing Risk
Group F	High/Medium/Low Hazard Industrial	An industrial occupancy is defined as one for the assembling, fabricating, manufacturing, processing, repairing or storing of goods and materials. This category is divided into low hazard (F3), medium hazard (F2) and high hazard (F1) based on its combustible content and the potential for rapid fire growth.	These occupancies constitute a special fire hazard due to their high levels of combustible, flammable or explosive content and the possible presence of oxidizing chemicals and gases. Processing and other activities that involve various ignition sources often occur in these occupancies. The lack of security during non-operational hours also makes them susceptible to incendiary type fires. Industrial fires generally involve large quantities of combustible materials and potentially result in large financial losses (e.g. building, contents) and significant damage to the community's environment and economic well-being (e.g. loss of jobs).	• Regular fire prevention inspection cycles • Staff training in fire prevention and evacuation • Public education • Pre-planning by fire suppression staff • Installation of early detection systems (e.g., fire alarm systems, heat detectors) • Installation of automatic sprinkler systems • Approved Fire Safety Plans • Preplanning by fire suppression staff • Fire extinguisher training
Other	Other Properties	Not Applicable	Not Applicable	• In addition to gathering information on building related risks, attention should also be given to other property types, particularly those that contain large quantities of combustible materials. Propane storage facilities, outdoor tire storage yards, grasslands/forests, plastic recycling depots are examples of properties that could severely impact a community and its environment if involved in a fire. Major highways and railway lines used to transport high volumes of traffic and perhaps large quantities of hazardous chemicals also warrant serious consideration.

Source: OFM Fire Risk Sub-Model[14]

[14] Office of the Fire Marshall and Emergency Management. (2016, February). Comprehensive Fire Safety Effectiveness Model: Fire Risk Sub-Model.

3.2.1 City of Oshawa Existing Major Building Classification Summary

Analysis of the City of Oshawa's existing major building occupancy types was conducted through a review of the Municipal Property Assessment Corporation (MPAC) property data as provided by the City of Oshawa. In comparison to Statistics Canada 2016 Census data, a discrepancy was identified related to residential dwellings which can be attributed to individual condominium units versus apartment buildings being assessed for property tax purposes. **Table 3** illustrates a summary of the City's existing major building occupancy classifications.

As shown, the majority of the City's existing property stock is comprised of Group C - Residential Occupancies (93.08%) represented by 52,578 residential property parcels. The second largest occupancy type within the City is Group F –Industrial Occupancies (combined Low [0.04%], Medium [0.95%] and High Hazard [0.02%]) accounting for 1.01% of the City's property stock. There is also a comparatively small number of Group A – Assembly Occupancies (262), Group E – Mercantile (439) and Group D – Business (226) and a small number of mixed use Group E/D property parcels (39). Vacant buildings comprise 4.14% of the building stock.

In addition, there are a number of parcels that are classified as farms under the National Farm Building code and some that are vacant or open space (e.g., park land, right-of-way, etc.).

There are 24 Group B – Care or Detention Occupancies in the City of Oshawa based on property parcel data. Through the analysis conducted for this CRA, it was identified that some Vulnerable Occupancies (VO) are considered Group C - Residential Occupancies according to MPAC data. In addition, not all registered City of Oshawa VOs are Group B - Care or Detention Occupancies. The property stock analysis presented in the table reflects a confirmation of occupancy types of these properties in consultation with the OFS.

Table 3: City of Oshawa Existing Property Stock

OBC Occupancy Classification	OFM Fire Risk Sub-Model Major Building Classifications	Number of Properties	Percentage of Properties
Group A	Assembly Occupancies	262	0.46%
Group B	Care or Detention Occupancies	21	0.04%
Group C	Residential Occupancies	52,578	93.08%
Group D	Business	226	0.40%
Group E	Mercantile	439	0.78%
Group F Division 3	Low-Hazard Industrial	22	0.04%
Group F Division 2	Medium-Hazard Industrial	538	0.95%
Group F Division 1	High-Hazard Industrial	11	0.02%
Group F (all Divisions combined)	Industrial Occupancies	571	1.01%
Group C/D/E/F	Mixed Use C/D/E/F	3	0.01%
Group E/D	Mixed Use E/D	39	0.07%
Farm	Classed under National Farm Building Code	5	0.01%
Vacant	Vacant	2,341	4.14%
All Groups	**Total**	**56,485**	**100.00%**

Source: City of Oshawa, Municipal Property Assessment Corporation Data, Retrieved in 2022

Group C - Residential Occupancies represent the most prominent type of building occupancy type within the City of Oshawa which is consistent with most municipalities across Canada. Within Ontario, information provided by the OFM (as described in **Table 32** of **Section10 – Past Loss and Event History Profile**) indicates that the majority of structure fires (318 fires or 84.1% of all fires) over the five-year period from January 1st, 2016 to December 31st, 2020, occurred within Group C - Residential Occupancies. This trend is also reflected in the fire loss data for the City of Oshawa, where 65.0% of

structure fire loss occurring during the five year period from January 1st, 2016 to December 31st, 2020 took place in residential dwellings.

Table 3 shows there are two mixed use Group C/D/E/F properties. Products related to farming are processed on these properties which also contain residential buildings and a business or mercantile occupancy for the sale of items processed nearby. These are separate buildings and facilities within the same property parcel.

Identified Risk: Group C - Residential Occupancies represent 93.08% (52,578) of the City's existing property stock, and over the five year period from January 1st, 2016 to December 31st, 2020 were associated with 84.1% (318) of the structure fires within the City.

Table 4 illustrates a comparison of the City's existing Group C- Residential building stock with that of the Province based on the 2021 Statistics Canada Census.[15] This analysis highlights that the existing residential building stock within the City is very similar to that of the Province. The City has a comparable but slightly higher percentage of single detached houses of 55.52% to that of the Province at 53.59%. The City also has a greater percentage of semi-detached houses (8.00%) compared to the Province (5.52%).

In contrast, the City has a lower number of apartments in buildings of five storeys or more of 11.39% compared to the Province of 17.93%.

[15] When reviewing tables with data from the Census, it is important to note that Statistics Canada uses random rounding whereby "to ensure confidentiality, the values, including totals, are randomly rounded either up or down to a multiple of '5' or '10.'" This means that "when these data are summed or grouped, the total value may not match the individual values since totals and sub-totals are independently rounded."
Source: Statistics Canada Census Profile Archived Page

Table 4: Group C- Residential Building Stock Comparison

Structural Dwelling Type	Oshawa Total Dwellings	Oshawa Total % Dwellings	Ontario Total Dwellings	Ontario Total % Dwellings
Single-detached house	37,000	55.52%	2,942,990	53.59%
Apartment in a building that has five or more storeys	7,590	11.39%	984,665	17.93%
Movable dwelling	5	0.01%	14,985	0.27%
Semi-detached house	5,330	8.00%	303,260	5.52%
Row house	6,445	9.67%	505,265	9.20%
Apartment or flat in a duplex	3,650	5.48%	181,030	3.30%
Apartment in a building that has fewer than five storeys	6,475	9.72%	548,785	9.99%
Other single-attached house[17]	145	0.22%	10,220	0.19%
Total	**66,640**	**100.00%**	**5,491,200**	**100.00%**

Source: Statistics Canada, 2021 Census of Population[18]

3.3 Building Density and Exposure

NFPA 1730 lists building density as a key factor for understanding potential fire risk with particular consideration given to core areas (downtown). Closely spaced buildings, typical of historic downtown core areas and newer infill construction, may have a higher risk of a fire spreading to an adjacent exposed building. In a built-up area with minimal

[17] The category 'other single-attached house' addresses houses attached to non-residential buildings and to account for single houses attached to multi-unit or multi-purpose buildings.

[18] Statistics Canada. 2022. (table). Census Profile. 2021 Census of Population. Statistics Canada Catalogue no. 98-316-X2021001. Ottawa. Released July 13, 2022.
Census Profile, 2021 Census of Population (accessed August 10, 2022).

building setbacks, a fire originating in one building could extend to a neighbouring structure due to the close proximity. The close proximity of buildings can also impede firefighting operations due to the limited access for firefighters and equipment.

As shown in **Table 4**, the City also has a higher percentage of semi-detached houses (8.00%), and row houses (9.67%) compared to that of the Province of 5.52% and 9.2% respectively. The City has a number of existing areas where the presence of building density and potential exposure as a result of minimal setbacks should be highlighted. These include the downtown core that contains mixed use occupancies including some Group C- Residential and commercial uses. These areas may be further impacted by infill construction and intensification. Existing residential areas that include other attached dwellings such as townhouses, row houses and apartments with less than five storeys should be highlighted for potential exposure risks. OFS has indicated that there are many townhouses located in the northern portion of Oshawa that present potential exposure related risks.

Key Finding: The City includes areas of building stock that have higher density and, as such, greater potential for exposure in the event of a fire.

3.4 Building Age and Construction

The OBC was adopted in 1975, and the Ontario Fire Code (OFC) was adopted in 1981. Together, these two codes have provided the foundation for eliminating many of the inconsistencies in building construction and maintenance that were present before their adoption.

The OBC and the OFC were developed to ensure that uniform building construction and maintenance standards are applied for all new building construction. The codes also provide for specific fire and life safety measures depending on the use of the building.

Examples of the fire and life safety issues that are addressed include:

- Occupancy;
- exits/means of egress including signs and lighting;
- fire alarm and detection equipment;
- fire department access; and
- inspection, testing, and maintenance.

In many situations the age and construction of a building can be directly associated with whether the building was constructed prior to, or after the introduction of these codes. For example, during the late 19th century and early 20th century, balloon frame construction was a common wood framing technique that was used in both residential and small commercial construction. This technique allowed for exterior walls to be continuous from the main floor to the roof in some cases extending multiple stories through a building. The result was the potential for fire and smoke to spread unobstructed from the basement to the roof of a building. In many cases, the result was a fire that started in the basement spreading to the roof very quickly and without the knowledge of building occupants or fire service personnel. The OBC implemented requirements to change this construction method and introduce additional requirements to mitigate the potential of fire spread through wall cavities.

Similarly, the new codes have recognized new construction techniques such as light weight wood frame construction. This includes the use of wood trusses to replace conventional wood frame roofing techniques and new construction materials including Laminated Veneer Lumber (LVL) that is a high strength engineered wood product now used commonly in residential and commercial buildings. Although these techniques and materials have enhanced the efficiency and cost of construction, this construction presents very different challenges to firefighters from those of historical construction methods. For example, the light weight wood frame construction used in an engineered wood truss roof system relies on all of the structural components to work together. In the event one of the components fails due to exposure to high heat or fire, the result is the potential for the entire roof system to fail.

In addition to building construction, fire growth rate depends on the flammability of the materials and contents within the building which introduces variances into the growth rates presented above.

The impact of increasing fire growth rates is directly related to the time lapse from ignition to flashover when the combustible items within a given space reach a temperature that is sufficiently high for them to auto-ignite.

Listed in **Table 5**, are fire growth rates measured by the time it takes for a fire to reach a one megawatt (MW) fire. Fire growth rate depends on the flammability of the materials and contents within the building which introduces variances into the growth rates presented below.

Table 5: Time to Reach 1 MW Fire Growth Rates in the Absence of Fire Suppression

Fire Growth Rate	Time in Seconds to Reach 1 MW	Time in Seconds to Reach 2 MW
Slow	600 seconds	848 seconds
Medium	300 seconds	424 seconds
Fast	150 seconds	212 seconds

Source: OFMEM, Operational Planning: An Official Guide to Matching Resource Deployment and Risk Workbook.[19]

In addition to building construction, fire growth rate depends on the flammability of the materials and contents within the building which introduces variances into the growth rates presented above. The impact of increasing fire growth rates is directly related to the time lapse from ignition to flashover when the combustible items within a given space reach a temperature that is sufficient high for them to auto-ignite. The graph in **Figure 7** (below) highlights the exponential increase in fire temperature and the potential for loss of property/loss of life with the progression of time.

[19] Office of the Fire Marshal and Emergency Management. (2017, May). Operational Planning: An Official Guide to Matching Resource Deployment and Risk Workbook. Retrieved from http://www.mcscs.jus.gov.on.ca/english/FireMarshal/FireServiceResources/PublicFireSafetyGuidelines/04-08-10at1.html

Figure 7: Fire Propagation Curve

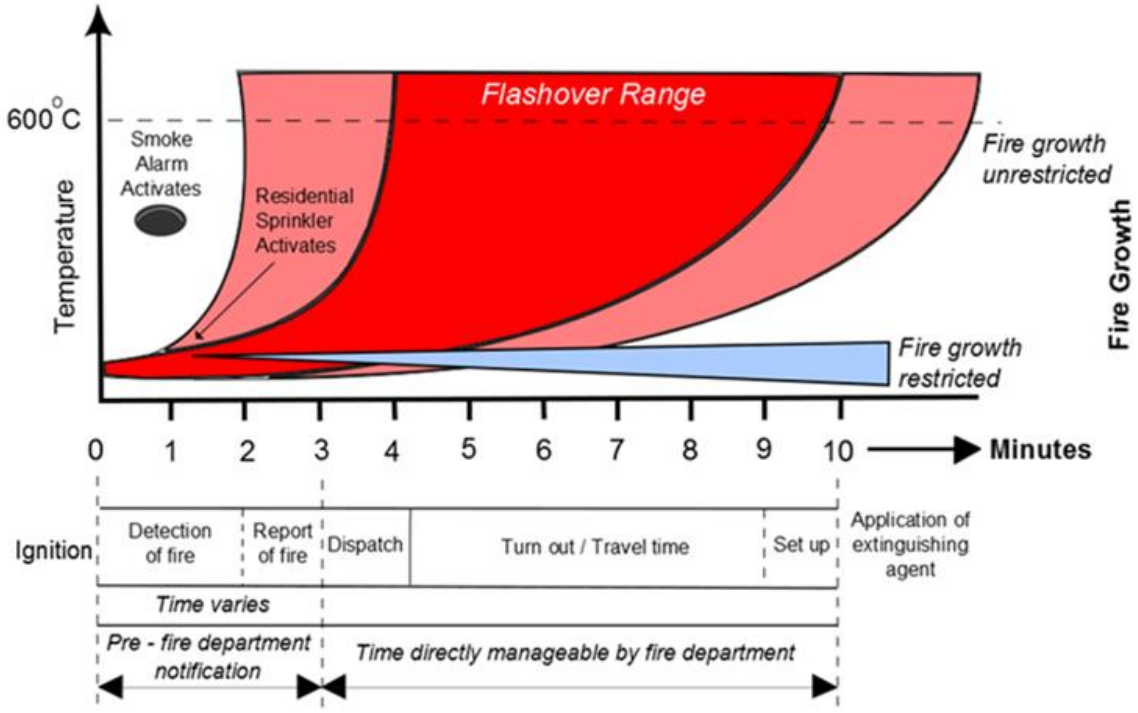


Figure Source: Fire Underwriters Survey "Alternative Water Supplies for Public Fire Protection: An informative Reference Guide for Use in Fire Insurance Grading" (May 2009) and NFPA "Fire Protection Handbook" (2001)

Understanding building construction and building materials is a critical component for firefighters in determining the appropriate type of fire attack and safety measures that need to be in place. As such, having knowledge of the age of a building may be directly related to the type of construction methods and materials used to build it, making building age and construction an essential component of this Community Risk Assessment.

Table 6 and **Figure 8** illustrate the age of residential buildings (2016 Census Data) within the City prior to the new codes, and in comparison, to the Province of Ontario. This analysis indicates that 62.60% of the City's residential building stock was built prior to 1981, preceding the adoption of the 1981 Ontario Fire Code. This represents a fire risk within the community. By comparison, 53.06% of the residential building stock in the Province was built prior to this date suggesting that the City of Oshawa has an older building stock when compared to the Province.

Table 6: Period of Construction of Residential Dwellings – Oshawa and Ontario

Period of Construction	Oshawa Total Dwellings	Oshawa % Dwellings	Ontario Total Dwellings	Ontario % Dwellings
Prior to 1960	16,350	26.12%	1,293,135	25.02%
1961 to 1980	22,835	36.48%	1,449,585	28.04%
1981 to 1990	7,810	12.48%	709,135	13.72%
1991 to 2000	5,045	8.06%	622,565	12.04%
2001 to 2005	3,220	5.14%	396,130	7.66%
2006 to 2010	3,925	6.27%	368,235	7.12%
2011 to 2016	3,400	5.43%	330,390	6.39%
Total	**62,595**	**100.00%**	**5,169,175**	**100.00%**

Source: 2016 Census, Statistics Canada[20]

[20] Statistics Canada. 2017. Oshawa, CY [Census subdivision], Ontario and Ontario [Province] (table). Census Profile. 2016 Census. Statistics Canada Catalogue no. 98-316-X2016001. Ottawa. Released November 29, 2017. Statistics Canada 2016 Census Page (accessed November 26, 2019)

Figure 8: Period of Construction of Residential Dwellings – Oshawa and Ontario

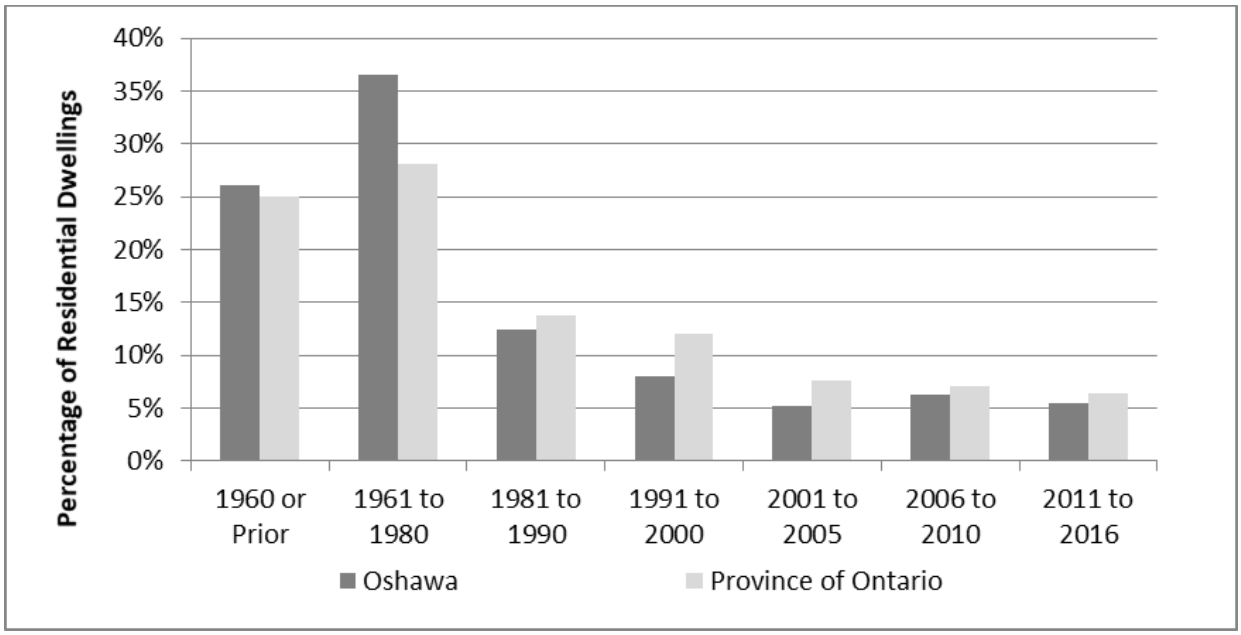


Figure Source: 2016 Census, Statistics Canada[21]

Identified Risk: The 2016 Census data indicates that 62.60% (39,185) of the City's Group C-Residential building stock was built prior to the introduction of the 1981 Ontario Fire Code and Ontario Building Code compared to 53.06% (2,742,720) of residential building stock in the remainder of the Province.

3.4.1 Lightweight Construction

As of February 25, 2022, the OFM provided direction that requires available information documenting the presence and location of truss and lightweight construction systems (referred to as lightweight construction) be used to inform pre-planning activities by fire departments. Buildings with lightweight construction are considered a safety risk to responding firefighters as they known to be susceptible to premature failure and rapid collapse under fire conditions. Pre-plans provide responding fire departments with awareness of the presence of lightweight construction, providing opportunity for proactive fire response strategies to protect the safety of responding firefighters.

The City is working to identify buildings with lightweight construction, which have been constructed using wood framing. The number of buildings, by occupancy type, identified

[21] Ibid.

to date by the Oshawa Fire Services that have potential lightweight construction concerns are presented in **Table 7**. It is anticipated that OFS will continue to collect and document information on buildings with lightweight construction. This information can be updated within the CRA during the annual review and updating process. It is also anticipated that OFS will apply this information to their pre-planning program.

Table 7: Lightweight Construction Buildings Identified within City of Oshawa

Occupancy	Number of Buildings Identified within Oshawa
Group A - Assembly	1
Group B - Care or Detention, Institutional	1
Group D - Business and Personal Services	1
Group E - Mercantile	5
Group F - Industrial (F3 Low Hazard)	1
Group F - Industrial (F3 Low Hazard), Farms	1
Group F - Industrial (F2 Medium Hazard)	13
Group F - Industrial (F2 Medium Hazard), Governmental	1
Total	24

Source: CFD

Key Finding: There are currently 24 properties within the City that are identified as known lightweight construction.

3.5 Building Height and Area

Buildings that are taller in height, or contain a large amount of square footage (building footprint) can have a greater fire loss risk and life safety concern. One of the unique characteristics and risks of tall / multi-storey buildings is known as the “stack effect”. This is characterized as vertical air movement occurring throughout the building, caused

by air flowing into and out of the building, typically through open doors and windows. The resulting buoyancy caused by the differences between the indoor/outdoor temperature and elevation differences causes smoke and heat to rise within the building. This can have a dramatic effect on smoke permeation throughout the common areas and individual units within the building. This can be directly related to the high percentage of deaths that occur in high-rise buildings as a result of smoke inhalation.

The nature of taller buildings also brings the presence of higher occupant loads and higher fuel loads due to the quantity of furnishings and building materials.

Efficient evacuation can also be a challenging process due to a lack of direction, signage, knowledge, or familiarity of the occupants which may result in overcrowding of stairways and exit routes.

Ensuring all required fire and life safety systems are in place and functioning is a priority for these occupancies. Taller buildings can experience extended rescue / fire suppression response times for firefighters to ascend to the upper levels. This is commonly referred to as "vertical response" representing the time it takes for firefighters to gain entry into the building and ascent to the upper floors by the stairwells. Options such as "shelter-in-place" whereby occupants are directed by the fire department to stay within their units can be an effective life safety strategy. However, ensuring internal building communications systems are in place and functioning is critical to the success of this strategy. Targeted public education campaigns addressing strategies like shelter-in-place are also critical to educating building occupants.

Building area can cause comparable challenges as those present in taller buildings. Horizontal travel distances rather than vertical can mean extended response times by firefighters attempting rescue or fire suppression activities in buildings with a very large footprint.

3.5.1 Building Height

3.5.1.1 Defining High-Rise Buildings

It is important to note that there are a variety of metrics associated with the terms "high rise", "tall buildings" and "high buildings." Some key definitions are outlined in **Table 8**.

Table 8: Summary of High-Rise Building Height Metrics

Source	Simplified Definition
Ontario Building Code/Ontario Fire Code	A building with its floor level 18 metres (59 feet) above grade, or 6 storeys
NFPA 1710: Standard for the Organization and Deployment of Fire Suppression Operations	Building height greater than 75 feet (23 metres), or 7 storeys
Statistics Canada*	Buildings with 5 or more storeys

*Statistic Canada's references to building height are not focused on a strict definition of building height consideration but to provide insight as to the overall built form of housing within a community.

The variance in these definitions is directly related to the different applications required by these organizations. For example, the OBC has detailed considerations to define a high-rise building based on the occupancy classification, floor area and occupant load. Within all occupancy classifications, additional OBC requirements apply when a building is or exceeds 18 meters in height.

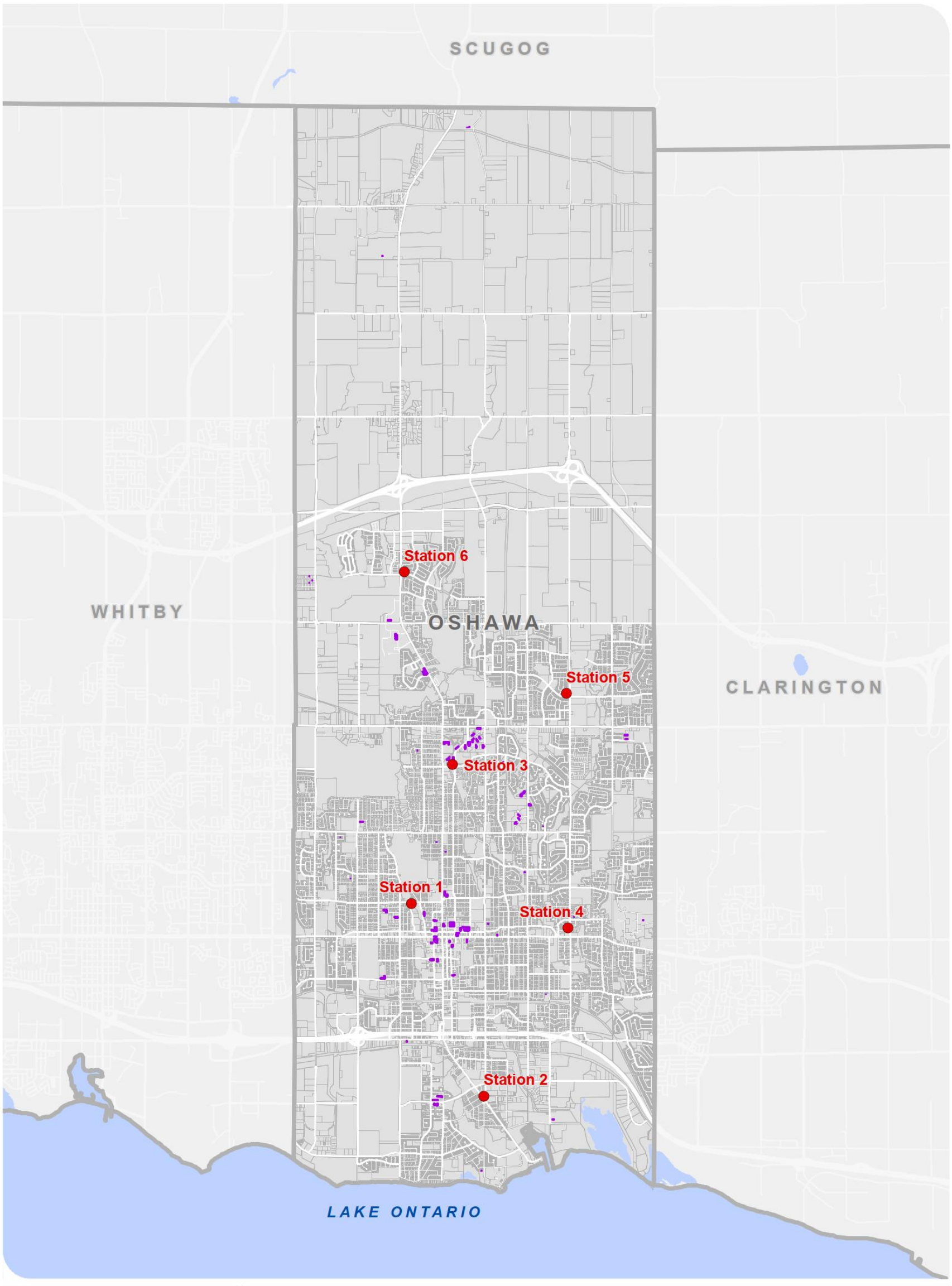
Within the data collection process to prepare this CRA the application of these different definitions was confirmed by the City. The OBC definition is applied by departments that work within the building, planning and development areas of the City, whereas OFS utilizes the definition of the NFPA 1710 standard to define high-rise buildings. In our experience, in other municipalities this is not uncommon and relates directly to the regulatory and operational responsibilities of the City.

For the purposes of developing this CRA, the OBC definition has been used to analyse building height within the City. Within the City's 2020 Fire Master Plan the NFPA 1710 standard is applied.

3.5.1.2 Mapping Building Height

As part of the data provided for this CRA, the City provided building height data from which buildings with a height greater than 18 metres were identified, reflecting a high-rise occupancy per Section 3.2.6 of the OBC For the purposes of this analysis, it has been assumed that buildings 18 metres or less (roughly 5 storeys or less) are not considered high-rise. Buildings identified with a height at or in excess of 18 metres are illustrated in **Figure 9**.

Figure 9: Building Height



In total, 76 buildings as defined by the OBC were identified as high-rise buildings. As shown, the buildings identified as high-rise are distributed within the urban area of the City, with several located in the downtown area.

Identified Risk: The City currently has 76 building defined by the OBC as high-rise buildings with a floor level 18 metres (59 feet) above grade, or 6 storeys. These buildings are distributed within the urban area with several located in the downtown area.

3.5.2 Building Area

Building area can cause comparable challenges as those present in taller buildings. Horizontal travel distances rather than vertical can mean extended response times by firefighters attempting rescue or fire suppression activities. Large buildings, such as industrial plants and warehouses, department stores, and big box stores, can also contain large volumes of combustible materials. In many of these occupancies the use of high rack storage is also present. Fires within this type of storage system can be difficult to access and may cause additional risk to firefighter safety, due to collapse-related risks.

As part of the data collection process, City staff were able to provide building footprint data for the City of Oshawa. The information presented in **Table 9** indicates that the majority of building stock (93.2%) have a total building area (footprint) of 2,500 square feet or less. This summary also indicates that 0.2% (91) buildings have an area greater than 50,000 square feet (approximately 4,645 square meters).

Table 9: Building Area

Building Size (Square Feet)	# of Buildings	% of all Buildings
0-2,500	56,392	93.15%
2,500-5,000	2,556	4.22%
5,000-10,000	892	1.47%
10,000-20,000	391	0.65%
20,000-50,000	215	0.36%
>50,000	91	0.15%
Total	**60,537**	**100.00%**

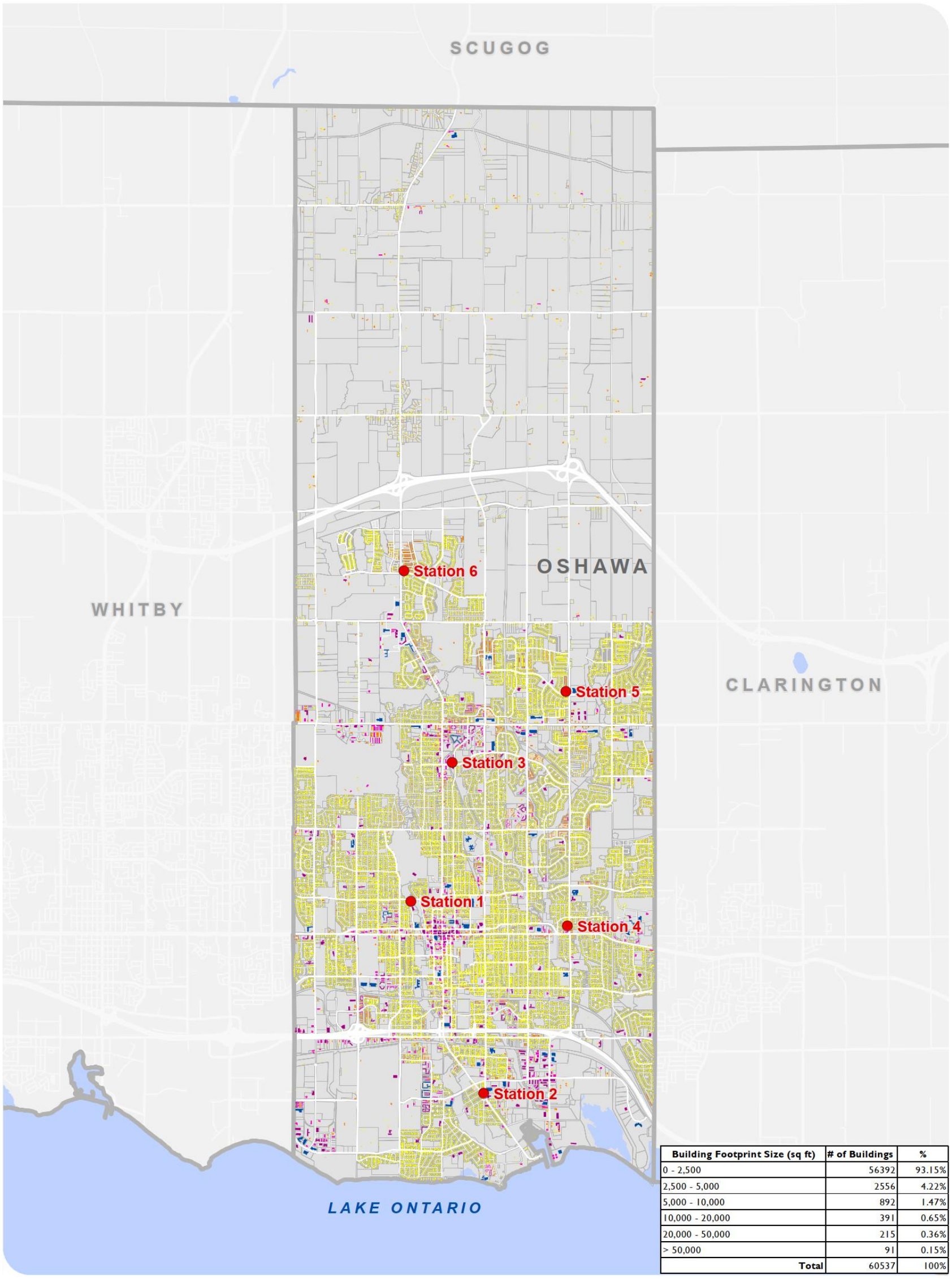
Source: City of Oshawa, Building Elevations Spreadsheet (includes building area in square feet).

3.5.2.1 Mapping Building Area

As part of the data provided for this CRA, the City provided building area in square feet. **Table 9** provided a breakdown of the number of buildings based on building footprint area. Based on this analysis, the vast majority of building footprints (93.2%) are 2,500 square feet or less. **Figure 10** illustrates these findings further, showing that the buildings with a larger footprint are dispersed mainly throughout the urban area of the City and are consistent with the commercial and industrial land use areas such as the area south of Highway 401 and along Taunton Road.

Identified Risk: The City has 91 buildings with a total building area (footprint) that exceed 50,000 square feet (4,655 square metres). These buildings are predominantly located in the commercial and industrial land use areas such as the area south of Highway 401 and along Taunton Road.

Figure 10: Building Area Locations



Building Footprint Size (sq ft)	# of Buildings	%
0 - 2,500	56392	93.15%
2,500 - 5,000	2556	4.22%
5,000 - 10,000	892	1.47%
10,000 - 20,000	391	0.65%
20,000 - 50,000	215	0.36%
> 50,000	91	0.15%
Total	60537	100%

Existing Fire Station
Parcel Boundary
Water Body

Building Footprint Area (sq ft)
0 - 2,500
2,500 - 5,000
5,000 - 10,000
10,000 - 20,000
20,000 - 50,000
> 50,000

CITY OF OSHAWA
COMMUNITY RISK ASSESSMENT

BUILDING AREA
FIGURE 10

DILLON CONSULTING

MAP DRAWING INFORMATION:
DATA PROVIDED BY OSHAWA, MNRF

MAP CREATED BY: LK
MAP CHECKED BY: CB
MAP PROJECTION: NAD 1983 UTM Zone 17N

1:70,000
0 0.5 1 2 km

PROJECT: 191064 STATUS: FINAL DATE: 2020-NOV

3.6 Potential High-Fire Risk Occupancies

Potential high-fire risk occupancy is another factor for consideration within a City's building stock. High fire risk can be linked to a combination of factors such as building density (exposures), building age, and construction. Fuel load typically refers to the amount and nature of combustible content and materials within a building. This can include combustible contents, interior finishes as well as structural materials. Combustible content tends to create the greatest potential fire loss risk. Higher fuel loads results in increased fire loss risk due to increased opportunity for ignition and increased fire severity. In many communities large amounts of fuel load can be contained within a single occupancy, such as a building supply business, within a large multi-unit residential building, or within a historic downtown core. This section of the Community Risk Assessment will focus primarily on fuel load for industrial occupancies.

In terms of industrial occupancies, the OFS has identified several occupancies with a fuel load concern, primarily those providing distribution and storage services for propane. In total, there are seven propane facilities registered through the Technical Standards and Safety Authority (TSSA), the governing body that regulates these facilities. In terms of local fire department involvement, different levels of facilities require different levels of involvement from a local fire department for servicing purposes. The OFS is aware of these facilities which are located in the following areas:

- 1818 Simcoe Street North
- 1279 Simcoe Street North
- 540 Taunton Road East
- 1333 Wilson Road North
- 1277 Wilson Road North
- 130 Ritson Road North
- 325 Bloor Street West
- 199 Wentworth Street East
- 90 Windfields Farm Drive East

Buildings with potential fuel load concerns as identified by OFS are presented in **Table 10.** OFS identified several occupancies with fuel load concerns as being lumber retail facilities or storage yards in addition to several fuel depots. As mentioned in **Section 3.4 – Building Age and Construction**, fire growth rate is dependent upon the flammability

of materials and contents within a building. Various material forms including fuels are carried in stock inside these facilities (e.g. lumber).

Table 10: Potential High-Fire Risk Occupancies

Address	Facility Name/Organization	Risk Description
328 Ritson Road South	Peacock Lumber	Lumber Yard
1481 Harmony Road North	Home Depot	Retail / Lumber Internal
685 Laval Drive	Lowes	Retail / Lumber Internal
999 Boundary Road	Kruger Products	Paper Distribution Center
1240 Skae Drive	Velcan Forest Products	Saw Mill / Wood Products
1181 Thornton Road South	Direct Timber	Wood Products
190 Wentworth Street East	Petro-Pass Truck	Fuel Depot
700 Raleigh Avenue	Kal Tire	Manufacturer / Retreading
1515 Thornton Road North	Recycling Facility	Recycling Facility
Farewell Street	Oshawa Harbour West	Shipping/Receiving/Storage
2000 Simcoe Street North	Ontario Tech University	Research Facility
Multiple Locations	Canadian Tire Propane Fill Stations	Fuel

Source: OFS

In addition to ensuring compliance to the requirements of the OBC and the OFC, there are operational strategies that a fire service can implement to address fuel load concerns. These include regular fire inspection cycles and pre-planning of buildings of this nature to provide an operational advantage in the event of fire.

Key Finding: OFS identified several properties within Oshawa as having an increased potential for high fire risk in regards to fuel load.

3.7 Occupancies with Potential High Fire Life-Safety Risk

Fire risk does not affect all people equally. Those who are at an increased risk of fire injury or fatality are known as vulnerable individuals. In the event of a fire, these individuals may be unable to self-evacuate and/or require assistance in their evacuation efforts. Identifying the location and number of vulnerable individuals or occupancies within the community provides insight into the magnitude of this particular demographic within a community.

From an occupancy perspective, vulnerable occupancies contain vulnerable individuals who may require assistance to evacuate in the event of an emergency due to cognitive or physical limitations, representing a potential high-life safety risk. As part of its registry of vulnerable occupancies, the OFM defines vulnerable occupancy as any care occupancy, care and treatment occupancy, or retirement home regulated under the Retirement Homes Act.

These occupancies house individuals such as seniors or people requiring specialized care. It is important to note, however, that **not all vulnerable individuals live in vulnerable occupancies**; for example, some seniors who are vulnerable due to physical limitation can live on their own or in subsidized housing making them a key demographic to reach.

3.7.1 Registered Vulnerable Occupancies

Ontario Regulation 150/13: Fire Code, which amends **Ontario Regulation 213/07: Fire Code**, identifies vulnerable occupancies as care, care and treatment and retirement homes. This includes hospitals, certain group homes and seniors' residences and long term care facilities. The regulation requires fire departments to perform annual inspection, approve and witness fire drill scenarios and file certain information regarding the occupancy with the Fire Marshal's office. **Table 11** provides a list of registered vulnerable occupancies within the City of Oshawa. As referenced in **Section 3.2.1 – City of Oshawa Existing Major Building Classification Summary,** a registered Vulnerable Occupancy could fall into different occupancy types such as Group B – Care or Detention or Group C – Residential.

Table 11: Registered Vulnerable Occupancies

Property Name	Occupancy Type	Location
Carriage House	Retirement Home	60 Bond Street East
Cedarcroft Place Retirement Community by Spring Living	Retirement Home	649 King Street East
Livita Centennial Retirement Residence	Retirement Home	259 Hillcroft Street
Chartwell Wynflied Retirement Residence	Retirement Home	431 Woodmount Drive
Christian Horizons Durham 20	Care occupancy – group home for adults	75 Southwood Street
Christian Horizons Durham 3	Care occupancy – group home for adults	1285 Harmony Road North
Christian Horizons Durham 1	Care occupancy – group home for adults	837 Somerville Street
Christian Horizons Durham 9	Care occupancy – group home for adults	11 Ridgetop Court
Christian Horizons Durham 5	Care occupancy – group home for adults	1143 Wakefield Drive
Community Living Oshawa/Clarington	Care occupancy – group home for adults	488 Rossland Road West
Community Living Oshawa/Clarington	Care occupancy – group home for adults	844 Bessborough Drive
Community Living Oshawa/Clarington	Care occupancy – group home for adults	425 Adelaide Avenue East
Community Living Oshawa/Clarington	Care occupancy – group home for adults	209 Killdeer Street
Community Living Oshawa/Clarington	Care occupancy – group home for adults	821 Central Park Boulevard North

Property Name	Occupancy Type	Location
Community Living Oshawa/Clarington	Care occupancy – group home for adults	1035 Olive Avenue
Community Living Oshawa/Clarington	Care occupancy – group home for adults	881 Pinecrest Road
Community Living Oshawa/Clarington	Care occupancy – group home for adults	380 Holcan Avenue
Deafblind Ontario	Care occupancy	1133 King Street East
Community Living Oshawa/Clarington	Care occupancy	743 Ashley Court
Extendicare Oshawa	Care and treatment occupancy – Long-term care home	82 Park Road North
Hillsdale Estates	Care and treatment occupancy – Long-term care home	590 Oshawa Boulevard North
Hillsdale Terraces	Care and treatment occupancy – Long-term care home	600 Oshawa Boulevard North
Lakeridge Health Oshawa	Hospital	1 Hospital Court
Community Living Oshawa/Clarington	Care occupancy	380 Holcan Avenue
The Wynfield LTC Centre	Care and treatment occupancy – Long-term care home	451 Woodmount Drive
Thorntonview Long Term Care - Revera	Care and treatment occupancy – Long-term care home	186 Thornton Road South
Aspira Traditions of Durham Retirement Living	Retirement Home	1255 Bloor Street East

Property Name	Occupancy Type	Location
Participation House	Care Occupancy (B3) – Group Home	165 Bloor Street West
Deaf Blind Ontario	Care Occupancy (B3) – Group Home	265 Chadburn Court
Community Living Oshawa Clarington	Care Occupancy (B3) – group home for adults	1186 King Street East
Harmony Hills Retirement Residence	Retirement Home	1335 Benson Street
Harmony Hills The Forest	Retirement Home	1345 Benson Street
Winchester Glen Retirement Community	Retirement Home	2505 Thoroughbred Street
Bloom Oshawa Retirement Community	Retirement Home	1224 Coldstream Drive
Christian Horizons Durham 19	Care Occupancy (B3) – group home	305 Gibbons Street

Source: City of Oshawa, Registry of Vulnerable Occupancies in Ontario

Identified Risk: The City of Oshawa currently has 35 registered vulnerable occupancies.

3.7.2 Other High Fire Life Safety Risk Occupancies

From the perspective of risk, and for the purposes of the services provided by the fire services, including enhanced and targeted fire inspections and public education programming, it can be valuable for a fire department to identify additional potential high fire life-safety risk considerations, including day care facilities and schools, where due to their age, children may have cognitive or physical limitations to preventing or delaying self-evacuation in the event of an emergency. For the purposes of this CRA, potential high life-safety risk occupancy considerations include schools and licenced day care

facilities. Analysis of the building stock details provided by OFS identified that there are 55 daycare facilities, 39 public schools (elementary and secondary), 13 catholic schools (elementary and secondary), four alternative schools and four private schools. There are also several post-secondary educational institutions in the City of Oshawa including Ontario Tech University, Trillium College, Durham College, Trent University - Oshawa Campus and Queen's University School of Medicine - Oshawa Campus.

It would be beneficial for OFS to conduct pre-planning activities for all occupancies with vulnerable occupants. Pre-planning activities increase fire department personnel familiarity with buildings of special interest. A fire department can help reduce the risk faced by vulnerable individuals or vulnerable occupancies by performing regularly scheduled fire safety inspections; approving and witnessing fire drill scenarios; enforcing the OFC; providing public education on fire safety issues; conducting pre-planning exercises to increase fire department personnel's familiarity with the facility; reviewing fire safety plans for accuracy and encouraging facility owners to update facilities as needed; providing staff training; and encouraging fire drills.

(Some of these activities are now legislated responsibilities under O. Reg. 150/13: Fire Code for those facilities classified as vulnerable occupancies.)

Key Finding: In addition to registered vulnerable occupancies the City has 60 schools, and 55 daycares that represent higher fire life-safety risks.

3.8 Historic or Culturally Significant Buildings

An understanding of the location of historic or culturally significant buildings or facilities is an important consideration within the building stock profile of a Community Risk Assessment. Such buildings or facilities may be keystone features to the community that provide a sense of heritage, place, and pride and act as tourism destinations which could result in an economic impact in the case of their loss. Historic areas can present a high fire risk due to their age, the materials used to construct the buildings, their exposure to other buildings, and their importance to the community. Regular fire inspection cycles and strategies to enforce continued compliance with the OFC are considered as best practices to achieving the legislative responsibilities of the municipality and providing an effective fire protection program to address fuel load risks.

The City of Oshawa maintains an inventory of properties of cultural heritage value or interest (last updated October 19, 2015). The Heritage Oshawa Inventory includes a

total of 24 designated properties and 11 registered, non-designated property under Part IV of the Ontario Heritage Act. There are also a combined 513 Class A or Class B properties having potential for heritage designation, many of which were constructed in the early to mid-1800s.[22]

Key Finding: There are a number of identified heritage buildings within Oshawa, many of which were constructed prior to the introduction of the Ontario Fire Code and Ontario Building Code.

[22] Data provided by the City of Oshawa as part of the data collection process for this Community Risk Assessment.

4.0 Critical Infrastructure Profile

As referenced in **O. Reg. 378/18**, the critical infrastructure profile assessment includes analysis of the capabilities and limitations of critical infrastructure, including electrical distribution, water distribution, telecommunications, hospitals and airports. The following section considers these critical infrastructure characteristics within the City of Oshawa.

4.1 Critical Infrastructure in Oshawa

Ontario's Critical Infrastructure Assurance Program defines critical infrastructure (CI) as "interdependent, interactive, interconnected networks of institutions, services, systems and processes that meet vital human needs, sustain the economy, protect public health, safety and security, and maintain continuity of and confidence in government."[23] The program also sets out nine critical infrastructure sectors, namely: continuity of government, electricity, financial institutions, food and water, health, oil and natural gas, public safety and security, telecommunications and transportation networks. Infrastructure is a complex system of interconnected elements whereby failure of one could lead to the failure of others. The vulnerability of infrastructure is often connected to the degree to which one infrastructure component depends upon another. Therefore, it is critical that these elements be viewed in relation to one another and not in isolation.

An extensive list of the City's CI for each sector was provided by the City of Oshawa as found within Appendix G of the City of Oshawa's Emergency Master Plan. For the purposes of this CRA, critical infrastructure of similar type were grouped into the categories listed below (for example, the multiple electrical substations identified by the City were grouped into one 'electrical substation' category). General considerations and concerns related to each CI as it pertains to the provision of fire protection services for each CI listed within the City of Oshawa are included in **Table 12**. Oshawa specific CI concerns are described in greater detail within the text.

[23] Ministry of the Solicitor General. (2017). Critical Infrastructure. Retrieved from https://www.emergencymanagementontario.ca/english/emcommunity/ProvincialPrograms/ci/ci.html

Table 12: Critical Infrastructure Considerations

Identified Critical Infrastructure	CI Sector	Fire Related Issues/Concerns
Water Storage, Distribution and Treatment Stations	Food and Water	• Oshawa water systems are owned and provided by the Region of Durham. Water supply is an essential component of firefighting and is accessible to the fire department through hydrant systems. A water supply shortage or damage to the distribution system could impede the fire department's ability or use of these systems. • There are fire department considerations to areas without adequate water flow and supply (hydrants)
Sewage Pumping Station	Food and Water	• Potential for contaminated water or spread of disease with untreated sewage on a local or regional level.
Electrical Substations	Electricity	• Electricity in Oshawa is provided by the Oshawa Power and Utilities Corporation and operates multiple substations within the City. Firefighter safety considerations when responding to a fire at an electrical substation (e.g. high voltage electrical hazards and the presence of chemical hazards that are used to cool electrical conductors). • Disruption to the electrical distribution system can disrupt communications, cause food spoilage, close local business, prevent the use of medical devices and have other potential impacts on public health.

Identified Critical Infrastructure	CI Sector	Fire Related Issues/Concerns
911 Dispatch Centre/Radio Tower/Switching Stations	Telecommunications	• There are several radio towers owned and operated by different entities within Oshawa including, the Durham Regional Police Service and the City of Oshawa. If wires or towers are compromised, the ability to communicate with emergency personnel could be delayed, possibly leading to delay in the delivery of emergency services. • The City of Oshawa also provides dispatching services for Oshawa, Whitby, Scugog, Clarington, Brock and Uxbridge. • Other telecommunications infrastructure would include telecommunication providers (such as Bell, Telus or Rogers, for example). In the event of an emergency, these companies are expected to have emergency response plans or business continuity plans in place to ensure the continuation of the services they provide.
Main Gas and Oil Distribution Lines	Gas and Oil	• There are three main gas and oil pipelines extending across the City. These lines have the potential for explosion and/or fire. • Hazardous materials response could expose firefighters to toxic or hazardous materials via inhalation, skin contact, and/or ingestion. • Gas and oil supply could be limited across the City.

Identified Critical Infrastructure	CI Sector	Fire Related Issues/Concerns
Rail Line	Transportation	• Accidents involving transportation of hazardous cargo could result in release hazardous material requiring hazardous materials response • Potential for explosions, fires and destabilization of surrounding structures • For passenger train derailments or collisions, passenger and rail employee extrication and technical rescue may be required • Difficulty accessing scene • Major incidents resulting in long term recovery could delay daily shipment of goods and services, with potential negative affects to local economy
Major Highways	Transportation	• Incidents involving hazardous materials transport • Motor vehicle collisions driving fire department and ambulance call volume • Multi lane and vehicle collisions can obstruct lane access for responding apparatus • Traffic hazards (distracted drivers, high speed movement) present safety considerations for responding crews

Identified Critical Infrastructure	CI Sector	Fire Related Issues/Concerns
Federal Harbour	Transportation	• Vessel collisions, fires and explosions • Electrical malfunctions and high voltage electrical incidents • Fuel load concerns • Dangerous goods and hazardous substance spills • Storage of hazardous cargo • Major incidents could affect local economy • Some harbours allow owners and passengers overnight stay in boat sleeping quarters presenting additional high fire life safety concerns.
Regional Transit	Transportation	• Some residents of the City rely on public transit and may not have access during emergencies impacting the road network.
Municipal Airport	Transportation	• Aircraft crash incidents. • Dangerous goods shipment and storage.

Identified Critical Infrastructure	CI Sector	Fire Related Issues/Concerns
Reception/ Evacuation Centres	Continuity of Government	• There are several community buildings designated as evacuation or reception centres within the City of Oshawa for use during emergency situations. A fire department should inspect the facilities designated for emergency shelter use to ensure compliance. • Facilities housing evacuees overnight present additional life safety risks to occupants. • Large number of people in these facilities during an emergency a consideration for fire department if there is a fire at one of these facilities – may include vulnerable occupants with mobility limitations requiring additional support during evacuation of a shelter.
Provincial and Municipal Buildings	Continuity of Government	• Municipal services are often interconnected, therefore the failure of one may lead to the failure or damage to other services.
Fire Station	Public Safety and Security	• There are six fire stations in Oshawa. Frequent or extreme emergency events could increase demand for emergency response services affecting the response capacity of the fire department.
Provincial Court	Public Safety and Security	• Municipal services are often interconnected, therefore the failure of one may lead to the failure or damage to other municipal services.
Ambulance Base	Health	• There are two ambulance bases in Oshawa in addition to a hospital ambulance staging area from which ambulances respond. Health related emergencies can increase demand for health care services, specifically ambulance services and medical response.

Identified Critical Infrastructure	CI Sector	Fire Related Issues/Concerns
Hospital	Health	• A fire at Lakeridge Hospital in Oshawa would require complex evacuation procedures for a large amount of immobile and medical device dependant individuals. • Infectious disease outbreaks can present significant challenges to first responders and the community causing hospital workplace absenteeism, and an increased demand for medical supplies.

Source: City of Oshawa, Appendix G of the Emergency Master Plan.

4.1.1 Water Infrastructure

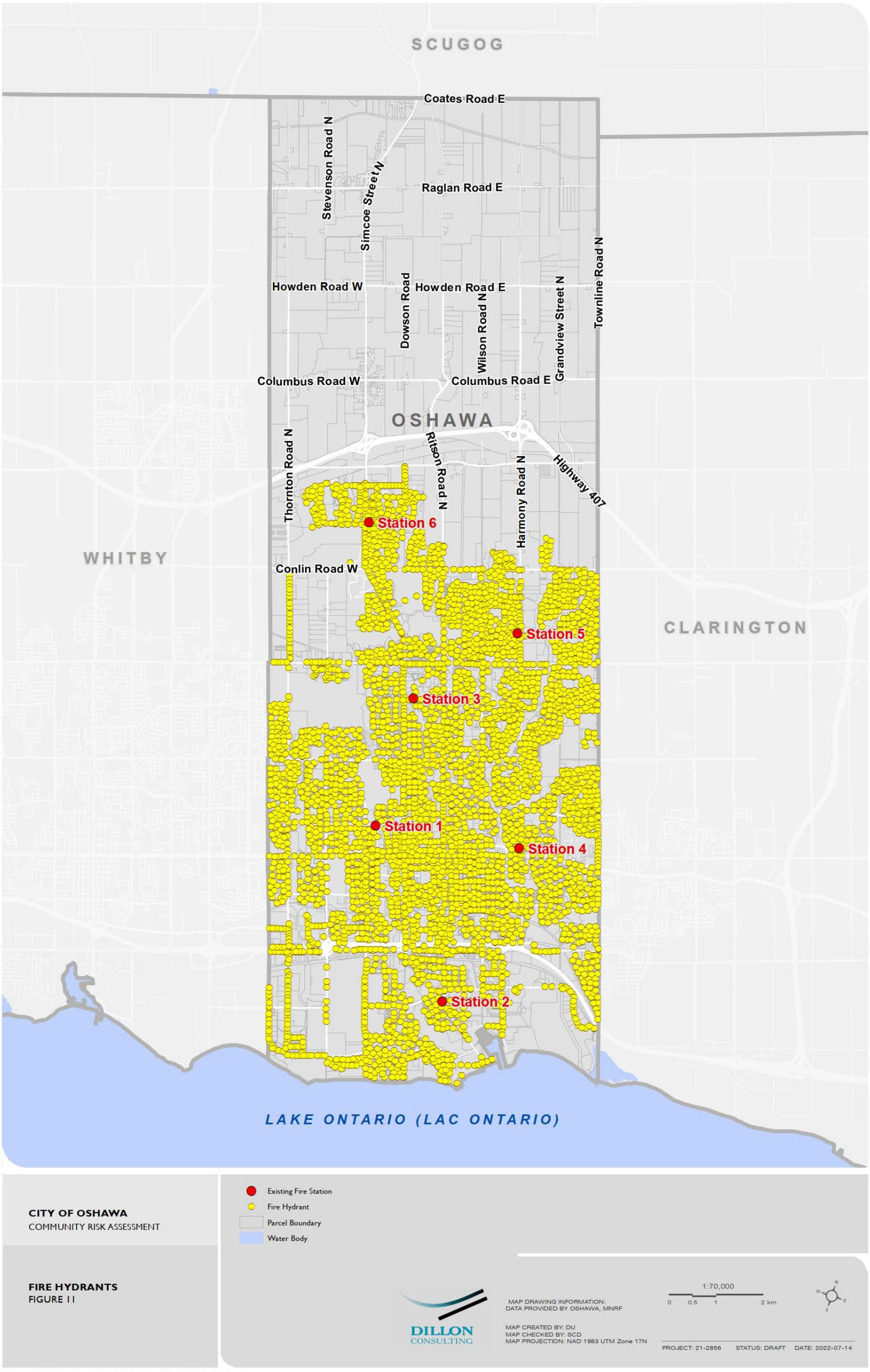
Oshawa has a water supply system consisting of water treatment, water storage, and distribution stations, as well as numerous fire hydrants mostly in the urban area. Water supply as a critical infrastructure is essential for firefighting and is accessible to the fire department through municipal water delivery systems, or the fire department itself (tanker shuttles). Equally important to the presence of water supply is the quantity of water available for fire protection purposes, referred to as fire flow. As described in the NFPA Glossary of Terms (2019 Edition), fire flow is "the flow rate of water supply measured at 20psi (137.9 kPa) residual pressure, that is available for firefighting." The control of structure fires in urban areas are typically delivered by hose lines supplied by a local water delivery system via hydrants. A water supply shortage or water system disruption could impede the flow rate of water delivered to hydranted areas resulting in inadequate water supply and distribution needed for the delivery of fire protection services.

Where no municipal water systems exist, supplementary water supply sources are considered. It is a common occurrence for rural and undeveloped areas, not to have pressurized hydranted water supply systems. For example, **Figure 11** displays fire hydrants located throughout Oshawa and as shown, they are found primarily in the southern half of the City. Alternate water supply sources can include the use of pumper apparatus that have portable tanks, such as a tanker shuttle and the use of reliable and accessible local water supplies. According to the Fire Underwriter's Survey, an Accredited Superior Tanker Shuttle Service is a recognized equivalency to hydrant protection if it meets all the requirements for accreditation. In areas without municipal water supply, a fire department should consider a water servicing strategy or formal plan for those areas requiring water flow for firefighting.

Although hydrants are mapped in **Figure 11** below, OFS has identified that there are several privately owned hydrants throughout the City, which are currently unknown to OFS.

Key Finding: It was identified that there are several privately owned hydrants located throughout the City. However, the City does not currently have an inventory of these hydrants.

Figure 11: Hydrants



4.1.2 Transportation Infrastructure

Transportation infrastructure within Oshawa is characterized by rail, major highways, a federal harbour and a municipal airport all of which are well connected and form a multimodal distribution network. As mentioned in **Section 2.3.1.1 – The Port of Oshawa**, the Port of Oshawa is a driver of the local economy and a critical component to the distribution of goods and services throughout the area. If a major incident were to occur at this port involving a fire or explosion of great magnitude, it could have significant consequential life safety, financial and/or environmental implications. Ensuring the resilience of this critical transportation infrastructure is essential in securing safe conditions at the port as well as Oshawa's status as a gateway to world markets.

4.1.3 Gas and Oil Infrastructure

There are three main gas and oil pipelines within the City of Oshawa; a natural gas pipeline (TransCanada Pipelines), an oil pipeline (TransNorthern Pipelines) as well as a crude oil pipeline (Enbridge Pipelines Inc.) (shown in **Figure 6**, **Section 2.2.3**). There are a number of risks associated with these types of materials due to their inherent properties and characteristics and the ways in which they are often transported. Natural gas, for example, is highly combustible and is explosive when placed under pressure. A pipeline rupture or leak could result in prolonged or uncontrolled product release requiring specialized emergency response and/or evacuation of the exposed surrounding area. Crude oil is a flammable liquid that can have a high or low flash point depending on the type. For this reason, it is important for local response agencies to understand the type of crude oil that is transported throughout the community and its physical and chemical properties. This is due to the fact that different variations in crude oil may require different response types or personal protective equipment. Pre-incident planning, training and exercise activities with the pipeline operator and other response partners is paramount to ensuring that the emergency response personnel are equipped with the right knowledge, skills and equipment needed to respond to a pipeline-related incident.[24] Establishing partnerships and procedures before an incident occurs is conducive to building awareness, and a safe and effective response. Public Safety

[24] Source: "Liquid Petroleum Pipeline Emergencies On-Scene Incident Commander Field Guide," NFPA Research Foundation, July 2016.

Response Partners are discussed further in **Section 7.0 – Public Safety Response Profile.**

4.1.4 Airport

Airports and airlines facilitate the movement of material goods and people, serving as gateways of connectivity to other municipalities and regions that can contribute to the economic growth and development of the City. They play an essential role in trade, commerce and product distribution and provide a major mechanism through which people travel. Airports also present unique hazards related to aircraft and supporting infrastructure. In addition to those using this type of transportation these hazards can include the use of aircraft fuel and the transportation of dangerous goods.

The Oshawa Executive Airport, located on Taunton Road West and Thornton Road North is the only aviation service provider within the City, which offers corporate business travel and general aviation services to the surrounding area. In the event of an emergency incident occurring at the airport, Fire Station 3 is the closest fire station that can provide fire protection services.

The Oshawa Executive Airport has their own Emergency Response Plan (as required by Canadian Aviation Regulations, S.O.R./96-433[25]) which considers all aviation related emergency scenarios that might occur both on and off airport grounds. The Oshawa Fire Services is the primary fire protection service provider for the Oshawa Executive Airport performing simulated training exercises for aircraft fire incidents while following Canadian aviation regulations.

Airport staff and tenants are also participants in the City of Oshawa's annual emergency exercise training program that also includes Durham Regional Police Services, the Oshawa Fire Services and the Whitby Fire Services, among others.

Special Consideration: The Oshawa Executive Airport presents a number of unique fire related risks associated with aircraft, supporting infrastructure and the potential transportation of dangerous goods requiring specialized fire protection services.

[25] Source: Canadian Aviation Regulations, SOR/96-433, Section 302.202 – Airport Emergency Plan, last amended August 8, 2019, Government of Canada Justice Laws Page

5.0 Demographic Profile

As referenced in **O. Reg. 378/18**, the demographic profile assessment includes analysis of the composition of the community's population, respecting matters relevant to the community such as population size and dispersion, age, gender, cultural background, level of education, socioeconomic make-up and transient population. The following sections consider these demographic characteristics within the City of Oshawa.

5.1 Population and Dispersion

Between 2001 and 2021, the City of Oshawa's population increased steadily from 139,051 to 175,383 people, representing a 26.13% population increase over two decades. This growth includes an approximate 10% increase from 2016 to 2021.

Table 13 shows that over the 20 years the number of total private dwellings has also increased by over 25%.

Table 13: Historic Growth in Population and Households - Oshawa

Year	Population	% Change from Previous Five Year Period	Total Private Dwellings	% Change from Previous Five Year Period
2001	139,051	No Data	53,298	No Data
2006	141,590	1.83%	57,469	7.83%
2011	149,607	5.66%	58,797	2.31%
2016	159,458	6.58%	64,883	10.35%
2021	175,383	9.99%	66,634	2.70%

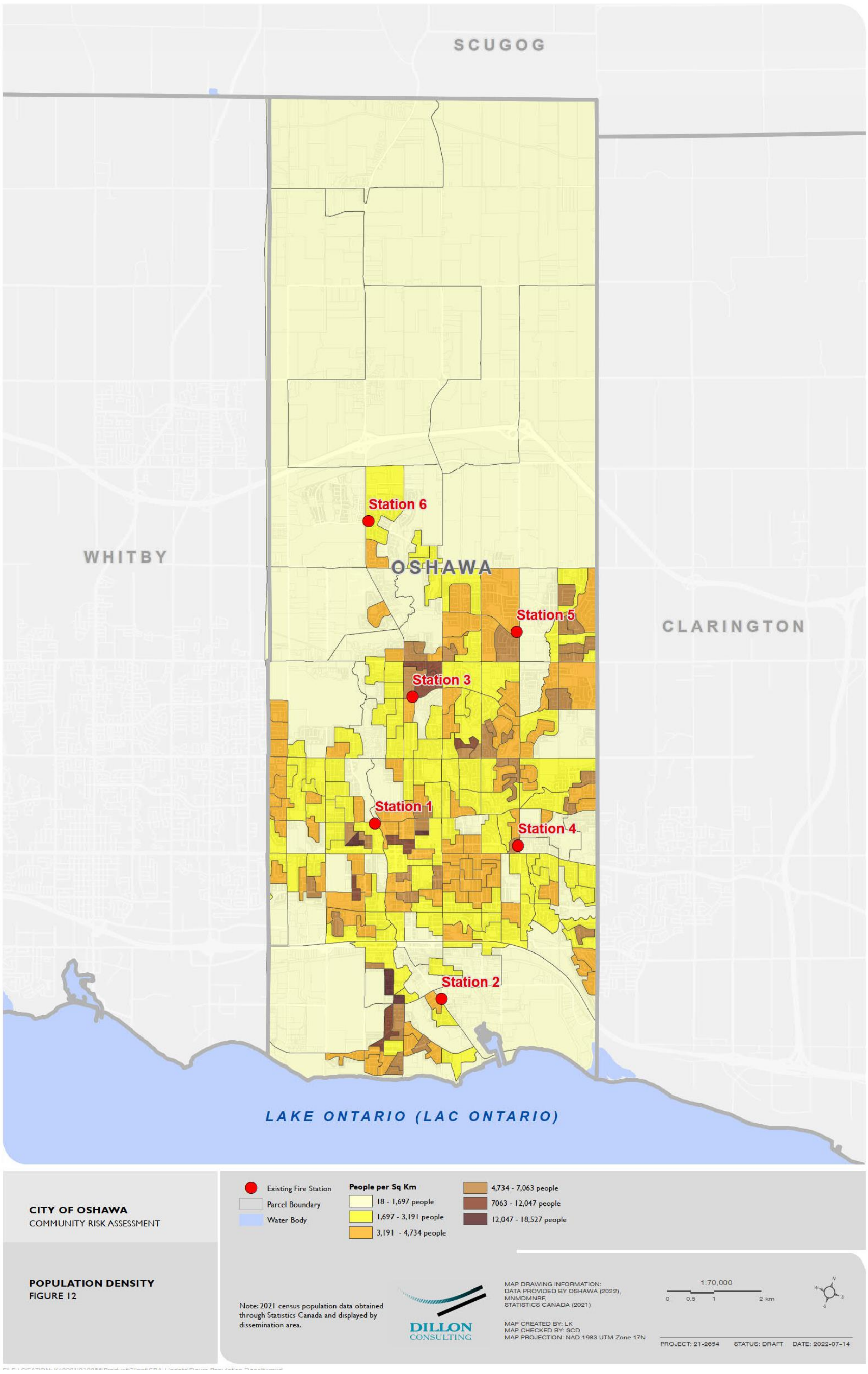
Source: 2021, 2016[26], 2011[27], 2006[28], 2001[29] Census, Statistics Canada

5.1.1 Mapping Population Dispersion

The dispersion of the population is presented in **Figure 12**. Areas of the City most densely populated are found in areas south of Provincial Highway 401, the residential area north of Station 3 and in the City's downtown core.

[26] Statistics Canada. 2022. (table). Census Profile. 2021 Census of Population. Statistics Canada Catalogue no. 98-316-X2021001. Ottawa. Released April 27, 2022.
Statistics Canada 2021 Census Page (accessed June 22, 2022).
Statistics Canada. 2017. Oshawa, CY [Census subdivision], Ontario and Ontario [Province] (table). Census Profile. 2016 Census. Statistics Canada Catalogue no. 98-316-X2016001. Ottawa. Released November 29, 2017.
[27] Statistics Canada. 2012. Oshawa, Ontario (Code 3518013) and Ontario (Code 35) (table). Census Profile. 2011 Census. Statistics Canada Catalogue no. 98-316-XWE. Ottawa. Released October 24, 2012.
[28] Statistics Canada. 2007. Oshawa, Ontario (Code3518013) (table). 2006 Community Profiles. 2006 Census. Statistics Canada Catalogue no. 92-591-XWE. Ottawa. Released March 13, 2007.
Statistics Canada 2006 Census Page
(accessed November 26, 2019)
[29] Statistics Canada. (updated 2012). Population and Dwelling Counts, for Canada and Census Subdivisions (Municipalities), 2001 and 1996 Censuses. Retrieved from Statistics Canada Archived Census Page

Figure 12: Population Density – City of Oshawa



5.2 Population Age

A community's population by age is an important factor in identifying specific measures to mitigate risks associated with a specific age group, such as seniors. Canada's aging population has been recognized as one of the most significant demographic trends. According to Statistics Canada, from 2016 to 2021 Canada experienced a large increase in the proportion of seniors due to the baby boomer generation reaching the age of 65. There are more Canadians over the age of 65 (19.0% of the population) than there were children aged 14 years and younger (16.3%).[30]

Seniors (those 65 years and over) are considered to represent one of the highest fire risk groups across the province based on residential fire death rate (fire deaths per million of population). **Figure 13** illustrates the results of an analysis revised by the OFM's Fire Statistics in November 2021. The figure illustrates fire death rate which is characterized by the number of fire fatalities per million of population. Through this analysis, seniors are identified at an increased risk of fatality in residential occupancies when compared to other age groups.

[30] Statistics Canada. (2022, June). Census of Population. Retrieved from Statistics Canada Census Program Page

Figure 13: 2008-2020 Residential Fire Death Rate by Age of Victim

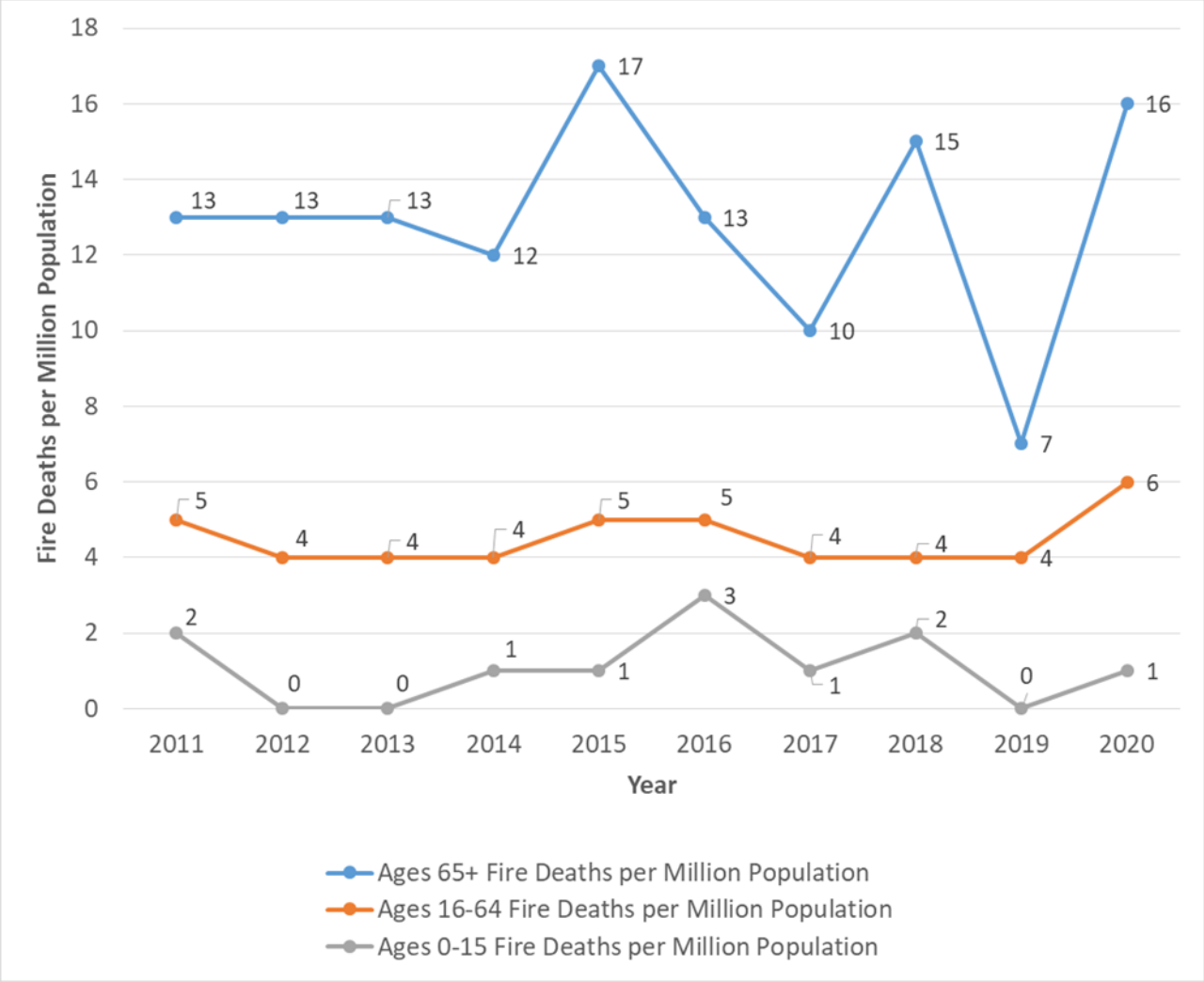


Figure Source: Adapted based on OFM reported residential fatal fires.[31]

Identifying a community's population by age category is a core component of developing the CRA and identifying specific measures to mitigate risks associated with a specific age group, such as seniors. The 2021Census identifies a total population of 175,383 for the City of Oshawa. The age distributions of the City's population and the Province of Ontario's population are summarized and compared in **Table 14** and further illustrated in

[31] Office of the Fire Marshal and Emergency Management. (Revised 2018, November). Ontario Residential Fatal Fires.

Figure 14 below.

Table 14: Population by Age Group – Oshawa and Ontario

Age	Oshawa Population	Oshawa %	Ontario Population	Ontario %
0 to 4 years	9,965	5.68%	683,515	4.80%
5 to 9 years	10,500	5.98%	764,430	5.37%
10 to 14 years	10,345	5.89%	803,850	6.65%
15 to 19 years	9, 680	5.51%	801,455	6.63%
20 to 24 years	10,800	6.15%	895,600	6.29%
25 to 44 years	38,000	21.66%	3,794,800	26.67%
45 to 54 years	21,695	12.37%	1,835,850	12.90%
55 to 64 years	23,750	12.40%	2,006,735	14.10%
65 to 74 years	8605	4.09%	1,504,495	10.57%
75 to 84 years	8,925	5.08%	794,595	5.58%
85 + years	3,825	2.18%	338,620	2.38%
Total	**175,383**[32]	**100.00%**	**14,223,942**	**100.00%**
Median Age of the Population	39.2	-	41.6	-
Population aged 14 and under	**30,805**	**17.6%**	**2,251,795**	**15.83%**
Population aged 65 and over	**29,325**	**16.7%**	**2,637,710**	**18.54%**

Source: 2021 Census, Statistics Canada[33]

[32] For the purposes of this C.R.A., the total population counts provided are a sum of the values provided by Statistics Canada. Of note, these totals may be different from the totals provided by Statistics Canada because of the following "Statistics Canada is committed to protect the privacy of all Canadians and the confidentiality of the data they provide to us. As part of this commitment, some population counts of geographic areas are adjusted in order to ensure confidentiality. The adjustment to counts of the total population for any dissemination block is controlled to ensure that the population counts for dissemination areas will always be within 5 of the actual values. The adjustment has no impact on the population counts of census divisions and large census subdivisions."

[33] Statistics Canada 2021 Census Profile Table Page

Overall, the City and the Province show similar age distributions. The youngest demographic (those 14 years of age and under) represents 17.6% of the City's total population, similar in comparison to the Province. While at a lower risk of fatality in residential occupancies overall when compared to seniors or adults, youth (aged 14 years and under) represent an important demographic for the purposes of public education. As a result, there should be public education and prevention programs targeted to this demographic. Structured education programs consistently provided to children and youth can help to engrain fire and life safety awareness and knowledge into future generations.

The percentage of the population aged 65 years and older in Oshawa is slightly lower to that of the Province. An additional 24.77% of the City's population falls between the age group of 45 and 64 who are aging towards the senior's demographic of 65 years of age and older. Based on historic residential fire fatality data, this population will soon become seniors who will be at greater risk.

These demographic trends are important considerations for the development of informed targeted public education programs and risk reduction strategies within the community.

Figure 14: Population Distribution – City of Oshawa and Province of Ontario

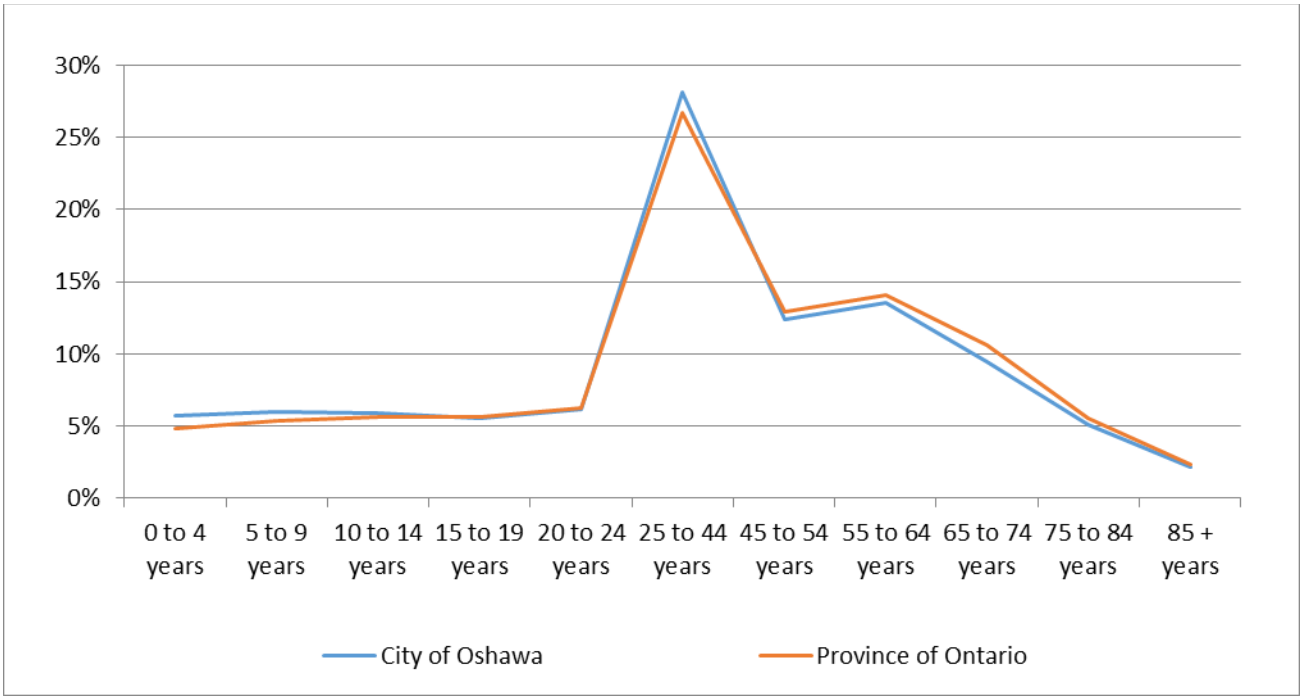


Figure Source: 2021 Census, Statistics Canada[34]

Key Finding: The 2021 Census data indicates that children aged 14 and under represent 17.6% (30,805) of the City's total population.

Identified Risk: Seniors (those 65 years and over) are considered to represent one of the highest fire risk groups across the Province based on residential fire death rate. According to the 2021 Census, seniors represent 16.7% (29,325) of the City's total population.

Key Finding: Of the City's total population, 24.77% (45,445) fall into the age range of 45 to 64, representing a cohort aging towards the seniors demographic of 65 years or older.

5.2.1 Mapping Population Age

To understand the spatial distribution of population by age across the City, 2021 Census data was mapped by dissemination area. **Figure 15** presents the distribution of the senior population (65 and older) and **Figure 16** shows the distribution of youth (0 to

[34] Ibid.

14 years). **Figure 15** shows that a higher proportion of seniors reside in the downtown area with notable clusters west of Harmony Road North, on and slightly north of King Street East. There is also a higher concentration of seniors living in the Centennial neighbourhood south of Fire Station 3 and in the area west of Harmony Road North near Rossland Road East. **Figure 16** shows a higher proportion of youth (0-14 years) concentrated along Lake Ontario in the Lakeview Park neighbourhood, in the Taunton neighbourhood between Townline Road North and Wilson Road North as well as in the Kedron neighbourhood between Ritson Road North and Simcoe Street North. (It is noted that due to how Statistics Canada delineates census areas, some of these areas may contain industrial uses.)The identified areas observed and presented in both figures could be targeted for relevant public education and fire life safety programming.

Figure 15: Percentage of Population Aged 65 and Older by Dissemination Area

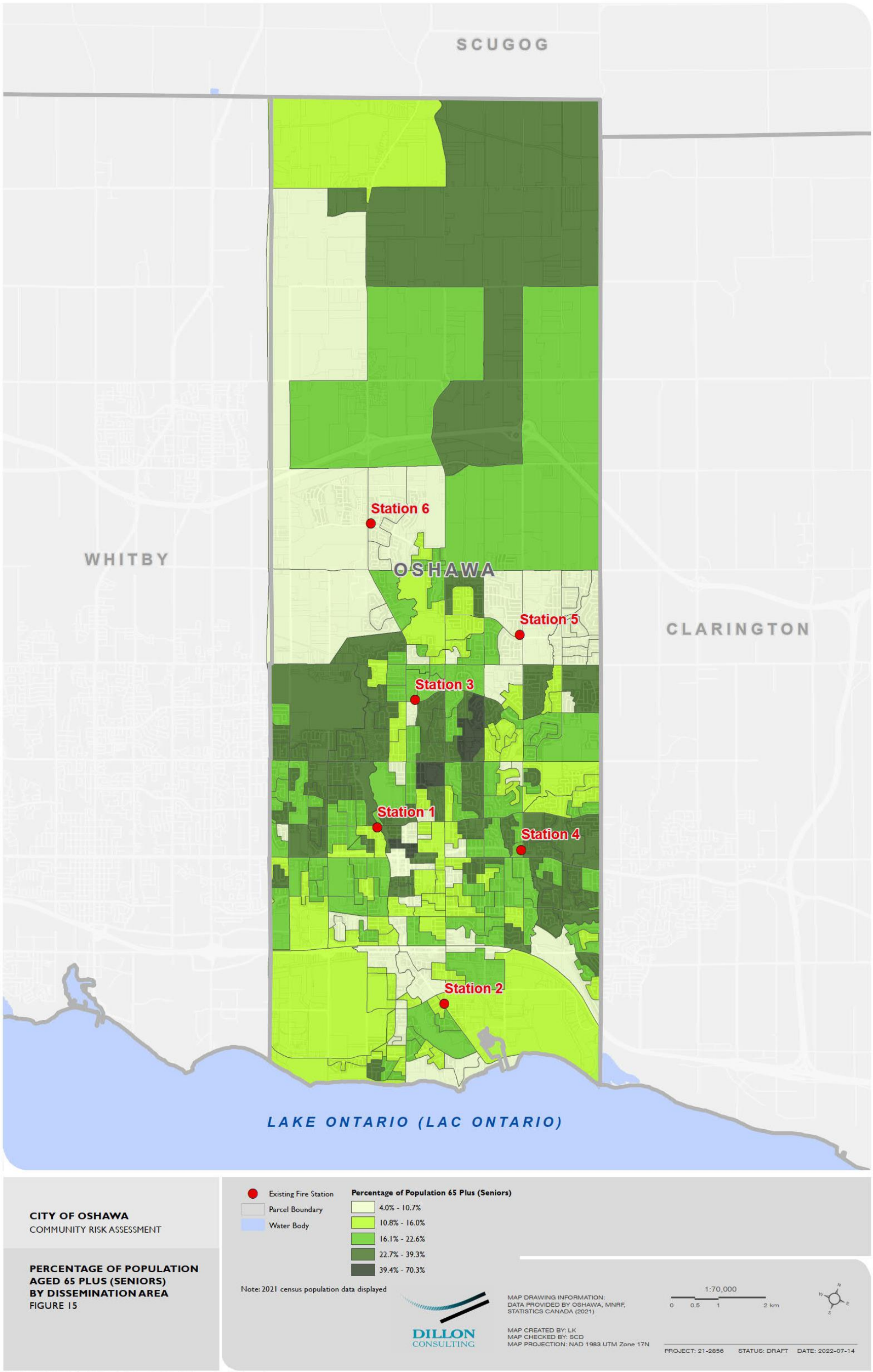
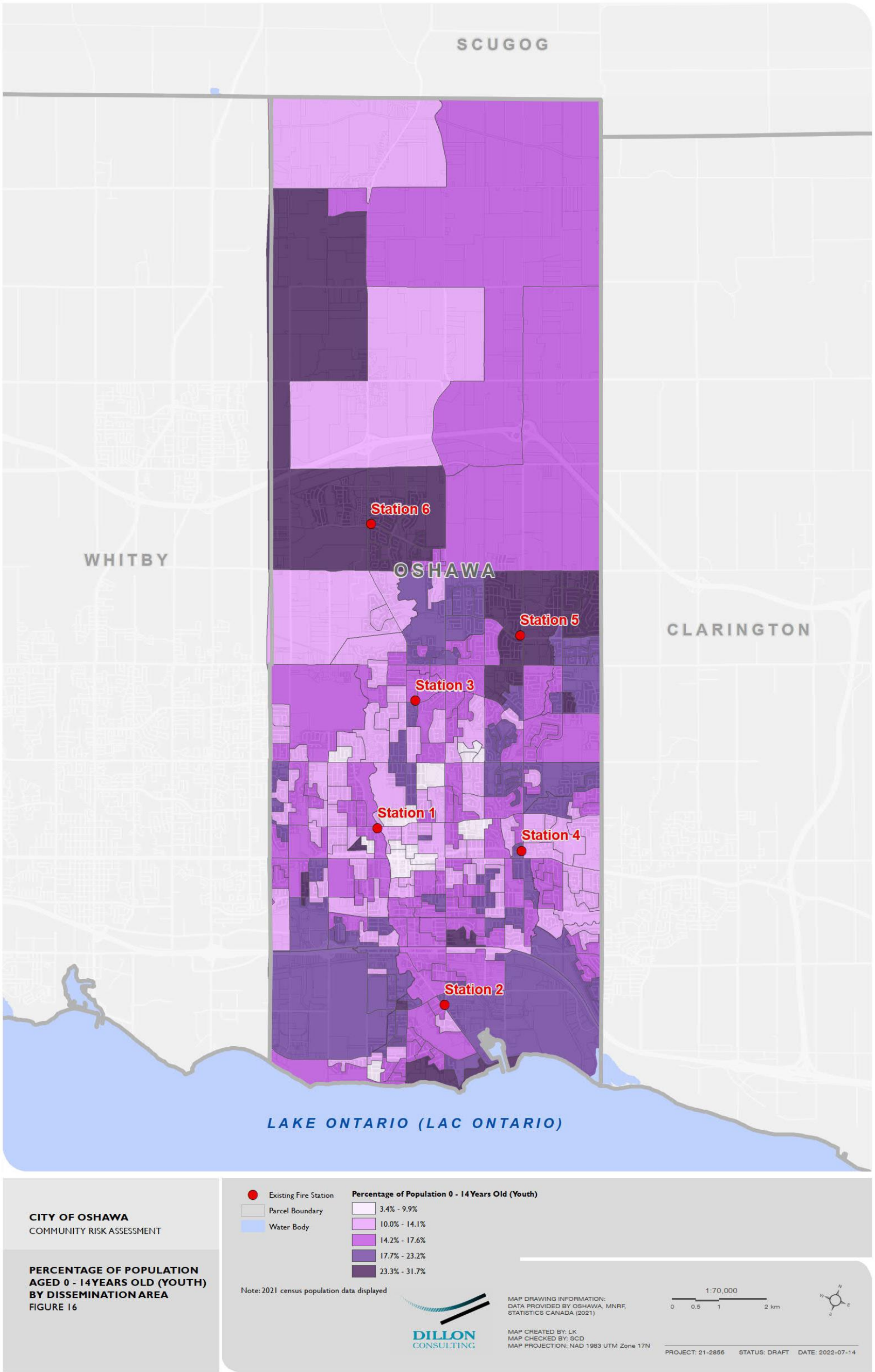


Figure 16: Percentage of Population Age 0-14 Years Old by Dissemination Area



5.3 Gender

NFPA 1730 considers gender as part of a Community Risk Assessment due to the finding that, based on historic data, males are more likely to be injured or lose their life in a fire. **Table 15** displays the gender distribution by age for the City of Oshawa. The proportion of males versus females is fairly even at 49.02% male and 50.98% female, as would be expected. When specific age groups are reviewed, there are minor variations. One of the greater differences is the proportion of males (35.81%) compared to females (64.19%) for the 85 years and over age group. Based on these statistics, it is not anticipated that public education programming would be refined based on gender. The impact of gender distribution on public education programming would be more notable in a community with unique demographics such as those that have transient populations due to employment, for example.

Table 15: Gender Distribution by Age Group – Oshawa

Age Group	Total Population	Male Population	% of Population, Male	Female Population	% of Population, Female
0 to 4 years	9,965	5,125	51.45%	4,835	48.55%
5 to 9 years	10,500	5,435	51.76%	5,060	48.24%
10 to 14 years	10,345	5,275	50.99%	5,065	49.01%
15 to 19 years	9,680	5,110	62.78%	4,570	47.22%
20 to 24 years	10,800	5,560	51.48%	5,235	48.52%
25 to 44 years	49,325	24,305	49.27%	25,105	50.73%
45 to 54 years	21,695	10,680	49.22%	11,020	50.78%
55 to 64 years	23,750	11,560	48.67%	12,185	51.33%
65 to 74 years	16,570	7,605	45.89%	8,965	54.11%
75 to 84 years	8,925	3,945	44.20%	4,985	55.80%
85 + years	3,825	1,370	35.81%	2,455	64.19%
Total	**175,380**	**85,980**	**49.02%**	**89,400**	**50.98**

Source: 2021 Census, Statistics Canada[35]

[35] Statistics Canada. 2017. Oshawa, CY [Census subdivision], Ontario and Ontario [Province] (table). Census Profile. 2016 Census. Statistics Canada Catalogue no. 98-316-X2016001. Ottawa. Released November 29, 2017. Statistics Canada 2016 Census Page (accessed November 26, 2019).

5.4 Socioeconomic Circumstances

Socioeconomic circumstances of a community are known to have a significant impact on fire risk. Socioeconomic status is reflected in an individual's economic and social standing and is measured in a variety of ways. These factors can be reflected in the analysis of socioeconomic indicators such as labour force status, educational attainment and income as well as household tenure, occupancy, suitability, and cost.

Socioeconomic factors intersect in a number of ways and have direct and indirect impacts on fire risk. One such example is outlined in the OFM's Fire Risk Sub-Model.[36] The Sub-Model makes reference to the relationship between income and fire risk. As one consideration, households with less disposable income may be less likely to purchase fire safety products (e.g., smoke alarms, fire extinguishers, etc.), which puts them at higher risk of experiencing consequences from a fire. Another consideration is that households living below the poverty line may have a higher number of persons per bedroom in a household and/or children who are more likely to be at home alone. These circumstances would impact both the probability and consequence of a fire. While these complex relationships between socioeconomic circumstances and the probability / consequence of a fire are not well understood, this CRA seeks to explore these factors.

The factors reviewed at a high level have been selected based on the data available from Statistics Canada. Socioeconomic factors such as income decile group and median household income have been displayed spatially throughout this section.

Factors that are highlighted in this section include:

- Labour force status
- Immigrant status
- Educational attainment
- Household tenure, occupancy, suitability, and cost

5.4.1 Labour Force Status

Those who are economically disadvantaged, including low-income families, the homeless and perhaps those living alone, may experience a higher fire risk. The OFM's

[36] Minister of the Solicitor General. (Modified 2016, February). Comprehensive Fire Safety Effectiveness Model: Fire Risk Sub-Model.

Fire Risk Sub-Model references a number of reports that suggest there is a correlation between income levels and fire risk. The reports identify the following factors:

- The higher number of vacant buildings found in low-income neighborhoods attract the homeless. This introduces risks such as careless smoking, drinking and unsafe heating practices.
- Building owners are less likely to repair building systems (electrical, mechanical, suppression) due to affordability, increasing fire risk from improper maintenance.
- Households with lower disposable income are less likely to purchase fire safety products (i.e. smoke alarms, extinguishers, cigarette ignition resistant furniture, etc.) due to affordability.
- Households with lower disposable income are more likely to have their utilities shut off due to non-payment, leading to increased risks related to unsafe heating, lighting and cooking practices.
- The 1981 report, "Fire-Cause Patterns for Different Socioeconomic Neighborhoods in Toledo, Ohio" determined that the incendiary fire rate in low-income neighbourhoods is 14.4 times higher compared to areas with the highest median income. Further, fires caused by smoking and children playing occurred at rates 8.5 and 14.2 times higher, respectively.
- Single parent families are more economically challenged due to the fact that there is only one income. These households also have fewer resources to arrange childcare, increasing the likelihood of fires caused by unsupervised children.
- Studies have shown that cigarette smoking is inversely related to income. In Canada, findings by the Centre for Chronic Disease Prevention and Control through the National Population Health Survey established that there were nearly twice as many smokers in the lowest income group when compared against the highest (38% vs. 21% respectively), and
- Those with low education and literacy levels are inhibited in their ability to read instruction manuals and warning labels and less likely to grasp fire safety messages.[37]

Labour force status is a possible indicator of income levels which directly influence fire risk (e.g. lower income, increased fire risk). The participation rate (i.e. the proportion of residents in the labour force) can also be an indicator of income and can be considered

[37] Ibid.

alongside unemployment rates (e.g. lower participation rate and higher unemployment could mean lower income, higher fire risk).

Labour force status, shown in **Table 16** below, shows that the City of Oshawa has a lower participation rate than the Province of Ontario (62.10% versus 64.70%). This would suggest that the City faces a slightly higher fire risk in comparison to the Province from the perspective of labour force.

Table 16: Labour Force Status – Oshawa and Ontario

Status	Oshawa Population	Oshawa %	Ontario Population	Ontario %
In the Labour Force[38]	81,425	62.10%	7,141,675	64.70%
Employed	73,470	56.04%	6,612,150	59.90%
Unemployed	7,955	6.07%	529,525	4.80%
Not in the Labour Force	49,685	37.90%	3,896,765	35.30%
Total	**131,110[39]**	**100.00%**	**11,038,440**	**100.00%**

Source: 2016 Census, Statistics Canada[40]

[38] The category 'In the Labour Force' is a subtotal of the following categories: employed and unemployed.
[39] Total population reflects those aged 15 years and over by Labour force status – 25% sample data. According to statistics Canada this refers to whether a person aged 15 years and over was employed, unemployed or not in the labour force during the week of Sunday, May 1 to Saturday, May 7, 2016.
[40] Statistics Canada. 2017. Oshawa, CY [Census subdivision], Ontario and Ontario [Province] (table). Census Profile. 2016 Census. Statistics Canada Catalogue no. 98-316-X2016001. Ottawa. Released November 29, 2017. Statistics Canada 2016 Census Page (accessed November 26, 2019)

5.4.2 Educational Attainment

The relationship between educational attainment and income is complex. An analysis conducted by Statistics Canada has found that high-income Canadians are generally more likely to be highly educated. Over two thirds (67.1%) of the top 1% had attained a university degree compared to 20.9% of all Canadians aged 15 and over.[41] Based on this national trend and for the purposes of this Community Risk Assessment it is assumed that a higher education leads to more disposable income and a lower fire risk. It is also assumed that households with more disposable income are more likely to invest in fire life safety products such as fire extinguishers and smoke alarms reducing the fire risk.

Table 17 displays educational attainment for the City of Oshawa and the Province of Ontario.

Table 17: Educational Attainment – City of Oshawa and Province of Ontario

Educational Attainment	Oshawa Population	Oshawa %	Ontario Population	Ontario %
No Certificate/Diploma/Degree	26,395	20.13%	1,935,355	17.53%
High School Diploma or Equivalent	42,195	32.18%	3,026,100	27.41%
Postsecondary Certificate; Diploma Or Degree	62,525	47.69%	6,076,985	55.05%
Total	**131,115[42]**	**100.00%**	**11,038,440**	**100.00%**

Source: 2016 Census, Statistics Canada[43]

[41] Statistics Canada. (Modified 2018, July). Education and occupation of high-income Canadians. Retrieved from Statistics Canada Archived Census Content Page

[42] According to Statistics Canada, the total population reflects the highest certificate, diploma or degree for the population aged 15 years and over in private households - 25% sample data.

[43] Statistics Canada. 2017. Oshawa, CY [Census subdivision], Ontario and Ontario [Province] (table). Census Profile. 2016 Census. Statistics Canada Catalogue no. 98-316-X2016001. Ottawa. Released November 29, 2017. https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/index.cfm?Lang=E (accessed November 26, 2019)

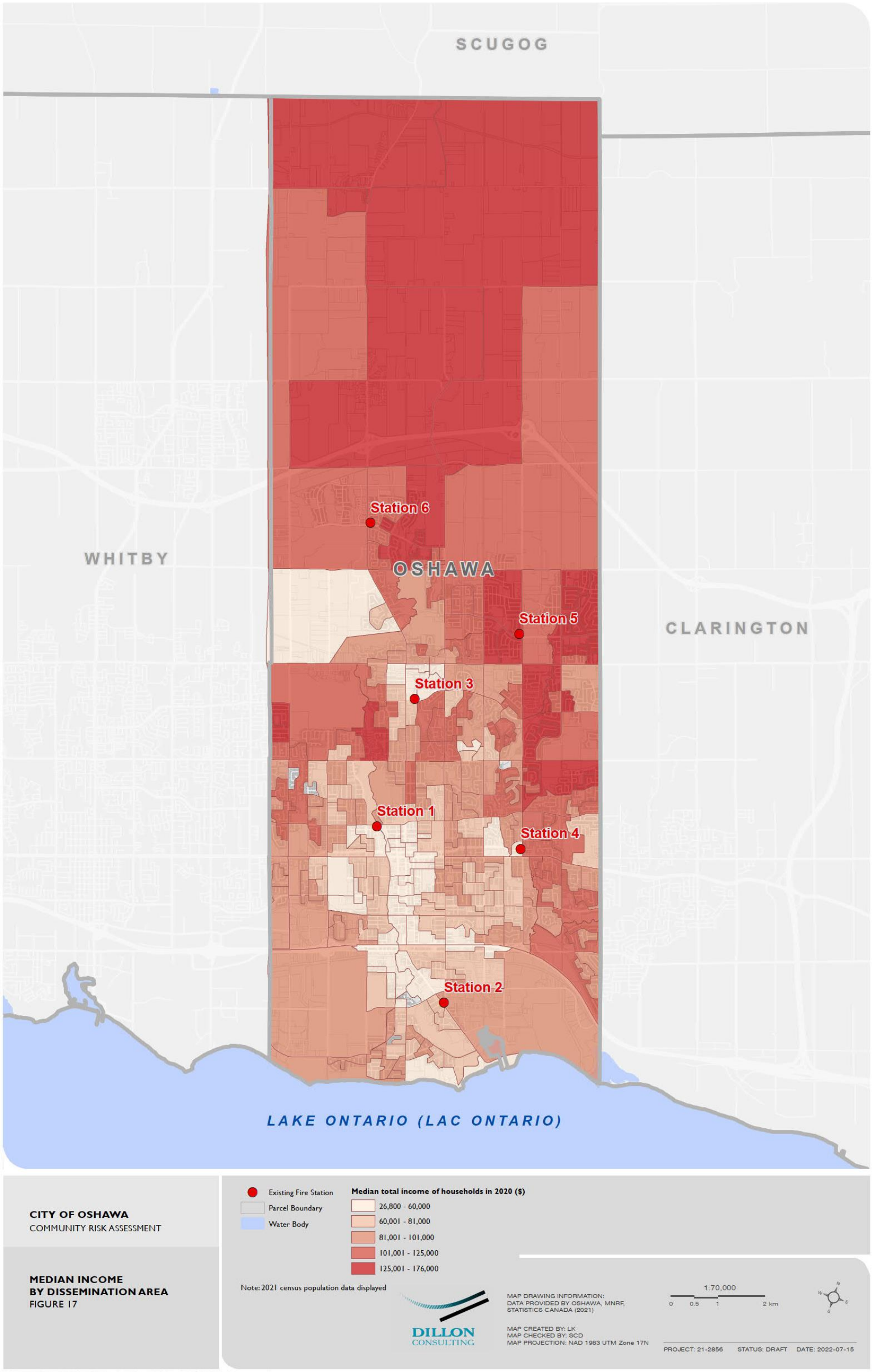
According to the 2016 Census, 47.69% of residents in Oshawa have a postsecondary Certificate, Diploma or Degree, which is 7.36% lower than the Province. This level of educational attainment could be linked to the median household incomes found in the City.

According to the 2021 Census, the median total income of households for Oshawa in 2020 was $86,000, slightly below the Provincial median total income per household of $91,000.

Mapping Income

Median household income across the City is displayed in **Figure 17**, indicating that households with a lower median income are clustered primarily in the areas south of Adelaide Avenue West (and Fire Station 1) and south of Provincial Highway 401, west of Fire Station 2.

Figure 17: Median Total Income of Households in 2020 by Dissemination Area



5.4.3 Income Decile Groups

Income can also be viewed through the lens of income decile groups. As stated by Statistics Canada, a "decile group provides a rough ranking of the economic situation of a person based on his or her relative position in the Canadian distribution of the adjusted after-tax income of economic families".[44] Economic family income decile group for the population in private households in Oshawa is presented in **Table 18** illustrating that a higher portion of the population within the City falls within the bottom distribution of income decile groups when compared to the overall population of the Province. These statistics may be suggestive of a slightly higher fire risk within the City from the perspective of income.

Table 18: Economic Family Income Decile Group for the Population in Private Households – Oshawa and Ontario

Decile Group	Oshawa Population	Oshawa %	Ontario Population	Ontario %
In the bottom half of the distribution	91,190	52.40%	6,520,565	46.47%
In the top half of the distribution	82,820	47.60%	7,511,190	53.53%
Total	**174,010[45]**	**100.00%**	**14,031,750**	**100.00%**

Source: 2021 Census, Statistics Canada[46]

[44] Statistics Canada. (Updated 2016). Income Decile Group. Retrieved from Statistics Canada Archived Content Page
[45] According to Statistics Canada, this total reflects economic family after-tax income decile group. The economic family income decile group provides a rough ranking of the economic situation of a person based on his or her relative position in the Canadian distribution of the adjusted after-tax income of economic families for all persons in private households. Using data from the 2016 Census of Population, the population in private households is sorted according to its adjusted after-tax family income and then divided into 10 equal groups each containing 10% of the population. The decile cut-points are the levels of adjusted after-tax family income that define the 10 groups. For the 2016 Census, the reference period is the calendar year 2015 for all income variables.
[46] Statistics Canada. 2022. (table). Census Profile. 2021 Census of Population. Statistics Canada Catalogue no. 98-316-X2021001. Ottawa. Released July 13, 2022. Statistics Canada 2021 Census Page (accessed July 14, 2022).

5.4.3.1 Mapping Income Decile Group

To understand the spatial distribution of income decile group, **Figure 18** and **Figure 19** display the percentages of the population in the bottom and top decile groups by dissemination area.[47] **Figure 18** shows that there are dissemination areas with a high percentage of the population in the bottom half of the income decile in the downtown area, southeast of Fire Station 1 and south of Provincial Highway 401 as well as the area along the Lake Ontario shoreline. **Figure 19** shows there are dissemination areas with a high percentage of the population in the top income decile in the neighbourhoods south of Taunton Road East and north of Adelaide Avenue West.

[47] Data obtained from Statistics Canada was used in the creation of both income decile maps. Some areas of the City are not included within the income decile group maps. According to the dataset obtained through Statistics Canada and viewed in the Beyond 20/20 data viewer, these areas were suppressed to meet the confidentiality requirements of the Statistics Act.

Figure 18: Percentage of Bottom Income Decile by Dissemination Area

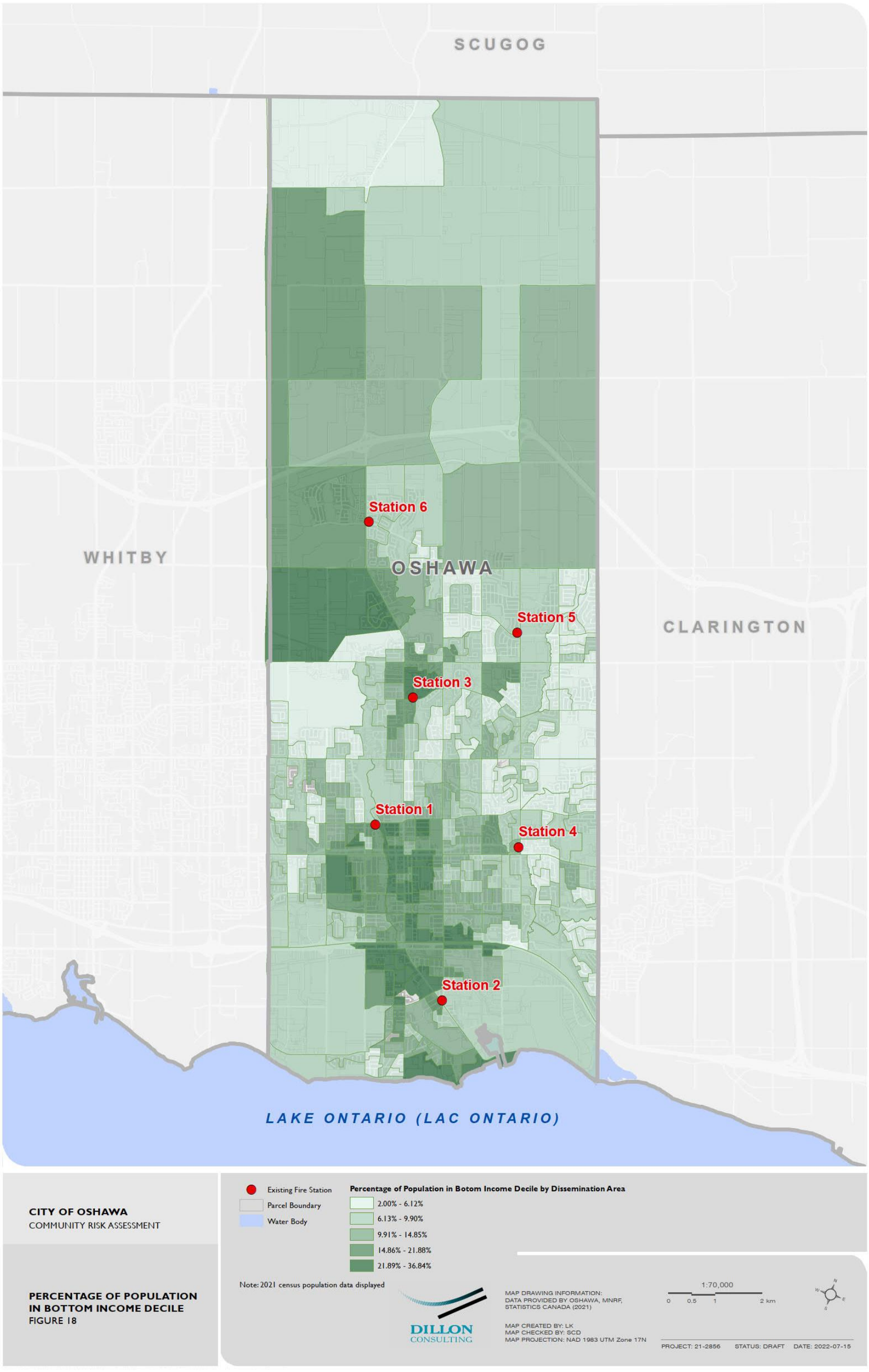
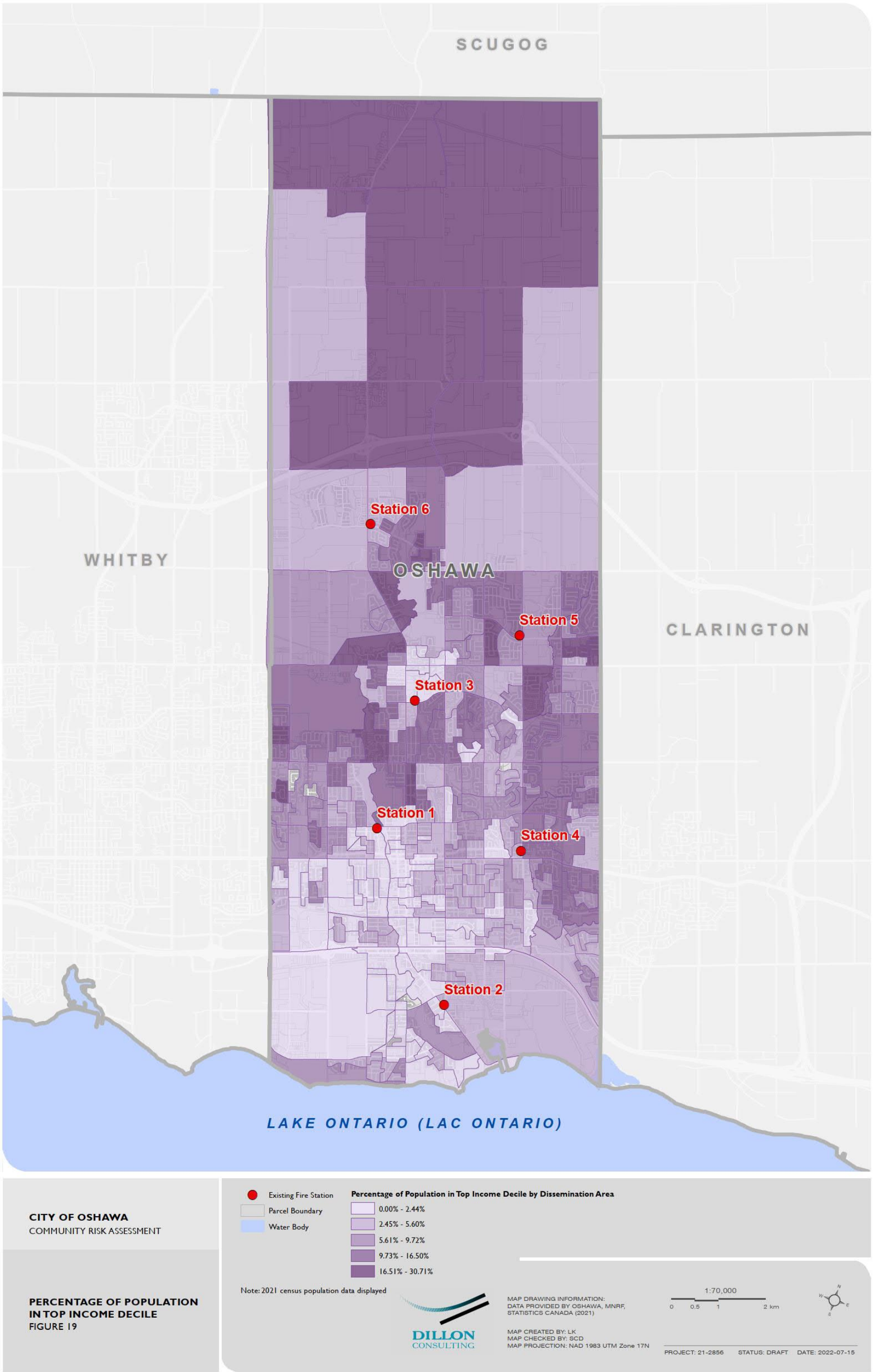


Figure 19: Percentage of Top Income Decile by Dissemination Area



5.4.4 Household Tenure, Occupancy, Suitability and Costs

Table 19 summarizes household statistics for the City of Oshawa and the Province of Ontario including tenure, occupancy, suitability and costs.

5.4.4.1 Housing Tenure

Housing tenure reflects socioeconomic status whereby a low home ownership rate may reflect lower incomes in the community and a higher overall fire risk. The City has a slightly lower proportion of dwellings that are owned versus rented when compared to the Province (68.50% owned in Oshawa versus 69.78% in the Province).

5.4.4.2 Occupancy

A higher proportion of multiple persons per household can result in increased fire loss (consequence) resulting in a higher risk. There are 595 households (0.95% of total households) that have more than one person per room in Oshawa. This reflects a lower percentage compared to the Province where 2.37% of households have more than one person per room.

5.4.4.3 Suitability

The 2016 Census reports on housing suitability which, according to Statistics Canada, refers whether a private household is a suitable accommodation according to the National Occupancy Standard. Suitable accommodations are defined by whether the dwelling has enough bedrooms based on the ages and relationships among household members. Based on this measure, 4.40% (or 2,755 households) are classified as “not suitable” within the City compared to 6.02% for the Province as a whole (resulting in nearly 311,005 “not suitable” households across Ontario). From the perspective of housing suitability, the City has a potential lower fire risk than that of the Provincial statistics.

5.4.4.4 Housing Costs

The cost of shelter may also be indicative of the amount of disposable income within a household. Households with less disposable income have fewer funds to purchase household fire life safety items resulting in a higher risk. In Oshawa, 29.70% of households spend 30% or more of the household total income on shelter costs. This is

2.05% higher than the Province, where 27.65% of households spend 30% or more of income on shelter costs.

Looking closer at shelter costs, the median value of dwellings in Oshawa is $370,343 ($30,153 less than the Province). The City also has a lower median monthly shelter costs for owned and rented dwellings than the Province.

Table 19: Household Tenure, Occupancy, Suitability and Costs – Oshawa and Ontario

Type	Oshawa	%	Ontario	%
Household Tenure	**Oshawa**	**%**	**Ontario**	**%**
Owner	42,875	68.50%	3,601,825	69.78%
enter	19,720	31.50%	1,559,720	30.22%
Total Households	62,595[48]	100.00%	5,161,545	100.00%
Household Occupancy	**Oshawa**	**%**	**Ontario**	**%**
One person or fewer per room	62,000	99.05%	5,046,810	97.63%
More than one person per room	595	0.95%	122,360	2.37%
Total Households	62,595[49]	100.00%	5,169,170	100.00%
Housing Suitability	**Oshawa**	**%**	**Ontario**	**%**
Suitable	59,840	95.60%	4,858,170	93.98%
Not suitable	2,755	4.40%	311,005	6.02%
Total Households	62,595[50]	100.00%	5,169,175	100.00%

[48] According to Statistics Canada, the total households refers to owner and tenant households with household total income greater than zero, in non-farm, non-reserve private dwellings by shelter-cost-to-income ratio - 25% sample data.
[49] According to Statistics Canada, the total households here refers to private households by number of persons per room - 25% sample data.
[50] According to Statistics Canada, the total households refers to private households by housing suitability - 25% sample data.

Type	Oshawa	%	Ontario	%
Shelter Costs	**Oshawa**	**%**	**Ontario**	**%**
Spending less than 30% of household total income on shelter costs	43,970	70.30%	3,694,385	72.35%
Spending 30% or more of household total income on shelter costs	18,575	29.70%	1,411,900	27.65%
Total Households	62,545[51]	100.00%	5,106,285	100.00%
Median value of dwellings	$370,343	100.00%	$400,496	100.00%
Median monthly shelter costs for owned dwellings	$1,396	100.00%	$1,299	100.00%
Median monthly shelter costs for rented dwellings	$1,015	100.00%	$1,045	100.00%

Source: 2016 Census, Statistics Canada[52]

5.4.5 Durham Region Healthy Neighbourhoods

The Durham Region Healthy Neighbourhoods project provides an overview of the 50 healthy neighbourhoods identified by the Region of Durham, presenting various indicators that provide information about the demographics and health of each community. The goal of this project is to use this information to improve the health and well-being of all residents across the Region. The results of the healthy neighbourhood review can help inform the City of Oshawa regarding the health and well-being of the residents of the City in relation to the Region as a whole.

[51] According to Statistics Canada, the total household count refers to owner and tenant households with household total income greater than zero, in non-farm, non-reserve private dwellings by shelter-cost-to-income ratio - 25% sample data.
[52] Statistics Canada. 2017. Oshawa, CY [Census subdivision], Ontario and Ontario [Province] (table). Census Profile. 2016 Census. Statistics Canada Catalogue no. 98-316-X2016001. Ottawa. Released November 29, 2017. Statistics Canada 2016 Census Page (accessed November 26, 2019)

In summary, the healthy neighbourhood profile for the City of Oshawa identified the following areas in which the rate or percentage for each demographic indicator was higher in the City of Oshawa when compared to the region:

- Higher percentage of senior demographic
- Higher percentage of female-lone parent families
- Higher percentage of seniors living alone
- Higher percentage of low income
- Higher percentage of children less than six years of age in low income households
- Higher percentage of high school education not completed
- Higher unemployment rate
- Higher aboriginal population[53]

5.5 Cultural Background and Language Considerations

Cultural background and language considerations can be factors for fire service providers to consider in developing and delivering programs related to fire prevention and public education. Communication barriers, in terms of language and the ability to read written material, may have an impact on the success of these programs. There may also be familiarity challenges related to fire safety standards within recent immigrant populations. A high proportion of immigrants could demonstrate a large population that has a potential for unfamiliarity with local fire life safety practices and/or may experience possible language barriers. **Table 20** summarizes the immigration status of Oshawa's population. The City has a lower proportion of newcomers (17.11%) when compared to Ontario (29.09%). This population should be monitored as new Census data becomes available for consideration when planning public education programs and materials.

[53] Durham Region (n.d.). Healthy Neighbourhoods. Retrieved March 9 2020 from Durham Region Health Neighbourhoods Page

Table 20: Immigration Status – Oshawa and Ontario

Immigration Status	Oshawa Population	Oshawa %	Ontario Population	Ontario %
Non-immigrants	129,685	82.27%	9,188,815	69.39%
Immigrants	26,970	17.11%	3,852,150	29.09%
Before 1981	11,925	7.57%	1,077,745	8.14%
1981 to 1990	3,765	2.39%	513,995	3.88%
1991 to 2000	4,290	2.72%	834,510	6.30%
2001 to 2005	2,620	1.66%	490,560	3.70%
2006 to 2010	2,420	1.54%	463,170	3.50%
2011 to 2016	1,950	1.24%	472,170	3.57%
Non-permanent residents	970	0.62%	201,200	1.52%
Total	**157,625**[54]	**100.00%**	**13,242,165**	**100.00%**

Source: 2016 Census, Statistics Canada[55]

Knowledge of official languages based on the 2016 Census is included in **Table 21** for the City of Oshawa and Province of Ontario. As shown, 92.81% of the population in the City speak English only, 6.47% possess knowledge of both English and French, 0.63% have no knowledge of English or French, and 140 people speak French only. The potential for communication barriers should be considered and monitored, especially as the City continues to grow in the future.

[54] According to Statistics Canada, the total population count refers to Immigrant status and period of immigration for the population in private households - 25% sample data.
[55] Statistics Canada. 2017. Oshawa [Census metropolitan area], Ontario and Ontario [Province] (table). Census Profile. 2016 Census. Statistics Canada Catalogue no. 98-316-X2016001. Ottawa. Released November 29, 2017. Statistics Canada 2016 Census Page (accessed November 26, 2019).

Table 21: Knowledge of Official Language – Oshawa and Ontario

Language	Oshawa Total	Oshawa %	Ontario Total	Ontario %
English Only	146,650	92.81%	11,455,500	86.05%
French Only	140	0.09%	40,040	0.30%
English and French	10,225	6.47%	1,490,390	11.20%
Neither English nor French	990	0.63%	326,935	2.46%
Total population (non-institutional)	**158,005**	**100.00%**	**13,312,865**	**100.00%**

Source: 2016 Census, Statistics Canada[56]

5.6 Transient Populations

Ontario Regulation 378/18 requires the consideration of "transient population". This refers to the concept of population shift where the population within a community can shift at various times during the day or week or throughout the year. Population shift can be a result of a number of factors including employment, tourism, and education. In some municipalities, residents regularly leave the community for employment. This can contribute to increased traffic resulting in an increase in the number of motor vehicle calls. Other communities may be major tourist and vacation destinations resulting in large population shifts related to seasonal availability of tourism activities. This can result in an increased risk due to overnight tourism accommodation (sleeping) which can impact the demand for fire protection services. Educational institutions can attract a transient student population who commute to school daily or reside in dormitories or student housing on a seasonal basis. Student accommodations and short term rental units present unique fire safety issues that may be attributed to the conversion of houses into boarding houses or rooming house type accommodations that do not conform to the OFC or OBC These properties are not always known to the fire department, posing a challenge for fire prevention division staff responsible for fire code enforcement.

[56] Ibid.

5.6.1 Tourism

An increase in tourism can result in an increased risk due to overnight tourism accommodation which can impact the demand for fire protection services. There are several events each year and attractions that draw residents and non-residents to the City of Oshawa. Annual festivals and events include AutoFest, Bikes on Bond, Purple Wood's Maple Syrup Festival, Fiesta Week and Canada Day. These events do not appear to cause a significant shift in population in terms of tourism accommodation; however, they may provide opportunities for OFS to distribute fire and life safety information to large numbers of people.

5.6.2 Education

Educational institutions are a key source for population shift in larger communities as they attract people from outside of the typical community. They are important to consider since they may have school-based residences, or contribute to a population that is not captured through the census. There are several educational institutions in the City of Oshawa including Ontario Tech University, Trillium College, Durham College, Trent University -Oshawa Campus and Queen's University School of Medicine - Oshawa Campus suggesting that there is a need for targeted education programs geared towards fire safety and prevention in student housing.

5.6.3 Employment

Commuter populations represent a significant portion of Oshawa's labour force. **Table** 22 shows the commuting destination trends for the residents of Oshawa based on 2016 Census data. (This is based on the employed labour force aged 15 years and over in private households with a usual place of work (25% sample data)). It appears that a large portion of the City's labour force (20,075) commutes to a different census subdivision. An additional 16,700 commute to a different census division within the province.

A shift in commuter population may impact the demand for fire protection services. These figures are important from a fire suppression standpoint as large numbers of person commuting to and from work could increase the number of vehicle collision calls to which the fire service responds.

Table 22: Commuting Destinations – City of Oshawa

Commuting Destination	Population
Commute within census subdivision of residence	23,050
Commute to a different census subdivision[57] within census division[58] of residence	20,075
Commute to a different census subdivision and census division within province or territory of residence	16,700
Commute to a different province or territory	155
Total	**59,985**

Source: 2016 Census, Statistics Canada[59]

[57] Census subdivision is defined by Statistics Canada as "the general term for municipalities (as determined by provincial/territorial legislation) or areas treated as municipal equivalents for statistical purposes" Source: Statistics Canada Census Subdivision Page

[58] Census division is defined by Statistics Canada as "the general term for provincially legislated areas (such as county, municipalité régionale de comté and regional district) or their equivalents. Census divisions are intermediate geographic areas between the province/territory level and the municipality (census subdivision). Source: Statistics Canada Census Division Page

[59] Statistics Canada. 2017. Oshawa [Census metropolitan area], Ontario and Ontario [Province] (table). Census Profile. 2016 Census. Statistics Canada Catalogue no. 98-316-X2016001. Ottawa. Released November 29, 2017. https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/index.cfm?Lang=E (accessed November 26, 2019).

Another way to measure this population shift is based on traffic counts. The Transportation Tomorrow Survey (TTS) is a comprehensive travel survey conducted every five years, providing insight into the travel habits of residents in the Greater Toronto, Hamilton and surrounding areas, including the City of Oshawa.

The most recent TTS reporting year (2016) indicates that, in a 24 hour period, 306,500 trips are made by the residents of Oshawa. Of the 306,500 trips made in a 24 hour period, the majority were made by drivers as the main mode of travel. Similarly, 309,900 trips are made to Oshawa by residents of the surrounding TTS Area in a 24 hour period.[60]

High commuter volumes (due to an individual's journey to work or school) can have a significant impact on transit and traffic, increasing the likelihood of vehicle collisions with the possibility of higher call volumes during peak commuting times in the morning and late afternoon. This could potentially impact emergency response times within the City.

Identified Risk: The City's commuter population presents a factor that may impact traffic congestion, and the potential occurrence of motor vehicle accidents within the City.

[60] Data Management Group, University of Toronto. (2018, March). Transportation Tomorrow Survey 2016 (PDF File). Retrieved from Transportation Tomorrow Survey Online PDF

6.0 Hazard Profile

As referenced in the **O. Reg. 378/18**, the hazard profile assessment includes analysis of the hazards within the community, including natural hazards, hazards caused by humans, and technological hazards to which fire departments may be expected to respond, that may have a significant impact on the community. This section considers these hazards within the City of Oshawa.

6.1 Hazard Identification and Risk Assessment in Ontario (HIRA)

A hazard is defined as a phenomenon, substance, human activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage. Hazards can be natural, human-caused or technological. It is important to identify and consider these hazards from a fire risk, emergency response and overall public safety perspective in order to assist local governments and emergency management personnel plan for the risks within their communities and take the appropriate action to reduce future losses.

Under the Emergency Management and Civil Protection Act (EMCPA), municipalities are required to 'identify and assess the various hazards and risks to public safety that could give rise to emergencies and identify the facilities and other elements of the infrastructure that are at risk of being affected by emergencies'. 2002, c. 14, s. 4. The OFM has recently released methodology guidelines outlining a process for the development of an HIRA program, to assist municipalities in assessing their local hazards and potential risks.

Current legislation requires an annual review and update of the municipally developed HIRA

6.1.1 HIRA and the CRA

The OFM TG-02-2019 and OFM "Question and Answers" provide guidance on the role of a completed HIRA in the context of a Community Risk Assessment. The guidelines acknowledge that these processes are separate but complementary. The OFM "Question and Answers" states that the CRA process "may result in decisions about fire department responses to various types of emergencies identified in a completed HIRA".

A HIRA is a comprehensive process to identify the hazards to a community as a whole. A CRA provides an opportunity to examine the impact that these hazards would have on the services provided by a fire department. For the purposes of this CRA, a "fire protection services" lens will be applied to the top hazards as identified through the municipal led HIRA.

6.2 City of Oshawa Hazard Identification and Risk Assessment

The City's Hazard Identification and Risk Assessment was reviewed and updated as recently as 2022 indicating that Oshawa has complied with its legislative requirements. As a component of the risk assessment and risk analysis process, the top risks in Oshawa were identified. The HIRA assigns likelihood and consequence levels to a list of hazards based on the potential for impacts to people, property and the environment. As a result of this analysis, the top hazards in the City include the following:

- transportation emergency (rail, light rail or subway / road and highway)
- infectious disease /health epidemic/pandemic;
- Major fires/explosions; and
- chemical / hazardous material incident;

6.3 Impacts of Hazards on Fire Protection Services

To better understand the risks of hazards as they pertain to fire protection services, the top five hazards have been assessed to identify possible impacts on fire protection services. The HIRA also identifies the likelihood of some hazards to be high with low consequence levels which as known to increase calls for service from the local fire department. These hazards have also been included within the table. Many of the potential impacts are not unique to a jurisdiction. The results of this review as they pertain to the top five hazards in the City are presented in **Table 23**.

Table 23: Impacts of Hazards on Fire Protection Services

Hazard (City HIRA)	Possible Impact on Fire Protection Services
Transportation Emergency – Rail/Light Rail, Road and Highway	The transportation system within Oshawa encompasses rail lines, roadways and major highways, an airport, and marine transportation. A transportation emergency could mean damage to or closure of a specific transportation type or to the system as a whole with impacts that include injury or loss of life, environmental damage, hazardous materials leak, and/or economic loss. Oshawa's transportation system is multimodal and supports the City as a distribution hub and day to day connectivity. A transportation emergency in Oshawa could require hazardous materials response from OFS or other specialized rescue service. The City's HIRA has indicated that there have been major pileups along the 401 Highway. This is supported by the impacts that vehicle collisions have already had on the fire service's call volume. For example, rescue calls responded to by OFS accounted for 15.5% of total call volume over a five year period from January 1st, 2014 to December 31st, 2018. Of those rescue calls, 93.8% are motor vehicle related incidents (**Section 10.2.2.3 – Spatial Modelling – Rescue Incidents**).
Infectious Disease - Health Epidemic/ Pandemic	Epidemic or pandemic breakout can present significant challenges to first responders and the community causing potential fire department workplace absenteeism, and an increased demand for medical response and supplies. For example, during the severe acute respiratory syndrome (SARS) outbreak in Toronto, declared a medical state of emergency in March of 2003, of Toronto EMS's 850 paramedics, 436 were placed in a 10-day home quarantine, 62 developed SARS-like illnesses, and 4 developed suspected or probable SARS requiring hospitalization.[61] 2020 to present day is a more severe and wide-reaching human health emergency, the COVID 19 global pandemic. The impact of this current pandemic has been challenging for all aspects of community services and has had a number of impacts on members of the community, which are still being qualified and quantified.

[61] Alexis Silverman, Andrew Simor, Mona R. Loutfy. (2004). Toronto Emergency Medical Services and SARS. Emerging Infectious Diseases., Volume 10(9): 1688–1689, doi: 10.3201/eid1009.040170

Hazard (City HIRA)	Possible Impact on Fire Protection Services
Fire Explosion	Fires/explosions can cause extensive damage to properties. A fire/explosion emergency will also cause large evacuations of people and pose restrictions on the re-entry of homes and businesses. Fire poses a significant public safety risk, especially for high-rise buildings in urban areas due to challenges associated with evacuation and rescue operations. OFS is trained and positioned to manage these hazards as the primary first responder.
Chemical/Hazardous Material Incident	Incidents involving chemical/hazardous materials can have harmful effects on human life, property and the environment. Depending on the level of service offered and training acquired, a fire department can perform hazardous materials response or partner with a neighbouring jurisdiction to provide the same service. It is important for a fire department to possess the proper training and certification required to perform hazardous materials response safety and securely in order to prevent firefighter injury. The City's HIRA indicates that hazardous materials incidents have happened on roads and railways within Durham Region as dangerous goods are transported on a daily basis. However, no marine or airway incidents have occurred in the Region. Within Oshawa specifically, hazardous materials are transported daily on the major highways and rail lines. Technical rescue capabilities of OFS are discussed in the City's 2020 Fire Master Plan.
Energy Emergency/ Power Outage	Energy emergencies that include power outages can affect critical infrastructure, essential services or a large portion of local residents and businesses, lasting long periods of time. Although the HIRA identifies these hazards as low risk, they are probable. Common causes of power outages include extreme weather events and storms, increased demand on the system, or energy infrastructure failure. An event such as this could mean the loss of energy for heat, cooling, cooking, refrigeration, life assistance equipment and more. Emergency Services such as OFS have backup generators but refuelling them could be an issue during a long-term power outage. The System Average Interruption Duration Index (SAIDI) is commonly used as a reliability indicator by electric power utilities. The City's HIRA indicates that a SAIDI report for OPUC. (the City's electricity provider) has a high reliability with only minor power outages.

Hazard (City HIRA)	Possible Impact on Fire Protection Services
Winter Weather - Snowstorm/ Blizzard and Freezing Rail	Although, not a high risk the City's HIRA identifies that Durham Region receives snowstorms and blizzards on an annual basis which is often increased due to its presence on the Lake. Snowstorm/blizzard events can cause disruptions to the road network, preventing emergency vehicles from reaching their destinations, delaying emergency response times. Additionally, this type of event promotes dangerous driving conditions leading to motor vehicle collisions or crashes, contributing to an increase in call volume. As mentioned above, it is not uncommon for OFS to experience high call volumes related to vehicle collisions throughout the year. Freezing rain can weigh down electrical wires or branches causing them to break, blocking roadways and fire department or other first responder access leading to delayed emergency response and extended travel times. Downed electrical wiring presents electrical current exposure hazards which can cause injuries requiring medical assistance and overall damages to the electrical grid could lead to energy system disruption. Freezing rain also promotes dangerous driving conditions leading to motor vehicle collisions or crashes, driving emergency response call volume. The City's HIRA indicates that on average the Region as a whole experiences approximately 10 days of freezing rain per year.
Flood	The City's HIRA indicates that in the springtime, water levels rise in local waterways due to snow thaw creating creek flooding. Although the level of risk is considered low, the likelihood is listed as probable. During heavy rain events in the summer, the City's stormwater systems cannot handle the surge resulting in flash flooding in many of the City's older neighbourhoods. Depending on the severity of the flooding, access to various sections of the road network could be limited to fire department response delaying emergency response times.

Source: City of Oshawa Hazard Identification and Risk Assessment, Appendix F of the Emergency Master Plan

The City of Oshawa is situated between two nuclear generating stations; the Pickering Nuclear Generating Station located in Pickering, Ontario and the Darlington Nuclear Generating Station located in Clarington, Ontario. Facilities of this type pose the potential risk of radiation release. Although the probability of a nuclear emergency is low, the consequences of a nuclear incident involving the release of radioactive materials would be severe and even catastrophic. This hazard is not a top risk for the City of Oshawa, but is noteworthy and warrants consideration for hazard specific planning and high prioritization due to the severity of potential consequences. To address this hazard, the City of Oshawa has a Nuclear Emergency Response Plan (NERP) in place outlining authority, roles and responsibilities as well as measures to be taken in response to a nuclear emergency. In the event of a nuclear incident at either of these two facilities, the Provincial Emergency Operations Centre and the Regional Emergency Operations Centre are automatically activated. Both Durham Region and City of Oshawa NERPs support the Provincial Nuclear Emergency Response Plan and conform to the directives issued by the Province who lead the overall effort in a nuclear event.

The 2020 Fire Master Plan, which is informed by the findings of this CRA, includes a high-level review of the City's emergency management and planning efforts and operational approaches to the hazards identified in this assessment.

Key Finding: The City's 2022 Hazard Identification and Risk Assessment identifies hazards that could each impact the ability of the City to deliver fire protection services.

7.0 Public Safety Response Profile

As required by **O. Reg. 378/18**, the Public Safety Response Profile includes analysis of the types of incidents responded to by other entities in the community, and those entities' responsibilities. These entities could include police, ambulance, fire and other entities that may be tasked with or able to assist in some capacity the collective response to an emergency situation. The following sections consider these public safety response characteristics within the City of Oshawa.

7.1 Public Safety Response Agencies in the City of Oshawa

Public safety and response agencies refer to agencies and organizations that respond to specific types of incidents within a community that provide trained personnel and resources critical to upholding public safety. Each of these entities offer specialized skillsets in support of front-line operations. The types of response services offered might include fire protection, medical attention, rescue operations, policing activities or hazardous materials response. In addition to responding individually to certain types of incidents, these entities work closely with one another in the event of major emergencies through a structured standardized response approach to ensure effective coordination among all response agencies.

Table 24 lists the public safety response agencies within Oshawa who will be able to assist in a collective emergency response effort and may contribute to the minimization of risk within the community. Identifying the public safety response agencies within the community can help the fire service understand the agencies that may be able to assist in the response to emergencies and therefore determine the level of response they offer.

Table 24: Public Safety Response Agencies

Identified Public Safety Response Agency	Types of Incidents They Respond To	Agency Role in Incident
Durham Regional Police Services	• Motor vehicle collisions • Medical incidents • Fire incidents • False fire incidents • Public assistance	• Traffic control, scene stabilization, investigation • Patient contact, initial first aid, scene stabilization, investigation • Scene stabilization, evacuation, investigation • Scene stabilization, investigation • Assist in coordinating public information
Region of Durham Paramedic Services	• Motor vehicle collisions • Medical incidents • Fire incidents • False fire incidents • Public assistance	• Patient stabilization, extrication, reporting • Patient stabilization, transport, reporting • Standby for firefighter safety, patient stabilization, transport, reporting • Standby for firefighter safety, patient stabilization, transport, reporting • Assist in coordinating public information
Oshawa Power and Utilities Corporation	• Power supply incident • Distribution emergency	• Customer and emergency personnel notification • Service restoration
Enbridge Gas	• Distribution emergency • Gas supply emergency	• Affected customer notification • Incident support teams for emergencies • Pipeline shutdown • Service restoration

Identified Public Safety Response Agency	Types of Incidents They Respond To	Agency Role in Incident
C.O.M.R.A. Marine Rescue Association	• Persons requiring water or ice water rescue • Missing persons requiring search	• Cooperate with emergency services • Patrol waters of Oshawa, Whitby and Clarington • Search and rescue • Water and ice rescue
Ontario Volunteer Emergency Response Team (OVERT) (located in Oshawa)	• Large scale disasters that may require evacuation including floods, power outages, public health emergencies and more.	• Provides emergency assistance to first responders and emergency management agencies • Incident command • Ground and marine search and rescue • canine unit support • Technical rescue • Communications.

7.1.1 Mutual Aid Agreements

Mutual aid agreements can provide additional depth of resources and response that may not have been dispatched as part of a municipality's initial response. These agreements establish a mutual relationship between multiple public safety and response agencies whereby emergency services and resources are shared to promote a more effective response and strengthen the depth of emergency response provided by a fire department. Currently, the Oshawa Fire Services is a participant in the Regional Municipality of Durham Mutual Aid Plan.

7.1.2 Automatic Aid Agreements

Agreements between public safety and response agencies such as fire departments can also provide for initial or supplemental emergency response services. Automatic aid agreements are programs designed to provide and/or receive assistance from the closest available resource, regardless of municipal boundaries, on a day-to-day basis. **Table 25** lists the automatic aid agreements established between the City of Oshawa and its surrounding municipalities for the provision of fire protection services.

Table 25: Public Safety Response Agencies through Automatic Aid Agreements

Identified Public Safety Response Agency	Types of Incidents They Respond To	Agency Role in Incident
Town of Whitby	• Fire scenes • Motor Vehicle Collisions • Rescue scenes	• Firefighting • Fire scene control • Rescue services • Provides services listed above for East-bound and West-bound coverage for each other on the 407 and the 401 on either side of the Oshawa/Whitby border
Municipality of Clarington	• Fire scenes • Motor Vehicle Collisions • Rescue scenes	• Firefighting • Fire scene control • Provides services listed above for all of Highway 401 between Harmony Road in Oshawa and Holt Road in Clarington, and Highway 418 north between Highway 401 and Highway 2 in Clarington.

Source: Automatic Aid Agreement between the City of Oshawa and Municipality of Clarington, dated 2018 and the Automatic Aid Agreement between the City of Oshawa and the Town of Whitby, dated 2016.

8.0 Community Services Profile

As referenced in **O. Reg. 378/18**, the community service profile assessment includes analysis of the types of services provided by other entities in the community, and those entities' service capabilities. This includes the presence or absence and potential abilities of other agencies, organizations or associations to provide services that may assist in mitigating the impacts of emergencies to which the fire department responds. The following sections consider these community service characteristics within the City of Oshawa.

8.1 Community Services in the City of Oshawa

Fires and other emergency events can have devastating effects on a community and at times can overwhelm public safety and security agencies' capacity to respond. In an emergency event, community-based agencies, organizations and associations can provide surge capacity to the response and recovery efforts of first responders and a useful resource to call upon if integrated into the emergency management framework of a municipality early on. These types of affiliations can contribute a variety of capabilities essential to response and recovery efforts including support in the areas of communications, health care, logistics, shelter, food and water supply, emergency clothing, and more specialized skillsets.

Investigating new community partnerships and strengthening existing ones may be an effective strategy for consideration towards enhancing the current public fire and life safety education program, fire inspection efforts and emergency response and recovery capabilities of OFS **Table 26** lists community agencies, organizations and associations within Oshawa.

Table 26: Community Service Agencies, Organizations and Associations

Community Service Agency	Types of Assistance Provided
Canadian Red Cross – Durham Region Branch (located in Oshawa)	In the event of a fire incident or emergency, The Canadian Red Cross - Durham Region Branch can provide temporary lodging, clothing and food to persons who cannot return to their homes or, who cannot find alternate accommodations. In larger emergencies requiring evacuation, the organization has the capability to set up reception and information services to greet evacuees, provide information, provide family reunification and control facility access.
Salvation Army Oshawa (located in Oshawa)	The Salvation Army is capable of providing both immediate and long-term recovery assistance in cooperation with Fire and Police Services. The Salvation Army's Emergency Disaster Services program can provide food and hydration resources, emotional and spiritual care, donations management, social services, long-term recovery and training and volunteers.
St. John's Ambulance (located in Oshawa)	As a member of the Disaster Response Service Agencies, St. John's Ambulance Emergency Preparedness and Disaster Response Teams are integrated into the collective community disaster and emergency response and preparedness effort. The organization has the capacity to provide health care and first aid in reception centres, casualty care at the scene of an event, patient transportation, and evacuation assistance.

Community Service Agency	Types of Assistance Provided
Local Radio Broadcasters (e.g. CKDO Radio)	Public media outlets can provide the fire department with means to disseminate important fire and life safety education messaging to a broad audience. This could include a partnership with local radio such as Durham Region's CKDO Radio to provide a fire safety messaging or advertising campaign to inform the public about residential fires and the actions residents can take to prevent incidents from happening. There may also be an opportunity to establish a partnership with local radio for a designated fire department member to appear regularly offering fire safety tips that capture a variety of brief messages around topics such as careless smoking, space heaters, faulty wiring, electrical outlet overloading, etc.).
Alcohol and Gaming Commission of Ontario	OFS can partner with local organizations that may be able to provide additional support in the area of fire inspection and enforcement. For example, the Alcohol and Gaming Commission of Ontario may be able to assist in the enforcement of occupancy loads in nightclubs through after hour inspections. Establishing lines of communications and collaborative partnerships early on with agencies who share a common concern for people's welfare and safety can inform and strengthen the fire department's inspection and enforcement program.
Durham Region Hoarding Coalition	Hoarding presents unique fire risks due to the large amount of flammable materials in the home which may contribute to a fire burning faster and hotter and due to the falling objects or sharp objects concealed within clutter that may injure or trap residents and responding firefighters. The Durham Region Hoarding Coalition can assist OFS in identifying occupancies that may present code violations and unsafe hoarding practices requiring follow up and inspection.

Community Service Agency	Types of Assistance Provided
School boards (e.g. Durham Catholic district School Board, Durham district School Board, French-First Language School Board)	As reported in **Section 5.2 – Population Age**, the 2021 Census data indicates that children aged 14 and under represent 17.6% of the City's total population. The proportion of children in the City is significant, especially when considering the opportunity for public education. This percentage supports the development of enhanced public education programming that targets children/youth of all ages. Partnering with school boards and other agencies that work with children can provide opportunity for fire and life safety education.
Durham Children's Aid Society (CA.S)	The Durham Children's Aid Society is responsible for providing child protection services to children who live in Durham Region. It is common practice for this agency to investigate and inspect living conditions where there is a concern for a child's welfare. C.A.S. workers may encounter property conditions that they feel warrant follow up by OFS due to unsafe conditions or fire hazard related concerns.
Victim Services of Durham Region	The Victim Services of Durham Region can provide aid in grief counselling and relocation of displaced civilians on a small scale.
Living Assistance Agencies (e.g. Home Instead Senior Care, Meals on Wheels), Victorian Order of Nurses, Retirement Homes Regulatory Authority	As reported in **Section 5.2 – Population Age** of this CRA, seniors (those 65 years and over) are considered to represent one of the highest fire risk groups across the Province based on residential fire death rate. According to the 2021 Census, seniors represent 16.70% of the City's total population. It also identified that of the City's total population, 24.77% fall into the age range of 45 to 64 years, representing a cohort aging towards the seniors demographic of 65 years or older. Agencies that provide at-home care and assisted living services to seniors can assist OFS in identifying occupants who are at increased fire risk due to unsafe living conditions (e.g. absence of a working smoke alarm) which may require follow up or inspection.

Community Service Agency	Types of Assistance Provided
Public Health – Durham Region	As reported in **Section 6.3 – Impacts of Hazards on Fire Protection Services** of this CRA, it was identified that there are hazards within the City of Oshawa that could impact the ability of the City to deliver fire protection services. Specifically, a health-related incident such as an epidemic or pandemic could present significant challenges to first responders and the community causing potential fire department workplace absenteeism due to illness, and an increase in medical call volume. Public Health – Durham Region can provide guidance and technical expertise to OFS during a health related emergency and educate emergency personnel about how to protect themselves and others during events of widespread illness.
Durham Transit Buses	In the event of a fire or other emergency, the OFS has used Durham Transit buses for residents in need of temporary shelter after a fire. This initiative is coordinated with Durham Regional Police Services.

9.0 Economic Profile

As referenced in **O. Reg. 378/18**, the economic profile assessment includes analysis of the economic sectors affecting the community that are critical to its financial sustainability. This involves economic drivers in the community that have significant influence on the ability of the community to provide or maintain service levels. The following sections consider these economic characteristics within the City of Oshawa.

9.1 Economic Sectors and Employers in Oshawa

Certain industries, employers and events contribute to the financial sustainability and economic vitality of a community. A fire or other emergency at key sectors and employment facilities within a community could have significant impacts on local economy and employment.

As mentioned in **Section 2.2.1,** the GO Transit network in Oshawa consists of two 'mobility hubs', or major transit stations, with one located in Downtown Oshawa and the other at the Oshawa Train Station. These areas currently promote easy accessibility to the City's employment areas.

The top industries that contribute to the economic base of the City are summarized in **Figure 20** below. According to the Statistics Canada 2016 Census, retail trade, health care and manufacturing were significant industries within Oshawa. Since 2018, Oshawa's economy has been trending away from manufacturing and the City has positioned itself for growth in areas of advanced manufacturing (new manufacturing processes that use computer controlled and electronic based equipment), energy, health and biosciences, information technologies and logistics.[62] As the City diversifies its economic base and positions itself for growth specifically in the logistics sector moving forward, Oshawa's position as a transportation hub will become increasingly significant. The various available modes of transportation and the Oshawa Port which have established Oshawa as a distribution hub already, often see the transport of dangerous goods and hazardous materials. A major hazardous materials or transportation emergency incident at a key logistics facility such as the Port of Oshawa

[62] City of Oshawa. (2020). Community Profile (PDF File)

could potentially impact the movement of cargo and the revenue it generates towards the local economy.

Figure 20: Industry in Oshawa

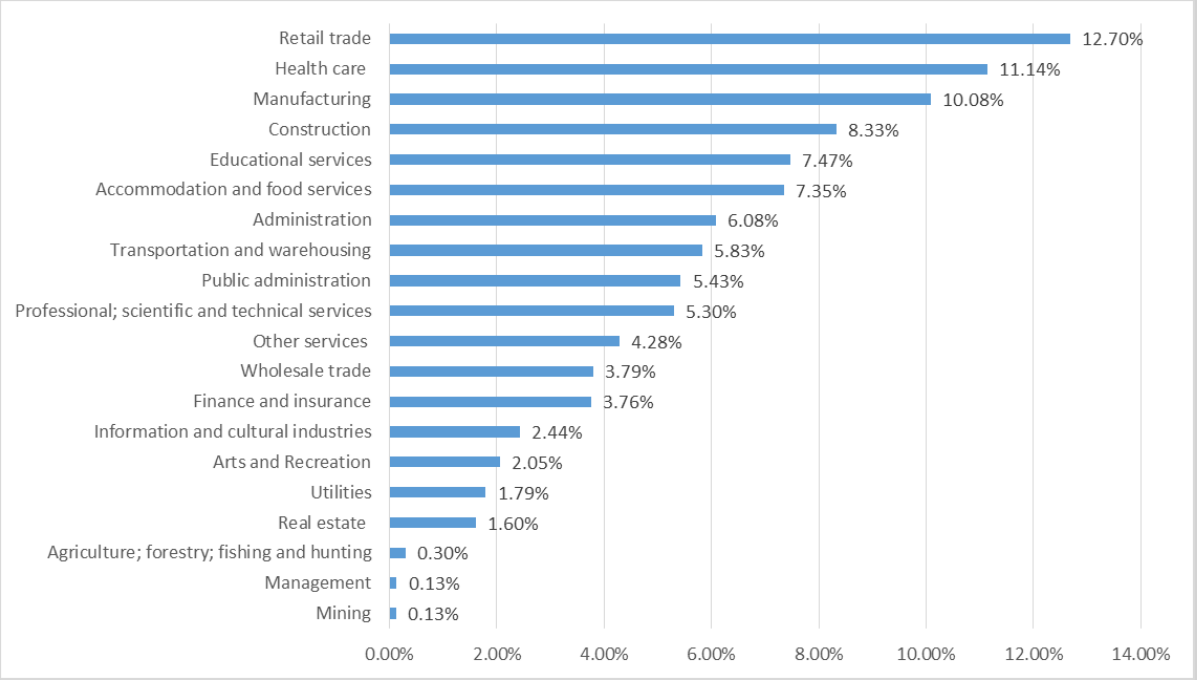


Figure Source: 2016 Census, Statistics Canada[63]

According to the Conference Board of Canada, education and health care are two significant industries within Oshawa that account for approximately one-sixth of the areas total economic activity today.[64] As part of the data collection process for this CRA, top employers were provided by the City of Oshawa. As shown in **Table 27: Top Employers in Oshawa**, there are two post-secondary institutions (University of Ontario Institute of Technology and Durham College) that are at the top of Oshawa's top employers list by number of employees after Lakeridge Health which employs an estimated 2,008 employees. Other top employers include Concentrix, the Ministry of Finance and the City of Oshawa. Not only are these employers significant in that they offer employment opportunities and contribute jobs to the local economy of Oshawa, but

[63] Statistics Canada. 2017. Oshawa, CY [Census subdivision], Ontario and Ontario [Province] (table). Census Profile. 2016 Census. Statistics Canada Catalogue no. 98-316-X2016001. Ottawa. Released November 29, 2017. https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/index.cfm?Lang=E (accessed November 26, 2019)

[64] Alan Arcand, Robin Wiebe, and Constantinos Bougas. (2019). Metropolitan Outlook 2: Oshawa. Conference Board of Canada, Winter 2019, p.9.

they also contain a number of assets that contribute economic development initiatives within one of the City's key sectors that has the potential for growth.

Therefore, a significant fire or other emergency at one of these institutions may have an impact on this economic sector and the sectors that are supported by the innovation and research taking place within them.

To reduce potential losses, the fire services can consider increasing public fire and life safety activities that focus on fire safety concerns within student housing and facilities or focus on Fire Code inspections (in particular Part 4.12 – Laboratories) to reduce the probability of an incident occurring at one of these sites.

Table 27: Top Employers in Oshawa

Employer	Description	Number of Employees
Lakeridge Health - Oshawa Hospital	Hospital	2,008
Concentrix	Runs commercial and emergency call centre.	1,200
Ministry of Finance	The Ministry of Finance performs a variety of roles, all focused on supporting a strong economic, fiscal investment climate for Ontario, while ensuring accountability with respect to public funds.	1,000
City of Oshawa	Municipal administration	750
Durham College - Oshawa Campus	College- Oshawa campus	713
Ontario Tech University	University- Oshawa campus.	657
Durham Children's Aid Society	Children's aid services.	400
Durham Regional Police (Central East Division)	Regional police services.	292

Employer	Description	Number of Employees
Ontario Power Generation	OPG head office	247
Oshawa Clinic	Doctor's office.	240
Metroland Media Oshawa Region	Distribution and manufacturing warehouse and office for The Whitby, Oshawa and Clarington This Week and for The Pickering and Ajax News Advertiser.	220
Hillsdale Estates	Long term care facilities.	216
Mackie Moving Systems	Moving services for anything from a local move to a large scale move system for a corporation - Trucking.	200
Costco Wholesale	Membership-only warehouse club that provides a wide selection of merchandise.	180
Extendicare Oshawa	Elderly care apartments	175
Durham Regional Transit - East	Bus maintenance and operations.	173
Del Monte Distribution Centre	Distribution centre for Del Monte.	150
A.G. Simpson Co Ltd	Auto parts supplier	150
Hillsdale Terrace	Long term care facility.	149

Source: Major Employers Spreadsheet, City of Oshawa

Key Finding: The City has identified top employers that contribute to the economic vitality of the community. If a fire were to occur at one of these facilities it could have a negative impact on the financial well-being of the City.

10.0 Past Loss and Event History Profile

As referenced in **O. Reg. 378/18**, the past loss and event history profile assessment includes analysis of the community's past emergency response experience, including an analysis of the number and types of emergency responses, injuries, deaths and dollar losses, and a comparison of the community's fire loss statistics with provincial fire loss statistics. Evaluation of previous response data will inform decisions on fire protection services delivery including public fire safety education and inspection programs. The following sections consider these past loss and event history characteristics within the City of Oshawa.

10.1 Past Loss

Analysis of historical data provides valuable insight into understanding the specific trends within a community. Assessing the key factors of life safety risk and fire risk in relation to provincial statistics provides a foundation for evaluating where specific programs or services may be necessary. The analysis within this section is based on the OFM's Standard Incident Reporting for the period of January 1st, 2016 to December 31st, 2020.

10.1.1 Total Fire Loss

Analysis of the total fire loss within the City over the five year period from January 1st, 2016 to December 31st, 2020 as displayed in **Table 28** includes three categories representing the primary types of fires and the total amount of dollar loss associated with these fires. This includes 378 structure fires, 13 outdoor fires, and 121 vehicle fires representing $46,505,822 in total dollar loss.

Over this five year period, the City averaged 102 fires per year and $9,301,164 in property loss per year. On average, 76 structure fires occur per year with an average structural fire property loss of $8,388,692 per year.

The fire loss in 2016 was driven by one major fire in a Group D- Business Occupancy that resulted in a fire loss of $3.0 million dollars, and six other significant fires with a fire loss in excess of $250,000 each. In 2018 the City also experience two large fires in Group D- Business Occupancy reflecting a total loss of $5.0 million dollars and twelve other significant fires with a fire loss in excess of $250,000 each. In 2019 the City

experienced two major fires. The first was a Group C multi-unit residential building reflecting an estimated $4.0 million dollars in loss, the second was a mixed use commercial and residential building with an estimated $1.0 million in dollar loss. In 2020 there were five fires with estimated dollar loss in the range of $500,000 to $800,000 in Group C residential buildings.

Table 28: Total Fire Loss – City of Oshawa

Year	Structure # of Fires	Structure Loss ($)	Outdoor # of Fires	Outdoor Loss ($)	Vehicle # of Fires	Vehicle Loss ($)	Total # of Fires	Total Loss ($)
2016	97	$8,203,861	5	$5,600	13	$85,630	115	$8,295,091
2017	71	$4,300,406	1	$3,000	20	$185,719	92	$4,489,125
2018	71	$10,963,471	2	$300	27	$3,117,021	100	$14,080,792
2019	64	$9,675,342	0	$0	27	$618,800	91	$10,294,142
2020	75	$8,800,380	5	$6,200	34	$540,092	114	$9,346,672
Total	**378**	**$41,943,460**	**13**	**$15,100**	**121**	**$4,547,262**	**512**	**$46,505,822**
% of All Fires	**73.83%**	**90.19%**	**2.54%**	**0.03%**	**23.63%**	**9.78%**	**100%**	**Not Applicable**
Average	**76**	**$8,388,692**	**3**	**$3,020**	**24**	**$909,452**	**102**	**$9,301,164**

Source: OFM Standard Incident Reporting

Table 30 compares the number of structure fires and the associated total property loss within the City of Oshawa for the period from January 1st, 2016 to December 31st, 2020 to the number of structure fires and total property loss that occurred across Ontario for the same period. The City of Oshawa experienced an average of 76 structure fires per year over the five year period from January 1st, 2016 to December 31st 2020, representing an average of 73.83% of all fires that occurred in the City. Over this same period, the Province experienced an average of 6,884 structure fires per year representing an average of 12.87% of all fires that occurred in the Province.

Structure fires in Oshawa and the Province accounted for the highest percentage of total dollar loss for fires. However, the average of all fire loss in Oshawa of 90.19% was higher than that of the Province of 88.21%.

Table 29: Structure Fires and Property Loss – City of Oshawa and Province of Ontario

Year	Oshawa Structure Fires	Loss ($)	% All Fires	% All Dollar Loss	Ontario Structure Fires	Loss ($)	% All Fires	% All Dollar Loss
2016	97	$8,203,861	18.95%	17.64%	7,171	$654,764,771	13.41%	15.62%
2017	71	$4,300,406	13.87%	9.25%	6,683	$658,345,490	12.49%	15.70%
2018	71	$10,963,471	13.87%	23.57%	7,012	$734,340,655	13.11%	17.51%
2019	64	$9,675,342.0	12.50%	20.80%	6,715	$860,408,256	12.55%	20.52%
2020	75	$8,800,380.0	14.65%	18.92%	6,841	$790,693,587	12.79%	18.86%
Average	**378**	**$41,943,460.0**	**73.83%**	**90.19%**	**34,422**	**$3,698,552,759.0**	**64.35%**	**88.21%**
Total for Structure Fires	**512**	**$46,505,822.0**	**Not Applicable**	**Not Applicable**	**53,491**	**$4,192,819,382.0**	**Not Applicable**	**Not Applicable**
Total for All Fires with a Loss (Structure, Vehicle, Outdoor)	**75.6**	**$8,388,692**	**14.77%**	**18.04%**	**6,884**	**$739,710,552**	**12.87%**	**17.64%**

Source: OFM Standard Incident Reporting

Key Finding: Over the five year period from January 1st, 2016 to December 31st, 2020, the City averaged 76 structure fires per year.

10.1.2 Fires by Occupancy Type

This section assesses the structure fires that occurred over the period from January 1st, 2016 to December 31st, 2020 based on the type of occupancy. Information retrieved from the OFM's Standard Incident Reporting was utilized to inform this analysis.

The analysis in **Table 30** indicates that during this period, Oshawa experienced a total of 378 structure fires, 318 of these fires, or 84.13%, occurred in Group C-Residential Occupancies. These fires were responsible for 76.50% of the City's total fire loss for this period. In comparison, structure fires in Group C-Residential Occupancies accounted for 73.36% of structure fires across the Province and 64.99% of all fire loss. Over this period, Oshawa experience a 10.77% higher rate of fires in Group C-Residential Occupancies than that of the Province and a 11.51% higher dollar loss in Group C-Residential Occupancies.

The second most significant source of property loss in the City accounting for 9.06% of structure fire loss and 2.38% of the total structure fires over the same period are Group E – Mercantile occupancies (lower than the Provincial structure fires within this occupancy type by 1.00%).

Some of the trends within this historical fire loss reporting for the City could be explained by the distribution of Property Stock by Major Occupancy classification within the City. For example, as found within **Section 3.2.1 – City of Oshawa Existing Major Building Classification Summary** of this CRA, 93.08% of the property stock classified by the Ontario Building Code is Group C – Residential. It is reasonable to expect that Group C would account for the highest proportion of structure fires. For example, Group F – Industrial occupancies account for 1.01% off the property stock but 3.97% of the structure fires.

Table 30: Fires by OBC Major Occupancy Classification – City of Oshawa and Province of Ontario

Group	Occupancy Classification	Fires	Oshawa % of Structure Fires	Oshawa Fire Loss	Oshawa % of Fire Loss	Ontario % of Structure Fires	Ontario % of Fire Loss
Group A	Assembly	8	2.12%	$21,785.0	0.05%	3.65%	4.85%
Group B	Care or Detention	1	0.26%	$500,000.0	1.19%	1.50%	1.08%
Group C	Residential	318	84.13%	$32,087,276.0	76.50%	73.36%	64.99%
Group D	Business and Personal services	7	1.85%	$2,961,000.0	7.06%	2.54%	2.43%
Group E	Mercantile	9	2.38%	$3,800,000.0	9.06%	3.38%	5.06%
Group F	Industrial	15	3.97%	$1,850,599.0	4.41%	7.57%	12.51%
Other	Not Classified within the OBC	18	4.8%	$352,800.0	0.84%	5.34%	1.18%

Group	Occupancy Classification	Fires	Oshawa % of Structure Fires	Oshawa Fire Loss	Oshawa % of Fire Loss	Ontario % of Structure Fires	Ontario % of Fire Loss
Farm	Classified within the National Farm Building Code (NFBC)	2	0.53%	$370,000.0	0.88%	2.63%	7.88%
Total	**All Classifications**	**378**	**100.00%**	**$21,785.0**	**100.00%**	**100.00%**	**100.00%**

Source: OFM Standard Incident Reporting

Key Finding: Over the five year period from January 1st, 2016 to December 31st, 2020 structure fires occurring in Group C – Residential occupancies account for 84.13% (318) of total structure fires within the City.

Key Finding: Over the five year period from January 1st, 2016 to December 31st, 2020 structure fires occurring in Group E – Mercantile occupancies account for 9.06% ($3,800,000) of total structure fire loss within the City, higher than the Province by 4.00%.

10.1.3 Civilian Fire Fatalities and Injuries

As shown in **Table 31**, according to OFM Standard Incident Reporting, over the five year period from January 1st, 2016 to December 31st, 2020, there were 26 reported injuries and seven reported fire fatalities within the City of Oshawa. The majority of injuries and fatalities within the City occurred in Group C – Residential Occupancies. There was also a fire fatality categorized as 'other' and occurred in a vehicle. This finding is consistent with the fire loss statistics by occupancy type, whereby the majority of fire losses within the Province and within the City occurred in Group C – Residential occupancies.

Table 31: Civilian Fire Fatalities and Injuries by OBC Major Occupancy Classification - City of Oshawa

Group	Occupancy Classification	Injuries	Fatalities
Group A	Assembly	0	0
Group B	Care or Detention	0	0
Group C	Residential	26	7
Group D	Business and Personal services	0	0
Group E	Mercantile	0	0
Group F	Industrial	0	0
Other	Not Classified within the OBC	0	1
All Groups	**Total**	**26**	**8**

Source: OFM Standard Incident Reporting

Key Finding: Most reported fire related civilian injuries (26) and fatalities (7) occurred in Group C – Residential Occupancies, with one (1) fatality occurring in an occupancy not classified within the OBC.

10.1.4 Reported Fire Cause

The NFPA defines fire cause as "the circumstances, conditions, or agencies that bring together a fuel, ignition source, and oxidizer (such as air or oxygen) resulting in a fire or a combustion explosion."[65] Assessing the possible cause of the fires reported is an important factor in identifying potential trends or areas that may be considered for introducing additional public education or fire prevention initiatives. Within OFM fire loss reporting, there are four categories of cause used to classify the cause of a fire. These include intentional, unintentional, other, and undetermined.

Table 32 presents the reported fire causes for the City compared to the Province over the five year period from January 1st, 2016 to December 31st, 2020. Overall the leading reported fire causes are fairly consistent with the Province.

The "intentional" category recognizes the cause of a fire to be started for a specific reason. These are typically classified as arson fires, acts of vandalism, or to achieve personal gain through insurance payment for example. As indicated in **Table 32**, 9.52% of the fires reported (arson and vandalism combined) over the five year period from January 1st, 2016 to December 31st, 2020 were intentional in the City, similar to the Provincial total of intentional fires (7.87%).

The "unintentional" category recognizes a number of the common causes of a fire that represent both human behavioural causes (e.g., playing with matches) and equipment failures (e.g., mechanical failure). In total, unintentional fire causes represented 90.48% of the cause for the 342 fires during this period (compared to 92.09% within the Province). This suggests a need for targeted education programs about fire causes and prevention. The leading cause of unintentionally set fires in Oshawa occurred due to misuse of ignition source at 28.84% (109 fires), compared to 29.54% in the Province, followed by undetermined at 17.99% (68 fires), compared to 18.81% in the Province.

[65] Source: NFPA, Glossary of Terms, 2019 Edition.

Table 32: Reported Fire Cause – City of Oshawa and Province of Ontario

Nature	Fire Cause	Oshawa # of Fires	Oshawa % of Fires	Ontario # of Fires	Ontario % of Fires
Intentional	Arson	32	8.47%	2,148	6.24%
Intentional	Vandalism	4	1.06%	561	1.63%
Intentional	Other Intentional	0	0.00%	15	0.04%
Unintentional	Children Playing	2	0.53%	142	0.41%
Unintentional	Design/Construction/Maintenance Deficiency	10	2.65%	2,380	6.91%
Unintentional	Mechanical/Electrical Failure	39	10.32%	5,271	15.31%
Unintentional	Misuse of Ignition Source	109	28.84%	10,167	29.54%
Unintentional	Other Unintentional	25	6.61%	2,399	6.97%
Unintentional	Undetermined	46	12.17%	2,838	8.24%
Unintentional	Vehicle Collision	1	0.26%	29	0.08%
Other	Other	42	11.11%	1,903	5.53%
Undetermined	Undetermined	68	17.99%	6,476	18.81%
Unknown, not reported	Unknown, not reported	0	0.00%	93	0.27%
Total	**All Causes**	378	100.0%	34,422	100.0%

Source: OFM Standard Incident Reporting

Key Finding: Of the fires occurring in the City over the five year period from January 1st, 2016 to December 31st, 2020, the leading cause of unintentionally set fires was due to misuse of ignition source at 28.84% (109 fires), compared to 29.54% (10,167) in the Province.

Key Finding: Of the fires occurring in the City over the five year period from January 1st, 2016 to December 31st, 2020, the second most common cause of unintentionally set fires was undetermined at 17.99% (68 fires), compared to 18.81% (6,476) in the Province.

10.1.5 Ignition Source

According to the 2019 NFPA Glossary of Terms, ignition source is defined as "any item or substance capable of an energy release of type and magnitude sufficient to ignite any flammable mixture of gases or vapors that could occur at the site or onboard the vehicle."[66] **Table 33** provides fire loss by source of ignition for the City of Oshawa and the Province.

The most common reported ignition sources within the City are "undetermined" at 18.25% (lower than the Province by 5.77%), "open flame tools/smokers' articles" at 17.72% (higher than the Province by 3.51%), "cooking equipment" at 17.46% (higher than the Province by 0.31%), miscellaneous at 16.67% (higher than the Province by 6.45%) and "exposure" at 10.58% (higher than the Province by 5.72%). This presents the opportunity to incorporate key messages relating to cooking and smoking in public education materials.

Table 33: Source of Ignition - City of Oshawa and Province of Ontario

Reported Ignition Source	Oshawa # of Fires	Oshawa % of Fires	Ontario # of Fires	Ontario % of Fires
Appliances	15	3.97%	1,528	4.50%
Cooking Equipment	66	17.46%	5,828	17.15%
Electrical Distribution	25	6.61%	2,991	8.80%
Heating Equipment, chimney etc.	17	4.50%	2,186	6.43%
Lighting Equipment	7	1.85%	1,047	3.08%
Open flame tools/smokers articles	67	17.72%	4,831	14.21%

[66] Source: NFPA Glossary of Terms, 2019 Edition.

Reported Ignition Source	Oshawa # of Fires	Oshawa % of Fires	Ontario # of Fires	Ontario % of Fires
Other electrical/mechanical	8	2.12%	1,734	5.10%
Processing Equipment	1	0.26%	440	1.29%
Miscellaneous	63	16.67%	3,474	10.22%
Exposure	40	10.58%	1,652	4.86%
Undetermined	69	18.25%	8,167	24.03%
Unknown, not reported	0	0.0%	112	0.33%
Total	**378**	**100.00%**	**33,990**	**100.00%**

Source: OFM Standard Incident Reporting

Key Finding: Of the fires occurring within the City over the five year period from January 1st, 2016 to December 31st, 2020, 18.25% (69) of fires had a reported undetermined ignition source, which is 5.77% lower than the Province (24.03%).

Key Finding: Of the fires occurring within the City over the five year period from January 1st, 2016 to December 31st, 2020, 17.72% (67) of fires had a reported ignition source of open flame tools/smokers articles, which is 3.51% higher than the Province (14.21%).

Key Finding: Of the fires occurring within the City over the five year period from January 1st, 2016 to December 31st, 2020, 17.46% (66) of fires had a reported ignition source of cooking equipment, which is 0.31% higher than the Province (17.15%).

10.1.6 Smoke Alarm Status Processing Equipment

Smoke alarms are required on every level of a dwelling in the Province of Ontario and are the first line of defence against the negative consequence of a fire. As a result, smoke alarm programs and compliance are a key component of public education and fire prevention activities provided by the municipal fire departments across the Province.

Data is publically available at the provincial level for the smoke alarm status in the event of a fire and municipalities collect smoke alarm status information and report it to the Province. This data was provided by the OFM as part of the CRA for the City of Oshawa and the Province of Ontario over a five year period from January 1st, 2016 to December 31st, 2020 for Group C - Residential occupancies. **Table 34** highlights whether a smoke alarm was present and operating on the floor or in the suite of fire origin.

Table 34: Smoke Alarm Presence and Operation on the Floor of Fire Origin - City of Oshawa and Province of Ontario

Smoke Alarm Status on Floor of Origin	City 2016	City 2017	City 2018	City 2019	City 2020	City Total	Oshawa %	Ontario Total	Ontario %
No Smoke Alarm Present	20	8	7	8	12	55	18.52%	4,236	17.44%
Smoke Alarm Present And Operated	30	29	26	29	34	148	49.83%	10,805	44.48%
Smoke Alarm Present, Did Not Operate	9	5	4	3	2	23	7.74%	3,200	13.17%
Smoke Alarm Present, Operation Undetermined	5	5	4	3	2	19	6.40%	2,000	8.23%

Smoke Alarm Status on Floor of Origin	City 2016	City 2017	City 2018	City 2019	City 2020	City Total	Oshawa %	Ontario Total	Ontario %
Smoke Alarm Presence Undetermined	15	12	8	8	8	51	17.17%	4052	16.68%
Unknown, not reported	0	1	0	0	0	1	0.34%	No Data	No Data

Source: OFM Standard Incident Reporting

Over the five year period from January 1st, 2016 to December 31st, 2020, there was no smoke alarm present for 18.5% of occurrences in the City compared to 17.4% in the Province. A further 23 incidents (or 7.7%) had a smoke alarm present but it did not operate (compared to 13.2% in the Province). In Oshawa, 49.8% of occurrences a smoke alarm was present and operated. Smoke alarm presence or operation combined was undetermined in 23.6% of instances in the City. Provincial and local statistics support having a targeted and proactive smoke alarm program in place and suggest the need for increased enforcement strategies for those properties that are non-compliant.

Key Finding: Over the five year period from January 1st, 2016 to December 31st, 2020, of the fire loss incidents in Group C – Residential occupancies, 18.52% (55) of incidents did not have a smoke alarm present (compared to 17.44% or 4,236 in the Province).

Key Finding: Over the five year period from January 1st, 2016 to December 31st, 2020, of the fire loss incidents in Group C – Residential occupancies, 49.83% (148) of incidents had a smoke alarm present and operating compared to 44.48% (10,805) in the Province.

10.2 Event History

Event history seeks to apply OFS' historic emergency call data to develop an understanding of community risks. OFS provided the data used in this analysis for all historical calls for the five year period from January 1st, 201 to December 31st, 2021. This section provides a statistical assessment of historic emergency call volumes for the City as a whole by different time segments (e.g. annual calls, monthly calls, weekly calls, daily calls, etc.).

The analysis included within this section also provides a detailed breakdown of calls by response type. Data used in the analysis of call volume by type was sourced from the OFM's Standard Incident Reporting because call volume by type is compared to the Province as a whole.

The volume and frequency of historic calls informs the understanding of response probability. The types of calls inform the potential consequences of OFS responses and calls for service. The combined consideration of these elements provides an understanding of community risk, based on past calls for service.

10.2.1 Emergency Call Volume – All Incident Types

This section illustrates the historical emergency call volume by year, month, day of week, and time of day for all types of incidents responded to by OFS for the time period from January 1st, 201 to December 31st, 2021.[67]

10.2.1.1 Annual Emergency Call Volume – All Incident Types

The analysis of annual emergency call volume can be beneficial in garnering an understanding of where trends may be evolving, or changes in community emergency response demand may be occurring. A summary of the total number of emergency calls for the period from January 1st, 2014 to December 31st, 2021 is shown in **Figure 21**. This analysis indicates an increase in the total emergency call volume within the City over this period from 4,350 calls in 2014 to 6,334 calls in 2021. This represents a total increase of 46% over this five year period with an average of 5,320 calls per year. A further observation of the year to year rate of emergency call volume growth illustrates an incremental annual growth average of 5.4%, however, there is also a noted downward trend in the amount of actual percentage of growth year over year. From 2014 to 2015 the annual growth increased by 8.2% whereas from 2017 to 2018 the actual percentage of growth year over year was 2.8%. The year by year percentage growth appears to be decreasing over time until 2019. From 2020 to 2021, the trend shows a rebound in the total emergency call volume by 13.9% following a notable decrease in 2020. This decrease in call volume in 2020 could be attributed to the unique circumstances of the COVID-19 pandemic resulting in an anomalous year of call volume.

[67] The data used for the analysis is a compilation of each of the 5 years (2014-2018) of unit response times reports. For the majority of statistics, only the first truck is considered; this is to ensure a single incident is not counted multiple times as this would not provide an accurate representation of the data. To determine which entries were the first truck entries, the dataset was sorted by Call Time and On Location [time]. The first entry for each incident number was included in the First Truck dataset. The second entry for each incident number was assumed to be the second truck. It should also be noted that calls from stations outside of Oshawa were excluded from the analysis. Similarly, all calls with either zero or more than one response type code were excluded from response type analyses.

Figure 21: Annual Call Volume – All Incidents January 1st, 2014 to December 31st, 2021

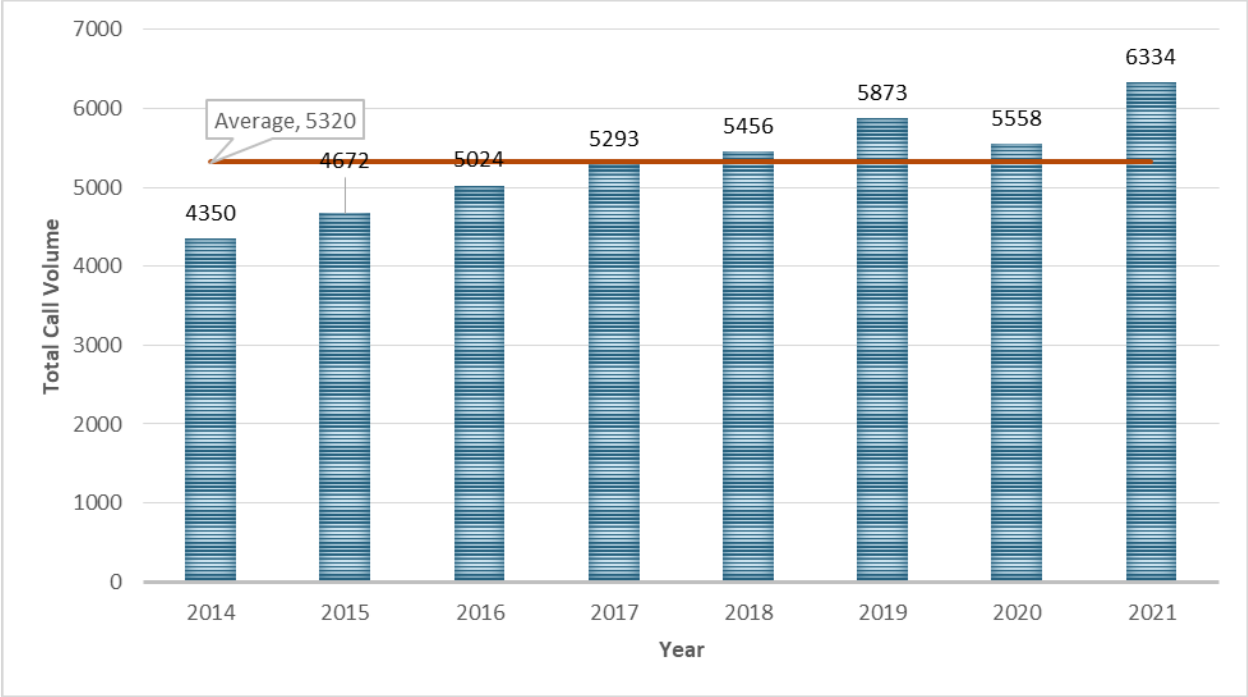


Figure Source: Oshawa Fire Services Emergency Response Call Data

Key Finding: Over the period from January 1st, 2014 to December 31st, 2021 the volume of emergency calls responded to by the Oshawa Fire Services increased by 46%.

Key Finding: Over the period from January 1st, 2017 to December 31st, 2018 there is a notable downward trend in the percentage of actual emergency call volume growth year over year.

10.2.1.2 Monthly Average Emergency Call Volume – All Incident Types

The analysis of average emergency call volume for the period from January 1st, 2014 to December 31st, 2021 by month can be beneficial to identifying any potential variances that may be associated with seasonal trends related to activities such as more motor vehicle travel during summer months, or use of heating devices during winter months. **Figure 22** illustrates an average monthly emergency call volume of 443 calls with the highest percentage of emergency calls occurring in July and August.

Figure 22: Average Call Volume by Month – All Incident January 1st, 2014 to December 31st, 2043

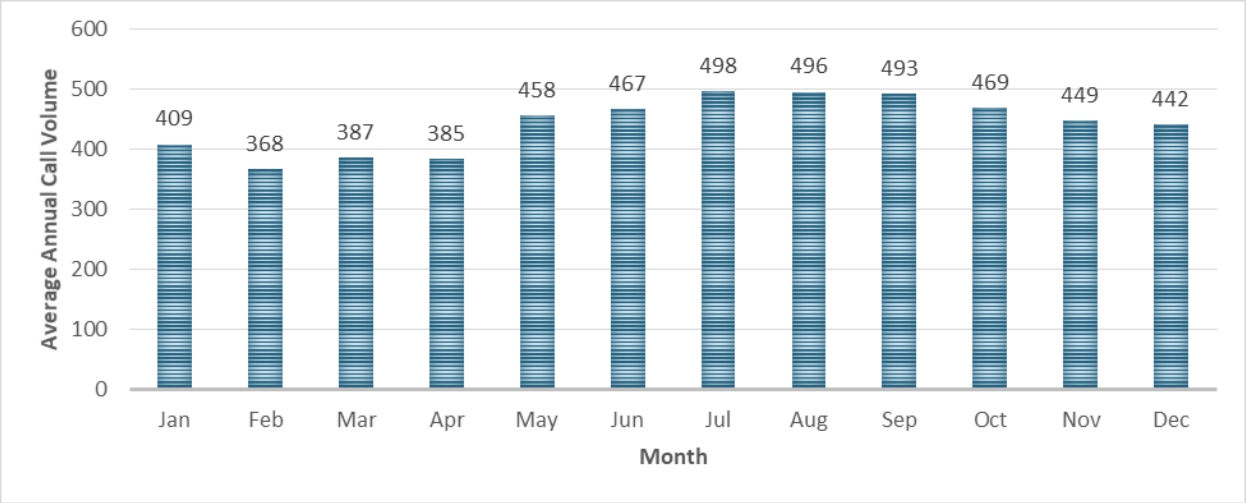


Figure Source: Oshawa Fire Services Emergency Response Call Data

10.2.1.3 Weekly Average Emergency Call Volume – All Incident Types

The analysis of average call volume for the period from January 1st, 2014 to December 31st, 2021 by day of the week as shown in **Figure 23** illustrates that on average the highest number of emergency call volume occurs on Fridays, while the lowest emergency call volume occurs on Sundays.

Figure 23: Average Call Volume by Day of Week – All Incidents January 1st, 2014 to December 31st, 2021

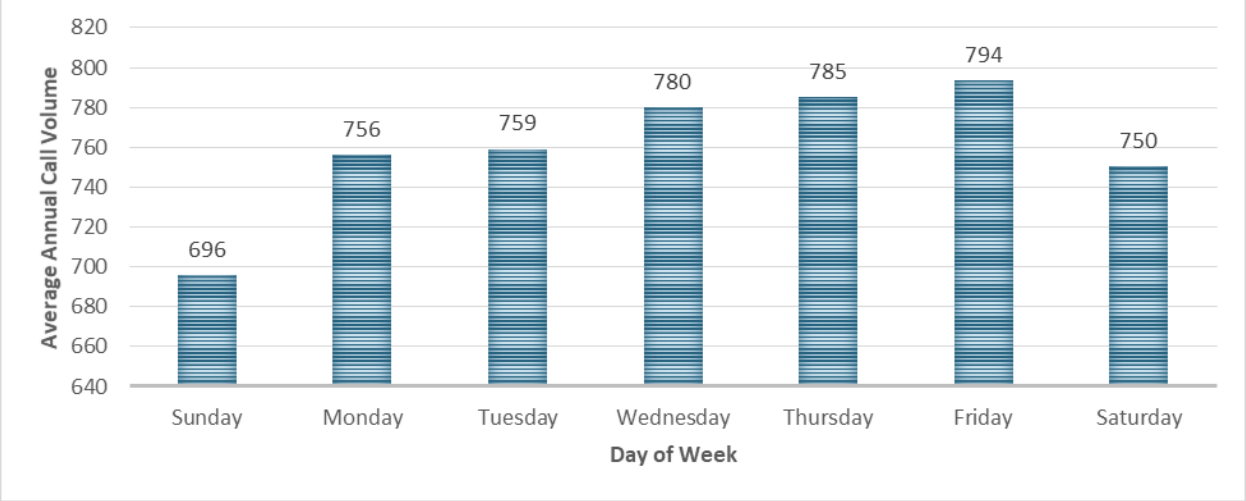


Figure Source: Oshawa Fire Services Emergency Response Call Data

10.2.1.4 Daily Emergency Call Volume – All Incident Types

Figure 24 indicates that for the period from January 1st, 2014 to December 31st, 2021 a higher emergency call volume is typically experienced between 8 A.M. and 10 P.M. The lowest percentage of emergency call volume typically takes place between the hours of 11 P.M. and 8 A.M. This trend can be directly associated to when the majority of the population is typically sleeping.

Figure 24: Average Call Volume by Time of Day – All Incidents January 1st, 2014 to December 31st, 2021

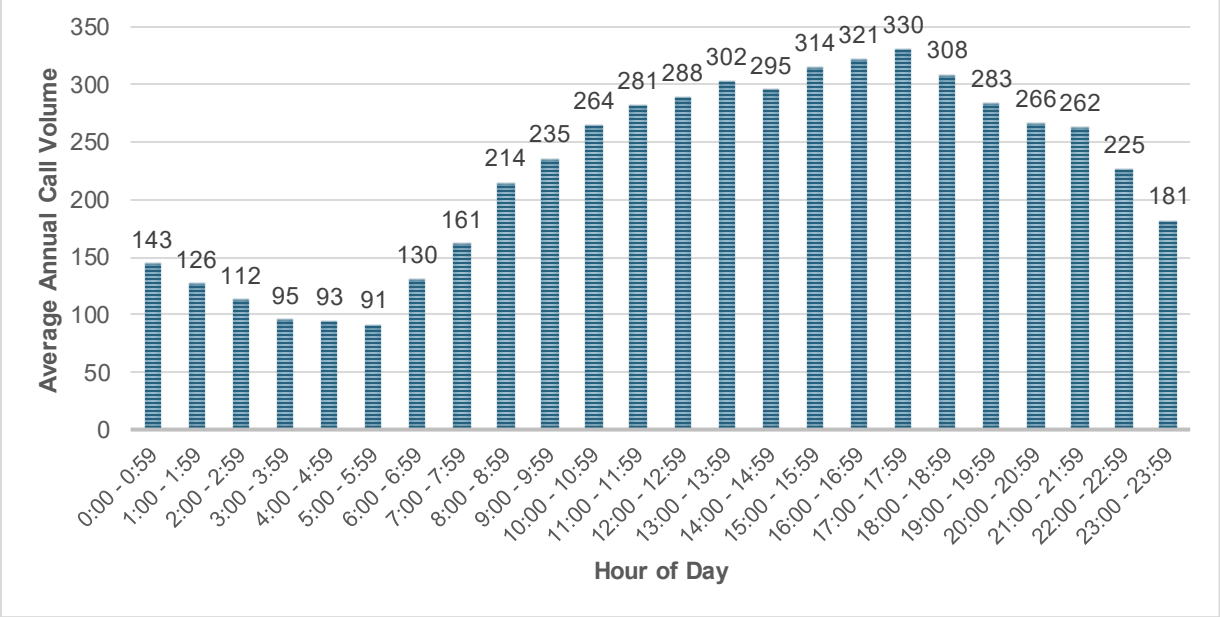


Figure Source: Oshawa Fire Services Emergency Response Call Data

10.2.1.5 Total Emergency Call Volume – All Incident Types

This section illustrates the analysis of all emergency call volume for the period from January 1st, 2016 to December 31st, 2020 by the designated OFM emergency response type. **Figure 25** illustrates that during this period 30.1% of the total emergency calls that Oshawa Fire Services responded to were medical/resuscitator incidents, lower than the Province at 44.9%. Responding to rescue calls was the second highest percentage of total emergency calls representing 18.5% of the department's total emergency call volume, higher than the Province at 10.6%. False fire calls represent the third highest percentage of emergency call volume at 15.2%, consistent with the Province at 15.6%. During this five year period, only 0.10% of emergency calls were categorized as overpressure/rupture/explosion in the City and Province. This analysis includes responses to fire-related incidents. OFS responded to 4.3% of calls relating to property fires/explosions, which is slightly higher than the Province during this period at 3.7%. Calls for pre-fire conditions represented 5.0% of the OFS call volume and 3.9% for the Province. Controlled burning represented 3.5% of the OFS call volume and 2.3% of the Province's.

Figure 25: Percentage of OFS Calls and Ontario Calls by OFM Response Type January 1st, 2016 to December 31st, 2020

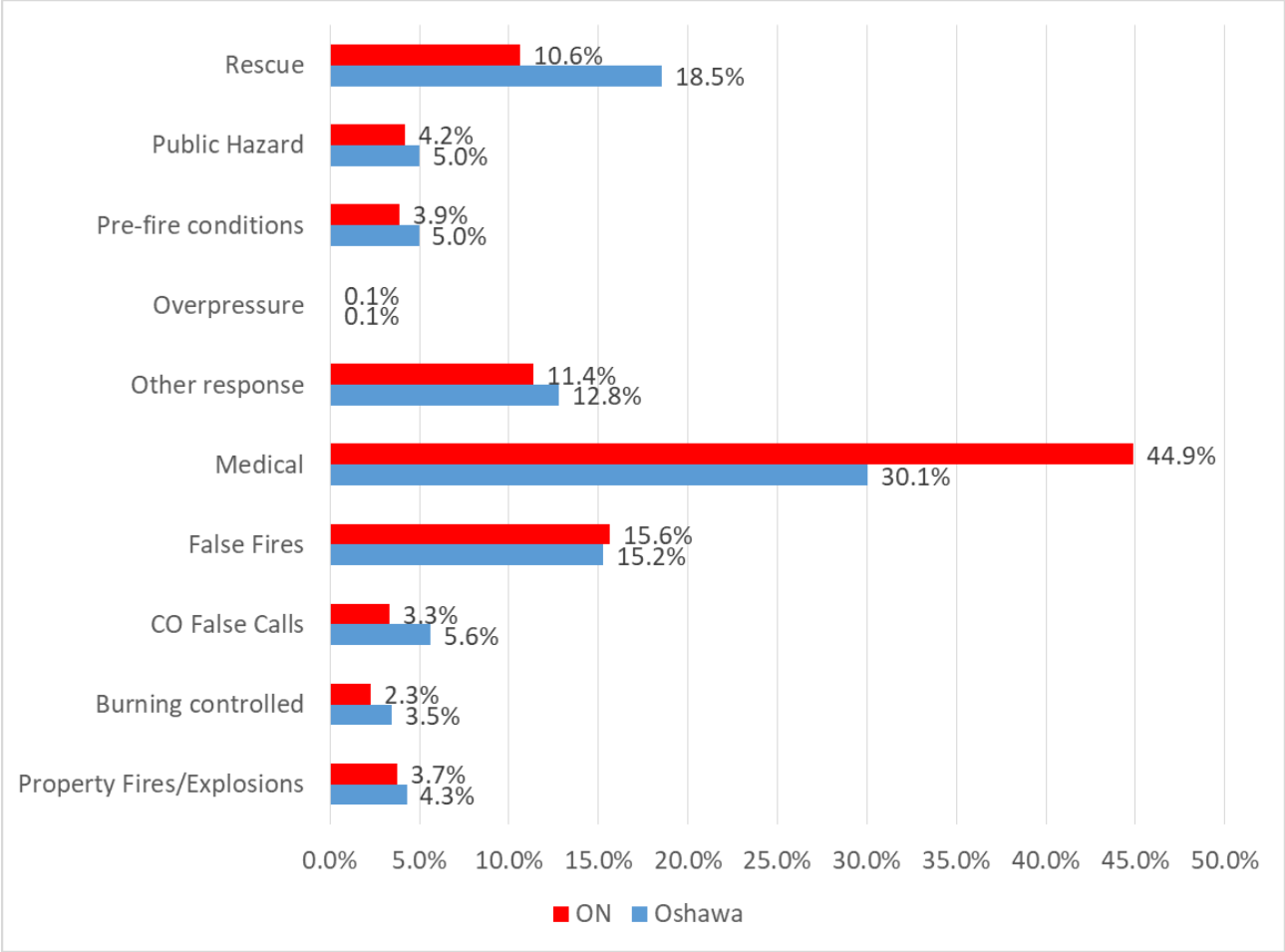


Figure Source: Office of the Fire Marshal and Emergency Management, Municipal Emergency Calls by Response Type Class

Key Finding: For the period from January 1st, 2016 to December 31st, 2020 the highest percentage of emergency call volume responded to by Oshawa Fire Services as defined by the OFM response types was medical/resuscitator calls representing 30.1% of total emergency call volume.

Key Finding: For the period from January 1st, 2016 to December 31st, 2020 the second highest percentage of emergency call volume responded to by Oshawa Fire Services as defined by the OFM response types was false fire calls representing 15.2% of total emergency call volume.

10.2.2 Emergency Call Volume – Spatial Modelling

The analysis within this section illustrates the distribution of the emergency call volume within the City for the period from January 1st, 2014 to December 31st, 2021. The analysis includes the spatial distribution of all emergency incidents that occurred during this period based on the OFM response types including medical/resuscitator, rescue, false fire and fire /explosions incidents over this eight year period.

10.2.2.1 Spatial Modelling – All Emergency Incidents

Figure 26 illustrates the distribution of all emergency incidents that occurred within the City over this eight year period. This model shows the wide distribution of all emergency incidents throughout the City. There is a notable concentration of incidents in the area located predominantly south east of Fire Station 1 representing a portion of the downtown core of the City. There are other smaller pockets of incidents shown across the City where multiple incidents have occurred over this eight year period. **Figure 27** illustrates an overview of where higher concentrations of incidents have occurred over this eight year period. This figure further illustrates the higher concentration of all emergency incidents in the area south east of Fire Station 1 and a portion of the downtown area. There is a smaller concentration of emergency incidents in the area just northeast of Fire Station 3.

Figure 26: Spatial Modelling – All Emergency Incidents

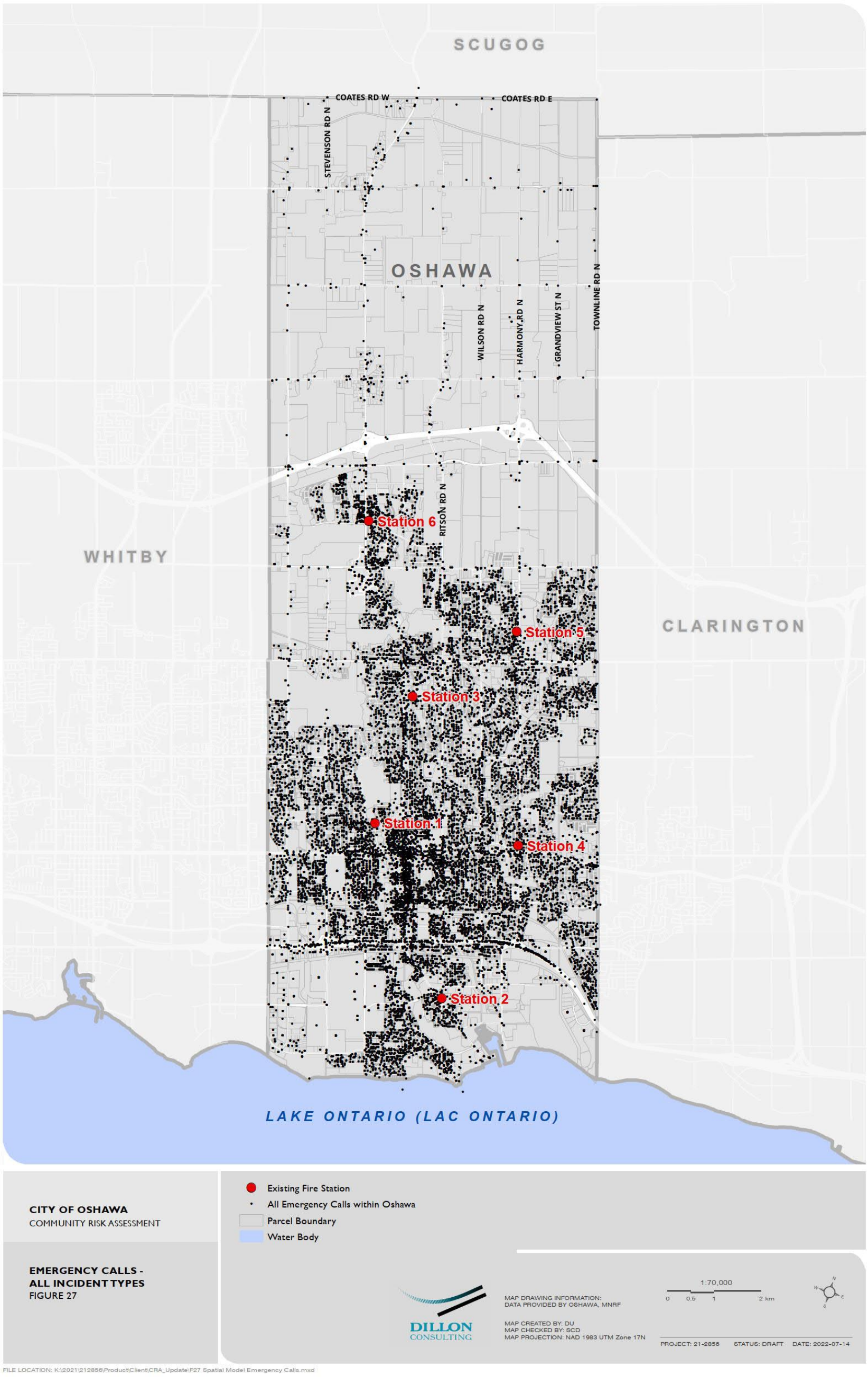
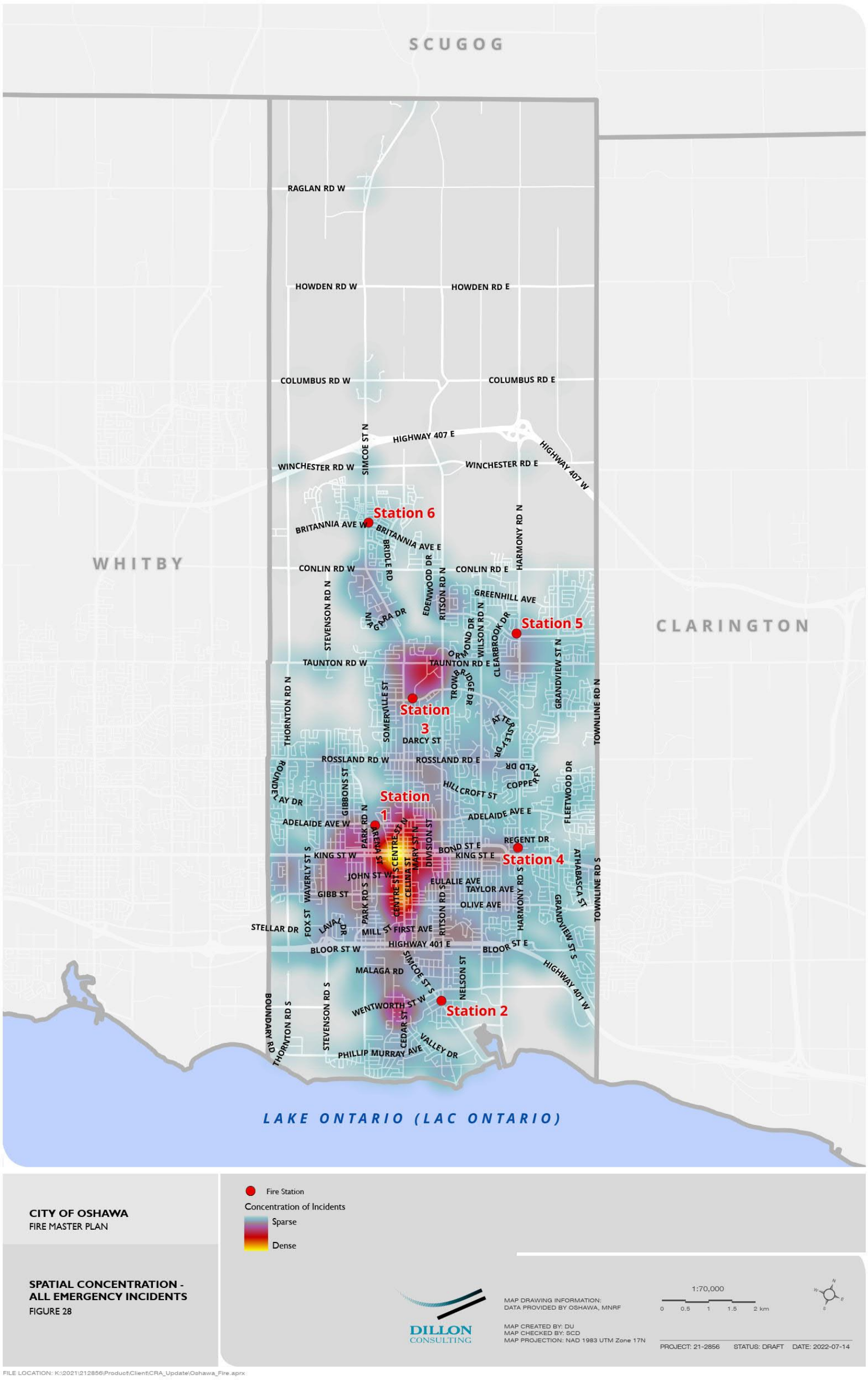


Figure 27: Spatial Concentration – All Emergency Incidents



10.2.2.2 Spatial Modelling – Medical/Resuscitator Incidents

Figure 28 illustrates the locations where the medical/resuscitator incidents occurred during the period from January 1st, 2016 to December 31st, 2021. This model illustrates a similar higher concentration of medical/resuscitator calls south east of Fire Station 1 representing a portion of the downtown core of the City and a smaller area of higher concentration northeast of Fire Station 3. **Figure 29** further illustrates the spatial concentration of medical/resuscitator over this period.

Figure 28: Spatial Modelling – Medical/Resuscitator Incidents

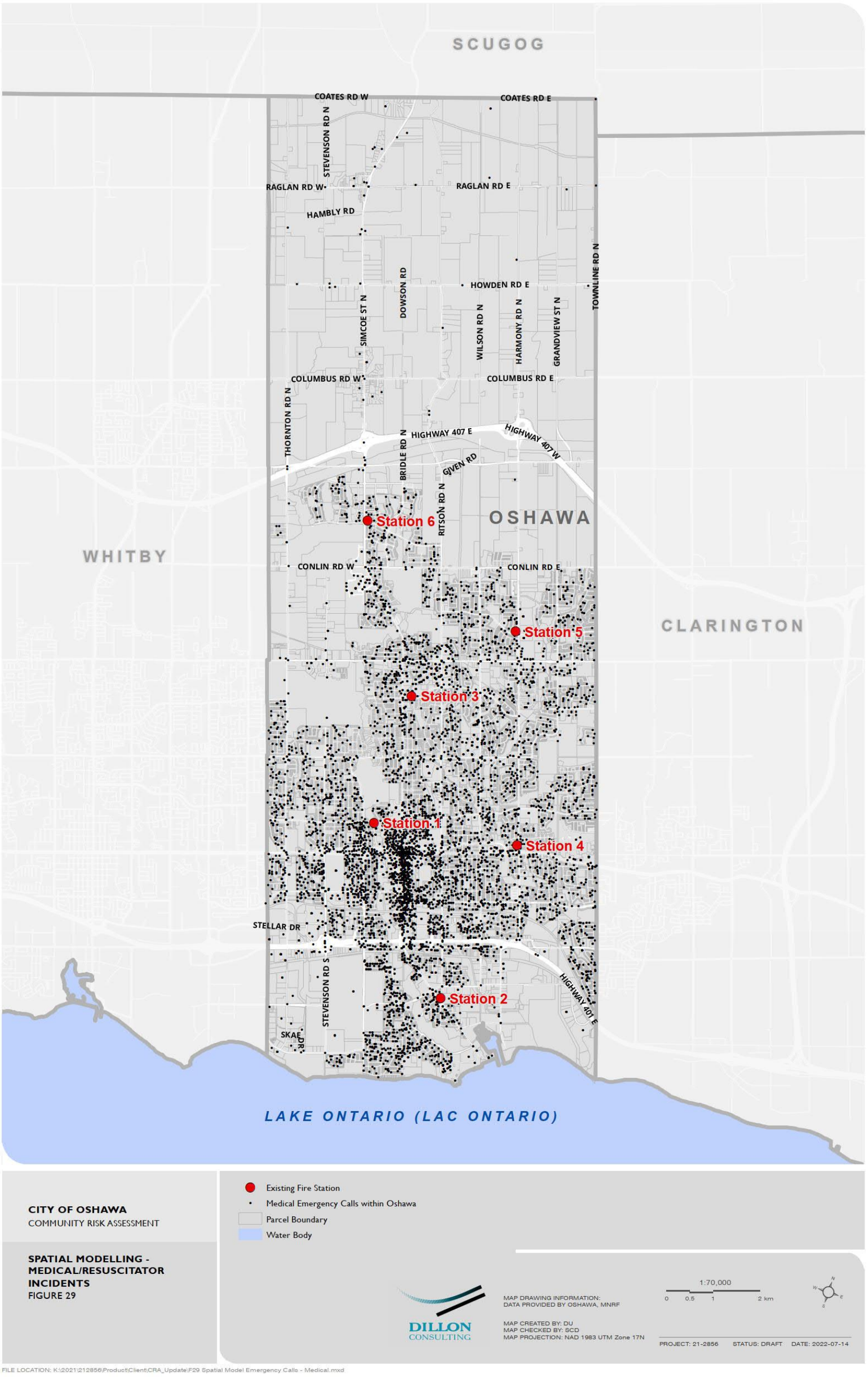
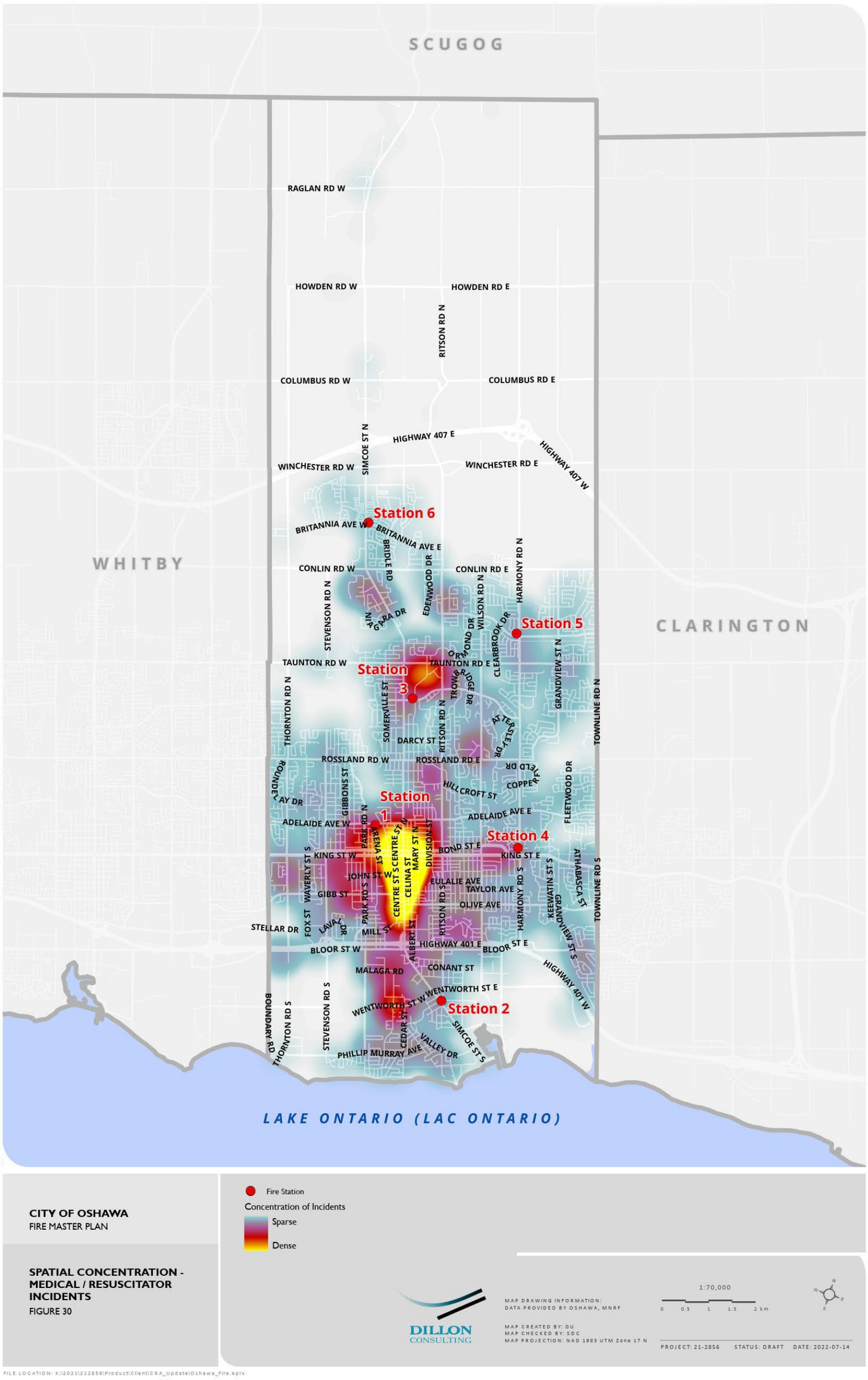


Figure 29: Spatial Concentration – Medical/Resuscitator Incidents



10.2.2.3 Spatial Modelling – Rescue Incidents

Figure 30 illustrates the locations where the rescue incidents occurred during the period from January 1st, 2016 to December 31st, 2020. **Table 35** presents a comprehensive analysis of rescue incidents that OFS responded to during this eight year period. This analysis indicates that 93.8% of the rescue incidents were related to responding to vehicle collisions. As described in **Section 10.2.1.1 – Annual emergency Call Volume, All Incident Types**, OFS experienced a total of 29,483 emergency calls during this eight year period, of which 3,765 calls pertain to motor-vehicle related incidents including vehicle collisions (3,697) and vehicle extrications (68) therefore accounting for approximately 12.77% of total emergency call volume responded to by OFS during this period.

Table 35: Rescue Incidents - Analysis

Response Type	Number of Calls	% of Calls
Animal rescue	12	0.3%
Building Collapse	2	0.0%
Commercial/Industrial Accident	2	0.0%
High angle rescue (non-fire)	4	0.1%
Home/Residential Accident	20	0.5%
Low angle rescue (non-fire)	5	0.1%
Other Rescue	53	1.3%
Persons Trapped in Elevator	68	1.7%
Rescue false alarm	19	0.5%
Rescue no action required	46	1.1%
Trench rescue (non-fire)	2	0.0%
Vehicle Collision	3,697	92.1%
Vehicle Extrication	68	1.7%
Water Ice Rescue	4	0.1%
Water Rescue	14	0.3%

Source: OFS

As a result the majority of the rescue incidents OFS responds to are distributed along major arterial roads within the City and the Highway 401 corridor. There is a noticeable concentration of rescue calls along the King Street East/West (Highway 2) corridor and

the Simcoe Street North corridor from Highway 401 to Highway 407. There is also a very high concentration of rescue calls along the Highway 401 corridor. These transportation corridors are associated with a large percentage of OFS response to motor vehicle accidents.

Figure 31 further illustrates the distribution of the historical rescue incidents that in addition to identifying the transportation corridors identified in the proceeding section also identify several major intersection where there has been a historical larger concentration of motor vehicle accidents.

Figure 30: Spatial Modelling – Rescue Incidents

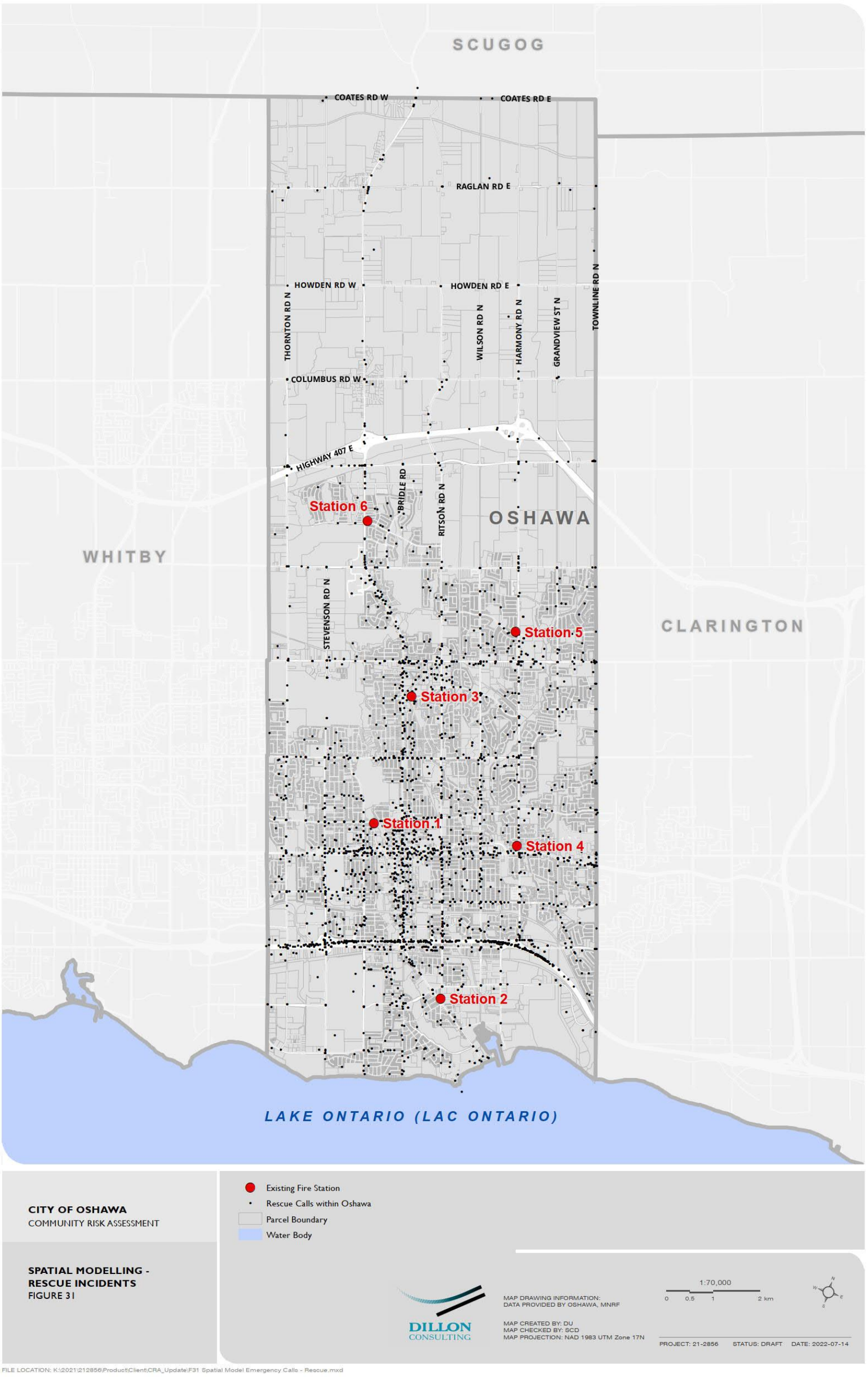
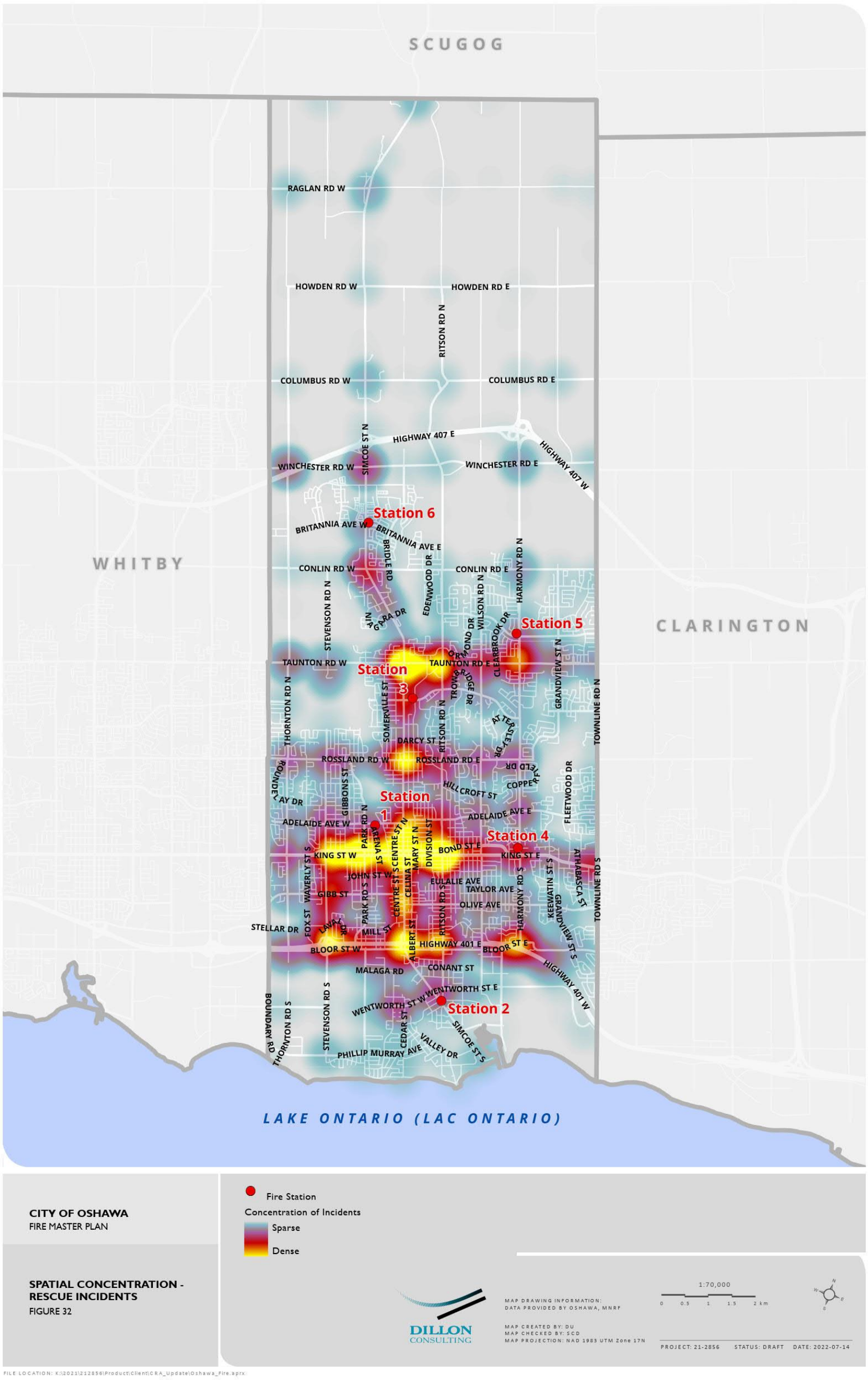


Figure 31: Spatial Concentration – Rescue Incidents

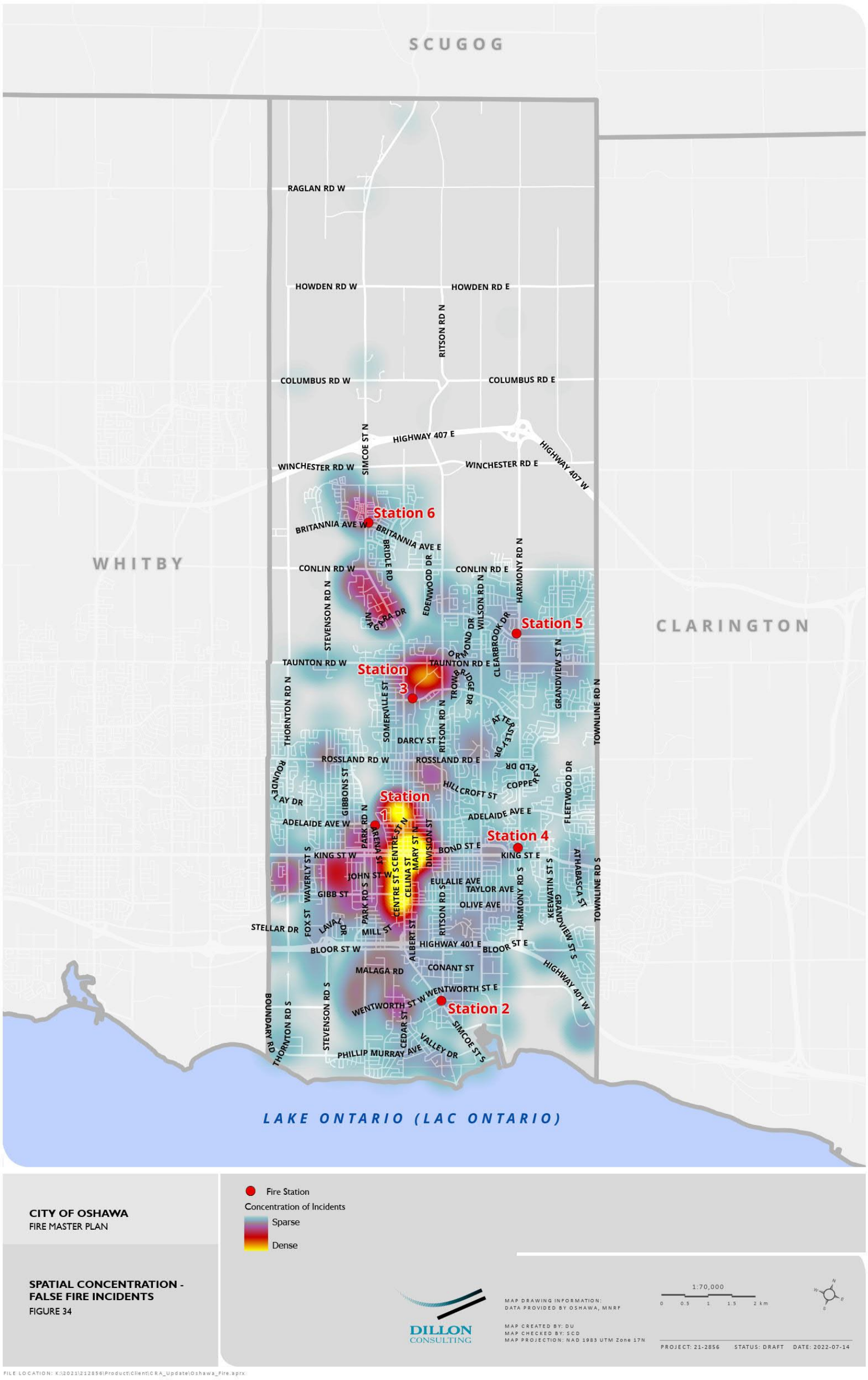


10.2.2.4 Spatial Modelling – False Fire Incidents

Figure 32 illustrates the locations where the false fire incidents occurred during the period from January 1st, 2016 to December 31st, 2021. During this eight year period false fire incidents accounted for 12.9% of OFS total emergency call volume. This figure illustrates a wide and relatively consistent distribution of false fire calls across the entire urban area south of Highway 407. This model indicates that there were very few false fire incidents north of the Highway 407 corridor. There is a higher concentration of false fire incidents along the Simcoe Street North corridor from Highway 401 north to Adelaide Avenue in the downtown core. **Figure 33** confirms the historical concentration of false fire calls along the Simcoe Street North corridor and a smaller concentration north of Fire Station 3

Figure 32: Spatial Modelling – False Fire Incidents

Figure 33: Spatial Concentration – False Fire Incidents

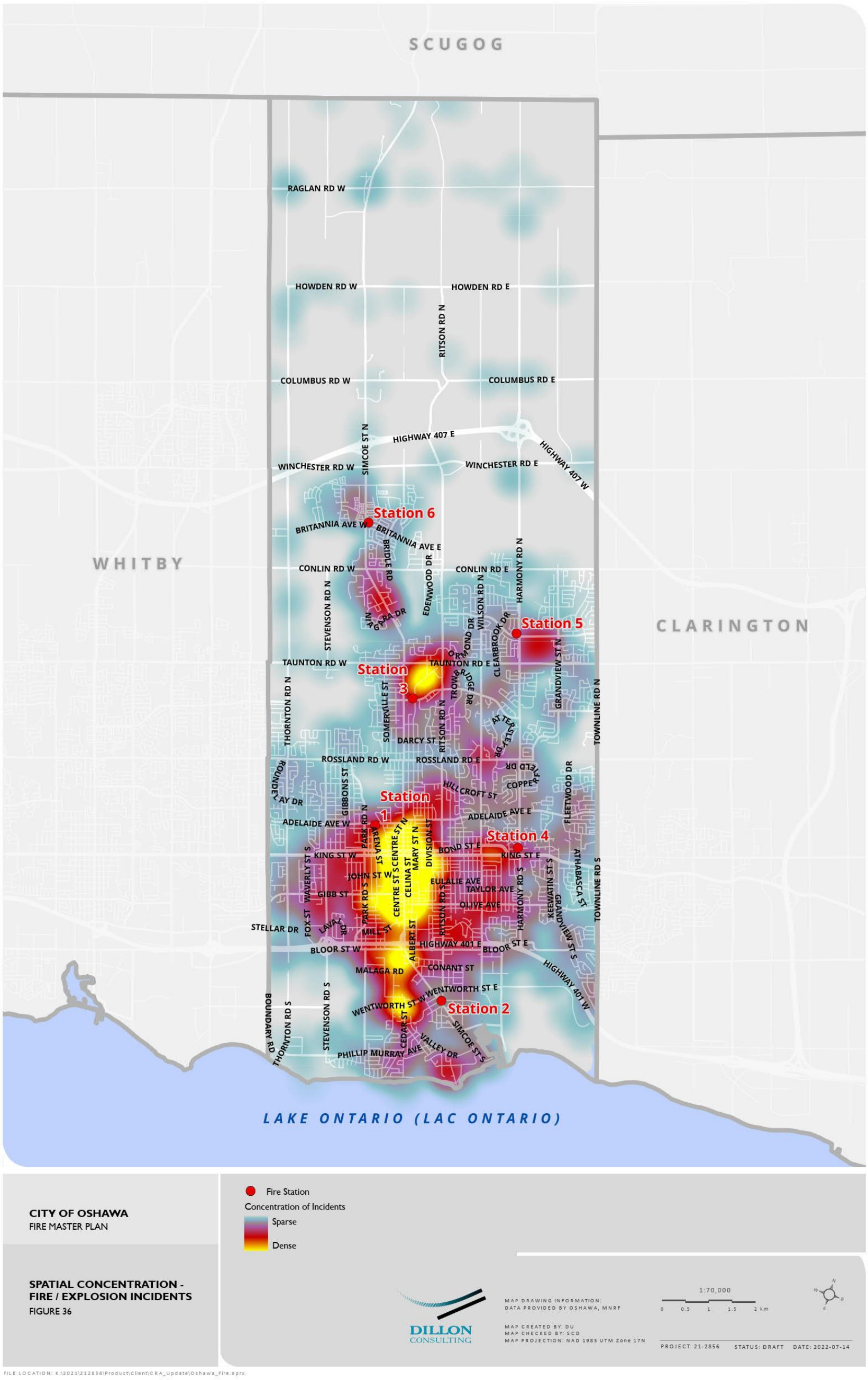


10.2.2.5 Spatial Modelling – Fire/Explosion Incidents

Figure 34 illustrates the locations where the fire/explosion incidents occurred during the period from January 1st, 2016 to December 31st, 2021. During this eight year period fire/explosion incidents accounted for 4.3% of OFS total emergency call volume. This analysis illustrates that the fire/explosions incidents were very widely distributed across the entire geographical area of the City. There is some evidence of a higher concentration of fire/explosion incidents south east of Fire Station 1 representing a portion of the downtown core of the City, west of Fire Station 2, and adjacent to Fire Stations 3 and 5. **Figure 35** further illustrates the higher concentration of fire/explosion incidents south east of Fire Station 1 representing a portion of the downtown core of the City, west of Fire Station 2, and adjacent to Fire Stations 3 and 5. It must be noted that although this figure visually illustrates a high concentration of incidents it does not represent a high volume of incidents.

Figure 34: Spatial Modelling – Fire/Explosion Incidents

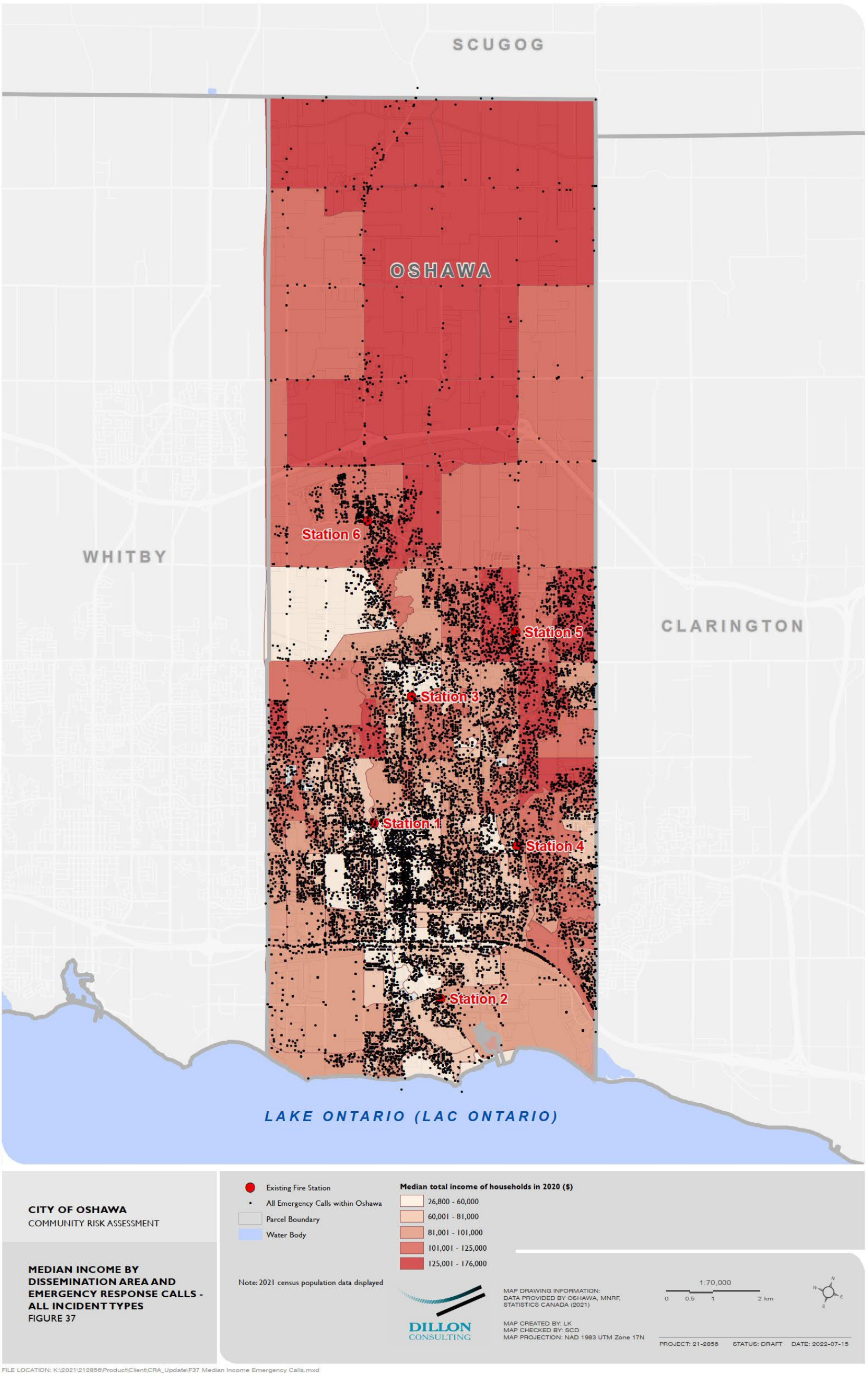
Figure 35: Spatial Concentration – Fire/Explosion Incidents



10.2.2.6 Spatial Modelling – Median Income Dissemination Area

Research within the fire service has identified a potential correlation between median income and the available financial capability to support fire and life safety measures within a home. This could include the purchase of smoke alarms and carbon monoxide detectors, or alterations to ensure two exists from every room. **Figure 36** illustrates results of analysing the median income by dissemination areas within the City of Oshawa based on 2021 census data. This analysis identifies a higher concentration of median income between $26,800 and $60,000 in the areas south east and south west of Fire Station 1 representing a portion of the downtown core of the City. This area of high concentration is consistent with the higher concentration of fires/explosion, medical/resuscitator and false fire incidents. Collectively these factors highlight the need to consider more proactive public education and fire inspection services and programs in these areas in support of prioritizing the first two lines of defence in responding to the fire risks in these areas.

Figure 36: Spatial Modelling – Median Income and Emergency Response Calls – All Incident Types



10.2.3 Emergency Call Volume – Summary

The spatial analysis of the City's historical emergency call volume for the period from January 1st, 2016 to December 31st, 2021 indicates a consistent distribution of emergency call types within the defined urban area of the City and south of the Highway 407 corridor. There has been limited emergency call volume in the identified rural area currently north of the Highway 407 corridor. There are some minor exceptions where there is evidence of higher concentration of specific incident types such as motor vehicle collisions that tend to occur major arterial corridors and intersections including the Highway 401 corridor. The exception is the areas south east and west of Fire Station 1 representing a portion of the downtown core of the City. In these areas there is a higher concentration medical/resuscitator, false fire and fire/explosions. The analysis also illustrates the presence of a lower median income in these same geographical areas.

Identified Risk: For the period from January 1st, 2016 to December 31st, 2021 there is a higher concentration of medical/resuscitator, false fire and fire/explosion incidents in the areas south east and west of Fire Station 1 representing a portion of the downtown core of the City.

Key Finding: There is a higher concentration of lower median income in the areas south east and west of Fire Station 1 representing a portion of the downtown core of the City.

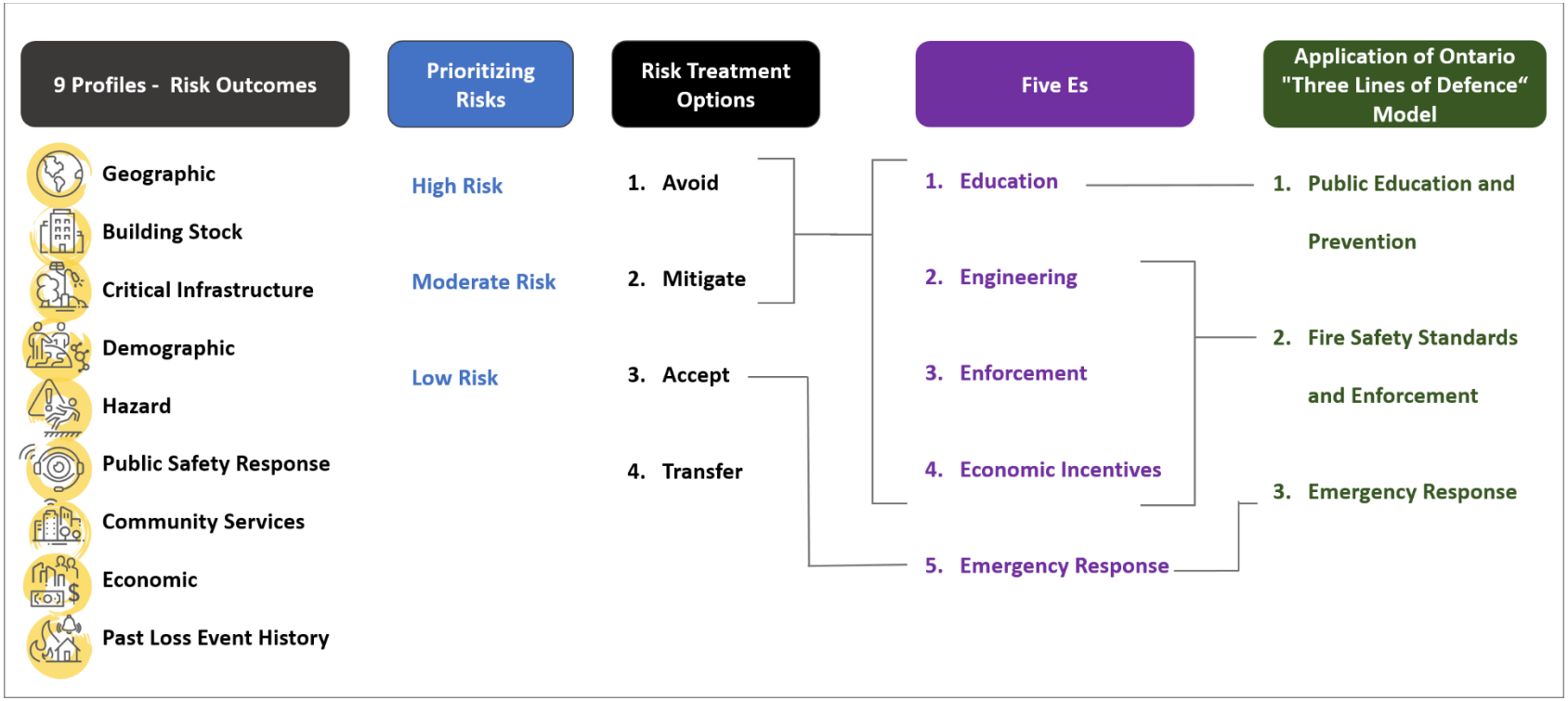
Key Finding: For the period from January 1st, 2016 to December 31st, 2021 there are higher concentrations of rescue incidents involving motor vehicle collisions and vehicle extrication along the King Street East/West (Highway 2) corridor and the Simcoe Street North corridor from Highway 401 to Highway 407 East. There is also a very high concentration of rescue calls along the Highway 401 corridor.

11.0 Applying Key Findings and Identified Risks

The purpose of a CRA is to identify risks that are then used to inform decision-making regarding the provision of fire protection services. The analysis throughout this CRA identifies '**Key Findings**' and '**Identified Risks'** to be considered within the planning processes for OFS. In alignment with TG-02-2019, this section takes the identified risk conclusions (both the key findings and the identified risks) through a risk assignment process to assist in the prioritization of risks, as well as a risk treatment process.

This section of the CRA brings together all of the key findings and identified risks and frames how they will be used to inform the City's decisions regarding the provision of fire protection services. The identified risks and key findings are taken through a risk treatment process and aligned with the "Five E's" of Community Risk Reduction and three lines of defence as shown in **Figure 37**.

Figure 37: Risk Conclusions Application Process



11.1 Prioritizing Risks

NFPA 1300 and OFM TG-02-2019 identify that risks can be prioritized based on their probability and consequence. The OFM TG-02-2019 further emphasizes that all the risk findings and profiles should be considered together.

Following the probability and consequence levels identified by the OFM as described in the subsections below, the risk assignment process considers probability and consequence of each identified risk. This will result in each risk having a risk level (e.g., low, moderate, or high) assigned.

11.1.1 Risk Assignment Process Overview

The risk assignment methodology used as part of this C.R.A is informed by the OFM Technical Guideline TG -02-2019 Community Risk Assessment Guideline.

There are three steps included in the risk assignment exercise used for this CRA:

1. Determine a probability level
2. Determine a consequence level
3. Establish the risk level (i.e., low, moderate or high) for each based on the identified probability and consequence for each event

The following sections provide additional insight into the assignment process.

11.1.1.1 Step 1 - Probability Levels

The probability of a fire or emergency event occurring can be estimated in part based on historical experience of the community and that of the province as a whole. The likelihood categories, and the values presented, follow the OFM TG-02-2019 Community Risk Assessment Guideline. **Table 36** presents the probability levels and the adjusted descriptions.

Table 36: Probability Levels

Likelihood Category*	Numerical Value	Description (Adjusted)
Rare	1	• may occur in exceptional circumstances • no incidents in the past 15 years
Unlikely	10	• could occur at some time, especially if circumstances change • 5 to 15 years since the last incident
Possible	100	• might occur under current circumstances • 1 incident in the past 5 years
Likely	1,000	• will probably occur at some time under current circumstances • multiple or recurring incidents in the past 5 years
Almost Certain	10,000	• expected to occur in most circumstances unless circumstances change • multiple or recurring incidents in the past year

11.1.1.2 Step 2 - Consequence Levels

The consequences of an emergency event relate to the potential losses or negative outcomes associated with the incident. There are four components that should be evaluated in terms of assessing consequence. These include:

1. **Life Safety:** Injuries or loss of life due to occupant and firefighter exposure to life threatening fire or other situations.
2. **Property Loss:** Monetary losses relating to private and public buildings, property content, irreplaceable assets, significant historic/symbolic landmarks and critical infrastructure due to fire.
3. **Economic Impact:** Monetary losses associated with property income, business closures, downturn in tourism, tax assessment value and employment layoffs due to fire.
4. **Environmental Impact:** Harm to human and non-human (e.g., wildlife, fish and vegetation) species of life and general decline in quality of life within the community due to air/water/soil contamination as a result of fire or fire suppression activities. **Table 37** presents the consequence levels.

Table 37: Consequence Levels

Consequence Category	Numerical Value	Description
Insignificant	1	• No life safety issue • Limited valued or no property loss • No impact to local economy and/or • No effect on general living conditions
Minor	10	• Potential risk to life safety of occupants • Minor property loss • Minimal disruption to business activity and/or • Minimal impact on general living conditions
Moderate	100	• Threat to life safety of occupants • Moderate property loss • Poses threat to small local businesses and/or • Could pose threat to quality of the environment
Major	1,000	• Potential for large loss of life • Would result in significant property damage • Significant threat to businesses, local economy, and tourism and/or • Impact to environment would result in a short term, partial evacuation of local residents and businesses
Catastrophic	10,000	• Significant loss of life • Multiple property damage to significant portion of the municipality • Long term disruption of businesses, local employment, and tourism and/or • Environmental damage that would result in long-term evacuation of local residents and businesses

11.1.1.3 Step 3 - Risk Level

Once probability and consequence are determined the level of risk is calculated by multiplying the numerical values for probability and consequence. The relationship between probability and consequence as it pertains to risk levels can be illustrated in a risk matrix. In a risk matrix, probability and consequence are defined on separate scales with varying descriptors providing direction on how to assign the probability and consequence of an event. **Table 38** shows the risk matrix for this CRA.

Table 38: Risk Matrix

Consequence to the Right **Probability Down**	**Insignificant** 1	**Minor** 10	**Moderate** 100	**Major** 1,000	**Catastrophic** 10,000
Almost Certain: 10,000	Moderate	Moderate	High	High	High
Likely: 1,000	Moderate	Moderate	Moderate	High	High
Possible 100	Low	Moderate	Moderate	Moderate	High
Unlikely: 10	Low	Low	Moderate	Moderate	Moderate
Rare: 1	Low	Low	Low	Moderate	Moderate

11.1.2 Assigned Risk Levels

The purpose of assigning a risk level is to assist in the prioritization of the range of risks that were identified as part of this CRA

The results of the risk assignment process are presented in **Table 39**. Where possible, quantitative data was used to inform the risk assignment as described in the rationale in the table. It is important to recognize that with the availability of new or updated data, the probability levels could change or be refined. It should also be recognized that, as identified in OFM TG-02-2019, "professional judgment based on experience should also be exercised in combination with historical information to estimate probability levels" (pg. 12). Similarly, TG-02-2019 acknowledges the role of professional judgment and reviews of past occurrences in determining consequence levels. The rationale provided for both probability and consequence takes into account information from the nine profiles, as TG-02-2019 supports consideration of the profiles together in order to inform decision making about the provision of fire protection services in the specific municipality/community.

Table 39: Risk Assignment

Identified Risk	Probability Level	Rationale	Consequence Level	Rationale	Risk Level
Geographic Profile: Increasing traffic congestion on the existing road network presents the potential for a delay in emergency response times.	Almost Certain	• Integrated Transportation Master Plan 2015 projects increased traffic congestion due to growth (Geographic) • Congestion during peak travel times such as between 5 PM and 6 PM, can influence emergency response times, in part through commuter populations (Demographic, Event History) • Motor vehicle-related incidents on the existing road network contribute to congestion (Critical Infrastructure, Event History) • Some identified hazards including transportation emergency, energy emergency/power outage, snowstorm/blizzard, flood, and freezing rain could contribute to increased congestion due to loss of power impacting traffic lights or increased motor vehicle incidents, for example (Hazard)	Minor	• Potential delay in emergency response travel time • Potential for risk to life safety of occupants • Potential risk for property loss • Consequence level could be impacted by the magnitude of a hazard event.	**Moderate**

Identified Risk	Probability Level	Rationale	Consequence Level	Rationale	Risk Level
Geographic Profile: Motor vehicle-related incidents on the existing road network represent 17.3% (3,765) of the historical emergency responses of the Oshawa Fire Services.	Almost Certain	• OFS responded to a total of 3,765 calls pertaining to motor-vehicle related incidents over a five year period (Event History) • Integrated Transportation Master Plan 2015 projects increased traffic congestion due to growth (Geographic) • Congestion during peak travel times such as between 5 PM and 6 PM, in part through commuter populations (Demographic, Event History) • Some identified hazards including transportation emergency, energy emergency/power outage, snowstorm/blizzard, flood, and freezing rain could contribute to increased congestion due to loss of power impacting traffic lights or increased motor vehicle incidents, for example (Hazard)	Moderate	• Potential for risk to life safety of occupants of motor vehicles • Potential risk for property loss • Could pose a threat to small local business • Could pose a threat to the quality of the environment • Consequence level could be impacted by the magnitude of a hazard event.	**High**
Geographic Profile: The presence of waterways within the City of Oshawa creates a potential need for specialized technical ice and water rescues.	Likely	• Presence of Lake Ontario and other water features including those that may be used for recreation (Geographic) • The identified hazard of flooding could contribute to the need for specialized ice or water rescue (Hazard) • Ten calls pertained to water or ice water rescue (an average of two water/ice water calls per year) (Event History)	Minor	• Potential risk to life safety of individuals needing rescue.	**Moderate**

Identified Risk	Probability Level	Rationale	Consequence Level	Rationale	Risk Level
Building Stock Profile: Group C - Residential Occupancies represent 93.08% (52,578) of the City's existing property stock, and over the five year period from January 1st, 2016 to December 31st, 2020 were associated with 84.1% (318) of the structure fires within the City.	Almost Certain	• The majority of property stock is Group C – Residential (Building Stock) • 318 fires (84.1%) over the five year period occurred in Group C – Residential (Past Loss)	Moderate	• Could pose a threat to the life safety of occupants, • Could result in moderate property loss, • Could pose a threat to small local businesses, and/or pose a threat to the quality of the environment. • Potential for vulnerable individuals including seniors and youth within Group C – Residential (Demographic) • Most reported fire-related civilian injuries (26) and fatalities (7) occurred in Group C – Residential (Past Loss) • Of the fire loss incidents in Group C – Residential occupancies 18.52% of incidents did not have a smoke alarm present (Past Loss) • Of the fire loss incidents in Group C – Residential occupancies 49.83% of incidents had a smoke alarm present and operating (Past Loss) • Potential for exposure risk depending on dwelling type and building age (Building Stock) • Potential for presence and maintenance of fire protection equipment, for example, fire alarm system, sprinkler's, etc. (Building Stock) • Potential of need for vertical response (Building Stock)	**High**

Identified Risk	Probability Level	Rationale	Consequence Level	Rationale	Risk Level
Building Stock Profile: The 2016 Census data indicates that 62.60% (39,185) of the City's Group C-Residential building stock was built prior to the introduction of the 1981 Ontario Fire Code and Ontario Building Code compared to 53.06% (2,742,720) of residential building stock in the remainder of the Province.	Almost Certain	• The majority of property stock is Group C – Residential (Building Stock) • 318 fires (84.1%) over the five year period occurred in Group C – Residential (Past Loss)	Moderate	• Could pose a threat to the life safety of occupants, • Could result in moderate property loss, • Could pose a threat to small local businesses, and/or pose a threat to the quality of the environment. • Potential for vulnerable individuals including seniors and youth within Group C – Residential (Demographic) • Most reported fire-related civilian injuries (26) and fatalities (7) occurred in Group C – Residential (Past Loss) • Of the fire loss incidents in Group C – Residential occupancies 18.52% of incidents did not have a smoke alarm present (Past Loss) • Of the fire loss incidents in Group C – Residential occupancies 49.83% of incidents had a smoke alarm present and operating (Past Loss) • Potential for exposure risk depending on dwelling type and building age (Building Stock) • Potential for presence and maintenance of fire protection equipment, for example, fire alarm system, sprinkler's, etc. (Building Stock)	**High**

Identified Risk	Probability Level	Rationale	Consequence Level	Rationale	Risk Level
Building Stock Profile: The City currently has 76 buildings defined by the OBC as high-rise buildings with a floor level of 18 metres (59 feet) above grade, or 6 storeys. These buildings are distributed within the urban area with several located in the downtown area.	Likely	• Recognizing the high number of Group C – Residential occupancies, it is assumed that some of the high-rise buildings are Group C – Residential • The majority of property stock is Group C – Residential (Building Stock) • 318 fires (84.1%) over the five year period occurred in Group C – Residential (Past Loss) • Potential for presence and maintenance of fire protection equipment, for example, fire alarm system, sprinkler's, etc. (Building Stock)	Major	• Potential of need for vertical response (Building Stock) • Due to the number of occupants in high-rise buildings, an incident occurring could result in a large loss of life, • Could result in significant property damage, • Could result in significant threat to large businesses, local economy and tourism, and/or impact to the environment or result in a short term, partial evacuation of local residents and businesses. • Potential for vulnerable individuals including seniors and youth within Group C – Residential (Demographic) • Most reported fire-related civilian injuries (26) and fatalities (7) occurred in Group C – Residential (Past Loss) • Of the fire loss incidents in Group C – Residential occupancies 18.52% of incidents did not have a smoke alarm present (Past Loss) • Of the fire loss incidents in Group C – Residential occupancies 49.83% of incidents had a smoke alarm present and operating (Past Loss) • Potential for exposure risk depending on dwelling type and building age (Building Stock) • Potential for presence and maintenance of fire protection equipment, for example, fire alarm system, sprinkler's, etc. (Building Stock)	**High**

Identified Risk	Probability Level	Rationale	Consequence Level	Rationale	Risk Level
Building Stock Profile: The City has 91 buildings with a total building area (footprint) that exceed 50,000 square feet (4,655 square metres). These buildings are predominantly located in the commercial and industrial land use areas such as the area south of Highway 401 and along Taunton Road.	Almost Certain	• Buildings with large area footprints appear to be predominantly located in the commercial and industrial areas (Building Stock) • Group D – Business, Group E - Mercantile, Group F - Industrial or a mix of uses represent 2.27% of the City's existing property stock (Building Stock) • Over the five year period, Group D, E and F were associated with 31 (8.2%) of the structure fires within the City (Past Loss) • Potential for presence and maintenance of fire protection equipment, for example, fire alarm system, sprinkler's, etc. (Building Stock)	Major	• Due to the potential for these buildings to contain large volumes of combustible materials, as well as horizontal travel distances for fire suppression activities, an incident occurring could result in a large loss of life • Could result in significant property damage, • Could result in significant threat to large businesses, local economy and tourism, and/or impact to the environment. • Potential for presence and maintenance of fire protection equipment, for example, fire alarm system, sprinkler's, etc. (Building Stock) • Over the five year period, Group D, E and F were associated with 8.2% of the structure fire loss within the City (Past Loss) • Some of the identified occupancies may play a role in the economic well-being of the City (Economic)	**High**

Identified Risk	Probability Level	Rationale	Consequence Level	Rationale	Risk Level
Building Stock Profile: The City of Oshawa currently has 35 registered vulnerable occupancies.	Likely	• These vulnerable occupancies may fall into different occupancy types such as Group B – Care or Detention or Group C – Residential (Building Stock) • Group B – Care or Detention occupancies represent 0.04% and Group C – Residential occupancies represent 93.08% of the City's existing property stock (Building Stock) • 318 fires (84.1%) over the five year period occurred in Group C – Residential and one (0.26%) fire occurred in Group B – Care or Detention (Past Loss) • Ontario Regulation 150/13 requires fire departments to perform annual inspections and approve and witness fire drill scenarios (Building Stock)	Major	• Ontario Regulation 150/13 requires fire departments to perform annual inspections and approve and witness fire drill scenarios (Building Stock) • Presence and maintenance of fire protection equipment, for example, fire alarm system, sprinkler's, etc. (Building Stock) • Most reported fire-related civilian injuries (26) and fatalities (7) occurred in Group C – Residential (Past Loss) • Potential for vulnerable individuals including those who receive special care or treatment within a Group B occupancy (Building Stock) • Potential to contain quantities of various flammable/combustible liquids and gases, oxidizers and combustible furnishings (Building Stock)	**High**

Identified Risk	Probability Level	Rationale	Consequence Level	Rationale	Risk Level
Demographic Profile: Seniors (those 65 years and over) are considered to represent one of the highest fire risk groups across the Province based on residential fire death rate. According to the 2021 Census, seniors represent 16.7% (29,325) of the City's total population.	Almost Certain	• Seniors represent one of the most vulnerable demographics and are 16.7% of the City's population (Demographic) • The majority of property stock is Group C – Residential (Building Stock) • 318 fires (84.1%) over the five year period occurred in Group C – Residential (Past Loss)	Moderate	• Could pose a threat to the life safety of occupants • Could result in moderate property loss • Most reported fire-related civilian injuries (26) and fatalities (7) occurred in Group C – Residential (Past Loss) • Of the fire loss incidents in Group C – Residential occupancies 18.52% of incidents did not have a smoke alarm present (Past Loss) • Of the fire loss incidents in Group C – Residential occupancies 49.83% of incidents had a smoke alarm present and operating (Past Loss) • Potential for exposure risk depending on dwelling type and building age (Building Stock) • Potential for presence and maintenance of fire protection equipment, for example, fire alarm system, sprinkler's, etc. (Building Stock)	**High**
Past Loss and Event History Profile: For the period from January 1st, 2016 to December 31st, 2021 there is a higher concentration of medical/resuscitator, false fire and fire/explosion incidents in the areas south east and west of Fire Station 1 representing a portion of the downtown core of the City.	Almost Certain	• Over the five-year period, false fires represent 15.2% of total emergency call volume, medical/resuscitator calls represent 30.1% and fire/explosion calls represent 4.3% (Event History). A higher concentration of medical, fire and false fire calls are expected to occur in portions of the downtown core area. • Areas of the City most densely populated are found in areas south of Provincial Highway 401 and in the City's downtown core (Demographics)	Moderate	• Could pose a threat to the life safety of occupants • Could result in moderate property loss • Could pose a threat to small local businesses, and/or pose a threat to the quality of the environment	**High**

11.2 Risk Treatment Options

NFPA 1300 and the OFM TG-02-2019 apply the process of identifying a risk treatment option for an identified risk. The risk treatment options include avoidance, mitigation, acceptance, and transfer. Further detail on these options can be found in **Table 40**. There are four risk treatment options:

1. Avoid;
2. Mitigate;
3. Accept; and
4. Transfer.

Table 40: Risk Treatment Options

Treatment Option	NFPA 1300 Description	OFM TG-02-2019 Description
Avoid	Eliminate the hazard.	Implementing programs and initiatives to prevent a fire or emergency from happening.
Mitigate	Reduce probability or impact (consequence) of the risk.	Implementing programs and initiatives to reduce the probability and/or consequence of a fire or emergency.
Accept	Take no actions.	No specific programs or initiatives will be implement. Accept the risk and respond if it occurs.
Transfer	Transfer the risk to another party.	Transfer the impact and/or management of the risk to another organization or body.

Most of these options, if chosen by a fire department, will require some action or consideration as they pertain to fire protection services. As part of the application of the risk conclusions, a risk treatment option will be identified for each outcome followed by the application of the Five Es as described in the next section.

11.2.1 The 'Five Es' of Community Risk Reduction

NFPA 1300 defines a Community Risk Reduction plan as a "document that outlines the goals, objectives, programs, and resources used to reduce the risks identified by the community risk assessment". Establishing service levels in regards to programs and resources in alignment with a CRA is required of Ontario municipalities as part of **O.Reg. 378/18**. In the City of Oshawa, the recommendations contained within the 2020 FMP can be considered a part of community risk reduction plan since it includes a review of Fire Prevention and Public Education. The recommended strategies and programs should be reviewed regularly, in alignment with the annual updates to the Community Risk Assessment.

Within this CRA, each risk conclusion ('key finding' or 'identified risk') is reviewed through the lens of the "Five Es". The Five Es is a framework outlined in NFPA 1300, and the Institution of Fire Engineers' Vision 20/20 National Strategy for Fire Loss Prevention. The Five Es are summarized in **Table 41**. They include:

1. increasing awareness (Education);
2. changes to the physical environment (Engineering);
3. influencing change through economic incentives (Economic Incentives)'
4. enforcing legislation through inspection programs (Enforcement); and
5. mitigating injury, illness and saving lives (Emergency Response).

Table 41: Overview of the NFPA 1300 Five "E's"

Five E's	Description
Education	Education influences audiences to refrain from risky or unhealthy behavior or take positive action to reduce risk.
Enforcement	Enforcement reduces risks through enforcing legislation through inspections and fines for noncompliance.
Engineering	Engineering includes incorporating new products and technology to modify the environment to prevent or mitigate injuries and deaths.
Economic Incentives	Economic incentives are typically offered to encourage better choices and changes in behaviour.
Emergency Response	Effective emergency response can mitigate the effects of unintentional injuries and save lives.

Source: Community Risk Reduction: Doing More With More, The NFPA Urban Fire and Life Safety Task Force, June 2016.

It is important to note that NFPA 1300 discusses the application of the Five Es to develop specific goals and objectives to reduce risk. It also acknowledges that some strategies may require policy advocacy or legislative work. These are important considerations for a department for long-range planning. The recommendations of the 2020 FMP focused on ways to reduce risk from the perspective of the typical suppression and public education/prevention operations of the department. This included a focus on a proactive reduction of risk through education, prevention, and enforcement with fire suppression as the fail-safe.

11.2.2 Risk Conclusions, Treatment Options, and the Five Es

When it comes to aligning service levels with risks that define local needs and circumstances, it is important to recognize that not all risk conclusions align with the services provided by a fire department in the same way. For this reason, the risk conclusions are categorized based on the identified treatment options and how they can be used to inform the activities, strategies, and services provided by the department through the lens of the Five Es. The purpose of the Five Es as they pertain to this study is shown in **Table 42**.

Table 42: Risk Analysis Conclusions – 5 E's Categorization

Five E's	Description	Purpose
Education	Education influences audiences to refrain from risky or unhealthy behavior or take positive action to reduce risk.	For consideration within the proposed Public Education Program
Enforcement	Enforcement reduces risks through enforcing legislation through inspections and fines for noncompliance.	For consideration within the proposed Inspection/Enforcement Program
Engineering	Engineering includes incorporating new products and technology to modify the environment to prevent or mitigate injuries and deaths.	For consideration within the proposed Fire Inspection and Enforcement Program
Economic Incentives	Economic incentives are typically offered to encourage better choices and changes in behaviour.	For consideration within the proposed Inspection/Enforcement Program
Emergency Response	Effective emergency response can mitigate the effects of unintentional injuries and save lives.	For consideration within the proposed Emergency Response Deployment Options

Table 43 presents the identified risks in a matrix format to indicate the ways in which the risks can be addressed by OFS and ultimately considered by the City to plan the delivery of fire protection services, such as through the fire master planning process. The same risk assessment process is applied to the key findings in **Table 43**.

The department should use the findings of the risk assessment to review other fire protection services provided by the department to help ensure compliance with **O.Reg.378/18** (e.g., training, by-laws, fleet, equipment, all department policies and guidelines, etc.).

Table 43: Treatment Options and Five E's Categorization – Identified Risks

Profile	Identified Risk	Risk Level	Risk Treatment Option: Avoid Mitigate Accept Transfer	Education For consideration within the proposed Public Education Program	Enforcement For consideration within the proposed Inspection and Enforcement Program	Engineering For consideration within the proposed Inspection and Enforcement Program	Economic Incentive For consideration within the proposed Inspection and Enforcement Program	Emergency Response For consideration within the proposed Emergency Response Program
Geographic	Increasing traffic congestion on the existing road network presents the potential for a delay in emergency response times.	Moderate	Accept	No	No	No	No	Yes
Geographic	Motor vehicle-related incidents on the existing road network represent 17.3% (3,765) of the historical emergency responses of the Oshawa Fire Services.	High	Accept	No	No	No	No	Yes
Geographic	The presence of waterways within the City of Oshawa creates a potential need for specialized technical ice and water rescues.	Moderate	Mitigate Accept	Yes	No	No	No	Yes
Geographic	Activities at the Port of Oshawa have been identified as including the potential for dangerous goods transportation that may present a risk to the community.	**Special Consideration**	Mitigate Accept	Yes	Yes	Yes	Yes	Yes
Building Stock	Group C - Group C - Residential Occupancies represent 93.08% (52,578) of the City's existing property stock, and over the five year period from January 1st, 2016 to December 31st, 2020 were associated with 84.1% (318) of the structure fires within the City.	High	Mitigate Accept	Yes	Yes	Yes	No	Yes

Profile	Identified Risk	Risk Level	Risk Treatment Option: Avoid Mitigate Accept Transfer	Education For consideration within the proposed Public Education Program	Enforcement For consideration within the proposed Inspection and Enforcement Program	Engineering For consideration within the proposed Inspection and Enforcement Program	Economic Incentive For consideration within the proposed Inspection and Enforcement Program	Emergency Response For consideration within the proposed Emergency Response Program
Building Stock	The 2016 Census data indicates that 62.60% (39,185) of the City's Group C-Residential building stock was built prior to the introduction of the 1981 Ontario Fire Code and Ontario Building Code compared to 53.06% (2,742,720) of residential building stock in the remainder of the Province.	High	Mitigate Accept	Yes	Yes	No	No	Yes
Building Stock	The City currently has 76 buildings defined by the OBC as high-rise buildings with a floor level of 18 metres (59 feet) above grade, or 6 storeys. These buildings are distributed within the urban area with several located in the downtown area.	High	Mitigate Accept	Yes	Yes	Yes	Yes	Yes
Building Stock	The City has 91 buildings with a total building area (footprint) that exceed 50,000 square feet (4,655 square metres). These buildings are predominantly located in the commercial and industrial land use areas such as the area south of Highway 401 and along Taunton Road.	High	Mitigate Accept	Yes	Yes	Yes	Yes	Yes
Building Stock	The City of Oshawa currently has 35 registered vulnerable occupancies.	High	Mitigate Accept	Yes	Yes	Yes	Yes	Yes

Profile	Identified Risk	Risk Level	Risk Treatment Option: Avoid Mitigate Accept Transfer	Education For consideration within the proposed Public Education Program	Enforcement For consideration within the proposed Inspection and Enforcement Program	Engineering For consideration within the proposed Inspection and Enforcement Program	Economic Incentive For consideration within the proposed Inspection and Enforcement Program	Emergency Response For consideration within the proposed Emergency Response Program
Critical Infrastructure	The Oshawa Executive Airport presents a number of unique fire related risks associated with aircraft, supporting infrastructure and the potential transportation of dangerous goods requiring specialized fire protection services.	**Special Consideration**	Mitigate Accept	No	Yes	Yes	No	Yes
Demographic	Seniors (those 65 years and over) are considered to represent one of the highest fire risk groups across the Province based on residential fire death rate. According to the 2021 Census, seniors represent 16.7% (29,325) of the City's total population.	High	Mitigate Accept	Yes	Yes	Yes	Yes	Yes
Past Loss and Event History	For the period from January 1st, 2016 to December 31st, 2021 there is a higher concentration of medical/resuscitator, false fire and fire/explosion incidents in the areas south east and west of Fire Station 1 representing a portion of the downtown core of the City.	High	Mitigate Accept	Yes	Yes	Yes	Yes	Yes

Table 44: Treatment Options and Five E's Categorization – Key Findings

Profile	Key Finding	Risk Treatment Option: Avoid Mitigate Accept Transfer	Education For consideration within the proposed Public Education Program	Enforcement For consideration within the proposed Inspection and Enforcement Program	Engineering For consideration within the proposed Inspection and Enforcement Program	Economic Incentive For consideration within the proposed Inspection and Enforcement Program	Emergency Response For consideration within the proposed Emergency Response Program
Geographic	There are several private or restricted (e.g. gated / locked) emergency access routes located throughout the City used by fire apparatus. It was identified that these routes are not always well-maintained and currently, the City does not possess an inventory of these emergency access routes.	Mitigate	Yes	No	No	No	No
Geographic	Bridges, with restrictions or closures, have the potential to reduce the connectivity of the City's road network resulting in the potential for delays in emergency response times.	Accept	No	No	No	No	Yes
Geographic	Grade level rail crossings could create a physical barrier to the connectivity of the City's road network that can potentially result in a delays in emergency response times.	Accept	No	No	No	No	Yes
Building Stock	The City includes areas of building stock that have higher density and, as such, greater potential for exposure in the event of a fire.	Mitigate Accept	Yes	Yes	Yes	Yes	Yes
Building Stock	There are currently 24 properties within the City that are identified as known lightweight construction.	Mitigate Accept	Yes	Yes	Yes	Yes	Yes

Profile	Key Finding	Risk Treatment Option: Avoid Mitigate Accept Transfer	Education For consideration within the proposed Public Education Program	Enforcement For consideration within the proposed Inspection and Enforcement Program	Engineering For consideration within the proposed Inspection and Enforcement Program	Economic Incentive For consideration within the proposed Inspection and Enforcement Program	Emergency Response For consideration within the proposed Emergency Response Program
Building Stock	OFS identified several properties within Oshawa as having an increased potential for high fire risk in regards to fuel load.	Mitigate	Yes	Yes	Yes	Yes	Yes
Building Stock	Key Finding: In addition to registered vulnerable occupancies the City has 60 schools, and 55 daycares that represent higher fire life-safety risks.	Mitigate Accept	Yes	Yes	Yes		Yes
Building Stock	There are a number of identified heritage buildings within Oshawa, many of which were constructed prior to the introduction of the Ontario Fire Code and Ontario Building Code.	Accept	No	No	No	No	Yes
Critical Infrastructure	It was identified that there are several privately owned hydrants located throughout the City. However, the City does not currently have an inventory of these hydrants.	Mitigate Accept	Yes	No	No	No	Yes
Demographic	The 2021 Census data indicates that children aged 14 and under represent 17.6% (30,805) of the City's total population.	Mitigate Accept	Yes	Yes	Yes	Yes	Yes
Demographic	Of the City's total population, 24.77% (45,445) fall into the age range of 45 to 64, representing a cohort aging towards the seniors demographic of 65 years or older.	Mitigate Accept	Yes	No	No	No	Yes

Profile	Key Finding	Risk Treatment Option: Avoid Mitigate Accept Transfer	Education For consideration within the proposed Public Education Program	Enforcement For consideration within the proposed Inspection and Enforcement Program	Engineering For consideration within the proposed Inspection and Enforcement Program	Economic Incentive For consideration within the proposed Inspection and Enforcement Program	Emergency Response For consideration within the proposed Emergency Response Program
Demographic	The City's commuter population presents a factor that may impact traffic congestion, and the potential occurrence of motor vehicle accidents within the City.	Accept	No	No	No	No	Yes
Hazard	The City's 2022 Hazard Identification and Risk Assessment identifies hazards that could each impact the ability of the City to deliver fire protection services.	Mitigate Accept	Yes	No	No	No	Yes
Economic	The City has identified top employers that contribute to the economic vitality of the community. If a fire were to occur at one of these facilities it could have a negative impact on the financial well-being of the City.	Mitigate Accept	Yes	Yes	Yes	Yes	Yes
Past Loss and Event History	Over the five year period from January 1st, 2016 to December 31st, 2020, the City averaged 76 structure fires per year.	Mitigate Accept	Yes	Yes	Yes	Yes	Yes
Past Loss and Event History	Over the five year period from January 1st, 2016 to December 31st, 2020, structure fires occurring in Group C – Residential occupancies account for 84.13% (318) of total structure fires within the City.	Mitigate	Yes	Yes	Yes	Yes	Yes

Profile	Key Finding	Risk Treatment Option: Avoid Mitigate Accept Transfer	Education For consideration within the proposed Public Education Program	Enforcement For consideration within the proposed Inspection and Enforcement Program	Engineering For consideration within the proposed Inspection and Enforcement Program	Economic Incentive For consideration within the proposed Inspection and Enforcement Program	Emergency Response For consideration within the proposed Emergency Response Program
Past Loss and Event History	Over the five year period from January 1st, 2016 to December 31st, 2020, structure fires occurring in Group E – Mercantile occupancies account for 9.06% ($3,800,000) of total structure fire loss within the City, higher than the Province by 4.0%.	Mitigate Accept	Yes	Yes	Yes	Yes	Yes
Past Loss and Event History	Most reported fire related civilian injuries (26) and fatalities (7) occurred in Group C – Residential Occupancies, with one (1) fatality occurring in an occupancy not classified within the OBC.	Avoid Accept	Yes	Yes	Yes	Yes	Yes
Past Loss and Event History	Of the fires occurring in the City over the five year period from January 1st, 2016 to December 31st, 2020, the leading cause of unintentionally set fires was due to misuse of ignition source at 28.84% (109 fires), compared to 29.54 (10,167) in the Province.	Mitigate Accept	Yes	Yes	Yes	No	Yes
Past Loss and Event History	Of the fires occurring in the City over the five year period from January 1st, 2016 to December 31st, 2020, the second most common cause of unintentionally set fires was undetermined at 17.99% (68 fires), compared to 18.81% (6,476) in the Province.	Mitigate Accept	Yes	Yes	Yes	No	Yes

Profile	Key Finding	Risk Treatment Option: Avoid Mitigate Accept Transfer	Education For consideration within the proposed Public Education Program	Enforcement For consideration within the proposed Inspection and Enforcement Program	Engineering For consideration within the proposed Inspection and Enforcement Program	Economic Incentive For consideration within the proposed Inspection and Enforcement Program	Emergency Response For consideration within the proposed Emergency Response Program
Past Loss and Event History	Of the fires occurring within the City over the five year period from January 1st, 2016 to December 31st, 2020, 18.25% (69) of fires had a reported undetermined ignition source of, which is 5.77% lower than the Province (24.03%).	Mitigate Accept	Yes	Yes	Yes	No	Yes
Past Loss and Event History	Of the fires occurring within the City over the five year period from January 1st, 2016 to December 31st, 2020, 17.72% (67) of fires had a reported ignition source of open flame tools/smokers articles, which is 3.51% higher than the Province (14.21%).	Mitigate Accept	Yes	Yes	Yes	No	Yes
Past Loss and Event History	Of the fires occurring within the City over the five year period from January 1st, 2016 to December 31st, 2020, 17.46% (66) of fires had a reported ignition source of cooking equipment, which is 0.31% higher than the Province (17.15%).	Mitigate Accept	Yes	Yes	Yes	No	Yes
Past Loss and Event History	Over the five year period from January 1st, 2016 to December 31st, 2020, of the fire loss incidents in Group C – Residential occupancies, 18.52% (55) of incidents did not have a smoke alarm present (compared to 17. 44% or 4,236 in the Province).	Mitigate Accept	Yes	Yes	Yes	Yes	Yes

Profile	Key Finding	Risk Treatment Option: Avoid Mitigate Accept Transfer	Education For consideration within the proposed Public Education Program	Enforcement For consideration within the proposed Inspection and Enforcement Program	Engineering For consideration within the proposed Inspection and Enforcement Program	Economic Incentive For consideration within the proposed Inspection and Enforcement Program	Emergency Response For consideration within the proposed Emergency Response Program
Past Loss and Event History	Over the five year period from January 1st, 2016 to December 31st, 2020, of the fire loss incidents in Group C – Residential occupancies, 49.83% (148) of incidents had a smoke alarm present and operating compared to 44. 48% (10,805) in the Province.	Mitigate Accept	Yes	Yes	Yes	Yes	Yes
Past Loss and Event History	There is a higher concentration of lower median income in the areas south east and west of Fire Station 1 representing a portion of the downtown core of the City.	Mitigate Accept	Yes	No	No	No	Yes
Past Loss and Event History	For the period from January 1st, 2016 to December 31st, 2021, there are higher concentrations of rescue incidents involving motor vehicle collisions and vehicle extrication along the King Street east/west (Highway 2) corridor and the Simcoe Street North corridor from Highway 401 to Highway 407 East. There is also a very high concentration of rescue calls along the Highway 401 corridor.	Accept	No	No	No	No	Yes