DILLON CONSULTING

Corporation of the Municipality of Chatham-Kent

Community Risk Assessment

Final

June 2022 – 20-3619

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1.0 Introduction

The process of assessing community risk is receiving increased attention within the fire service in North America. Assessing community risk informs the understanding of local needs and circumstances which can then be applied to align the service levels provided by the municipality. The use of community risk assessment reflects a shift within the fire service towards opportunities to mitigate or avoid fire-related risks through proactive public education programs and fire inspection and enforcement programs.

This Community Risk Assessment (CRA) has been developed for the Municipality of Chatham-Kent (Municipality or Chatham-Kent) to comply with Ontario Regulation 378/18: Community Risk Assessments (O. Reg. 378/18).

As required by O. Reg. 378/18, this CRA includes an analysis of nine mandatory profiles:

1. Geographic Profile
2. Building Stock Profile
3. Critical Infrastructure Profile
4. Demographic Profile
5. Public Safety and Response Profile
6. Community Services Profile
7. Hazard Profile
8. Economic Profile
9. Past Loss and Event History Profile

O. Reg. 378/18 requires all municipalities in Ontario to develop a CRA (by July 1st, 2024) and use the CRA to "inform decisions about the provision of fire protection services". The findings of this CRA will directly inform the Municipality of Chatham-Kent Fire Master Plan, with particular connections to fire prevention, training, and emergency response.

Consistent with the regulation, this CRA should be reviewed annually and updated every five years or as needed.

1.1 Methodology

The methodology and analysis used to develop this CRA have been directly informed by the Office of the Fire Marshal (OFM) Technical Guideline-02-2019 (TG-02-2019) which 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.

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:

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

The profiles herein are based on an analysis of several sources of information, including data provided by the Municipality of Chatham-Kent, Statistics Canada, the OFM, and desktop research. This CRA also incorporates input provided by the Chatham-Kent Fire and Emergency Services (CKFES), including feedback received from each Station Chief regarding the potential risks and hazards within their fire response area.

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**'. 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 and aligned with the three lines of defence in order to inform the analysis and recommendations within the Fire Master Plan.

More information on how the findings and identified risks will be used to inform the FMP can be found in **Section 11.0 – Applying Key Findings and Identified Risks**.

2.0 Geographic Profile

The geographic profile assessment includes an 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 Municipality of Chatham-Kent.

2.1 Geographical Overview

Chatham-Kent is a municipality located in southwestern Ontario, surrounded by the counties of Essex, Lambton, Middlesex and Elgin. Within its borders, a land area of 12.62 square kilometres comprises the Delaware Nation at Moraviantown.

The Municipality of Chatham-Kent was established in 1998, resulting in the amalgamation of twenty-two communities. As a result of the amalgamation, Chatham-Kent spans a large geographical area covering 2,471 square kilometres, consisting mostly of rural land. This contributes to the success of the municipality's agricultural industry.

Present-day Chatham-Kent is comprised of the following communities[1]:

- Chatham
- Wallaceburg
- Dresden
- Bothwell
- Thamesville and Area
- Mitchell's Bay and Area
- Ridgetown and Area
- Blenheim and Area
- Tilbury
- Wheatley
- North Buxton and Area
- Highgate and Area
- Erieau

These communities and Chatham-Kent as a whole are connected to each other and the surrounding counties as well as distant urban centres via Provincial Highway 401 and Provincial Highway 40, among other roads.

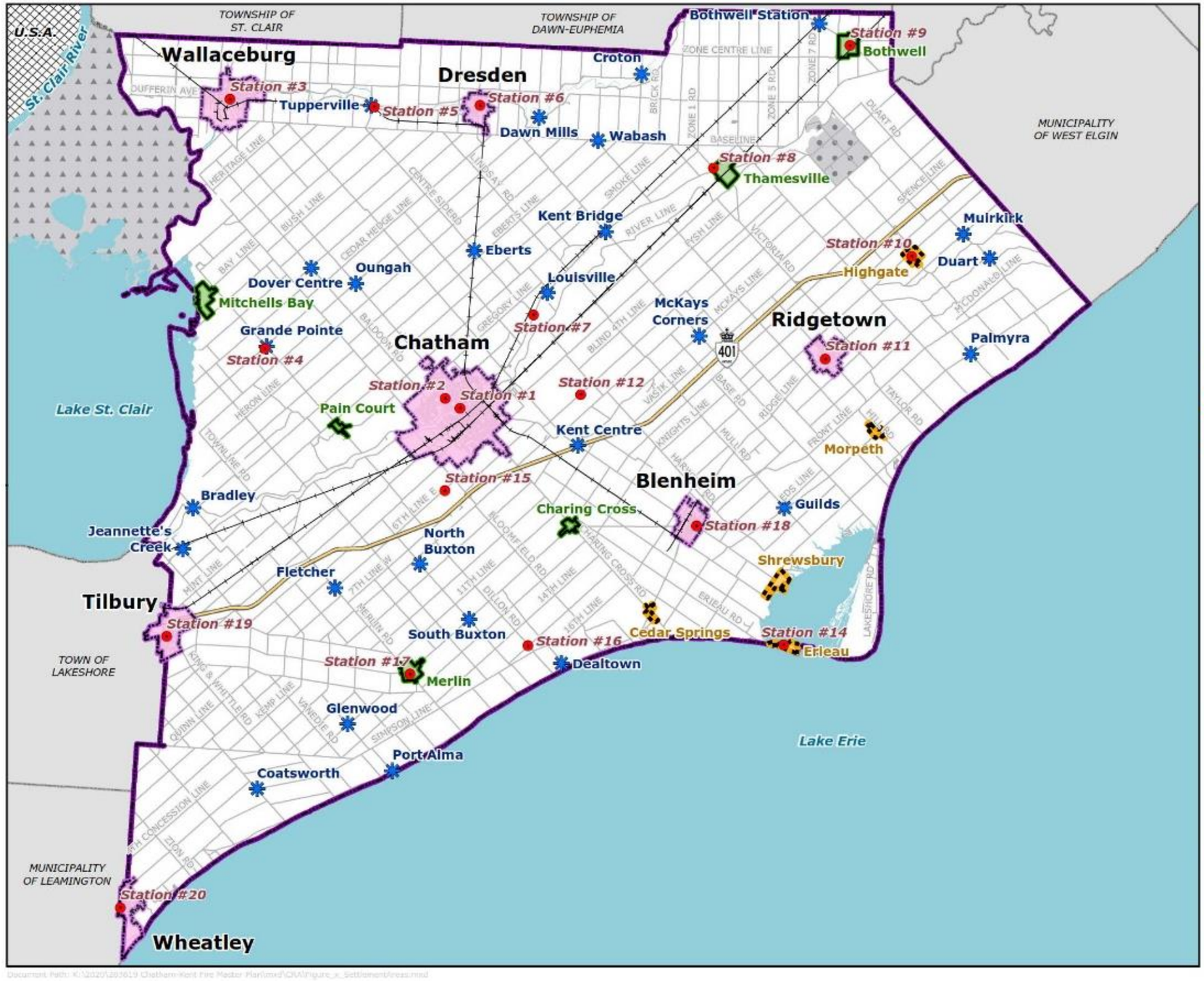
[1] Our Communities. Chatham-Kent website. Retrieved April 14, 2021 from https://www.chatham-kent.ca/visitck/communities/Pages/default.aspx

The municipality is surrounded by several waterbodies including Lake Erie to the south, Lake St. Clair to the east and the Thames and Sydenham Rivers which run through it. Natural sites and features include but are not limited to the St. Clair National Wildlife Area, Wheatley, Clear Creek Forest and Rondeau Provincial Parks, of which the latter is a Peninsula jutting out of the southern shore of the Municipality into Lake Erie.

The communities of Chatham-Kent including settlement areas, primary urban area, secondary urban areas, and hamlets are shown in **Figure 1**. As shown, the municipality spans a large geographical area, which could contribute to extended emergency response times.

Key Finding: The Municipality of Chatham-Kent spans a large geographical area which could result in extended emergency response times for some areas of the municipality.

Figure 1: Chatham Kent Communities



Chatham-Kent

COMMUNITY RISK ASSESSMENT

SETTLEMENT AREAS

FIGURE X

- Fire Station
- Railway
- Highway 401
- Road
- Settlement Area
- Primary Urban Area
- Secondary Urban Area
- Hamlet
- Municipal Boundary of Chatham-Kent
- Moravian 47 First Nations Reserve
- Walpole Island 46 First Nations Reserve
- U.S.A

DATA PROVIDED BY THE MUNICIPALITY OF CHATHAM-KENT, MNRF

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

Kilometres
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2.2 Roads, Transit, Bridges and Rail

2.2.1 Road Network

Road networks and transportation systems provide fire services access throughout a community when responding to emergency calls. It is valuable to consider where there may be a lack of connectivity due to road network design as well as other human-made or natural barriers. Human-made barriers can include inadequate road conditions, bridges or at-grade rail crossings. Natural barriers can include rivers and lakes which can traverse through regions or inundate road networks along watercourses during flood events.

As shown in **Figure 2**, Chatham-Kent is intersected by several provincial highways and a freeway that connect communities in the region to other urbanized parts of Ontario such as the City of Sarnia to the north, the City of Windsor to the west and the cities of London, Kitchener, and Toronto to the east. The highways also connect Chatham-Kent to international markets such as Michigan in the United States. These highways and freeways include Highway 401 and Highway 40. In addition to these major highways, CKFES also identified a truck route and a high volume of transport trucks travelling to the Ridge Landfill.

In addition to the Provincial highways, the Municipality's road network is comprised of local, rural arterial, rural collector, urban arterial and urban collector roads. The potential for a road-based transport incident is a major consideration as a transportation accident involving the goods being transported (hazardous materials) could occur, requiring hazardous materials response from CKFES Due to its significant agricultural industry, a large volume of various hazardous materials is frequently transported throughout the Municipality. As discussed in **Section 3.5**, there are several facilities throughout the area that store large quantities of fuel and other chemicals which present an increased risk from the perspective of hazardous materials response. For example, there is a large fuel distribution operation located north of Highway 401 near the municipal boundary.

Figure 2: Municipality of Chatham-Kent Road Hierarchy

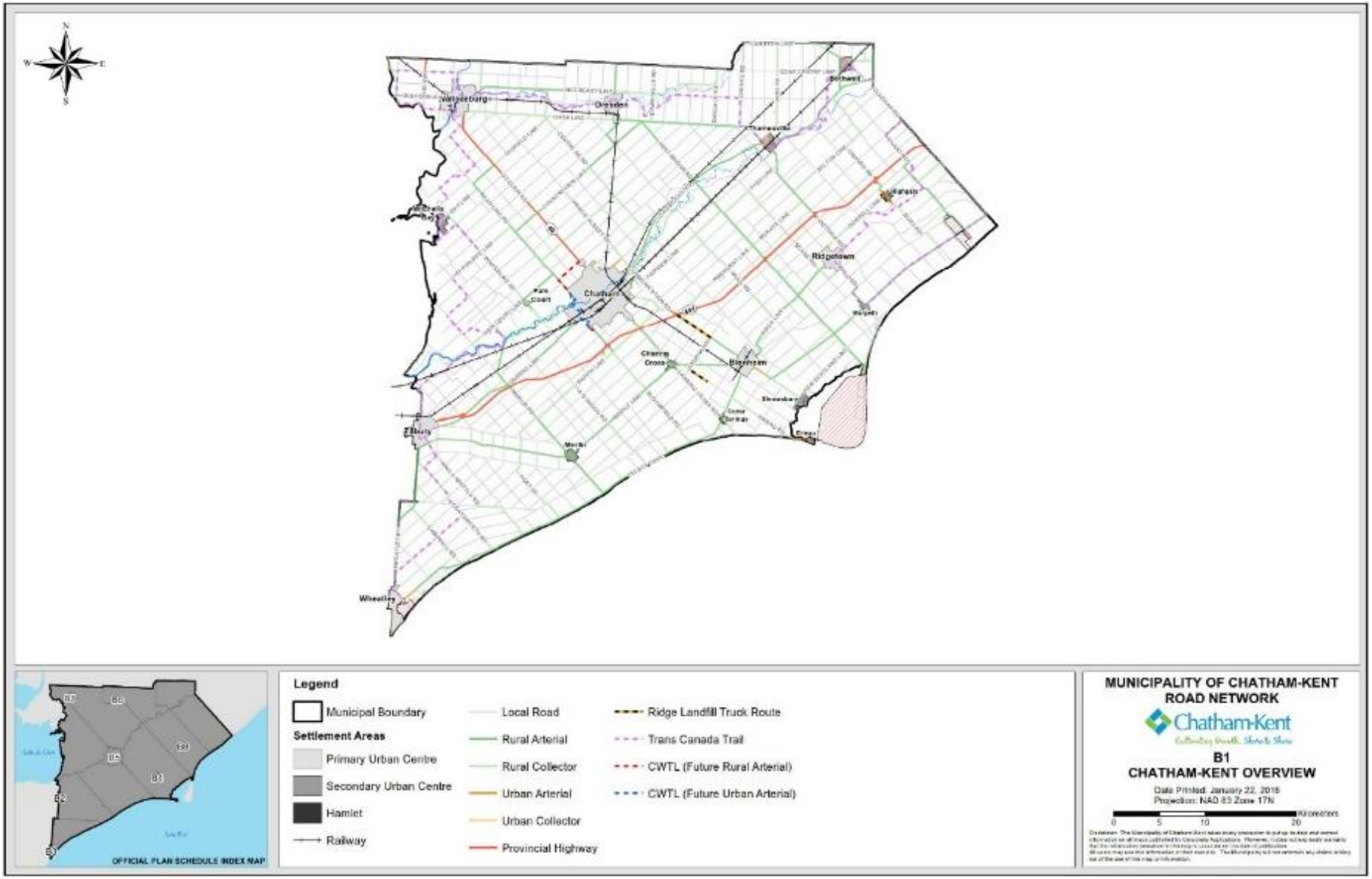


Figure Source: Municipality of Chatham-Kent Official Plan, Schedule B1, 2016.

The road network can also contribute to emergency response call volume due to incidents involving motor-vehicle collisions and accidents. As described in **Section 10.2.2.3 – Spatial Modelling - Rescue Incidents** of this CRA, 92.0% of rescue calls pertain to motor-vehicle related incidents (vehicle collisions and vehicle extrication combined), therefore accounting for 12.7% of all calls responded to by CKFES during a five year period (2015-2019). Emergency Detour Routes (EDR) are identified from Highway 401 to provide alternative routes for vehicle traffic in the event of a highway closure. When in use, these EDRs can bring significant volumes of traffic onto local and arterial roadways within the communities of Chatham-Kent. The volume of the detoured traffic and the lack of familiarity with the detour routes by pass-by travellers can cause further incidents or events.

Road networks can also contribute to vehicle congestion causing delays in emergency response travel times. The 2020 Chatham-Kent Transportation Master Plan (TMP) projects moderate traffic growth over the next 30+ years, and therefore recommends that the next planning horizon anticipate only marginal growth in traffic demand. According to the 2020 TMP, the population of Chatham-Kent is projected to increase to approximately 109,000 people by 2046, with the forecasted population growth composed primarily of the senior population (aged 75 years and older).[2] Although it is anticipated that peak hour traffic demands will be less affected, this projected growth can place increasing importance on having an efficient road network that can accommodate this marginal growth.

A specific area of concern from the perspective of emergency access includes the community of Erieau which is located on a small peninsula extending from the southern shores of Chatham-Kent on Lake Erie. There is only one ingress and egress route for the community of Erieau (Erieau Road). A 2020 Chatham-Kent Lake Erie Shoreline Study (2020 Shoreline Study) identified that Erieau Road would flood by 1.5 metres of water if there were to be a breach in the Erie Shore Drive dike during the 100-year storm event. If Erieau Road experienced a flooding event, it would pose a challenge to emergency access and CKFES emergency response travel times in responding to emergencies on the peninsula. If such an event were to occur, emergency boat access may be required. This CRA discusses natural barrier risks to the road network in terms of their vulnerability to water inundation brought on by flooding events and erosion in more depth in **Section 2.4 – Waterways.**

[2] BT Engineering Inc. Municipality of Chatham-Kent Transportation Master Plan Update. May 2020. Retrieved March 28, 2021 from https://www.chatham-kent.ca/Traffic/Documents/18-037%20Chatham-Kent%20TMP%20Report%20May%2014-20%20V2%20QC%20Combined.pdf

Key Finding: There are roads within the Municipality that have been identified as hazardous material routes that may require hazardous materials response.

Identified Risk: There is one ingress and egress route for the community of Erieau (Erieau Road). Closure of Erieau Road due to flooding or other incidents has the potential to reduce the connectivity of the road network to this area resulting in potential impacts on emergency response capabilities.

Identified Risk: Motor vehicle-related incidents on the existing road network represent 12.7% of the historical emergency responses of CKFES

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 the potential impact on road network connectivity in the event that a bridge is out of service.

There are approximately 890 bridges across the Municipality that overpass rail lines, roads, or water features, as shown in **Figure 3**.[3] As discussed in **Section 2.4 – Waterways**, the Thames River runs through the Municipality, separating the Municipality down the middle with the Sydenham River bisecting a north-west portion of the Municipality. This directly affects both Primary Urban Areas of Chatham and Wallaceburg which are bisected by rivers. Problems on these bridges related to flooding, for example, or structural bridge updates can impact emergency response. As of spring 2021, access to the 3rd Street bridge crossing has been restricted temporarily for maintenance work. This is anticipated to temporarily affect emergency response times though the issue may be mitigated by having one fire station on the south side of the river and one on the north.

Some bridges currently have load limits that affect the ability of fire department apparatus to cross safely. These 12 bridges, as identified by the Municipality, are presented in **Figure 4**.

As part of the review for this CRA, it was also identified that the Municipality is experiencing several infrastructure-related funding challenges whereby municipal finances only account for the repair or replacement of approximately half of the Municipality's bridges. In the absence of funding, the Municipality has had to resort to load limiting failed bridge infrastructure rather than replacing it. As a result, there is a potential for the road connectivity to be impacted should one or more of these bridges

[3] Refers to bridges with a span greater than 3 metres. Source: Bridges. Chatham-Kent website. Retrieved April 14, 2021 from https://www.chatham-kent.ca/services/roads/Pages/Bridges.aspx

be rendered out of service. This could result in the potential for delays in emergency response times.

Key Finding: There are currently 12 bridges within the Municipality which have load limits, affecting the ability of fire department apparatus to cross.

Key Finding: Funding-related challenges for bridge maintenance could make bridge-related restrictions more common, potentially affecting emergency response times.

Figure 3: Bridges of Chatham-Kent

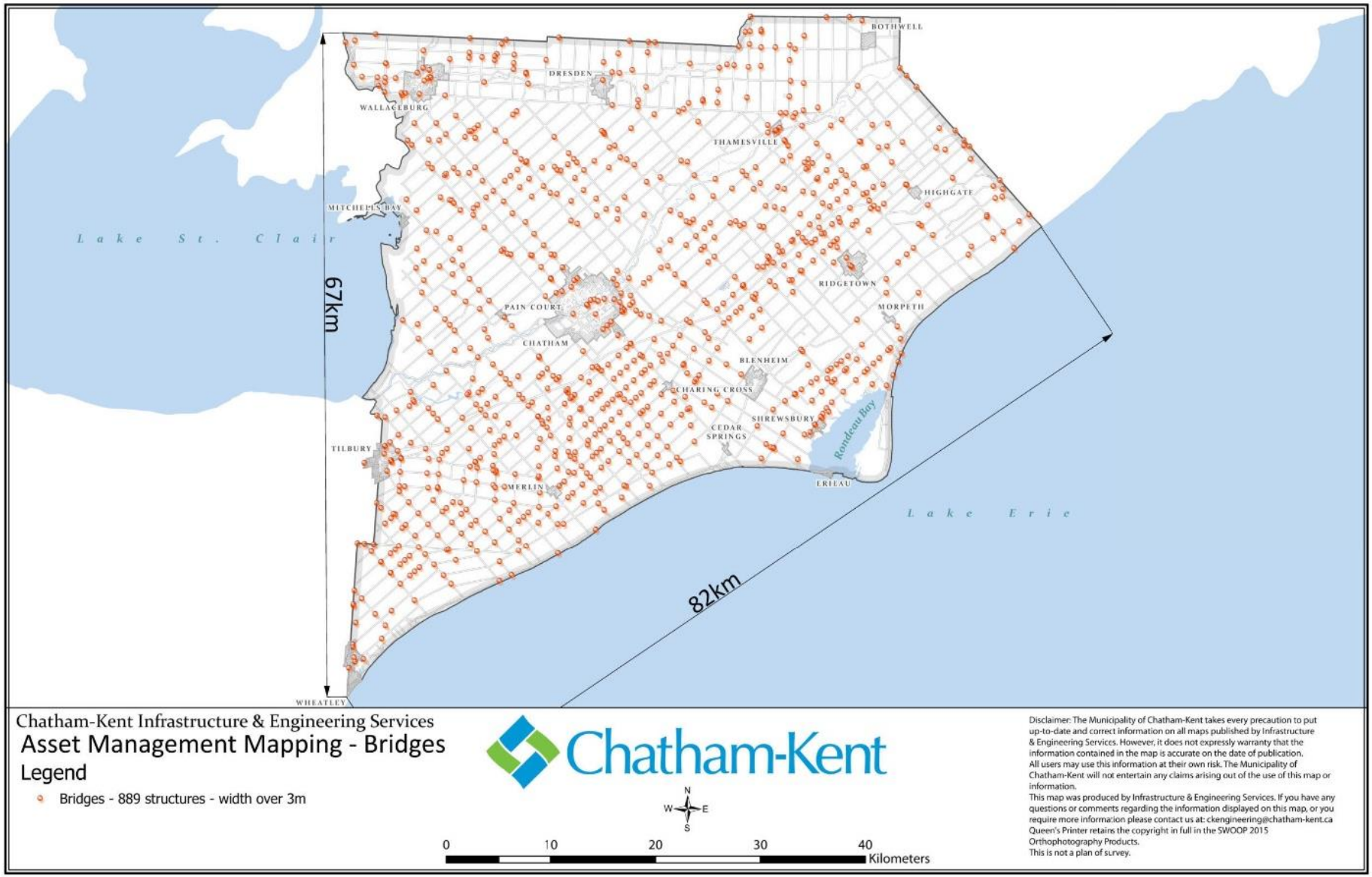
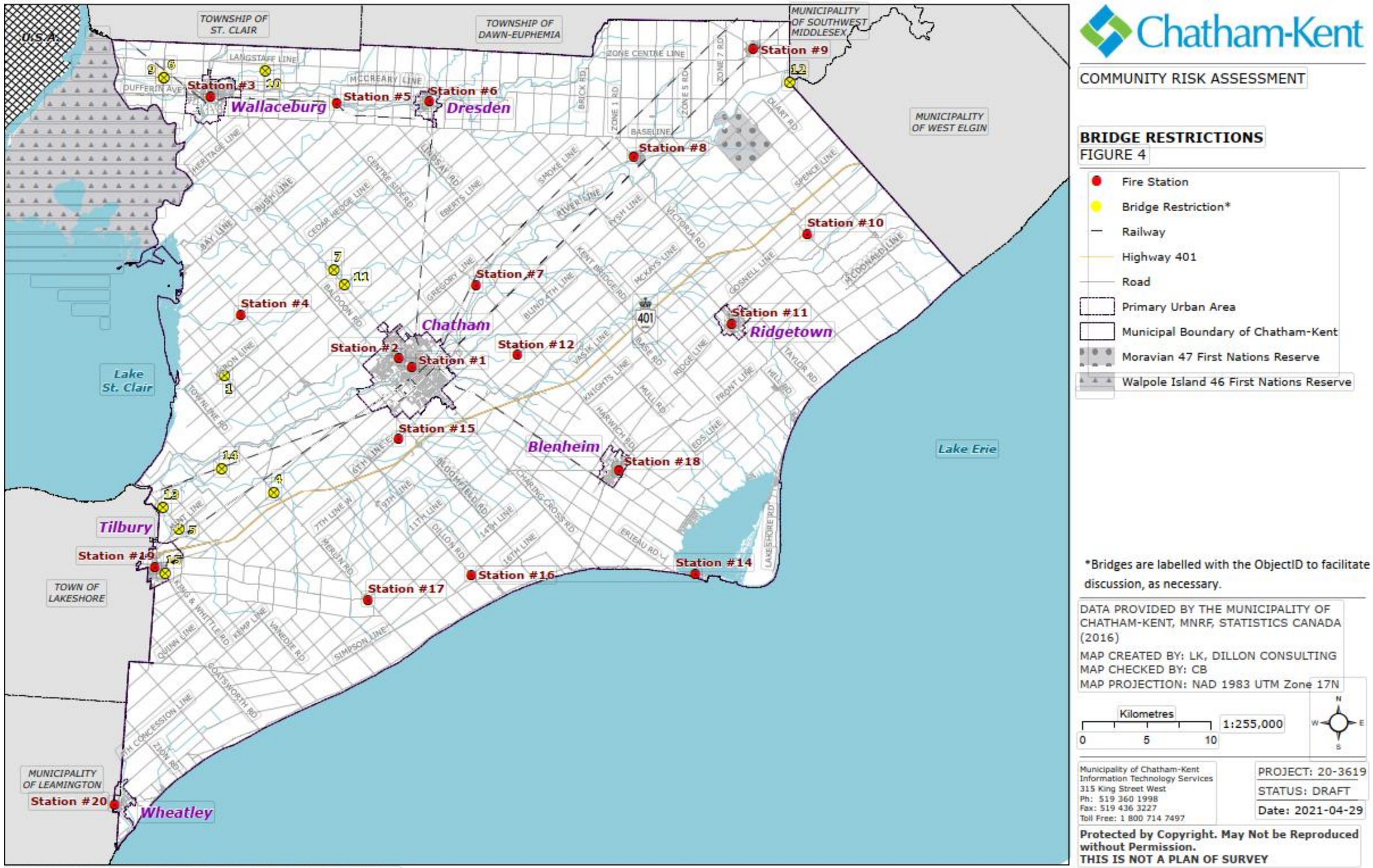


Figure 4: Bridge Restrictions in Chatham-Kent



Chatham-Kent

COMMUNITY RISK ASSESSMENT

BRIDGE RESTRICTIONS
FIGURE 4

- Fire Station
- Bridge Restriction*
- Railway
- Highway 401
- Road
- Primary Urban Area
- Municipal Boundary of Chatham-Kent
- Moravian 47 First Nations Reserve
- Walpole Island 46 First Nations Reserve

*Bridges are labelled with the ObjectID to facilitate discussion, as necessary.

DATA PROVIDED BY THE MUNICIPALITY OF CHATHAM-KENT, MNRF, STATISTICS CANADA (2016)

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

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N W E S

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2.2.3 Rail Network

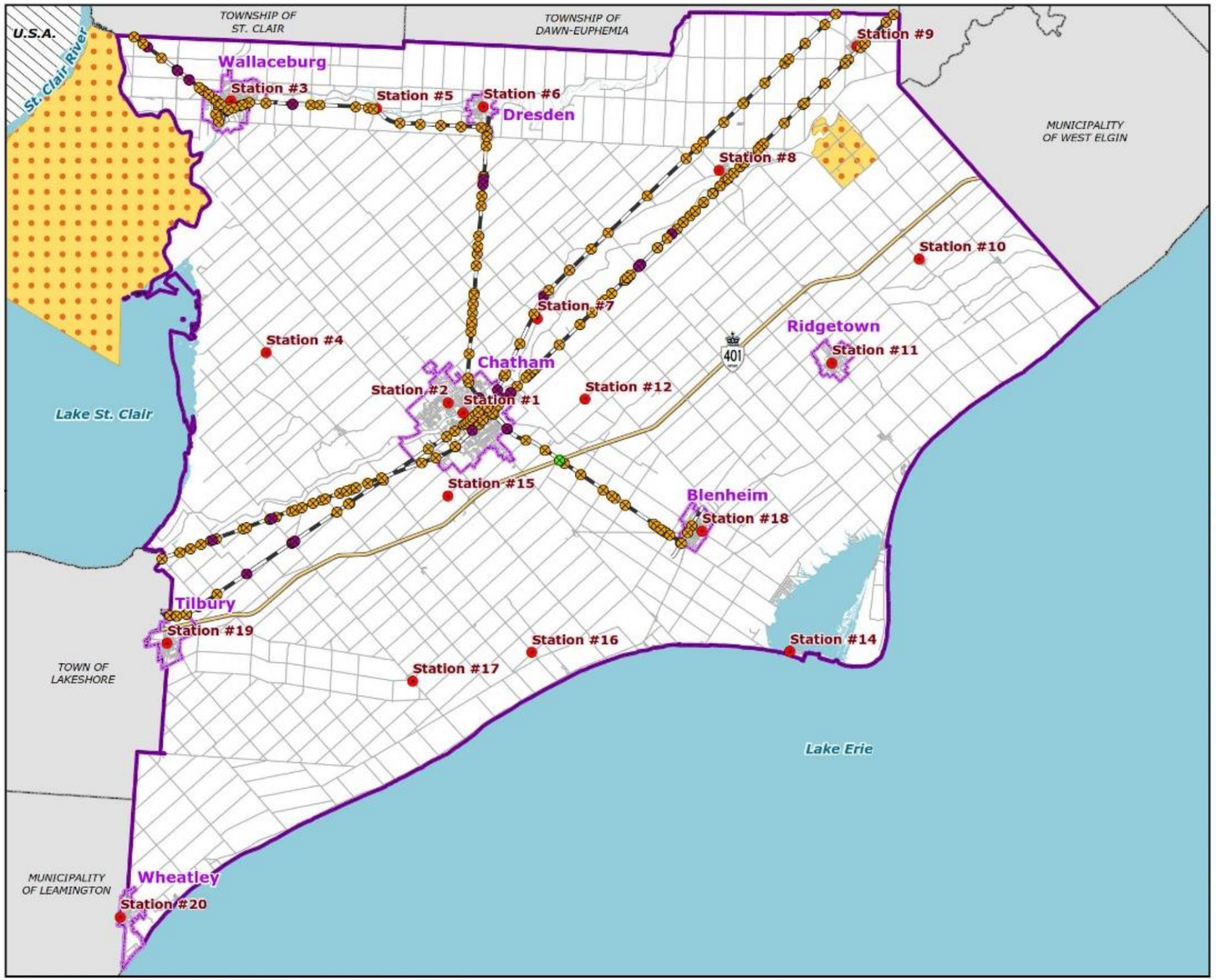
Rail lines are considered in this CRA for a few key reasons related to emergency services. The potential for a rail-based transportation incident, such as a derailment or accident involving dangerous goods transport has the potential to occur. Incidents involving hazardous materials can have harmful 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. 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 physical barrier created by the rail infrastructure itself, such as rail yards or the placement of rail infrastructure (e.g. tracks, grade separations, grade level crossings, etc.) throughout a municipality can impact emergency response travel times.

At-grade rail crossings (an intersection where a rail line crosses a road) can create delays in emergency response by inhibiting emergency response vehicles and apparatus from accessing a road. There are a significant number of at-grade rail crossings throughout the Municipality. At-grade rail crossings can be found in both the urban and rural areas in the locations as shown in **Figure 5**. A number of these crossings can be found in the larger urban centres of Chatham and Wallaceburg. It is also important to note that the rail line that runs from Chatham to Wallaceburg and the municipal boundary is at present not operational.

Key Finding: The at-grade road-rail crossings have the potential to impact emergency response times.

Figure 5: Rail Crossings



Chatham-Kent

COMMUNITY RISK ASSESSMENT

RAIL CROSSINGS

FIGURE X

- Fire Station

Railway Crossing

- At Grade
- Over
- Under
- Railway
- Highway 401
- Road
- Primary Urban Area
- Municipal Boundary of Chatham-Kent
- Surrounding Municipality
- First Nation Reserve
- Waterbody
- U.S.A

DATA PROVIDED BY THE MUNICIPALITY OF CHATHAM-KENT, MNRF

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2.3 Conservation Areas and Landforms

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. Natural sites and recreational features located within the Municipality include:

- Trans-Canada Trail
- C.M. Wilson Conservation Area
- Thames Grove Conservation Area
- Lower Thames Valley Conservation Area
- Crothers Conservation Area
- O'Neil Nature Preserve
- Sinclair's Bush Conservation Area
- Merlin Conservation Area
- McGeachy Pond Conservation Area
- Keith McLean Conservation Area
- Two Creeks Conservation Area
- St. Clair National Wildlife Area
- Wheatley Provincial Park
- Clear Creek Forest Provincial Park
- Rondeau Provincial Park
- Various Municipal Parks
- Tilbury North Side Park (former conservation area)

Many of the conservation areas and provincial parks offer outdoor recreational activities such as camping, hiking and canoeing in the warmer months and cross-country skiing and snow-shoeing in the winter. The presence of water activities at many of these natural areas necessitates consideration of water-related hazards (see **Section 2.4 – Waterways**). Emergency response may experience challenges in accessing areas inside of these conservation areas and parks due to their large geographical layout.

2.3.1 Bluffs

Chatham-Kent's shoreline consists of bluffs; steep cliffs overlooking Lake Erie. Due to the area's natural setting and elevation, there is potential for falling hazards and injury as a result of the activities taking place along the cliffs (hiking or rock climbing). As

indicated by CKFES, there have been several incidents in recent years along the Lake Erie bluffs requiring specialized rescue services from emergency response personnel.

Other features that may necessitate specialized rescue response, such as low-angle rescue, include riverbanks and deep drainage ditches which are present within the community.

Identified Risk: The bluffs along Chatham-Kent's Lake Erie shoreline present a risk associated with residents and visitors participating in activities that may require specialized rescue services (e.g. high angle rope rescue).

2.3.2 Landfill

Chatham-Kent is home to one of Ontario's large landfill sites, the Ridge Landfill (privately owned). Landfills can present unique fire safety concerns such as spontaneous combustion or fires of harmful materials.

Key Finding: The Ridge Landfill presents a risk associated with a fire occurring within the landfill site.

2.4 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. The municipality is surrounded by several waterbodies including Lake Erie to the south, Lake St. Clair to the east and the Thames and Sydenham Rivers which run through it. There are also several large irrigation ponds scattered throughout the municipality. Due to the presence of waterways within and surrounding Chatham-Kent and the high volume of recreational activities that take place within them (such as boating and fishing) there is the potential for ice and water-related incidents requiring specialized technical ice and water rescue response. See **Section 10.2.1.6 – Total Emergency Call Volume by OFM Response Type** for further discussion.

There may also be natural hazards, such as flooding and erosion, associated with waterways. The Chatham-Kent Lake Erie Shoreline stretches for approximately 120 kilometres. With a long history of coastal erosion and flooding, these concerns have persisted for many decades and are expected to worsen with the changing climate. Climate change will introduce variability in lake levels and unpredictability in extreme weather events such as heavier rainfall and hotter temperatures. Erosion rates are expected to increase as warmer winters and more frequent and severe storms threaten the formation of seasonal ice cover while increasing wave action in Lake Erie.

According to the 2020 Shoreline Study, increasing erosion rates were found to have significant impacts on the communities in and around Chatham-Kent. Within the next 50 years, 478 buildings (with an assessed value of $66.2 million) are expected to be impacted by coastal erosion.[4] Continued erosion from wave action and heavy rainfall can also result in slope failures and dike failures which can directly impact roads and emergency routes, and cause traffic disruptions, prompting the need for road re-alignment. Moreover, the 2020 Shoreline Study identified that more than 160 hectares of coastal wetlands have vanished in Rondeau Bay since 1955 as a result of the eroding barrier beach.

As found within the vulnerability assessment presented in the 2020 Shoreline Study, several communities were determined to be high-risk areas along Lake Erie, susceptible to the impacts of flooding. These areas include the Holiday Harbour, Erie Beach, Erie Shore Drive, Rose Beach Line, the Village of Erieau, Shrewsbury, Rondeau Bay Estates, and the Summer Place. Anticipated impacts to these areas include water inundation of buildings and roads resulting in extensive remediation costs. The assessed value of land and buildings (538) vulnerable to flooding for the 100-year lake level along the Lake Erie coastline in Chatham-Kent is $41.6 million.[5]

It is well documented that homes along Erie Shore Drive have seen frequent flood events that have inflicted costly damage to the community, and even resulted in evacuation notices.[6] With the changing climate, increasing erosion rates and higher water levels can be expected to further increase the severity and frequency of these flooding events in the future. Therefore, flooding and erosion have the potential to disrupt the road network, resulting in the potential for delays in emergency response times and/or require community evacuation.

In preparing this CRA, it was also learned that there are several steep ditches throughout the Municipality, many located adjacent to the road network that often flood.

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[4] Chatham-Kent Lake Eerie Shoreline Study, 2020. Zuzek Inc. Retrieved April 2, 2021 from https://portal.chatham-kent.ca/downloads/es/CKLakeErieSS_HR.pdf

[5] Ibid.

[6] Flood Warning – Erie Shore Drive – February 4, 2021 – 11:45 PM, Lower Thames Conservation Area. Retrieved March 28, 2021 from https://www.lowerthames-conservation.on.ca/flood-warning-erie-shore-drive-february-4-2021-1145-pm/

Homes and properties coated in ice along Lake Erie shoreline. CBC News. Posted: Feb 17, 2020 10:56 AM ET. Retrieved March 28, 2021 from https://www.cbc.ca/news/canada/windsor/icy-weekend-lake-erie-shore-1.5466269

November gales are just beginning': Erie Shore Drive expected to get hit harder on Friday. CBC News. Posted: Oct 27, 2019 5:43 PM ET. Retrieved March 28, 2021 from https://www.cbc.ca/news/canada/windsor/erie-shore-flooding-again-1.5337477

Disheartening for all of us': State of emergency declared in Chatham-Kent. CBC News. Posted: Aug 27, 2019 12:39 PM ET. Retrieved March 28, 2021 from https://www.cbc.ca/news/canada/windsor/chatham-kent-state-of-emergency-erie-shore-drive-1.5261366

Due to the location of these ditches near roads, there is the potential for cars or tractors to fall into them due to motor vehicle collisions or accidents that would require technical rescue services of the CKFES.

Identified Risk: Flooding and erosion have the potential to require community evacuation and/or disrupt the road network, resulting in potential impacts on emergency response capabilities.

Identified Risk: The presence of waterways within and surrounding Chatham-Kent creates a potential need for specialized technical ice and water rescue services.

2.4.1 Marinas

Marinas present unique and complex fire safety risks and challenges to any fire department. For example, marinas can present potential fuel load concerns. If boats are placed in close proximity to one another, a fire aboard one boat can rapidly spread to an adjacent boat if inadequate fire safety measures are in place. Fires can result from the malfunction of electrical devices on the boat itself or from incidents relating to the dispensing of fuel given that many marinas offer on-site fueling. Some marinas may allow boat owners and passengers the opportunity to reside on their boat and spend the evening presenting an additional life safety risk to occupants.

There are numerous marinas situated along Lake Erie and the shores of Chatham-Kent which accommodate a significant amount of boat traffic and storage throughout the year. Several of these marinas offer overnight docking, as well as electrical, storage and on-site fueling services.

NFPA 303 Standard for Marinas and Boatyards includes a number of important topics related to a safer marine environment and is intended to provide a minimum level of safety from fire as well as electrical safety at marinas and boatyards. Educating boat owners and marina operators about potential fire and electrical risks will help them identify the hazards in this setting. Regular inspection cycles of Chatham-Kent's marinas by the CKFES could contribute to the prevention of marina fires.

Key Finding: There are properties within the Municipality that have fuel-load related concerns linked to marinas.

2.5 Wildland-Urban Interface

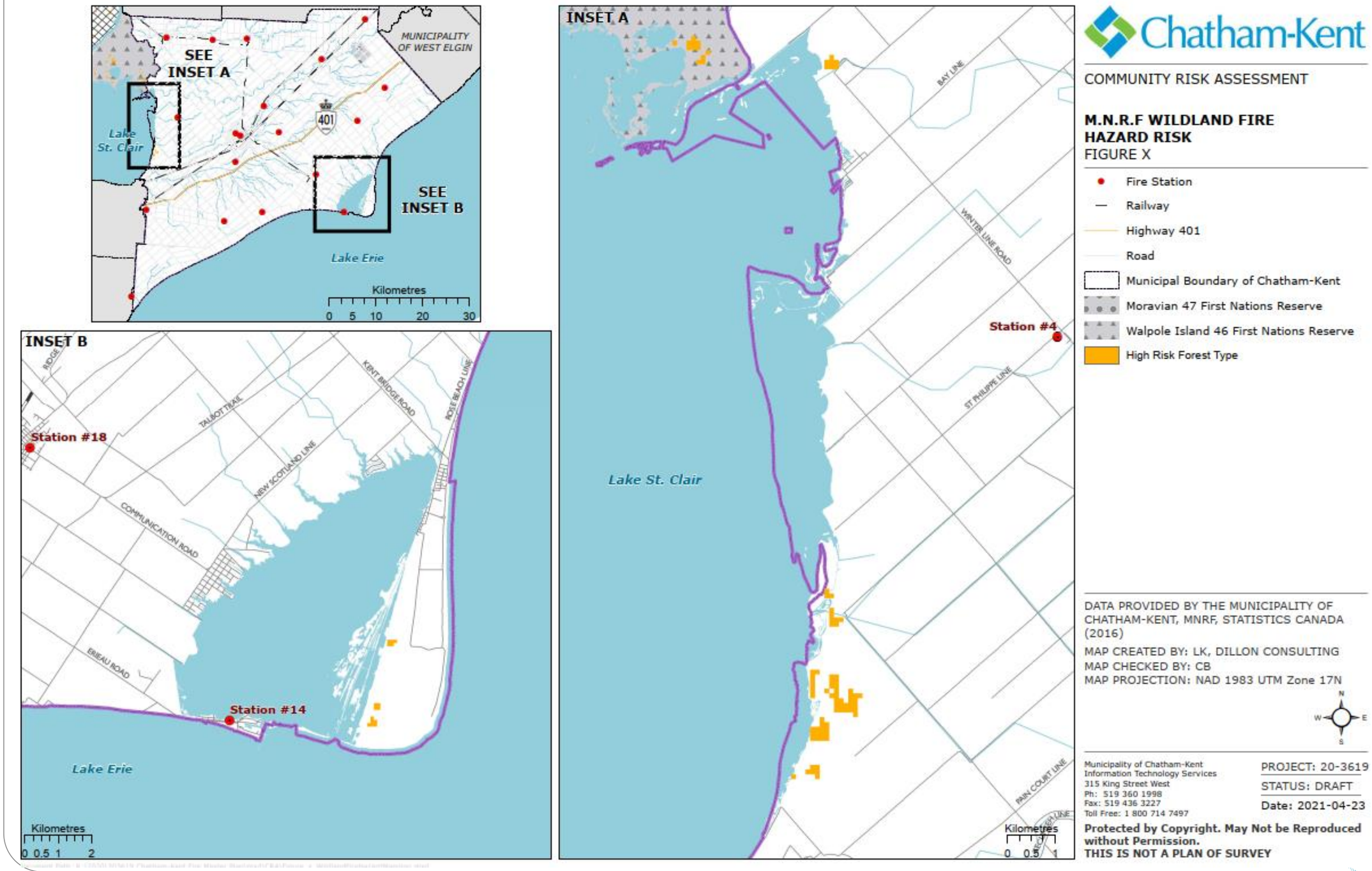
NFPA 1730 identifies wildland-urban interface as geography-based risk for consideration. This interface refers to the area of transition between unoccupied land and human development. This transition area can be comprised of a mix of woodlots, bush or grass.

The Ontario Ministry of Natural Resources and Forestry's (MNRF) Wildland Fire Assessment and Mitigation Reference Manual includes guidance on conducting a wildland fire assessment through a review of generalized MNRF wildland fire hazard mapping, planning authority mapping, [and] broad level site assessment.[7] The Manual recommends that local planning authorities undertake a broad-level/municipal-wide wildland fire assessment. While this CRA considers available information to review this risk at a high level, this study does not reflect a wildland fire assessment as described within the Manual. However, it does review the generalized MNRF wildland fire hazard mapping.

The MNRF wildland fire hazard mapping (**Figure 6**) shows two areas within Chatham-Kent with high risk forest types.

[7] Ontario Ministry of Natural Resources. April 2017. Wildland Fire Assessment and Mitigation Reference Manual in Support of Provincial Policy Statement, 2014.

Figure 6: M.N.R.F Wildland Fire Hazard Mapping



Many residential neighbourhoods in Chatham-Kent are located adjacent to wildland or grassland areas. Based on review of fire loss data for the Municipality for the period of 2015 to 2019, there were 32 outdoor fires, 4.8% of all fires responded to by CKFES (**Section 10.1.1 – Total Fire Loss**). There does not appear to be a high risk of wildfire in the Municipality related to forest cover, however, CKFES indicated in the consultation process that there was an increase in grassland fires in 2020.

Key Finding: For the period of 2015 to 2019, there were 32 outdoor fires, 4.8% of all fires responded to by CKFES

3.0 Building Stock Profile

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 Municipality of Chatham-Kent.

3.1 Building Stock

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 each occupancy classification's 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:

- Group A – Assembly
- Group B – Care or Detention
- Group C – Residential
- Group D – Business and Personal Services
- Group E – Mercantile
- Group F – Industrial

Each occupancy type comes with its own fire-related risks and opportunities to proactively reduce risk as shown in **Attachment A**. The risk of an occupancy is also related to past inspection practices and frequencies.

Analysis of the Municipality of Chatham-Kent's existing major building occupancy types was conducted through a review of the CKFES 2015 Risk Assessment building stock data, as provided by the Chatham Kent Fire and Emergency Services. **Table 1** summarizes the Municipality's existing major building occupancy classifications. This table has been populated with the information provided by the Chatham-Kent Fire and Emergency Services, however as indicated by the Municipality, growth has occurred in recent years. Further discussion can be found in **Section 3.3.**

As presented in **Table 1** the majority of the Municipality's existing property stock is comprised of Group C - Residential Occupancies (91.3%) representing 36,681 residential occupancies. The second largest occupancy type within the Municipality is

Group D/E – Business/Mercantile Occupancies accounting for 3.6% of the Municipality's property stock.

Of the Municipality's total building stock, 1,137 occupancies or 2.8% are Group F – Industrial Occupancies (combined Low, Medium and High Hazard).

There are also 58 Group B - Care or Detention Occupancies and 553 Group A – Assembly Occupancies. There are 305 properties that are classified as Mixed Use Occupancies.

Table 1: Municipality of Chatham-Kent Existing Property Stock

OBC Occupancy Classification	OFM Fire Risk Sub-Model Major Building Classifications	Number of Occupancies	Percentage of Occupancies
Group A	Assembly Occupancies	553	1.4%
Group B	Care or Detention Occupancies	58	0.1%
Group C	Residential Occupancies	36,681	91.3%
Group D/E (Combined)	Business/Mercantile	1,450	3.6%
Group F (all Divisions combined)	Industrial Occupancies	1,137	2.8%
Other	Mixed Use Occupancies	305	0.8%
Total	**Total Building Classifications**	**40,184**	**100.0%**

Source: Municipality of Chatham-Kent, CKFES 2015 Risk Assessment

Group C - Residential Occupancies represent the most prominent type of building occupancy type within the Municipality of Chatham-Kent, which is consistent with most municipalities across Canada. Within Ontario, information provided by the OFM (as described in **Section 10.0** – **Past Loss and Event History Profile**) indicates that the majority of structure fires over the five year period from January 1, 2015 to December 31, 2019, occurred within Group C - Residential Occupancies (72.5%). This trend is also reflected in the fire loss data for the Municipality of Chatham-Kent, where 61.8% of all fires occurring over the five year period from January 1, 2015 to December 31, 2019 are related to structure fires.

Identified Risk: Group C - Residential Occupancies represent 91.3% (36,681) of the Municipality's existing building stock, and over the five year period from January 1st, 2015 to December 31st, 2019 were associated with 72.5% (296) of the structure fires within the Municipality.

3.2 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 (downtowns). 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 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.

Table 2 illustrates a comparison of the Municipality's existing Group C - Residential building stock with that of the Province based on the 2016 Statistics Canada Census.

As shown, the Municipality has a higher percentage of single-detached houses (76.6%) than the Province 54.3%. It has a lower percentage of other attached dwellings at 19.7%, as compared to the Province (28.2%). CKFES identified that there are several areas throughout the Municipality where there are older buildings with little to no fire separation.

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

Table 2: Group C - Residential Building Stock Comparison (2016 Census)

Structural Dwelling Type	Municipal Total Dwellings	Municipal Total % Dwellings	Ontario Total Dwellings	Ontario Total % Dwellings
Single-detached house	32,970	76.6%	2,807,380	54.3%
Apartment in a building that has five or more storeys	1,385	3.2%	886,705	17.2%
Movable dwelling	205	0.5%	14,890	0.3%
Other attached dwellings[8]	8,475	19.7%	1,460,200	28.2%
Semi-detached house	1,295	3.0%	289,975	5.6%
Row house	1,475	3.4%	460,425	8.9%
Apartment or flat in a duplex	730	1.7%	176,080	3.4%

[8] The category 'Other attached-dwelling' is a subtotal of the following categories: semi-detached house, row house, apartment or flat in a duplex, apartment in a building that has fewer than five storeys and other single-attached house.

Structural Dwelling Type	Municipal Total Dwellings	Municipal Total % Dwellings	Ontario Total Dwellings	Ontario Total % Dwellings
Apartment in a building that has fewer than five storeys	4,880	11.3%	522,810	10.1%
Other single-attached house	95	0.2%	10,910	0.2%
Total	**43,035**	**100.0%**	**5,169,175**	**100.0%**

Source: 2016 Census, Statistics Canada[9]

3.3 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 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.

In many situations the construction of a building can be directly associated with whether the building was built 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. 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

[9] Statistics Canada. 2017. Chatham-Kent, MU [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 April 10, 2021).

presents very different challenges to firefighters from those of historical construction methods. Lightweight construction is discussed further in **Section 3.4**.

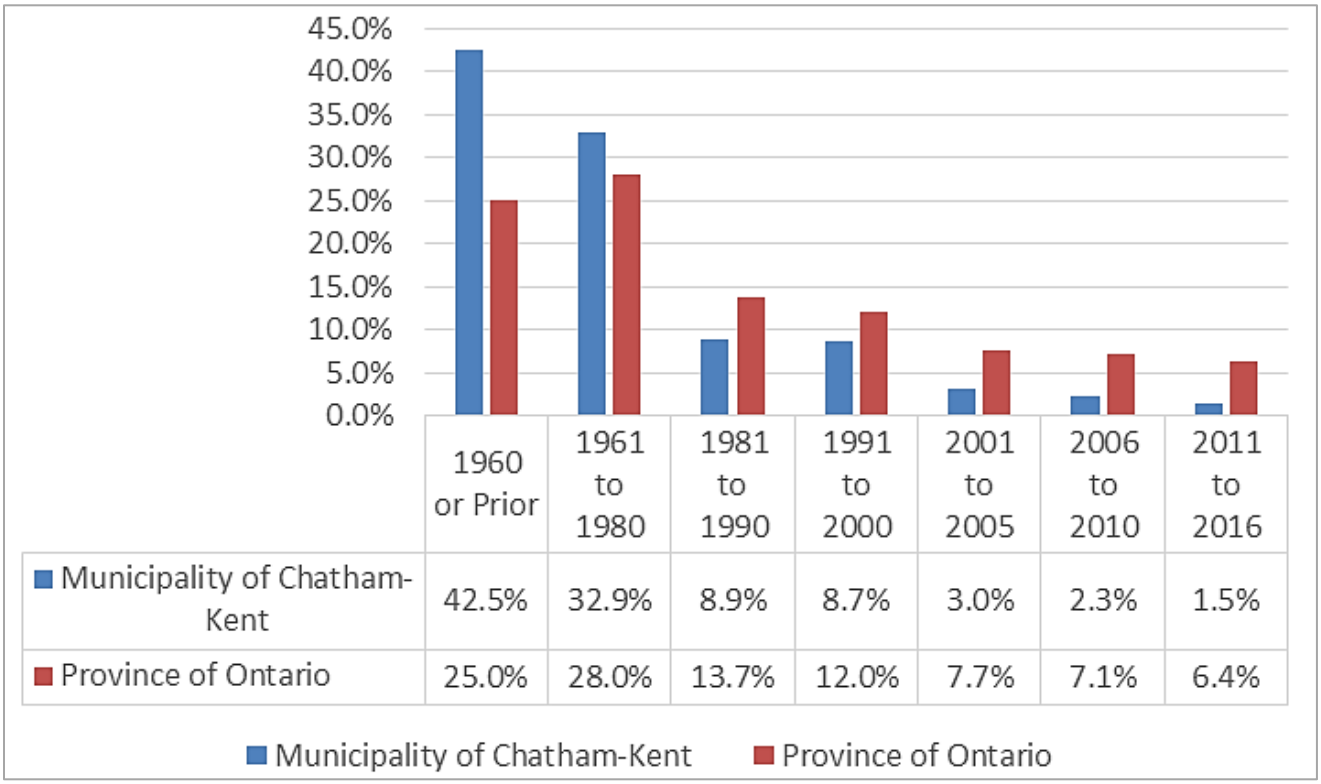
In addition to building construction, fire growth rate depends on the flammability of the materials and contents within the building which introduces variances into the growth rates presented above.

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.

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.

Figure 7 illustrates the age of residential buildings within the Municipality prior to the new codes, as compared to the Province. This analysis indicates that 75.5% of the Municipality'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. As noted in **Section 3.1 – Building Stock**, since 2016 the Municipality has experienced growth in its building stock which is not reflected in **Figure 7**. Based on analysis of new residential construction data provided by the Municipality, this included the addition of 877 residential construction units from 2016 to 2020 of which 86% were single-detached dwelling, 10% were semi-detached or duplex, and 2% were row houses. Nearly half (44%) of the total units have been added to Chatham. Future growth will be further considered in the Fire Master Plan.

Figure 7: Period of Construction of Residential Dwellings – Chatham-Kent



	1960 or Prior	1961 to 1980	1981 to 1990	1991 to 2000	2001 to 2005	2006 to 2010	2011 to 2016
Municipality of Chatham-Kent	42.5%	32.9%	8.9%	8.7%	3.0%	2.3%	1.5%
Province of Ontario	25.0%	28.0%	13.7%	12.0%	7.7%	7.1%	6.4%

Figure Source: 2016, Census, Statistics Canada[10]

Identified Risk: The 2016 Census data indicates that 75.5% (32,480) of the Municipality's Group C-Residential building stock was built prior to the introduction of the 1981 Ontario Fire Code and Ontario Building Code compared to 53.1% (2,742,720) of residential building stock in the remainder of the Province.

3.4 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

[10] Statistics Canada. 2017. Chatham-Kent, MU [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 April 10, 2021).

awareness of the presence of lightweight construction, providing opportunity for proactive fire response strategies to protect the safety of responding firefighters.

The Municipality is working to identify buildings with lightweight construction, which have been constructed using wood framing. The Chatham Kent Building Department has identified the following numbers for new residential buildings constructed in Chatham-Ken from 2016 to 2021. These new homes are presumed to be lightweight construction (wood framing): 109 in 2016, 147 in 2017, 145 in 2018, 200 in 2019, 272 in 2020 and 384 in 2021.

It is anticipated that CKFES 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 CKFES will apply this information to their pre-planning program. Pre-planning will be discussed further within the Fire Master Plan.

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.

3.5.1 Building Height

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.

It is important to note that there are a variety of meanings associated with the terms “high rise”, “tall buildings” and “high buildings.” For the purposes of developing this CRA, the OBC /OFC definition has been used to analyze building height within the Municipality which defines high-rise as 18 metres above grade, or six storeys.

The Municipality 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 five storeys or less) are not considered high-rise.

In total, 19 buildings as defined by the OBC were identified as high-rise buildings. The majority of the buildings identified as high-rise are distributed within the settlement area of Chatham.

Identified Risk: The Municipality currently has 19 building defined by the OBC as high-rise buildings with a floor level 18 metres (59 feet) above grade, or six storeys. These buildings are primarily located within the settlement area of Chatham.

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, the Municipality staff were able to provide building footprint data for the Municipality of Chatham-Kent. The information presented in **Table 3** indicates that the majority of building stock (84.6%) has a total building area (footprint) of 2,500 square feet or less. This summary also indicates that 0.2% (131) buildings have an area greater than 50,000 square feet.

Table 3: Building Area

Building Size (Square Feet)	# of Buildings	% of all Buildings
0-2,500	62,469	84.6%
2,500-5,000	8,526	11.5%
5,000-10,000	1,837	2.5%
10,000-20,000	630	0.9%
20,000-50,000	289	0.4%
>50,000	131	0.2%
Total	**73,882**	**100.0%**

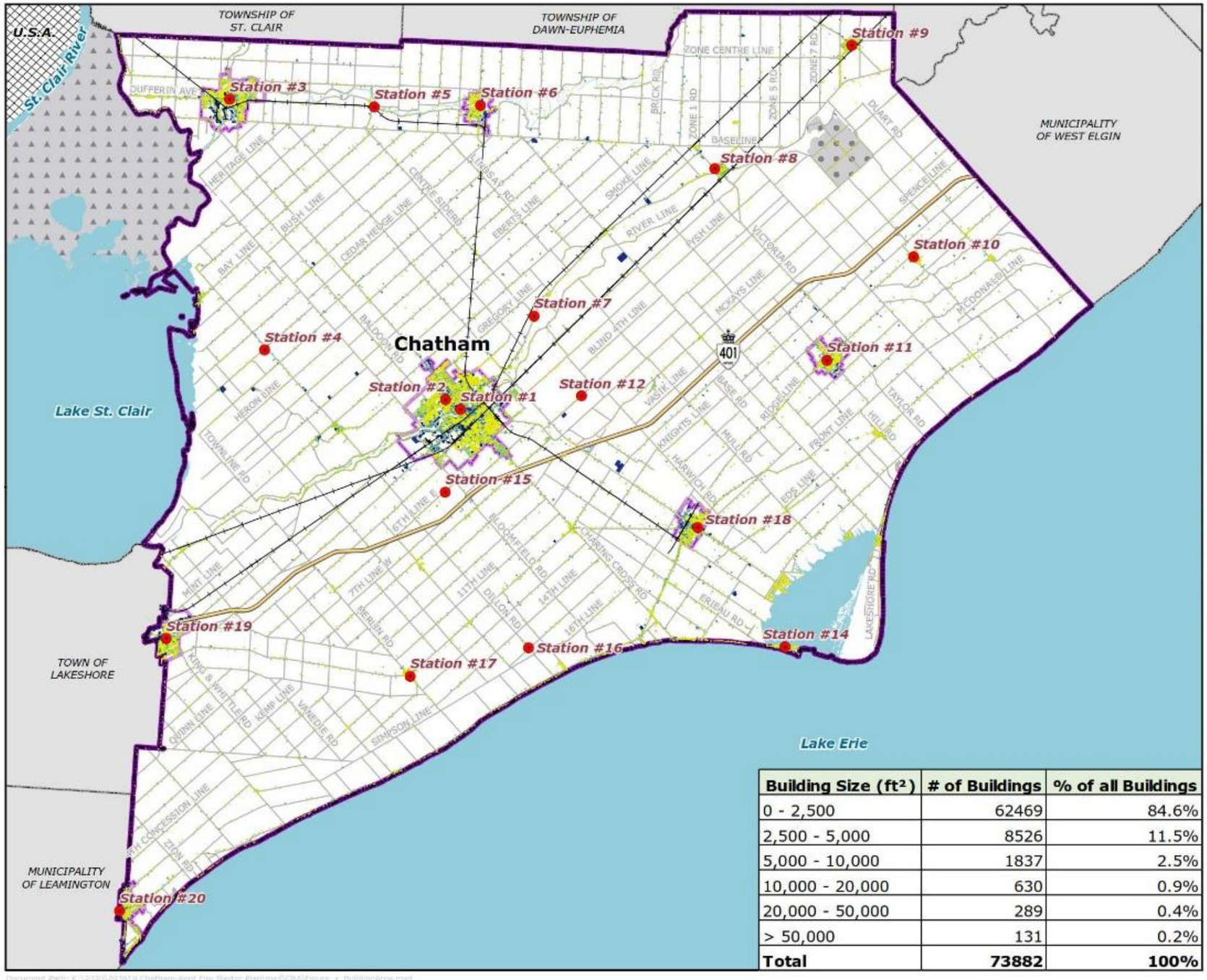
Source: Municipality of Chatham-Kent

3.5.2.1 Mapping of Building Area

Figure 8 illustrates the distribution of the building as categorized and presented in **Table 3**. The figure illustrates that the buildings with a larger footprint are dispersed throughout the Municipality in both urban and rural areas.

Identified Risk: The Municipality has 131 buildings with a total building area (footprint) that exceed 50,000 square feet. These buildings are located throughout the Municipality in both the urban and rural areas.

Figure 8: Building Area Locations



Building Size (ft²)	# of Buildings	% of all Buildings
0 - 2,500	62469	84.6%
2,500 - 5,000	8526	11.5%
5,000 - 10,000	1837	2.5%
10,000 - 20,000	630	0.9%
20,000 - 50,000	289	0.4%
> 50,000	131	0.2%
Total	**73882**	**100%**

Chatham-Kent

COMMUNITY RISK ASSESSMENT

BUILDING AREA

FIGURE X

- Fire Station
- Railway
- Highway 401
- Road
- Municipal Boundary of Chatham-Kent
- Moravian 47 First Nations Reserve
- Walpole Island 46 First Nations Reserve
- U.S.A

Building Area (ft ²)

- < 2,500
- 2,500 - 5,000
- 5,000 - 10,000
- 10,000 - 20,000
- 20,000 - 50,000
- > 50,000

DATA PROVIDED BY THE MUNICIPALITY OF CHATHAM-KENT, MNRF

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

Kilometres
0 5 10
1:250,000

Municipality of Chatham-Kent
Information Technology Services
315 King Street West
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Fax: 519 436 3227
Toll Free: 1 800 714 7497

PROJECT: 20-361
STATUS: DRAFT
Date: 2021-04-19

3.6 Potential High-Fire Risk Occupancies

Potential high-fire risk occupancy is another factor for consideration within a municipality'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. This section of the CRA will focus primarily on fuel load for industrial occupancies.

Buildings with potential fuel load concerns as identified by CKFES are presented in **Table 4.**

Table 4: Potential High-Fire Risk Occupancies

Facility Type	Risk Description	Example Facilities
Lumber Yards	Fuel loads – wood, in large volumes	Home Building Centre Wheatley, Home Building Centre Tilbury, Home Building Centre Chatham, Rona Chatham, Home Depot, Rona Wallaceburg, Lumber Jack Home Building Centre, Town & Country Lumber
Commercial Manufacturing	Fuel loads – flammable materials	H & H Wood Products (Pallet Manufacturer), Floraplast Inc. (plastics manufacturer)
Fuel Depots and Suppliers	Fuel loads – fuels and combustibles	Smith Fuels / Waddick Fuels (Fuel & Lubricant supplier)
Warehousing	Fuel Loads in Storage – various materials in large volumes	Charron Warehousing Inc.
Industrial	Fuel loads – fuels, chemicals, flammable / combustible materials in large volumes	Greenfield Global (Ethanol Plant)

Source: CKFES

As discussed in **Section 2.0 – Geographic Profile**, Chatham-Kent is largely comprised of rural land, an ideal location for agricultural related activities. Consultation with CKFES identified several fuel load concern areas related to agriculture in the Municipality.

From a high-level, CKFES personnel highlight a significant number of agricultural facilities that store large quantities of fertilizers, chemicals and other hazardous materials. For example, many of the local farms in the area store chemicals on site in storage rooms which have been described by fire service staff as having limited oxygen supply, making them dangerous to enter. In addition, there are tobacco farms which store tobacco and use fire to cure it. There are also several facilities from which fuel distribution takes place.

Chatham-Kent is also home to a Canada's largest ethanol producer[11]. The hazards linked to solvents such as ethanol are unique and require specialized response. Consultation with CKFES personnel identified that there is an ethanol processing facility located at the University of Guelph's Ridgetown campus. Referred to as the Centre for Agricultural Renewable Energy and Sustainability, the facility has the capacity to produce 2 190 000 kWh of renewable electricity annually using biofuels and biogas.[12] The hazards linked to solvents such as ethanol are unique and, as such, additional education around the risks associated with this type of biofuel is required.

To assist first responders in considering their preparedness for potential emergencies related to ethanol, the International Fire Chiefs Association developed an Ethanol Fixed Facilities - Assessment and Guide.[13] The Guide recommends that fire departments develop a strong relationship with any ethanol facilities in their response area to support the safe and competent response to the facility.

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: CKFES identified several properties within Chatham-Kent as having an increased potential for high fire risk in regards to fuel load, many of them related to agriculture.

[11] Canada's largest ethanol producer takes steps to expand production at biorefinery. Biofuels International. October 16, 2019. Retrieved April 11, 2021 from https://biofuels-news.com/news/canadas-largest-ethanol-producer-takes-steps-to-expand-production-at-biorefinery/
[12] Fun Facts, CARES. Ridgetown Campus, University of Guelph website. Page Reviewed 06/09/2015. Retreived April 9, 2021 from https://www.ridgetownc.com/cares/funfacts.cfm
[13] Ethanol Fixed Facilities: Assessment and Guide. International Fire Chiefs Association. First Edition 2008. Retrieved April 9, 2021 from file:///C:/Users/31CKB/Downloads/progseerc-ethanolfixedfacilitiesguide.pdf

3.6.1 Silos and Grain Elevators

Due to the extent to which farming activities take place within the Municipality, there are a significant number of grain handling and storage facilities such as silos and elevators. These types of facilities present unique firefighting hazards for responders. Although the probability of fire at these facilities may not be high, first responders must be knowledgeable about the potential hazards that are present. In particular, the conditions and equipment used in grain handling and storage, may contribute to grain entrapment situations or result in injury. The Canadian Agricultural Safety Association has developed a Grain Rescue Training Course specifically for firefighters to prepare them to respond to grain entrapment incidents on farm at grain handling facilities.[14] Currently, the CKFES strives to incorporate grain silo safety information into its public education programming targeted towards farmers and agricultural employees.

Key Finding: Silos and grain elevators in the Municipality may require specialized rescue and present unique hazards during an emergency call.

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.

[14] Firefighter Training. Canadian Agricultural Safety Association. Retrieved April 10, 2021 from https://www.casa-acsa.ca/en/begrainsafe/firefighter-training/

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. In total, the Municipality of Chatham-Kent has 76 vulnerable occupancies, primarily throughout Chatham and Wallaceberg.

Identified Risk: The Municipality currently has 76 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 department, 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 data provided by the CKFES identified that there are 46 elementary schools and 28 daycares. Of the 46 elementary grade schools, several are private schools that provide boarding accommodations such as Darul Uloom School.

Key Finding: In addition to registered vulnerable occupancies, the Municipality has 46 elementary schools and 28 identified daycare centres, representing higher fire life-safety risks due to the number of children attending these facilities.

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 CRA 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. Historic areas can present a high fire risk due to age, the materials used to construct the buildings, exposure to other buildings, and 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 Municipality of Chatham-Kent regulates a number of heritage properties through the municipal register under the Ontario Heritage Act. **Table 5** lists some historic or culturally important buildings/areas as identified by CKFES. In addition to the aforementioned properties, the Underground Railroad also has its place in Chatham-Kent's important history. This secret network was instrumental in the largest anti-slavery freedom movement in North America. Today, sites like Uncle Tom's Cabin and the Buxton Museum provide the community opportunities to learn more about Chatham-Kent's rich history.

Another notable heritage property is the Milner House, home to one of Chatham-Kent's earliest settlers Robert Milner. Pre-fire planning activities increase fire department personnel familiarity with buildings of special interest. A fire department can help reduce the risk of fire within heritage properties through regularly scheduled fire safety inspections, enforcement of the Ontario Fire Code, regular review of fire safety plans for accuracy and encouraging facility owners to upgrade facilities as needed.

Table 5: Historic or Culturally Important Buildings/Areas

Street #	Street Address	Facility/ Area Name	Facility Type
75	William Street North	Chatham-Kent Museum	Museum
59	William Street North	Milner House	Museum
53	Erie Street	Ridge House	Museum
29251	Uncle Tom's Road	Uncle Tom's Cabin	Museum
505	King Street	Wallaceburg Museum	Museum
21975	AD Shadd Road	Buxton Museum	Museum
238	King Street West	Chatham Capitol Theatre	Theatre
315	Queen Street	Queen's Court	Residential (Apartment)

Source: CKFES

Key Finding: There are a number of identified heritage buildings within the Municipality of Chatham-Kent, many of which were constructed prior to the introduction of the Ontario Fire Code.

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 Municipality of Chatham-Kent.

4.1 Critical Infrastructure in Chatham-Kent

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."[15] 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 Municipality's CI for each sector was provided by the Municipality of Chatham-Kent. For the purposes of this CRA, general considerations and concerns related to each CI sector (as per the Critical Infrastructure Assurance Program) as it pertains to the provision of fire protection services are included in **Table 6**. Chatham-Kent specific CI concerns are described in greater detail within the text.

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

Table 6: Critical Infrastructure Considerations

CI Sector	Fire Related Issues/Concerns
Public Safety and Security	There are nineteen fire stations in Chatham-Kent. Emergency events could increase demand for emergency response services affecting the response capacity of the fire department.
Continuity of Government	Municipal services are often interconnected, therefore the failure of one may lead to the failure or damage to other services or loss of continuity of operations.
Food and Water	Food related infrastructure can include agriculture, major distribution centres or grocery stores, for example. • The hazards related to agriculture are unique and require special consideration. These hazards are discussed throughout this CRA in greater detail. • Grocery stores and food distribution centres typically contain large amounts of ammonia used as a component of refrigeration systems. Emergency responders should be aware of dangers related to an ammonia release and response protocols. Water infrastructure is comprised of various components such as water treatment, water storage, and distribution stations. 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). These are discussed further in **Section 4.1.3 – Hydrants** below. Chatham-Kent currently operates six water treatment plants/distribution systems, approximately 1,710 km of water mains, eight waste water treatment plants and 533 km of sanitary sewer lines.

CI Sector	Fire Related Issues/Concerns
Telecommunication Systems	There are several radio and cell communication towers within Chatham-Kent. If wires or towers are compromised, the ability to communicate with emergency personnel could be extended, possibly leading to extended emergency response times. In addition, CKFES identified that around the edges of the Municipality, including the area of Clearview Park, the department experiences challenges in terms of coverage for radio communications. Similarly, there is not consistent cellular service along the shorelines including the Mitchell's Bay Area and Rondeau Bay area.
Electrical Power System	Within the Municipality of Chatham-Kent, Hydro One and Entegrus are the main electricity providers. Hydro One provides service to most rural properties within the Municipality while Entegrus provides electricity supply, transmission and distribution to 16 communities in Southern Ontario. There are many wind farms located throughout Chatham-Kent. For example, South Kent Wind utilizes 124 wind turbines to power approximately 100,000 homes throughout Ontario [16], many of which are located throughout the Municipality. There is also a solar farm located in Kent. 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 could disrupt emergency communication systems, or municipal power supply leading to a wide range of public health and safety concerns, requiring fire department assistance.

[16] Overview. South Kent Wind website. Retrieved April 9, 2021 from https://southkentwind.com/overview/

CI Sector	Fire Related Issues/Concerns
Gas and Oil	Natural gas is distributed throughout the Municipality by Enbridge Gas Inc. 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.[17] Establishing partnerships and procedures before an incident occurs is conducive to building awareness, and a safe and effective response. Public Safety Response Partners are discussed further in **Section 7.0 – Public Safety Response Profile**.
Financial Services	Financial infrastructure can include institutions such as banks or credit unions or ATMs. In the event of a significant emergency, residents may not have access to their financial institutions and banking services.

[17] Source: “Liquid Petroleum Pipeline Emergencies On-Scene Incident Commander Field Guide,”N.F.P.A. Research Foundation, July 2016.

CI Sector	Fire Related Issues/Concerns
Health System	There are several health centres and hospitals located throughout the Municipality of Chatham-Kent, governed by the Chatham-Kent Health Alliance. A fire at one of these facilities would require complex evacuation procedures for a large number of immobile and medical device dependant individuals. Health care infrastructure is also significant from the perspective of fire protection services because a health-related emergency can increase demand for health care services, specifically ambulance services and medical response (e.g. tiered response).

CI Sector	Fire Related Issues/Concerns
Transportation Networks	**Rail** The Municipality of Chatham-Kent has three prominent rail lines; two which span the Municipality southwest to northeast and the other, which traverses the Municipality north and south of the Municipality. Rail lines and operations are of concern from the perspective of fire protection services due to the following factors: • 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 **Roads and Highways** Chatham-Kent is intersected by a number of provincial highways and freeways including Highway 401 and Highway 40. Major highways are of concern from the perspective of fire protection services due to the following factors: • 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 • Use of Emergency Detour Routes to bypass provincial highway closures **Air** 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. There is one aircraft facility located in the Municipality's rural area - the Chatham-Kent Municipal Airport (**Section 4.1.2**, below).

4.1.1 Recreational Arenas

Municipal staff have highlighted that there are several arenas located in Chatham-Kent, most of which contain liquid anhydrous ammonia loaded refrigeration systems which have been estimated to contain approximately 300-400 lbs of this substance per facility. A release of anhydrous ammonia gas into the atmosphere could pose a health and safety risk and require hazardous materials response.

4.1.2 Chatham-Kent Health Alliance (CKHA) – Hospitals

The Chatham-Kent Health Alliance (CKHA) is a 200+ bed community hospital, with sites located in Chatham and Wallaceburg.[18] With over 100,000 patients each year, the hospital employs 1,400 staff, 200 physicians, and 300 volunteers.[19] CKHA provides a full range of programs, services and specialties including:

- Chronic Disease Management, Family Medicine, Rural & Seniors Health
- Medicine & Critical Care
- Mental Health & Addictions
- Surgery
- Women & Children's and Indigenous Health
- Emergency, Ambulatory Care & Patient Flow
- Diagnostics & Therapeutics

The Chatham-Kent Health Alliance's Wallaceburg site is in critical need of upgrades. The outdated facility layouts do not support accessibility needs and the aging facilities prevent integration and optimization of more modern healthcare delivery systems. In October of 2020, it was announced that Ontario is investing $7.3 Million to replace the aging infrastructure at CKHA's Wallaceburg site through a phased redevelopment approach which begins with the construction of a new power plant (planned 2021 completion) that will support CKHA's critical functions.[20]

[18] CKHA. 2018. Chatham-Kent Health Alliance Fast Facts. Retrieved April 14, 2021 from http://www.ckha.on.ca/sites/default/files/pdf/general/fastfacts.pdf
[19] Ibid.
[20] CKHA. 2020. Ontario Invests $7.3 Million to Replace Aging Facilities at Chatham-Kent Health Alliance's Wallaceburg Site. Retrieved April 15, 2021 from at: http://www.ckha.on.ca/ontario-invests-73-million-replace-aging-facilities-chatham-kent-health-alliance%E2%80%99s-wallaceburg-site

4.1.3 Chatham-Kent Municipal Airport

Airports facilitate the movement of valuable resources across borders, serving as gateways of connectivity to other regions that can contribute to the economic growth and development of any region. They play an important role in trade and commerce, and provide a vital mechanism through which people travel. Airports also present unique hazards related to aircraft and supporting infrastructure.

The Chatham-Kent Municipal Airport is located 11 km southeast of Chatham. Although it is a smaller aircraft facility, the airport serves the community of Chatham-Kent through a number of ways such as flight training. The airport caters primarily to smaller aircraft, however, if expanded could accommodate larger aircraft if needed. The airport also serves the medical community by being capable of handling aircrafts for medevacs and organ transfers.

In May of 2020, a small bi-plane crashed at the airport to which Fire and Emergency Services responded. The development of the Airport Master Plan as part of the broader Transportation Master Plan will aim to explore the expansion and further development of Chatham-Kent airport facilities and aerospace programs. The presence of a more active airport that is increasingly more connected with the wider Ontario aerospace can facilitate economic development and employment opportunities for residents.

Special Consideration: The Chatham-Kent Municipal 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.

4.1.4 Water Infrastructure – Hydrants

Chatham-Kent 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 of the Municipality.

Water supply is essential for firefighting, 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. The Municipality of Chatham-Kent is in part serviced by an approximately 20 km watermain from Lake Erie which transports water to Chatham. This line is a primary feed line for which there is no redundancy built into the system. If there were an issue with the raw water feed line, it could have an impact on overall water supply including a direct impact on firefighting capabilities.

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.

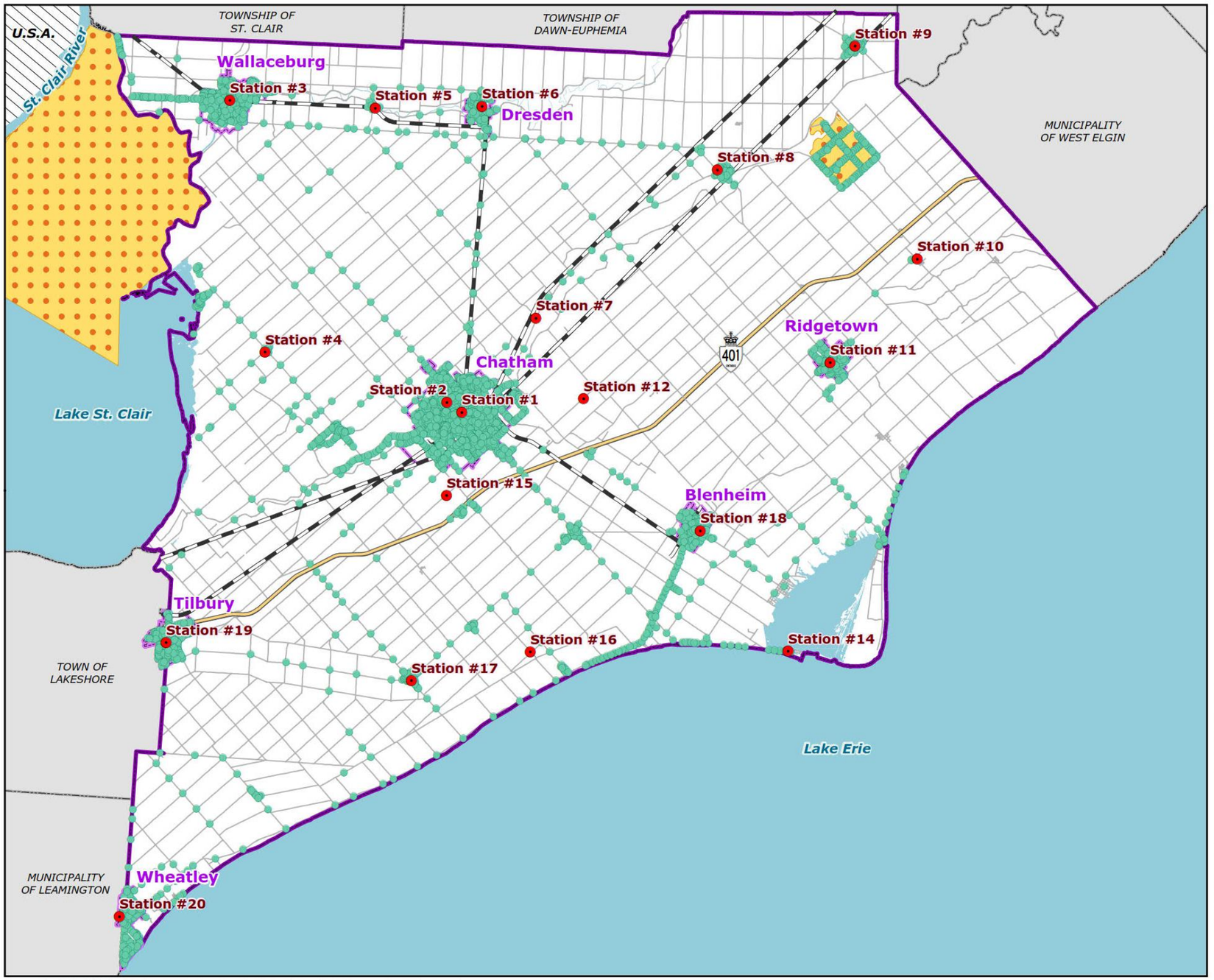
Figure 9 illustrates the location of fire hydrants throughout Chatham-Kent and as shown, they are found primarily in the urban areas of the Municipality with some located throughout the rural areas along watermains. Most hydrants located in urban centres such as Chatham and Wallaceburg (and some along certain corridors in the rural area) are serviced by watermains that are pressurized and rated to fire flow. These hydrants would allow for water to be pumped out using fire apparatus.

Within the rural areas, most of the hydrants are fed by watermains that are not pressurized and rated for fire flow. These hydrants would, however, be available as a source for firefighting purposes such as tanker shuttle as part of reliable and accessible local water supplies (e.g. reservoirs, swimming pools, ponds, rivers, etc.). 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.

As illustrated in **Figure 9**, the area surrounding Ridgetown and Highgate does not have any rural hydrants. This is because this area of the municipality is serviced by wells and not through a lake-based water distribution system. The hydrants in Ridgetown can be used to pump water; however, it is noted that historically there has been the potential for an impact on water supply availability in the event of a larger incident such as a structure fire in a Group F – Industrial occupancy.

Key Finding: Different areas of the municipality are serviced by hydrants with varying rates of flow. Primarily the urban areas are serviced by fire flow rated hydrants. Hydrants in the rural area are available as a water supply.

Figure 9: Hydrants



Chatham-Kent

COMMUNITY RISK ASSESSMENT

FIRE HYDRANTS

FIGURE X

- Fire Station
- Hydrant
- Railway
- Highway 401
- Road
- Primary Urban Area
- Municipal Boundary of Chatham-Kent
- Surrounding Municipality
- First Nation Reserve
- Waterbody
- U.S.A

DATA PROVIDED BY THE MUNICIPALITY OF CHATHAM-KENT, MNRF

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

Kilometres
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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 Municipality of Chatham-Kent.

5.1 Population and Dispersion

Between 2001 and 2006, the Municipality of Chatham-Kent's population slightly increased, followed by two consecutive census periods of decrease. **Table 7** shows that over this 15-year period, the number of total private dwellings has followed a similar trend, with an increase between 2001 and 2006, followed by a decrease from 2006 to 2016.

Table 7: Historic Growth in Population and Households - Chatham-Kent

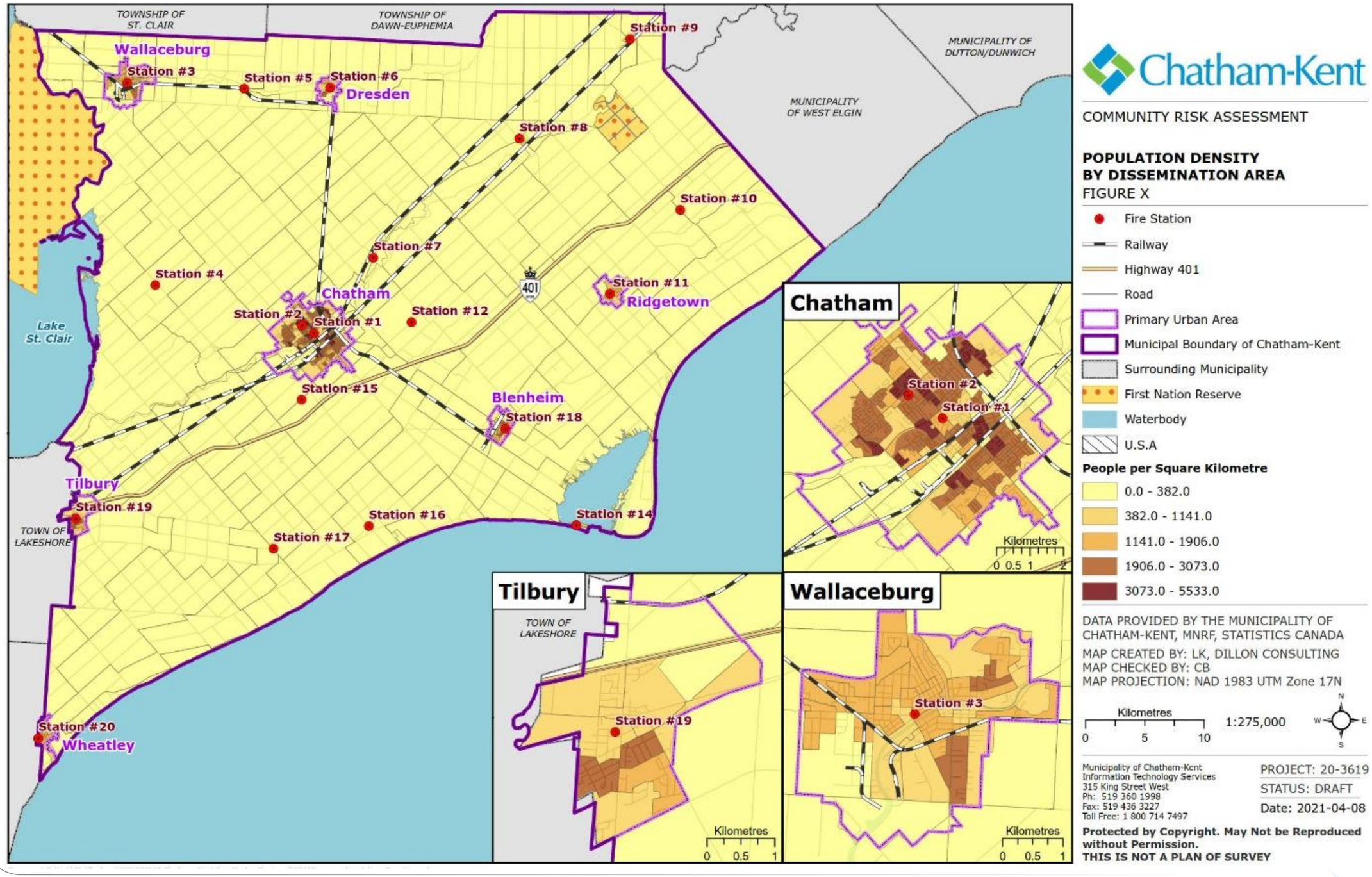
Year	Population	% Change	Total Private Dwellings	% Change
2001	107,341	No Data	45,241	No Data
2006	108,177	0.8%	46,614	2.9%
2011	103,671	-4.3%	46,209	-0.9%
2016	101,647	-2.0%	46,103	-0.2%

Source: 2016[21], 2011[22], 2006[23], 2001[24] Census, Statistics Canada

The dispersion of the population is presented in **Figure 10**. Areas of the Municipality most densely populated are found within the settlement areas of Chatham and Wallaceburg.

[21] Statistics Canada. 2017. Chatham-Kent, MU [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 March 23, 2021).
[22] Statistics Canada. 2012. Chatham-Kent, Ontario (Code 3536020) and Canada (Code 01) (table). Census Profile. 2011 Census. Statistics Canada Catalogue no. 98-316-XWE. Ottawa. Released October 24, 2012. http://www12.statcan.gc.ca/census-recensement/2011/dp-pd/prof/index.cfm?Lang=E (accessed March 23, 2021).
[23] Statistics Canada. 2007. Chatham-Kent, Ontario (Code3536020) (table). 2006 Community Profiles. 2006 Census. Statistics Canada Catalogue no. 92-591-XWE. Ottawa. Released March 13, 2007. https://www12.statcan.gc.ca/census-recensement/2006/dp-pd/prof/92-591/index.cfm?Lang=E (accessed March 23, 2021).
[24] Statistics Canada. 2001. Population and Dwelling Counts, for Canada and Census Subdivisions (Municipalities) with 5,000-plus Population, 2001 and 1996 Censuses - 100% Data. https://www12.statcan.gc.ca/english/census01/products/standard/popdwell/Table-CSD-N5.cfm?S=20 (accessed March 23, 2021).

Figure 10: Population Density – Municipality of Chatham-Kent



Chatham-Kent

COMMUNITY RISK ASSESSMENT

POPULATION DENSITY BY DISSEMINATION AREA

FIGURE X

- Fire Station
- Railway
- Highway 401
- Road
- Primary Urban Area
- Municipal Boundary of Chatham-Kent
- Surrounding Municipality
- First Nation Reserve
- Waterbody
- U.S.A

People per Square Kilometre

- 0.0 - 382.0
- 382.0 - 1141.0
- 1141.0 - 1906.0
- 1906.0 - 3073.0
- 3073.0 - 5533.0

DATA PROVIDED BY THE MUNICIPALITY OF CHATHAM-KENT, MNRF, STATISTICS CANADA

MAP CREATED BY: LK, DILLON CONSULTING
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5.2 Population Age and Sex

A community's population by age is an important factor in identifying specific measures to mitigate the risks associated with a specific age group. Canada's aging population has been recognized as one of the most significant demographic trends. According to Statistics Canada, from 2011 to 2016 Canada experienced "the largest increase in the proportion of seniors since Confederation" due to the baby boomer generation reaching the age of 65. There are now more Canadians over the age of 65 (16.9% of the population) than there are children aged 14 years and younger (16.6%).[25]

Seniors (those 65 years and over) are considered to represent one of the highest fire risk groups across the province of Ontario based on residential fire death rate (fire deaths per million of population). **Figure 11** illustrates the results of an analysis adapted from the OFM's Fire Statistics in November 2018 on the fire death rate. Through this analysis, it is identified that seniors are at an increased risk of fatality in residential occupancies compared to other age groups. However, the fire death rate for seniors has been generally decreasing since 1997 according to Ontario residential fatal fires reporting.

[25] Statistics Canada. (2017, May). The Daily: Age and sex, and type of dwelling data: key results from the 2016 Census. Retrieved from http://www.statcan.gc.ca/daily-quotidien/170503/dq170503a-eng.htm?HPA=1

Figure 11: 2007-2018 Residential Fire Death Rate by Age of Victim

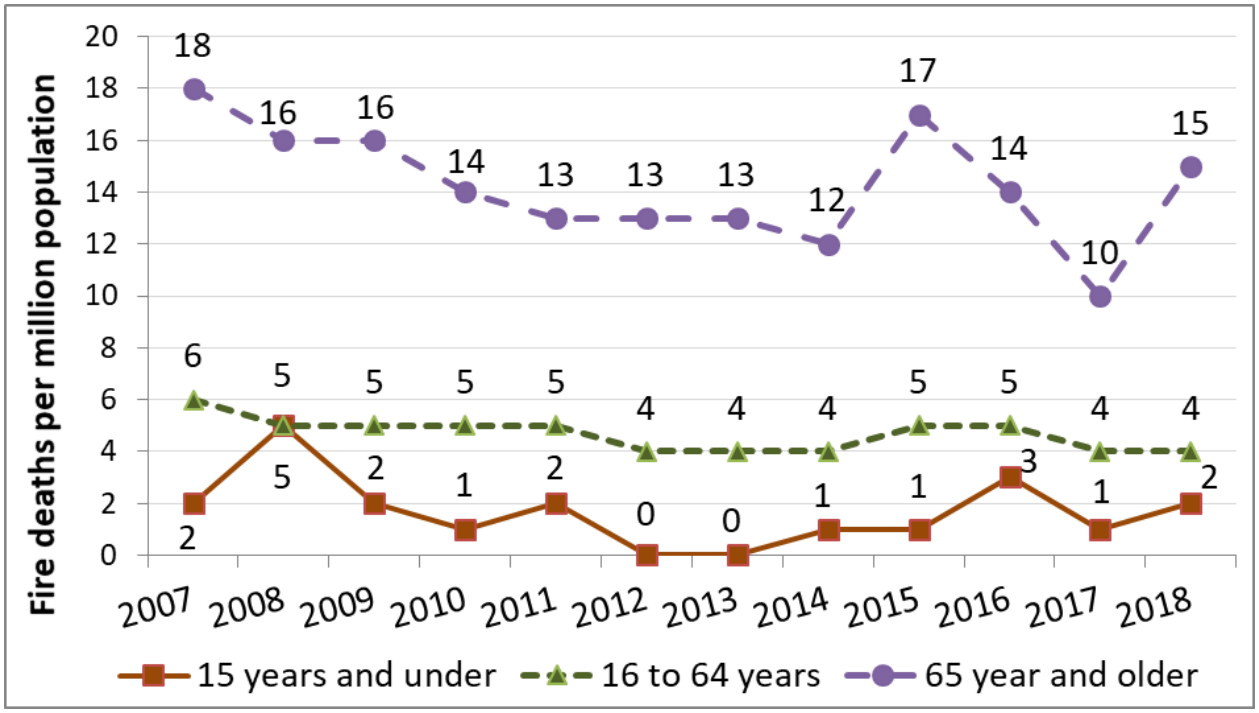


Figure Source: Adapted based on OFM reported residential fatal fires.[26]

The 2016 Census identifies a total population of 101,655 for the Municipality of Chatham-Kent. The age distribution of the Municipality's population and the Province of Ontario's population are summarized and compared in **Table 8**.

Table 8: Population by Age Group – Chatham-Kent and Ontario

Age	Chatham-Kent Population	Chatham-Kent Population %	Ontario Population	Ontario %
0 to 4 years	5,245	5.2%	697,360	5.2%
5 to 9 years	5,645	5.6%	756,085	5.6%
10 to 14 years	5,760	5.7%	754,530	5.6%
15 to 19 years	6,075	6.0%	811,670	6.0%
20 to 24 years	5,520	5.4%	894,390	6.7%

[26] Office of the Fire Marshal and Emergency Management. (Revised 2018, November). Ontario Residential Fatal Fires. Retrieved from https://www.mcscs.jus.gov.on.ca/english/FireMarshal/MediaRelationsandResources/FireStatistics/OntarioFatalities/HomeFireFatalitiesChildrenAdultsSeniors/stats_fatal_res.html

Age	Chatham-Kent Population	Chatham-Kent Population %	Ontario Population	Ontario %
25 to 44 years	21,550	21.2%	3,453,475	25.7%
45 to 54 years	14,285	14.1%	1,993,730	14.8%
55 to 64 years	16,160	15.9%	1,835,605	13.7%
65 to 74 years	11,950	11.8%	1,266,390	9.4%
75 to 84 years	6,400	6.3%	684,195	5.1%
85 + years	3,065	3.0%	301,075	2.2%
Total	**101,655[27]**	**100.0%**	**13,448,505**	**100.0%**
Median Age of the Population	46	Not Applicable	41	Not Applicable
Population aged 14 and under	16,650	16.4%	2,207,975	16.4%
Population aged 65 and over	21,415	21.1%	2,251,660	16.7%

Source: 2016 Census, Statistics Canada[28]

[27] For the purposes of this CRA, 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."

[28] Statistics Canada. 2017. Chatham-Kent, MU [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 March 23, 2021).

The youngest demographic (those 14 years of age and under) represents 16.4% of the Municipality's total population, similar in comparison to the Province (16.4%). 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. 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 Chatham-Kent represents 21.1% of the total population, which is higher than the Province (16.7%) by 4.4%. An additional 30.0% (30,445) of the Municipality'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 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.

Key Finding: The 2016 Census data indicates that children aged 14 and under represent 16.4% (16,650) of the Municipality'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 2016 Census, seniors represent 21.1% (21,415) of the Municipality's total population.

Key Finding: Of the Municipality's total population, 30.0% (30,445) fall into the age range of 45 to 64, representing a cohort aging towards the seniors demographic of 65 years or older.

The distribution of both sexes by age for the Municipality of Chatham-Kent was reviewed. The proportion of males versus females is fairly even, as would be expected. When specific age groups are reviewed, there are minor variations. Based on these statistics, it is not anticipated that public education programming would be refined based on sex. The impact of sex ratio 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.

5.2.1 Mapping Population Age

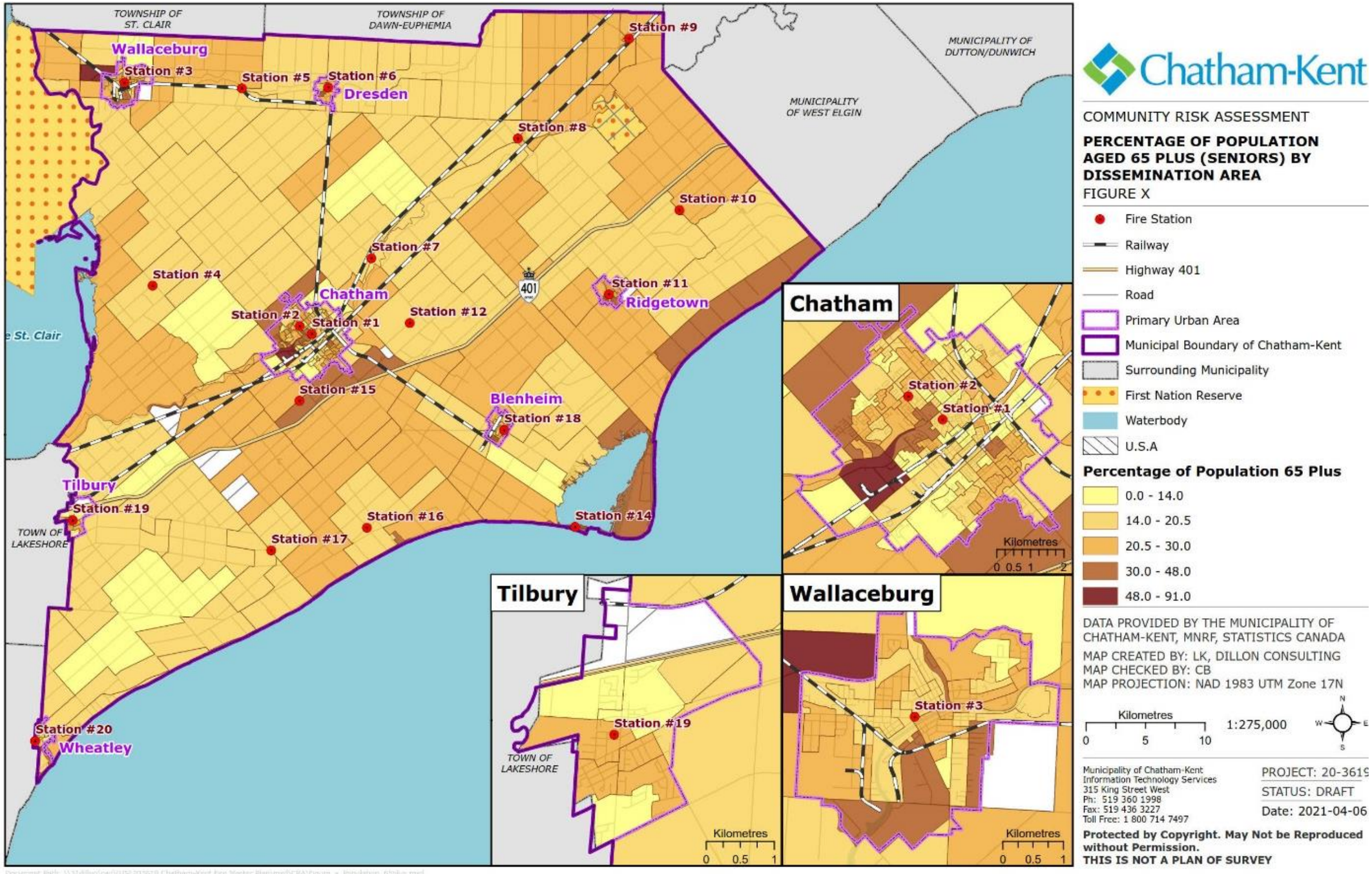
To understand the spatial distribution of population by age across the Municipality, 2016 Census data was mapped by dissemination area. **Figure 12** presents the distribution of the senior population (65 and older) and **Figure 13** shows the distribution of youth (0 to

14 years). **Figure 12** shows that a higher proportion of seniors reside in the settlement areas of Chatham and Wallaceburg as well as along the shoreline of Lake Erie. Within Chatham, there is a notable cluster of seniors located near the Thames River. There is also a high proportion of seniors living on the northwestern edge of the settlement area boundary of Wallaceburg.[29] This reflects the existing seniors residences in these areas.

Figure 13 shows a higher proportion of youth (0-14 years) concentrated in the southwest corner of the Municipality in and outside of Tilbury and in the Municipality's northern corridor near Dresden. There are also clusters of youth in more densely population areas such as Chatham.

[29] It is acknowledged that some of the dissemination areas with higher proportions of identified age groups may be shown may include employment lands.

Figure 12: Percentage of Population Aged 65 and Older by Dissemination Area



Chatham-Kent

COMMUNITY RISK ASSESSMENT

PERCENTAGE OF POPULATION AGED 65 PLUS (SENIORS) BY DISSEMINATION AREA

FIGURE X

- Fire Station
- Railway
- Highway 401
- Road
- Primary Urban Area
- Municipal Boundary of Chatham-Kent
- Surrounding Municipality
- First Nation Reserve
- Waterbody
- U.S.A

Percentage of Population 65 Plus

- 0.0 - 14.0
- 14.0 - 20.5
- 20.5 - 30.0
- 30.0 - 48.0
- 48.0 - 91.0

DATA PROVIDED BY THE MUNICIPALITY OF CHATHAM-KENT, MNRF, STATISTICS CANADA

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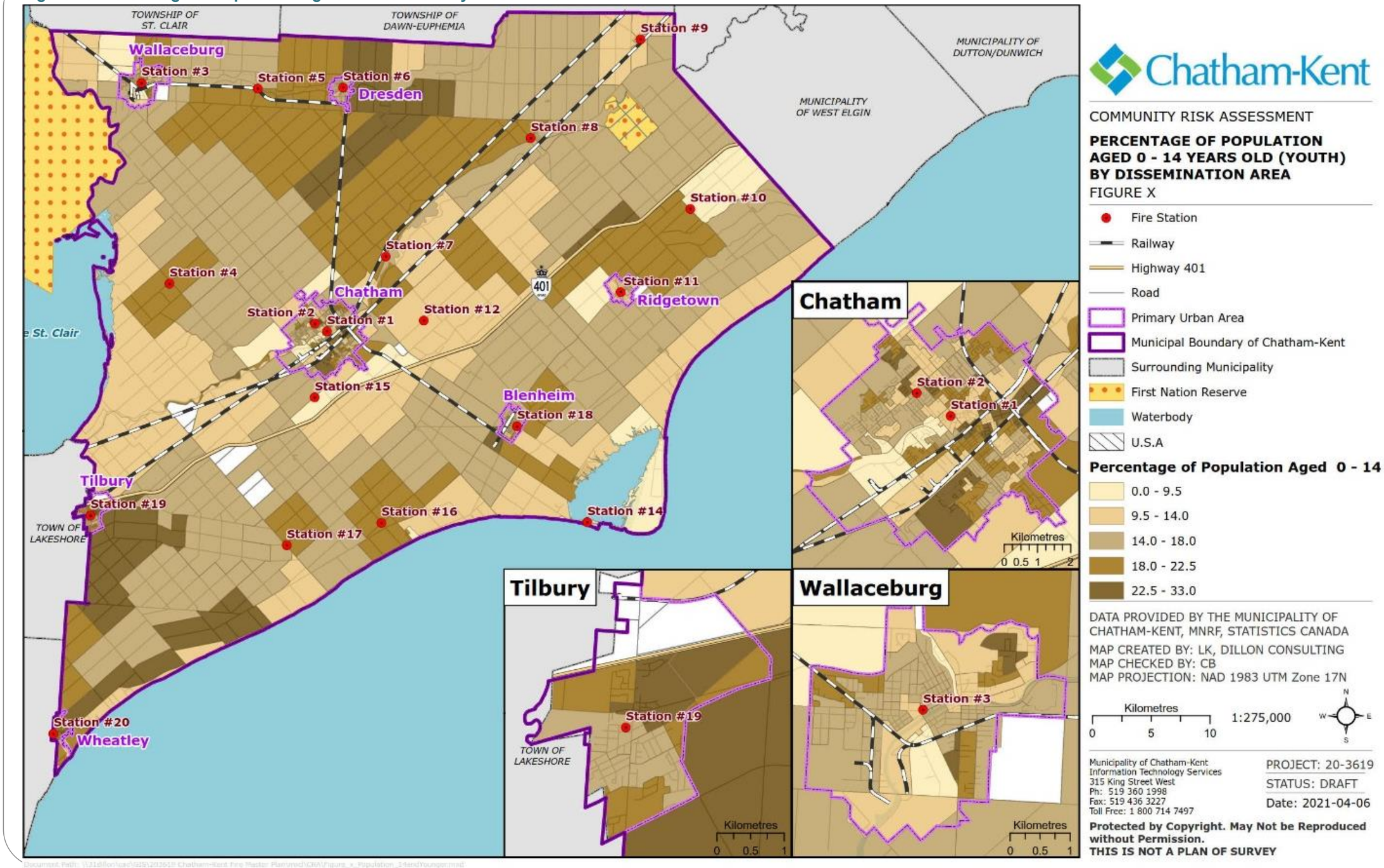
Figure 13: Percentage of Population Age 0-14 Years Old by Dissemination Area



Chatham-Kent

COMMUNITY RISK ASSESSMENT

PERCENTAGE OF POPULATION AGED 0 - 14 YEARS OLD (YOUTH) BY DISSEMINATION AREA

FIGURE X

- Fire Station
- Railway
- Highway 401
- Road
- Primary Urban Area
- Municipal Boundary of Chatham-Kent
- Surrounding Municipality
- First Nation Reserve
- Waterbody
- U.S.A

Percentage of Population Aged 0 - 14

- 0.0 - 9.5
- 9.5 - 14.0
- 14.0 - 18.0
- 18.0 - 22.5
- 22.5 - 33.0

DATA PROVIDED BY THE MUNICIPALITY OF CHATHAM-KENT, MNRF, STATISTICS CANADA

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5.3 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.[30] 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.

5.3.1 Labour Force Status

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

Labour force status, shown in **Table 9** indicate that the Municipality of Chatham-Kent has a lower participation rate than the Province of Ontario (60.2% versus 64.7%). This would suggest that the Municipality faces a slightly higher fire risk in comparison to the Province from the perspective of labour force.

[30] Minister of the Solicitor General. (Modified 2016, February). Comprehensive Fire Safety Effectiveness Model: Fire Risk Sub-Model. Retrieved from https://www.mcscs.jus.gov.on.ca/english/FireMarshal/FireServiceResources/ComprehensiveFireSafetyEffectivenessModel/FireRiskSub-Model/Fire_risk_submodel.html

Table 9: Labour Force Status – Chatham-Kent and Ontario

Status	Chatham-Kent Population	Chatham-Kent %	Ontario Population	Ontario %
In the Labour Force[31]	49,785	60.2%	7,141,675	64.7%
Employed	46,040	55.6%	6,612,150	59.9%
Unemployed	3,745	4.5%	529,525	4.8%
Not in the Labour Force	32,975	39.8%	3,896,765	35.3%
Total	**82,760**	**100.00%**	**11,038,440**	**100.0%**

Source: 2016 Census, Statistics Canada[32]

5.3.2 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% of income earners had attained a university degree compared to 20.9% of all Canadians aged 15 and over.[33] Based on this national trend and for the purposes of this CRA 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 10 displays educational attainment for the Municipality of Chatham-Kent and the Province of Ontario.

[31] The category 'In the Labour Force' is a subtotal of the following categories: employed and unemployed.
[32] Statistics Canada. 2017. Chatham-Kent, MU [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 March 23, 2021).
[33] Statistics Canada. (Modified 2018, July). Education and occupation of high-income Canadians. Retrieved from https://www12.statcan.gc.ca/nhs-enm/2011/as-sa/99-014-x/99-014-x2011003_2-eng.cfm

Table 10: Educational Attainment – Chatham-Kent and Ontario

Educational Attainment	Chatham-Kent Population	Chatham-Kent%	Ontario Population	Ontario %
No Certificate/Diploma/Degree	19,870	24.0%	1,935,355	17.5%
High School Diploma or Equivalent	24,935	30.1%	3,026,100	27.4%
Postsecondary Certificate; Diploma or Degree	37,960	45.9%	6,076,985	55.1%
Total	**82,765**	**100.0%**	**11,038,440**	**100.0%**

Source: 2016 Census, Statistics Canada[34]

According to the 2016 Census, 45.9% of residents in Chatham-Kent have a postsecondary certificate, diploma or degree, which is 9.2% lower than the Province. This level of educational attainment could be linked to the median household incomes found in the Municipality.

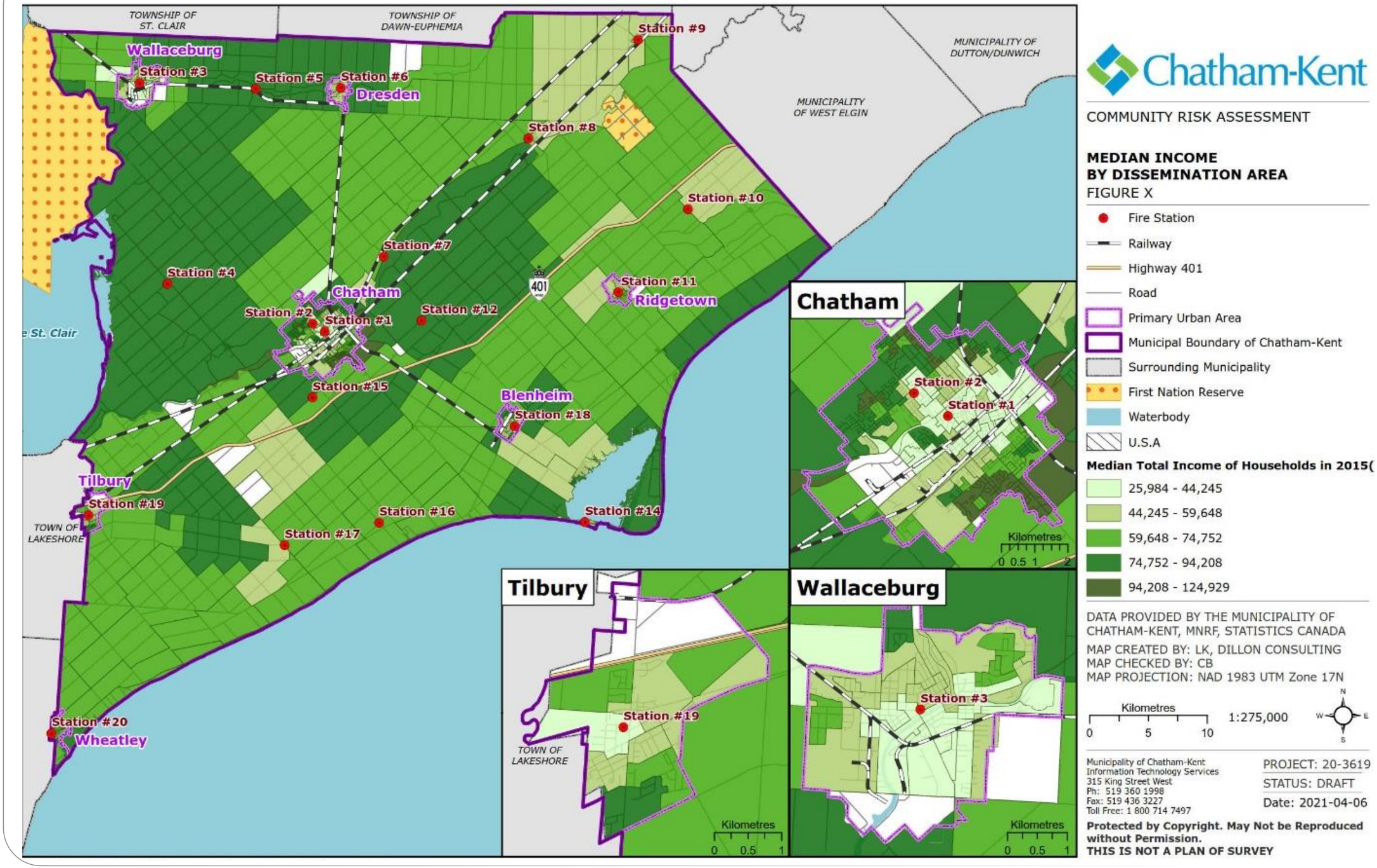
According to the 2016 Census, the median total income of households for Chatham-Kent in 2015 was $58,264, lower than the Provincial median total income per household of $74,287.

5.3.2.1 Mapping Income

Median household income across the Municipality is displayed in **Figure 14**, indicating that households with a lower median income are found primarily within higher populated settlement areas of Chatham, Tilbury and Wallaceburg, in close proximity to Stations 1, 2, 3 and 19.

[34] Statistics Canada. 2017. Chatham-Kent, MU [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 March 23, 2021).

Figure 14: Median Total Income of Households in 2015 by Dissemination Area



Chatham-Kent

COMMUNITY RISK ASSESSMENT

MEDIAN INCOME BY DISSEMINATION AREA
FIGURE X

- Fire Station
- Railway
- Highway 401
- Road
- Primary Urban Area
- Municipal Boundary of Chatham-Kent
- Surrounding Municipality
- First Nation Reserve
- Waterbody
- U.S.A

Median Total Income of Households in 2015(

- 25,984 - 44,245
- 44,245 - 59,648
- 59,648 - 74,752
- 74,752 - 94,208
- 94,208 - 124,929

DATA PROVIDED BY THE MUNICIPALITY OF CHATHAM-KENT, MNRF, STATISTICS CANADA

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

Kilometres
0 5 10
1:275,000

N W E S

Municipality of Chatham-Kent
Information Technology Services
315 King Street West
Ph: 519 360 1998
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PROJECT: 20-3619
STATUS: DRAFT
Date: 2021-04-06

5.3.3 Household Tenure, Occupancy, Suitability and Costs

Table 11 summarizes household statistics for the Municipality of Chatham-Kent and the Province, including tenure, occupancy, suitability and costs.

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 Municipality has a higher proportion of dwellings that are owned versus rented when compared to the Province (72.2% owned in Chatham-Kent versus 69.8% in the Province).

Occupancy reflects socioeconomic status whereby a higher proportion of multiple persons per household room may reflect lower income. There are 220 households (0.5% of total households) that have more than one person per room in Chatham-Kent. This reflects a lower percentage compared to the Province where 2.4% of households have more than one person per room.

The 2016 Census reports on **housing suitability** which, according to Statistics Canada, refers to 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, 2.8% (or 1,205 households) are classified as “not suitable” within the Municipality, compared to 6.0% for the Province as a whole. From the perspective of housing suitability, the Municipality has a potentially lower fire risk.

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 Chatham-Kent, 21.0% of households spend 30% or more of the household total income on shelter costs. This is approximately 6.7% less than the Province, where 27.7% of households spend 30% or more of income on shelter costs.

Looking closer at shelter costs, the median value of dwellings in Chatham-Kent is $160,572 ($239,924 lower than the provincial median). The Municipality also has lower median monthly shelter costs for owned and rented dwellings than the Province.

Table 11: Household Tenure, Occupancy, Suitability and Costs – Chatham-Kent and Ontario

Type	Chatham-Kent	%	Ontario	%
Household Tenure	**Chatham-Kent**	**%**	**Ontario**	**%**
Owner	31,075	72.2%	3,601,825	69.8%
Renter	11,955	27.8%	1,559,720	30.2%
Total Households	43,030	100.0%	5,161,545	100.0%
Household Occupancy	**Chatham-Kent**	**%**	**Ontario**	**%**
One person or fewer per room	42,805	99.5%	5,046,810	97.6%
More than one person per room	220	0.5%	122,360	2.4%
Total Households	43,025	100.0%	5,169,170	100.0%
Housing Suitability	**Chatham-Kent**	**%**	**Ontario**	**%**
Suitable	41,825	97.2%	4,858,170	94.0%
Not suitable	1,205	2.8%	311,005	6.0%
Total Households	43,030	100.0%	5,169,175	100.0%
Shelter Costs	**Chatham-Kent**	**%**	**Ontario**	**%**
Spending less than 30% of household total income on shelter costs	32,770	79.0%	3,694,385	72.4%
Spending 30% or more of household total income on shelter costs	8,730	21.0%	1,411,900	27.7%
Total Households	41,500	100.0%	5,106,285	100.0%
Median value of dwellings	**$160,572**	**100.0%**	**$400,496**	**100.0%**
Median monthly shelter costs for owned dwellings	**$804**	**100.0%**	**$1,299**	**100.0%**
Median monthly shelter costs for rented dwellings	**$743**	**100.0%**	**$1,045**	**100.0%**

Source: 2016 Census, Statistics Canada[35]

[35]Statistics Canada. 2017. Chatham-Kent, MU [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 March 23, 2021).

5.4 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 newcomer 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. As summarized in **Table 12,** the Municipality has a lower proportion of newcomers (8.7%) when compared to Ontario (29.1%). This population should be monitored as new Census data becomes available for consideration when planning public education programs and materials.

Table 12: Immigration Status – Chatham-Kent and Ontario

Immigration Status	Chatham-Kent Population	Chatham-Kent %	Ontario Population	Ontario %
Non-immigrants	90,410	91.0%	9,188,815	69.4%
Immigrants	8,625	8.7%	3,852,150	29.1%
Before 1981	4,675	4.7%	1,077,745	8.1%
1981 to 1990	1,135	1.1%	513,995	3.9%
1991 to 2000	1,055	1.1%	834,510	6.3%
2001 to 2005	585	0.6%	490,560	3.7%
2006 to 2010	515	0.5%	463,170	3.5%
2011 to 2016	660	0.7%	472,170	3.6%
Non-permanent residents	350	0.4%	201,200	1.5%
Total	**99,385**	**100.00%**	**13,242,165**	**100.0%**

Source: 2016 Census, Statistics Canada[36]

Knowledge of official languages based on the 2016 Census is included in **Table 13** for the Municipality of Chatham-Kent and Province of Ontario.

[36] Statistics Canada. 2017. Chatham-Kent, MU [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 March 23, 2021).

As shown, 92.4% of the population in the Municipality has knowledge of English only, 7.0% possess knowledge of both English and French, 0.6% speak neither English nor French, and 75 people speak French only. The potential for communication barriers should be considered and monitored, especially as the Municipality continues to grow in the future.

Table 13: Knowledge of Official Language – Chatham-Kent and Ontario

Language	Chatham-Kent Population	Chatham-Kent %	Ontario Population	Ontario %
English Only	93,000	92.4%	11,455,500	86.0%
French Only	75	0.1%	40,040	0.3%
English and French	7,045	7.0%	1,490,390	11.2%
Neither English nor French	570	0.6%	326,935	2.5%
Total population (non-institutional)	**100,690**	**100.0%**	**13,312,865**	**100.0%**

Source: 2016 Census, Statistics Canada[37]

5.5 Transient Populations

Ontario Regulation 378/18 requires the consideration of “transient populations”. 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.

5.5.1 Tourism

Some 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.

[37] Statistics Canada. 2017. Chatham-Kent, MU [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 March 23, 2021).

There are several Municipality-hosted events each year and attractions that draw residents and non-residents to the Municipality of Chatham-Kent.

Due to COVID-19 travel restrictions and health considerations, most events in Chatham-Kent have been cancelled until further notice at the time this report was written, with the exception of a few events which have been transitioned to a virtual platform.

Consultation with the CKFES identified that the community of Erieau experiences an increase in seasonal population every year. Erieau is located on the shore of Lake Erie and Rondeau Bay and attracts summer tourists who come to Chatham-Kent to utilize the beach and other local amenities.

5.5.2 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. Student accommodations and short term rental units present unique fire safety issues (discussed further in **Section 8.0 – Community Services**. Students and landlords need to know the risks including unattended cooking, candles, the disabling of smoke alarms in rooms, and the preventative actions that can save their lives.

There are two major post-secondary education campuses located within the Municipality and several nearby universities and colleges. These include:

- Located within Chatham-Kent:
  - St. Clair College's Chatham Campus
  - University of Guelph's Ridgetown Campus

By working together, CKFES and the listed university/college campuses can raise awareness about the dangers of fires among college-aged students who live in on- and off- campus college housing.

5.5.3 Employment

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 collision calls. **Table 14** shows the commuting destination trends for the residents of Chatham-Kent based on 2016 Census data. A small portion of the Municipality's labour force (25) commutes to a different census subdivision within the census division of their residence within the community. An additional 5,865 commute to a different census division within the province. Although not a significant proportion of the population, this 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 people commuting in and out of the Municipality could increase the number of vehicle collision calls to which the fire service responds. Vehicle collision/motor vehicle accident calls and call volume by time of day may help inform this finding further (**Section 10.2 – Event History**).

Table 14: Commuting Destinations – Municipality of Chatham-Kent

Commuting Destination*	Population
Commute within census subdivision of residence	31,675
Commute to a different census subdivision within census division of residence	25
Commute to a different census subdivision and census division within province or territory of residence	5,865
Commute to a different province or territory	55
Total	**37,620**

Source: 2016 Census, Statistics Canada[38]

[38] Statistics Canada. 2017. Chatham-Kent, MU [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 March 23, 2021).

*Commuting destination for the employed labour force aged 15 years and over in private households with a usual place of work - 25% sample data

5.5.3.1 Temporary Foreign Workers

Due to its large agricultural sector and need for agricultural workers, Chatham-Kent's agricultural employers hire temporary foreign workers (TFW) through the Seasonal Agricultural Worker Program. The program allows employers to hire TFW from participating countries for a maximum period of eight months. Therefore, each year, Chatham-Kent experiences a population shift due to this type of employment.

During their stay, TFW are typically housed in congregate living quarters or dormitories. Agriculture facilities that house TFW in Chatham-Kent are usually subject to building and fire inspections.

TFW accommodations 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 types of fire safety issues are similar to those presented by student accommodations (discussed further in **Section 8.0 Community Services**).

It is important that CKFES continue to review its inspection processes of TFW accommodations and develop partnerships where appropriate to reduce the fire safety risks associated with congregate housing and protect the safety of offshore workers.

Key Finding: The Municipality's agricultural sector employs Temporary Foreign Workers resulting in a population shift.

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 to. Hazardous incidents may have significant impact within the community. This section considers such hazards within the Municipality of Chatham-Kent.

6.1 Hazard Identification and Risk Assessment in Ontario (HIRA) and the CRA

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.[39] 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. Current legislation requires an annual review and update of the municipally developed HIRA.

The OFM TG-02-2019 acknowledges that the processes of developing a HIRA and a CRA 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" 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 Impacts of Hazards on Fire Protection Services

The Municipality's HIRA was last updated in 2017. As a component of the risk assessment and risk analysis process, the top risks in Chatham-Kent 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.

To better understand the risks of hazards as they pertain to fire protection services, the Municipality's top hazards have been assessed to identify potential impacts on fire

[39] English-French Emergency Management Glossary of Terms. Ministry of the Solicitor General. December 2011. Retrieved March 5, 2021 from https://www.emergencymanagementontario.ca/english/emcommunity/response_resources/GlossaryOfTerms/glossary_of_terms.html

protection services. The results of this review as they pertain to the top hazards in the Municipality of Chatham-Kent are presented in **Table 15**.

Table 15: Impacts of Hazards on Fire Protection Services

Hazard (Municipality HIRA)	Possible Impact on Fire Protection Services
Critical Infrastructure Failure, Water	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 to access these systems. There are fire department considerations to areas without adequate water flow and supply (hydrants), and the fire department should consider a water servicing strategy for those areas requiring water flow for firefighting. Water infrastructure failure can also occur when a municipality's stormwater systems cannot accommodate increased precipitation resulting in flash flooding. Similarly, flooding can occur due to the overflow of water from a river or other body of water overland. The impacts of a flooding event could include property or structural damage, resulting in disruptions to the transportation network. Depending on the severity of the flooding, access to various sections of the road network impact fire department response, resulting in extended emergency response times. As referenced in **Section 2.4 – Waterways**, several communities along the Lake Erie shoreline have been impacted by flooding in the past, and in some cases due to the failure of water infrastructure, such as the dikes.
Tornadoes	Tornado events can cause varying levels of property or structural damage; disrupt multi-modal transportation services and interfere with the delivery of utilities (e.g. hydro) or other critical infrastructure (e.g. telecommunications). The damage to property and infrastructure caused by tornadoes and high winds can obstruct first responder access to the road network, leading to a delay in emergency response times.

Hazard (Municipality HIRA)	Possible Impact on Fire Protection Services
Fog	According to the Municipality's HIRA, fog is considered a top hazard. Fog conditions can present visibility issues, promoting dangerous driving conditions leading to motor vehicle collisions or crashes, contributing to an increase in call volume. As discussed in **Section 10.2.2.3 – Spatial Modelling – Rescue Incidents** of this CRA, it is not uncommon for CKFES to experience high call volumes related to vehicle collisions throughout the year.
Major Structural Fires	The Municipality's 2017 HIRA lists Major Structural Fires as one of its top hazards. Upon further analysis, **Section 10.1.1 – Total Fire Loss** of this C.R.A compares the number of structure fires within the Municipality of Chatham-Kent and those that occurred across Ontario for the period from January 1, 2015 to December 31, 2019. Structure fires in Chatham-Kent account for 61.8% of all fires experienced within this timeframe.
Arson	As indicated in **Section 10.1.4 – Reported Fire Cause**, 9.3% of the fires reported as intentional (i.e. combined categories of arson and vandalism) within the Municipality over the five year period from January 1, 2015 to December 31, 2019 is slightly higher than the Provincial total of intentional fires (7.7%). Arson fires specifically accounted for 33 fires over this five year timeframe.
Road Transportation Accident	The road transportation network in Chatham-Kent supports the Municipality as a distribution hub for agricultural products as well as its day to day connectivity. A road transportation emergency in Chatham-Kent (on Highway 401 or 40, for example) could require hazardous materials response from CKFES or other specialized rescue service. 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 the fire department account for 11.1% of total call volume over a five year period from January 1st, 2015 to December 31st, 2019. Of those rescue calls, 92.0% are motor vehicle related incidents (**Section 10.2.2.3 – Spatial Modelling – Rescue Incidents**).

Hazard (Municipality HIRA)	Possible Impact on Fire Protection Services
Oil and Gas Well Emergencies	As indicated in **Section 4.0 – Critical Infrastructure**, there are several natural gas and oil pipelines within the Municipality. There are a number of risks associated with pipelines due to volatile properties and characteristics. 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 of crude oil. Different variations in crude oil may require different response types or personal protective equipment. 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. CKFES identified that there is a risk of abandoned oil and gas wells located throughout the Municipality. These have the potential to cause contamination if not appropriately decommissioned. Schedule G2 - Petroleum Pool Resources of the Chatham Kent Official Plan identifies active and suspected petroleum pools as well as abandoned petroleum pools located across the Municipality. Recently, there was an explosion at the corner of Erie Street North and Talbot Road East in Wheatley which injured several people and caused damage to two buildings. Although a cause/source was not confirmed at the time this report was written, hydrogen sulfide gas was detected ahead of the explosion likely from an abandoned gas well.[40] At present, according to data from Land Information Ontario, there are 1,521 abandoned wells located in the Municipality of Chatham-Kent, which includes oil and gas wells. Pre-incident planning, training and exercise activities with the pipeline operator and other response partners such as the CKFES will help equip emergency response personnel with the right knowledge, skills and equipment needed to respond to a pipeline-related incident. Establishing partnerships and procedures before an incident occurs is conducive to building awareness, and a safe and effective response.

Hazard (Municipality HIRA)	Possible Impact on Fire Protection Services
Energy Emergency, Hydro	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. 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. Ideally, emergency response agencies such as CKFES would have access to backup generators in the event of an energy emergency.
Energy Emergency, Hydro	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. 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. Ideally, emergency response agencies such as CKFES would have access to backup generators in the event of an energy emergency.

[40] Ontario has thousands of abandoned gas wells. Here's where they are. CBC News. Posted: Sep 01, 2021. Retrieved Sept 2, 2021 from https://www.cbc.ca/news/canada/windsor/ontario-thousands-abandoned-gas-wells-1.6160949

Hazard (Municipality HIRA)	Possible Impact on Fire Protection Services
Floods	The Municipality's HIRA indicates that flooding is a top hazard for Chatham-Kent. Flooding can occur when municipal stormwater systems cannot accommodate increased precipitation resulting in flash flooding. Similarly, flooding can occur due to the overflow of water from a river or other body of water overland or ponding in low-lying areas due to heavy rainfall. The impacts of a flooding event could include property or structural damage, resulting in disruptions to the transportation network. Depending on the severity of the flooding, access to various sections of the road network can impact fire department response, resulting in extended emergency travel times. In instances of long-term flooding, there could be impacts to human health, as an increase in water and moisture could promote the prevalence of pests that thrive in wetter environments. Flooding incidents specific to Chatham-Kent are discussed in **Section 2.4 – Waterways**.
Nutrient Release	Agriculture is a significant part of Chatham-Kent's economy and local history and culture. Many of the farms in the area use fertilizers and other chemicals that, if released due to rainfall and runoff can lead to environmental contamination. Many residents in the rural areas rely on well-water and agricultural chemical runoff, if uncontrolled could lead to the contamination of local water sources.
Rail Transportation Accident	An incident involving a derailment or rail accident could be a significant emergency event within a community and could involve hazardous materials and/or dangerous goods. An emergency involving rail in Chatham-Kent could require hazardous materials response or other specialized rescue service from the CKFES.

Source: Municipality of Chatham-Kent's 2017 Hazard Identification and Risk Assessment

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

Key Finding: The Municipality's 2017 HIRA identifies hazards that could each impact the ability of the Municipality to deliver fire protection services.

Special Consideration: There are abandoned wells throughout the Municipality, including oil and gas wells, which could pose a threat to life, property, local economy and environment if an explosion were to occur.

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 with the collective response to an emergency situation. The following sections consider these public safety response characteristics within the Municipality of Chatham-Kent.

7.1 Public Safety Response Agencies in the Municipality of Chatham-Kent

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 16 lists the public safety response agencies within Chatham-Kent that will be able to assist in a collective emergency response effort and may contribute to the mitigation of risk within the community. Identifying the public safety response agencies within the community can help the fire service become familiar with other public safety response agencies and each agency's specific response capabilities.

Table 16: Public Safety Response Agencies

Identified Public Safety Response Agency	Types of Incidents They Respond To	Agency Role in Incident
Chatham-Kent Police Service	• 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
Medavie Emergency Medical 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
Hydro One Entegrus	• 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
Harold Marcus Limited	• Hazardous materials incidents • Tank truck rollovers • In-plant incidents • Marine and waterway spills • Train derailments • Chemical attacks • Other unique emergencies	• Responds to any stage of a spill incident • Comprehensive site remediation and decontamination
Water Treatment Plants	• Fire incidents	• Water pressure control

Identified Public Safety Response Agency	Types of Incidents They Respond To	Agency Role in Incident
Civil Air Search and Rescue Association CASARA (several units across Ontario and Canada)	• Incidents requiring volunteer air search and rescue service throughout Southwestern Ontario • Military training exercises	• Support Canada's Search and Rescue (SAR) program and to promote SAR Awareness • May also be called upon to supply certified SARCASARA members trained as spotters onboard military aircraft • Tasked on SAR missions by the Joint Rescue Coordination Centre, located at Canadian Forces Base Trenton
Ontario Volunteer Emergency Response Team (OVERT) – services available through request for assistance	• Large scale disasters that may require evacuation including floods, power outages, public health emergencies and more • Incidents requiring technical rescue • Search and rescue/missing persons	• Provides emergency assistance to first responders and emergency management agencies • Incident command • Ground and marine search and rescue • Canine unit support • Technical rescue • Communications
Canadian Coast Guard	• Marine and waterway spills • Search and Rescue	• Search and Rescue Marine communications and traffic services • Wrecked abandoned or hazardous vessels • Environmental response • Icebreaking • Maritime security

7.1.1 Mutual Aid and Automatic 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 CKFES is not a participant in a Mutual Aid Agreement. In part, the decision to enter in agreements is informed by geography and available services.

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.

The Municipality of Chatham-Kent provides fire protection services to surrounding municipalities including:

- Walpole Island First Nation
- Moraviantown (Delaware Nation)
- Township of Dawn-Euphemia
- Municipality of Leamington
- Town of Lakeshore
- Village of Newbury

Automatic aid agreements will be discussed further within the Fire Master Plan.

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 Municipality of Chatham-Kent.

8.1 Community Services in the Municipality of Chatham-Kent

Fires and other emergency events can have devastating effects on a community, and at times, can overwhelm public safety and security agencies' capability 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 the CKFES **Table 17** identifies community agencies, organizations and associations within Chatham-Kent.

Table 17: Community Service Agencies, Organizations and Associations

Community Service Agency	Types of Assistance Provided
Red Cross	In the event of a fire incident or emergency, the Canadian Red Cross 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. Consultation with the CKFES identified that there is an agreement with the Red cross to provide the Municipality with registration and inquiry services and emergency shelters should the need arise.
FIRST Strategy	The FIRST Strategy is a community partnership representing a broad cross-section of community partners whose mandate is to serve and support individuals and families. The partnership harnesses the strengths and resources of partnering agencies to better serve the Chatham-Kent community by decreasing the risks they face and preventing negative outcomes. First Strategy involves many local agencies to identify vulnerable individuals.

Community Service Agency	Types of Assistance Provided
EarlyON	The Municipality of Chatham-Kent 2019 Annual Report includes six areas of strategic focus; one of which is "healthy and safe communities"[41]. To help promote healthy and safe communities, Chatham-Kent launched EarlyON Centres across the municipality which offer free drop-in programs where parents and children from the ages of 0-6 years old can play, learn and receive advice. In 2019, the EarlyON centres received 24,361 visitors at its eight locations. In partnering with this initiative, there is an opportunity for the CKFES to reach a wider audience and provide fire and life safety education to families within the Municipality of Chatham-Kent.
Salvation Army - Chatham	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, training and volunteers.

[41] Annual Report 2019. Municipality of Chatham-Kent. 2019. Retrieved March 28, 2021 from https://www.chatham-kent.ca/MeasuringOurProgress/Documents/CK%20Annual%20Report%202019-Accessible.pdf

Community Service Agency	Types of Assistance Provided
Community Living Chatham-Kent - Partners for Planning Program	Community Living Chatham-Kent connects families or individuals who are the relative or caregiver of a person with a disability with the Partners for Planning Program with a network of professionals, organizations and agencies to help them with planning for their loved one. There is opportunity for CKFES to partner with Community Living Chatham-Kent to participate in the Partner for Planning Program. For example, the CKFES can provide fire and life safety education about specialized smoke alarm systems that benefit individuals with disabilities. Decreased hearing ability or hearing loss entirely may limit an individual's ability to hear the audible warnings of a smoke alarm or respond to a fire. Proper fire escape planning and education programming geared towards the hearing impaired is a crucial consideration in the planning and design of living spaces geared towards individuals with a disability.
March of Dimes Canada - Sarnia-Lambton/Chatham-Kent	March of Dimes Canada supports older adults, and adults with disabilities, helping individuals remain independent in their own homes for as long as possible. For those entering the homes of senior adults and adults with disabilities to assist them in living more independently, the CKFES can provide them with educational materials and awareness about the proper installation of smoke alarms and fire and life safety information.
Loads of Love	Loads of Love is an organization based in Chatham that receives donations from the community and distributes them to people who are in need locally and around the world. This organization works with a network of other community partners to provide clothing and household items to those in need. Loads of Love may be able to assist the local fire department in providing emergency clothing or other household items, for those who have lost their households and possessions in a fire.

Community Service Agency	Types of Assistance Provided
Victim Services	Victim Services works in cooperation with the Police, Emergency Service Personnel and Community Partners to assist victims of crime and/or tragic circumstances (such as fire).
Local School Boards: Lambton Kent District School Board, St. Clair Catholic District Board, Conseil Scolaire Catholique Providence, Local Private Schools	As reported in **Section 5.2 – Population Age and Sex**, the 2016 Census data indicates that children aged 14 and under represent 16.4% of the Municipality's total population. The proportion of children in Chatham-Kent 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.
Post-Secondary Institutions (University of Guelph, St. Clair College)	As reported in **Section 5.5 – Transient Populations**, Chatham-Kent is home to several post-secondary education institutions. These include St. Clair College, Chatham Campus and the University of Guelph, Ridgetown Campus. 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. It is important that CKFES continue to develop a partnership with these institutions that supports the development of public education programming and materials geared towards these types of risks.

Community Service Agency	Types of Assistance Provided
Chatham-Kent Children's Services	The Chatham-Kent Children's Services (CKCS) is responsible for providing child protection services to children who live in Chatham-Kent. CKCS is a multi-service agency that supports the well-being and safety of children and their families through evidence-based practices and collaboration with community partners. It is common practice for this agency to investigate and inspect living conditions where there is a concern for a child's welfare. CKCS workers may encounter property conditions that they feel warrant follow up by CKFES due to unsafe conditions or fire hazard related concerns.
Local Agricultural Organizations	As reported in **Section 2.0 – Geographic Profile**, Chatham-Kent spans a large geographical area, comprised mostly of a rural landscape. It was also identified that due to its rich soil, the local climate, history and location and access to international markets, Chatham-Kent is a key location for agricultural production and food processing (**Section 9.0 – Economic Profile**). Barn fires can be devastating incidents leading to loss of livestock, buildings, and equipment. CKFES could consider partnering with local agricultural organizations to bring awareness to agriculture-related fire and emergency risks and if available, important resources available to Chatham-Kent farmers regarding fire and life safety measures.

Community Service Agency	Types of Assistance Provided
Home Care Services (e.g. Nurse Next Door, Meals on Wheels Chatham-Kent, Victorian Order of Nurses, Community Care Access Centre, Senior Homecare by Angels [Leamington])	As reported in **Section 5.2 – Population Age and Sex** 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 2016 Census, seniors represent 21.1% of Chatham-Kent's total population. It also identified that of the Municipality's total population, 30.0% 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 CKFES 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. Collaboration with these organizations on public education initiatives can provide an opportunity to increase fire and life safety awareness and education among the senior population.
Poverty Awareness Week	As identified in **Section 5.3 – Socioeconomic Circumstances**, the OFM's Fire Risk Sub-Model indicates that there is a relationship between income and fire risk. It suggests that households with less disposable income may be less likely to purchase fire safety products (e.g., smoke alarms, fire extinguishers, etc.), placing those households at a higher risk of experiencing consequences from a fire. The 2019 Municipality of Chatham-Kent Annual Report indicates that the municipality participated in Poverty Awareness Week. There may be an opportunity here for CKFES to participate annually in Poverty Awareness Week and provide important public fire and life safety education at this event.
Municipal Building Department	The CKFES can work collaboratively with the Municipality's building department to review building plans as part of the building permit process.

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 Municipality of Chatham-Kent.

9.1 Economic Sectors and Employers in Chatham-Kent

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.

From a workforce perspective, the Municipality's workforce is characterized by manufacturing, health care, retail trade and agriculture, as shown in **Figure 15**.

Figure 15: Industry in Chatham-Kent

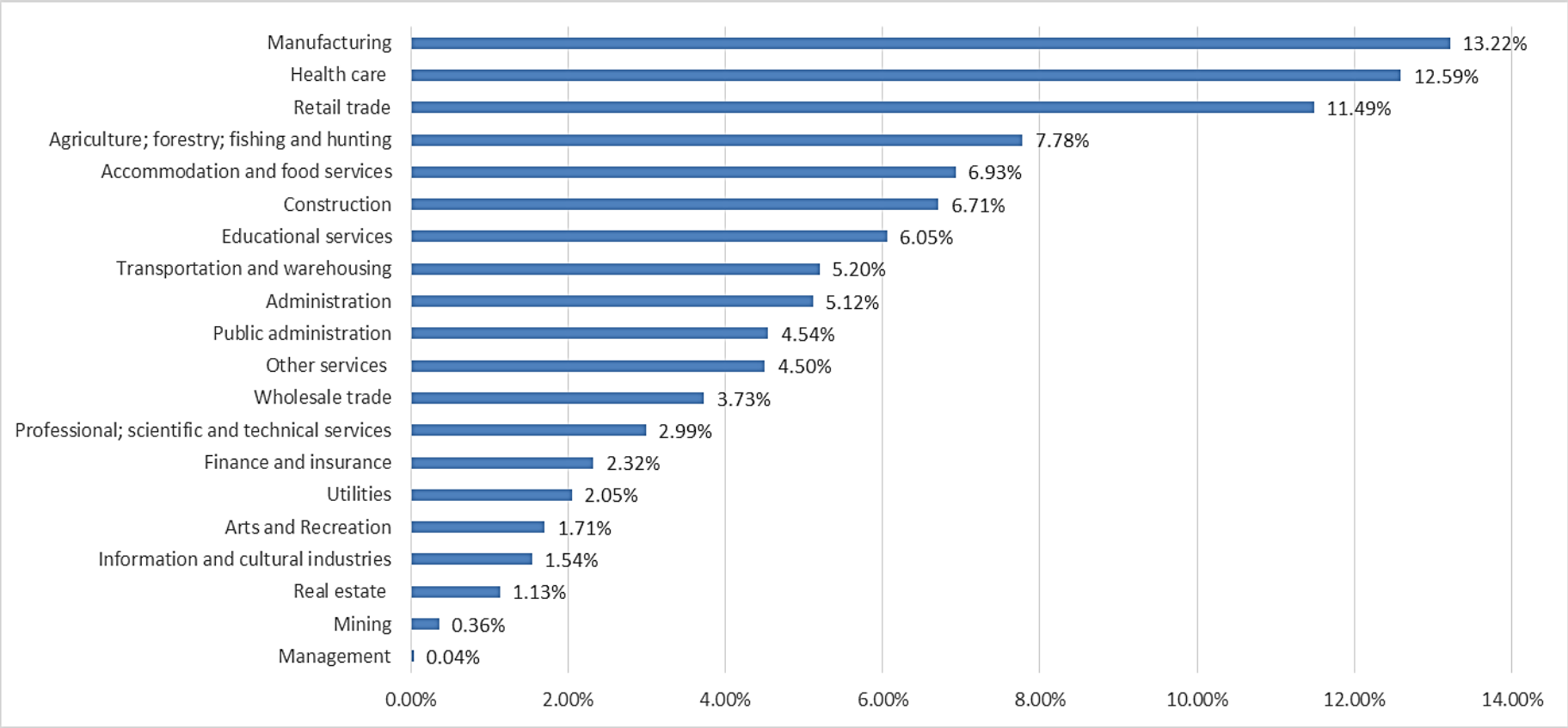

Figure Source: 2016 Census, Statistics Canada[42]

[42] Statistics Canada. 2017. Chatham-Kent, MU [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 March 23, 2021).

The Municipality of Chatham-Kent has a diverse economic base and is home to a growing number of high profile companies in the areas of Advanced Manufacturing, Agriculture and Agri-Food, Food Processing and Information and Communications Technology.[43] One of Chatham-Kent's Council Strategic priorities is Economic Prosperity which includes growing agri-industries as one of its key areas of strategic focus.[44]

As mentioned in **Section 2.0 – Geographic Profile**, the Municipality is a key location for agricultural production and food processing. Chatham-Kent is a leader in the production of over 70 crop varieties, with products ranging from fruits and vegetables to plants and grains.[45] It is the number one producer in the world of products such as brussel sprouts, black tobacco, cucumbers, pumpkins, quail, and much more. Soybeans, corn and wheat are the three major crops in Chatham-Kent in terms of acreage and greenhouses account for 370 acres of land (roughly 9% of Ontario's total greenhouse area). The economic impacts of Chatham-Kent's agricultural sector are significant accounting for approximately 16,000 jobs[46] and $3 billion in agri-products shipped worldwide in 2019.[47]

The Municipality, specifically the Town of Wheatley, is also referred to as the "freshwater capital of the world" and home to the world's largest fresh water commercial fishing port.[48] The economic impacts of Lake Erie's commercial fishing sector are also significant and contribute to the economy of Chatham-Kent. The fishing sector on Lake Erie, provides 700 direct and indirect jobs, has a Gross Domestic Product of over $244 million and contributes to 90% of Ontario's total commercial fishery exports to the United States and Europe.[49]

The major employers within the Municipality with 200 or more employees as provided by CKFES are summarized in **Table 18**.

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[43] Investing in Chatham-Kent, Chatham-Kent Economic Development. Last updated Wednesday, December 30, 2020. Retrieved February 28, 2021 from https://www.chatham-kent.ca/EconomicDevelopment/invest/invest/Pages/Advanced-Manufacturing.aspx
[44] Annual Report 2019.
[45] Investing in Chatham-Kent, Agriculture and Agri-Food. Chatham-Kent Economic Development. Last Updated: February 18, 2021. Retrieved March 28, 2021 from https://www.chatham-kent.ca/EconomicDevelopment/invest/invest/Pages/Agriculture.aspx
[46] Ibid.
[47] Annual Report 2019.
[48] Living Here, Wheatley. Municipality of Chatham-Kent. Last Updated: February 20, 2020 9:55 AM. Retrieved March 28, 2021 from https://www.chatham-kent.ca/Newcomers/choose-chatham-kent/our-communities/wheatley#:~:text=Nestled%20in%20the%20southwest%20corner,enjoy%20an%20active%20outdoor%20lifestyle.
[49] Investing in Chatham-Kent, Chatham-Kent Economic Development. Last updated Wednesday, December 30, 2020. Retrieved February 28, 2021 from https://www.chatham-kent.ca/EconomicDevelopment/invest/invest/Pages/Advanced-Manufacturing.aspx

Table 18: Top Employers in Chatham-Kent

Industry	Employer	Number of Employees
Education	Lambton Kent District School Board	2300
Government	Municipality of Chatham-Kent	2200
Healthcare	Chatham-Kent Health Alliance	1500
Education	St. Clair Catholic School Board	795
Utilities	Enbridge	600
Business Services	TekSavvy	500
Business Services	Concentrix	400
Manufacturing	KSR International	293
Retail	The Lally Group	290
Manufacturing	Mahle Filter Systems	275
Government	Service Canada Income Security Programs	275
Manufacturing	Martinrea	250
Agriculture	Greenhill Produce	250
Manufacturing	Woodbridge Foam	240
Food Processing	ConAgra Foods	200

Source: CKFES, Major Employers April 2021

Key Finding: The Municipality 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 Municipality.

10.0 Past Loss and Event History Profile

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 Municipality of Chatham-Kent.

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 1, 2015 to December 31, 2019 in order to provide a comparison with Provincial fire loss data. Provincial data for 2020 is currently unavailable.

10.1.1 Total Fire Loss

Analysis of the total fire loss within the Municipality over the five year period from January 1, 2015 to December 31, 2019 as displayed in **Table 19,** includes three categories representing the primary types of fires and the total amount of dollar loss associated with these fires. This includes 408 structure fires, 32 outdoor fires, and 220 vehicle fires representing $44,581,791 in total dollar loss.

Over this five year period, the Municipality averaged 132 fires and $8,916,358.2 in property loss per year. On average, 82 structure fires occur per year with an average structural fire property loss of $7,827,100 per year.

Table 19: Total Fire Loss – Municipality of Chatham-Kent

Year	Structure # of Fires	Structure Loss ($)	Outdoor # of Fires	Outdoor Loss ($)	Vehicle # of Fires	Vehicle Loss ($)	Total # of Fires	Total Loss ($)
2015	90	$6,966,350	5	$2,650	41	$492,820	136	$7,461,820
2016	82	$6,389,400	9	$539,000	45	$988,300	136	$7,916,700
2017	76	$10,546,050	7	$21,800	55	$1,212,502	138	$11,780,352
2018	81	$6,569,702	10	$131,200	46	$738,800	137	$7,439,702
2019	79	$8,664,000	1	$4	33	$1,319,213	113	$9,983,217
Total (2015-2019)	**408**	**$39,135,502.0**	**32**	**$694,654.0**	**220**	**$4,751,635.0**	**660**	**$44,581,791.0**
% of All Fires (2015-2019)	**61.8%**	**87.8%**	**4.8%**	**1.6%**	**33.3%**	**10.7%**	**N/A**	**N/A**
Average (2015-2019)	**81.6**	**$7,827,100.4**	**6.4**	**$138,930.8**	**44.0**	**$950,327.0**	**132.0**	**$8,916,358.2**

Source: OFM Standard Incident Reporting (2015 to 2019 data)

Table 20 compares the number of structure fires and the associated total property loss within the Municipality of Chatham-Kent for the period from January 1, 2015 to December 31, 2019 to the number of structure fires and total property loss that occurred across Ontario for the same period.

The Municipality of Chatham-Kent experienced an average of 82 structure fires per year over the five year period from January 1, 2015 to December 31, 2019, representing an average of 12.4% of all fires that occurred in the Municipality. Over this same period, the Province experienced an average of 6,957 structure fires per year representing an average of 17.6% of all fires that occurred in the Province. Structure fires accounted for the highest percentage of total dollar loss for fires in the Municipality and in the Province.

Table 20: Structure Fires and Property Loss – Municipality of Chatham-Kent and Province of Ontario

Year	CK Structure Fires	CK Loss ($)	CK % All Fires	CK % All Loss ($)	Ontario Structure Fires	Ontario Loss ($)	Ontario % All Fires	Ontario % All Loss ($)
2015	90	$6,966,350	13.6%	15.6%	7,240	$658,957,595	13.5%	16.4%
2016	82	$6,389,400	12.4%	14.3%	7,169	$654,514,771	13.3%	16.3%
2017	76	$10,546,050	11.5%	23.7%	6,679	$657,580,390	12.4%	16.4%
2018	81	$6,569,702	12.3%	14.7%	7,000	$732,673,155	13.0%	18.3%
2019	79	$8,664,000	12.0%	19.4%	6,698	$860,026,206	12.5%	21.5%
Total for Structure Fires	**408**	**$39,135,502**	**61.8%**	**87.8%**	**34,786**	**$3,563,752,117**	**64.7%**	**88.9%**
Total for all Fire Loss	**660**	**$44,581,791**	**N/A**	**N/A**	**53,782**	**$4,007,872,935**	**N/A**	**N/A**
Average 2015-2019	81.6	$7,827,100.4	12.4	17.6	**6,957.2**	**$712,750,423.4**	**12.9%**	**17.8%**

Source: OFM Standard Incident Reporting (2015 to 2019 data).

Key Finding: Over the five year period from January 1, 2015 to December 31, 2019, the Municipality averaged 82 structure fires per year.

10.1.2 Fires by Occupancy Type

This section assesses the structure fires that occurred over the period from January 1, 2015 to December 31, 2019 based on the OBC occupancy type. OFM's Standard Incident Reporting data was utilized to inform this analysis.

The analysis in **Table 21** indicates that during this period, Chatham-Kent experienced a total of 408 structure fires, with 296 of these fires, or 72.5% occurring in Group C-Residential occupancies. These fires account for 56.9% of the Municipality's total fire loss for this period. In comparison, structure fires in Group C-Residential occupancies accounted for 73.2% of structure fires across the Province and 63.9% of all fire loss. Over this period, Chatham-Kent experienced a similar rate of fires in Group C-Residential occupancies than that of the Province and a 7.0% lower dollar loss in Group C-Residential occupancies.

The second most significant source of property loss in the Municipality, accounting for 9.3% of structure fires and 16.7% of structure fire loss over the same period, is Group F – Industrial occupancies (higher than the Provincial structure fire loss within this occupancy type by 4.3%).

Some of the trends within this historical fire loss reporting for the Municipality could be explained by the distribution of building stock by major occupancy classification within the Municipality. For example, as found within **Section 3.2.1 – Building Stock** of this CRA, 91.3%% of the property stock classified by the Ontario Building Code is Group C – Residential. It is therefore reasonable to expect that Group C would account for the highest proportion of structure fires.

Additionally, Group F – Industrial occupancies account for the third most predominant occupancy type within the Municipality, accounting for 2.8% of the property stock. Group F occupancies account for the second highest proportion of structure fires (9.3%).

Being a geographically large municipality with a strong agricultural base, structure fires within buildings classified within the National Farm Building Code accounts for 4.7% of structure fires (2.0% higher than the Province) and buildings not classified within the OBC accounts for 5.9% of structure fires (0.7% higher than the Province). This results in a total of 10.6% of structure fires over this period occurring in occupancies outside of an OBC classification.

Table 21: Fires by OBC Major Occupancy Classification – Municipality of Chatham-Kent and Province of Ontario

Group	Occupancy Classification	CK Fires	CK % of Structure Fires	CK Fire Loss ($)	CK % of Fire Loss	Ontario % of Structure Fires	Ontario % of Fire Loss
Group A	Assembly	11	2.7%	$2,756,000.0	7.0%	3.8%	4.9%
Group B	Care or Detention	2	0.5%	$10,500.0	0.0%	1.5%	1.5%
Group C	Residential	296	72.5%	$22,248,602.0	56.9%	73.2%	63.9%
Group D	Business and Personal Services	14	3.4%	$2,395,500.0	6.1%	2.5%	2.3%
Group E	Mercantile	4	1.0%	$2,652,000.0	6.8%	3.4%	5.6%
Group F	Industrial	38	9.3%	$6,527,900.0	16.7%	7.6%	12.4%
Other	Not Classified within the OBC	24	5.9%	$1,189,500.0	3.0%	5.2%	1.2%
Farm	Classified within the N.F.B.C.	19	4.7%	$1,355,500.0	3.5%	2.7%	8.1%
All Groups	**Total**	**408**	**100.0%**	**$39,135,502.0**	**100.0%**	**100.00%**	**100.0%**

Source: OFM Standard Incident Reporting (2015 to 2019 data)

Key Finding: Over the five year period from January 1, 2015 to December 31, 2019, structure fires occurring in Group F – Industrial occupancies account for 9.3% of total structure fires within the Municipality and 16.7% of total structure fire loss.

Key Finding: Over the five year period from January 1, 2015 to December 31, 2019, structure fires occurring in buildings classified within the National Farm Building Code and in other buildings not classified within the OBC, accounted for 10.6% of total structure fires.

10.1.3 Civilian Fire Fatalities and Injuries

As shown in **Table 22**, according to OFM Standard Incident Reporting, over the five year period from January 1, 2015 to December 31, 2019, there were five reported injuries and three reported fire fatalities within the Municipality of Chatham-Kent. All three fatalities and the majority of injuries within the Municipality occurred in Group C – Residential occupancies. This finding is consistent with the fire loss statistics by occupancy type, whereby the majority of fire losses within the Province and within the Municipality occurred in Group C – Residential occupancies.

Table 22: Civilian Fire Fatalities and Injuries by OBC Major Occupancy Classification - Municipality of Chatham-Kent

Group	Occupancy Classification	2015 to 2019 Injuries	2015 to 2019 Fatalities
Group A	Assembly	0	0
Group B	Care or Detention	0	0
Group C	Residential	4	3
Group D	Business and Personal services	1	0
Group E	Mercantile	0	0
Group F	Industrial	0	0
Other	Not Classified within the OBC	0	0
Farm	Classified within the NFBC	0	0
Total	**Total Occupancy Classifications**	**5**	**3**

Source: OFM Standard Incident Reporting (2015 to 2019 data)

Identified Risk: All reported fire fatalities (3) and the majority of fire related civilian injuries (5) occurred in Group C – Residential occupancies.

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.”[50] 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 23 presents the reported fire causes for the Municipality compared to the Province over the five year period from January 1, 2015 to December 31, 2019.

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 23**, 9.3% of the fires reported as intentional (i.e. combined categories of arson and vandalism) within the Municipality over the five year period from January 1, 2015 to December 31, 2019 is slightly higher than the Provincial total of intentional fires (7.7%).

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 58.8% of the cause for the 408 fires during this period (compared to 68.0% within the Province). The leading cause of unintentionally set fires in Chatham-Kent occurred due to misuse of ignition source at 25.7% (105 fires), compared to 29.9% in the Province, followed by mechanical/electrical failure at 15.2% (62 fires), compared to 15.4% in the Province.

In Chatham-Kent, the cause of 26.5% of fires was ‘undetermined’, 7.8% higher than the Province.

[50] Source: N.F.P.A., Glossary of Terms, 2019 Edition.

Table 23: Reported Fire Cause – Municipality of Chatham-Kent and Province of Ontario

Nature	Fire Cause	CK # of Fires	CK % of Fires	Ontario # of Fires	Ontario % of Fires
Intentional	Arson	33	8.1%	2,086	6.0%
Intentional	Vandalism	5	1.2%	591	1.7%
Intentional	Other Intentional	0	0.0%	14	0.0%
Unintentional	Children Playing	3	0.7%	147	0.4%
Un intentional	Design/Construction/Maintenance Deficiency	29	7.1%	2,494	7.2%
Unintentional	Mechanical/Electrical Failure	62	15.2%	5,367	15.4%
Unintentional	Misuse of Ignition Source	105	25.7%	10,386	29.9%
Unintentional	Other Unintentional	16	3.9%	2,444	7.0%
Unintentional	Undetermined	25	6.1%	2,781	8.0%
Unintentional	Vehicle Collision	0	0.0%	30	0.1%
Other	Other	22	5.4%	1,865	5.4%
Undetermined	Undetermined	108	26.5%	6,507	18.7%
Unknown, not reported	Unknown, not reported	**0**	**0.0%**	74	0.2%
Total	**Total Fire Causes**	**408**	**100.0%**	**34,786**	**100.0%**

Source: OFM Standard Incident Reporting (2015 to 2019 data)

Identified Risk: Of the fires occurring in the Municipality over the five year period from January 1, 2015 to December 31, 2019, the leading cause of unintentionally set fires was due to misuse of ignition source at 25.7% (105 fires), compared to 29.9% in the Province.

Identified Risk: Of the fires occurring in the Municipality over the five year period from January 1, 2015 to December 31, 2019, the second most common cause of unintentionally set fires was due to mechanical/electrical failure at 15.2% (62 fires), compared to 15.4% in the Province.

Key Finding: Of the fires occurring in the Municipality over the five year period from January 1, 2015 to December 31, 2019, the cause of 26.5% of fires was 'undetermined', 7.8% higher than 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."[51] **Table 24** provides fire loss by source of ignition for the Municipality of Chatham-Kent and the Province.

For the period January 1, 2015 to December 31, 2019, the most common reported ignition sources within the Municipality are "cooking equipment" at 12.5% (lower than the Province by 4.8%), miscellaneous at 10.5% (higher than the Province by 0.6%), and "open flame tools/smokers' articles" at 8.6% (lower than the Province by 5.4%). This presents the opportunity to incorporate key messages relating to cooking and smoking in public education materials.

Of note, the ignition source for 34.3% of structure fires was "undetermined", higher than the Province by 10.9%.

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

Table 24: Source of Ignition - Municipality of Chatham-Kent and Province of Ontario

Reported Ignition Source	Municipality of Chatham-Kent (2015 to 2019) # of Fires	Municipality of Chatham-Kent (2015 to 2019) % of Fires	Province of Ontario (2015 to 2019) # of Fires	Province of Ontario (2015 to 2019) % of Fires
Appliances	19	4.7%	1,591	4.6%
Cooking Equipment	51	12.5%	6,013	17.3%
Electrical Distribution	33	8.1%	3,072	8.8%
Heating Equipment, chimney etc.	33	8.1%	2,687	7.7%
Lighting Equipment	4	1.0%	1,099	3.2%
Open flame tools/smokers articles	35	8.6%	4,857	14.0%
Other electrical/mechanical	21	5.1%	1,727	5.0%
Processing Equipment	9	2.2%	453	1.3%
Miscellaneous	43	10.5%	3,443	9.9%
Exposure	20	4.9%	1,612	4.6%
Undetermined	140	34.3%	8,149	23.4%
Unknown, not reported	**0**	**0.0%**	83	0.2%
Total	**408**	**100.0%**	**34,786**	**100.0%**

Source: OFM Standard Incident Reporting (2015 to 2019 data)

Key Finding: Of the fires occurring in the Municipality over the five year period from January 1, 2015 to December 31, 2019, 12.5% of fires had a reported ignition source of cooking equipment, which is 4.8% lower than the Province (17.3%).

Key Finding: Of the fires occurring in the Municipality over the five year period from January 1, 2015 to December 31, 2019, 10.5% of fires had a reported ignition source of miscellaneous, which is 0.6% higher than the Province (9.9%).

Key Finding: Of the fires occurring in the Municipality over the five year period from January 1, 2015 to December 31, 2019, 8.6% of fires had a reported ignition source of open flame tools/smokers articles, which is 5.4% lower than the Province (14.0%).

Key Finding: Of the fires occurring in the Municipality over the five year period from January 1, 2015 to December 31, 2019, the ignition source for 34.3% of fires was undetermined, 10.9% higher than the Province (24.4%).

10.1.6 Smoke Alarm Status Processing Equipment

Smoke alarms are required in Ontario on every level of a dwelling and between sleeping areas, notifying building occupants of a fire and allowing for prompt escape. 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 publicly 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 Municipality of Chatham-Kent and the Province of Ontario over a five year period from January 1, 2015 to December 31, 2019 for Group C - Residential occupancies. **Table 25** highlights whether a smoke alarm was present and operating on the floor or in the suite of fire origin.

Table 25: Smoke Alarm Presence and Operation on the Floor of Fire Origin - Municipality of Chatham-Kent and Province of Ontario

Smoke Alarm Status on Floor of Origin	Chatham-Kent 2015	Chatham-Kent 2016	Chatham-Kent 2017	Chatham-Kent 2018	Chatham-Kent 2019	Chatham-Kent Total (2015-2019)	Chatham-Kent % (2015-2019)	Ontario Total (2015-2019)	Ontario % (2015-2019)
No Smoke Alarm Present	21	12	9	11	12	**65**	**23.0%**	**4,223**	**17.3%**
Smoke Alarm Present and Operated	20	25	25	26	19	**115**	**40.8%**	**11,052**	**45.3%**
Smoke Alarm Present, Did Not Operate	10	0	5	6	4	**25**	**8.9%**	**3,260**	**13.4%**
Smoke Alarm Present, Operation Undetermined	5	7	4	6	5	**27**	**9.6%**	**1,877**	**7.7%**
Smoke Alarm Presence Undetermined	11	12	7	10	10	**50**	**17.7%**	**3,983**	**16.3%**
Total	**67**	**56**	**50**	**59**	**50**	**282**	**100.0%**	**24,395**	**100.0%**

Source: OFM

Over the five year period from January 1, 2015 to December 31, 2019, there was no smoke alarm present for 23.0% of occurrences in the Municipality compared to 17.3% in the Province. A further 25 incidents (or 8.9%) had a smoke alarm present but it did not operate (compared to 13.4% in the Province). In Chatham-Kent, in 40.8% of occurrences, a smoke alarm was present and operated. Smoke alarm presence or operation combined was undetermined in 27.3% of instances in the Municipality.

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. The CKFES fire prevention strategy includes the CHIRP (Chatham-Kent, Homes, Informed, Ready & Protected) program which provides free home alarm checks to residents. This program will be discussed in greater detail in the Fire Master Plan.

Key Finding: Over the five year period from January 1, 2015 to December 31, 2019, of the fire loss incidents in Group C – Residential occupancies, 23.0% of incidents did not have a smoke alarm present (compared to 17.3% in the Province).

Key Finding: Over the five year period from January 1, 2015 to December 31, 2019, of the fire loss incidents in Group C – Residential occupancies, 40.8% of incidents had a smoke alarm present and operating compared to 45.3% in the Province.

10.2 Event History

Event history seeks to apply the CKFES's historic emergency call data to develop an understanding of community risk. The CKFES provided the data used in this analysis for all historical calls for the five year period from January 1, 2015 to December 31, 2019. This section provides a statistical assessment of historic emergency call volumes for the Municipality 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 OFM 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. Data for 2020 for the Province as a whole is not currently available from OFM and therefore, the data used in this analysis is for January 1, 2015 to December 31, 2019.

The volume and frequency of historic calls informs the understanding of response probability. The types of calls inform the potential consequences of CKFES 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 Analysis

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 the CKFES for the time period from January 1, 2015 to December 31, 2019.[52]

[52] The data used for the analysis is a compilation of each of the 5 years (2015-2019) of unit response time 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 It should also be noted that calls from stations outside of Chatham-Kent were excluded from the analysis. Similarly, all calls with either no response type code were excluded from response type analyses.

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 1, 2015 to December 31, 2019 is shown in **Figure 16**. This analysis indicates an increase in the total emergency call volume within the Municipality over this period from 2,582 calls in 2015 to 3,132 calls in 2019. In total, the department responded to 14,738 calls in total during this five year timeframe. While there has been fluctuation in call volume, this represents a total increase of 21.3% over this five year period with an average of 2,948 calls per year.

Figure 16: Annual Call Volume – All Incidents January 1, 2015 to December 31, 2019

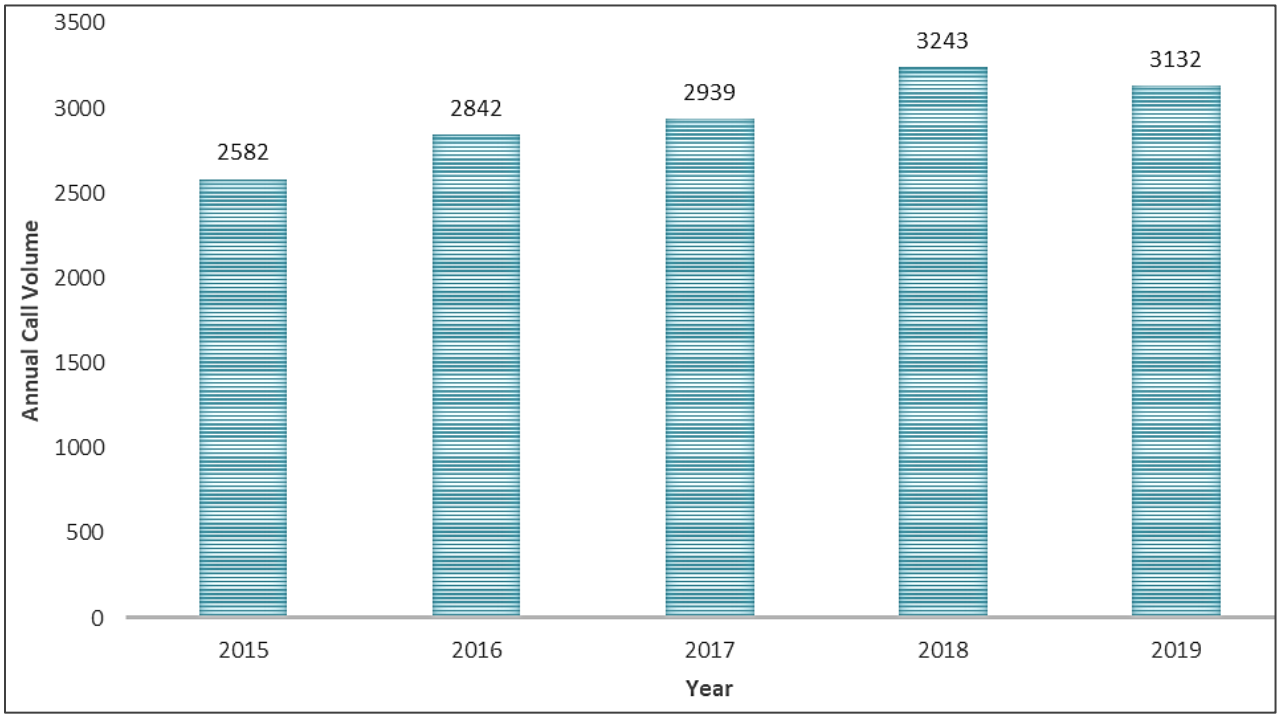


Figure Source: Chatham-Kent Fire Department Emergency Response Call Data

Key Finding: Over the period from January 1, 2015 to December 31, 2019 the volume of emergency calls responded to by CKFES increased by 21.3%.

10.2.1.2 Monthly Average Emergency Call Volume – All Incident Types

The analysis of average emergency call volume for the period from January 1, 2015 to December 31, 2019 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 17 illustrates an average monthly emergency call volume of 246 calls with the highest percentage of emergency calls occurring from May to October.

Figure 17: Average Call Volume by Month – All Incidents January 1, 2015 to December 31, 2019

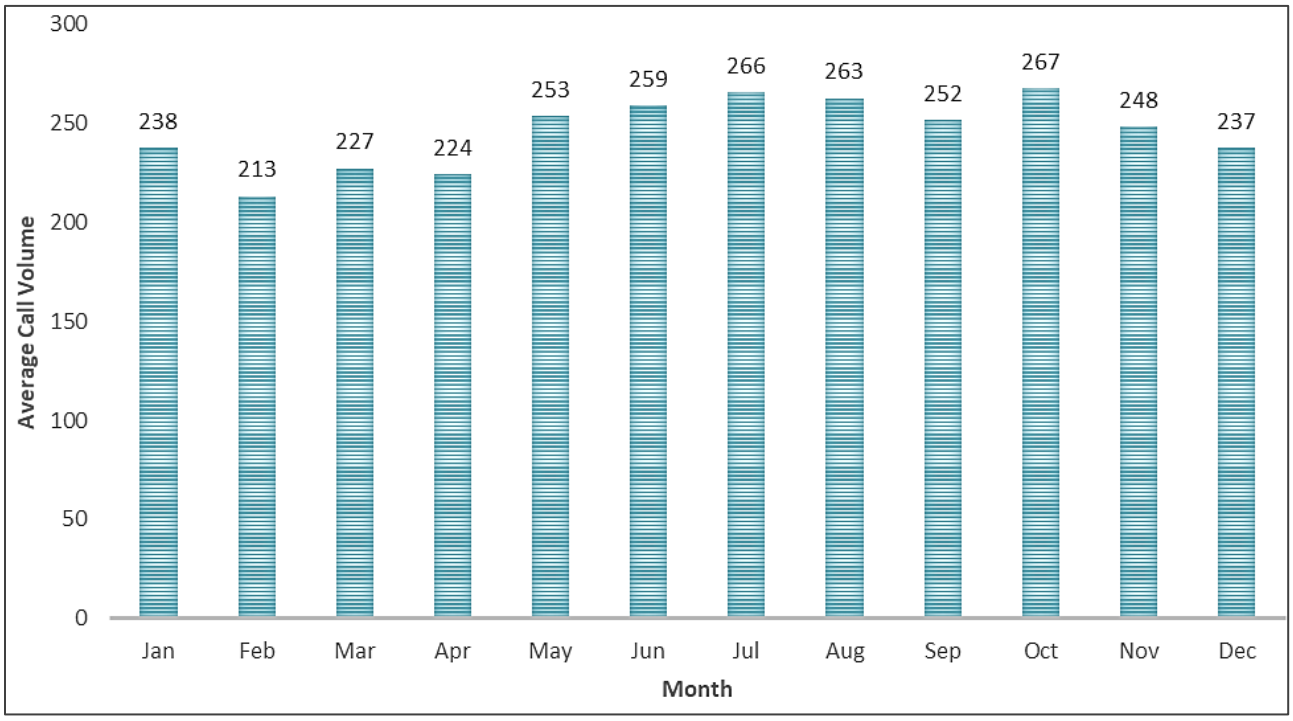


Figure Source: Chatham-Kent Fire Department Emergency Response Call Data

10.2.1.3 Weekly Average Emergency Call Volume – All Incident Types

The analysis of average call volume for the period from January 1, 2015 to December 31, 2019 by day of the week as shown in **Figure 18** illustrates that on average, the highest number of emergency call volume occurs on Mondays, while the lowest emergency call volume occurs on Sundays.

Figure 18: Average Call Volume by Day of Week – All Incidents January 1, 2015 to December 31, 2019

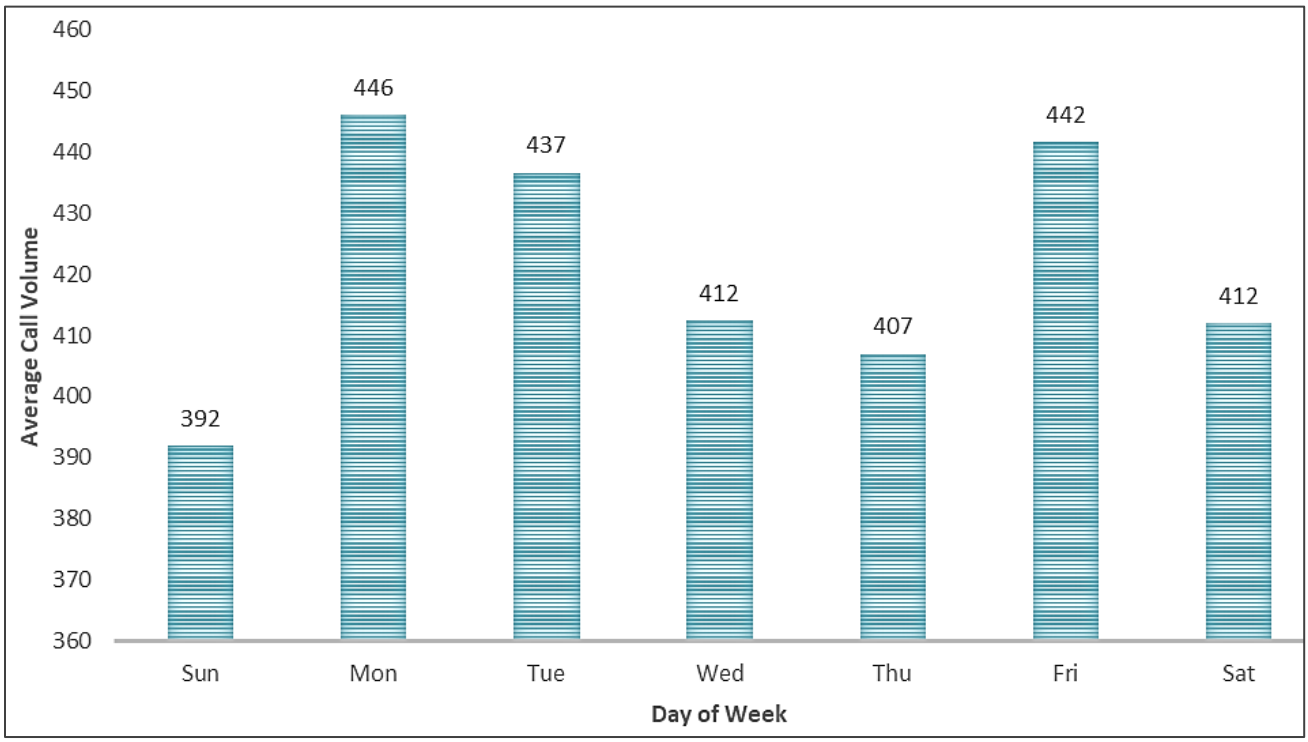


Figure Source: Chatham-Kent Fire Department Emergency Response Call Data

10.2.1.4 Daily Emergency Call Volume – All Incident Types

Figure 19 indicates that for the period from January 1, 2015 to December 31, 2019 a higher emergency call volume is typically experienced between 8 AM and 11 PM The lowest percentage of emergency call volume typically takes place between the hours of 12 AM and 7 AM This trend can be directly associated to when the majority of the population is typically sleeping.

Figure 19: Average Call Volume by Time of Day – All Incidents January 1, 2015 to December 31, 2019

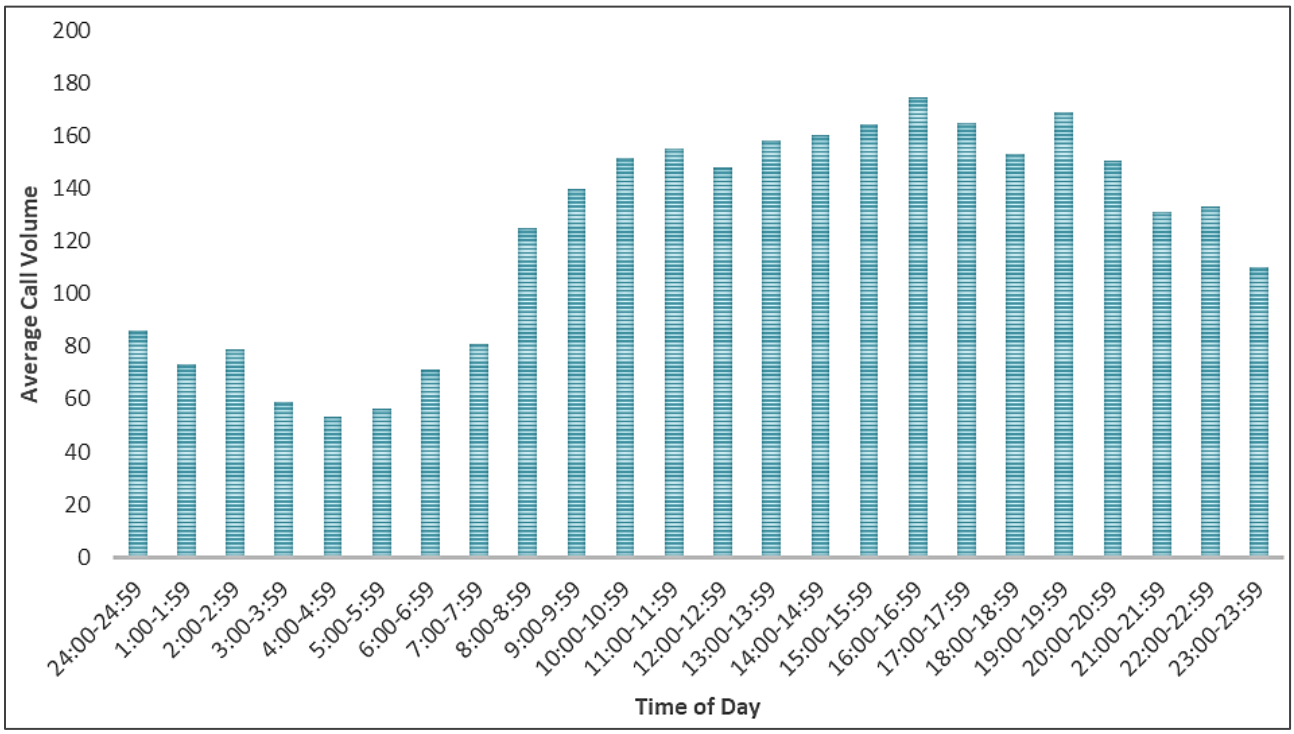
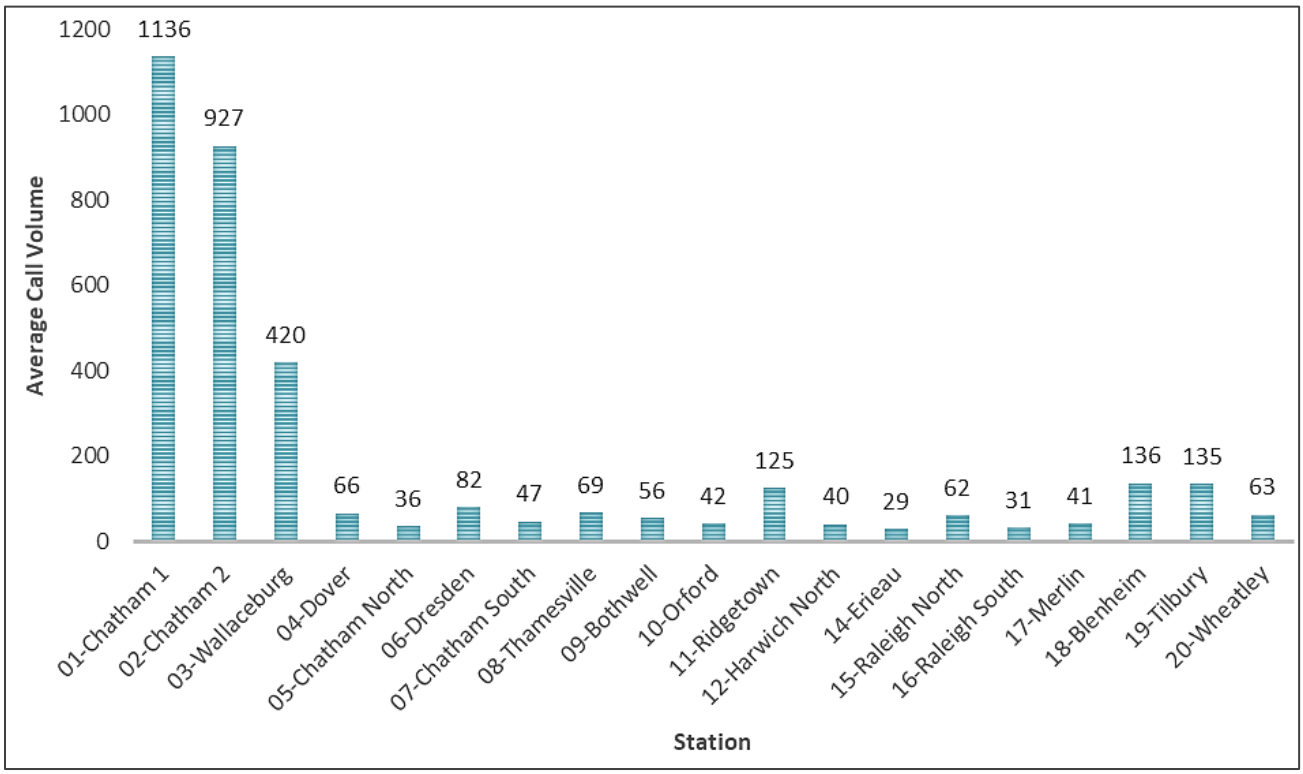


Figure Source: Chatham-Kent Fire Department Emergency Response Call Data

10.2.1.5 Average Emergency Call Volume by Station – All Incident Types

The analysis of average emergency call volume by station for the period from January 1, 2015 to December 31, 2019 is shown in **Figure 20**. This illustrates that the stations in Chatham and Wallaceburg (Stations 1, 2, and 3) have the highest average call volume. Of the remaining 16 stations, 13 of them have fewer than 100 emergency calls per year on average.

Figure 20: Average Call Volume by Station – All Incidents January 1, 2015 to December 31, 2019



10.2.1.6 Total Emergency Call Volume by OFM Response Type

This section illustrates the analysis of all emergency call volume for the Municipality of Chatham-Kent and the Province of Ontario for the period from January 1, 2015 to December 31, 2019 by OFM emergency response type.

Figure 21 illustrates that during this period, 32.8% of the total emergency calls that CKFES responded to were medical/resuscitator incidents (lower than the Province by 10.2%). Responding to false fire calls was the second highest percentage of total emergency calls representing 16.5% of the fire services' total emergency call volume (slightly higher than the Province by only 0.4%). Rescue calls represent the third highest percentage of emergency call volume responded to by CKFES at 14.2% (higher than the Province by 3.1%).

This comparison shows that for the same period, response to incidents involving a property fire/explosion account for 8.3% of total call volume in Chatham-Kent, which is higher than the Province by 4.4%. Further analysis of property fire/explosion calls is provided in **Table 26**.

Figure 21: Percentage of CKFES Calls by OFM Response Type January 1, 2015 to December 31, 2019

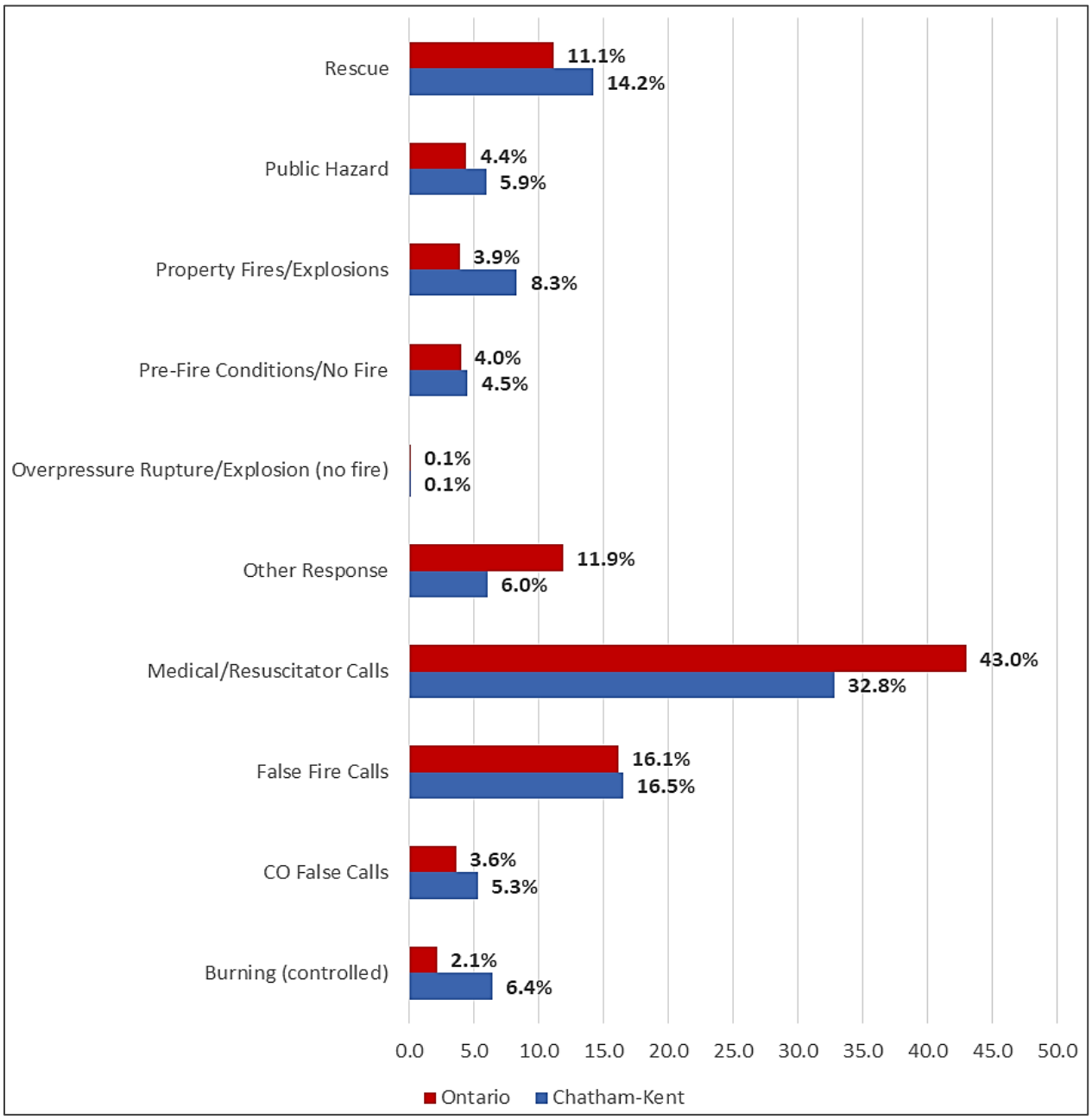


Figure Source: Office of the Fire Marshal and Emergency Management, Municipal Emergency Calls by Response Type Class

Key Finding: For the period from January 1, 2015 to December 31, 2019 the highest percentage of emergency call volume responded to by CKFES as defined by the OFM response types was medical/resuscitator calls representing 32.8% of total emergency call volume.

Key Finding: For the period from January 1, 2015 to December 31, 2019 the second highest percentage of emergency call volume responded to by CKFES as defined by the OFM response types was false fire calls representing 16.5% of total emergency call volume.

Key Finding: For the period from January 1, 2015 to December 31, 2019 the third highest percentage of emergency call volume responded to by CKFES as defined by the OFM response types was rescue calls representing 14.2% of total emergency call volume.

Property Fires/Explosions Response Types

As shown in **Table 26**, there are five categories that contribute to property fires/explosion response call volume; 'loss fire structure', 'loss fire other', 'loss fire vehicle', 'no loss fire' and 'no loss fire excluded'. Chatham-Kent exceeds the Provincial percentage in each of these five categories. 'Loss fire structure' and 'no loss fire excluded' contribute significantly to the total % of property fires/explosions calls. 'No loss fires excluded' account for 2.0% of total call volume and account for fires that occurred outdoors only with no injury, no fatality and $0 loss reported. This analysis and further investigation into the cause of outdoor no loss fires can help inform areas for targeted public education and fire prevention.

Table 26: Property Fires/Explosion Call Breakdown

Property Fire/Explosion Call Category	Chatham Kent # of calls (2015-2019)	Chatham Kent % of calls (2015-2019)	Ontario # of calls (2015-2019)	Ontario % of calls (2015-2019)	% Difference
Loss Fire* Structure	408	2.9%	34,793	1.4%	+1.5%
Loss Fire Other	32	0.2%	3,790	0.1%	+0.1%
Loss Fire Vehicle	220	1.5%	15,213	0.6%	+0.9%
No Loss Fire**	244	1.7%	10,542	0.4%	+1.3%
No Loss Fire EXCLUDED***	280	2.0%	35,021	1.4%	+0.6%
Total Property Fire/Explosion calls (2015-2019)	**1,184**	**8.3%**	**99,359**	**3.9%**	**+4.4%**
Total Calls – All Response Types (2015-2019)	**14,294**	**N/A**	**2,566,602**	**N/A**	**N/A**

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

*Loss fires are defined as fires where an injury, fatality or $ loss is reported (structure/vehicle/outdoor)

**No loss fires are defined as fires with no injury, no fatality and $0 loss reported (structure/vehicle/outdoor)

***No loss fire EXCLUDED: (OFM response code 3) No Loss fire occurring Outdoors only that did not occur in a dump/ recycling facility AND was not caused by arson/vandalism/children playing

Key Finding: For the period from January 1, 2015 to December 31, 2019, 8.3% of CKFES Calls by OFM Response Type were Property Fire/Explosions. Of these calls, 2.9% were loss structure fires and 3.7% were no loss fires.

Rescue Response Types

Rescue calls account for 14.2% of total emergency call volume. **Table 27** presents an overview of breakdown of rescue incidents that CKFES responded to from January 1st, 2015 to December 31st, 2019 based on OFM Municipal Emergency Calls by Response Type Class.

This analysis indicates that 92.0% of the rescue incidents responded to by CKFES were related to responding to vehicle collisions. CKFES experienced a total of 14,738 emergency calls during this five year period, of which 1,872 calls pertain to motor-vehicle related incidents including vehicle collisions (1,728) and vehicle extrications (144) therefore accounting for approximately 12.7% of total call volume.

As shown in **Table 27,** the percentage of calls related to motor vehicle accidents and extrication responded to by CKFES are higher than the Province by 6.7%. CKFES has also historically as a higher proportion of Water Ice Rescue and Water Rescue calls (2.8%) as compared to the Province (1.1%).

Table 27: Breakdown of Rescue Response Types (OFM SIR 2015 to 2019)

Rescue Type	Chatham-Kent # of Rescue Calls	Chatham-Kent % of Rescue Calls	Ontario # of Rescue Calls	Ontario % of Rescue Calls
Animal Rescue	3	0.1%	1,258	0.4%
Building Collapse	2	0.1%	179	0.1%
Commercial/Industrial Accident	5	0.2%	653	0.2%
Confined Space rescue (non-fire)	2	0.1%	82	0.0%
High Angle Rescue (non-fire)	3	0.1%	453	0.2%
Home/Residential Accident	6	0.3%	1,696	0.6%
Low Angle Rescue (non-fire)	2	0.1%	333	0.1%
Other Rescue	22	1.1%	5,271	1.9%
Persons Trapped in Elevator	44	2.2%	24,075	8.5%
Rescue False Alarm	3	0.1%	1,302	0.5%
Rescue No Action Required	14	0.7%	3,247	1.1%
Trench Rescue (non-fire)	0	0.0%	53	0.0%
Vehicle Collision	1,728	84.9%	232,297	81.6%
Vehicle Extraction	144	7.1%	10,471	3.7%
Water Ice Rescue	11	0.5%	755	0.3%
Water Rescue	46	2.3%	2,412	0.8%
Total	**2,035**	**100.0%**	**284,537**	**100.0%**

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

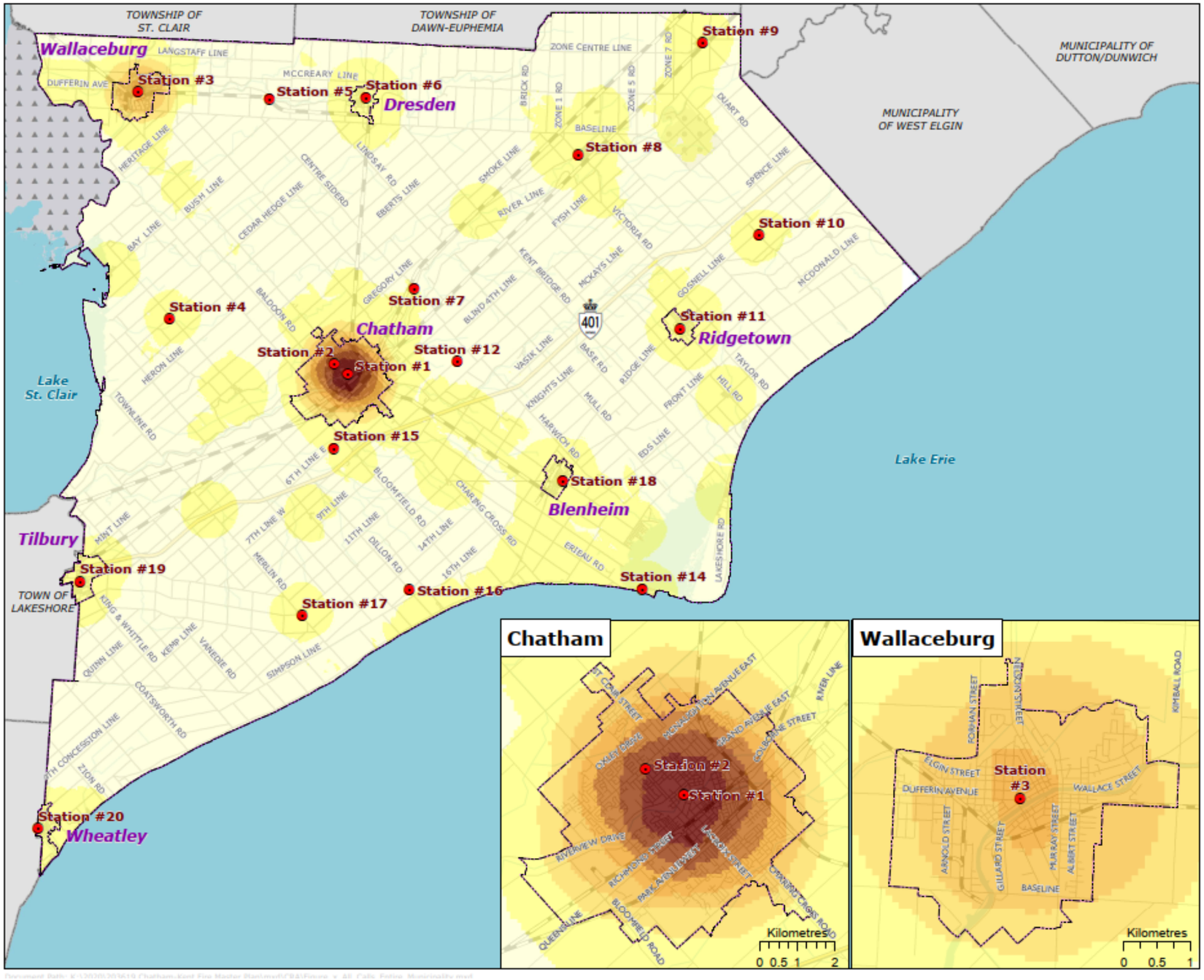
10.2.2 Emergency Call Volume – Mapping

The analysis within this section illustrates the distribution of the emergency call volume for the period from January 1, 2015 to December 31, 2019 using CKFES historic emergency call data of which 71% of the total historic calls (approximately 20,000) were successfully geocoded and analyzed in GIS (geographic information systems). The analysis includes the spatial distribution of select emergency incident types using a point density analysis tool in ArcMap.

10.2.2.1 Spatial Modelling – All Emergency Incidents

Figure 22 illustrates where higher concentrations of all emergency incidents have occurred over the five year period. This analysis further demonstrates the higher concentration of emergency incidents in the areas of Chatham and Wallaceburg, which is consistent with the station workload analysis (**Figure 20).**

Figure 22: Spatial Concentration – All Emergency Incidents



Chatham-Kent

COMMUNITY RISK ASSESSMENT

DENSITY OF ALL CALLS
ENTIRE MUNICPALITY
FIGURE 22

- Fire Station
- Railway
- Highway 401
- Road
- Primary Urban Area
- Municipal Boundary of Chatham-Kent
- Moravian 47 First Nations Reserve
- Walpole Island 46 First Nations Reserve

Density of Calls

- 0
- 1 - 36
- 37 - 86
- 87 - 141
- 142 - 203
- 204 - 271
- 272 - 343
- 344 - 431

DATA PROVIDED BY THE MUNICIPALITY OF CHATHAM-KENT, MNRF, STATISTICS CANADA (2016)

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

Kilometres
0 5 10

1:275,000

N W E S

Municipality of Chatham-Kent
Information Technology Services
315 King Street West
Ph: 519 360 1998
Fax: 519 436 3227
Toll Free: 1 800 714 7497

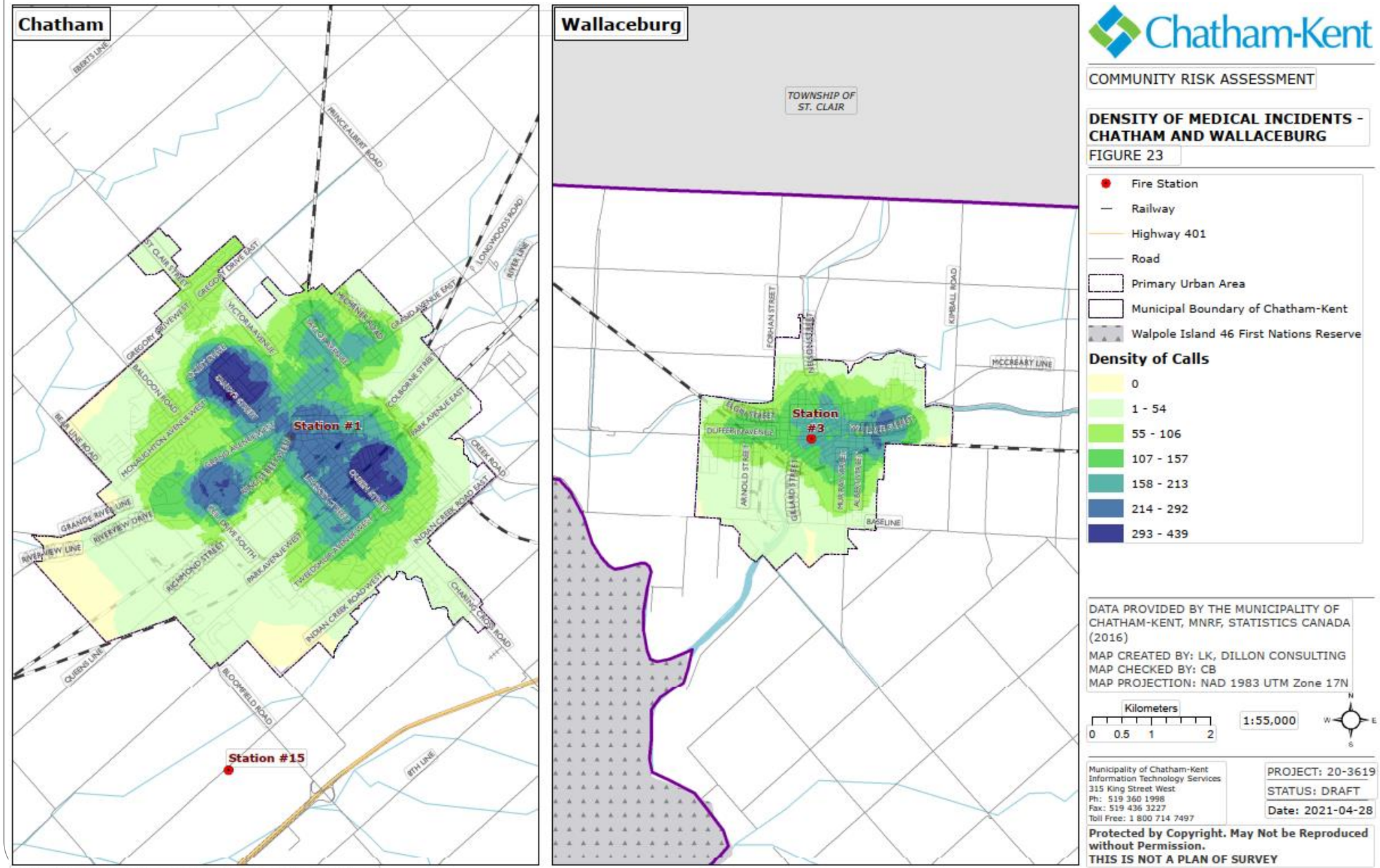
PROJECT: 20-3619
STATUS: DRAFT
Date: 2021-04-29

In order to provide more refined analysis on the distribution of calls, the criteria for the point density analysis was amended to allow for a focused analysis of the historic calls in the Primary Urban Areas of Chatham and Wallaceburg. The following analyses by response type is therefore focused on these two communities.

10.2.2.2 Spatial Modelling – Medical/Resuscitator Incidents

Figure 23 illustrates the spatial concentration of medical/resuscitator over this period for Chatham and Wallaceburg. The highest concentration of calls in Chatham can be found in the area of Park Avenue East (east of Queen Street) and around the intersection of McNaughton Avenue West and Sandys Street.

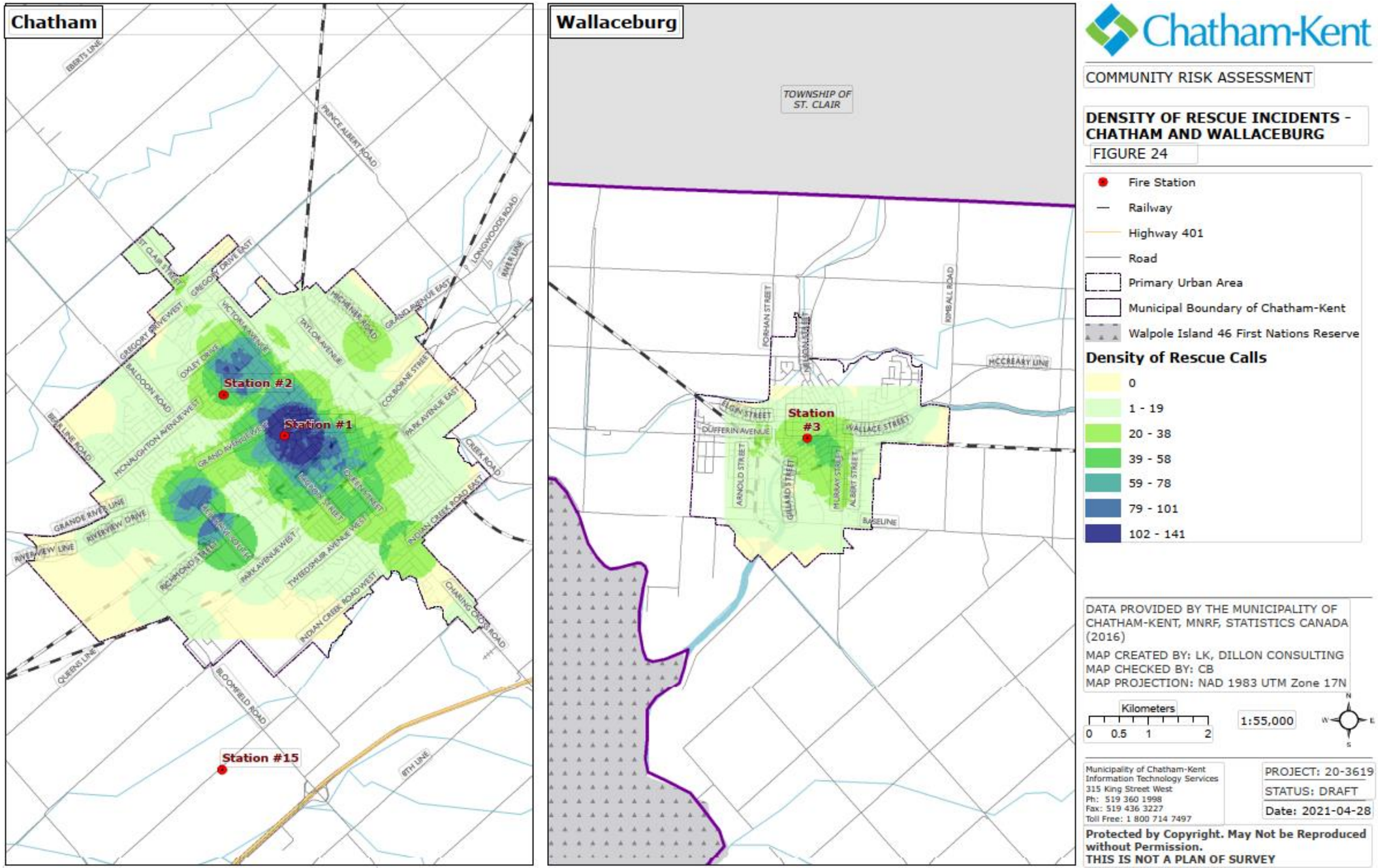
Figure 23: Density of Medical Incidents - Chatham and Wallaceburg



10.2.2.3 Spatial Modelling – Rescue Incidents

Figure 24 illustrates the distribution of the historical rescue incidents over this period Chatham and Wallaceburg. Within Chatham, a higher concentration of rescue incidents has historically occurred in the vicinity of Station 1 and the downtown. In Wallaceburg they occur in the vicinity of Gillard Street and Hebert Street.

Figure 24: Density of Rescue Incidents - Chatham and Wallaceburg



Chatham-Kent

COMMUNITY RISK ASSESSMENT

DENSITY OF RESCUE INCIDENTS - CHATHAM AND WALLACEBURG

FIGURE 24

- Fire Station
- Railway
- Highway 401
- Road
- Primary Urban Area
- Municipal Boundary of Chatham-Kent
- Walpole Island 46 First Nations Reserve

Density of Rescue Calls

- 0
- 1 - 19
- 20 - 38
- 39 - 58
- 59 - 78
- 79 - 101
- 102 - 141

DATA PROVIDED BY THE MUNICIPALITY OF CHATHAM-KENT, MNRF, STATISTICS CANADA (2016)

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

Kilometers
0 0.5 1 2

1:55,000

N W E S

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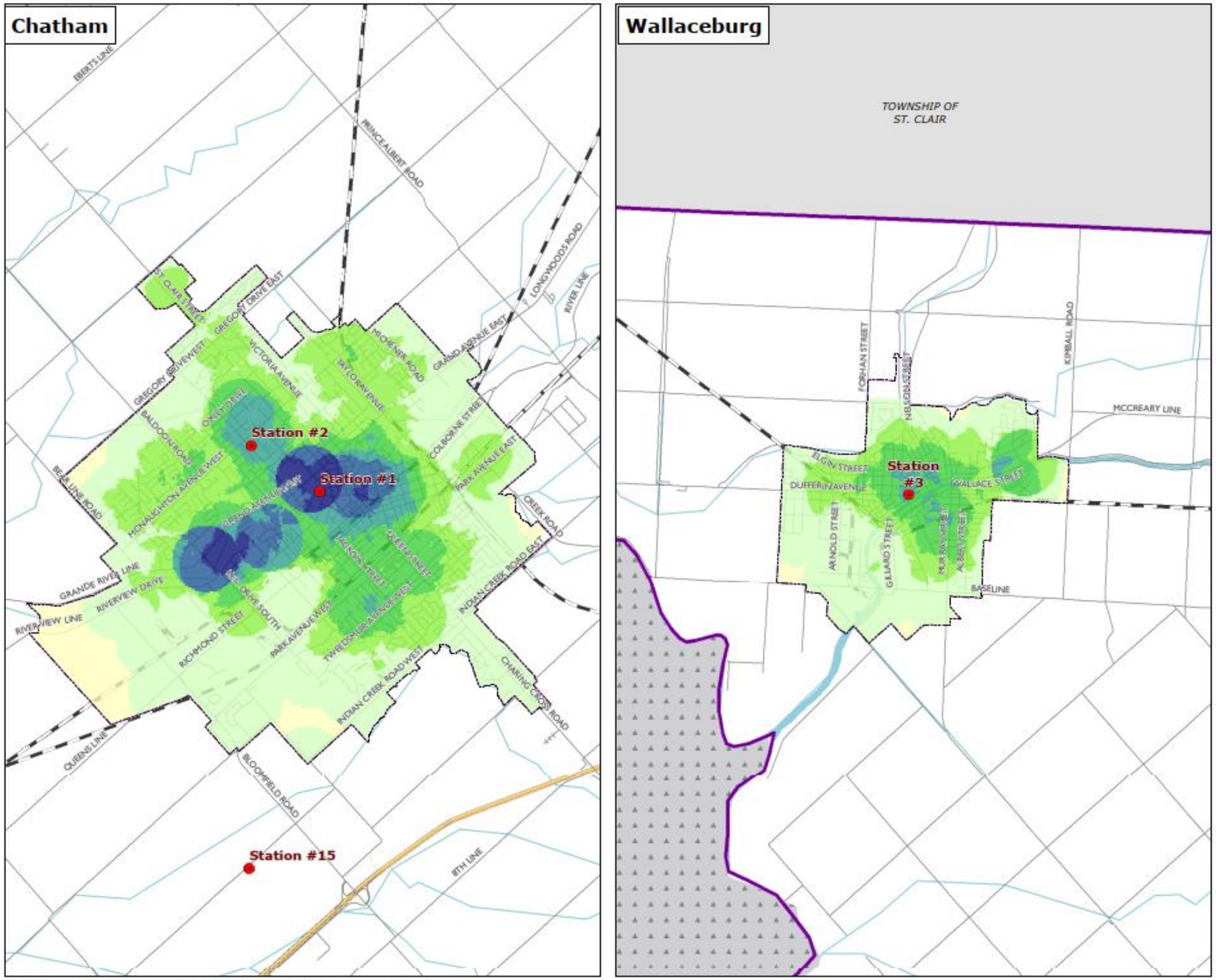
PROJECT: 20-3619
STATUS: DRAFT
Date: 2021-04-28

10.2.2.4 Spatial Modelling – False Fire and C.O. False Call Incidents

Figure 25 illustrates the historical concentration of false fire calls and C.O. false calls during the Chatham and Wallaceburg. The highest concentration in Chatham can be found in the downtown around Station 1. The concertation in Wallaceburg is found in a few smaller areas.

Figure 25: Density of False Fire and CO False Incidents - Chatham and Wallaceburg



Chatham-Kent

COMMUNITY RISK ASSESSMENT

DENSITY OF FALSE FIRE AND FALSE CO INCIDENTS - CHATHAM AND WALLACEBURG

FIGURE 25

- Fire Station
- Railway
- Highway 401
- Road
- Primary Urban Area
- Municipal Boundary of Chatham-Kent
- Walpole Island 46 First Nations Reserve

Density of Calls

DATA PROVIDED BY THE MUNICIPALITY OF CHATHAM-KENT, MNRF, STATISTICS CANADA (2016)

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

Kilometers
0 0.5 1 2

1:55,000

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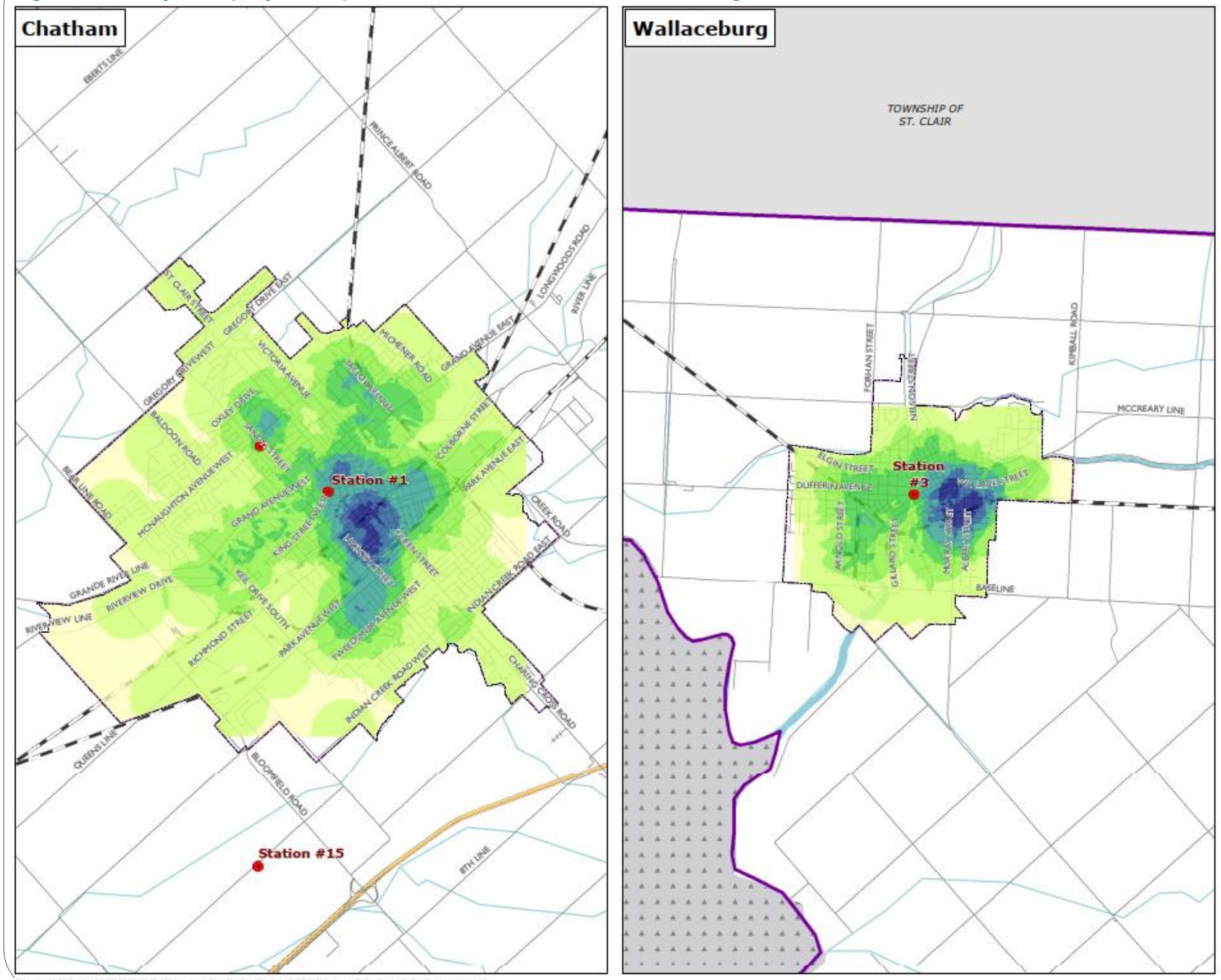
PROJECT: 20-3619
STATUS: DRAFT
Date: 2021-04-28

10.2.2.5 Spatial Modelling – Property Fire/Explosion Incidents

Figure 26 illustrates the concentration of property fire/explosion incidents Chatham and Wallaceburg. Chatham has a higher concentration of property fire/explosion incidents south of the downtown between Colborne Street, Queen Street, Park Avenue East, and Lacroix Street. In Wallaceburg, a higher concentration is found in the vicinity of Murray Street and Wallace Street.

Figure 26: Density of Property Fire/Explosion Incidents – Chatham and Wallaceburg



Chatham-Kent

COMMUNITY RISK ASSESSMENT

DENSITY OF PROPERTY FIRE / EXPLOSIONS INCIDENTS - CHATHAM AND WALLACEBURG

FIGURE 26

- Fire Station
- Railway
- Highway 401
- Road
- Primary Urban Area
- Municipal Boundary of Chatham-Kent
- Walpole Island 46 First Nations Reserve

Density of Calls per Sq Km

- 0
- 1 - 8
- 9 - 17
- 18 - 26
- 27 - 36
- 37 - 45
- 46 - 59

DATA PROVIDED BY THE MUNICIPALITY OF CHATHAM-KENT, MNRF, STATISTICS CANADA (2016)

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

Kilometers
0 0.5 1 2

1:55,000

N W E S

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Toll Free: 1 800 714 7497

PROJECT: 20-3619
STATUS: DRAFT
Date: 2021-04-28

10.2.2.6 Event History Mapping Summary

The spatial analysis of the historical emergency call volume for the period from January 1st, 2015 to December 31st, 2019 in Chatham and Wallaceburg indicates that while there is a concentration of calls by call type in the downtown area of these communities, there is also variation in the distribution of historic emergency calls depending on the type of incident.

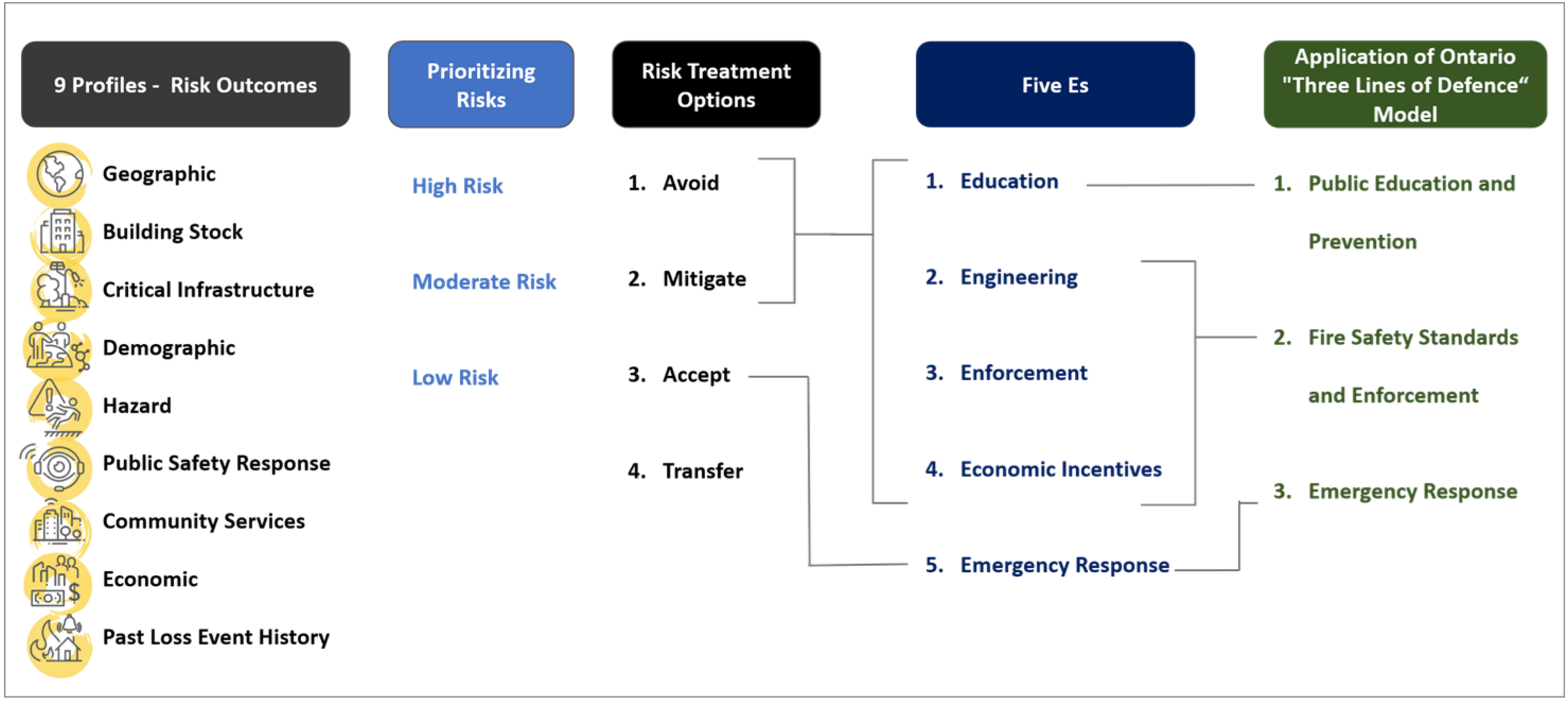
Key Finding: For the period from January 1st, 2015 to December 31st, 2019 there is a concentration of calls by call type in the downtown area of these communities, there is also variation in the location of higher concentration of historic calls in Chatham and Wallaceburg depending on the type of call.

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 FMP. 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 FMP. They are taken through a risk treatment process and aligned with the "Five E's" of Community Risk Reduction and three lines of defence in order to inform the analysis and recommendations within the Fire Master Plan as shown in **Figure 27**.

Figure 27: Risk Conclusions Application Process



11.1 Prioritizing Risks

NFPA 1300 and OFM TG-02-2019 identify that risks can be prioritized based on probability and consequence. 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. These risk levels will then be used to assist in the prioritization of risks as part of the Fire Master Plan.

11.1.1 Risk Assignment Process Overview

The risk assignment methodology used as part of this CRA is informed by the OFM Technical Guideline (T.G.)-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 OFM TG-02-2019 Community Risk Assessment Guideline. **Table 28** presents the probability levels and the descriptions.

Table 28: Probability Levels

Likelihood Category	Numerical Value	Description
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

Source: OFM TG-02-2019 Community Risk Assessment Guideline

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; and
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 29 presents the consequence levels.

Table 29: 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

Source: OFM TG-02-2019 Community Risk Assessment Guideline

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. **Figure 28** shows the risk matrix for this CRA.

Figure 28: Risk Matrix

Probability \ Consequence		Insignificant	Minor	Moderate	Major	Catastrophic
		1	10	100	1,000	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 30**. Where possible, quantitative data was used to inform the risk assignment as described 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”.[53] Similarly, OFM 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 OFM 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.

[53] Source: OFM T.G.-02-2019 Community Risk Assessment Guideline, p.12

Table 30: Risk Assignment

Identified Risk	Probability Level	Rationale	Consequence Level	Rationale	Risk Level
There is one ingress and egress route for the community of Erieau (Erieau Road). Closure of Erieau Road due to flooding or other incidents has the potential to reduce the connectivity of the road network to this area resulting in potential impacts on emergency response capabilities. **(Geographic Profile)**	Rare	• Waterways in Chatham-Kent include Lake Erie to the south, Lake St. Clair to the east and the Thames and Sydenham Rivers which run through it (Geographic) • Flooding identified as one of the municipality's top hazards. (Hazard)	Major/Catastrophic	• Potential for extended emergency response travel time • Potential for risk to life safety of occupants if increase in the number of vehicles on the road leads to motor vehicle accidents • Potential risk for property loss • Consequence level could be impacted by the magnitude of a hazard event • A significant event could lead to long-term disruption of business, employment, tourism and/or long-term evacuation.	**High**
Motor vehicle-related incidents on the existing road network represent 12.7% of the historical emergency responses of CKFES **(Geographic Profile)**	Almost Certain	• CKFES responded to a total of 1,872 calls pertaining to motor-vehicle related incidents over a five year period. (Event History) • Fog could contribute to motor vehicle incidents (Hazard) • Road Transportation Accidents identified as one of the municipality's top hazards. (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**
The bluffs along Chatham-Kent's Lake Erie shoreline present a risk associated with residents and visitors participating in activities that may require specialized rescue services (e.g. high angle rope rescue). **(Geographic Profile)**	Likely	• There is potential for falling hazards and injury as a result of the activities taking place along the cliffs (hiking or rock climbing). (Geographic) • Over a five year period (2015 to 2019), 3 calls pertained to high angle rescue (non-fire) for an average of 0.6 calls per year, some of which may have occurred at the bluffs. (Event History)	Minor	• Potential risk to life safety of individuals needing rescue.	**Moderate**
Flooding and erosion have the potential to require community evacuation and/or disrupt the road network, resulting in potential impacts on emergency response capabilities. **(Geographic Profile)**	Possible	• Waterways in Chatham-Kent include Lake Erie to the south, Lake St. Clair to the east and the Thames and Sydenham Rivers which run through it. (Geographic) • There has been evacuations and flood notices issued historically. (Geographic) • Flooding identified as one of the municipality's top hazards. (Hazard)	Major	• Potential for large loss of life • Would result in significant property damage • Significant threat to businesses, local economy, and tourism • Impact to environment would result in a short term, partial evacuation of local residents and businesses • Consequence level could be impacted by the magnitude of a hazard event.	**Moderate**

Identified Risk	Probability Level	Rationale	Consequence Level	Rationale	Risk Level
The presence of waterways within and surrounding Chatham-Kent creates a potential need for specialized technical ice and water rescue services. **(Geographic Profile)**	Almost Certain	• Waterways in Chatham-Kent include Lake Erie to the south, Lake St. Clair to the east and the Thames and Sydenham Rivers which run through it (Geographic) • Over a five year period (2015 to 2019) 57 calls pertained to water or ice water rescue (an average of 11.4 water/ice water calls per year) (Event History)	Moderate	• Could pose a threat to life safety of individuals needing rescue.	**High**
Group C - Residential Occupancies represent 91.3% (36,681) of the Municipality's existing building stock, and over the five year period from January 1st, 2015 to December 31st, 2019 were associated with 72.5% (296) of the structure fires within the Municipality. **(Building Stock)**	Almost Certain	• The majority of property stock is Group C – Residential (Building Stock) • 296 fires (72.5%) over the five year period (2015 to 2019) 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 (4) and fatalities (3) occurred in Group C – Residential (Past Loss) • Of the fire loss incidents in Group C – Residential occupancies 23.0% of incidents did not have a smoke alarm present (Past Loss) • Potential for exposure risk depending on dwelling type and building age (Building Stock) • Potential presence and maintenance of fire protection equipment would influence consequence level (Building Stock) • The Municipality currently has 19 buildings defined by the OBC as high-rise buildings with a floor level 18 metres (59 feet) above grade, or 6 storeys. (Building Stock)	**High**

Identified Risk	Probability Level	Rationale	Consequence Level	Rationale	Risk Level
The 2016 Census data indicates that 75.5% (32,480) of the Municipality's Group C- Residential building stock was built prior to the introduction of the 1981 Ontario Fire Code and Ontario Building Code compared to 53.1% (2,742,720) of residential building stock in the remainder of the Province. **(Building Stock)**	Almost Certain	• The majority of property stock is Group C – Residential (Building Stock) • 296 fires (72.5%) over the five year period (2015 to 2019) 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 (4) and fatalities (3) occurred in Group C – Residential (Past Loss) • Of the fire loss incidents in Group C – Residential occupancies 23.0% of incidents did not have a smoke alarm present (Past Loss) • Potential for exposure risk depending on dwelling type and building age (Building Stock) • Potential presence and maintenance of fire protection equipment would influence consequence level (Building Stock)	**High**
The Municipality currently has 19 building defined by the OBC as high-rise buildings with a floor level 18 metres (59 feet) above grade, or six storeys. These buildings are primarily located within the settlement area of Chatham. **(Building Stock)**	Almost Certain	• The majority of property stock is Group C – Residential (Building Stock) • 296 fires (72.5%) over the five year period (2015 to 2019) 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 (4) and fatalities (3) occurred in Group C – Residential (Past Loss) • Of the fire loss incidents in Group C – Residential occupancies 23.0% of incidents did not have a smoke alarm present (Past Loss) • Potential for exposure risk depending on dwelling type and building age (Building Stock) • Potential presence and maintenance of fire protection equipment would influence consequence level (Building Stock)	**High**

Identified Risk	Probability Level	Rationale	Consequence Level	Rationale	Risk Level
The Municipality has 131 buildings with a total building area (footprint) that exceed 50,000 square feet. These buildings are located throughout the Municipality in both the urban and rural areas. **(Building Stock)**	Almost Certain	• Group D – Business, Group E - Mercantile, Group F - Industrial or a mix of uses represent 6.4% of the Municipality's existing building stock (Building Stock) • Over the five year period (2015 to 2019), Group D, E and F were associated with 62 (13.7%) of the structure fires within the Municipality (Past Loss) • Potential for presence and maintenance of fire protection equipment, for example, fire alarm system, sprinklers, 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, sprinklers, etc. (Building Stock) • Some of the identified occupancies may play a role in the economic well-being of the Municipality (Economic)	**High**
The Municipality currently has 76 vulnerable occupancies. **(Building Stock)**	Possible	• 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 0.01% and Group C – Residential • occupancies represent 91.3% of the Municipality's existing property stock (Building Stock) • 296 fires (72.5%) over the five year period (2015 to 2019) occurred in Group C – Residential and 2 fires occurred over the same five year period in Group B – Care or Detention occupancies. (Past Loss) • Ontario Regulation 150/13 requires fire departments to perform annual inspections and, • approve and witness fire drill scenarios which may influence the probability of a fire occurring in a vulnerable occupancy (Building Stock)	Catastrophic	• 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, sprinklers, etc. (Building Stock) • Most reported fire-related civilian injuries (4) and fatalities (3) 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)	**High**

Identified Risk	Probability Level	Rationale	Consequence Level	Rationale	Risk Level
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 2016 Census, seniors represent 21.1% (21,415) of the Municipality's total population. **(Demographic)**	Almost Certain	• Seniors represent one of the most vulnerable demographics and are 21.1% of the Municipality's population (Demographic) • The majority of property stock is Group C – Residential (Building Stock) • 296 fires (72.5%) over the five year period (2015 to 2019) 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 (4) and fatalities (3) occurred in Group C – Residential (Past Loss) • Of the fire loss incidents in Group C – Residential occupancies 23.0% of incidents did not have a smoke alarm present (Past Loss) • Potential for exposure risk depending on dwelling type and building age (Building Stock) • Potential presence and maintenance of fire protection equipment would influence consequence level (Building Stock)	**High**
All reported fire fatalities (3) and the majority of fire related civilian injuries (5) occurred in Group C – Residential occupancies. **(Past Loss)**	Almost Certain	• The majority of property stock is Group C – Residential (Building Stock) • 296 fires (72.5%) over the five year period (2015 to 2019) 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 (4) and fatalities (3) occurred in Group C – Residential (Past Loss) • Of the fire loss incidents in Group C – Residential occupancies 23.0% of incidents did not have a smoke alarm present (Past Loss) • Potential for exposure risk depending on dwelling type and building age (Building Stock) • Potential presence and maintenance of fire protection equipment would influence consequence level (Building Stock) • The Municipality currently has 19 buildings defined by the OBC as high-rise buildings with a floor level 18 metres (59 feet) above grade, or 6 storeys. (Building Stock)	**High**

Identified Risk	Probability Level	Rationale	Consequence Level	Rationale	Risk Level
Of the fires occurring in the Municipality over the five year period from January 1, 2015 to December 31, 2019, the leading cause of unintentionally set fires was due to misuse of ignition source at 25.7% (105 fires), compared to 29.9% in the Province. **(Past Loss)**	Almost Certain	• Over the five year period (2015 to 2019) 105 fires were caused by misuse of ignition source, an average of 21 fires of this type of cause per year (Past Loss)	Minor	• Potential risk to life safety of occupants • Minor property loss • Minimal disruption to business activity and/or • Minimal impact on general living conditions • Potential presence and maintenance of fire protection equipment would influence consequence level (Building Stock)	**Moderate**
Of the fires occurring in the Municipality over the five year period from January 1, 2015 to December 31, 2019, the second most common cause of unintentionally set fires was due to mechanical/electrical failure at 15.2% (62 fires), compared to 15.4% in the Province. **(Past Loss)**	Almost Certain	• Over the five year period (2015 to 2019) 62 fires were caused by mechanical/electrical failure, an average of 12.4 fires of this type of cause per year (Past Loss)	Minor	• Potential risk to life safety of occupants • Minor property loss • Minimal disruption to business activity and/or, • Minimal impact on general living conditions • Potential presence and maintenance of fire protection equipment would influence consequence level (Building Stock)	**Moderate**

11.2 Risk Treatment Options

NFPA 1300 - Standard on Community Risk Assessment and Community Risk Reduction Plan Development (2020 Edition) 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 31**. There are four risk treatment options:

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

Table 31: 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 implemented. 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. In addition, even a mitigation treatment option may require the department to accept that there is still some level of risk and be prepared to respond if an event occurs. 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 - Standard on Community Risk Assessment and Community Risk Reduction Plan Development (2020 Edition) 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".[54] 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**. As such, the recommendations of the FMP if implemented can be considered a part of community risk reduction plan since it includes a review of Fire Prevention and Public Education.

To apply the risk conclusions to the FMP, each risk conclusion ('key finding' or 'identified risk') will be reviewed through the lens of the "Five Es". The Five Es is a framework outlined in NFPA 1300 - Standard on Community Risk Assessment and Community Risk Reduction Plan Development (2020 Edition), and the Institution of Fire Engineers' Vision 20/20 National Strategy for Fire Loss Prevention. The Five Es are summarized in **Table 32**. 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)
5. Mitigating injury, illness and saving lives (Emergency Response)

[54] NFPA 1300, 3.3.6.

Table 32: Overview of the NFPA 1300 - Standard on Community Risk Assessment and Community Risk Reduction Plan Development (2020 Edition) 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 - Standard on Community Risk Assessment and Community Risk Reduction Plan Development (2020 Edition) 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 but are beyond the purview of the recommendations found within Fire Master Plan. As a result, the recommendations of the FMP will focus on ways to reduce risk from the perspective of the typical suppression and public education/prevention operations of the department. This includes 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. This categorization will then be used to inform the Fire Master Plan. The purpose of the Five Es as they pertain to this study is shown in **Table 33**.

Table 33: 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 34 presents the identified risks in a matrix format to indicate the ways in which the risks can be addressed by the department and ultimately considered within the Fire Master Plan analysis and recommendations. The same process is applied to the key findings in **Table 35**.

For those risk conclusions that will not be considered within the FMP, 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.). The table provided in **Attachment B** provides suggested proactive measures for reducing risk for each of the major occupany types. This table is tool that can assist CKFES with future risk reduction planning.

Table 34: Treatment Options and Five E's Categorization – Identified Risks

Profile	Key Finding	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	There is one ingress and egress route for the community of Erieau (Erieau Road). Closure of Erieau Road due to flooding or other incidents has the potential to reduce the connectivity of the road network to this area resulting in potential impacts on emergency response capabilities.	High	Mitigate	Yes				Yes
Geographic	Motor vehicle-related incidents on the existing road network represent 12.7% of the historical emergency responses of CKFES	High	Accept					Yes
Geographic	The bluffs along Chatham-Kent's Lake Erie shoreline present a risk associated with residents and visitors participating in activities that may require specialized rescue services (e.g. high angle rope rescue).	Moderate	Mitigate	Yes				Yes
Geographic	Flooding and erosion have the potential to require community evacuation and/or disrupt the road network, resulting in potential impacts on emergency response capabilities.	High	Mitigate	Yes				Yes
Geographic	The presence of waterways within and surrounding Chatham-Kent creates a potential need for specialized technical ice and water rescue services.	High	Mitigate	Yes				Yes
Building Stock	Group C - Residential Occupancies represent 91.3% (36,681) of the Municipality's existing building stock, and over the five year period from January 1st, 2015 to December 31st, 2019 were associated with 72.5% (296) of the structure fires within the Municipality.	High	Mitigate	Yes	Yes	Yes	Yes	Yes

Profile	Key Finding	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 75.5% (32,480) of the Municipality's Group C-Residential building stock was built prior to the introduction of the 1981 Ontario Fire Code and Ontario Building Code compared to 53.1% (2,742,720) of residential building stock in the remainder of the Province.	High	Mitigate	Yes	Yes			Yes
Building Stock	The Municipality currently has 19 building defined by the OBC as high-rise buildings with a floor level 18 metres (59 feet) above grade, or six storeys. These buildings are primarily located within the settlement area of Chatham.	High	Mitigate	Yes	Yes	Yes	Yes	Yes
Building Stock	The Municipality has 131 buildings with a total building area (footprint) that exceed 50,000 square feet. These buildings are located throughout the Municipality in both the urban and rural areas.	High	Mitigate	Yes	Yes	Yes	Yes	Yes
Building Stock	The Municipality currently has 76 vulnerable occupancies.	High	Mitigate	Yes	Yes	Yes	Yes	Yes
Demographics	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 2016 Census, seniors represent 21.1% (21,415) of the Municipality's total population.	High	Mitigate	Yes	Yes	Yes	Yes	Yes
Past Loss	All reported fire fatalities (3) and the majority of fire related civilian injuries (5) occurred in Group C – Residential occupancies.	High	Mitigate	Yes	Yes	Yes	Yes	Yes

Profile	Key Finding	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
Past Loss	Of the fires occurring in the Municipality over the five year period from January 1, 2015 to December 31, 2019, the leading cause of unintentionally set fires was due to misuse of ignition source at 25.7% (105 fires), compared to 29.9% in the Province.	High	Mitigate	Yes	Yes	Yes	Yes	Yes
Past Loss	Of the fires occurring in the Municipality over the five year period from January 1, 2015 to December 31, 2019, the second most common cause of unintentionally set fires was due to mechanical/electrical failure at 15.2% (62 fires), compared to 15.4% in the Province.	High	Mitigate	Yes	Yes	Yes	Yes	Yes

Table 35: 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	The Municipality of Chatham-Kent spans a large geographical area which could result in extended emergency response times for some areas of the municipality.	Mitigate	Yes		Yes	Yes	Yes
Geographic	There are roads within the Municipality that have been identified as hazardous material routes that may require hazardous materials response.	Accept					Yes
Geographic	There are currently 12 bridges within the Municipality which have load limits, affecting the ability of fire department apparatus to cross.	Accept					Yes
Geographic	Funding-related challenges for bridge maintenance could make bridge-related restrictions more common potentially affecting emergency response times.	Mitigate			Yes		Yes
Geographic	The Ridge Landfill presents a risk associated with a fire occurring within the landfill site.	Accept					Yes
Geographic	The at-grade road-rail crossings have the potential to impact emergency response times.	Accept					Yes
Geographic	There are properties within the Municipality that have fuel-load related concerns linked to marinas.	Mitigate	Yes	Yes	Yes	Yes	Yes
Geographic	For the period of 2015 to 2019, there were 32 outdoor fires, 4.8% of all fires responded to by CKFES	Mitigate	Yes	Yes	Yes	Yes	Yes
Building Stock	The Municipality includes areas of building stock that have higher density and, as such, greater potential for exposure in the event of a fire.	Mitigate	Yes	Yes	Yes	Yes	Yes
Building Stock	CKFES identified several properties within Chatham-Kent as having an increased potential for high fire risk in regards to fuel load, many of them related to agriculture.	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
Building Stock	Silos and grain elevators in the Municipality may require specialized rescue and present unique hazards during an emergency call.	Mitigate	Yes				Yes
Building Stock	In addition to registered vulnerable occupancies, the Municipality has 46 elementary schools and 28 identified daycare centres, representing higher fire life-safety risks due to the number of children attending these facilities.	Mitigate	Yes	Yes	Yes	Yes	Yes
Building Stock	There are a number of identified heritage buildings within the Municipality of Chatham-Kent, many of which were constructed prior to the introduction of the Ontario Fire Code.	Mitigate	Yes	Yes	Yes		Yes
Critical Infrastructure	The Chatham-Kent Municipal 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	Yes	Yes	Yes	Yes	Yes
Critical Infrastructure	Different areas of the municipality are serviced by hydrants with varying rates of flow. Primarily the urban areas are serviced by fire flow rated hydrants. Hydrants in the rural area are available as a water supply.	Accept					Yes
Demographics	The 2016 Census data indicates that children aged 14 and under represent 16.4% (16,650) of the Municipality's total population.	Mitigate	Yes				Yes
Demographics	Of the Municipality's total population, 30.0% (30,445) fall into the age range of 45 to 64, representing a cohort aging towards the seniors demographic of 65 years or older.	Mitigate	Yes				Yes
Demographics	The Municipality's agricultural sector employs Temporary Foreign Workers resulting in a population shift.	Mitigate	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
Hazard	The Municipality's 2017 HIRA identifies hazards that could each impact the ability of the Municipality to deliver fire protection services.	Mitigate	Yes	Yes	Yes	Yes	Yes
Hazard	There are abandoned wells throughout the Municipality, including oil and gas wells, which could pose a threat to life, property, local economy and environment if an explosion were to occur (**Special Consideration**).	Accept					Yes
Economic	The Municipality 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 Municipality.	Mitigate	Yes	Yes	Yes	Yes	Yes
Past Loss	Over the five year period from January 1, 2015 to December 31, 2019, the municipality averaged 82 structure fires per year.	Mitigate	Yes	Yes	Yes	Yes	Yes
Past Loss	Over the five year period from January 1, 2015 to December 31, 2019, structure fires occurring in Group F – Industrial occupancies account for 9.3% of total structure fires within the Municipality and 16.7% of total structure fire loss.	Mitigate	Yes	Yes	Yes	Yes	Yes
Past Loss	Over the five year period from January 1, 2015 to December 31, 2019, structure fires occurring in buildings classified within the National Farm Building Code and in other buildings not classified within the OBC, accounted for 10.6% of total structure fires.	Mitigate	Yes	Yes	Yes	Yes	Yes
Past Loss	Of the fires occurring in the Municipality over the five year period from January 1, 2015 to December 31, 2019, the cause of 26.5% of fires was 'undetermined', 7.8% higher than the Province.	Mitigate	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	Of the fires occurring in the Municipality over the five year period from January 1, 2015 to December 31, 2019, 12.5% of fires had a reported ignition source of cooking equipment, which is 4.8% lower than the Province (17.3%).	Mitigate	Yes	Yes	Yes	Yes	Yes
Past Loss	Of the fires occurring in the Municipality over the five year period from January 1, 2015 to December 31, 2019, 10.5% of fires had a reported ignition source of miscellaneous, which is 0.6% higher than the Province (9.9%).	Mitigate	Yes	Yes	Yes	Yes	Yes
Past Loss	Of the fires occurring in the Municipality over the five year period from January 1, 2015 to December 31, 2019, 8.6% of fires had a reported ignition source of open flame tools/smokers articles, which is 5.4% lower than the Province (14.0%).	Mitigate	Yes	Yes	Yes	Yes	Yes
Past Loss	Of the fires occurring in the Municipality over the five year period from January 1, 2015 to December 31, 2019, the ignition source for 34.3% of fires was undetermined, 10.9% higher than the Province (24.4%).	Mitigate	Yes				Yes
Past Loss	Over the five year period from January 1, 2015 to December 31, 2019, of the fire loss incidents in Group C – Residential occupancies, 23.0% of incidents did not have a smoke alarm present (compared to 17.3% in the Province).	Mitigate	Yes	Yes	Yes	Yes	Yes
Past Loss	Over the five year period from January 1, 2015 to December 31, 2019, of the fire loss incidents in Group C – Residential occupancies, 40.8% of incidents had a smoke alarm present and operating compared to 45.3% in the Province.	Mitigate	Yes	Yes	Yes	Yes	Yes
Event History	Over the period from January 1, 2015 to December 31, 2019 the volume of emergency calls responded to by CKFES increased by 21.3%.	Mitigate	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
Event History	For the period from January 1, 2015 to December 31, 2019 the highest percentage of emergency call volume responded to by CKFES as defined by the OFM response types was medical/resuscitator calls representing 32.8% of total emergency call volume.	Accept					Yes
Event History	For the period from January 1, 2015 to December 31, 2019 the second highest percentage of emergency call volume responded to by CKFES as defined by the OFM response types was false fire calls representing 16.5% of total emergency call volume.	Mitigate	Yes	Yes	Yes	Yes	Yes
Event History	For the period from January 1, 2015 to December 31, 2019 the third highest percentage of emergency call volume responded to by CKFES as defined by the OFM response types was rescue calls representing 14.2% of total emergency call volume.	Accept					Yes
Event History	For the period from January 1, 2015 to December 31, 2019, 8.3% of CKFES Calls by OFM Response Type were Property Fire/Explosions. Of these calls, 2.9% were loss structure fires and 3.7% were no loss fires.	Mitigate	Yes	Yes	Yes	Yes	Yes
Event History	For the period from January 1st, 2015 to December 31st, 2019 there is a concentration of calls by call type in the downtown area of these communities, there is also variation in the location of higher concentration of historic calls in Chatham and Wallaceburg depending on the type of call.	Mitigate	Yes	Yes	Yes	Yes	Yes

Attachment A

OBC Occupancy Classifications

Station #	Potential Risks Identified by Chatham-Kent Station Chiefs
Station 1	• Two railway tracks running through the centre of Chatham with possible hazardous product • Ethanol Plant on the west side of the Municipality which is the prevailing wind • Station 1 responds to 33 Vulnerable Occupancies • Water treatment plant • Thames River running through Municipality along with other waterways, risk for water/ice rescue. Flooding in low lying areas along river • Highways 2 and 40 run through community with a risk for auto extrication and hazardous materials response • Unauthorized open burns in the community • Drug use resulting in an increase in Medical Assistance calls
Station 3	• One railway track running through the centre of Wallaceburg with possible hazardous product • Station 3 responds to 22 Vulnerable Occupancies • River running through community. Potential for water rescue • Water treatment plant • Highway 40 goes through community, heavily travelled by fuel tankers going to and from refineries in Sarnia • Hospital • Multiple industries, risk of fire and evacuation • Unauthorized open burns in the community • Drug use resulting in an increase in Medical Assistance calls

Station #	Potential Risks Identified by Chatham-Kent Station Chiefs
Station 4	• Thames River • Lake St-Claire • Highway 40 • Many natural creeks and drains of various sizes running throughout. • There are 4 main communities, listed from largest to smallest: Mitchell's Bay, Pain Court, Grande Pointe and Dover Centre. Grande Pointe, the centre nearest the middle of the area, is where the fire hall is situated. • Most roads have 80 km/h speed limits. There are no 100 km/h stretches and no railway lines. • Most buildings are detached houses, many with large shed, barns or other outbuildings. • Schools • Church buildings • Agricultural services • Public or commercial campgrounds • Hunting and fishing lodges or club houses by Lake St. Claire, the Mitchell's Bay Marine Park, the Saint-Luke's • There is one Community Living residence on Marsh Line and one Choices Child and Adolescent Services residence on Angler Line where the residents are assumed to be passively or forcibly confined. • Condominiums (multi-unit dwellings) • Water towers • Wind turbines • Snowy or icy roads during the winter • Coastlines • Generally, Station 4 is finding that they are responding less to more "traditional" fire calls and more to water or ice rescue calls, medical emergencies and motor vehicle collisions.
Station 5	• 3 major highways with lots of vehicle traffic heading to Chatham and/or Sarnia • 1 river – several creeks and ditches. • Agricultural community • Grain elevators/grain bins • Fertilizer plants • Tupperville has the only bridge other than Wallaceburg or Dresden • Two Hydro distribution locations • Enbridge Gas lines going through properties

Station #	Potential Risks Identified by Chatham-Kent Station Chiefs

Station 5 Continued	• Apartment Dwellings
	  ○ 1 to 3 storey old buildings
	• Retirement & Group Homes
	• Churches
	• 3 Schools
	• Sydenham River & Bridge
	• Dawn Mills Bridge, Baseline Bridge
	• HWY 21 & Baseline Rd. runs through catchment area
	• Large vehicles
	  ○ Transport Agriculture vehicles
	  ○ School Buses
	• Food Processing Plant
	• MGF Plant
	• Welding Shops and Supply Storage
	• Solar Farm
	• Concrete Manufacturer
	• Farms and Greenhouses
	• Truck/Bus Depots
	• 3 Gas Stations
	• Arena (with solar panels on roof)
	• Enbridge Transfer Station
	• Hydro Sub Station
	• Water Treatment Plant
	• Weather head, explosive bunker

Station #	Potential Risks Identified by Chatham-Kent Station Chiefs

Station 7	• 14 km of the Thames River with variable access points making access difficult in some areas.
	• 14 km of Longwoods Road running the full width of the response area where most of our major M.V.C.'s occur
	• 5 km of St. Clair Road with minimum responses in the area
	• 14 km of C.P Rail line with major incident when a vehicle ran into the side of a moving train and was carried 5 km before the train stopped
	• 1 bridge - Sherman Brown on Communication Road
	• 2 irrigation ponds on farms with the largest one nearly one million gallons when full
	• Three small villages Eberts on Centre Side Road, Louisville on Longwoods Road and Kent Bridge on Longwoods Road.
	• 1 grain facility Anderson Grain in Kent Bridge
	  ○ Had one small fire in a dust bin there in the last 25 years. This location also has many confined space storage bins and silos.
	  ○ At this same location is Slyvite Fertilizer facility which houses input products for farmers as to dry and liquid fertilizers and chemicals
	• At 24734 Centre Side Road Southwest Agro Mart has a fertilizer facility selling fertilizer to area farmers dry and liquid. Buildings holding dry fertilizer with tanks on site holding liquid along with seed storage, a shop facility and chemical storage
	• Dowler Karn – Fuel retail business
	  ○ Had one odour call there in the last ten years
	• Grain storage and grain dryers on farms
	• 3 farm machinery businesses with large storage buildings Huron Tractor on Prince Albert Road, Kucera Farm Equipment and Profota's Farm Equipment
	• 2 large boat storage buildings on Grand Ave East
	• 1 large green house operation Green Hill
	  ○ Greenhouses & bunk houses
	• 2 wind mills for North Wind project.
	• Hydro transfer station for North Wind Project.
	• Municipal water pumping.
	• Unauthorized burning (No permits)

Station #	Potential Risks Identified by Chatham-Kent Station Chiefs

Station 8	• Highways
	  ○ Victoria Rd (#21 HWY) and London Rd (#2 HWY) run through and intersect in our response area.
	  ○ Risks are with the potential of hazardous material incidents and motor vehicle collisions. Many trucks/transports take this route.
	• Railroads
	  ○ CN and CP railroads run through our response area.
	  ○ Risks are train vehicle accidents with vehicles.
	  ○ Risk are train derailments, dangerous goods carried by CPR and passenger trains, CNR. We have had numerous train derailments and vehicle train accidents.
	  ○ Both facilitate grain pickup from AGRIS and LAC.
	• Flooding (Thames River/Sydenham River)
	  ○ Past drowning
	• Fuel Storage Facility (Thamesville Bulk ENERGY – AGRIS Co-operative)
	  ○ The potential explosion and fire if the facility is compromised.
	• AGRIS Co-operative
	  ○ Grain elevator – Near constant risk of explosion
	  ○ Storage of large bulk liquid Anhydrous Ammonia tank and multiple Anhydrous Ammonia nurse tanks, chemicals (for farming) and bulk fertilizer.
	  ○ Risk of explosion of larger tanks or release of anhydrous ammonia.
	  ○ There is a risk that the smaller nurse tanks blow off (rupture or hose/valve malfunction in the yard which would require us to notify the public in the areas to keep inside and close windows or evacuate the area. There is a risk that there could be an accident while transporting the “nurse tanks”
	  ○ Grain elevator entrapment – agricultural workers sucked into grain in storage
	• LAC – London Agriculture Commodities
	  ○ Same as above
	• Two gas stations (Esso and UPI)
	  ○ Risk is fire or explosion.
	• Briarwood Mobile Home Park
	  ○ 70 lots
	  ○ The risk is if there is a fire, access can be a challenging. Also because of proximity of the units if there is a fire and the wind is high there could be a huge risk to the entire park.

Station #	Potential Risks Identified by Chatham-Kent Station Chiefs

Station 8 Continued	• 2 Grade Schools
	  ○ Usual risk related to schools
	• Ferguson Park
	  ○ The risk is there is a community pool located there.
	• Gravel Pits
	  ○ Located just outside Thamesville are gravel pits.
	  ○ The risk is possible drowning in these pits.
	• Tobacco Operation
	  ○ 1 tobacco operator in our area.
	  ○ In the past we have had numerous calls for fire over the years. During the smoking/curing of the tobacco they use live fires in the barn.
	• Swine Operations
	• Cattle Operation
	  ○ Huge storage of large round hay bales for feeding.
	• Chicken Operations/Rural Farming
	  ○ General farming accidents, farm machinery fires along with wheat/corn field fires.
	• Westover Treatment Centre
	  ○ A leading addiction treatment facility located just outside Thamesville.
	  ○ Risk is with the residence and fire at the facility.

Station 9	• Both CN and CP Railways run through the community • Longwoods Road and 79 Hwy being main roads through the area • Large Farm Operations • Automatic Aid to Dawn Euphemia Township and the Community of Florence • Main Street Bothwell has several old building with little to no fire separation • Thames River and Sydenham (Dawn Euphemia) • Moravian Town First Nations Community is within the response area • In the last 3 years the community of Bothwell has seen approx. 15 new homes being built • There is no fire hydrants between Bothwell and Thamesville.

Station #	Potential Risks Identified by Chatham-Kent Station Chiefs
Station 10	• 401 runs through the district • 1 trailer park • 1 lake • 3 gravel pits • 3 electricity distribution plants • 3 apartment complexes • 2 grain elevators • 1 automotive yard (car/truck storage)
Station 11	• 401 crosses through our response area bringing the hazardous materials and potential high speed accidents. • Ethanol processing plant at the Guelph University • A fairly large sour gas processing plant at the corner of McKinlay, and Rose Beach line • We also have 20 kilometers of Lake Erie shore line and about approximately 8 kilometers of Rondeau shore line. • There is a lot of large scale farms and a fertilizer plant that process nitrates and delivers • anhydrous • We have 4 lagoons and a gravel pit • There are 3 schools and the Guelph University campus that changes the town and area population quite prominently at different season • There is also a punch press factory on the golf course line with the potential of the operator getting trapped in the machines • We have a nursing home that we have frequent calls too • We cover an area that has 2 gas stations

Station #	Potential Risks Identified by Chatham-Kent Station Chiefs
Station 12	• CN Rail East & West = London Windsor and North & South = Blenheim & Chatham • 401 • Thames River • Farm and Commercial • Lower Thames Conservation Area • McGregor Creek Flood Plain Drain • Livestock Buildings • Grain Storage & Grain Dryer • Chemical Storage = on Farms - Green Houses • Residential • Commercial = R&M • Industrial • Gravel Pits • Hydro One Sub-Stat • Hydro One Kent Transmission Station - Windmills and Solar Power • Tele-Communication Towers • Rural • Commuters • Farming Background • Flooding • Chemicals & Fertilizers • Chemical Transportation by Rail & 401 • Police & EMT • Marcus Waste Disposal = MOE • Agriculture • R&M Auto Restoration • Fire • MVA • Medical • Chemical • 401

Station #	Potential Risks Identified by Chatham-Kent Station Chiefs
Station 14	• One road in and out • Lack of Hydrants • Wind Farms • Used Oil Depository-Commercial Docks • Flooding • Increased Seasonal Population • Tobacco Barns
Station 15	• 401 Highway (17km) • Queens Line No.2 HWY • Bllomfield Road • River View Line; River Road; Thames River • Railway (Via Rail, CN, CP) • Raleigh Plains Drain (numerous pumped ditches) • Industrial Park (including Veolia – waste management) • Alcohol storage facility • Wind Turbines • Pioneer Hi-Bred Limited Seed Growers HQ • Canada production Canada • Floraplast Chatham (Plastic product manufacturer) • Sarnia Propane (Fuel) • 1 Gold+Sons Recycling Yard (junkyard) **Community of Buxton** • Pride seed company • Multiple, large grain bin farmers (dryers) • New housing project

Station #	Potential Risks Identified by Chatham-Kent Station Chiefs

Station 16	• South Buxton Race Track
	• Chatham-Kent Municipal Airport
	  ○ Crashes/fuel spill
	• High cliffs along Lake Erie
	  ○ Erosion and fall risks
	• Fruit farms (along Talbot Trail)
	  ○ Stored chemicals
	  ○ Fruit storage with limited oxygen
	  ○ Dormitories
	• Dealtown Apartments
	  ○ 3 storey walkups
	• Raleigh Municipal Garage
	  ○ Large salt storage
	  ○ Large fuel storage - gas, diesel
	• L.A.C. Grain Elevator
	  ○ Large grain storage- entrapment
	  ○ Chemical/ fertilizer storage
	• Peeters Mushroom Farm
	  ○ Large indoor mushroom farm
	  ○ Dormitories
	  ○ Trucks/ heavy machinery
	• Sykes Trucking
	  ○ Heavy foot and truck traffic
	  ○ Fuel storage on site
	• Farms
	  ○ Chemicals/ fertilizers stored and used
	  ○ Farm machinery on roads - have had collisions in past
	  ○ Field/barn fires
	• Deer Run Golf Course
	  ○ Major fire in past/ new clubhouse
	  ○ Large gatherings of people

Station #	Potential Risks Identified by Chatham-Kent Station Chiefs
Station 17	• Lake Erie bluff rescues (high angle rescue) • Large number of greenhouses (Safety Response) • Farming community – no training on grain bin rescues • Deep ditches – water rescue, motor vehicle accidents involving submerged vehicles
Station 18	• Has the most farms with Tobacco Barns • A lot of big farms with ponds, chemicals • The bay and other waterways • 3 big grain elevators • Highway #31 or Talbot trail ○ Trucks with hazardous cargo like rolls of steel/chemicals • Rifle range • Green houses • Factories with chemicals • Landfill
Station 19	• Hwy 401 runs through our response area, hazardous material incidents is a concern. Access on to the 401 with the concrete barriers that are to be installed will be a challenge with this change. • There is a couple of railway stations that run through our area with a wide range of cargo including and not limited to hazardous materials. • A large part of our area is located along the Thames River that could pose water related risk in the summer and in the winter. • We have a large agricultural fertilizer supply chain located just south of the town that has a large supply of hazardous materials. • We have several manufacturing plants along the 401 that manufacture and paint car parts that may be a risk due to fire. • We have a large fuel distribution operation located just north of the 401 on the edge of city limits. This facility is located within 500 meters of a wildlife reserve and the threat of fuel or runoff from a fire getting into the waterways is a real concern. • Within the city limits we have three vulnerable occupancies two of the three buildings are 2 storey or more. • There are some marijuana growing facilities within our areas, little is known about them and the internal layout- pre planning needs to be completed. • There is currently two pallet manufacturing facilities within the city limits and are located within 200 meters of the 401 corridor. Both are in densely populated areas.

Station #	Potential Risks Identified by Chatham-Kent Station Chiefs

Station 20	• Registered vulnerable occupancies
	  ○ Senior home and low income residence. 21205 pier road
	• Private roads with in area, not serviced by public works, no winter control.
	  ○ Hiawatha Beach Rd.,
	  ○ Hodovick Rd./ Tideswell Line,
	  ○ Wharram Rd./ tilton Line,
	  ○ Clarke Line,
	  ○ Fiat Rd. / Ocean Blvd.
	• 18 km of lake bank cliffs of heights up to 20 ft
	• Highway running through area
	  ○ Truck traffic, carrying hazard materials.
	  ○ Talbot Trail, Wheatley road
	• 18 km of lake with limited access.

Attachment B

Proactive Risk Reduction Measures by Occupancy Classification

Corporation of the Municipality of Chatham-Kent
Community Risk Assessment
June 2022 – 20-3619

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
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

OBC Occupancy Classification	OFM Fire Risk Sub-Model Major Building Classifications	OFM Definitions	OFM Fire Related Risks	Proactive Measures for Reducing Risk
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
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 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 Properties

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.