Municipality of Middlesex Centre
2023 FIRE SERVICES MASTER PLAN

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PREFACE

This document serves as the Municipality of Middlesex Centre's Fire Services Master Plan (FSMP). The primary motivation for developing this document is for the Municipality and Middlesex Centre Fire Service in establishing a long-term strategy based on community risk, safety, corporate priorities, and council-approved budget allocations. This document will be used as a tool to evaluate and forecast the immediate and future emergency service needs of the community.

ACKNOWLEDGEMENTS

Behr would like to specifically acknowledge the leadership, diligence and continuous improvement focus of Director of Emergency Services - Fire Chief, Colin Toth. While there are some challenges for the Middlesex Centre Fire Services, Chief Toth remains positive in his efforts to enhance the department and public safety for the community and its citizens. The fire services' leadership and firefighters are dedicated and engaged in all facets of their community. Their pride in the department and their service is clear.

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ACRONYMS

AHJ	Authority Having Jurisdiction
ASP	Area Structure Plan
CAD	Computer Aided Dispatch
CRA	Community Risk Assessment
ERF	Effective Response Force
FSMP	Fire Services Master Plan
FUS	Fire Underwriters Survey
MAP	Mutual Aid Plan
MCFS	Middlesex Centre Fire Service
MVC	Motor Vehicle Collision
NFPA	National Fire Protection Association
OBC	Ontario Building Code
POC	Paid-On-Call (Volunteer Firefighter)
PSAP	Primary Service Answering Point
QMP	Quality Management Plan
RMS	Record Management System
SOC	Standard of Cover
SOG	Standard Operating Guideline
WUI	Wildland Urban Interface

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EXECUTIVE SUMMARY

Introduction

Today's fire and emergency services are continually being challenged by budget constraints, rising call volumes, and increasing and unusual risks against a backdrop of expectations to do more with less. The demand for emergency response and emergency management services has expanded, causing the role to shift and for services to diversify. Failing to realize and address these challenges could leave both the community and its responders vulnerable.

Effective management of an emergency services department requires a clear understanding of risk and the ability to provide an appropriate response to mitigate the risks. Contemporary fire, rescue and emergency services have evolved into a critical component of a community's social safety net. Whereas early fire departments were established specifically to combat structure fires that, at the time, were often devastating. Today's fire departments are also called upon to respond to medical emergencies, rescues of all sorts, motor vehicle incidents, dangerous goods releases, wildland fires and natural disasters etc. As a result, fire departments must be adequately resourced and equipped to provide these services safely, efficiently, effectively, and competently.

The goal of developing this Fire Service Master Plan is to provide strategic direction for the fire service for the next 10 years. The plan will provide a systematic and comprehensive approach to evaluate current response capabilities by identifying and mitigating risks and assist in formulating and communicating strategic directions for the fire service, while highlighting opportunities for improved service delivery. This plan will also assist in conveying information to the public, staff, and municipal council about what to expect in the municipality's approach to fire and emergency service planning, service delivery model, policy, and development.

While risks are the basis for triggering response decisions, our analysis has also investigated the needs of the community and will provide a point of reference upon which future decisions and priorities can be evaluated and implemented. This included identifying priorities, challenges, and opportunities for the improvement of the delivery of emergency services to the community, businesses, and overall public safety. This FSMP has considered applicable legislation, industry-leading practices, and standards, along with current and anticipated risks to provide unbiased analysis and evidence-based recommendations.

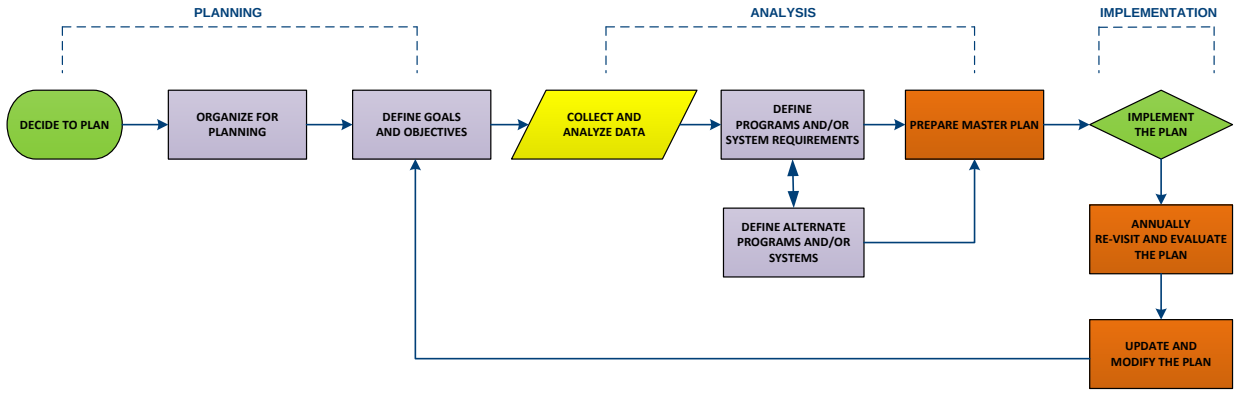
Ultimately, this FSMP has determined options towards an optimum service delivery model(s) and serves as a 'blueprint' for the municipality to be more effective and efficient in the delivery of emergency services through current and future challenges. The detailed project scope is available at Section 1.3 of this FSMP.

Fire Services Master Plan Process

The following diagram illustrates the process used to complete this FSMP. The FSMP is sometimes referred to as a 'road map' to the future and used as a guiding document for current and future department leaders and decision makers.

As described in the 'implementation' phase, it is highly recommended that this plan be reviewed and evaluated, at minimum, on an annual basis or when there are unusual changes in risk, response demands, population and residential or industrial development activity. When reasonably practicable, we also recommend a third-party update of the FSMP at the five-year mark to apply an unbiased review into the operation and provide further credibility to the master plan process.

Figure 1: Fire Services Master Plan Process



Consultation and Comparatives

Key aspects in the development of the FSMP included a community and station tour that focused on the overall footprint, topography, transportation infrastructure of the municipality and the various response zones for each of the five stations. Touring each station provided an opportunity to conduct a general condition and operational functionality assessment on each station. This tour also provided the opportunity to meet with various Middlesex Centre Fire Services (MCFS) staff and discuss their respective interests regarding the FSMP development.

Targeted interviews and an online survey were used to collect data and information. These consultative processes were used to promote an open discussion about the community, risks, general concerns related to the community and municipal operations.

An industry peer municipal comparative analysis[1] of MCFS was conducted as a method of benchmarking the performance of departments to similar municipalities. These benchmarks include budgets, performance, effectiveness, and efficiencies. Although fire and emergency services ultimately have the same goal of protecting life and property, each community has its unique features in how to accomplish their goals. Our main criteria for the comparative analysis are indicators of effectiveness and efficiencies amongst the communities for risk and mitigation.

[1] *Please see Section 3.15, Municipal Comparative Analysis, Page 74*

Community and Risk Overview

The Municipality of Middlesex Centre is located roughly in the centre of Middlesex County, bordered by the City of London to the south, Thames Centre to the east, North Middlesex, and Lucan Biddulph to the north and Adelaide Metcalfe and Strathroy-Caradoc to the west. It has a land-based area of 588 km^2, which is predominantly rural and agricultural, but also has considerable forested areas and wetlands. Land designations outside of settlement areas are categorized as agriculture, rural industrial, rural commercial, parks and recreation, natural environment areas and flood plain.

Between 2001 and 2021, the Municipality of Middlesex Centre population changed variably, with a decrease in 2016, followed by a marked increase in 2021. During this 20-year timeline, the number of total private dwellings has also changed variably, with the highest increase occurring between 2016 and 2021 by 11.5%. This trend is seen in similar parts of Ontario, as affordability and availability for new developments outside cities is a popular and cost-effective choice for commuters.

The hierarchy classification of settlement areas in the municipality are urban settlement areas, community settlement areas and hamlets. While urban and community settlement areas have a combination of the listed land use classifications, hamlets have not been separated into individuals land use designations, but rather classified as a 'hamlet' in their entirety.

Urban Settlement Areas:	Ilderton, Komoka-Kilworth
Community Settlement Areas:	Arva, Delaware
Hamlet Areas:	Ballymote, Birr, Denfield, Bryanston, Lobo, Melrose, and Poplar Hill/Coldstream

Every municipality has unique challenges and characteristics contributing to the overall risk profile of the community. Some general examples of challenges that may impact community risks include:

- Fire/rescue service model and response capacity
- Population and demographics
- Population growth rate
- Industry types
- Economy
- Rate of development
- Transportation corridor types
- Typography
- Weather
- Historical response data

The evaluation of fire or rescue risks considers both the probability and consequence of emergency event types. The probability of an event is quantified by analyzing historical, current,

and projected data. The consequence of the event type or risk is based on an informed assessment of the potential impact on a community should the event occur.

Middlesex Centre completed a review of its hazard identification and risk assessment (HIRA) in December 2021, indicating its commitment to sustaining compliance with the municipality's legislative requirements. The current HIRA assigns likelihood and consequence levels to a list of hazards based on the potential for impacts to people, property, and the environment. As a result of this analysis, the top seven hazards in the rated as a medium threat to the municipality are:

- Tornado
- Infectious disease
- Lightning
- Flood
- Oil/natural gas
- Thunderstorm
- Rail

In addition to the overall highest risks to the community, certain events pose an increased risk specific to firefighting. The risk to MCFS firefighting responders to the most hazardous events are identified below, as well as the most hazardous events they may encounter that pose a specific risk to them and their ability to respond, in particular:

- Snowstorms/hail/freezing rain
- Hazardous materials release/spill/fire
- Critical infrastructure failure
- Motor vehicle incident
- Industrial fire
- Dust explosion
- Swift water rescue

Department Overview

One of the challenges for MCFS and the municipality is to provide fire, rescue, and first medical response services in an area of 588.11 km^2, which is predominantly rural and agricultural, but also has considerable forested areas and wetlands. MCFS currently operates out of five fire stations or demand zones:

- Arva Station 14352 Medway Road, Arva
- Bryanston Station 15321 Plover Mills Road, Bryanston
- Coldstream Station 10227 Ilderton Road, Coldstream
- Delaware Station 11563 Longwoods Road, Delaware
- Ilderton Station 22531 Hyde Park Road, Ilderton

Based on these different characteristics it is reasonable to consider providing different fire and rescue services, as well as service levels, to manage the unique risks found in the varying demand zones.

MCFS relies on a current roster of 118 POC volunteer firefighters, one fire prevention officer, plus one fire services coordinator to provide fire, rescue, and medical first response services to residents and visitors of Middlesex Centre. This team is led by the Director of Emergency Services-Fire Chief

MCFS can request or be requested for additional fire/rescue resources with partners within Middlesex County through mutual and automatic aid agreements.

The people of MCFS have dedicated their time and energy to faithfully serve their communities by using training, technology, and commitment in providing valued service to the citizens and visitors to the municipality. MCFS is a proud fire service that values their past, embraces the present and looks forward to the challenges of the future.

Summary of Observations and Recommendations

The following recommendations are drawn from findings presented throughout the report. They are grouped into four categories according to priority: critical, short term, intermediate and long term. A colour code is applied to each recommendation according to prioritization and completion. A timeframe within 1 – 120 months (1 – 10 years) has been assigned to each recommendation, recognizing that the start and completion of any recommendation is based on annual corporate priorities and council approved budget allocations.

Critical	Short Term	Intermediate	Long Term
1 -12 months	12 - 48 months	48 - 60 months	60 - 120 months

Most of the recommendations presented in this report are achievable using existing staff or members' time and will therefore not pose significant additional costs to the community. Other recommendations regarding staffing, aerial apparatus procurement and fire station concentration and distributions will have associated costs. Costs are rough order of magnitude estimates only and will require further investigation. 'Cost neutral' refers to the use of internal staff through a normal work schedule. Undertaking of these cost neutral recommendations are also contingent upon staff availability.

Note: *Observations and recommendations are numbered based on how the appear in the report.*

Observation #1: A standard of cover (SOC) policy identifies high and extreme risks in a community and measures the current performance of the fire service to ensure these risks are managed safely. MCFS and the municipality currently do not have an SOC that is approved by Council. This policy is used to define services, service levels and outline performance reporting requirements. Where service gaps are identified, the analysis of the unique and common risks in specific demand zones provide elected officials with the information required to make informed service level decisions. This information can be used to identify performance reporting requirements. Appropriate levels of performance reports can be shared with key stakeholders and inform the public.

The information gathered in the standard of cover process can be shared both at the senior administrative and elected official levels. This can facilitate a purposeful and informed decision-making framework for both these groups of officials regarding the need for specific services, setting service levels, allocating funding, and establishing performance goals for MCFS.

Once completed, a standard of cover policy may be shared with the public to provide clarity with respect to services provided and service level expectations. The information/data contained in the CRA is foundational in the development of the SOC policy.

Reference: Section 2.16.1, Fire Station Response Demand Zones, p.24

> ***Recommendation #1: Undertake the development of a standard of cover policy that includes the analysis and risk factors identified in the CRA.***
>
> *(Suggested completion: 48 - 60 months)*
>
> *It is recommended that MCFS undertake the development of a standard of cover for all demand zones within the municipality. After completing this review, the results should be compiled into a single document and presented to council. Identified service concerns or policy gaps should be discussed with council and policy should clearly reflect the services and service levels provided by MCFS. Further, the SOC should consider the unique risk factors in each of the five demands zones and the availability of firefighting water supplies.*
>
> *To be successful, this process requires the support of all levels of senior municipality's leadership and municipal council, as well as adequate resourcing within MCFS.*
>
> > ***Rationale:*** *A standard of cover policy offers several benefits to the operation and governance of MCFS. A comprehensive risk analysis completed at the level of individual demand zones would identify all high, extreme, and unique risks within the different demand zones. It also involves a complete review of existing services and service levels, standard operating guidelines and policies, a review of fire department resource distribution and concentration based on risk factors, and fire department performance measurement and reporting.*

Observation #2: During interviews with the fire chief, district chiefs, and chief training officer it was obvious that each demonstrates an enthusiastic and professional passion for the fire service and specifically MCFS. Opportunities for each to share respective experiences and feedback on issues is an important component of a highly functioning team. While the fire chief maintains a

regular schedule of staff meetings with the senior chief officers where all senior officers can discuss items in a collaborative way, feedback was if there may be opportunities to improve this process.

Reference: Section 3.2.3, Department Leadership, Management and Operations, p.34

Recommendation #2a: Facilitate a team building workshop with senior MCFS administration.

(Suggested completion: 3-6 months)

It is recommended that the fire service administration team undertake a team building workshop or planning session facilitated by a third party with the purpose of clarifying roles and responsibilities and developing a high performing team with clearly defined immediate and long-term goals.

***Rationale**: It is important that all fire service administration staff work together as a cohesive team. Clearly defined expectations and terms of reference for all administration meetings will promote a unified understanding necessary of a high functioning organization.*

Recommendation #2b: Establish an 'alarm assignment response criteria' for the fire chief (and deputy chief) and district chiefs.

(Suggested completion: 6-9 months)

It is recommended that the fire chief, in consultation with the district chiefs develop an 'alarm assignment response criteria'.

***Rationale**: Having a defined response criteria will promote effectiveness and accountability throughout the organization.*

Observation #3: During the station tours and interviews, the Behr team was convinced that the fire chief has a tremendous number of responsibilities. Many of the fire chief's current duties are operational in nature that are not typically required of a fire chief.

Reference: Section 3.2.3, Department Leadership, Management and Operations, p.34

Recommendation #3: Develop and approve a full-time deputy fire chief position within MCFS management team with the focus on adding managerial capacity to MCFS.

(Suggested completion: 6-12 months)

It is recommended that MCFS managerial team be expanded to include a full-time deputy fire chief position. The overarching goal is to enhance a high-performing team that has a clear vision and understanding of MCFS direction and how the community and public will be well served.

***Rationale:** The addition of the deputy fire chief position to MCFS management structure will improve MCFS capacity and effectiveness on through to the entire organization. Many of the current responsibilities and duties can be shared or re-directed to the deputy fire chief as directed by the fire chief. This additional management capacity will allow the fire*

chief to provide a higher level of strategic leadership to MCFS and the Middlesex Centre senior leadership team.

Observation #4: The attraction and volume of applications received in recent recruitment initiatives for POC volunteer firefighters has been stable for MCFS; however, the actual numbers of applicants that meet the residential and response criteria for each fire station capture area is considerably lower.

MCFS typically has a loss of 2-5 or more POC volunteer firefighters each year to resignation or retirement which requires replacement by new inexperienced POC volunteer firefighters. Retaining the necessary number of trained POC volunteer firefighters in each of their five fire stations will remain a challenge moving forward. It is important to note that recruitment and retention of POC volunteer firefighters is a prevalent challenge across Canada and the U.S.

Reference: Section 3.3.4, Retention, p.41

Recommendation #4: The fire chief should continue to evaluate the ability to sustain a viable firefighting complement and develop retention strategies.

(Suggested completion: 12-24 months)

It is recommended that the fire chief research leading retention strategies for POC volunteers such as live- in, live-out, work experience programs, tax breaks, and benefits that enhance POC volunteer retention and operational effectiveness. Further it is recommended that the fire chief work with HR to undertake a complete compensation and benefits analysis that includes roles and responsibilities and associated pay rates, step increases, benefits, recognition programs, and other incentives for POC volunteer firefighters.

The move towards a composite fire department with full-time career firefighting staff would only be prudent if a sustainable complement of POC volunteer firefighters cannot be maintained in some of MCFS fire stations.

***Rationale:** The fire service relies on sufficient POC volunteer firefighters in each of their fire stations to deliver necessary emergency services to their community. The timelines to recruit and train new firefighters is typically close to a year which necessitates advance anticipation of recruit POC volunteer firefighters' numbers. Retaining an experienced, solid core of fully trained POC volunteer firefighters lessens the financial impact and service level gaps to MCFS and their community.*

Observation #5: While Middlesex Centre has an established health and wellness program for their permanent staff, the fire service does not have a dedicated health and wellness program tailored specifically for the unique needs of a firefighter.

Reference: Section 3.5, Health and Wellness, p.44

Recommendation #5: Develop a unique health and wellness program tailored around the needs of their POC volunteer firefighters.

(Suggested completion: 6-24 months)

It is recommended that MCFS continues to take advantage of programs available through the municipality and expand their program to offer additional services to their staff as outlined in the International Association of Firefighters Wellness-Fitness Initiative Manual.

***Rationale:** Recognizing the unique challenges and programs available for the mental and physical wellbeing of firefighters, an industry specific health and wellness and peer-to-peer program implemented and available to all firefighters is an important component within the core services of the department.*

Observation #6: MCFS does not have an aerial apparatus within their fleet inventory. Should an aerial apparatus be required for response in the municipality, it would be requested from Strathroy-Caradoc. The delay or inability to have an aerial apparatus on scene can seriously hinder the safe and effective operations. Also, there is no assurance that this apparatus will be made available to leave from their respective community.

Middlesex Centre has provided capital funding allocation for a 110-foot, non-platform aerial apparatus in the 2025 year. The amount of time typically required to design, tender, and build fire apparatus is two years or more.

Reference: Section 3.6.1, Structural Firefighting (provided to the NFPA 1001, Level II, and NFPA 1002 Standard), p.45

Recommendation #6: Commence the design and tender process for the new aerial apparatus.

(Suggested completion: 12 - 18 months)

It is recommended that an appropriate apparatus committee should be convened to evaluate the requirements to be used for the design, and tender of the anticipated new aerial apparatus.

***Rationale:** The requirement of an aerial apparatus on many emergency scenes is critical for safe and effective firefighting and rescue operations. Aerial apparatus is typically required for:*

- *Elevated water streams*
- *Roof top fire attack/entry*
- *Elevated evacuations and rescues*
- *Water curtains*
- *Exposure protection*

The ongoing and future development plans both ongoing and proposed, as detailed in the official Municipality of Middlesex Centre Plan, anticipate a significant increase in

commercial, residential (low, medium, and high density) which will increase the need for an aerial apparatus.

The anticipated timelines to put a new piece of apparatus into service typically requires two years or more.

Observation #7: MCFS does not have an established pre-emergency planning program for the municipality.

Reference: Section 3.6.6.5, Pre-Emergency Planning, p.51

Recommendation #7: Establish a pre-emergency planning program for Middlesex Centre

(Suggested completion: 24 – 36 months)

It is recommended that MCFS establishes a department-wide pre-emergency planning program. Pre-emergency plans amongst other criteria, include information regarding the construction type, occupancy, building status, emergency contacts, utility shutoffs, fire suppression and detection systems, exposure information, water supply availability, access problems, staging locations and any other hazards.

***Rationale:** Advanced planning for fires and other emergency type incidents will assist with a safe and effective response.*

Observation #8: MCFS has one fire prevention/training officer with a significant number of fire prevention responsibilities to perform for Middlesex Centre, as well as meeting required obligations for the two agreements with the municipalities of Thames Centre and North Middlesex. This workload has necessitated that the fire chief assist and be on a rotational 24-hour on-call schedule shared with the fire prevention officer.

Reference: Section 3.6.6.5, Pre-Emergency Planning, p.51

Recommendation #8: Establish a second fire prevention/training officer.

(Suggested completion: 24 – 36 months)

It is recommended that MCFS establish a second fire prevention/training officer position. The present fire prevention/training officer is currently responsible for fire prevention, public education and fire investigation for Middlesex North, Thames Centre, and Middlesex Centre, with no training obligations.

***Rationale:** The demand for fire prevention, public education, fire investigations responsibilities, in some cases at a 24/7 basis is difficult, and for some requirements, impossible to meet by a single person. The current requirement for the fire chief to regularly provide some of these services are not consistent of that normally required of a fire chief. Opportunities to share fire prevention, public education, and investigation needs, along with training needs should be considered.*

Observation #9: Some of the recent apparatus purchased were constrained in size and capacity because of limitations of apparatus bay dimensions in the fire stations. Three of the four stations do not have adequate training rooms or areas to support the recurring training requirements.

Reference: Section 3.9.1, Fire Station Overview and Assessment, p.54

Recommendation #9: Undertake a complete condition assessment of all fire stations.

(Suggested completion: 36-60 months)

It is recommended that the municipality undertakes a facilities condition assessment of the Arva, Bryanston, Delaware, and Ilderton fire stations to determine the long-term life cycle of these capital assets. These assessments focused on the building systems, structure, major components and building code compliance. Further, it is also recommended that this assessment includes functional and operational analysis to support MCFS's core services. Together with the future growth projections in each of the fire station response zones this fire station functional analysis typically focuses on the following:

- *Sufficient apparatus bay to safely and effectively garage and maneuver emergency response vehicles and apparatus.*
- *Firefighter staging and personal protective equipment storage.*
- *Equipment storage, maintenance, and decontamination areas*
- *Training and fitness area*
- *Staff support areas such as workstations, offices, kitchen, rest areas, washrooms, and showers (non-gender or gender specific)*

Rationale: *Conducting a facility assessment at each of the four identified fire stations, together with the performance assessments contained in this report and the Middlesex Centre Official Plan community growth projections will assist to determine and plan whether status quo, replacement, refurbishment, re-location, or closure is the most prudent approach to managing the current and future fire department needs of the municipality.*

Observation #10: There is an established apparatus and emergency vehicle replacement schedule. This schedule anticipates the retirement of all apparatus and emergency vehicles at 20 years. Financial resources are set aside in their fire equipment and apparatus reserve fund in anticipation of upcoming replacements. It has been determined that this fund is not sufficient to meet the life cycle replacement needs of the fire service.

Reference: Section 3.10.4, Fire Apparatus Replacement and Dispersal, p.67

Recommendation #10: Develop a comprehensive reserve fund process to meet life cycle requirements.

(Suggested completion: 12-18 months)

It is recommended that there is an annual review and update of fire equipment and emergency vehicle reserve fund to ensure sufficient funds will be available when replacements are necessary.

Further, the development of a comprehensive reserve fund process that accounts for necessary criteria to establish ideal replacement timelines for all fire apparatus and emergency vehicles. A yearly review of this plan should be undertaken to evaluate whether the schedule remains on track. Necessary adjustments to individual apparatus or emergency vehicles can be made at that time.

***Rationale:** Given the nature of emergency services and the reliance on safe and dependable equipment and vehicles, the need for regular and a critical review of these assets is important to determine if the intended life cycle is both achievable and financially responsible.*

Fire apparatus are routinely utilized under extreme conditions for long periods of time. The reliability of these critical pieces of equipment cannot be suspect. As stipulated in NFPA 1901, frontline apparatus is required to maintain a 95% in service status.

In addition to maintaining a current fleet capable of providing reliably service, meeting insurance (ULC) guidelines favourably impacts municipal insurance ratings. While the life expectancy of any piece of equipment or vehicle is contingent on proper use, maintenance and repair, fire apparatus life cycles are subject to adjustments more frequently than normal service vehicles. Annual reviews of all apparatus in MCFS, including mileage, call volume, maintenance records, testing results and salvage values should be carefully done with subsequent adjustments to the original life cycle, whether reduced or extended as warranted.

Updating all apparatus and emergency vehicle replacement schedules will assist with ensuring sufficient timelines for replacement process and necessary funds are there when needed.

Observation #11: The 90th percentile alarm processing performance is trending upward and was more than 2.5 times the recommended 60 seconds in 2021. There may be numerous reasons for the extended times for alarm processing including the increased time taken to determine incident locations in rural areas, and potential technology or process challenges.

Reference: Section 4.4.1, Alarm Handling, p.95

Recommendation #11: Investigate opportunities to reduce alarm processing time.

(Suggested completion: 12-24 months)

It is recommended that the fire chief, working with the Strathroy-Caradoc Police Communications Bureau, should conduct a review of alarm processing and station notification processes and identify opportunities to reduce alarm processing time. Potential causes to consider may include fire department pre-alerting, rural addressing improvements, alarm processing and enhance multi-station response notification.

***Rationale:** Alarm processing impacts fire department response and intervention times. Efforts to reduce this time segment has the immediate impact of reducing overall response time.*

Observation #12: The Middlesex Centre By-Law 2009-13 is the establishing and regulating bylaw for MCFS. It references services to be delivered. However, it does not include specific emergency response time performance service levels. Furthermore, response performance such as the number of firefighters responding either directly or converging on scene, or the time increment to achieve a safe ERF and complete the critical tasks is not being tracked or monitored. All these components would be included in a standard of cover or service level policy.

Reference: Section 4.4.4, Total Response Time, p.100

Recommendation #12: Establish service levels for emergency response.

(Suggested completion: 1-24 months)

It is recommended that the fire chief and senior administration identify relevant performance reporting helpful in identifying current response performance with the aim of assisting Middlesex Centre council with establishing fire department response service levels. This may be achieved as an outcome of completing a standard of cover. A standard of cover is a systematic framework used to validate fire department resource concentration and distribution and confirm services and service levels.

***Rationale:** NFPA 1201: Standard for Providing Emergency Services to the Public suggests all fire departments should have policy identifying service types and service levels. Section 4.5.3.1 states:*

"The fire and emergency services (FESA) leader shall develop and adopt a formal policy statement that includes the specific types and levels of services to be provided by the organization, the service area, and the delegation of authority to subordinates."

Developing formalized policy statements regarding fire department service levels is considered a leading practice. In the absence of established service levels, it is difficult for a fire chief to determine whether fire department response performance meets community and council service expectations. Further, the anticipated growth planned for the Komoka-Kilworth region will increase demands for service in this region of the municipality. Increases in service demands are correlated to increases in population and related risks such as increased traffic flow.

Observation #13: Interview and survey participants identified concerns regarding the sustainability of the Bryanston Station. Numerous anecdotal reports of a reduced or uncertain firefighter response from this station were offered. The difficulty recruiting POC volunteer firefighters in the immediate catchment area is also challenging. Further, the Middlesex Centre Official Plan identifies that future development in the Bryanston and Arva areas will be limited. As a result, community risk and service demand in this demand zone is expected to be stable in the foreseeable future.

From 2017-2021, this station responded to approximately 173 requests for service, or 10% of all incidents in Middlesex Centre. The most frequent incident type occurring in the Bryanston Station demand zone were MVCs. Nine of the 39 fire-related incidents in this period were structure fires. Bryanston Station made 71 requests for second station responses, accounting for

nearly half of all second station responses that weren't cancelled. The incident data and response analysis did not identify frequent response delays or failures. The limitation of this analysis is that it only provides a relatively high-level review of response performance. Presumably at least a portion of these requests resulted from an inability to assemble an adequate response from the station requiring a second station response.

Bryanston Station exceeds the NFPA 1720 response time standard for a rural station. NFPA 1720 suggests a minimum of six firefighters respond within 14 minutes, 80 percent of the time. The five-year 80th percentile response time for Bryanston Station was 677 seconds, or 11.3 minutes, and generally in line with the other MCFS stations. Further, an average number of 10 firefighters responded from this station over this five-year period. Upon further discussion with the fire chief, it was revealed that responses from Bryanston Station are convergent ERF where the response is assembled on scene and incrementally based upon POC availability. This is further exacerbated in that most of the Bryanston firefighters do not reside in the response district or Middlesex Centre. Anecdotally Bryanston Station is not likely to achieve six firefighters within the 14 minutes. These factors have resulted in the requirement to have an automatic second station response. The Bryanston POCs routinely (similar convergent ERF stations) use their personal vehicles and directly respond to the scene. While this is not an ideal or recommended method it is a widely utilized practice with rural or remote demands zones and volunteer fire services.

As indicated in our rationale below, given the Bryanston Station response performance in the five-year review period, the relatively low operating cost, and the current balanced distribution of stations across Middlesex Centre, in our opinion, the value of retaining this station currently outweighs the benefits of closing it. The development of the recommended SOC should include a detailed review of the Bryanston Station response performance including an analysis of the effective response force (ERF) and the POC's personally owned vehicles response model. Notwithstanding the options listed below the SOC should establish an appropriate demand zone level and could include the move from rural to remote as indicated in NFPA 1720.

Reference: Section 4.5, Response Coverage Mapping, p.102

Recommendation #13: Maintain status quo (Option 1) and initiate Option 2 as station performance decreases.

(Suggested completion: 1-120 months)

It is recommended that the fire chief and senior Middlesex Centre administration monitor the operational performance of Bryanston Station. This would include an in-depth analysis of the current response model that includes the use of POC's personally own vehicles, ERF performance, and establishment of an appropriate demand zone as part of the Standards of Cover. Most of the Bryanston members do not live in Middlesex Centre and as such ERF will be significantly impacted.

Working with this community, efforts should be made to retain the service. However, if the current response model is determined to be inadequate, or if failure to recruit/retain POC volunteer firefighters persists, the Bryanston Station should be closed.

Several options were considered to maintain efficient and effective service in the Bryanston, Ilderton and Arva Station demand zones. Each of the following four options present opportunities and challenges.

Option	Pros	Cons
Option 1: Status quo continue to operate Bryanston Station	• No change in level of service • Community retains local connection to fire department and Municipality.	• Retain operating costs of $160,000 (2021 Op. Budget) • Retain future capital replacement liabilities of facility and large apparatus. • May experience increase in future response challenges, as well as challenges with recruitment and retention
Option 2: Closure of Bryanston Station reassign firefighters to current Arva and Ilderton Stations	• Reduction of operating costs of an estimated $50,000 – $100,000 depending on retention of firefighters • May increase number of firefighters available in Arva and Ilderton • No future capital replacement liabilities of fire station and large apparatus • Modest reduction in MCFS administrative and training effort currently utilized to manage Bryanston Station	• Modest reduction in level of service to Bryanston area • Bryanston community loses local connection to fire department and Municipality
Option 3: Closure of Bryanston Station amalgamate firefighters with Arva Station POC volunteers and construct new larger station in rural location between Arva and Bryanston	• Reduction of operating costs of an estimated $50,000 – $75,000 depending on retention of firefighters • Decrease in capital replacement liabilities of older Arva and Bryanston Stations and large apparatus from Bryanston Station • May access disposition value of land and property of Arva and Bryanston Stations • Potential reduction in MCFS administrative and training activities	• Bryanston community loses local connection to fire department and Municipality. • Modest reduction in level of service to some areas of Bryanston and Arva demand zones • Capital construction cost estimation of $7 M - $12 M to construct new fully functional fire station and modest training ground. • Increase response demands on fewer POC volunteer firefighters
Option 4: Closure of Bryanston and Arva Stations amalgamate Bryanston and Arva firefighters with Ilderton and expand current station if possible, or construct larger station within or near Ilderton	• Reduction of operating costs of an estimated $50,000 – $75,000 depending on retention of firefighters • Distributing resources in area with highest population and most likely to experience growth in the future. • Decrease in capital replacement liabilities of older Arva and Bryanston Stations and large apparatus from both stations. • May access disposition value of land and property of Arva and Bryanston Stations • Opportunity to include the development of modest training ground	• Modest reduction in level of service to some areas of Bryanston and Arva demand zones • Increase response demands on fewer POC volunteer firefighters. • Bryanston and Arva communities lose local connection to fire department and Municipality. • Capital construction cost estimation of $7 M - $12 M to construct new fully functional fire station and modest training ground

***Rationale**: In the absence of a complete emergency response performance analysis there is value of retaining Bryanston station until the development of the recommended SOC. The SOC should include a detailed review of the Bryanston Station response performance including an analysis of the effective response force (ERF) capability. An informed decision can then be made regarding the appropriate level of service and the disposition of the Bryanston station.*

Observation #14: MCFS standard operating guidelines do not identify the number of firefighters and resources required to complete tactical or critical tasks. Critical task analyses will clarify incident resource requirements and identify the critical tasks to clarify firefighter tasks and manage an incident efficiently and safely. Survey and interview participants indicated weekday and holiday POC volunteer firefighter availability was occasionally limited. The assembly time discussed in the report needs to be established for the convergent and direct ERFs used by MCFS. A common practice for POC services is to have one officer and three firefighters either onboard before exiting the station for the first alarm assignment, or fully established on scene before attempting the required critical tasks.

Reference: Section 4.7, Critical Task Analysis, p.111

Recommendation #14: Complete critical task analyses for common incident types in response SOGs

(Suggested completion: 12-18 months)

It is recommended that MCFS completes a critical task analysis of common responses and embed them in their SOGs as a component of completing the standards of cover process. Additionally, tactical ERF objectives in SOGs should be scaled to the resources available in the event there are not adequate firefighters available to complete all critical tasks.

***Rationale**: POC volunteer staffing models are limited by firefighter availability and ability to respond. Occasionally this limitation can result in inadequate staffing for more complex and larger incidents. As a result, tactics and critical tasks should be scaled to reflect available resources. For example, if the number of assembled firefighters or water supply are not sufficient to support an interior fire attack or rescue, fire tactics should be limited to exterior and defensive operations. Critical task analyses should be used to identify operational limitations in policy to clarify incident command objectives and maintain safe operations.*

Observation #15: MCFS does not routinely monitor and report response performance. The current process of collecting data and developing reports is largely reliant on manual processes. The ability to collect reliable data and identify changes in service demand and response performance is an important management function. Further, the ability to measure and report performance is critical in maintaining department accountability and transparency for response performance.

Reference: Section 4.8, Measuring, Managing and Reporting Performance, p.115

Recommendation #15: Continue the implementation of a new RMS with the functional requirements to support automated data transfer and reporting.

(Suggested completion 12-24 months)

Fire departments have access to large amounts of data. However, the data only becomes useful if it can be developed into meaningful reports. Manual entry of data is both time consuming and prone to errors. Further, the correction of any errors compounds the inefficiency of this process. Contemporary CAD and fire department RMS systems can be integrated to streamline the data capture process. An RMS can typically be programmed to produce reports and queries to investigate specific topics or incidents.

Rationale: *The first step in performance measurement is to develop the processes to collect reliable and valid data. As already discussed, fire and emergency services are typically data rich agencies. Manual entry of response data is a time consuming and error prone process. Use of integrated computer aided dispatch (CAD) and records management systems can improve the accuracy of the data captured and streamline the reporting process. These technologies simplify the conversion of data into useful information. Performance measurement and reporting is at the core of moving toward a databased culture and moves it away from mere opinion for fire services. Performance measurement and reporting allows fire services to:*

- *Determine a baseline performance level according to the indicators.*
- *Support a transparent and open government.*
- *Establish service level goals based on current performance.*
- *Determine the gap between desired goals and current performance levels.*
- *Track progress toward achieving goals.*
- *Benchmark and compare performance between departments.*
- *Identify problems and causes.*
- *Plan for the future*

Note: *The following table shows the recommendations, along with cost implications, in order of criticality and timeline for implementation.*

	Recommendation	'23	'24	'25	'26	'27	'28	'29	'30	'31	32	Source	Est. Cost	Comments
2a	Facilitate a team building workshop with senior MCFS administration											Staff time	Cost neutral	
2b	Establish an 'alarm assignment response criteria' for the fire chief (and deputy chief) and district chiefs											Staff time	Cost neutral	
3	Develop and approve a full-time deputy fire chief position within MCFS management team with the focus on adding managerial capacity to MCFS												$125,000 annually	
5	Develop a unique health and wellness program tailored around the needs of their POC volunteer firefighters											Staff time	Cost neutral	
4	The fire chief should continue to evaluate the ability to sustain a viable firefighting complement and develop retention strategies												No cost until full-time firefighters needed	
6	Commence the design and tender process for the new aerial apparatus												$1.4 M (estimate)	
10	Develop a comprehensive reserve fund process to meet life cycle requirements											Staff time	Cost neutral	
11	Investigate opportunities to reduce alarm processing time											Staff time	Cost neutral	
14	Complete critical task analyses for common incident types in response SOGs											Staff time	Cost neutral	

	Recommendation	'23	'24	'25	'26	'27	'28	'29	'30	'31	32	Source	Est. Cost	Comments
15	Continue the implementation of a new RMS with the functional requirements to support automated data transfer and reporting												Neutral if current budget for this project is adequate	
7	Establish a pre-emergency planning program Middlesex Centre											Staff time	Cost neutral	
12	Establish service levels for emergency response											Staff time	Cost neutral	
1	Undertake the development of a standard of cover policy that includes the analysis and risk factors identified in the CRA											Staff Time	Cost neutral	
8	Establish a second fire prevention/training officer												$100,000 annually	
9	Undertake a complete condition assessment of all fire stations											Staff time	Cost neutral	
13	Maintain status quo (Option 1) and initiate Option 2 as station performance decreases											Staff Time	Cost neutral	Option 2 could reduce operating costs to an estimated $50,000 – $100,000 depending on retention of firefighters

Conclusion

The goal of developing this Fire Services Master Plan is to conduct a comprehensive review of the Middlesex Centre's fire service and produce a strategic plan for the next 10 years. This will provide a systematic and comprehensive approach to evaluate current response capabilities by identifying and mitigating risks and assist in formulating and communicating strategic directions for the fire service, while highlighting opportunities for improved service delivery. The FSMP will also assist in conveying information to the public, staff, and municipal council about what to expect in the municipality's approach to fire and emergency service planning, service delivery model, policy, and development.

Critical factors identified in this FSMP include:

- POC remuneration and point system that does not include incentives for experience, increased roles, and responsibilities.
- POC recruitment and retention strategies to sustain a viable firefighting contingent. Increased compensation, benefits, recognition, and wellness programs that enhances POC volunteer retention.
- Limited response performance data to complete a full evaluation of the current emergency response capabilities. In particular, the convergent and direct effective response force models that does not track the number of firefighters responding for the initial alarm assignments, or the time increments to achieve an effective response force.
- Bryanston station operational response capacity and ability to assemble an effective response force within a reasonable timestamp. The need for an automatic second station response requirement.
- Anticipated growth and development primarily in the Komoka-Kilworth region and impacts of the Delaware Station and need to enhance the response capacity. Options such as live-in work experience programs, POC station days, and part-time staffing during peak periods.
- Critical need for a standard of cover or service level policy and operational guidelines based upon the Council approved emergency response policy. Critical task assignments and established response staffing levels to safely undertake operational requirements.

There are several observations and recommendations provided in this master plan to improve operational effectiveness and efficiencies. Key among the 15 recommendations is:

- Undertake the development of a standard of cover policy that includes the unique risk factors of each station's demand zone. Identified service concerns or policy gaps should be discussed with council and the SOC policy should clearly reflect the services and service levels provided by MCFS.
- Develop and approve a full-time deputy fire chief position within MCFS management team with the focus on adding managerial capacity to MCFS. Some responsibilities and duties can be shared or re-directed to the deputy fire chief as directed by the fire

chief. This additional management capacity will allow the fire chief to provide a higher level of strategic leadership to MCFS and Middlesex Centre senior leadership team.

- MCFS continue to evaluate the ability to sustain a viable POC volunteer firefighting force and develop retention strategies. The fire chief researched leading retention strategies for POC volunteer such as live-in work experience programs, POC station days, part-time staffing during peak periods, increased compensation and benefits that enhance POC volunteer retention and operational effectiveness. The move to a composite fire department with full-time career firefighting staff would only be prudent if a sustainable complement of POC volunteer firefighters cannot be maintained in some of MCFS fire stations.
- Establish a second fire prevention/training officer. The current requirement for MCFS fire chief to regularly provide some of these services are not consistent of that normally required of a fire chief. Opportunities to share fire prevention, public education, and investigation needs, along with MCFS training needs should be considered.
- Commence the design and tender process for the new aerial apparatus. The current and projected future development plans both, as detailed in the official Municipality of Middlesex Centre Plan, anticipate a significant increase in commercial, residential (low, medium, and high density) which will increase the need for an aerial apparatus.
- Consider options to mitigate changing risk profiles of station demand zones. There are several options identified to validate the concentration and distribution of MCFS resources to maintain service levels in alignment with anticipated growth and development primarily in the Komoka-Kilworth region. The foundation to monitor station demand zone performance and impacts of projected growth is the recommended SOC.
- Develop a comprehensive reserve fund process to meet life cycle emergency vehicle requirements for MCFS.

Although each recommendation has a corresponding timeframe, it is important to note this FSMP needs to be revisited on a regular basis to confirm that the observations and recommendations remain relevant. The recommendations outlined in this FSMP will better position MCFS to mitigate and manage community risks, monitor response capabilities and performance, and maintain excellent community relationships and value for money.

Finally, our interactions with the Middlesex Centre staff revealed a highly professional and dedicated organization that is committed to providing the best possible service to the citizens of the Middlesex Centre.

SECTION 1
INTRODUCTION

1.1 Background and Significance

Community leaders across Canada continue to search for innovative approaches to improve the efficiency and effectiveness of service delivery. Effectiveness refers to the ability to achieve the desired results or outcomes. Efficiency refers to optimizing the use of available resources – whether it is time, money, or effort. The notion of efficiency is service delivery is often described as 'doing more for less' or 'value for money'.

Elected officials, CAOs, directors and managers are often faced with the ongoing challenge of achieving efficient and effective service delivery models. Public safety is most often one of the top priorities within most communities, but achieving this goal comes at a relatively high cost. The services charged with achieving this outcome, including police, fire, EMS, and emergency management services, are essential components of any community's social safety net. Service effectiveness is not an option. However, the need for fiscal prudence and to review operational efficiency and effectiveness cannot be ignored. Senior community officials must continue to be vigilant in their search for innovative and sustainable practices and finding the balance between service levels and expenditures to ensure their citizens are getting 'value for money'.

1.2 Goals and Objectives

The goal of developing this fire services master plan (FSMP) is to conduct a comprehensive review of the Middlesex Centre's fire service and produce a strategic plan for the next 10 years. This will provide a systematic and comprehensive approach to evaluate current response capabilities by identifying and mitigating risks and assist in formulating and communicating strategic directions for the fire service, while highlighting opportunities for improved service delivery. The FSMP will also assist in conveying information to the public, staff, and municipal council about what to expect in the municipality's approach to fire and emergency service planning, service delivery model, policy, and development.

While risks are the basis for triggering response decisions, our analysis also investigated the needs of the community and will provide a point of reference upon which future decisions and priorities can be evaluated and implemented. This includes identifying priorities, challenges, and opportunities for the improvement of the delivery of emergency services to the community, businesses, and overall public safety. This FSMP considers applicable legislation, industry-leading practices, and standards, along with current and anticipated risks to provide unbiased analysis and evidence-based recommendations.

Ultimately, this FSMP will determine optimum service delivery model and serve as a 'blueprint' for the municipality to be more effective and efficient in the delivery of emergency services through current and future challenges.

1.3 Project Scope

The FSMP will consider and achieve the following benefits:

- Enhanced firefighter safety
- Enhanced cost control and containment
- Increased efficiency and effectiveness
- Identification of the right sized service to meet the current and future needs of the community.

At minimum, we completed the following items:

1. Completed a Community Risk Assessment (CRA) addressing the nine mandatory profiles outlined in Ontario Reg 378/18 to make informed decisions regarding the current service capabilities.
2. A review of all current fire services and programs, based upon the above risk assessment. Our analysis included an examination of the department's core functions, including, but not limited to administration, fire prevention, public education, training, fire suppression, apparatus, facilities, and training. The review ofthe fire services and programs must consider and include recommendations respecting:
    - Continuous improvement to the services (administration, suppression, training, public education, and prevention) currently being provided.
    - Fire station location and apparatus deployment that ensures effective and efficient way of suppression services.
    - Recruitment and retention of volunteer firefighters
    - Benchmarking current services and programs against current industry standards and guidelines
    - Reviewed existing means of delivering fire services including an investigation of any underlying issues, budgets, human resources, service delivery protocols, bylaws, etc.
    - Consulted with fire service personnel to understand how fire and emergency response services are delivered, with a view to evaluate existing program efficiencies and effectiveness while identifying potential enhancements.
    - Consulted municipal management and fire department staff to understand administratively and operationally what is and what is not working in fire and emergency response service delivery.
    - Identified needs, opportunities and concerns expressed by interview and survey participants with a view to developing recommendations on improvements or maintaining an effective delivery of service to residents, safety of emergency responders, financial efficiencies, proper infrastructure, fair compensation, and rewards for emergency responders.
    - Considered the growth in population and activities within the areas of jurisdiction over the next 5 - 10 years, and the potential impact to service delivery and

operations of fire and emergency services.

- Reviewed all areas of service delivery including policy and procedures, staffing, station locations, response times, vehicles, and apparatus (new and replacement cycles), vehicle and apparatus maintenance, other equipment, administration, training, mechanical, fire prevention, emergency planning and public education.
- Developed recommendations, rational and their approximate financial implications and implementation plans, including timelines.

1.4 Standards and References

This plan considers the following references and standards:

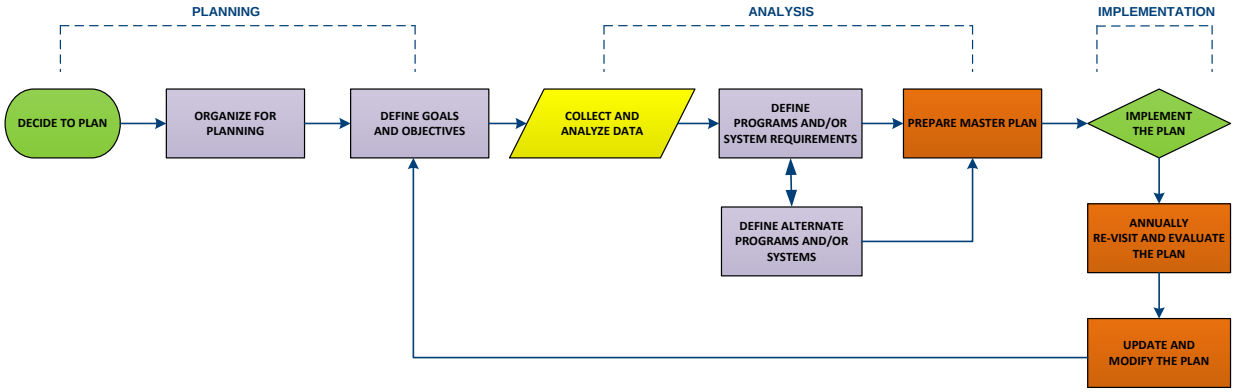
- Commission on Fire Accreditation International
- Canadian Standards Association (CSA)
- Fire Underwriters Survey (FUS)
- Ontario Emergency Management and Civil Protection
- Ontario Fire Protection and Prevention Act
  - O. Reg. 213/07: Ontario Fire Code
  - O. Reg. 378/18: Community Risk Assessments
  - O. Reg. 364/13: Mandatory Inspection – Fire Drill in Vulnerable Occupancy
  - O. Reg 365/13: Mandatory Assessment of Complaints and Requests for Approval
- Fire Marshal Directives
- National Fire Protection Association (NFPA)
- Ontario Occupational Health and Safety Act
- Ontario Building Code
- Underwriters Laboratories (UL/ULC)

1.5 Fire Services Master Plan Process

The following diagram illustrates the process used to complete this FSMP. The FSMP is sometimes referred to as a 'road map' to the future and used as a guiding document for current and future department leaders and decision makers.

As described in the 'implementation' phase, it is highly recommended that this plan be reviewed and evaluated, at minimum, on an annual basis or when there are unusual changes in risk, response demands, population and residential or industrial development activity. When reasonably practicable, we also recommend a third-party update of the FSMP at the five-year mark to apply an unbiased review into the operation and provide further credibility to the master plan process.

Figure 1: Fire Services Master Plan Process



1.6 Consultative Process

1.6.1 Community and Fire Station Tour

The community and station tour focused on the overall footprint, topography, transportation infrastructure of the municipality and the various response zones for each of the five stations. Touring each station provided an opportunity to conduct a general condition and operational functionality assessment on each station. This tour also provided the opportunity to meet with various MCFS staff and discuss their respective interests regarding the FSMP development.

1.6.2 Targeted Interviews

Targeted interviews were part of the data and information collection process. Participants were asked questions related to their areas of purview and expertise. An interview guide was used to conduct the interviews. The interview itself was used to promote an open discussion about the community, risks, general concerns related to the community and municipal operations.

Table 1: Targeted Interview List

No.	Name	Job Title
1	Colin Toth	Director of Emergency Services - Fire Chief
2	Randy Wilson	Station District Chief
3	Blair Harvey	Station District Chief
4	Launie Fletcher	Station District Chief
5	Dave McVittie	Station District Chief
6	Mark Rennison	Station District Chief
7	Carol Huxley	Fire Prevention and Training Officer
8	Shannon Leitch	Fire and Emergency Services Coordinator – Public Educator
9	Michael Di Lullo	Chief Administrative Officer/Director of Planning
10	Scott Mairs	Director of Community Services and Facilities
11	Rob Cascaden	Director of Public Works and Engineering (& Fleet)
12	Tiffany Farrell	Director of Corporate Services
13	Arnie Marsman	Director of Buildings and Bylaw

1.6.3 Online Firefighter Survey

To obtain balanced input, we also employed an online firefighter survey. Our survey methodology offers several unique benefits. First, it offers an opportunity to gather opinions from an entire group as opposed to a limited sample of opinions from a select few. The online survey also offers an extremely flexible approach to the collection of data as respondents can complete the survey questions when it is convenient for them. Additionally, the anonymity of participants is relatively easy to control and therefore may yield more candid and valid responses. Finally, surveys are also extremely time and cost-efficient methods to engage large groups while capturing extensive data.

1.6.4 Municipal Comparative Analysis

An industry peer comparative analysis[2] of MCFS was conducted as a method of benchmarking the performance of departments to similar municipalities. These benchmarks include budgets, performance, effectiveness, and efficiencies. Although fire and emergency services ultimately have the same goal of protecting life and property, each community has its unique features in how to accomplish their goals. Our main criteria for the comparative analysis are indicators of effectiveness and efficiencies amongst the communities for risk and mitigation.

[2] *Please see Section 3.15, Municipal Comparative Analysis, Page 74*

1.7 Study Considerations

The following factors that affected both the assessment and effective mitigation of risk were considered and assessed:

Community-Specific Considerations

- Total area of review
- Population and future growth
- Community risk factors
- Community demographic information
- Development and area structure plans
- Multi-jurisdictional requirements and cooperation
- Current and future development impact on risks and response
- Financial resources and constraints
- Impacts of government legislation
- Bylaws affecting the emergency services.
- Economic factors
- Tourism
- Construction
- Industrial activity
- Utilities
- Retail businesses and other services
- Agriculture
- Buildings and structures concentrating on high-risk demands, including business, assembly occupancies, etc.
- Municipal emergency management plans

Department-Specific Considerations

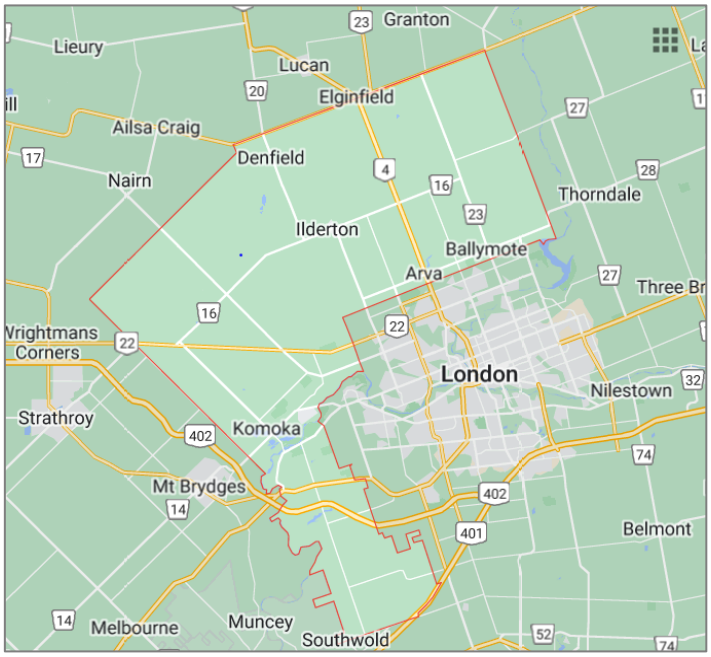
- Geographic and physical boundaries for response
- Fire service annual reports
- Fire service focused reports previously conducted.
- Standard of cover
- Budgets
- Current staff rosters with qualifications
- Fire station locations and other infrastructure
- Support services
- Department structure
- Service delivery models
- Apparatus and equipment inventory, and future needs
- Building space requirements
- Operation staffing and administrative needs
- Bylaw, policies, and procedures
- Reporting structure and requirements
- Fire prevention & public education
- Emergency core service response
- Health and wellness
- Training and recruitment records and standards
- Succession planning
- Prevention programs such as inspections, education, and enforcement
- Records and data management
- Emergency services standard operating guidelines and procedures

SECTION 2
COMMUNITY PROFILE AND RISK OVERVIEW

2.1 Community Overview

The Municipality of Middlesex Centre is in the middle of Middlesex County, bordered by the City of London to the south, Thames Centre to the east, North Middlesex, and Lucan Biddulph to the north and Adelaide Metcalfe and Strathroy-Caradoc to the west. It has a land-based area of 588 km^2, which is rural and agricultural, but also has considerable forested areas and wetlands. Land designations outside of settlement areas are as agriculture, rural industrial, rural commercial, parks and recreation, natural environment areas and flood plain.

Map 1: Middlesex Centre Overview

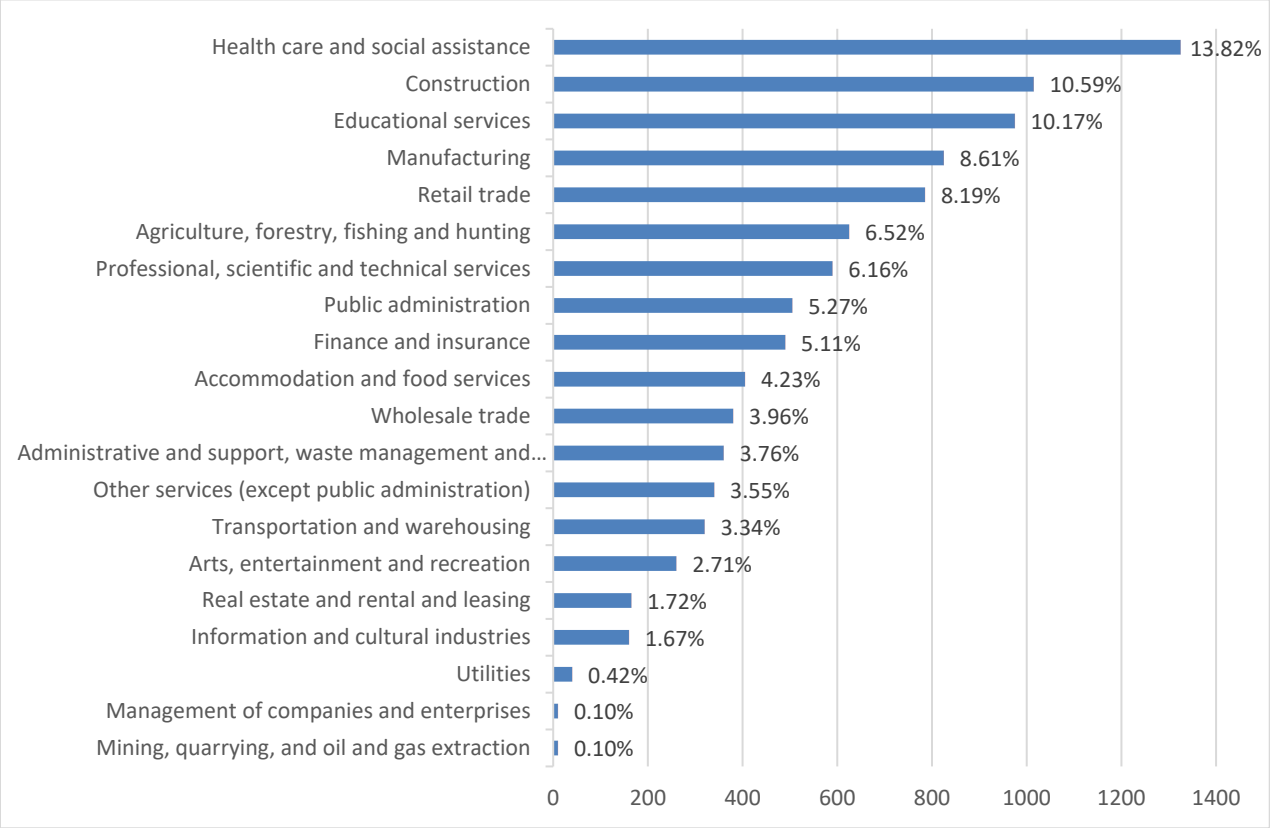


There is an abundance of small rivers and creeks running through the municipality, the largest being the Thames River which runs through the southern portion of the municipality through Kilworth/Komoka. These tributaries are an important water source for the region and beyond, as they flow south to Lake St. Clair, eventually draining into Lake Erie which supplies many Canadian and American communities (including Middlesex County) with drinking water.

2.2 Economic Indicators

The top industry employers in Middlesex Centre are summarized in Figure 2 below. As displayed, approximately 35% of the employed population works in health care and social assistance, construction, or educational services. It should be noted, that 75% of the employed population travels outside of Middlesex Centre for employment, with 71.6% of those travelling to the City of London, and an additional 12% travel to other municipalities or out of province.

Figure 2: Top Employment Industries for Middlesex Centre



The business community within the municipality is one of long-standing small businesses. This sector employs approximately 925 individuals, or 13% of the total working population in the community. Currently the risk of a fire or emergency upsetting the local economy is low, however with its ideal location to major transportation routes, vast lands for potential expansion and strong farm-based agricultural sector; there are proposed expansions in the agricultural and food processing, manufacturing, logistics and distribution along with a light-industrial sectors. Plans forward focus on larger scale expansion particularly in the Kokoma-Kilwroth area. Fire services should be involved with the planning of these expansion projects to determine the impact on emergency response service delivery.

2.3 Growth Projections

Between 2001 and 2021, the Municipality of Middlesex Centre population changed variably, with a decrease in 2016, followed by a marked increase in 2021. Table 2 shows that over this 20-year timeframe, the number of total private dwellings has also changed variably, with the highest increase occurring between 2016 and 2021 by 11.5%. This trend is seen in similar parts of Ontario, as affordability and availability for new developments outside cities is a popular and cost-effective choice for commuters.

Table 2: Population and Private Dwellings Change (2001 to 2021)

Year	Population	% Change	Total Private Dwellings	% Change
2001	14,242	9.7	4,867	
2006	15,589	9.5	5,346	9.8
2011	16,487	5.8	5,808	8.6
2016	17,262	4.7	6,139	5.7
2021	18,928	9.7	6,845	11.5

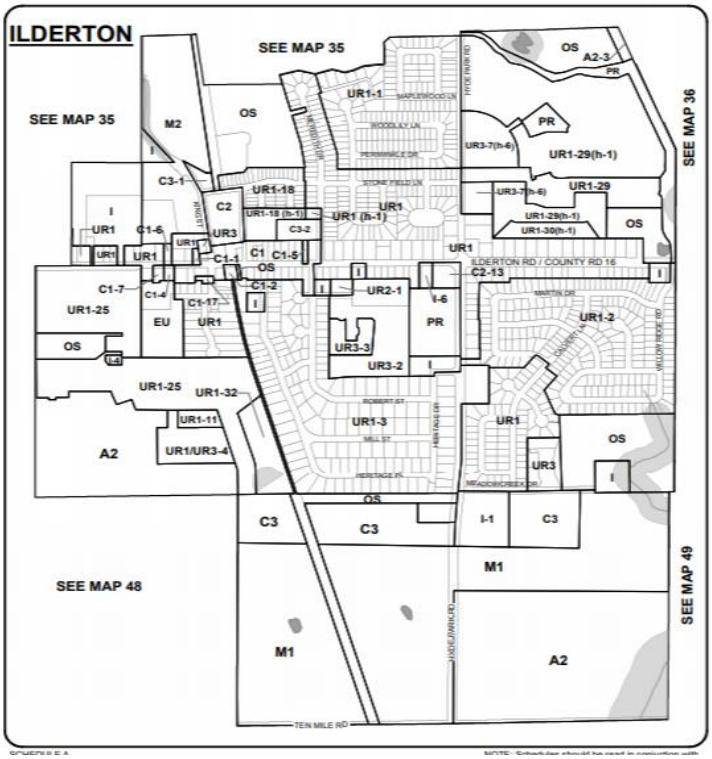
The hierarchy classification of settlement areas in the municipality are urban settlement areas, community settlement areas and hamlets. While urban and community settlement areas have a combination of the listed land use classifications, hamlets have not been separated into individuals land use designations but classified as a 'hamlet' in their entirety.

2.4 Urban Settlement Area

2.4.1 Ilderton

Ilderton is located several kilometers from the outskirts of London. There are approximately 1,200 households in Ilderton, with an estimated population of 3,500 (2016). The community is, expected to account for 20% of projected population growth. The land use in Ilderton is mostly residential (UR1-UR3). However, there is a small cluster of village, highway, and office park land use designation (C1-C3). There are several small amenities including medical and veterinary centre.

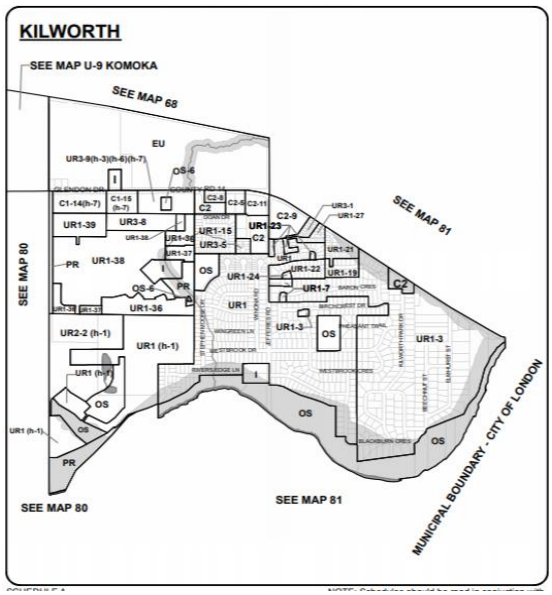
Map 2: Ilderton Land Use Area



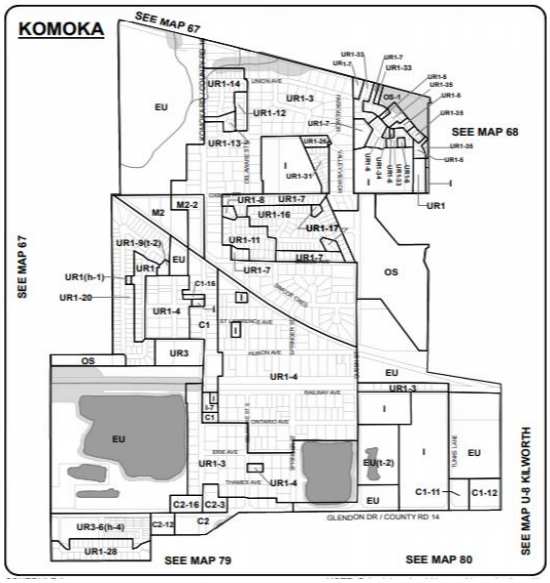
2.4.2 Komoka-Kilworth

Located west of London. There are approximately 1,610 households in the area and a population of 4,600 (2016). While there are several commercial buildings, there is no central business district or focal point of the community. Much of the surrounding area/outskirts of the settlement area is designated as 'open space' (OS), generally used for light recreation; or as 'existing use' (EU), which limits development in these areas. It is noted however that the provisions of category EU were set to expire as of June 2020.

Map 3: Kilworth Land Use Area



Map 4: Komoka Land Use Area

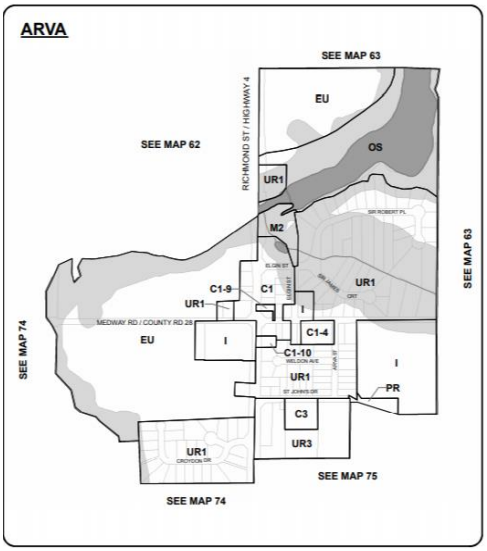


2.5 Community Settlement Areas

2.5.1 Arva

Arva is located approximately 1.3 km kilometers from the northern boundary of London. The 2016 census indicated that there were approximately 190 households in Arva, and it had a population of 500, however long-term population forecasts suggest that between 2016 and 2046, Arva and Delaware, will collectively account for 14% of the area's population growth, which would be estimated at 82 people per year.

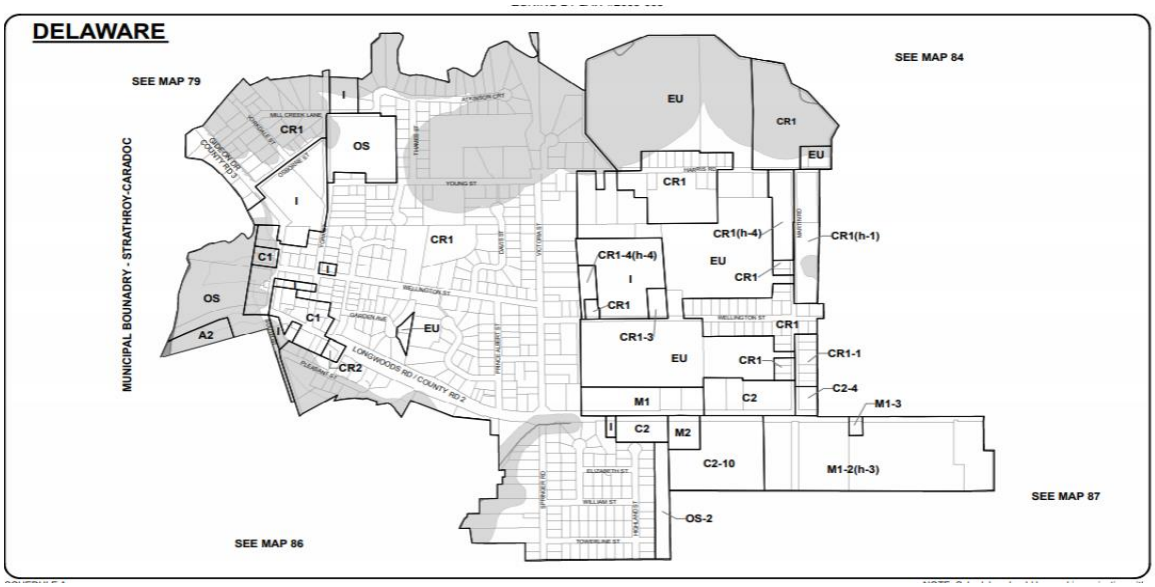
Map 5: Arva Land Use Area



2.5.2 Delaware

Located 5.09 kilometers from the western edge of London. The community straddles the Thames River and surrounded by forests, farmland, and floodplains. It has an estimated 550 households and population of 1,600 (2016). It has a small industrial area which is the site of manufacturing and wholesale farming equipment.

Map 6: Delaware Land Use Area



2.5.3 Hamlet Areas

The remaining hamlet areas located throughout the municipality, account for 2,400 households and a population of 7,600 (2016). These areas designated as residential areas, with small lots dedicated to village commercial areas. The main hamlet areas are:

- Ballymote
- Birr
- Denfield
- Bryanston
- Lobo
- Melrose
- Poplar Hill/Coldstream

2.6 Key Community Demographics

- Middlesex Centre currently has a population aged 65 and older of 3,575 (18.9%) and projected increase to this number (16%) over the next decade.
- Labour force status shows that Middlesex Centre has a higher participation rate than the province of Ontario (71.5% versus 64.7%)[3].
- 2016 Census, 62.0% of residents in the municipality have a postsecondary Certificate, Diploma or Degree, which is higher than the province. This level of educational attainment could be linked to the median household incomes found in the municipality.

[3] *Statistics Canada Census Profile, 2016*

- 2016 Census, the median total income of households for Middlesex Centre in 2015 was $108,971, which is significantly higher than the provincial median total income per household of $74,287.
- Approximately 35% of Middlesex Centre's employed population works in health care and social assistance, construction, or educational services. It should be noted that 75% of the employed population travels outside of Middlesex Centre for employment, with 71.6% of those travelling to the City of London, and an additional 12% travel to other municipalities or out of province.
- Immigration status indicates the municipality has a lower proportion of newcomers (10.5%) when compared to Ontario (29.09%).
- Middlesex Centre is well positioned for day activities for visitors and tourist centres such as London, Grand Bend, Port Stanley, and Stratford. The region promotes agri-tourism, arts, and natural outdoor activities. Tourism contributes to some population shift that is seasonal; overall, they do not contribute to a significant shift in population in terms of tourism accommodation.

2.7 Community Planning and Development

During the creation of the Municipality's Strategic Plan, five priorities were developed with specific initiatives and objectives associated with each. The five priorities were, Engaged Community, Balanced Growth, Vibrant Local Economy, Sustainable Infrastructure and Services, and Responsive Municipal Government.

Since 2016 Middlesex County and local municipalities have seen an increasing amount of development applications and approvals. There has been a 100 percent increase in subdivision and condominium activity, and a 25 percent increase in local approval issues like zoning amendments and minor variances. With anticipated growth projections, this activity is expected to increase even further. The recent trend suggests that new developments are larger in volume and more complex. This is consistent with growing demand for residential and commercial properties in Middlesex County.

2.8 Community Risk Assessment

Every municipality has unique characteristics and challenges contributing to risk. Risk can be managed through either accepting the risk, insuring against damages, or investing in risk prevention and mitigation strategies. Local governments typically employ a combination of these approaches. In general, the risks and management strategies of a community are relative to a municipality's financial capacity, geography, population demographics, fixed assets, and critical infrastructure, as well as overall service delivery.

This study provides a high-level community assessment of risk associated with fire and hazards, specifically focusing on the high-priority risks managed with a fire department response. High-priority risks are those associated with a high consequence or those that have moderate consequences and greater likelihood of occurring. The overall purpose of conducting a risk assessment is to establish an immediate, short-term, and long-range general strategy for the management these types of community risks.

Risk Evaluation

- *Identify the existing risks and assign a value to specific risks based on quantitative and qualitative data.*
- *Identify fire department management strategies for high priority risks.*
- *Predict future risks.*

Conducting a risk assessment is the first step towards establishing a strategic plan to manage community risks based upon local fire department response capabilities. The results are used to assist the municipality in making informed decisions regarding the allocation of limited fire prevention and fire response resources.

2.8.1 Factors Contributing to Risk

As mentioned, every municipality has unique challenges and characteristics contributing to the overall risk profile of the community. Examples of community risks include:

- Fire/rescue service model and response capacity
- Population and demographics
- Population growth rate
- Industry types
- Economy
- Rate of development
- Transportation corridor types
- Typography
- Weather
- Historical response data

2.8.2 Risk Management

Image 1: Risk Management Cycle Process

All communities require a process to identify and actively manage high-priority risks. As previously discussed, there are approaches to managing risk. The focus of this report is to identify and discuss specific risks, and unique community characteristics that contribute to risk, typically managed through fire prevention or fire department response. Image 1 describes the risk management cycle. The first step in the risk management process includes the assessment of the probability and consequence of specific risks. The next step is the assessment to identify key risks which are then evaluated against the current prevention or response strategy to identify potential service gaps. The third step in this cycle includes adjusting fire prevention and response service levels to manage the resources necessary to pre-emptively mitigate or respond as determined by approved service levels. The last step in the cycle is to measure and report results to key policy makers. This cycle should be repeated periodically to address changes in the risk profile and make thoughtful and informed decisions regarding strategies to manage any changes.

In Canada, local governments are charged with delivering fire and rescue response services for their citizens. Elected officials are the 'authority having jurisdiction' (AHJ) who determines the level of service required to manage fire and rescue risks to an acceptable level. The challenge for elected officials lies in determining the best balance between investing in adequate emergency services and accepting a certain level of risk.

2.9 Risk Evaluation vs. Service Levels

The evaluation of fire or rescue risks considers both the probability and consequence of emergency event types. The probability of an event is quantified by analyzing historical, current, and projected data. The consequence of the event type or risk is based on an informed assessment of the potential impact on a community should the event occur.

Probability – The probability of a risk, or event type, is the determined likelihood that an event will occur within a given time. The probability is quantified by considering the frequency of event type data. An event that occurs daily is highly probable and therefore higher risk. An event that occurs only once in a century is assessed as a lower risk as it may never occur.

Consequence – There are three types of consequences when considering fire/rescue response requirements:

- Life safety impact: Life safety risk for victims and responding emergency personnel are the highest order of consequence when considering the risk associated with specific event types. Events with a high likelihood of injury/death occurring and even a moderate

probability of occurring require close examination to ensure adequate resources required to safely rescue or protect the lives of occupants from life-threatening are accessible to respond. Incidents that risk life safety include motor vehicle accidents, extreme weather, flooding, fire, release of hazardous materials, medical emergencies, and all types of rescue situations.

- Economic impact: Events with high negative impact on the local economy are devastating to a municipality. For example, recovering from the fire loss of a large employer's property or key public infrastructure in smaller municipalities can be difficult. Therefore, providing adequate response capacity necessary to manage these types of events must be considered.
- Environmental impact: Negative environmental consequences resulting in irreversible or long-term damage to the environment must also be considered in the analysis. Events with risk of negatively impacting water, soil and air quality are also likely to impact life safety as well as the economy and therefore must be considered.

Social and cultural impacts as experienced with the loss of historic buildings, recreation facilities or non-critical community infrastructure, are considered but do not typically affect how fire department resources are deployed.

As discussed, the risk evaluation process is used to identify high-priority risks and the appropriate risk management strategy. Where a fire department response is determined to be the most appropriate management strategy, the appropriate services and service levels should be established to safely manage the risks. Elected officials are responsible for determining which services are delivered and setting service level goals. The service level goals determine the necessary concentration and distribution of either fire prevention or emergency response resources to safely manage the identified risks.

> ***Distribution*** *refers to the number of fixed resources, such as fire stations, and where they are placed throughout the community. Distribution varies depending on factors related to the number of incidents and types of calls for service in the defined area.*
>
> ***Concentration*** *refers to the assembling of resources, such as a specialized work force and equipment, needed to effectively respond to an incident in each area within the community. It must also identify the availability of additional response resources including the reliability and time of arrival of a secondary responding unit.*

The risk evaluation matrix (see Figure 3.) can be divided into four levels of risk based on the probability and consequence, each with specific implications for the concentration and distribution of resources. It is provided as a reference and context for use of the matrix to quantify fire response risks in your municipality. Different quadrants of the risk matrix need different response requirements.

Figure 3: Risk Evaluation Matrix

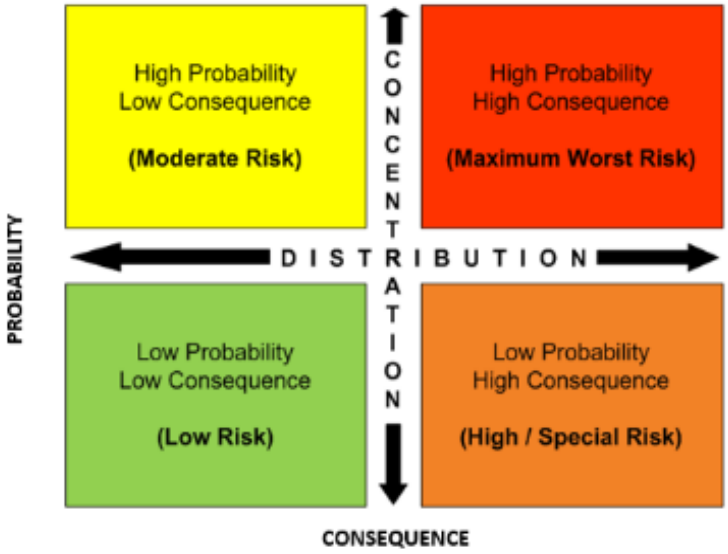


Table 3 offers examples of categories of types of structural fires and general hazards commonly found in communities. As described above, these risks are categorized by considering the probability and consequence of the fire or hazard. This qualitative analysis is based on experience and expertise, and should be completed with input from fire, building and emergency management officials. Every community will have a unique risk inventory contributing to its risk profile.

Table 3: Sample Risk Inventory

Low Risk = Low Probability and Low Consequence

This category is limited to areas or incidents having a low probability of fire risk and low consequence for the potential for loss of life or economic loss. Some low risks include:

- Outdoor fire pits
- Non-structure lightning strikes
- Vacant land
- Parks without structures
- Isolated structures such as sheds

Moderate Risk = High Probability and Low Consequence

Most responses fall under this category. Moderate risks include:

- Motor vehicle collisions
- Carbon monoxide detection (emergency medical co-response)
- Monitoring/local alarms
- Vehicle fires
- Dangerous goods incidents with small quantities of a known product (20 litres or less), outdoor odours (natural gas or unknown)
- Miscellaneous explosions
- Emergency standbys
- Smoke
- Odours
- Fires:
  - garbage
  - detached garages
  - single or multi-family residential fires
  - small non-residential buildings less than 600 square metres

High Risk = Low Probability and High Consequence

There are very few properties/responses that are considered high probability, high consequence. These properties are categorized as large properties, over 600 square metres, without adequate built-in fire protection systems, or that has large concentrations of people or has a significant impact on the local economy. High risks include:

- Commercial, industrial warehouse
- Dangerous goods incidents with large quantities of known products (75 litres or more), unknown products or large exposure
- Hospitals, care homes, institutions
- Derailments & transportation of dangerous goods
- Aircraft crashes on or off the airport
- Bulk fuel storage facility fire/explosion

Maximum Risk = High Probability and High Consequence

This category of risk can be generally categorized as properties over 600 square metres that have high economic value in the form of employment or are not easily replaceable, or natural disasters occurring in highly populated areas, creating high life and property loss potential and strains on the department and other agency resources. Damage to properties in this category could result in temporary job loss or permanent closure of the business. Such properties are highly regulated or possess built-in fire protection systems. Some maximum risks include:

- Wildland fires
- Weather related events (floods, tornadoes, serve storms etc.)
- Large vehicle accidents, pileups, derailments
- Quantities of known flammable products (500-1000 litres)
- Explosions or substation electrical fires
- Confirmed natural gas leak

2.9.1 Assigning 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 (below). 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 4 shows the risk matrix from the CRA appended to this report[4].

Figure 4: Risk Matrix Template

Almost Certain 10,000	Moderate Risk	Moderate Risk	High Risk	High Risk	High Risk
Likely 1,000	Moderate Risk	Moderate Risk	Moderate Risk	High Risk	High Risk
Possible 100	Low Risk	Moderate Risk	Moderate Risk	Moderate Risk	High Risk
Unlikely 10	Low Risk	Low Risk	Moderate Risk	Moderate Risk	Moderate Risk
Rare 1	Low Risk	Low Risk	Low Risk	Moderate Risk	Moderate Risk
	Insignificant 1	Minor 10	Moderate 100	Major 1,000	Catastrophic 10,000

The purpose of assigning a risk level is to assist in the prioritization of the range of risks that are identified in the CRA.

Where possible, quantitative data was used to inform the risk assignment as described in the rationale in the table. It is important to recognize that with the availability of new or updated data, the probability levels could change or be refined. It should also be recognized that, as identified in. OFM T.G.-02-2019, "professional judgment based on experience should also be exercised in combination with historical information to estimate probability levels. Similarly, OFM T.G.-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 consider information from the CRA's nine profiles, as OFM T.G.-02-2019 supports consideration of the profiles together to inform decision-making about the provision of fire protection services in the specific municipality/community.

[4] *See Appendix G*

2.10 Structural Fire Risk Analysis

It is critical to use careful planning and consider alternative solutions when managing risk because the ability to increase the distribution of resources and add capacity is always limited. Spending substantial amounts of time and resources to manage a risk with low frequency/low consequences will have limited impact and make a minimal improvement to community safety. When planning for fire department response, the planning process includes a detailed review of the frequency of events and their potential consequence(s) to ensure prevention and response efforts maximize life safety and minimize negative consequences for high-priority events.

The Office of the Fire Marshal (OFM) have developed guidelines to assist municipalities with conducting community risk assessments to inform decisions about the provision of fire protection services, in accordance with Ontario Regulation 378/18 and the Fire Protection Act 1997 (FPPA).

As referenced in O. Reg. 378/18, the building stock profile assessment includes analysis of the types and uses of building stock of a 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 department. There are potential fire risks associated with different types and uses of buildings given the presence or absence of fire safety systems and equipment at time of construction and maintenance thereafter. This section considers these building characteristics within the municipality.

2.11 Ontario Building Code Occupancy Classifications

2.11.1 Building Stock Profile

The Ontario Building Code (OBC) categorizes buildings by their major occupancy classifications. Each classification has definitions that distinguish it from other occupancy classifications. Using the OBC as the source for defining the occupancy classifications provides a recognized definition and baseline for developing the community risk profile. The OBC major classification groups and divisions are presented in Table 4 below.

Table 4: OBC Major Occupancy Classification

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

2.12 OFM Fire Risk Sub-Model Occupancy Classifications

The Fire Risk Sub-model developed by the OFM utilizes the major building occupancy classifications (i.e., Group A, B, C, D, E and F), but does not use the detailed division classifications as included in the OBC. This strategy provides the opportunity for further analysis of a specific occupancy group. Subject to any site-specific hazards or concerns, occupancies within a group can be assessed individually and then included where required within the scope of the broader community risk assessment.

Analyzing structural fire risk begins by developing an exhaustive inventory of existing building stock and monitoring changes to the inventory. This process should include staff from the planning and development departments, as well as building and fire prevention officers. This provides the fire service with an opportunity to evaluate the Ontario Fire Code requirements in the design, construction, and operation phases of the building.

The building inventory database becomes the foundation of assessing fire risk in the community. This inventory provides a count of all property types including single and multi-family residential, assembly (including schools, churches, hospitals, personal care homes, etc.), mercantile, commercial, and industrial properties.

Once the inventory is assembled, fire department response capability is measured against the identified property risks. This simple identification of the high numbers of specific high-risk property types may identify gaps in the current response model, resulting in the reorganization or addition of fire department resources. As building stocks increase, fire departments should continue to monitor response capability and capacity to ensure service levels are maintained.

2.13 Middlesex Centre Existing Major Building Classifications Summary

The majority of the municipality's existing property stock consists of Group C - Residential Occupancies (6,365). The second largest occupancy type within the municipality is those considered under the 'Other' category, such as farm buildings (2,747). Note only Types I, II and III barns were considered under this category, and no other outbuildings, i.e., milking parlours, silos, etc.

Industrial, mercantile, and personal services accounted for few properties in the inventory (again reflective of building type and not number). This analysis confirms that Group C - Residential Occupancies represent the most prominent type of building occupancy type within the municipality. For the five-year period from 2016 to 2020 the Group C- Residential Occupancies accounted for 49.1% of the structure fires in the municipality. Similar historical data provided by the OFM indicates that most structure fires within Ontario also occurred in Group C - Residential Occupancies (76%).

Middlesex Centre has an impressive inventory of building stocks within the municipality. This inventory is included as part of the CRA attached as appendix C. The information provided in the building classification summary includes the occupancy classifications, concerns, and measures to mitigate the risks and a risk level classification. Other key factors for understanding fire related risk included in the CRA include building density and exposure, age and construction and high potential fire risk occupancies.

2.14 Occupancies with Potential High-Fire Life Safety Risk

Occupancies with a potential high-fire life safety risk are those where occupants may require evacuation support, have mobility issues, or require specialized medical equipment. Examples of occupancies of this type include medical facilities and hospitals, nursing homes, and assisted living homes. The municipality has identified the following occupancies in Table 5 below with a high fire life safety risk.

Table 5: High Fire Life Safety Occupancies (2018)[5]

Occupancy	Address	Hazard
County Terrace Nursing Home	10072 Oxbow Drive, Komoka	• 120 extended-care residents • Two floors one elevator • Need to accommodate wheelchairs
Middlesex Terrace	2094 Gideon Drive, Delaware	• 105 extended-care residents • Three floors one elevator • Need to accommodate wheelchairs

[5] *As retrieved from Community Emergency Management Plan 2018*

2.15 Community Risk Analysis Overview

Middlesex Centre completed a review of its hazard identification and risk assessment (HIRA) in December 2021, indicating its commitment to sustaining compliance with the municipality's legislative requirements. The current HIRA assigns likelihood and consequence levels to a list of hazards based on the potential for impacts to people, property, and the environment. As a result of this analysis, the top seven hazards in the rated as a medium threat to the municipality are:

- Tornado
- Infectious disease
- Lightning
- Flood
- Oil/natural gas
- Thunderstorm
- Rail

2.16 Impacts of Hazards on Fire Protection Services

In addition to the overall highest risks to the community, certain events pose an increased risk specific to firefighting. The risk to firefighting responders to the most hazardous events are identified below, as well as the most hazardous events they may encounter that pose a specific risk to them and their ability to respond, in particular:

- Snowstorms/hail/freezing rain
- Hazardous materials release/spill/fire
- Critical infrastructure failure
- Motor vehicle incident
- Industrial fire
- Dust explosion
- Swift water rescue

Table 6: Top Hazards and Possible Impacts on Fire Services

Hazard	Possible Impacts on the Fire Service
Critical Infrastructure Failure	• Inability to communicate with responders, stations, and dispatch • Loss of backup power for communications • Increased medical calls • Traffic disruptions and MVCs causing increased calls and response delays
Dust Explosion	• May occur suddenly which responding to another alarm type • Inability to evacuate • Falling debris • Dangerous rescue conditions • High rate of fatalities
Flood	• Impassable, flooded roadways • Increased calls for rescue • Swift water rescue • Submerged debris on roads creating hazards for civilians and responders (drivers and on foot) • Delays in response due to road conditions • Increased MVIs
Hazardous Materials Release/Spill/Fire	• Lack of proper training and or response gear • Delay in assistance • Exposure to hazardous products • Fire or explosion
Industrial Fire	• Lack of knowledge of hazardous materials on location • Lack of proper training and or response gear • Delay in assistance with hazardous materials • Fire or explosion
Infectious Disease	• Staffing shortages – inability to run apparatus • Increased medical calls • Extended shifts to cover staff shortages resulting in fatigue and potential for injuries and accidents • Increased cost of running apparatus • Impact to supply chain • Increased overhead for PPE • Exposure of employees responding to medical calls
Lightning	• Igniting fire (structure, grass, etc.) • Power outages – increasing calls and interfering with communication • Loss critical infrastructure • Danger to workers responding to calls
Motor Vehicle Incident	• MVC with apparatus • Oncoming traffic and potential for injury/death • Fire/explosion • Release of hazardous materials

Hazard	Possible Impact on Fire Service
Oil/Natural Gas	• Dangerous exposure to responders • Need for proper PPE • Ignition/explosion • May need hazmat support
Rail	• Hazardous materials release in populated area • Exposure to responders • Need for specialized response and coordination with rail carrier • Closure of roads and emergency routes
Snowstorms/Hail/Freezing Rain	• Loss of control of apparatus • Dangerous driving conditions • Delayed response
Swift Water Rescue	• Inexperience and or lack of proper equipment • Hypothermic conditions • Secondary drowning or injury • Obstructed view of debris in water
Tornado	• Sudden and dramatic increase calls for assistance, overwhelming capability • Multiple stations in demand at once, inability to offer mutual assistance • Potential damage to station and/or apparatus • Rescues due to structural collapse imposing danger on firefighters
Thunderstorm	• Risk of lightning strikes igniting structures, grass, etc. • Power outages – increasing calls and interfering with communications • Risk of flooding • Potential for damaging hail and tornados

2.16.1 Fire Station Response Demand Zone

One of the challenges for MCFS and the municipality is to provide fire, rescue, and first medical response services in an area of 588.11 km^2, which is rural and agricultural, but also has considerable forested areas and wetlands. MCFS currently operates out of five fire stations or demand zones:

- Arva Station 14352 Medway Road, Arva
- Bryanston Station 15321 Plover Mills Road, Bryanston
- Coldstream Station 10227 Ilderton Road, Coldstream
- Delaware Station 11563 Longwoods Road, Delaware
- Ilderton Station 22531 Hyde Park Road, Ilderton

Based on these different characteristics, it is reasonable to consider providing different fire and rescue services, as well as service levels, to manage the unique risks found in the varying demand zones. The structural fire risks along with the differing hazards within each demand zone should be analyzed using the risk matrix methodology. This process should identify high, extreme, and unique risks in these demand zones. As a result, the types and service levels necessary to manage these risks may differ across the demand zones within the municipality.

Observation #1: A Standard of Cover (SOC) policy identifies high and extreme risks in a community and measures the current performance of the fire service to ensure these risks are managed safely. MCFS and the municipality currently do not have an SOC that is approved by Council. This policy is used to define services, service levels and outline performance reporting requirements. Where service gaps are identified, the analysis of the unique and common risks in specific demand zones provide elected officials with the information required to make informed service level decisions. This information can be used to identify performance reporting requirements. Appropriate levels of performance reports can be shared with key stakeholders and inform the public.

The information gathered in the standard of cover process can be shared both at the senior administrative and elected official levels. This can facilitate a purposeful and informed decision-making framework for both these groups of officials regarding the need for specific services, setting service levels, allocating funding, and establishing performance goals for MCFS.

Once completed, a standard of cover policy may be shared with the public to provide clarity with respect to services provided and service level expectations. The information/data contained in the CRA is foundational in the development of the SOC policy.

Recommendation #1: Undertake the development of a standard of cover policy that includes the analysis and risk factors identified in the CRA.

(Suggested completion: 48 - 60 months)

It is recommended that MCFS undertake the development of a standard of cover for all demand zones within the municipality. After completing this review, the results should be compiled into a single document and presented to council. Identified service concerns or policy gaps should be discussed with council and policy should clearly reflect the services and service levels provided by MCFS. Further, the SOC should consider the unique risk factors in each of the five demands zones and the availability of firefighting water supplies.

To be successful, this process requires the support of all levels of senior municipality's leadership and county council, as well as adequate resourcing within MCFS.

***Rationale:** A standard of cover policy offers several benefits to the operation and governance of MCFS. A comprehensive risk analysis completed at the level of individual demand zones would identify all high, extreme, and unique risks within the different demand zones. It also involves a complete review of existing services and service levels, standard operating guidelines and policies, a review of fire department resource distribution and concentration based on risk factors, and fire department performance measurement and reporting.*

2.17 Water Infrastructure

Additionally, the municipality has both urban and rural areas within the demand zones that are not serviced by fire hydrants. Middlesex Centre has two water distribution systems: Melrose Supply System and Middlesex Centre Distribution System. The Melrose Supply System gets its source from groundwater wells, while the Middlesex Centre Distribution System relies on the Lake Huron Primary Water Supply System or from the City of London Distribution System[6].

Water supply is a critical infrastructure that is essential for firefighting. Having access to the municipal water delivery systems is critical to service delivery. The municipal system consists of 11 facilities, 81.8 km of mains, 909 valves and 432 hydrants. Overall, the system is particularly good, with only a 30% useful life (UL%) percentage used. The reliability of the system – which quantifies any downtime of the system (due to main breaks), is a loss of 0.029 connection days per year, compared to the total number of properties connected to the system (pp. 2-27 – 2-31). Fire flow, which is the available water supply for fire protection purposes, is available for all areas with service.

The risk to the fire service is the low percentage of the properties in the municipality that have connection to the water system. Only 56% of properties have connection to the water system where fire flow is available (pp.2-24). As such, the need to have additional apparatus available to haul water across the municipality is of major importance.

Alternate water supply sources can include fire department access to ponds, streams and alternative water supplies, and the use of fire suppression apparatus that have portable tanks that can support a tanker shuttle and a continuous supply of water to support fire suppression activities. According to the Fire Underwriter's Survey, an Accredited Superior Tanker Shuttle Service is a recognized equivalent to a municipal fire hydrant protection system 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. It is essential for MCFS to develop a water servicing strategy for those areas requiring water flow for firefighting.

[6] *Municipality of Middlesex Centre Asset Management Plan, 2020*

SECTION 3
DEPARTMENT PROFILE

3.1 Department Overview

MCFS was formed in 1998 following the amalgamation of the former townships of Delaware, Lobo, and London into what is now the Municipality of Middlesex Centre. Today's MCFS is a POC volunteer fire service, relying on POC volunteer firefighters assigned to respond out of five fire stations situated throughout the municipal boundary. These stations include:

- Arva Fire Station
- Bryanston Fire Station
- Coldstream Fire Station
- Delaware Fire Station
- Ilderton Fire Station

MCFS relies on a current roster of 118 POC volunteer firefighters, one fire prevention officer, plus one fire services coordinator to provide fire, rescue, and medical first response services to residents and visitors of Middlesex Centre. This team is led by the Director of Emergency Services-Fire Chief Colin Toth, who is the only management position in MCFS joining four other directors answering to the CAO and Middlesex Centre Council.

MCFS can request or be requested for additional fire/rescue resources with partners within the Middlesex County through mutual and automatic aid agreements.

The people of MCFS have dedicated their time and energy to faithfully serve their communities by using training, technology, and commitment in providing valued service to the citizens and visitors to the municipality. MCFS is a proud fire service that values their past, embraces the present and looks forward to the challenges of the future.

Modern fire departments have evolved into a critical component of a community's social safety net. Whereas early fire departments were established specifically to combat structure fires that, at the time, were often devastating. Today, fire departments are also called upon to respond to medical emergencies, technical rescues, and dangerous goods releases, often working together with other response agencies. As a result, fire departments must be properly structured, adequately resourced and equipped to deliver these services safely and competently.

Middlesex Centre is a large and diverse municipal district (588 km^2) with a mixture of urban, rural, commercial, and industrial communities with a 2021 census population of 18,928.

Middlesex Centre Council has developed an official strategic plan that provides for the orderly growth and development of the municipality as well as provide guidance in the management of change. One of council's strategic themes is to provide a thriving, progressive and welcoming community that honours their rural roots and embraces their natural spaces.

The anticipated growth in development and population in certain areas of the municipality will challenge MCFS to maintain the current level of service going forward. It is desirable to ensure

current services and infrastructure are in step with future development. In the case of a fire service, the lead-time to have stations, staffing and equipment in place at the appropriate time is validating the need to develop a master plan that is aligned with the Middlesex Centre plan and council priorities.

While volunteer fire departments have a long-valued service history with their respective communities throughout North America, there may be a point that necessitates a transition toward a hybrid full-time/volunteer staffing model, typically referred to as a composite delivery model. MCFS has not moved in that direction however may be required at some point because of increasing call volume, incident complexity and resource demand in certain areas of the municipality.

3.1.1. Mission, Vision of Middlesex Centre

A mission statement declares concisely the purpose of an organization, why it exists and how it provides service. A vision statement offers insight into where the department strives to be in the future. The following mission and vision statements were captured from the Middlesex Centre Municipality Official Plan.

Municipality of Middlesex Centre Mission Statement

To deliver the highest standard in municipal services in a sustainable, professional, and innovative manner

Municipality of Middlesex Centre Vision Statement

A thriving, progressive and welcoming community that honours our rural routes and embraces our natural spaces

3.1.2. Mission and Vision of Middlesex Centre Fire Service

Middlesex Centre Fire Service Mission Statement

To position Middlesex Centre Fire Service to be a leader in all three lines of defence and one of the most respected emergency services providers in Ontario

Middlesex Centre Fire Service Vision Statement

To provide a range of services and programs to help protect the lives and properties of the residents of Middlesex Centre

3.2 Human Resources

Whether full-time (career), volunteer (not paid) or POC volunteer; a fire department's employees are its most valuable asset. Emergency services are often delivered under difficult and stressful circumstances, with little room for error. Fire departments must be adequately resourced with staff, equipment, and training to be effective in delivering the highly technical services to achieve service excellence. As a result, a considerable effort is warranted to ensure that only highly committed, team-oriented, and physically able employees are recruited, trained, and retained.

An effective organizational structure must promote and support strong, effective leadership, sound business management and continuity, and effective communication with opportunities for staff development.

Middlesex Centre maintains a Human Resources Department (HR) partnering with each of the municipality's departments, programs, and services to assist with achieving their human resources goals and objectives.

Services provided include:

- Recruitment and selection
- Compensation and benefits
- Employee relations
- Performance management
- Employee wellness
- Policy implementation and interpretation

The HR Specialist works together with MCFS Fire Chief to assist with providing consistent delivery of fire services. The staff of MCFS are committed to the pillars of pride, professionalism, and proficiency. During the period of Behr's involvement in developing this fire service master plan the staff demonstrated a commitment to their mandate and consistently providing a high level of service to the municipality while maintaining the safety and health of the members.

Middlesex Centre maintains a non-unionized work force, and as a result does not have collective agreements to maintain, however most employer-employee issues are handled through policy. The HR department maintains MCFS job descriptions for all positions currently in the organization.

3.2.1 Thematic Summary of Interview and Survey Results

The fire master planning process was initiated by providing MCFS firefighters, fire administration and select Middlesex Centre senior administration an opportunity to comment on numerous aspects of MCFS operations. Thirteen interview participants and 54 survey respondents provided responses to similar questions and statements. The following key themes emerged from this process:

1. MCFS is a well-managed organization with strong leadership and a highly committed group of POC volunteer fire staff. Almost all survey and interview participants felt that Middlesex Centre currently received adequate fire and rescue services. Future demand for services is predicted to continue to increase, particularly in the Komoka-Kilworth corridor.
2. Administrative/management capacity should be increased. The day-to-day management tasks associated with a department of five stations far exceeded the capacity of one fire chief and an administrative coordinator. It was also noted that administrative functions such as communication across the department could be improved, and firefighting policies required updating.

3. The shared fire inspection/fire prevention position was a cost-effective approach to increasing the fire prevention activity in Middlesex Centre. However, the number of inspectable properties and fire prevention activities with this municipality exceeded the capacity of one position. In addition, pre-emergency planning was not being done in a formalized program.
4. The paid-on-call volunteer model was well supported but some concerns were reported. Recruitment and retention of new firefighters was occasionally a challenge. Additional limitations such as low daytime and weekend response of firefighters were identified. Several suggestions to increase automatic second station responses and increased use of the resources as one response system could improve responsiveness. Comments regarding the need to address the dated compensation process were made.
5. The current stations were generally reported to be well positioned to provide services across the municipality. Most participants felt the stations were functional but were at capacity and had limited space for conducting training and storing apparatus and equipment. There were numerous comments regarding the sustainability of the Bryanston Fire Station noted and the future need for an additional station in the Komoka-Kilworth area.
6. Most firefighters agreed that MCFS was well supplied with both small equipment and apparatus. However, numerous comments were made regarding the need for an aerial fire truck capable of providing rescue and a high-volume elevated master water stream.
7. Most firefighters felt the current level of training was adequate. Live-fire training was limited and could be increased. The current capacity of POC volunteer training staff, including the CTO, and training lieutenants, was most thought to be inadequate to support the training requirements of MCFS firefighters. There were numerous supporters of the need to have a fulltime training officer position and a local training ground.

3.2.2 Staffing Complement

MCFS has a lean management structure (fire chief) with one fire service coordinator (non-management) that assists with supporting the fire service, including a rather large complement of POC volunteer firefighters and one fulltime Fire Prevention and Training Officer to deliver emergency services and fire prevention activities.

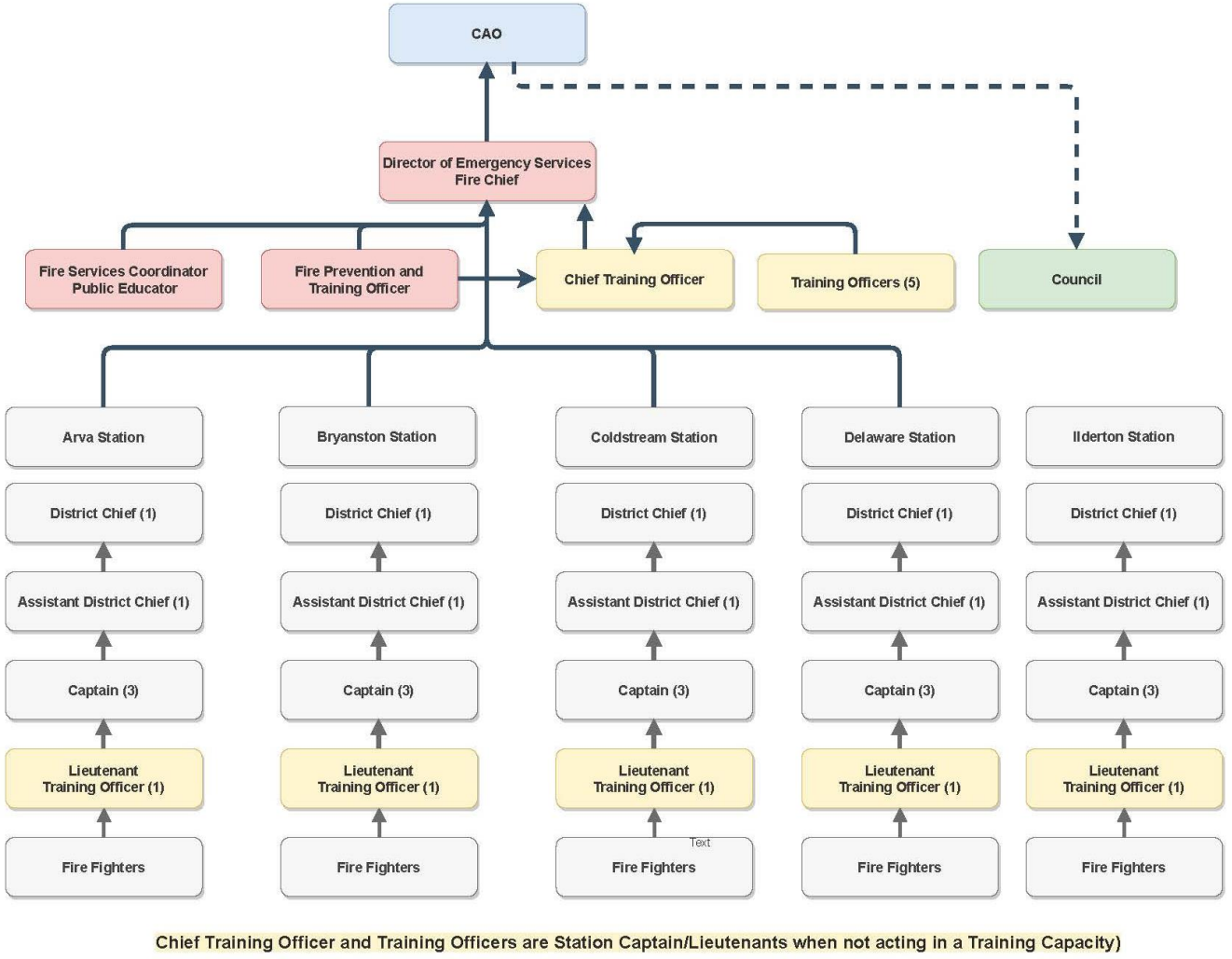
As illustrated in Figure 5 MCFS Organizational Structure, the service is currently funded to employ the following full-time and POC volunteer positions:

- 1 director of emergency services- fire chief
- 1 fire services coordinator and public educator
- 1 fire prevention and training officer
- 5 district chiefs (POC volunteer)
- 5 assistant district chiefs (POC volunteer)

- 1 chief training officer
- 15 station captains (POC volunteer)
- 5 POC station lieutenants/station training officers
- 85 firefighters (POC volunteer) *fluctuates

Note: *The chief training officer, station training officers, station captains, station lieutenants, and firefighters are all considered as front-line* POC *volunteer firefighters*

Figure 5: Middlesex Centre Fire Services Organization Chart[7].



[7] *Source: Middlesex Centre Fire Services, 2021*

Table 7: MCFS 2022 Staffing by Station

Station	Staffing
Headquarters	• 1 fire chief • 1 fire services coordinator and public educator • 1 fire prevention and training officer
Arva Fire Station *Volunteer Staffing 23* *Full-time Staffing 0*	• 1 district chief • 1 assistant district chief • 3 captains • 1 lieutenant/training officer • 17 firefighters
Bryanston Fire Station *Volunteer Staffing 23* *Full-time Staffing 0*	• 1 district chief • 1 assistant district chief • 3 captains • 1 lieutenant/training officer • 17 firefighters
Delaware Fire Station *Volunteer Staffing 24* *Full-time Staffing 0*	• 1 district chief • 1 assistant district chief • 3 captains • 1 lieutenant /training officer • 18 firefighters
Ilderton Fire Station *Volunteer Staffing 24* *Full-time Staffing 0*	• 1 district chief • 1 assistant district chief • 3 captains • 1 lieutenant /training officer • 18 firefighters
Coldstream Fire Station *Volunteer Staffing 23* *Full-time Staffing 3*	• 1 district chief • 1 assistant district chief • 3 captains • 1 lieutenant • 1 chief training officer • 17 firefighters

MCFS staffing levels at each of their fire stations are subject to change depending on resignations and/or retirements of POC volunteer staff that may occur during the year.

Volunteer fire departments rely on a strong complement of trained POC volunteer firefighters, recognising that most times all their firefighters may not be able to respond when call upon. Most POC volunteer departments will establish rules or expectations for their firefighters. These typically require that either a firefighter lives or works close to their fire

station with response expectations. As well, many require that a certain percentage of training sessions and responses are met, with the goal of providing a timely and competent response to the emergency.

As is the case with the majority of volunteer or POC volunteer fire departments in North America, the ability to attract dependable staffing levels to ensure safe and effective response levels at all times of the day is difficult to maintain. This is compounded when the fire station is in a small rural community with limited persons willing or able to take on this obligation. This again can be more challenging when the fire station has low call volumes that are often discouraging members to maintain the necessary training and attendance expectations asked of them.

The reliance on POC volunteer firefighters to routinely fill staffing requirements is something that should be consistently evaluated. While there are financial and community advantages to relying on POC volunteer staff to fill positions, the need for sufficient and reliable firefighting resources is paramount for a community's safety.

3.2.3 Department Leadership, Management and Operations

Effective leadership and management start at the top of an organization to guide it towards success. With increasing pressure to find value for money, elected officials are relentlessly looking for ways to increase the value for money proposition for their citizens. Department managers are challenged to maintain or increase services while avoiding services cost increases. This environment generates the need for communities to adopt more business-like approaches for delivering public safety services. Managers of fire and emergency services are required to develop private sector-like business practices such as:

- Conducting regular market (external) cost analysis
- Developing performance measures and objectives for core services including emergency response, fire prevention, public education and health and safety
- Regularly monitoring and reviewing performance to determine effectiveness
- Ensuring value for service

In some cases, this requires a shift from the historical approach of a focus on day-to-day service delivery to scanning the future and moving towards a department that is responsive to change, sustainable and efficient.

Fire department leaders must also adopt a business-like approach to leading and managing their departments. Along with their municipality's senior administration, they need to be proactive and examine all aspects of their service delivery systems to look for innovation in efficiencies and effectiveness.

The following theoretical figure suggests how to allocate leadership time to effectively operate a fire department, scan for improvement opportunities and implement system improvements:

Figure 6: Fire Service Time Management

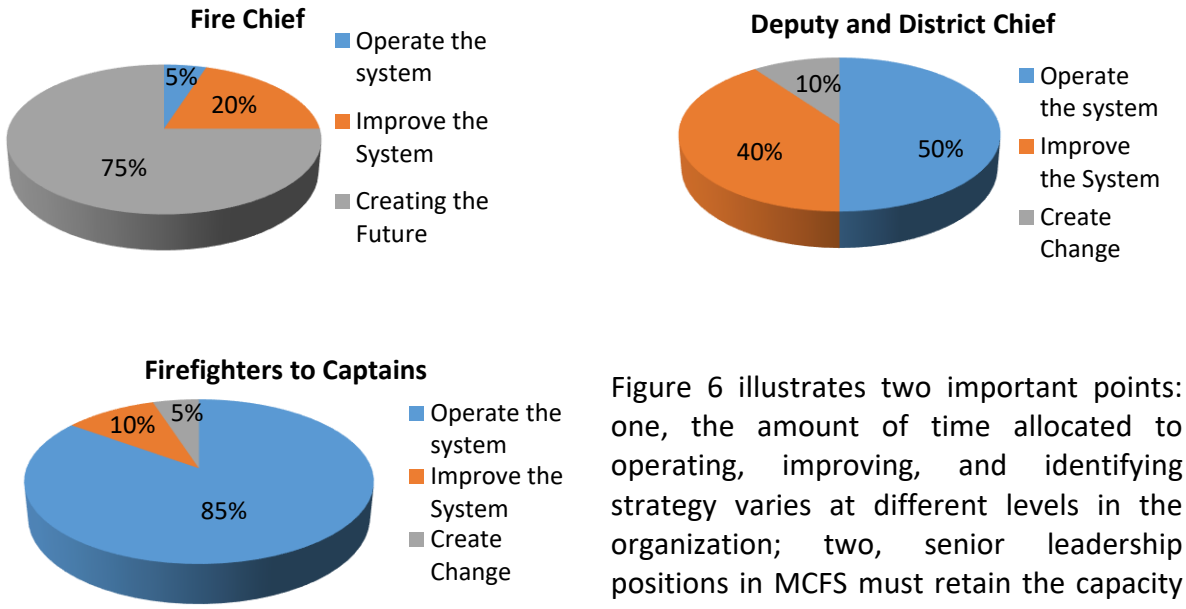


Figure 6 illustrates two important points: one, the amount of time allocated to operating, improving, and identifying strategy varies at different levels in the organization; two, senior leadership positions in MCFS must retain the capacity to identify and implement change.

For the purposes of this section, there will be a distinction between management positions and administration positions. The main differences are linked to the overall responsibilities and accountabilities of each position. The administrative team of MCFS consists of the positions of district chiefs, assistant district chiefs and chief training officer led by MCFS management (fire chief).

Based upon our review of MCFS organizational structure there are shortfalls in the management capacity that will require additional staff to adequately perform the identified responsibilities. Another capacity shortfall is around, fire prevention. These observations are based upon review of the current job descriptions, POC volunteer limitations, interviews and survey data, and the comparative community analysis.

The administrative leadership team seems sufficient, which takes into consideration the POC volunteer district chiefs, assistant district chiefs, as well as the fire prevention and training officer. The number of positions accurately reflect their responsibilities; however, relying on the increasingly demanding workload from POC volunteer chief officer volunteers appear to be of concern. These administrative positions are assigned specific portfolios for the safe and effective management and leadership of the department which requires many hours of commitment which can be difficult to accomplish on a voluntary basis. Much care must be taken to ensure POC volunteers are not over-tasked.

It is extremely important that senior management and other fire administration work closely as a team. A highly functioning team is one that understands each person's roles and responsibilities and brings their skills together in a collaborative manner to lead the organization in achieving their vision, mission, and goals. Therefore, it is important to ensure

that accurate and updated job descriptions are made available and respected for each team member to promote role clarity.

Traits of a high performing team include:

- Trust
- Strong communication
- Transparency
- Collaboration
- Support
- Clarity
- Adaptive
- Reflective

Leadership is a function of all members of MCFS. Chief officers to firefighters contribute to the leadership required to achieve service excellence in a fire department. Day-to-day station leadership is the responsibility shared with the district chiefs and each station officer. These positions play a critical role in leading, managing, and mentoring firefighters. This role is crucial in ensuring firefighter practice is aligned with department policy, as well as being the critical link in the chain of command between firefighters and chief officers. Within the current MCFS organizational structure it is imperative that the fire chief work closely with each district chief, chief training officer, and fire prevention officer (direct reports) to provide direction and support while allowing for constructive feedback.

Observation #2: During interviews with the fire chief, district chiefs, and chief training officer it was obvious that each demonstrates an enthusiastic and professional passion for the fire service and specifically MCFS. Opportunities for each to share respective experiences and feedback on issues is an important component of a highly functioning team. While the fire chief maintains a regular schedule of staff meetings with the senior chief officers where all senior officers can discuss items in a collaborative way, feedback was if there may be opportunities to improve this process.

Recommendation #2a: Facilitate a team building workshop with senior MCFS administration.

(Suggested completion: 3-6 months)

It is recommended that the fire service administration team undertake a team building workshop or planning session facilitated by a third party with the purpose of clarifying roles and responsibilities and developing a high performing team with clearly defined immediate and long-term goals.

***Rationale:** It is important that all fire service administration staff work together as a cohesive team. Clearly defined expectations and terms of reference for all administration meetings will promote a unified understanding necessary of a high functioning organization.*

Recommendation #2b: Establish an 'alarm assignment response criteria' for the fire chief (and deputy chief) and district chiefs.

(Suggested completion: 6-9 months)

It is recommended that the fire chief, in consultation with the district chiefs develop an 'alarm assignment response criteria'.

***Rationale**: Having a defined response criteria will promote effectiveness and accountability throughout the organization.*

Current community growth projections, risk factors, volunteer attrition and increasing management demands associated with maintaining a diverse POC volunteer service will require additional management staff capacity. The chief officers should be focusing most of their time on improving the current system and creating change to meet future challenges. An effective organization structure allows for roles and responsibilities to be evenly distributed. The management and administration team, including officer ranks, require the capacity to undertake and complete fire service management and strategic level requirements, including those recommended in this FSMP.

MCFS officers and firefighters are responsible for the delivery of most services. They are the primary point of interaction between a fire department and someone in crisis or the public. Their leadership is exhibited by their professionalism and commitment to service excellence. Although their influence may be limited to their immediate coworkers, their role in forming public perceptions regarding the value and support of their services is critical.

Finally, the importance of maintaining a team atmosphere across the department and commitment to common goals cannot be overstated. Despite the varying roles and responsibilities assigned to managers, administrative, senior officer and more junior staff, the characteristics of a successful team should be promoted at every level in the organization. As strategic direction and vision are identified, they should be openly shared across the department.

Officers and firefighters often work in isolation from the fire chief. This heightens the need for leadership positions, including the chiefs and station officers to communicate frequently and bridge perceived gaps regarding commitment to mission and service excellence. It also highlights the need to recruit only the best candidates to join MCFS team.

Based upon our review, MCFS is positioned to achieve service excellence in the future. Led by the fire chief, the leadership team needs to work closely together to guide and manage the department while continuing to demonstrate the high degree of pride and commitment to the fire service and their community.

Observation #3: During the station tours and interviews, the Behr team was convinced that the fire chief has a tremendous number of responsibilities. Many of the fire chief's current duties are operational in nature that are not typically required of a fire chief.

Recommendation #3: Develop and approve a full-time deputy fire chief position within MCFS management team with the focus on adding managerial capacity to MCFS.

(Suggested completion: 6-12 months)

It is recommended that MCFS managerial team be expanded to include a full-time deputy fire chief position. The overarching goal is to enhance a high-performing team that has a clear vision and understanding of MCFS direction and how the community and public will be well served.

***Rationale:** The addition of the deputy fire chief position to MCFS management structure will improve MCFS capacity and effectiveness on through to the entire organization. Many of the current responsibilities and duties can be shared or re-directed to the deputy fire chief as directed by the fire chief. This additional management capacity will allow the fire chief to provide a higher level of strategic leadership to MCFS and the Middlesex Centre senior leadership team.*

3.2.4 MCFS Administrative Positions

As previously indicated, there is a distinction between management positions and administration positions. The main differences are linked to the overall responsibilities and accountabilities of each position. As stated above, there is a capacity shortfall in MCFS management position.

The administrative team of MCFS is considered of the positions of district chiefs, assistant district chiefs and chief training officer led by the fire chief.

Current community growth projections, risk factors, firefighter attrition and increasing management demands associated with maintaining a POC volunteer service all require strong operational and administrative staff capacity. The senior chief officers should be focusing most of their time on improving the current system and creating change to meet future challenges. The district chiefs and chief training officer capacities are limited because they are providing these roles on a volunteer basis, while managing their respective private lives and careers. A tremendous amount of recognition must be shown to these individuals for their long-standing and continued commitment to MCFS and their communities.

MCFS position summaries taken from the current Municipality of Middlesex Centre job descriptions are appended as Appendix E.

3.3 Remuneration, Recruitment, Selection, Retention, Promotion

3.3.1 Remuneration

Volunteer fire departments typically are structured to either be a totally volunteer fire service, but more typically are referred to as a 'paid-on call' or 'paid-per-call' fire service where some amount of stipend or hourly remuneration is given for emergency response and/or training. Additionally, depending on the size and complexity of the community, they will often be led by a full-time fire chief. Additional managerial or administrative positions may also be required either in a full-time or part-time basis.

The Municipality of Middlesex Centre is committed to recruiting the best candidates possible. Competitive salaries and benefits are offered to all their full-time positions. The Municipality of Middlesex Centre maintains a non-unionized work force, and as a result does not have collective agreements to maintain, however most employer-employee issues are handled through policy. The positions on the municipal salary grid are determined by a review of their respective job requirements and qualifications. MCFS fire chief is provided a competitive salary in alignment with senior management positions in the municipality.

All full-time positions are provided hourly rates of pay and benefits. The total remuneration package offered both managerial and full-time employees of MCFS is competitive. Volunteer firefighters are not eligible for any benefits.

The POC volunteer staff within MCFS compensation is determined by council as per Bylaw 2009-013. Each POC volunteer member is credited with "points" with a monetary value based on an emergency response or training attendance. These points are then totalled at the end of the year (twice a year for Delaware members) and paid out. All POC volunteer members (district chiefs through to firefighters) are awarded the same value per point, with a supplemental compensation given to the district chiefs at the end of the year.

During the consultation process the current point system and remuneration was identified as a critical issue. Paying all firefighters, the same base (points) regardless of experience, roles or responsibilities was considered to be a key factor. Recommendation 4 in this report recommends that the fire chief, along with HR, undertake a complete compensation and benefits analysis that includes roles and responsibilities and associated pay rates, step increases, benefits, recognition programs, and other incentives for POC volunteer firefighters.

The compensation provided to POC firefighters, while not usually the main attracting component for new potential hires, is an important component that must be considered, and becomes more of a factor for retention of existing POC firefighters, including officers. This is further discussed in recruitment and retention below.

3.3.2 Recruitment

Recruitment is a key function of all emergency service agencies. The community places a tremendous amount of faith in their fire department personnel, trusting them to provide the

highest level of service when the public is most vulnerable. As such, the process used to select personnel should be very comprehensive.

Experience within the emergency services industry has shown that relaxing the requirements for entry-level positions is not the answer for recruiting any employee. Instead, most departments have had the greatest success when qualified applicants are encouraged to apply. This process often involves targeted advertising and promotional campaigns aimed at demonstrating the benefits, as well as the personal satisfaction of becoming part of the fire service. The expected requirements for residency, required training, and attendance must be clearly explained early in the process. Existing firefighters should be encouraged to participate in any such campaign.

MCFS, like other fire services in North America, must train, maintain, and equip their firefighters to the recognised NFPA standards for the services being delivered. As this is typically provided at no cost from the recruit firefighters involving substantial investment in both financial and resource commitments, recruit selection should be carefully managed.

Note: *On April 14, 2022, the Ontario government filed O. Reg. 343/22: Firefighter Certification, under the* Fire Protection and Prevention Act, 1997*. The regulation came into force on July 1, 2022.*[89]

Most interview and survey participants suggested that MCFS's firefighter recruiting efforts for POC volunteer firefighters were successful in attracting applicants, however through the vetting process the actual number of applicants that meet requirements and deemed suitable are significantly less. A process for recruiting POC volunteer firefighters is established. Job postings including minimum requirements and process are listed on the municipal website.

The minimum qualifications for all MCFS firefighters include:

- 18 years of age or older and legally entitled to work in Canada
- Possess an Ontario high school graduation diploma or equivalent
- Have, or willing to obtain an Ontario Class "D" driver's license with "Z" endorsement
- Have, or willing to complete the NFPA 1001 Level I and II and NFPA 1002 program within 1 year or as available (costs paid by the municipality)
- Willing to complete Firefighter Services of Ontario clinical and medical assessments including physical aptitude, acrophobia, and claustrophobia assessments (costs paid by the municipality)
- Provide a clear driver's abstract and criminal record and vulnerable sector check
- Provide proof of immunization from COVID-19, Red measles, mumps, rubella (German measles), tetanus/diphtheria and hepatitis B

[8] *O. Reg. 343/22: FIREFIGHTER CERTIFICATION (ontario.ca)*

[9] *Hicks Morley | Ontario Introduces Firefighter Certification Standards*

3.3.3 Selection and Training of Recruit Firefighters

MCFS has an extensive selection process. After submitting their application and meeting the minimum qualifications, firefighter candidates are required to move through a multi-stage process. Applications are only accepted when there is an open competition and candidates meet all the initial requirements begin the following process:

- Completed applications must contain all the minimum qualifications
- Once the complete application package is received by HR and reviewed by HR, the Fire Chief and District and Assistant District Chief, the candidate may be selected to begin the process.
- Performance will be reviewed after each stage and a decision will be made regarding suitability to move on to a recruit firefighter

MCFS receives a substantial number of applications for POC volunteer firefighters when the recruitment process is initiated each year, however through the vetting process this number is lower for appropriate candidates offered to commence their training. The rural stations continue to struggle with attracting new firefighters.

3.3.4 Retention

Career full-time employee retention is not generally an issue for MCFS. The highest turnover typically exists in the POC volunteer firefighters. The reason for resignation from the volunteer group is typically because of:

- A physical move of residence or workplace out of the municipality
- Career/primary work demands
- Family commitments
- Childcare
- Obtain a career firefighter position
- Increased training demands of the position up to NFPA 1001 and other requirements
- Increased demands on department time obligations
- Occupational and safety requirements

A constant turnover of trained firefighters results in staffing shortages and increased costs of recruitment and training.

Observation #4: The attraction and volume of applications received in recent recruitment initiatives for POC volunteer firefighters has been stable for MCFS; however, the actual numbers of applicants that meet the residential and response criteria for each fire station capture area is considerably lower.

MCFS typically has a loss of 2-5 or more POC volunteer firefighters each year to resignation or retirement which requires replacement by new inexperienced POC volunteer firefighters. Retaining the necessary number of trained POC volunteer firefighters in each of their five fire stations will remain a challenge moving forward. It is important to note that recruitment and retention of POC volunteer firefighters is a prevalent challenge across Canada and the U.S.

Recommendation #4: The fire chief should continue to evaluate the ability to sustain a viable firefighting complement and develop retention strategies.

(Suggested completion: 12-24 months)

It is recommended that the fire chief research leading retention strategies for POC volunteer's such as live- in, live-out, work experience programs, tax breaks, and benefits that enhance POC volunteer retention and operational effectiveness. Further it is recommended that the fire chief working with HR, to undertake a complete compensation and benefits analysis that includes roles and responsibilities and associated pay rates, step increases, benefits, recognition programs, and other incentives for POC volunteer firefighters.

The move to a composite fire department with full-time career firefighting staff would only be prudent if a sustainable complement of POC volunteer firefighters cannot be maintained in some of MCFS fire stations.

***Rationale:** The fire service relies on sufficient POC volunteer firefighters in each of their fire stations to deliver necessary emergency services to their community. The timelines to recruit and train new firefighters is typically close to a year which necessitates advance anticipation of recruit POC volunteer firefighters' numbers. Retaining an experienced, solid core of fully trained POC volunteer firefighters lessens the financial impact and service level gaps to MCFS and their community.*

3.3.5 Promotions and Advancement

The promotional policy for administrative, full-time, and POC volunteer firefighter officer positions are filled through a competitive process and appointment. Promotions to officer ranks for the POC volunteer stations are based on competition as detailed in Bylaw 2009-013 which states, "Any member demonstrating responsible firefighting skills with the Department may make application in writing to the fire chief to qualify him/her for promotion when a position becomes available."

Fire chief and district chief shall review all applicants for promotion and the successful applicant shall be chosen based on the applicant's experience, fire station record, training record, and any tests and interviews as may be required by the fire chief.

3.4 Training

Training and competency development are essential and ongoing activities for all contemporary fire departments. A prepared and competent workforce reduces risk and safely optimizes service delivery. An effective workforce-training program aligns the growth and development of personnel to the organization's mission and goals.

The recent closing of the Ontario Fire College and the change to regional training centres resulted in a partnership agreement between Middlesex County and Elgin County to develop a regional training facility under the purview of the Office of the Fire Marshal.

The Ontario Firefighter Certification regulation filed April 14, 2022, and enacted on July 1, 2022, introduces mandatory minimum certification standards for firefighters that align with fire protection services being provided. This regulation will help ensure that firefighters have consistent training according to the level of service set by a municipality supporting firefighter and public safety.

Training and education program activities are identified by assessing the Knowledge, Skills, and Abilities (KSAs) needed for the firefighters to perform their duties as outlined in the department's SOGs and procedures. When firefighters are competently trained and possess the KSAs for the services they are expected to provide, they reduce risk and increase their own safety and the safety of the public they serve.

The training program of a fire service is a very important and demanding portfolio. The scheduling of instructors, facilities and participants is a daunting task to ensure safe and consistent training, while not negatively impacting the operational capacity.

MCFS designates one of the officers to serve as the chief training officer who oversees the training needs of the firefighters while also assisting with delivering a schedule of standardized training based on MCFS core training syllabus.

MCFS relies on weekly training sessions for the delivery of core competency and related training at each of the fire stations. MCFS Core Training Syllabus:

- NFPA 1001/1072 – Recruit Training
- NFPA 1041 – Fire Service Instructor Level I
- NFPA 1021 – Officer Training Level I
- Structural search, victim removal, survival, and fire behavior
- Scene lighting and scene safety
- Auto extrication
- Emergency medical care and first aid
- Driver training
- Water and ice rescue
- High and low angle rescue
- Firefighter safety and health
- Personal protective equipment (PPE)
- FD communications
- Pumper and tanker operations
- Equipment familiarization
- Water supply and fire streams
- Ladders
- Pre-planning
- Ropes, webbing, and knots
- Hose lays and uses
- Loss controls
- Rescue tools
- Rescue tools
- Technical rescue

Supplemental or specialized training is scheduled through the regional training centre or other accredited agency. Additionally, the municipality offers MCFS chief officers leadership courses through the University of Waterloo.

3.4.1 Industry Recommended Qualifications

NFPA certification standards represent industry best practices. However, it must be emphasized that the following list may not apply to all fire departments. The qualifications required for specific positions vary depending on identified community risks and services provided to manage the risks. Position profiles and associated KSAs should prepare staff to competently provide the services necessary to address the risks in their community.

Further, organizational size and structure will often change the breadth of tasks and competencies required by specific positions. For example, large career fire departments tend to have a higher degree of specialization for senior positions and less need for senior officers to be directly involved in fire suppression or rescue operations. In contrast, smaller volunteer POC or paid-per-call volunteer department senior officers will lead or be directly involved in fire suppression and rescue operations.

The following list of NFPA standards is offered as a general guideline for NFPA training standards aligned with most fire department positions:

Deputy Chief and Fire Chief - NFPA 472 Dangerous Goods Operations - NFPA 1001 Firefighter (Level 2) - NFPA 1002 Pump Operator - NPFA 1021 Fire Officer (Level 2) - NFPA 1041 Instructor (Level 1) - NFPA 1403 Standard on Live Fire Training Evolutions - NFPA 1521 Incident Safety Officer Captain - NFPA 472 Dangerous Goods Operations - NFPA 1001 Firefighter (Level 2) - NFPA 1002 Pump Operator - NPFA 1021 Fire Officer (Level 1) - NFPA 1041 Instructor (Level 1) - NFPA 1403 Standard on Live Fire Training Evolutions - NFPA 1521 Incident Safety Officer Safety Officer NFPA 1521 Incident Safety Officer	Lieutenant - NFPA 472 Dangerous Goods Operations - NFPA 1001 Firefighter (Level 2) - NFPA 1002 Pump Operator - NPFA 1021 Fire Officer (Level 1)NFPA 1041 Instructor (Level 1) Firefighter - NFPA 472 Dangerous Goods Operations - NFPA 1001 Firefighter (Level 1) - NFPA 1002 Driver/Pump Operator - NFPA 1006 Vehicle extrication Level 1 Operator - NFPA 472 Dangerous Goods Operations - NFPA 1001 Firefighter (Level 1) - NFPA 1002 Driver/Pump Operator - NFPA 1002 Aerial Operator - NFPA 1006 Vehicle extrication Level 1 Training Officer - NFPA 1041 Instructor (Level 1) - All Qualifications required to instruct firefighters and recruits - NFPA 1403 Standard on Live Fire Training Evolutions

3.5 Health and Wellness

The active pursuit of employee health and wellness is extremely important to an organization. The benefits may include but not be limited to:

- Early recognition and treatment of illness
- Reduction in absenteeism due to short/long-term illness
- Decreased injuries during normal duties
- Decreased workers' compensation board (WCB) premiums
- Increased employee career longevity
- Improved work/life balance

Middlesex Centre provides health and wellness programs for its employees. As an employer, MCFS full-time employees are offered access to their group benefit plans. Paid-on-call volunteer firefighters are provided access to the employee assistance program.

The mental health of first responders, whether career or POC volunteer, is an issue that has garnered considerable attention over the past 10 years. As identified in the International Association of Firefighters Wellness-Fitness Initiative Manual[10], "a firefighter's work is characterized by long hours, shift work, disruptions in sleep patterns, sporadic high intensity situations, strong emotional involvement, life and death decisions and exposure to extreme human suffering." Over time, this type of work can impose considerable stress on some individuals.

Observation #5: While Middlesex Centre has an established Health and Wellness program for their permanent staff, the fire service does not have a dedicated health and wellness program tailored specifically for the unique needs of a firefighter.

Recommendation #5: Develop a unique Health and Wellness Program tailored around the needs of their POC volunteer firefighters.

(Suggested completion: 6-24 months)

It is recommended that MCFS continues to take advantage of programs available through the municipality and expand their program to offer additional services to their staff as outlined in the International Association of Firefighters Wellness-Fitness Initiative Manual.

***Rationale:** Recognizing the unique challenges and programs available for the mental and physical wellbeing of firefighters, an industry specific health and wellness and peer-to-peer program implemented and available to all firefighters is an important component within the core services of the department.*

3.6 Core Services

As most modern fire departments, MCFS provides a broad range of services to the citizens of the Middlesex Centre. Any services provided should align with the identified community risks and the needs of the citizens. Cyclical evaluation of community risks and fire department response capability is necessary to support ongoing emergency planning. Most citizens will not have the need to access fire department services. However, when emergencies occur, service expectations are high. Good planning processes are necessary to ensure citizens get the services they expect, and the community gets good value for their investment.

MCFS core services and programs are approved by bylaw or resolution. Bylaw 2009-013 states: "The operation of the department will be carried out only to the limit of personnel and equipment that is available and the personal training that has been taken."

3.6.1 Structural Firefighting

Fire department resources should be adequate to manage the most probable risks. Structural fire suppression encompasses a wide range of tactics for the control and extinguishment of fires originating from several sources. Single-family dwellings are the most prevalent building

[10] *Joint Labor Management Wellness-Fitness Initiative, 4th Edition, p.48*

type in most communities. As a result, these types of structure fires are typically the most probable, but only rated as a low to moderate risk as the consequence are limited to one or two properties. Residential fires are a leading cause of fire-related death, injuries, and property loss in Canada.

While in many communities, structure fires are not the most frequent emergency response request, they require a significant investment in resources (equipment and staffing), training and coordination to manage safely and effectively. MCFS trains and maintains their firefighters to the NFPA 1001 Level I and II standard.

Residential structure fires are a frequent type of structure fire encountered by MCFS. Available staffing and equipment should be adequate for firefighters to be able to safely perform the task expected of them. For Middlesex Centre and MCFS, the recommended NFPA standard for fire suppression operations is NFPA 1720. This standard is further covered in Section 4 of this master plan.

Structure fires that require entry into the building for fire suppression and rescue require many critical tasks to occur simultaneously for the safety of both the victims and the firefighters. Each of these tasks may require one or more companies of firefighters to accomplish them safely and effectively. Without enough companies of firefighters on scene, entry may be delayed until some of these tasks are completed.

Structural fire suppression encompasses a wide range of tactics for the control and extinguishment of fires originating from several sources. In both the interviews and survey, firefighters indicated that MCFS is equipped and properly trained to respond to fires that originate within or outside a structure. Sufficient firefighters arriving on-scene in a timely manner are paramount to facilitate safe and effective rescue and suppression tactics for the control and extinguishment of fires. MCFS maintains a modern fleet of emergency response vehicles and equipment along with a committed team of POC volunteer firefighters available for emergency response.

Most interview and survey participants agreed that MCFS was adequately trained and staffed to safely manage most structural fire incidents. As previous discussed, MCFS relies on the availability of sufficient trained firefighters responding out of each fire station. Confirmed structure fires will require additional station deployments to safely handle an interior attack and/or rescue. The staffing level constraints consistent with most POC volunteer fire services is the most significant limiting factor in determining the actual effectiveness of any given emergency response.

During the interviews and within the survey, a degree of concern was expressed regarding the lack of an aerial device within MCFS apparatus inventory. Where aerial apparatus is recommended, and/or required, they must rely on the availability of one from the mutual aid partners.

Observation #6: MCFS does not have an aerial apparatus within their fleet inventory. Should an aerial apparatus be required for response in the municipality, it would be requested from Strathroy-Caradoc. The delay or inability to have an aerial apparatus on scene can seriously hinder the safe and effective operations. Also, there is no assurance that this apparatus will be made available to leave from their respective community.

Middlesex Centre has provided capital funding allocation for a 110-foot, non-platform aerial apparatus in the 2025 year. The amount of time typically required to design, tender, and build fire apparatus is two years or more.

Recommendation #6: Commence the design and tender process for the new aerial apparatus.

(Suggested completion: 12 - 18 months)

It is recommended that an appropriate apparatus committee should be convened to evaluate the requirements to be used for the design, and tender of the anticipated new aerial apparatus.

***Rationale:** The requirement of an aerial apparatus on many emergency scenes is critical for safe and effective firefighting and rescue operations. Aerial apparatus is typically required for:*

- *Elevated water streams*
- *Roof top fire attack/entry*
- *Elevated evacuations and rescues*
- *Water curtains*
- *Exposure protection*

The ongoing and future development plans both ongoing and proposed, as detailed in the official Municipality of Middlesex Centre Plan, anticipate a significant increase in commercial, residential (low, medium, and high density) which will increase the need for an aerial apparatus. The anticipated timelines to put a new piece of apparatus into service typically requires two years or more.

3.6.2 Medical First Response

Medical co-response is a valuable service provided by MCFS. The number of medical responses requested amounts to a significant percentage of the total call volume. The distribution of fire department resources often exceeds that of ambulance resources and as a result, firefighters are often able to respond to medical emergencies faster, or in support of, ambulance services.

Middlesex Centre maintains a tiered medical agreement with Central Ambulance Communications Centre (CACC) that outlines the medical protocols that may need the assistance of MCFS.

Survey and interview participants felt this service was not over-taxing the department's response capacity and was valued by the community.

3.6.3 Motor Vehicle Collisions, Vehicle Extrication

Motor vehicle collisions (MVCs) with or without trapped persons can pose unique hazards to both the victims and responders. Vehicle extrication requires specialized training and equipment. Close coordination with police and ambulance services is necessary for the safety of both victims and responders. Weather conditions also contribute significantly to both the severity of the incident and the effectiveness of the response.

Many of modern vehicles have added risks to firefighters, such as airbag deployment and hybrid vehicles containing fuel cells or batteries. Vehicle collisions or events involving transport vehicles often pose the additional challenge of involving dangerous goods or requiring heavy equipment to manage.

MCFS is well equipped and trained to manage vehicle collision and extrication incidents (services provided to the NFPA 1001 and NFPA 1006 Standard). Depending on the nature of the incident, fire engines and/or tankers are typically deployed to these events. MVCs was the most common incident over the five-year period within the municipality. High-speed roadways are common throughout the municipality. Responses on these roadways may present hazardous conditions for all responders. MCFS resources must work closely together with partner agencies at the scene of an MVC. These types of incidences may require the resources and expertise of MCFS staff including:

- Scene safety
- Fire suppression
- Extrication
- Stabilization
- Medical first aid
- Dangerous goods control
- Special rescue

Additional apparatus and staff are often required to provide additional support for equipment and roadway safety.

3.6.4 Dangerous Goods Response

Response capabilities should align with service levels defined in the NFPA 1072: Standard for Competence of Responders to Hazardous Materials Weapons of Mass Destruction Incidents service level matrix. It requires departments without advanced hazmat (dangerous goods) training to take only a limited role in hazardous materials (dangerous goods) response. There are three dangerous goods response service levels.

The first level of service is the awareness level. This level is the most basic and is for persons who could be the first on the scene of emergency involving dangerous goods. Responders at

the awareness level are expected to recognize the presence of hazardous materials, protect themselves, call for trained personnel and secure the area to the best of their abilities. It does not involve donning protective suits to enter the contaminated zone to stop the flow of hazardous materials or conducting decontamination.

The second level of response is the operations service level. Responders are trained to be part of the initial response and control the impact of the release in a defensive fashion. Crews are expected to take a more hands-on approach than considered at the awareness level. They will use absorption, damming and diking to stop or redirect the flow of the hazardous material. Firefighters are trained to don protective suits, enter the hot zone to conduct rescue activities and control the product release. They must also establish a decontamination zone for responders and equipment. Crews also lead the evacuation in the hot zone.

The third level of response is the technician level. Technical-level responders must be certified hazmat technicians, trained in the use of specialized chemical protective clothing and control equipment. Responders at this level take offensive action in responding to releases or potential releases of dangerous goods. Given the required training, cost of equipment and limited community need, this level of service is normally provided by provided by larger communities or private companies through contract.

MCFS does not have a dangerous goods response unit. While incidents involving hazardous materials are infrequent, these types of events can result significant environmental and life-threatening consequences. In addition, a dangerous goods release was identified and discussed as a community risk factor. Given that the on-duty response of MCFS is provided at the operations and/or awareness level of service, the Middlesex Centre Municipality has an agreement with a private company to provide advanced dangerous goods response when requested.

3.6.5 Technical Rescue Services

Rescue operations are often unique situations that require specialized equipment and training to ensure the responders maintain the competencies to safely execute the rescue. The challenge in maintaining these skills is the low frequency of the events. As a result, fire departments offering technical rescue services must provide adequate training to maintain competencies and equipment.

MCFS provides two special operations teams. The department is equipped and trained to provide and maintain competencies for:

- Ice rescue provided by the Coldstream Fire Station (services provided to the NFPA 1006 Standard)
    - Technician level (certification required by 2026 by OFM)
- Swift/static water rescue provided by the Coldstream Fire Station (services provided to the NFPA 1006 Standard)
    - Technician level (certification required by 2026 by OFM)

- Rope rescue provided by the Delaware Fire Station (services provided to the NFPA 1006 Standard)
    - High and low angle rescue to operations level plus select advanced procedures

3.6.6 Fire Prevention Services

As departments increase their emphasis on fire prevention activities, communities are seeing a significant reduction in fire-related losses. In Canada alone, deaths caused by fire have been reduced over the last 100 years from 3500 deaths per year to 330 each year. Although difficult to measure, effective fire prevention programs generally reduce fire-related deaths and property loss proportionately to the resources committed. Data collection and analysis will determine the effectiveness of these programs and their impact on the overall reduction of losses.

Middlesex Centre has formal agreements with the Municipalities of Thames Centre and North Middlesex to provide comprehensive service level services for fire prevention. The services include public education and training, as well as fire investigation.

MCFS employs one full-time fire prevention officer/training officer, designated, along with MCFS fire chief, as assistants to the Fire Marshal to carry out all directives required within the Fire Protection and Prevention Act, 1997 to the municipalities of Middlesex Centre, Thames, and North Middlesex.

3.6.6.1 Fire Code Inspection Services

Modern building codes including life safety design and operating requirements are key component of risk management. Cyclical fire inspection programs for high-risk buildings ensure these systems continue to function throughout the life of the building. This is especially important for high occupancy and special purpose buildings such as apartment buildings, hospitals, seniors housing and schools.

While the benefits of an effective fire prevention program are sometimes difficult to fully quantify, the reduction of fire deaths and injuries in Canada following the implementation and enforcement of modern building and fire codes illustrates the value. These services are fundamental elements of a broader community fire reduction and life safety strategy. Fire inspections are critical services in identifying fire hazards and maintaining life safety systems.

3.6.6.2 New Developments Plan Reviews

Working with the three municipalities planning and development services departments, the fire prevention officer is involved in development and construction plans review. The fire prevention officer together with the planning and development staff review building and site plans to ensure the construction process complies with Ontario Building Code and Fire Code requirements. This is a key public safety function as the fire risk during the framing phase of wood-framed development is relatively high.

3.6.6.3 Fire Cause and Origin Services

All fires causing injury, death and property loss are to be investigated in Ontario. The Ontario's Office of the Fire Marshall and Emergency Management maintains a fire incident database and provides trend analysis that can be utilized by MCFS to identify specific fire and injury prevention campaigns based upon leading fire and other incident causes. Examples include cooking safety, wood burning appliance safety, smoke alarm testing and maintenance, and fire prevention, carbon monoxide alarm installation, home escape planning and fire prevention week MCFS fire prevention officer and fire chief are trained and certified by the Ontario Fire Marshal Office to conduct fire investigations to the municipality of Middlesex Centre, Thames Centre, and North Middlesex.

3.6.6.4 Fire Public Education Services

Public education programs and active involvement in the community are important efforts that inform and engage citizens to think about fire safety and risk reduction. Most recently, public education opportunities including station tours and public appearances was limited because of COVID-19 restrictions. Fire safety messaging as well as displaying the services that are provided by the fire department are typical public education activities provided at each of MCFS stations. As the pandemic risks lessen, the opportunities and requests for such fire prevention activities can be expected to increase from schools and community groups.

3.6.6.5 Pre-Emergency Planning

Pre-emergency or incident plans are intended to provide emergency responders with advanced knowledge and processes for a safe and effective response. These pre-plans include information regarding the construction type, occupancy, building status, emergency contacts, utility shutoffs, fire suppression and detection systems installations and locations exposure information, water supply availability, access problems and any other hazards.

Pre-planning programs are not necessarily tied directly to the fire inspection program, but rather include operationally relevant information that was gained on a site visit. Pre-planning should also include potential responses to areas of concern that are not captured in the formal fire inspection program.

Observation #7: MCFS does not have an established pre-emergency planning program for the municipality.

Recommendation #7: Establish a pre-emergency planning program for Middlesex Centre

(Suggested completion: 24 – 36 months)

It is recommended that MCFS establish a second fire prevention/training officer position. The present fire prevention/training officer is currently responsible for fire prevention, public education and fire investigation for Middlesex North, Thames Centre, and Middlesex Centre, with no training obligations.

***Rationale:** Advanced planning for fires and other emergency type incidents will assist with a safe and effective response.*

Observation #8 MCFS has one fire prevention/training officer with a significant number of fire prevention responsibilities to perform for Middlesex Centre, as well as meeting required obligations for the two agreements with the municipalities of Thames Centre and North Middlesex. This workload has necessitated that the fire chief assist and be on a rotational 24-hour on-call schedule shared with the fire prevention officer.

Recommendation #8: Establish a second fire prevention/training officer.

(Suggested completion: 24 – 36 months)

It is recommended that a second fire prevention/training officer position be established. The present fire prevention/training officer is currently responsible for fire prevention, public education and fire investigation for Middlesex North, Thames Centre, and Middlesex Centre, with no training obligations.

***Rationale:** The demand for fire prevention, public education, fire investigations responsibilities, in some cases at a 24/7 basis is difficult, and for some requirements, impossible to meet by a single person. The current requirement for the fire chief to regularly provide some of these services are not consistent of that normally required of a fire chief. Opportunities to share fire prevention, public education, and investigation needs, along with training needs should be considered.*

3.6.7 Citizen Assist and Public Services

Fire departments play an important but often unrecognized role in the social safety net of communities. When citizens perceive an emergency or an urgent request for assistance, the agency most frequent called to help is the fire department. These types of requests can vary broadly - from a request to rescue a pet to help with flooding. In reviewing MCFS response

data, this response type occurs on a relatively frequent basis in the municipality. MCFS should continue to provide this service where practical to help in their communities. It is a value-added service of considerable value for citizens making the request.

3.6.8 911 and Fire Dispatch

The Strathroy-Caradoc Police Dispatching Bureau provides emergency fire dispatching services (including information and communications technology) for Middlesex Centre through a Memorandum of Agreement with the Strathroy-Caradoc Police Service Board, the Corporation of the County of Middlesex, and Corporation of the Municipality of Strathroy-Caradoc.

3.7 Emergency Management Program and Emergency Operation Centre

Ontario's Emergency Management and Civil Protection Act lays out obligations and standards for emergency management programs required of all levels of government. In Ontario, each municipality must develop and implement an emergency management program to protect the lives and property of its citizens.

Middlesex Centre's Emergency Management Operations Centre is established and follows the requirements under the Act. The Municipality of Middlesex Centre Emergency Response Plan has been developed under the authority of the Corporation of the Municipality's By-Law 2020-095 and maintained under the direction of the emergency control group (ECG). This plan enables a centralized controlled and coordinated response to emergencies in the municipality.

3.8 Mutual Aid and Other Service Agreements

Large emergency events quickly overwhelm the response capacity of most municipal fire departments. This is especially true for smaller fire departments with limited resources. As a result, mutual aid and automatic aid agreements are a necessary component in adding response capacity for these low frequencies but potentially high or extreme consequence events.

Mutual aid agreements between fire departments allow them to assist each other across jurisdictional boundaries. Typically, this happens when local emergencies exceed local resources. They may include fire response, and/or specialty response services including rescue, dangerous goods. Any response would be made by the requesting agency and is not pre-determined in the case of automatic aid. The requested agency may or may not be able to fulfill the request.

Automatic aid agreements ensure a provision of initial or supplemental response to fires, rescues, and emergencies where a fire department situated in a neighbouring municipality can provide a response quicker than any fire department situated in the requesting municipality.

The Province of Ontario through the Office of the Fire Marshall has developed a provincial wide mutual aid plan (MAP) to formalize and maintain mutual aid and automatic aid agreements for identified areas coordinated through an Ontario Fire Marshall appointed fire coordinator. Each area will develop and maintain their respective MAP consistent with the Ontario plan.

The principle of operation of MAPs is to promote and ensure adequate and coordinated efforts to minimize loss of human life and property, as well as damage to the environment through the efficient utilization of fire department and provincial resources in the event of a mutual aid activation during times of natural or human-made emergencies.

Middlesex Centre is included in the Middlesex County MAP with the MSFS fire chief appointed as the fire coordinator for 8 municipalities in the county. There are no boundaries when considering mutual aid assistance and may run into neighbouring counties.

The Middlesex County MAP contains letters of agreement between participating municipalities for both mutual aid and automatic aid structure fire response. This MAP is currently being reviewed and updated by the fire coordinator to be forwarded to the Office of the Fire Marshall for acceptance.

3.9 Facilities

MCFS provides fire and emergency response out of five fire stations that are strategically located throughout the municipality.

3.9.1 Fire Station Overview and Assessment

Note: *See Section 3.10.5 Apparatus Details*

MCFS Headquarters			
Comments:	- This facility serves as the headquarters for Middlesex Centre Fire Services - 2 administration personnel - 1 fire prevention officer - 1 casual District Chief (as required)		
Unit Inventory:	1 Chief vehicle	1 Fire prevention /Investigation vehicle	1 Fire training trailer

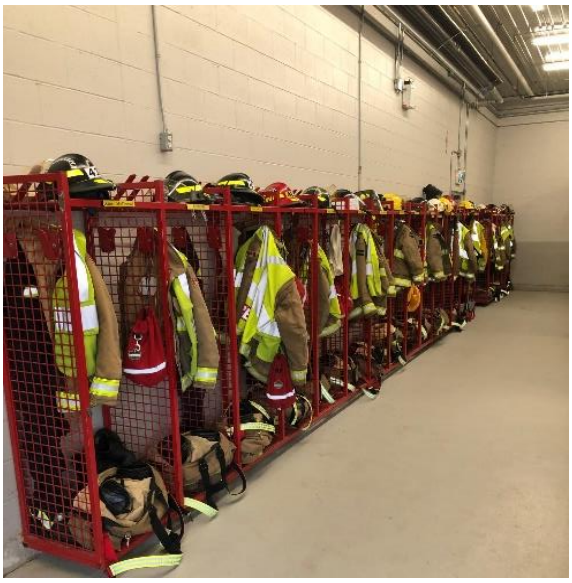
Coldstream Station					
Bays:	3 tandem drive-thru bays	Unit Capacity:	7	Year in Service:	2017
Comments:	- This station serves as the primary station for all apparatus, operations, and POC volunteer response personnel for the Coldstream demand zone - 1st net-zero emissions fire station in Canada - A modern fire station with updated OH&S and environmental systems - This station should meet the current and future needs for the foreseeable future				
Unit Inventory:	1 Engine	1 Tanker		1 Rescue	
	1 Rescue/air vehicle	1 Boat and trailer			
	Rehab Trailer				

Bryanston Fire Station					
Bays:	2 single bays	Unit Capacity:	2	Year in Service:	1986
Comments:	- This station serves as the primary station for all apparatus, operations, and POC volunteer response personnel for the Bryanston demand zone - 1 district chief, 1 assistant district chief, 3 captains, 1 lieutenant, and 17 POC volunteer firefighters work out of this station - Common meeting and washrooms room shared with community - This station is at capacity - Bay size limits future apparatus specifications - This station is meeting the current needs of the community				
Unit Inventory:	1 Pumper/Tanker	1 Rescue			

Ilderton Fire Station					
Bays:	1 drive-through tandem	Unit Capacity:	4	Year in Service:	2003
Comments:	- This station serves as the primary station for all apparatus, operations, and POC volunteer response personnel for the Ilderton response area - 1 district chief, 1 assistant district chief, 3 captains, 1 lieutenant, and 17 firefighters work out of this station - Basic operational quarters - This station is at capacity - Bay size limits future apparatus specifications - This station is meeting the current needs of the community				
Unit Inventory:	Engine	Pumper/Tanker	Rescue		
	Support vehicle (Gator)	Trailer			

Arva Fire Station					
Bays:	2 drive-through bays	Unit Capacity:	4	Year in Service:	1975
Comments:	- This station serves as the primary station for all apparatus, operations, and POC volunteer response personnel for the response area - 1 district chief, 1 assistant district chief, 3 captains, 1 lieutenant, and 17 firefighters work out of this station - Basic operational quarters - Bay size limits future apparatus specifications - This station is meeting the current needs of the community				
Unit Inventory:	Engine	Rescue	Tanker		

Delaware Fire Station					
Bays:	2 tandem bays	Unit Capacity:	4	Year in Service:	2006
Comments:	- This station serves as the primary station for all apparatus, operations, and POC volunteer response personnel for the Delaware response area - 1 district chief, 1 assistant district chief, 3 captains, 1 lieutenant, and 17 firefighters work out of this station - Basic operational quarters - Bay size limits apparatus specifications. - This station is meeting the current needs of the community				
Unit Inventory:	Engine	Pumper/Tanker		Rescue	



All five of MCFS fire stations are well maintained, clean and kept tidy. Each station was constructed and/or refurbished to meet the needs of the fire service of the time.

The Coldstream fire station was constructed in 2017, with considerable attention given to meeting the current and future needs of MSFS. As stated earlier, this fire station has the distinction of being the first net-zero fire station in Canada. Built with sufficient office, boardroom space, amenities, and firefighter health and wellness enhancements. his station also serves as the location of Middlesex Centre's emergency operations centre.

The remaining four fire stations are meeting the minimal requirements of a modern fire service. All have limited apparatus space, office space and living quarters. Except for the Coldstream station, the remaining three stations do not have adequate training rooms to the support operational effectiveness of MSFS.

Observation #9: Some of the recent apparatus purchased were constrained in size and capacity because of limitations of apparatus bay dimensions in the fire stations. Three of the four stations do not have adequate training rooms or areas to support the recurring training requirements.

Observation #9: Some of the recent apparatus purchased were constrained in size and capacity because of limitations of apparatus bay dimensions in the fire stations. Three of the four stations do not have adequate training rooms or areas to support the recurring training requirements.

Recommendation #9: Undertake a complete condition assessment of all fire stations.

(Suggested completion: 36-60 months)

It is recommended that the municipality undertakes a facilities condition assessment of the Arva, Bryanston, Delaware, and Ilderton fire stations to determine the long-term life cycle of these capital assets. These assessments focused on the building systems, structure, major components and building code compliance. Further, it is also recommended that this assessment includes functional and operational analysis to support MCFS's core services. Together with the future growth projections in each of the fire station response zones this fire station functional analysis typically focuses on the following:

- *Sufficient apparatus bay to safely and effectively garage and maneuver emergency response vehicles and apparatus*
- *Firefighter staging and personal protective equipment storage*
- *Equipment storage, maintenance, and decontamination areas*
- *Training and fitness area*
- *Staff support areas such as workstations, offices, kitchen, rest areas, washrooms, and showers (non-gender or gender specific)*

Rationale: *Conducting a facility assessment at each of the four identified fire stations, together with the performance assessments contained in this report and the Middlesex Centre Official Plan community growth projections will assist to determine and plan whether status quo, replacement, refurbishment, re-location, or closure is the most prudent approach to managing the current and future fire department needs of the municipality.*

3.10 Equipment

3.10.1 Apparatus and Emergency Vehicles

Fire apparatus and emergency vehicles are typically the largest asset expenditures for any fire department. Purchasing and managing these assets requires strong fiscal responsibility to endure public and local government scrutiny. Currently, MCFS has millions of dollars invested in vehicles and equipment. The lifespan of apparatus varies depending on its type and use, along with regular maintenance and testing standards. Fire services typically designate a lifecycle to each piece of apparatus and other emergency vehicles and contribute

to a capital reserve fund to ensure enough funds are available when the replacement is needed.

3.10.1.1 NFPA Standards for Fire Apparatus

NFPA has developed standards to assist a fire service with the design, maintenance, inspection, testing, life cycling, and dispersal for their fire apparatus. Fire departments may choose to adopt these standards or utilize them as a reference in their own standards and practices.

NFPA 1901: Standard for Automotive Fire Apparatus

The NFPA 1901 standard defines the requirements for new automotive fire apparatus and trailers designed to be used under emergency conditions to transport personnel and equipment and to support the suppression of fires and mitigation of hazardous conditions. This standard recommends that fire apparatus should respond to first alarms for the first 15 years of service, with the expectation that they perform as designed 95% of the time. For the next five years, it should be held in reserve for use at large fires or used as a temporary replacement for out of service first line apparatus.

NFPA 1911: Standard for the Inspection, Maintenance, Testing and Retirement of In-Service Emergency Vehicles

The NFPA 1911 standard defines the minimum requirements for establishing an inspection, maintenance, and testing program. Also included are guidelines for emergency vehicle refurbishment and retirement.

The Underwriters Laboratory of Canada utilizes many of the provisions within these NFPA standards which are referenced by Fire Underwriters Survey (FUS) for determining fire insurance ratings for a community. For example, it follows the life cycle program with the exception that it may award full credit for a fire apparatus older than 15 years, but not more than 20 years, in remote locations only if the piece of equipment is deemed in excellent condition and all necessary upgrades are done. The value of the additional credit in this case which is only a portion of the total grading for a final FUS rating may well be overshadowed by the cost of maintaining an older unit.

In addition, the NFPA 1901: Standard for Automotive Fire Apparatus recommends the following:

D.1 General

To maximize firefighter capabilities and minimize risk of injuries, it is important that fire apparatuses be equipped with the latest safety features and operating capabilities.

In the last 10 to 15 years, much progress has been made in upgrading functional capabilities and improving the safety features of fire apparatus. Apparatuses more than 15 years old might include only a few of the safety upgrades required by the recent editions of the NFPA fire department apparatus standards or the equivalent Underwriters Laboratories of Canada (ULC) standards. Because the changes, upgrades, and fine-tuning

to NFPA 1901 have been truly significant, especially in safety, fire departments should seriously consider the value (or risk) to firefighters of keeping fire apparatus more than 15 years old in first line service. It is recommended that apparatus more than 15 years old that have been properly maintained and that are still in serviceable condition be placed in reserve status; be upgraded in accordance with NFPA 1912; and incorporate as many features as possible of the current fire apparatus standard (See Section D3 of Standard). This will ensure that, while the apparatus might not totally comply with the current editions of the automotive fire apparatus standards, many of the improvements and upgrades required by the current editions of the standards are available to the firefighters who use the apparatus. Apparatuses that were not manufactured to the applicable NFPA fire apparatus standards or that are over 25 years old should be replaced.

Underwriters Laboratories of Canada

Current Underwriters Laboratories of Canada (ULC[11]) and NFPA 1901: Standard for Automobile Firefighting Apparatus Standards recommend using apparatus on the front line for up to 15 years, then as a backup for another four to five years. Of course, this timeline is dependent on the frequency of use, scheduled maintenance, and budgets. As indicated in Table 8, some emergency vehicles life cycles can be extended due to low usage or serviceable condition. A leading practice is to have a complete condition survey conducted to determine if there is usable life cycle remaining. This condition survey must consider the NPFA and FUS standards along with the maintenance and cost records of the respective vehicle.

[11] *Underwriters Laboratories of Canada (ULC) is an independent product safety testing, certification, and inspection organization. www.canada.ul.com*

Table 8: Fire Apparatus Service Schedule (Fire Insurance Grading)

Apparatus Age (Yrs.)	Major Cities [3]	Medium Sized Cities [4]	Small Communities[5] and Rural Centres
0 – 15	First Line Duty	First Line Duty	First Line Duty
16-20	Reserve	2nd Line Duty	First Line Duty
20-25[1]	No Credit in Grading	No Credit in Grading or Reserve[2]	No Credit in Grading or 2nd Line Duty[2]
26-29[1]	No Credit in Grading	No Credit in Grading or Reserve[2]	No Credit in Grading or Reserve[2]
30+	No Credit in Grading	No Credit in Grading	No Credit in Grading

[1]All listed fire apparatus 20 years of age and older are required to be service tested by recognized testing agency on an annual basis to be eligible for grading recognition (NFPA 1071).

[2]Exceptions to age status may be considered in a small to medium sized communities and rural centres conditionally, when apparatus condition is acceptable, and apparatus successfully passes required testing.

[3]Major Cities are defined as an incorporated or unincorporated community that has:

- *a populated area (or multiple areas) with a density of at least 400 people per square kilometer; AND*
- *a total population of 100,000 or greater.*

[4]Medium Communities are defined as an incorporated or unincorporated community that has:

- *a populated area (or multiple areas) with a density of at least 200 people per square kilometer; and/or*
- *a total population of 1,000 or greater.*

[5]Small Communities are defined as an incorporated or unincorporated community that has:

- *no populated areas with densities that exceed 200 people per square kilometer; AND*
- *does not have a total population more than 1,000.*

3.10.2 Fire Apparatus Design and Procurement

Fire apparatus are designed and tendered based on the unique requirements of the fire service and the community needs that it serves. With the design, tender and procurement processes typically taking two to three years or longer as well as with the expected life cycles of these apparatus of 20 years or more, it is important that the initial decisions accurately reflect the immediate needs and those in the future.

MCFS fire stations vary significantly in the risks and needs of each area. Delaware, Coldstream, and Ilderton demand zones have significant commercial, residential development, while Arva and Bryanston are primarily rural developments. The ideal apparatus for each fire station may be considerably different. MCFS seeks input from station chiefs and officers for the concentration and distribution of replacement apparatus. Together with input from municipal fleet staff and finance, MCFS administration develops a specification for replacement apparatus for tender. Some of the recent apparatus purchased by MCFS were constrained in size and capacity because of limitations of apparatus bay dimensions in the fire stations.

3.10.3 Fire Apparatus Maintenance and Repair

In Ontario, all fire apparatus with a gross weight, registered gross weight, or manufacturers gross vehicle weight rating exceeding 4500 kilograms must be inspected on an annual basis in accordance with regulations made under the Highway Traffic Act. These vehicles are required to display an inspection sticker as evidence of compliance with this requirement.

Daily driver inspections for commercial vehicles are a requirement under the Act. Fire vehicles are not included in this requirement, however most fire departments in Ontario mandate daily inspections either at the beginning of a shift, or post-trip at a minimum.

A sound and reliable preventative maintenance program is a vital component of the overall fleet management process ensuring each piece operates reliably in the way it was intended safely and effectively while assisting in making it to the anticipated life cycle. Poor maintenance scheduling or neglect on required checks and repairs can lead to accidents, breakdowns, and life safety issues. A fire apparatus pre-maintenance program should consist of the flowing components:

- Trip inspections (daily, pre-trip, post trip)
- Regular preventative maintenance scheduling
- Annual preventative maintenance comprehensive check

The maintenance and repair of all MCFS heavy and light emergency vehicles is skillfully handled through the Municipalities Fleet Services. The “customers” (MCFS) are very satisfied with the level of service that they receive.

Required speciality testing and certifications are successfully handled through contract by a third-party vendor utilizing fire industry emergency vehicle technicians (EVTs).

Daily inspection sheets and post trip inspections are reviewed to ensure any necessary repairs are made as soon as possible. Recommended service schedules, testing and certifications are coordinated with MCFS administration to ensure compliance with as little disruption to service as possible. Through interviews with MCFS staff and review of records, it is obvious that the maintenance and upkeep of all fire vehicles are maintained to a very high standard.

3.10.4 Fire Apparatus Replacement and Dispersal

Middlesex Centre has a policy for the replacement of capital equipment and vehicles. MCFS has been making a conscious attempt to extend the life of their apparatus. A list of all MCFS apparatus and their anticipated replacement dates has been developed and maintained. MCFS apparatus have a target replacement date of twenty years. The fire chief, together with municipal partners have established a fire equipment and vehicle reserve fund for anticipated apparatus replacement. The next apparatus scheduled to be replaced under this schedule is 2024.

There are several assumptions that should form the criteria for fire apparatus replacement. This process for determining the appropriate dollar value required to be placed in a reserve fund to ensure sufficient monies are available at the time of replacement is based on the

identified life cycle, forecasted inflation, depreciation, and salvage value of current assets. Calculating the yearly contributions is based on the number of years of expected life in the fleet inventory. Although both NFPA and FUS have criteria on re-classifying or retiring apparatus, modifications or upgrades may be required based on age or heavy usage.

For example:

- Engines: 16-20 years frontline (FUS & NFPA), but can be reduced due to high usage
- Rescue Truck: 15 years frontline (NFPA), but can be reduced due to high usage

Replacement lifecycles for MCFS vehicles are not consistent with lifecycles recommended by NFPA 1901 and the FUS body reporting to the Canadian General Insurance (CGI). For example (as detailed in Table 9) first line apparatus are to be utilized for up to 15 years and then serve as a backup, or in reserve capacity for up to five additional years. MCFS heavy apparatus have a planned life cycle of 20 plus years with no defined reserve status.

In review of current apparatus, a study of the original purchase price minus market depreciation is compared to the anticipated replacement cost, taking into consideration the trend in inflationary increases. The salvage or trade-in value of the original apparatus can be estimated based on industry trends. This value is subject to several considerations including:

- Age of the vehicle
- Kilometers
- General condition
- Certifications
- Annual test results

Through careful analysis the optimal replacement year can be determined. The table below shows an example of an apparatus purchased in 2007 with a 25-year replacement timeline. Assumptions need to be determined for a particular piece of apparatus to consider the type of factors above, as well as the type of requirements for the replacement apparatus to meet the needs for the next 20 plus years. Annual reserve contributions should be made to ensure sufficient funds are available at the time of anticipated replacement.

Table 9: Fire Apparatus Life Cycle Cost Projection Example

Vehicle	Year	Replacement cost based on 6.5% increase per year	Difference between original and replacement	Depreciated value
1	2007	$240,000.00	$0.00	$240,000.00
2	2008	$255,840.00	$15,840.00	$223,200.00
3	2009	$272,725.44	$32,725.44	$207,576.00
4	2010	$290,725.32	$50,725.32	$193,045.68
5	2011	$309,913.19	$69,913.19	$179,532.48
6	2012	$330,367.46	$90,367.46	$166,965.21
7	2013	$352,171.71	$112,171.71	$155,277.64
8	2014	$375,415.05	$135,415.05	$144,408.21
9	2015	$400,192.44	$160,192.44	$134,299.63
10	2016	$426,605.14	$186,605.14	$124,898.66
11	2017	$454,761.08	$214,761.08	$116,155.75
12	2018	$484,775.31	$244,775.31	$108,024.85
13	2019	$516,770.48	$276,770.48	$100,463.11
14	2020	$550,877.33	$310,877.33	$93,430.69
15	2021	$587,235.24	$347,235.24	$86,890.55
16	2022	$625,992.76	$385,992.76	$69,512.44
17	2023	$667,308.28	$427,308.28	$55,609.95
18	2024	$711,350.63	$471,350.63	$44,487.96
19	2025	$758,299.77	$518,299.77	$35,590.37
20	2026	$808,347.56	$568,347.56	$28,472.29
21	2027	$861,698.50	$621,698.50	$22,777.84
22	2028	$918,570.60	$678,570.60	$18,222.27
23	2029	$979,196.26	$739,196.26	$14,577.81
24	2030	$1,043,823.21	$803,823.21	$11,662.25
25	2031	$1,112,715.54	$872,715.54	$9,329.80
26	2032	$1,186,154.77	$946,154.77	$7,463.84

Figure 7: Fire Apparatus Life Cycle Cost Projection Example

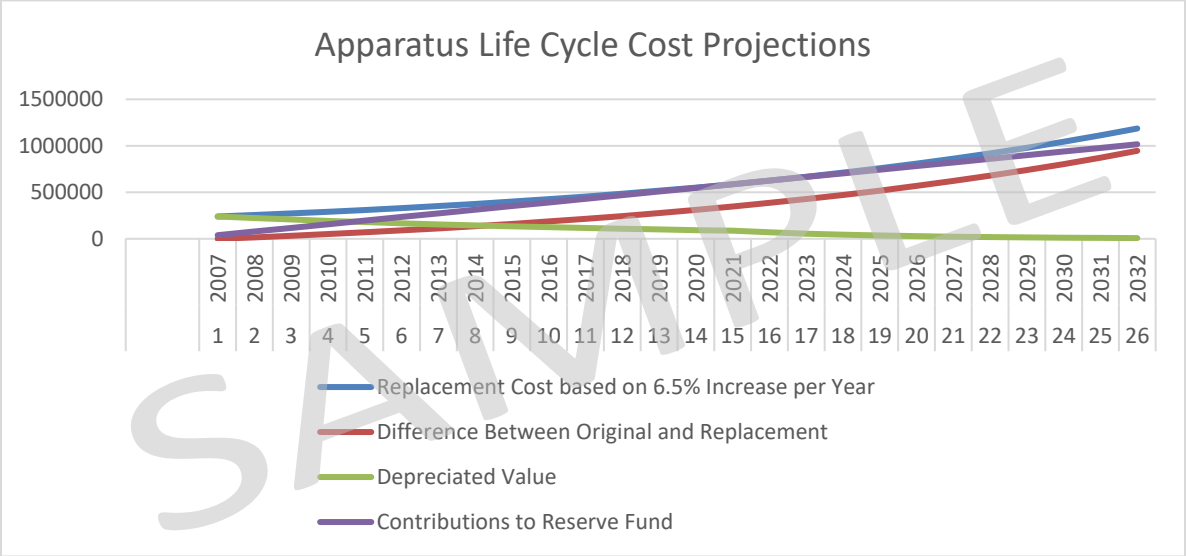


Table 10 and Figure 7 show that the monies put into the replacement reserve fund is close to the projected replacement cost in year 15 and requires additional contributions to extend past. Note the following key points:

- Five-year increase to replacement cost from 15-20 years = $182,533
- Five-year decrease in depreciation value from 15-20 years = $58,415
- Total increased costs to retain apparatus for additional 5 years (15-20) = $240,948
- Additional contributions to reserve fund $195,500
- Difference between 15 and 20 years is $240,948 - $195,500 =$45,448 or an additional $9,090 of contribution per year
- Changing from 15 to 20-year replacement cycle requires $1,818 per year more from year

A fire service that utilizes a similar process as above, taking into consideration local conditions to determine the optimal replacement time for each major piece of apparatus will be able to accurately ensure sufficient funds are available when required.

Observation #10: There is an established apparatus and emergency vehicle replacement schedule. This schedule anticipates the retirement of all apparatus and emergency vehicles at 20 years. Financial resources are set aside in their fire equipment and apparatus reserve fund in anticipation of upcoming replacements. It has been determined that this fund is not sufficient to meet the life cycle replacement needs of the fire service.

Recommendation #10: Develop a comprehensive reserve fund process to meet life cycle requirements.

(Suggested completion: 12-18 months)

It is recommended that there is an annual review and update of fire equipment and emergency vehicle reserve fund to ensure sufficient funds will be available when replacements are necessary.

Further, the development of a comprehensive reserve fund process that accounts for necessary criteria to establish ideal replacement timelines for all fire apparatus and emergency vehicles. A yearly review of this plan should be undertaken to evaluate whether the schedule remains on track. Necessary adjustments to individual apparatus or emergency vehicles can be made at that time.

***Rationale:** Given the nature of emergency services and the reliance on safe and dependable equipment and vehicles, the need for regular and a critical review of these assets is important to determine if the intended life cycle is both achievable and financially responsible.*

Fire apparatus are routinely utilized under extreme conditions for long periods of time. The reliability of these critical pieces of equipment cannot be suspect. As stipulated in NFPA 1901, frontline apparatus is required to maintain a 95% in service status.

In addition to maintaining a current fleet capable of providing reliably service, meeting insurance (ULC) guidelines favourably impacts municipal insurance ratings. While the life expectancy of any piece of equipment or vehicle is contingent on proper use, maintenance and repair, fire apparatus life cycles are subject to adjustments more frequently than normal service vehicles. Annual reviews of all apparatus in MCFS, including mileage, call volume, maintenance records, testing results and salvage values should be carefully done with subsequent adjustments to the original life cycle, whether reduced or extended as warranted.

Updating all apparatus and emergency vehicle replacement schedules will assist with ensuring sufficient timelines for replacement process and necessary funds are there when needed.

Table 10: MCFS Apparatus and Planned Life Cycle

Unit Name	Manufacturer	Chassis	Year Built	Planned Yr. Replacement	Current kms.
Headquarters					
Truck	Dodge	Dodge 1500	2015	2035	N/A
Rehab Trailer	Custom	Custom	2006	N/A	N/A
SUV	Ford	Ford Escape	2019	2039	N/A
Coldstream Fire Station					
Engine	Dependable	International	2010	2030	17542
Rescue	Dependable	GMC C5500	2008	2028	17542
Rescue – Air and Water	Ford	Ford F 250	2018	2038	12888
Tanker	MetalFab	International	2011	2031	13871
Boat	Melt	Custom	2016	2031	N/A
Trailer	custom	custom	2009	N/A	N/A
Arva Fire Station					
Engine	MetalFab	Freightliner	2019	2039	10154
Rescue	Fort Garry	Freightliner	2019	2039	4906
Tanker	Superior E-One	International	2004	2024	25,340
Bryanston Fire Station					
Tanker	MetalFab	Freightliner	2017	2037	7903
Rescue	Dependable	Freightliner	2009	2029	12918
Delaware Fire Station					
Engine	MetalFab	Freightliner	2007	2027	31938
Pumper/Tanker	MetalFab	Freightliner	2020	2040	3481
Rescue	Ford	Ford F-150	2016	2036	9955
Ilderton Fire Station					
Engine	Fort Garry	Freightliner	2020	2040	3416
Pumper/Tanker	Almonte/DOB	International	2005	2025	17537
Rescue	Ford	Ford F-150	2016	2036	7559
Support	John Deer	Gator	2019	2039	881
Trailer	Custom	Custom	2019	2039	N/A

3.10.5 Apparatus and Emergency Vehicle Fleet Inventory

MCFS through Middlesex Centre, owns and maintains 10 heavy apparatus (engines, tankers, rescues), five emergency vehicles (three light rescues, two pick-up trucks), one boat, one ATV, and three trailers (two light, one enclosed) that are strategically located throughout MCFS response area in their five fire stations. Each piece of apparatus has specific roles in

anticipation of the risks in each response zone. This mobile equipment is supported by similar types of apparatus deployed out of mutual aid fire departments when requested.

One noted gap is the absence of an elevated platform or ladder truck in MCFS apparatus inventory, and rather depend on one being available when requested from one of the mutual aid partners.

MCFS inventory of apparatus and equipment is modern and well maintained. MCFS places appropriate apparatus in each station based on anticipated needs. Some apparatuses have been designed to fit into individual fire stations based on limitations of bay size. A summary of the current MCFS apparatus and light duty vehicle inventory is appended as Appendix F.

3.11 Ancillary Equipment

Equipment needed for field response operations such as vehicle extrication tools, hand tools and blowers, etc. are current and appropriate for the needs of MCFS. The ancillary equipment is designed and maintained to meet the department's current core service, goals, and objectives. As the response needs change or grow, additional equipment to match the service must be considered.

3.12 Personal Protective Equipment

MCFS personnel are supplied with NFPA, NIOSH and CSA approved personal protective equipment (PPE) including turnout (bunker gear), gloves, helmets, boots and any specialized gear for specific rescue and EMS operations. MCFS has a strict cleaning and maintenance program in compliance with NFPA 1971: Standard on Selection, Care, and Maintenance of Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting for the health and safety of their firefighters.

The PPE provided is current, appropriate, and designed to meet the department's safety goals and objectives.

3.13 Specialized Operations Equipment

Effective and efficient response to an incident requires equipment designed for a specific purpose. MCFS responds with specialized equipment to incidents involving motor vehicles, Hazmat/DG incidents, technical rope rescue, ice rescue, water rescue and wildland interface fires. This equipment is typically kept on the apparatus or in-station in anticipation of the known risks in each response zone.

The equipment currently meets the goals and objectives of the department, however, may need upgrading or replacement based on usage or change in response risks for any given response zone.

3.14 Asset Management

In some municipalities, the municipal corporation manages fire and emergency services assets to take advantage of synergies with other fleet and facilities management programs. Middlesex Centre has developed and maintained a commercial asset management software program with associated standard operating guidelines (SOGs). MCFS utilizes this process throughout the five fire stations with great success.

3.15 Municipal Comparative Analysis

Comparing MCFS to similar communities is a good way to identify benchmarks and trends. It must be noted that all communities have different attributes such as risk factors and community profile. For this reason, the community comparative analysis should be used as a base reference that is not necessarily intended to be replicated by the Municipality of Middlesex Centre. These benchmarks include department type and service model, infrastructure, budgets, performance, effectiveness, and efficiencies.

For the purposes of this analysis, we used 2017–2022(Q1) information to get common information from each community.

Although fire and emergency services ultimately have the same goal of protecting life and property, each community has its unique features in how to accomplish their goals. Therefore, there are no ideal or identical comparators for MCFS. Our main criteria for collecting information were:

- Population
- Budgets
- Department size
- Type (full-time, part-time or combination)
- Department staffing

Additional information for evaluation was:

- Number of fire stations
- Call volume
- Call types

3.16 Participating Communities

Table 11: Comparatives Population and Land Area

Community	Province	Population	Jurisdiction Land Area (km^2)
Middlesex Centre	ON	18,928	592
Township of Clearview	ON	14,500	650
St. Clair Township	ON	15,000	618.57
Township of Springwater	ON	21,000	534
Municipality of Strathroy-Caradoc	ON	23,871	271

3.17 Department Profile

Department profile, staffing models and levels of service are based on community risk, risk tolerance and the ability for a community to pay for and sustain desired service levels. MCFS is the only department of those surveyed to have no Deputy Fire Chief. The position of Deputy Fire Chief is a crucial position to make an organization that operates 24 hours a day, seven days a week efficient and effective.

Table 12: Comparative Departments' Profile

Community	Middlesex Centre	Township of Clearview	St. Clair Township	Township of Springwater	Municipality of Strathroy-Caradoc
Department Type	POC	POC	POC	Composite	Composite (PT)
No. of Stations	5	5	6	4	3
Total Staff	120	92	155	100	80
Fire Chief (FT)	1	1	1	1	1
Deputy (DC) (FT) Assistant Chief (AC) (FT)	0	1	3	1	1 (PT) 1 (FT)
Support Staff (FT)	1	1	1	1	1
Suppression Staff	117	87	150	100	70
Fire Prevention Staff (FT)	1	1	0	1	2.5
Training Staff (FT)	0	1	0	1	1
Dispatch	0	0	0	0	0
Mechanical (FT)	0	0	0	0	0
Other	0	0	6 District Chief/ 6 Deputy DC	0	1 Public Educator
FT - Full-time PT - Part-time POC - Paid-On-Call Aux - Auxiliary (aka. POC)	Composite – Combination of two or more of Fulltime/ Part time/ Paid-On-Call/ Auxiliary				

3.18 Budgets

Department budgets are of specific concern to all communities. In some instances, budgeting for fire and emergency services make up a considerable portion of a community's operating budget. Each community factors in overall community profile and risk factors.

We evaluated the budgets for each community, and it is important to note that each is unique in how the respective municipality allocates their budgets. Of the five communities we evaluated, all fire departments are listed as either paid-on-call or composite make up.

All five departments have operating budgets within the range of $1.65M to a high of $2.1M this translates to a range of 2.7% to 14.2% of the overall municipal budget for operating the fire service There is only one other fire service in the comparable communities that has a lower percentage of the overall municipal budget. The lower cost fire service has half the land area to provide services to than MCFS. All five communities have listed their fire departments as either POC or composite organizations. It cannot be overstated that while POCs are cost efficient, there are operational effectiveness limitations to the model involving mobilization and response times. As the data shows, MCFS's is an efficient, cost-effective fire service with respect to the operating budget and cost per-capita in delivering fire and emergency services to their community.

Table 13: Community Comparative Budget Ranking

Community	Province	Municipal Budget	Department Operating Budget	Cost per capita	Percentage of Municipal Budget
Middlesex Centre	ON	$65.2 M	$1.84 M	$97.38	2.8%
Township of Clearview	ON	$32.9 M	$2.1 M	$313	7%
St. Clair Township	ON	$14.8 M	$2.1 M	$139.31	14.2%
Township of Springwater	ON	$22.9 M	$1.65 M	$79	7.2%
Municipality of Strathroy-Caradoc	ON	$64.9 M	$1.76 M	$73.73	2.7%

Note: *This analysis, used 2022 information to get common information from each community*

3.19 Response Data

For the purposes of this municipal comparative analysis, we used 2015–2019 information to get common information from each community. Breakdowns are divided into the two following categories:

Table 14: Examples of Incident Types for Statistical Analysis

INCIDENTS BY TYPE		
EMS Related Calls		
Call Types	Alfa, Bravo Charlie Delta Echo	
	Lift Assist	
	False Alarms	
Fire Related Calls		
Fire Emergency	Alarm Burning Complaint Structure Fire Minor Fire Smoke	Car Fire Re-check Wildfire – Grass, Brush, Outdoor Oven/Pot on Stove Explosion
MVC (Motor Vehicle Collision)	Extrication	No Extrication
Rescue	Stalled Elevator Lake/Marine Rescue High Angle	Swift Water Building Collapse Ice
Hazmat/Dangerous Good	Highway Incident Rail Incident	Industrial Incident Resident Incident
Non-Emergency	Carbon Monoxide Gas/Oil Smell/Spill Power/Telephone/Cable Line Down Natural Gas Leak	Aircraft Standby Incident Bomb Threat Hazardous Materials Propane Leak/Smell
Other	Inspections Assist Other Agency Public Service	This is a service many communities provide to pick up hypodermic needles left on streets/in parks it can be removed Flood Assessment Water Problem (in structure)

Note: *Description and category names may not be common terminology in all jurisdictions.*

Table 15: Municipal Comparative Response Call Volume (2015 – 2019)

Community		Middlesex Centre	Township of Clearview	St. Clair Township	Township of Springwater	Municipality of Strathroy-Caradoc
Total Call Volume Statistics	2017	352	765	293	537	1040
	2018	344	771	290	601	993
	2019	331	813	301	504	1029
	2020	328	NA	341	498	NA
	2021	380	NA	377	510	NA
Fire/ Rescue/ MVC Related Calls Statistics	2017	189	346	121	238	454
	2018	180	349	146	312	371
	2019	207	401	150	239	412
	2020	182	NA	144	348	NA
	2021	215	NA	177	340	NA
EMS Related Calls Statistics	2017	36	414	94	145	24
	2018	47	415	97	110	25
	2019	44	407	103	114	31
	2020	42	NA	133	150	NA
	2021	42	NA	126	170	NA

Note: *The initial survey sent did not include 2020 & 2021, 3 of 5 departments responded to the second survey with the 2020 & 2021 data.*

There is no standard for categorizing incidents so it must be understood that statistics are only general reference when comparing fire departments. The most significant difference in the statistics is the number of medical calls attended by the surveyed fire departments. The three of the fire departments (Clearview, St. Clair, and Clearwater) attended a substantially greater number of medical calls than the other two fire departments (the Municipality of Middlesex Centre and Strathroy - Caradoc). The five-year response volume, based on the three fire departments that reported, has MCFS just below the average number of responses of 1735. This is attributed to the minimal number of EMS/medical incidents MCFS responds to by comparison. MCFS' five-year average response for EMS incidents is 42 in comparison to the five-year averages of 105 (St. Clair) and 138 (Springwater).

As previously indicated, all communities have different attributes such as risk factors and community profiles and services or service levels such as not providing EMS. In addition, financial administration, records and data methodology, and management systems all differ in varying degrees.

None of the fire departments surveyed have engaged in a 'Standard of Cover' policy for their respective departments.

SECTION 4
INCIDENT STATISTICS AND RESPONSE PERFORMANCE ANALYSIS

4.1 Industry Standards and Provincial Legislation

The following section provides an overview of relevant industry standards and provincial legislation with respect to fire department response performance in Ontario. This section also includes a detailed analysis of the trends in incident types occurring within Middlesex Centre and MCFS response performance.

4.1.1 National Fire Protection Association (NFPA) Standards

The most widely accepted standards for the fire service are developed by the National Fire Protection Agency (NFPA). Established in 1986, "the NFPA is a self-funded non-profit organization devoted to eliminating death, injury, property and economic loss due to fire, electrical and related hazards (NFPA, 2021)." The NFPA has developed over 300 consensus-based codes and standards designed to improve fire department effectiveness and firefighter safety. NFPA research is applied in establishing industry benchmarks for fire department operations, training, and equipment. Many of these standards form the basis of and are referenced throughout the Ontario Fire Protection and Prevention Act, 1997 and related firefighting regulations and guidelines the Ontario Occupational Health and Safety Act, R.S.O. 1990.

The NFPA has done considerable research in developing standards and ensuring they reflect the primary value of life-safety in emergency response for responders and victims. The NFPA standard identifying firefighting operations and response performance objectives for paid-on-call departments such as MCFS is NFPA 1720: Standard for the Organization and Deployment of Fire Suppression Operations Emergency Medical Operations, and Special Operations to the Public by Volunteer Fire Departments. This standard provides the framework for the fire department emergency response performance analysis and will be discussed in detail further in this section of this master plan.

Additionally, NFPA 1201: Standard for Providing Emergency Services to the Public outlines several practices in establishing and managing an effective and efficient fire service. It provides standards regarding governance, organizational structure, planning and resource deployment. It will be referenced throughout this section.

4.1.2 Ontario Regulatory Framework Regarding Community Fire Safety

Ontario municipalities are required to provide a public education and fire safety program but may or may not elect to do that by establishing a fire department. The *Fire Protection and Prevention Act, 1997, S.O. 1997, c. 4* states the following:

> *"Municipal responsibilities*
>
> *2(1) Every municipality shall,*
>
> *(a) establish a program in the municipality which must include public education with respect to fire safety and certain components of fire prevention; and*

(b) provide such other fire protection services as it determines may be necessary in accordance with its needs and circumstances.

Methods of providing services

(2) In discharging its responsibilities under subsection (1), a municipality shall,

(a) appoint a community fire safety officer or a community fire safety team; or

(b) establish a fire department."

In the event a fire department is established, municipalities are required to meet the numerous requirements regarding fire department equipment, training and certification standards identified in the regulations of this act and the *Occupational Health and Safety Act, R.S.O. 1990*. Many of these requirements are based on NFPA standards. However, municipalities are not required to provide specific services or meet the service level standards identified in NFPA 1720. The response time goals and the number of required firefighters to respond identified in NFPA 1720 are an industry leading practice but not mandated.

Establishing service types and associated service levels is the responsibility of the authority having jurisdiction (AHJ). For most municipalities, the AHJ is the municipal council. Formalizing service types and service levels in policy is also considered a best practice. Fire department service types and service levels are typically established to mitigate identified community risks. However, service levels should also be achievable and affordable.

The Centre for Public Safety Excellence and International Association of Fire Chiefs developed a standard of cover framework to support the process of establishing fire department service types and service levels. It is a comprehensive process to identifying community risks, assessing fire department capability, and establishing appropriate emergency response service levels to mitigate community risks. The outcome of this process results in a standard of cover policy including service level recommendations to be considered for approval by the AHJ.

4.2 Incident Types and Frequency Analysis

Fire and rescue services typically have access to large amounts of incident and response data. Incident data can be used and reported for several purposes. Incident type and frequency data is used to analyze department activity levels and identify trends in demand for fire services. The breadth of services provided by the modern fire service is often surprising. Fire departments have evolved from responding primarily to fires to responding to a broad range of public service and emergency incidents and becoming a critical component of a community's social safety net.

Five years of response data provided by Middlesex Centre Fire Services (MCFS) was analysed. The data includes all incidents from January 2017 to December 2021. Incident data is aggregated into broader categories and more specific incident categories. For example, all types of fire incidents including structural, vehicle and wildland/brush/garbage/cropland fires may be combined into a single category. This differentiation is made to provide varying levels of information as stakeholder reporting and information needs vary depending on their level of interest in MCFS activities.

MCFS stations respond to incidents within their demand zones, provide a second station response to concurrent or large incidents within the municipality and occasionally provide

mutual aid outside of Middlesex Centre. Table 16 identifies all unique incidents occurring within the municipal boundary. This analysis provides a general overview of the types of emergencies occurring and their respective frequency. It does not include counts of second station incidents as the incident is already captured in the initial response or mutual aid responses which are outside of Middlesex. These incident types will be discussed in further detail in this section.

Table 16: Unique Incidents within Middlesex Centre (2017 to 2021)

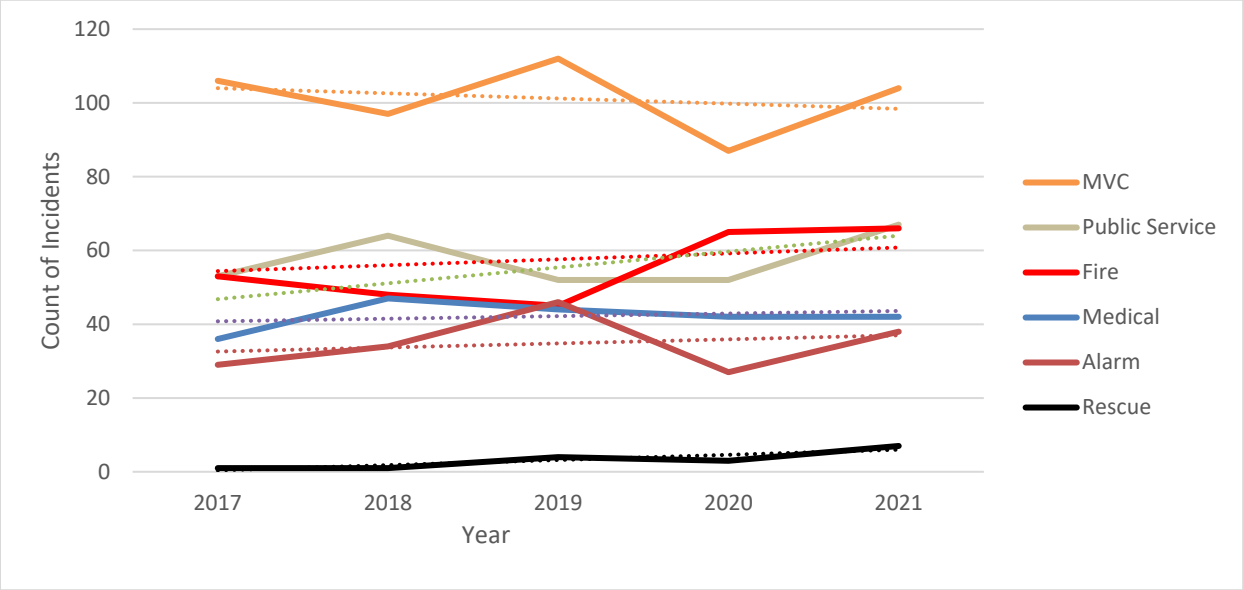
Incident Type	2017	2018	2019	2020	2021	Total	%
MVC	106	97	112	87	104	506	34
Public Service	53	64	52	52	67	288	20
Fire	53	48	45	65	66	277	19
Medical	36	47	44	42	42	211	14
Alarm	29	34	46	27	38	174	12
Rescue	1	1	4	3	7	16	1
Total	278	291	303	276	324	1472	100

The following observations regarding unique incident types within Middlesex Centre were noted:

- 34% of all incidents were motor vehicle collisions
- Public service incidents were a relatively high percentage of the incident types occurring in Middlesex Centre
- Medical incidents accounted for a relatively low percentage of responses in comparison to many fire services providing first medical response where the percentage often exceeds 50%
- Rescue related incidents were relatively infrequent

Figure 8 illustrates the general trends seen in the broad categories of unique incidents occurring in Middlesex Centre during this period. This analysis is intended to draw attention to the incident categories that are changing rapidly. A positive trend (increasing) may forecast a future need for additional resources to respond to these incidents or new mitigation strategies to address this type of community risk. A negative trend (decreasing) may identify successful mitigation efforts or a decreasing risk resulting from other changes in the community risk profile.

Figure 8: Unique Incidents by Incident Type (2017 to 2021)



The following general trends regarding unique incidents within Middlesex Centre were noted:

- Most incident types experienced considerable year over year variation, making it difficult to identify a clear trend
- Fire incidents increased the most during this period in 2020 which was flattened in 2021, but decreased in 2018 and 2019 with a slight overall positive trend
- Public service, medical, alarm and rescue incidents varied year over year but also demonstrated slightly positive trends overall
- MVCs increased in 2019 and 2021, but decreased in 2018 and 2020 with a slight negative trend overall

General or broad incident type categories can be broken out into subcategories of incident types to provide more specific information regarding community risks. For example, fire incidents may be categorized into specific fire types such as brush, structure fires, garbage fires or vehicle fires. This level of detail is useful in analyzing more specific trends in community risk and service requirements. It may also be useful in identifying the need for specific risk mitigation strategies such as increased property inspections, reduced speed limits or targeted public education.

Table 17 reflects all incident types in greater detail that occurred in Middlesex Centre from 2017 to 2021. The color coding of the incident subcategories aligns with the incident types in the table above. This dataset included mutual aid and second-station responses to reflect the response activity from a department-wide and individual station response perspective. It is useful to include these categories to acknowledge and reflect the additional demand on the fire response system these types of incidents create.

Table 17: All Incidents/Responses by Incident Subcategory Type

Incident Subcategory	2017	2018	2019	2020	2021	Total	Total %
MVC	106	97	112	87	104	506	29.2
CO	24	28	23	30	34	139	8
Utilities	12	21	13	10	19	75	4.3
Public assist	17	15	16	12	14	74	4.3
Open burn	14	26	16	27	13	96	5.5
Fire - vehicle	14	11	22	20	19	86	5
Fire - structure	23	11	7	15	22	78	4.5
Fire - field	2	0	0	3	12	17	1
Medical	36	47	44	42	42	211	12.2
Monitor alarm	29	34	46	27	38	174	10
Low angle	0	1	0	1	4	6	.3
Water/ice	1	0	4	1	1	7	.4
UTV	0	0	0	1	2	3	.2
Second station	66	41	23	39	48	217	12.5
Mutual/auto aid	8	12	5	13	8	46	2.7
Total	352	344	331	328	380	1735	100%

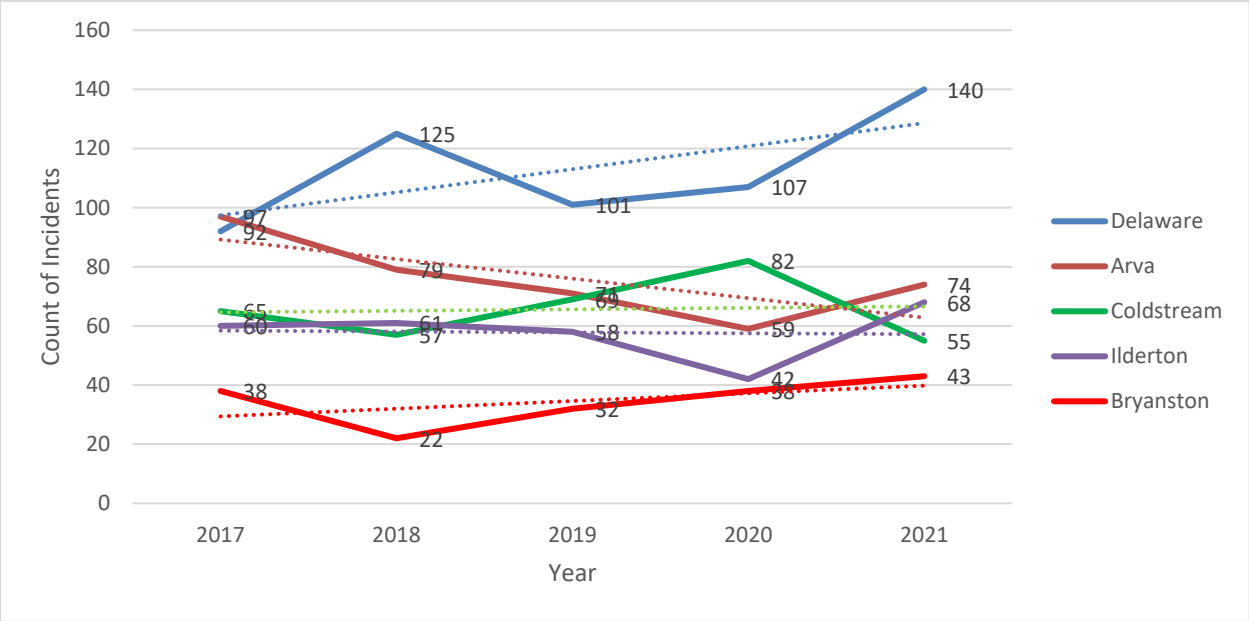
The following observations regarding all incident types/all responses were noted:

- Carbon monoxide (CO) related incidents accounted for 8% of all station responses, which is a relatively high number that warrants consideration of alternative strategies such as increased public education
- Open burning varied considerably year over year
- Structure fires decreased substantially in 2018 but have increased steadily since
- Field fires quadrupled between 2020 and 2021, but were still relatively infrequent
- Medical incidents were relatively constant during this period and but not overtaxing MCFS
- At 10% of all incidents Municipality of Middlesex Centre monitor alarms are a little lower than typically experienced
- Low angle and water/ice rescue occurred relatively infrequently
- Second station responses accounted for more than 12% of all incident types and occurred for almost 15% of all unique incidents (217 incidents of 1472 unique incidents)
- Mutual aid accounted for 2.7% of incidents, providing critical assistance to neighbouring municipalities

Figure 9 includes counts of all MCFS incidents, including mutual aid and second station responses. This chart illustrates the general trends in activity levels and demand for service for each of the

five MCFS stations. Positive trends indicate an increase in incidents and negative trends indicate incidents generally decreased.

Figure 9: All incidents by Station (2017-2019)



The following trends regarding incident types and frequency for each station were noted:

- Delaware Station experienced a considerable increase in incidents in 2018, a decrease in 2019 and nearly twice the requests for service than the next nearest station in 2021 with an overall positive trend
- Arva Station experienced a consistent decline in incidents from 2017 to 2020, with an increase in 2021 but maintained an overall negative trend
- Coldstream Station experienced a 30% increase in incidents in 2020 which declined in 2021 but maintained an overall positive trend
- Ilderton Station experienced a 40% decline in incidents in 2020 but an offsetting increase in 2021 with a very slight negative trend
- Bryanston Station experienced nearly a 50% decline in incidents in 2018 but has increased steadily since with an overall positive trend
- All stations apart from Coldstream Station experienced an increase between 2020 and 2021

Table 18. includes all MCFS incidents, including second station and mutual aid incidents. This perspective provides insight into the types of incidents each station responds to and differences in the frequency of incident types in each demand zone. The information can be used to inform service-level decisions in the five demand zones. It also provides insight into the response frequency and activity levels for each station.

Table 18: All Incidents by Incident Type by Station (2017 to 2021)

Incident Type	Delaware	Arva	Coldstream	Ilderton	Bryanston	Total
MVC	136	131	100	58	81	506
Public Service	113	40	45	69	21	288
Fire	108	47	40	43	39	277
Second station	11	102	52	40	12	217
Medical	81	33	34	48	15	211
Alarm	95	25	24	26	4	174
Mutual aid	15	0	28	2	1	46
Rescue	6	2	5	3	0	16
Total	565	380	328	289	173	1735
%	32.6	21.9	18.9	16.7	10	

The following observations regarding incident types and frequency for each station were noted:

- Delaware Station was dispatched to 565 incidents and was the busiest MCFS station during this period
    - MVCs were the most frequently occurring emergency incidents in this demand zone (136), accounting for nearly 25% of all incidents
    - Fire and medical incidents occurred at approximately twice the frequency in this demand zone in comparison to the others, accounting for 34% of all incidents when combined
    - Public service incidents accounted for approximately 20% the incidents in this demand zone
    - Delaware Station responded to the least number of second station responses (11 incidents)
    - It experienced the second highest number of requests for mutual aid (15 incidents)
- Arva Station was dispatched to 380 incidents and was the second busiest MCFS station during this period
    - MVCs were the most frequent incident in this demand zone (131), accounting for 34% of all incidents
    - Fire and medical incidents occurred relatively frequently, accounting for 21% of all incidents when combined
    - Arva Station responded to the most second station responses (102 incidents), accounting for approximately 27% of all incidents
    - Arva Station did not respond to any mutual aid incidents
- Coldstream Station was dispatched to 328 incidents and was the third busiest MCFS station during this period

  - MVCs were the most frequent incident type in this demand zone (100 incidents), accounting for 30% of all incidents
  - Fire and medical incidents occurred relatively frequently, accounting for 23% of all incidents when combined
  - Coldstream Station received 28 requests for mutual aid, accounting for approximately 60% of all mutual aid incidents for MCFS during this period
- Ilderton Station was dispatched to 289 incidents during this period
  - Public service incidents were the most frequent incidents in this demand zone (69 incidents), accounting for 24% of all incidents
  - MVCs was the second most frequent (58 incidents)
  - Fire and medical incidents occurred relatively frequently, accounting for 32% of all incidents when combined
- Bryanston Station was dispatched to 173 incidents during this period
  - MVCs were the most frequent incident type in this demand zone (81 incidents), accounting for 47% of all incidents
  - Fire and medical incidents occurred relatively frequently, accounting for 31% of all incidents when combined
  - Bryanston Station responded to the least number of second station requests (12 incidents)

Table 19 considers the frequency of specific types of fire-related station responses. It is a general indication of the types of fire risk occurring within each station's demand zones. Typically, structure fires would involve the highest risk to life and property. Except for wildland urban interface fires, structure fires typically involve the highest risk of firefighter injury and can tax fire department resources.

Table 19: Fire Incidents by Type by Station (2017-2021)

Incident Type	Delaware	Arva	Coldstream	Ilderton	Bryanston	Total
Open Burn	29	25	11	19	12	96
Fire-Vehicle	41	11	13	8	13	86
Fire-Structure	29	11	14	15	9	78
Fire-Field	9	0	2	1	5	17
Total	108	47	40	43	39	277

The following observations regarding fire incident types and frequency for each station were noted:

- Generally, the frequency of structure fires is relatively low and accounted for approximately 28% of all fire-related incidents and 4.5% of all incidents
- Delaware Station was dispatched to 108 fire-related incidents including 47% of all vehicle fires and 37% of all structure fires in Middlesex Centre
- More than 50% of the fire incidents Arva Station responded to were open burn fires

- Coldstream Station responded to nearly an equal number of open burn, vehicle, and structure fires
- Ilderton Station responded primarily to open burn fires and some structure fires
- Bryanston Station responded to the open burn vehicle fires

Second station responses are driven by several potential causes. They may occur when the resources required to safely manage an incident are expected to exceed the initial responding station's capacity or capability. They may also be driven by concurrent incidents, limited volunteer availability or apparatus mechanical issues. The frequency that a station provides a second station response and the frequency a station requests a second station response should be monitored and the cause considered.

Table 20: Second Station Response Types (2017 to 2021)

	Second Responding Station					
Response Type	Arva	Bryanston	Coldstream	Delaware	Ilderton	Total
Assisting Arva Station		4	4	2	4	14
Assisting Bryanston Station	47		2	1	21	71
Assisting Coldstream Station	3	1		4	11	19
Assisting Delaware Station	2	0	24		1	27
Assisting Ilderton Station	12	7	9	0		28
Call cancelled on route	38	0	12	3	3	56
Total	102	12	51	10	40	215*

*Of the 217 second station responses noted in Table 20, all Incidents by Incident type by Station, two records were incomplete did not identify the response type

The following observations regarding second station responses were noted:

- Arva Station provided nearly half of all second station responses (64 incidents - 102 requests but cancelled on 38), which were primarily requested by Bryanston Station
- Bryanston Station requested a second station most frequently of all stations by a considerable margin (71 incidents), and occasionally provided a second station response for Ilderton Station
- Coldstream was requested to provide a second station response to 51 incidents, primarily by the Delaware Station (24 incidents), and requested it for 19 incidents
- Delaware Station provided a second station response to 10 incidents, and requested it for 27 incidents
- Ilderton Station provided a second station response to 40 incidents, primarily for Bryanston and to a lesser extent Coldstream Station, and requested it for 28 incidents

Middlesex Centre participates in the Province of Ontario Mutual Aid Plan. As such, it is useful to monitor the frequency and the regions requesting mutual aid. This information can be used to assess the potential impact on MCFS's ability to provide aid and maintain services within the municipality.

Table 21: Mutual Aid Incidents by Response Type (2017 to 2021)

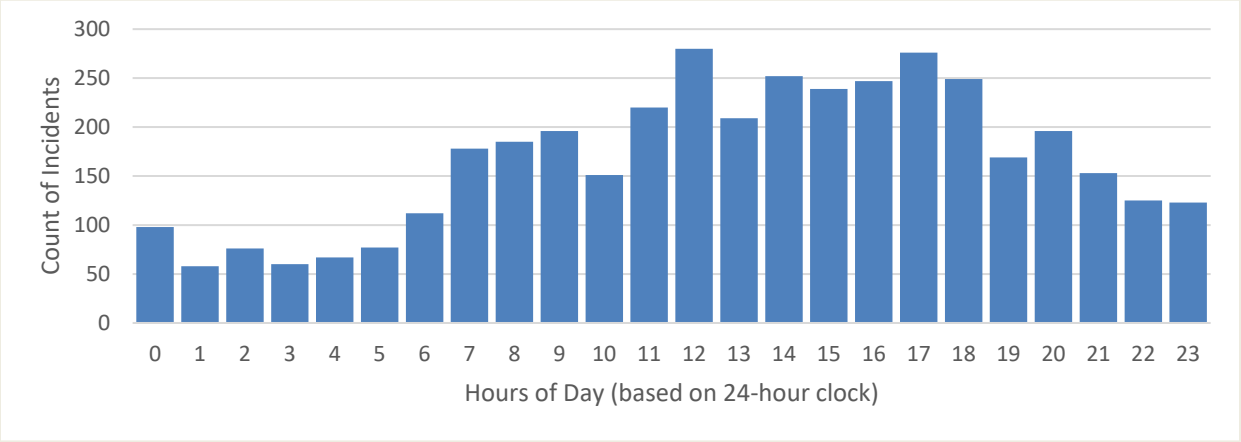
Response Type	Arva	Bryanston	Coldstream	Delaware	Ilderton	Total
Assisting Other FD: Automatic Aid	0	0	8	0	0	8
Assisting Other FD: Mutual Aid	0	1	3	7	0	11
Call Cancelled On Route	0	0	3	3	0	6
Mutual Aid - Ailsa Craig Station (North Middlesex)	0	0	5	0	1	6
Mutual Aid - Kerwood Station (Adelaide Metcalfe)	0	0	7	0	0	7
Mutual Aid - Oneida Station (Oneida)	0	0	0	5	0	5
Mutual Aid	0	0	1	0	1	2
Other Rescue	0	0	1	0	0	1
Station Total	0	1	28	15	2	46

The following observations regarding second station responses were noted:

- In general, mutual aid was requested relatively infrequently over the five-year period
- Coldstream Station was requested most frequently (28 incidents) by a considerable margin
- Mutual aid was requested by the Adelaide Metcalfe Station most frequently, followed by the Alisa Craig Station and Oneida Station
- The reporting available did not always identify the receiving agency or municipality

The time incidents occur is useful in identifying periods of peak and lower demand for services. Typically, demand for emergency services is lowest in the early hours of the morning. The horizontal axis in Figure 10 Incidents by Time of Day begins with 0 hours (12 p.m. – 1 a.m.) and ends at 23 hours (11 p.m. to 12 p.m.).

Figure 10: 2018-2021 Incidents by Time of Day

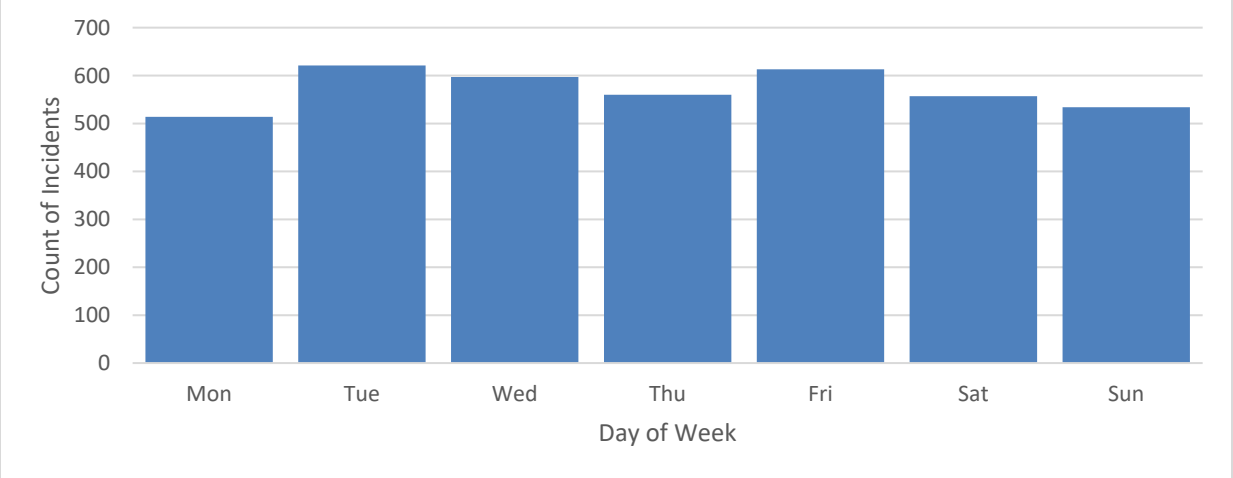


The following observations regarding the time incidents occurred were noted:

- Most incidents are occurring during the daytime hours when people are most active and or traffic flow is highest, and the majority of POC volunteer firefighters are likely to be at work
- Incidents began to increase around 4 a.m. and peaked around 12 p.m. and then again around 6 p.m.
- This two-peaked pattern is common in fire and emergency service
- After 6 p.m. the number of incidents declined steadily until 4 a.m.

Similarly, monitoring the days of the week in which Middlesex Centre Fire Services respond most and least frequently provide additional insight into potential pressures in service delivery. Typically, emergency services respond most frequently on Friday and Saturday.

Figure 11: 2018-2021 Incidents by Day of Week



The following observations were noted in service demands for different days of the week:

- In general, incidents occurred with similar frequency throughout the week
- The fewest incidents occurred on Mondays and the most occurred on Tuesdays, but the variation was very minimal

4.3 Response Performance

The following sections provide an analysis of the response performance of MCFS. The response performance is assessed based on two key elements – the length of time taken to respond and the adequacy of resources responding to safely manage an emergency incident. The response performance goals applied in the analysis are identified in the NFPA 1720 standard.

4.3.1 Intervention Time

Total intervention time is the elapsed time between the incident occurring and the time incident management begins. The discovery of the incident and initiation of the emergency response system, typically by calling 911. From a community perspective, this time segment can be partially managed by implementing cyclical life-safety system inspections and promoting residential fire alarms and sprinkler systems.

After the 911 call is made, the emergency response system is engaged to manage the incident and minimize its impact. Simplified, the system is composed of an emergency dispatching centre and the first responding agency. Although many of the requests for service may not require an urgent intervention, when it is, the main purpose of this system is to respond and manage the incident as quickly as is safely possible. As a result, the times taken to get all the relevant caller and incident information (call handling time), notify first responders and have them prepare to respond (assembly time), and drive to the incident (travel time) are all critical elements of an effective response. These time segments are the focus of this section and are the key indicators of total response time performance.

Total response time is the best indicator of how the entire system is functioning. It also reflects the experience of the person making the 911 call. System performance can be managed and improved by implementing best practices and supporting technologies. As a result, total response time performance should be monitored and reported to the authority having jurisdiction (AHJ) regularly. The causes of significant changes in response time performance should be identified and discussed with the AHJ.

Incident management time is variable and depends on the type of incident and the resources required to safely manage it. Fire department resource availability is determined by the concentration (how many and what types of resources there are in one station) and distribution (where are those resources located relative to the incident) of fire department equipment and firefighters. Resource requirements are based on community risks. An adequately resourced response system should provide an effective response force (ERF) to safely manage commonly known risks as effectively and efficiently as possible.

Figure 12 provides an overview of the incident intervention timeline. The definitions and descriptions of the actions taken in each time segment are provided below.

Figure 12: Incident Intervention Timeline

Notification	Intervention Time			
Incident Discovery and 911 Call	Alarm Processing	Assembly / Chute Time	Travel Time	Set-up
Time unknown (Time varies with every incident)	64 Seconds	80 Seconds Fire 60 seconds medical	240 Seconds	May vary by event
Time indirectly manageable	*Time directly manageable*			
Time Values				

Discovery: This is the time between the start of the emergency incident and when a person or an engineered system has detected the incident.

Emergency 911 Call: This is the time taken dial 911 and notify the 911 call centre for the need for emergency services.

Alarm Handling: This is the time segment begins when the 911 call is answered and ends with the notification of firefighters. It is the time taken to extract the necessary information from the 911 caller to allow the proper response to be initiated.

Assembly Time: This is the time segment begins when dispatch notifies the firefighters until the vehicle leaves the station for response. Time is required for POC volunteer firefighters to respond to the station, dress in proper personal protective equipment (PPE) and safely egress the station.

Travel Time: This time segment begins when an apparatus leaves the station or otherwise begins the response to the scene of the emergency and ends at the time when the assigned vehicle arrives on scene. This time segment is a function of distance and the speed traveled.

Total Response Time: This time segment begins when the 911 call is answered and ends when the first apparatus capable of commencing the incident management arrives.

Setup Time: This is the time it takes (on-site) to evaluate the necessary actions, position the required resources, and commence the intervention. In the case of a fire, completing size-up, assigning the necessary tasks, and deploying resources can provide delays on scene. A well-trained crew can minimize these delays while providing a safe, successful response.

4.3.2 NFPA 1720 Performance Standards

Recognizing that POC volunteer fire departments serve a variety of community types with varying population densities and geography, NFPA developed response time and staffing standards relative to regional and individual demand zone conditions. NFPA 1720 response standards are lowered as population density decreases and travel distances increase within a demand zone increase. For example, the response goal for urban areas is to respond within nine minutes 90% of the time with 15 firefighters whereas the rural response standard is within 14 minutes 80% of the time with six firefighters. It is important to note that depending on the geography of a fire department's total response area and demand zone(s), levels of service may vary across demand zones for a fire department. Additionally, the response

standards identified in NFPA 1720 are considered a leading practice and not a legislated requirement.

Table 22: NFPA 1720 Staffing and Response Time Standards

Demand Zone	Demographics	Minimum Staff to Respond[b]	Response Time (minutes)[c]	Meets Objective (%)
Urban area	>1000 people/2.6 km^2	15	9	90
Suburban area	500-1000 people/2.6 km^2	10	10	80
Rural area	<500 people/2.6 km^2	6	14	80
Remote area	Travel distance ≥ 12.87 km	4	Directly dependent on travel distance	90
Special risks	Determined by AHJ	Determined by AHJ based on risk	Determined by AHJ	90

[a] A jurisdiction can have more than one demand zone.
[b] Minimum staffing includes members responding from the AHJs department and automatic aid
[c] Response time begins upon completion of the dispatch notification and ends at the time interval shown in the table.

MCFS has five fire stations with unique demand zones. The population densities and geography vary within areas across Middlesex Centre. As a result, service levels goals may vary across and even within a station's demand zone. The difference in population density across the demand zones will increase as development proceeds in the Komoka-Kilworth area as discussed in the Middlesex Centre Official Plan Review.

The intent of the aggressive response goals in NFPA 1720 is to minimize total intervention time. Increased intervention time can have the following important impacts on a property owner/patient/victim:

- Decreased survivability
- Increased property loss in the event of fire
- Building design restrictions for response times beyond 10 minutes
- Potentially higher property insurance premiums based on extended response times and proximity to water supply
- Longer-term economic impacts resulting from increased recovery time

4.4 MCFS Emergency Response Performance Analysis

The time segments identified above are calculated by the dispatching service capturing individual response timestamps throughout an incident. The timestamps are recorded by the dispatching agency and used to compile a complete history for all responding emergency vehicles to every incident. Examples of typical incident timestamps include:

- Incident begins
- Station or firefighter notification
- Apparatus responding
- Apparatus arrived
- Loss stopped
- Leaving scene
- Returned to station

The response performance analysis for MCFS focuses on emergency responses from 2017 to 2021. The timestamps are used to calculate alarm-handling time, assembly time, travel time and total response time. Emergency response performance information can be used by the fire chief and senior administration for several purposes including but not limited to:

- Monitoring response efficiency and effectiveness
- Reporting response performance to community and elected officials
- Evaluating the effectiveness and compliance with national and provincial codes
- Evaluating the effectiveness and compliance with Council policies and local bylaws
- Identifying possible improvement strategies
- Developing or modifying service level standards
- Planning for future resource needs (operational and capital)

Historically, fire departments typically reported their average performance. Average performance can be misleading as it is only achieved 50% of the time. Contemporary fire and emergency services report 80th or 90th percentile performance times to provide a more precise representation of response reliability depending upon whether they are POC volunteer or career fire departments.

Emergency response time analyses typically begins with the timestamp identifying the point at which the 911 call is answered by the primary service answering point (PSAP). However, the PSAP for the entire London region is the London Police Service. Once the 911 call is taken, it is transferred to the appropriate dispatching centre. All requests for service provided by MCFS are transferred and dispatched the Strathroy-Caradoc Police Service dispatch centre. The incident begin time captured by the PSAP was not included in the available data. As a result, all the emergency response time segments in this analysis begin with the timestamp identifying when the alarm was answered in the Strathroy-Caradoc Police Service dispatch centre.

4.4.1 Alarm Handling

Alarm handling time is typically the cumulative time taken for alarm answering and alarm processing in the dispatching process. The initial time stamp available for the identifying the incident begin time in the PSAP was not available. Therefore, only alarm processing was analysed. Alarm processing time begins at the point of time the alarm is transferred and answered in the Strathroy-Caradoc Police Service Communications Bureau and ends when MCFS is dispatched.

NFPA 1720 suggests this should be achieved within 60 seconds, 90% of the time. Alarm handling performance is somewhat manageable by implementing best practice processes and supporting technologies. This benchmark should be monitored with the aim of ensuring this process is as efficient as possible to achieve optimal total response time performance. However, non-emergency requests for service, identifying rural addressing and remote locations, or getting adequate levels of incident details may delay the interrogation time required to gather the appropriate information for first responders.

Table 23: Alarm Processing Performance (in secs)

Alarm Processing	2017	2018	2019	2020	2021	5 Year
50th percentile	60	53	55	61	65	59
80th percentile	93	87	89	109	109	96
90th percentile	109	110	125	152	164	129
60 sec compliance	50%	60%	54%	50%	45%	52%

The following observations regarding alarm processing performance were noted:

- The 90th percentile alarm processing time increased by 50% over the five-year period
- Compliance with the 60 second NFPA standard was achieved approximately 50% of the time during this period

Observation #11: The 90th percentile alarm processing performance is trending upward and was more than 2.5 times the recommended 60 seconds in 2021. There may be numerous reasons for the extended times for alarm processing including the increased time taken to determine incident locations in rural areas, and potential technology or process challenges.

Recommendation #11: Investigate opportunities to reduce alarm processing time

(Suggested completion: 12-24 months)

It is recommended that the fire chief, working with the Strathroy-Caradoc Police Communications Bureau, should conduct a review of alarm processing and station notification processes and identify opportunities to reduce alarm processing time. Potential causes to consider may include fire department pre-alerting, rural addressing improvements, alarm processing and enhance multi-station response notification.

***Rationale:** Alarm processing impacts fire department response and intervention times. Efforts to reduce this time segment has the immediate impact of reducing overall response time.*

4.4.2 Assembly Time

Assembly time is calculated from the point of notification of an alarm to the point at which firefighters begin traveling to the incident. For MCFS firefighters, assembly time begins when paged and includes travel to the firehall as well as the time taken to dress in their personal protective equipment and safely seat themselves on the responding fire apparatus. NFPA 1720 does not include an assembly time standard.

Assembly time is influenced by several factors including time of incident, availability of firefighters, road conditions and distance to the fire station. As a result, it is difficult to assess whether assembly time performance can be improved given the range of factors influencing it. However, assembly time should be monitored to assess its impact on total response time and establishing achievable service levels.

4.4.2.1 Data Limitation

As previously stated, the data provided by MCFS are the timestamps used to calculate alarm-handling time, assembly time, travel time and total response time of the first arriving unit without the initial alarm assignment that includes the number of firefighters and their arrival time on scene. There are several limitations in this analysis that does not facilitate a full evaluation of the current response performance. MCFS stations utilize two basic response configurations:

- **Convergent ERF**: the initial alarm assignment some firefighters respond to directly to the scene with a least one firefighter responding the station to drive the responding fire apparatus to the scene. This includes Arva, Bryanston, and Coldstream (majority daytime responses)
- **Direct ERF**: the initial alarm assignment the firefighters assemble at the station and dress in their personal protective equipment and safely seat themselves on the responding fire apparatus before departing the station to the scene. This includes Delaware, Ilderton and Coldstream (majority nighttime responses)

This is deemed as a high-level analysis. It must be clearly understood that there was no data available to determine how many firefighters responded directly to the scene or the effectiveness timestamp of being dressed in their personal protective equipment and ready for critical task assignment. Further there was no data available to determine how many firefighters assembled at the station before responding directly to the scene.

Therefore, the following tables regarding assemble, travel time, and total response time is solely based upon the first responding fire apparatus only.

Table 24: Convergent ERF Assembly Performance by Station – First Departing Only (in secs)

Station 80th Percentile	2017	2018	2019	2020	2021	5 Year
Arva	213	142	203	198	190	193
Bryanston	467	453	345	351	360	379
Coldstream	265	404	430	389	369	377
80th percentile	311	325	349	349	348	336
50th percentile	224	242	263	273	270	257

Table 24B: Direct ERF Assembly Performance by Station – First Departing Only (in secs)

Station 80th Percentile	2017	2018	2019	2020	2021	5 Year
Delaware	328	317	350	336	339	335
Ilderton	311	346	330	360	364	354
80th percentile	311	325	349	349	348	336
50th percentile	224	242	263	273	270	257

The following observations regarding assembly time performance were noted:

- Arva Station firefighters were able to respond in just a little over three minutes 80% of the time
    - The response practice in Arva, Bryanston and Coldstream (daytime) Stations include firefighters responding directly to the incident, therefore it is difficult to establish whether the responding apparatus are fully staffed when departing
- In general, the remaining stations responded in approximately six minutes after being notified

As previously indicated, assembly time was calculated using the fire department notification and first responding apparatus timestamps. It did not include the time taken for a second or third apparatus to respond. As a result, the assembly times reported only reflect the time taken for the first apparatus. Additionally, the number of firefighters responding on the initial apparatus was not available. The assembly time is useful generalizing the time taken to respond at least one apparatus following notification. However, it is not a measure of how long it took for an Effective Response Force (ERF) to assemble and respond. Going forward it is critical for MCFS to compile and monitor this data to fully evaluate response performance. The new RMS identified at Recommendation 15 can provide the IT system to accurately record this data.

4.4.3 Travel Time Performance

Travel time is the time taken to drive to the location of the incident. It is measured from the point at which the responding vehicle leaves the station until the point of arrival on scene. Travel time is a function of distance from the fire station to the incident and the speed travelled to the incident. It can be managed to a certain degree by distributing fire resources in optimal response locations within demand zones. Travel time should be monitored to

assess the distribution and concentration of resources and assess whether additional resources are required in different locations to maintain service levels.

NFPA 1720 acknowledges the considerable variations in size and population densities of the demand zones of many POC volunteer fire services. Depending upon the specific geography, the standard offers several different response time goals, but it does not identify a specific travel time standard.

Table 25: 80th Percentile Travel Performance by Station (in secs)

Station	2017	2018	2019	2020	2021	5 Year
Arva	478	445	373	433	379	434
Bryanston	386	342	367	392	322	376
Coldstream	378	377	404	405	413	408
Delaware	427	383	420	419	443	426
Ilderton	269	361	258	360	335	320
80th percentile	418	381	387	413	414	404
50th percentile	261	221	248	255	262	251

The following observations regarding 80th percentile travel times were noted:

- Ilderton Station responses had the shortest travel times for emergency responses, reflecting the number of incidents occurring in the developed area near the station
- Arva Station responses had the longest travel times for emergency responses

Reviewing the distance traveled from stations to emergency incidents can provide insight into the appropriate distribution of resources. The following data was entered into fire reports as an estimated distance traveled to the incident. As with any manual data entry and estimated data, it can be more prone to errors. However, the calculation is based on the average distances for each incident type and the impact of data entry errors affecting this calculation is decreased.

Table 26: Average Kilometres Travelled by Incident Type by Station (2017-2021)

Incident Type	Arva	Bryanston	Coldstream	Delaware	Ilderton	All Stations
Fire	6.2	6.7	5.1	7.6	5.0	6.5
MVC	4.0	6.5	5.2	7.1	6.6	5.8
Alarm	5.0	5.8	5.5	6.6	3.0	5.7
Public Service	6.0	5.7	5.3	6.9	3.9	5.7
Second Station	8.7	12.2	11.1	13.2	11.9	10.3
Medical	5.0	6.0	5.8	5.1	3.3	4.9
Rescue	6.5	n/a	10.8	5.8	19.0	9.9
Mutual Aid	n/a	12.0	11.1	13.5	17.0	12.2
Average kilometres	5.9	6.8	6.8	7.1	5.8	6.5

The following observations regarding average kilometers traveled for emergency responses were noted:

- As a generalization, emergency incidents are occurring on average of within 6.5 km from stations and further than that 50% of the time during
- On average, the most frequent high-risk events such as fires, MVCs and medical incidents are occurring relatively near the stations which suggests they were generally well situated to respond to these incidents
- The five-year average travel distance for all incident types ranged from 5.8 km for Ilderton Station to 7.1 km for Delaware Station, with no significant outliers other than rescue, second station and mutual aid incidents which were infrequent

4.4.4 Total Response Time

Total response time would typically be measured from the point at which the emergency call is answered in the 911-dispatching centre to the time the first fire or rescue apparatus arrives at the incident. This time best reflects the emergency system's overall response performance and the experience of the person requesting the service. For the purposes of measuring compliance with NFPA 1720 response standards, total response time is measured from the point of fire department notification to the point of the first arriving fire apparatus. The rationale for this approach is to acknowledge that most volunteer fire departments contract dispatch services and are not in control of the time taken for alarm handling.

As the population, geographic footprint of developed areas and community risk increase, a fire department will experience an increase in concurrent requests for service, longer travel distances and a higher frequency of complex incidents. As a result, emergency response times will gradually increase as demand for service increases.

Table 27 identifies the 80th percentile total emergency response time performance for all MCFS stations. NFPA 1720 recognizes that the variation in suburban and rural response

performance is greater than urban responses and therefore adopted an 80th percentile standard. The 80th percentile suburban response time standard is 600 seconds (10 minutes), and the rural response time standard is 840 seconds (14 minutes). The 50th percentile MCFS is offered as a comparison to the 80th percentile times. In addition, compliance with a 10-, 12- and 14-minute response time goals were provided to give some insight to achievable response time service levels.

Table 27: 80th Percentile Response Performance by Station (in secs)

Station	2017	2018	2019	2020	2021	5 Year
Arva	631	547	542	590	527	585
Bryanston	707	679	624	666	686	677
Coldstream	520	671	713	717	791	700
Delaware	710	657	742	723	737	723
Ilderton	539	678	549	717	684	646
80th percentile	660	648	672	693	719	684
50th percentile	465	471	502	536	550	505
600 sec compliance	74%	74%	67%	59%	59%	67%
720 sec compliance	87%	88%	86%	83%	81%	85%
840 sec compliance	93%	96%	92%	93%	94%	94%

The following observations regarding MCFS emergency response performance were noted:

- Over the five-year period, the 80th percentile response times of Arva and Bryanston Stations declined slightly
- Over the five-year period, the 80th percentile emergency response times of Coldstream and Ilderton Stations increased slightly
- Over the five-year period, the 80th percentile emergency response times of Delaware Station remained relatively constant
- Cumulatively, the 80th percentile emergency response times of MCFS increased slightly over this same period
- Cumulatively, the five-year compliance with a 600 second response time goal was 67%
- Cumulatively, the compliance with a 720 and 850 second goals were above 80% every year

In general, and considering the limitations of the data provided, the response time performance of all MCFS stations was very good. It's typically difficult for POC volunteer firefighters to travel to the fire station and respond as quickly as MCFS firefighters do. Response time performance should be monitored and routinely reported to firefighters and council.

Observation #12: The Middlesex Centre By-Law 2009-13 is the establishing and regulating bylaw for MCFS. It references services to be delivered. However, it does not include specific emergency response time performance service levels. Furthermore, response performance such as the number of firefighters responding either directly or converging on scene, or the time increment to achieve a safe ERF and complete the critical tasks is not being tracked or monitored. All these components would be included in a standard of cover or service level policy.

Recommendation #12: Establish service levels for emergency response.

(Suggested completion: 36 months)

It is recommended that the fire chief and senior administration identify relevant performance reporting helpful in identifying current response performance with the aim of assisting Middlesex Centre council with establishing fire department response service levels. This may be achieved as an outcome of completing a standard of cover. A standard of cover is a systematic framework used to validate fire department resource concentration and distribution and confirm services and service levels.

Rationale: *NFPA 1201: Standard for Providing Emergency Services to the Public suggests all fire departments should have policy identifying service types and service levels. Section 4.5.3.1 states:*

> *"The fire and emergency services (FESA) leader shall develop and adopt a formal policy statement that includes the specific types and levels of services to be provided by the organization, the service area, and the delegation of authority to subordinates."*

Developing formalized policy statements regarding fire department service levels is considered a leading practice. In the absence of established service levels, it is difficult for a fire chief to determine whether fire department response performance meets community and council service expectations. Further, the anticipated growth planned for the Komoka-Kilworth region will increase demands for service in this region of the municipality. Increases in service demands are correlated to increases in population and related risks such as increased traffic flow.

4.5 Response Coverage Mapping

This section provides mapping of the response coverage from each of the five MCFS fire stations. The methodology used to calculate the theoretical travel time and area coverage was based on the following formula:

Response Time Goal – (Alarm Processing Time + Assembly Time) = Theoretical Travel Time

For MCFS stations:

600 secs (10 min), 720 secs (12 min) or 840 secs (14 min) - (80th percentile alarm processing time + 80th percentile assembly time in secs) = theoretical travel time (in secs)

The theoretical travel time and road network travel speed data were applied to generate the response area of each station in the geographic information system (GIS) mapping program.

The calculated theoretical travel time using this approach is a conservative calculation. Use of the 80th percentile alarm handling and assembly times to calculate theoretical travel time and corresponding area coverage for 10, 12 and 14-minute response time goals is highly reliable. When the 50th percentiles times are used, the associated alarm processing and assembly times would only be achieved about 50% of the time. In other words, the theoretical travel time and area coverage would only be achieved about 50% of the time. Whereas by using the 80th percentile times, the mapped area coverage is somewhat smaller but should be achieved 80% of the time and is therefore a more reliable representation of response area coverage within a given time.

The 80th percentile alarm processing time was standardized at 96 seconds for all station travel time calculations based on the five-year alarm processing performance. The variation in the theoretical travel times resulted from the differences in assembly time for each station. Assembly time was calculated using the first responding apparatus timestamp. It did not include the time taken for a second or third apparatus to respond.

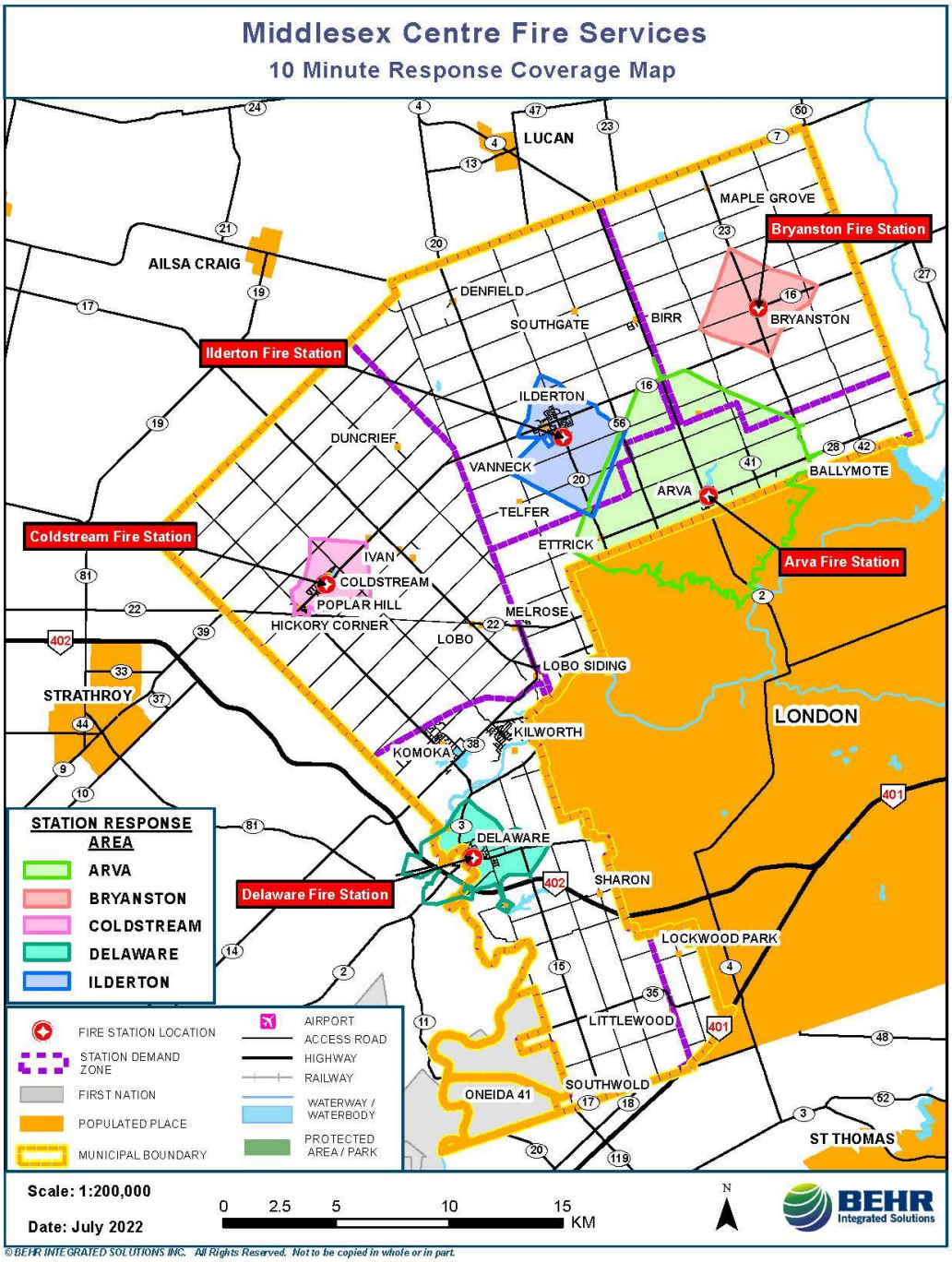
Table 28: Theoretical Travel Time Calculation (in secs)

Station	5-Year 80th Percentile Alarm Processing + Assembly Times	Theoretical 600 Second Response Travel Time	Theoretical 720 Second Response Travel Time	Theoretical 840 Second Response Travel Time
Arva	289	311	431	551
Bryanston	475	125	245	365
Coldstream	473	127	247	367
Delaware	431	169	289	409
Ilderton	450	150	270	390

The following observations regarding theoretical travel times were noted:

- Arva Station had a considerably shorter alarm processing and assembly time and therefore longer theoretical travel time, and the resulting mapped area coverage is correspondingly larger for that station
- Coldstream and Bryanston Stations had similar theoretical travel times of approximately two, four and six minutes respectively
- Delaware and Ilderton Stations had similar theoretical travel times of approximately 2.5, 4.5 and 6.5 minutes respectively

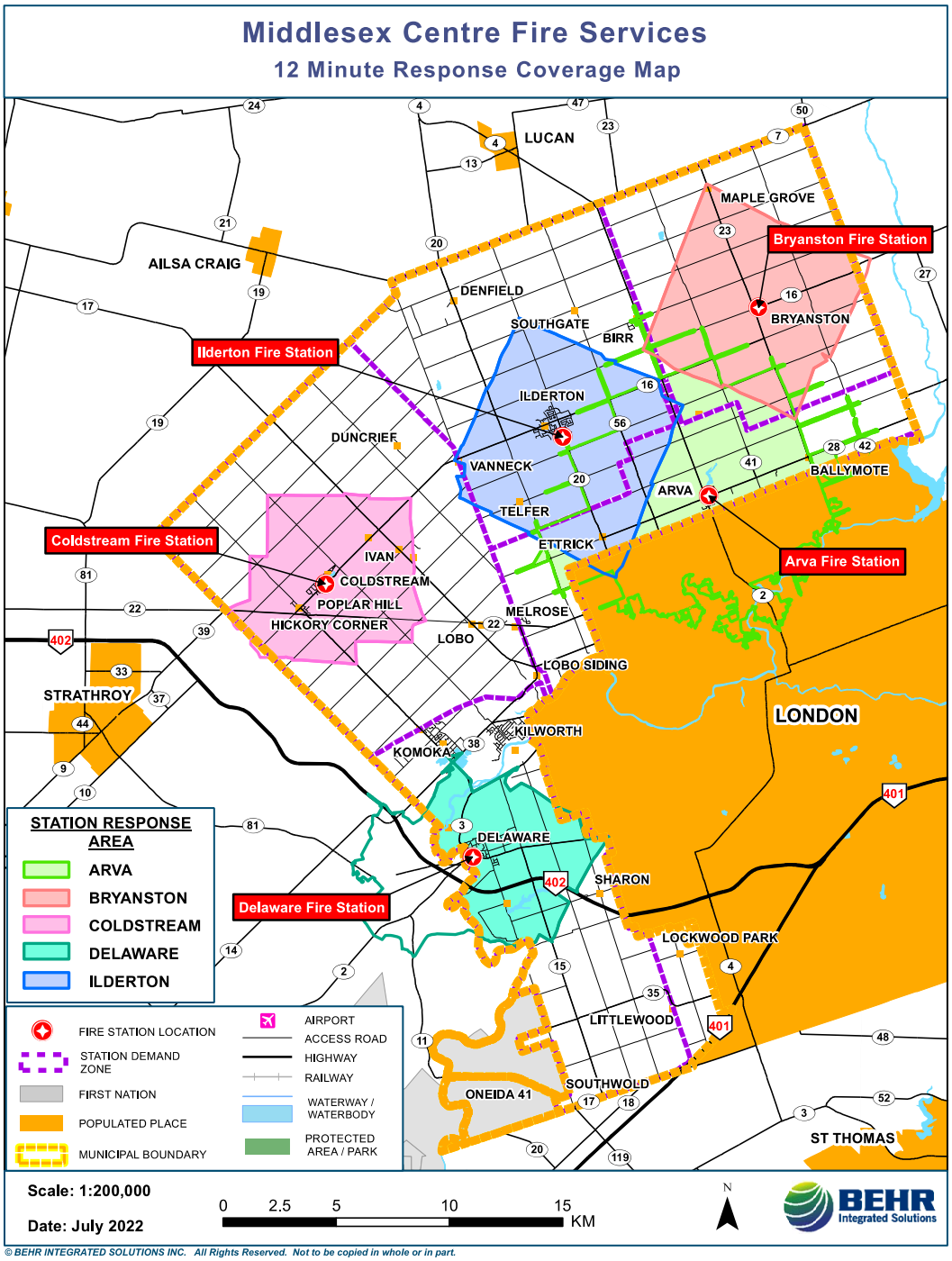
Map 7: 10-Minute Response Coverage Map



Observations on response coverage based on a 10-minute response goal:

- Station response coverage is relatively limited as the potential travel time to achieve the 10-minute goal is between two and three minutes, except for Arva Station
- Arva and Ilderton Stations coverage overlaps slightly
- The Delaware Station 10-minute response coverage does not reach the Komoka-Kilworth regions

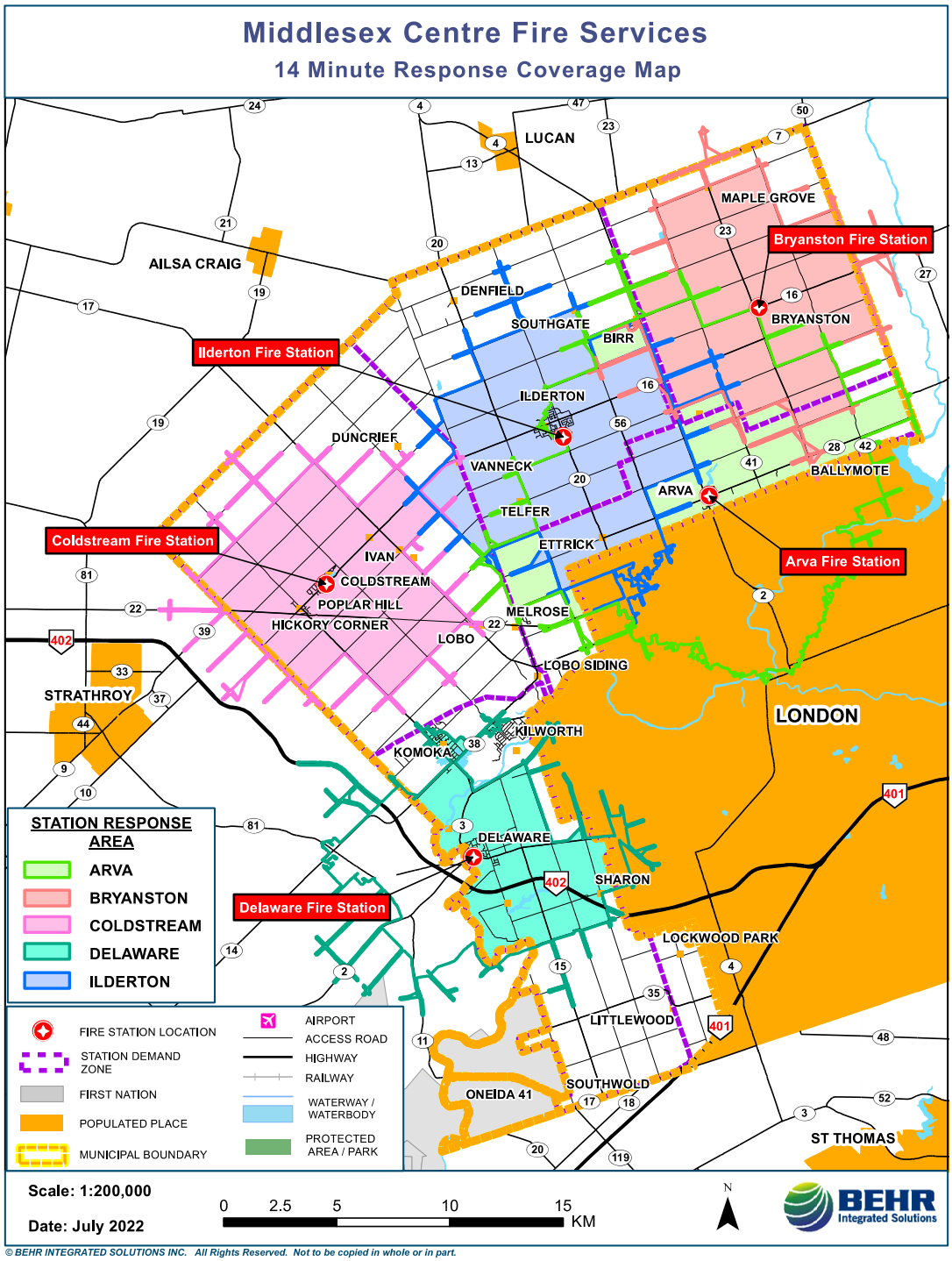
Map 8: 12-Minute Response Coverage Map



Observations on response coverage based on a 12-minute response goal:

- Considerable improvement in the cross-coverage and overlap between Arva, Bryanston and Ilderton Stations' response coverage
- The Delaware Station response coverage will reach the fringe of Komoka within 12-minutes in most cases

Map 9: 14-Minute Response Coverage Map



Observations on response coverage based on a 14-minute response goal:

- Considerable overlap in response areas between Arva, Bryanston and Ilderton Stations
- The 14-minute Arva Station response area typically reaches Bryanston and Ilderton
- The 14-minute Delaware Station response area extends to Komoka-Kilworth

Observation #13: Interview and survey participants identified concerns regarding the sustainability of the Bryanston Station. Numerous anecdotal reports of a reduced or uncertain firefighter response from this station were offered. The difficulty recruiting POC volunteer firefighters in the immediate catchment area is also challenging. Further, the Middlesex Centre Official Plan identifies that future development in the Bryanston and Arva areas will be limited. As a result, community risk and service demand in this demand zone is expected to be stable in the foreseeable future.

From 2017-2021, this station responded to approximately 173 requests for service, or 10% of all incidents in Middlesex Centre. The most frequent incident type occurring in the Bryanston Station demand zone were MVCs. Nine of the 39 fire-related incidents in this period were structure fires. Bryanston Station made 71 requests for second station responses, accounting for nearly half of all second station responses that weren't cancelled. The incident data and response analysis did not identify frequent response delays or failures. The limitation of this analysis is that it only provides a relatively high-level review of response performance. Presumably at least a portion of these requests resulted from an inability to assemble an adequate response from the station requiring a second station response.

Bryanston Station exceeds the NFPA 1720 response time standard for a rural station. NFPA 1720 suggests a minimum of six firefighters respond within 14 minutes, 80 percent of the time. The five-year 80th percentile response time for Bryanston Station was 677 seconds, or 11.3 minutes, and generally in line with the other MCFS stations. Further, an average number of 10 firefighters responded from this station over this five-year period. Upon further discussion with the fire chief, it was revealed that responses from Bryanston Station are convergent ERF where the response is assembled on scene and incrementally based upon POC availability. This is further exacerbated in that most of the Bryanston firefighters do not reside in the response district or Middlesex Centre. Anecdotally Bryanston Station is not likely to achieve six firefighters within the 14 minutes. These factors have resulted in the requirement to have an automatic second station response. The Bryanston POCs routinely (similar convergent ERF stations) use their personal vehicles and directly respond to the scene. While this is not an ideal or recommended method it is a widely utilized practice with rural or remote demands zones and volunteer fire services.

As indicated in our rationale below, given the Bryanston Station response performance in the five-year review period, the relatively low operating cost, and the current balanced distribution of stations across Middlesex Centre, in our opinion, the value of retaining this station currently outweighs the benefits of closing it. The development of the recommended SOC should include a detailed review of the Bryanston Station response performance including an analysis of the effective response force (ERF) and the POC's personally owned vehicles response model. Notwithstanding the options listed below the SOC should establish an appropriate demand zone level and could include the move from rural to remote as indicated in NFPA 1720.

Recommendation #13: Maintain status quo (Option 1) and initiate Option 2 as station performance decreases.

(Suggested completion: 10 years)

It is recommended that the fire chief and senior Middlesex Centre administration monitor the operational performance of Bryanston Station. This would include an in-depth analysis of the current response model that includes the use of POC's personally own vehicles, ERF performance, and establishment of an appropriate demand zone as part of the Standards of Cover. Most of the Bryanston members do not live in Middlesex Centre and as such ERF will be significantly impacted.

Working with this community, efforts should be made to retain the service. However, if the current response model is determined to be inadequate, or if failure to recruit/retain POC volunteer firefighters persists, the Bryanston Station should be closed.

Several options were considered to maintain efficient and effective service in the Bryanston, Ilderton and Arva Station demand zones. Each of the following four options present opportunities and challenges.

Option	Pros	Cons
Option 1: Status quo continue to operate Bryanston Station	• No change in level of service • Community retains local connection to fire department and Municipality	• Retain operating costs of $160,000 (2021 Op. Budget) • Retain future capital replacement liabilities of facility and large apparatus • May experience increase in future response challenges, as well as challenges with recruitment and retention
Option 2: Closure of Bryanston Station reassign firefighters to current Arva and Ilderton Stations	• Reduction of operating costs of an estimated $50,000 – $100,000 depending on retention of firefighters • May increase number of firefighters available in Arva and Ilderton • No future capital replacement liabilities of fire station and large apparatus • Modest reduction in MCFS administrative and training effort currently utilized to manage Bryanston Station	• Modest reduction in level of service to Bryanston area • Bryanston community loses local connection to fire department and Municipality
Option 3: Closure of Bryanston Station amalgamate firefighters with Arva Station POC volunteers and construct new larger station in rural location between Arva and Bryanston	• Reduction of operating costs of an estimated $50,000 – $75,000 depending on retention of firefighters • Decrease in capital replacement liabilities of older Arva and Bryanston Stations and large apparatus from Bryanston Station • May access disposition value of land and property of Arva and Bryanston Stations • Potential reduction in MCFS administrative and training activities	• Bryanston community loses local connection to fire department and Municipality • Modest reduction in level of service to some areas of Bryanston and Arva demand zones • Capital construction cost estimation of $7 M - $12 M to construct new fully functional fire station and modest training ground • Increase response demands on fewer POC volunteer firefighters
Option 4: Closure of Bryanston and Arva Stations amalgamate Bryanston and Arva firefighters with Ilderton and expand current station if possible, or construct larger station within or near Ilderton	• Reduction of operating costs of an estimated $50,000 – $75,000 depending on retention of firefighters • Distributing resources in area with highest population and most likely to experience growth in the future • Decrease in capital replacement liabilities of older Arva and Bryanston Stations and large apparatus from both stations • May access disposition value of land and property of Arva and Bryanston Stations • Opportunity to include the development of modest training ground	• Modest reduction in level of service to some areas of Bryanston and Arva demand zones • Increase response demands on fewer POC volunteer firefighters • Bryanston and Arva communities lose local connection to fire department and Municipality • Capital construction cost estimation of $7 M - $12 M to construct new fully functional fire station and modest training ground

***Rationale**: In the absence of a complete emergency response performance analysis there is value of retaining Bryanston station until the development of the recommended SOC. The SOC should include a detailed review of the Bryanston Station response performance including an analysis of the effective response force (ERF) capability. An informed decision can then be made regarding the appropriate level of service and the disposition of the Bryanston station.*

4.6 Effective Response Force

This section provides further explanation on the importance of assembling an effective response force (ERF) comprising of adequate firefighters and equipment to manage emergency incidents safely and effectively.

ERF standards are based on fire response research completed by organizations such as NFPA and the National Institute of Standards and Technology (NIST). These standards are established to ensure adequate resources are available to complete critical tasks in a safe and timely manner. NIST research identified over 22 essential fire ground tasks at a typical single-family house fire. Ideally, NFPA suggests a minimum of 16 firefighters, or four companies of four firefighters, are required for a full alarm assignment (17 if an aerial devise is used) for residential house fire. This goal is typically only achieved by urban metropolitan fire departments. However, the key point is that even a low-risk structure fire requires considerable resources to complete concurrent tasks and initiate interventions as quickly as possible.

NFPA 1720 identifies the minimum number of firefighters that should respond to a fire incident within a specific timeframe. For suburban responses, a minimum of 10 firefighters should arrive within 10 minutes, 80% of the time. Rural responses require a minimum of six firefighters to respond within 14 minutes, 80% of the time. MCFS stations were typically able to assemble and respond with adequate numbers of firefighters and exceeded NFPA 1720 staffing response performance standards. Table 29 summarizes the average number of firefighters that responded to different incident types.

Table 29: Average Number of Personnel on Scene by Incident Type

Incident Type	2017	2018	2019	2020	2021	5 Year
Fire	13	13	11	12	12	12
MVC	11	10	11	10	11	11
Alarm	10	13	9	8	9	10
Public Service	8	9	9	11	11	10
Second Station	10	7	8	9	10	9
Medical	10	8	8	8	8	8
Rescue	19	11	9	5	6	8
Mutual Aid	4	11	11	7	4	7

Table 30 summarizes the average number of firefighters responding to emergency incidents from each MCFS station over the five-year review period. All stations were able to respond with an average exceeding the rural NFPA 1720 standard of six firefighters. As an average, most stations were able to meet the suburban NFPA 1720 standard of 10 firefighters.

Table 30: Average Number of Personnel on Scene by Station

Incident Type	2017	2018	2019	2020	2021	5 Year
Arva	12	11	12	10	13	12
Bryanston	7	9	10	10	13	10
Coldstream	10	11	11	11	10	10
Delaware	8	8	8	8	8	8
Ilderton	12	11	10	10	11	11

4.7 Critical Task Analysis

A critical task analysis for common incident types illustrates the resources required to achieve tactical objectives based on resource availability. The rationale for completing a critical task analysis is to identify whether response policies and guidelines align with available resources. In other words, are enough firefighters typically responding to complete the critical tasks on emergency scenes in a safe and timely manner.

However, the optimal number of firefighters are not always available. Response policies and guidelines should identify critical task assignments and tactical objectives based on available resources. The optimum numbers of firefighters to manage larger and more complex incidents may not be dispatched initially due to the availability of firefighters. As a result, tactical objectives should be scaled to reflect these limitations. For example, an interior fire attack or rescue may not be possible with a single engine company and a limited water supply. Response policies or guidelines should also identify a contingency plan to call-in of off-duty firefighters or initiate mutual aid resources/automatic aid for larger incidents complex incidents.

The following tables provide examples of critical task analyses that should be embedded in fire department standard operating guidelines or policies. The purpose of completing a critical task

analysis is to establish the ERF response requirements and embed task assignments in standard operating guidelines. The examples provided are intended to illustrate leading practices with respect to the ERF required to safely manage commonly occurring emergency incidents. They are provided as a guide and not intended to specifically represent MCFS response capacity or apparatus.

Table 31: Low Risk: Small fire (no exposures): garbage, vehicle – private, grass, investigate (external), monitoring alarm (w/o confirmation)

Initial Deployment	No. FF	Task Assignment
Engine	4	Incident Command, Scene Safety, Size up, IAP Development, Accountability, Resource Determination, Water Supply, 360 assessment, Forcible Entry, Primary Search, Fire Control, Incident Stabilization
Total Personnel	4	

Table 32: Moderate Risk: Grass/wildland/brush fire (with exposures)

Initial Deployment	No. FF	Task Assignment
UTV (Support vehicle requested as required)	4	Incident Command, Scene Safety, Size up, IAP Development, Accountability, Resource Determination, Water Supply, Fire Control, Incident Stabilization
Tender	2	Water Supply
Engine	4	Firefighters for Operations
District Chief	1	Transfer of Command, Scene Safety, IAP Confirmation and Evaluation, Accountability, Resource Management
Total Personnel	11	

Table 33: Moderate Risk: Attached garage, single family residential (detached/duplex)

Initial Deployment	No. FF	Task Assignment
Engine	4	Incident Command, Scene Safety, Size up, IAP Development, Accountability, Resource Determination, Water Supply, 360 assessment, Forcible Entry, Primary Search, Fire Control, Incident Stabilization
Ladder (if available)	4	Scene Safety, Water Supply, Aerial Operations, On-deck Assignment, Primary Search, Fire Control
Rescue	4	Scene Safety, On-Deck, Primary/Secondary Search, Fire Control
2nd Engine	4	Scene Safety, Water Supply, On-deck Assignment, Primary Search, Fire Control
District Chief	1	Transfer of Command, Scene Safety, IAP Confirmation and Evaluation, Accountability, Resource Management.
RDU & Pickup truck		Rehab, Command area, protection from elements
Total Personnel	17	

Table 34: Moderate Risk: Medical incident, cardiac arrest (VSA)

Initial Deployment	No. FF	Task Assignment
Engine or Rescue	4	Scene safety, Patient Assessment/CPR, Patient History, Apply Automatic External Defibrillator, Assist with Patient Packaging
Total Personnel	4	

Table 35: Moderate Risk: Medical incident, vehicle vs. pedestrian

Initial Deployment	No. FF	Task Assignment
Engine	4	Incident Command, scene safety, patient assessment / Care, patient packaging, Traffic Management
Rescue	4	Stabilization, Extrication, Traffic Management
Total Personnel	8	

Table 36: Moderate Risk: Motor vehicle crash (1-3 private vehicles)

Initial Deployment	No. FF	Task Assignment
Rescue	4	Incident command and size-up, safety, establish outer perimeter, pump operation, 2 FFs prepare hand line.
Engine	4	Establish inner perimeter, triage patients, patient care, extrication, patient packaging.
Total Personnel	8	

Table 37: Moderate Risk: Surface water, swift water or ice rescue, animal rescue

Initial Deployment	No. FF	Task Assignment
Water Rescue Unit	4	Officer of first arriving unit on scene assumes command, size up, scene safety and communications, patient contact, shore rescue if possible or water/ice rescue if required.
Rescue	4	Addition Resources for Shore operations, On Deck, Patient care
Squad	4	Addition Resources for Shore operations, On Deck, Patient care
District Chief	1	Overall Incident Command, safety, accountability, resource management.
Total Personnel	13	

Table 38: Moderate Risk: Small quantity (<20 L) of known product (gasoline, anti-freeze), open space natural gas smell or odor from unknown source

Initial Deployment	No. FF	Task Assignment
Engine	4	Incident Command, Scene Safety, Size up, IAP Development, Accountability, Resource Determination, Water Supply, 360 assessment, Forcible Entry, Incident Stabilization
HAZMAT Unit	4	• Hazard and risk evaluation • Selection of personal protective equipment • Information management and resource coordination • Implement response objectives • Decontamination and clean-up operations • Terminate the incident
Total Personnel	8	

Table 39: High Risk: Commercial, industrial, strip mall, warehouse, mid-rise residential

Initial Deployment	No. FF	Task Assignment
Ladder (if available)	4	Incident Command, Scene Safety, Size up, IAP Development, Accountability, Resource Determination, Water Supply, 360 assessment, Aerial Operations, Forcible Entry, Primary Search, Fire Control, Incident Stabilization
Engine	4	Scene Safety, Water Supply, On-deck Assignment, Primary Search, Fire Control
Rescue	4	Scene Safety, On-Deck, Primary/Secondary Search, Fire Control
3rd Engine	4	Scene Safety, Water Supply, On-deck Assignment, Primary Search, Fire Control
District Chief	1	Transfer of Command, Scene Safety, IAP Confirmation and Evaluation, Accountability, Resource Management
RDU & Pickup	2	Rehab, Command area, protection from elements
Total Personnel	19	

Observation #14: MCFS standard operating guidelines do not identify the number of firefighters and resources required to complete tactical or critical tasks. Critical task analyses will clarify incident resource requirements and identify the critical tasks to clarify firefighter tasks and manage an incident efficiently and safely. Survey and interview participants indicated weekday and holiday POC volunteer firefighter availability was occasionally limited. The assembly time discussed in the report needs to be established for the convergent and direct ERFs used by MCFS. A common practice for POC services is to have one officer and three firefighters either onboard before exiting the station for the first alarm assignment, or fully established on scene before attempting the required critical tasks.

Recommendation #14: Complete critical task analyses for common incident types in response SOGs

(Suggested completion: 12-18 months)

It is recommended that MCFS completes a critical task analysis of common responses and embed them in their SOGs as a component of completing the standards of cover process. Additionally, tactical ERF objectives in SOGs should be scaled to the resources available in the event there are not adequate firefighters available to complete all critical tasks.

***Rationale**: POC volunteer staffing models are limited by firefighter availability and ability to respond. Occasionally this limitation can result in inadequate staffing for more complex and larger incidents. As a result, tactics and critical tasks should be scaled to reflect available resources. For example, if the number of assembled firefighters or water supply are not sufficient to support an interior fire attack or rescue, fire tactics should be limited to exterior and defensive operations. Critical task analyses should be used to identify operational limitations in policy to clarify incident command objectives and maintain safe operations.*

4.8 Measuring, Managing and Reporting Performance

Performance measurement and reporting is key to moving towards a databased culture of performance improvement and away from mere opinion. Performance measurement and reporting supports the following:

- Determining a baseline performance level according to the indicators
- Establishing achievable service goals based on current performance
- Identifying the gap between desired goals and current performance levels
- Tracking progress toward achieving goals
- Benchmarking performance between departments
- Identifying problems and root causes
- Planning for the future

Performance data must be valid and reliable to generate useful and trusted performance reports. The Strathroy-Caradoc Police Service Communications Bureau is the contracted dispatch service provider. When interviewing 911 and non-emergency callers, the dispatcher identifies the incident type and captures a series of incident response time benchmarks. This information is then passed on to MCFS officer and used to complete their incident report. The report data is entered into the department's record management system (RMS), Fire Pro. Manual entry of response timestamp data is time consuming and prone to have more errors.

Operational performance data and service level expectations should be regularly reported to staff. Timely performance reporting reflecting operational performance metrics and service levels is key to implementing performance management and system improvements. One approach to providing timely information to fire staff is develop a performance dashboard. CAD and RMS technologies must be integrated to support this tool.

Observation #15: MCFS does not routinely monitor and report response performance. The current process of collecting data and developing reports is largely reliant on manual processes. The ability to collect reliable data and identify changes in service demand and response performance is an important management function. Further, the ability to measure and report performance is critical in maintaining department accountability and transparency for response performance.

Recommendation #15: Continue the implementation of a new RMS with the functional requirements to support automated data transfer and reporting.

(Suggested completion 12-24 months)

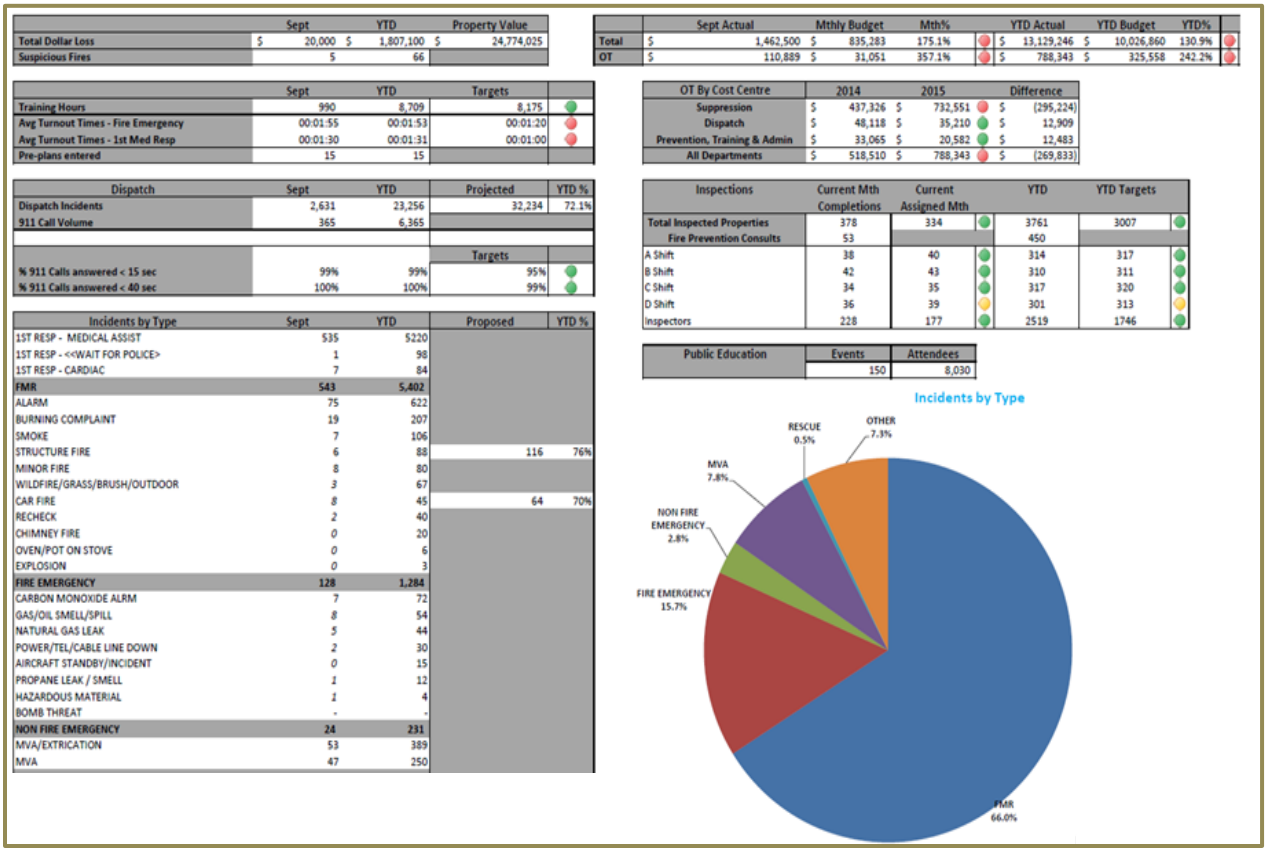
Fire departments have access to large amounts of data. However, the data only becomes useful if it can be developed into meaningful reports. Manual entry of data is both time consuming and prone to errors. Further, the correction of any errors compounds the inefficiency of this process. Contemporary CAD and fire department RMS systems can be integrated to streamline the data capture process. An RMS can typically be programmed to produce reports and queries to investigate specific topics or incidents.

Rationale: *The first step in performance measurement is to develop the processes to collect reliable and valid data. As already discussed, fire and emergency services are typically data rich agencies. Manual entry of response data is a time consuming and error prone process. Use of integrated computer aided dispatch (CAD) and records management systems can improve the accuracy of the data captured and streamline the reporting process. These technologies simplify the conversion of data into useful information. Performance measurement and reporting is at the core of moving toward a databased culture and moves it away from mere opinion for fire services. Performance measurement and reporting allows fire services to:*

- *Determine a baseline performance level according to the indicators*
- *Support a transparent and open government*
- *Establish service level goals based on current performance*
- *Determine the gap between desired goals and current performance levels*
- *Track progress toward achieving goals*
- *Benchmark and compare performance between departments*
- *Identify problems and causes*
- *Plan for the future*

One approach to providing timely information to fire staff is to develop a performance dashboard. CAD and RMS technologies must be integrated to support this tool. Figure 13 provides an example of the information that could be reported on a performance dashboard.

Figure 13: Performance Dashboard



	Sept	YTD	Property Value
Total Dollar Loss	$ 20,000	$ 1,807,100	$ 24,774,025
Suspicious Fires	5	66	

	Sept Actual	Mthly Budget	Mth%	YTD Actual	YTD Budget	YTD%
Total	$ 1,462,500	$ 835,283	175.1%	$ 13,129,246	$ 10,026,860	130.9%
OT	$ 110,889	$ 31,051	357.1%	$ 788,343	$ 325,558	242.2%

	Sept	YTD	Targets
Training Hours	990	8,709	8,175
Avg Turnout Times - Fire Emergency	00:01:55	00:01:53	00:01:20
Avg Turnout Times - 1st Med Resp	00:01:30	00:01:31	00:01:00
Pre-plans entered	15	15	

OT By Cost Centre	2014	2015	Difference
Suppression	$ 437,326	$ 732,551	$ (295,224)
Dispatch	$ 48,118	$ 35,210	$ 12,909
Prevention, Training & Admin	$ 33,065	$ 20,582	$ 12,483
All Departments	$ 518,510	$ 788,343	$ (269,833)

Dispatch	Sept	YTD	Projected	YTD %
Dispatch Incidents	2,631	23,256	32,234	72.1%
911 Call Volume	365	6,365		
			Targets	
% 911 Calls answered < 15 sec	99%	99%	95%	
% 911 Calls answered < 40 sec	100%	100%	99%	

Inspections	Current Mth Completions	Current Assigned Mth	YTD	YTD Targets
Total Inspected Properties	378	334	3761	3007
Fire Prevention Consults	53		450	
A Shift	38	40	314	317
B Shift	42	43	310	311
C Shift	34	35	317	320
D Shift	36	39	301	313
Inspectors	228	177	2519	1746

Public Education	Events	Attendees
	150	8,030

Incidents by Type	Sept	YTD	Proposed	YTD %
1ST RESP - MEDICAL ASSIST	535	5220		
1ST RESP - <<WAIT FOR POLICE>	1	98		
1ST RESP - CARDIAC	7	84		
FMR	543	5,402		
ALARM	75	622		
BURNING COMPLAINT	19	207		
SMOKE	7	106		
STRUCTURE FIRE	6	88	116	76%
MINOR FIRE	8	80		
WILDFIRE/GRASS/BRUSH/OUTDOOR	3	67		
CAR FIRE	8	45	64	70%
RECHECK	2	40		
CHIMNEY FIRE	0	20		
OVEN/POT ON STOVE	0	6		
EXPLOSION	0	3		
FIRE EMERGENCY	128	1,284		
CARBON MONOXIDE ALRM	7	72		
GAS/OIL SMELL/SPILL	8	54		
NATURAL GAS LEAK	5	44		
POWER/TEL/CABLE LINE DOWN	2	30		
AIRCRAFT STANDBY/INCIDENT	0	15		
PROPANE LEAK / SMELL	1	12		
HAZARDOUS MATERIAL	1	4		
BOMB THREAT	-	-		
NON FIRE EMERGENCY	24	231		
MVA/EXTRICATION	53	389		
MVA	47	250		

SECTION 5
CONCLUSION

The goal of developing this Fire Services Master Plan is to conduct a comprehensive review of the Middlesex Centre's fire service and produce a strategic plan for the next 10 years. This will provide a systematic and comprehensive approach to evaluate current response capabilities by identifying and mitigating risks and assist in formulating and communicating strategic directions for the fire service, while highlighting opportunities for improved service delivery. The FSMP will also assist in conveying information to the public, staff, and municipal council about what to expect in the municipality's approach to fire and emergency service planning, service delivery model, policy, and development.

Critical factors identified in this FSMP include:

- POC remuneration and point system that does not include incentives for experience, increased roles, and responsibilities.
- POC recruitment and retention strategies to sustain a viable firefighting contingent. Increased compensation, benefits, recognition, and wellness programs that enhances POC volunteer retention.
- Limited response performance data to complete a full evaluation of the current emergency response capabilities. In particular, the convergent and direct effective response force models that does not track the number of firefighters responding for the initial alarm assignments, or the time increments to achieve an effective response force.
- Bryanston station operational response capacity and ability to assemble an effective response force within a reasonable timestamp. The need for an automatic second station response requirement.
- Anticipated growth and development primarily in the Komoka-Kilworth region and impacts of the Delaware Station and need to enhance the response capacity. Options such as live-in work experience programs, POC station days, and part-time staffing during peak periods.
- Critical need for a standard of cover or service level policy and operational guidelines based upon the Council approved emergency response policy. Critical task assignments and established response staffing levels to safely undertake operational requirements.

There are several observations and recommendations provided in this master plan to improve operational effectiveness and efficiencies. Key among the 15 recommendations is:

- Undertake the development of a standard of cover policy that includes the unique risk factors of each station's demand zone. Identified service concerns or policy gaps should be discussed with council and the SOC policy should clearly reflect the services and service levels provided by MCFS.
- Develop and approve a full-time deputy fire chief position within MCFS management team with the focus on adding managerial capacity to MCFS. Some responsibilities and duties can be shared or re-directed to the deputy fire chief as directed by the fire

chief. This additional management capacity will allow the fire chief to provide a higher level of strategic leadership to MCFS and Middlesex Centre senior leadership team.

- MCFS continue to evaluate the ability to sustain a viable POC volunteer firefighting force and develop retention strategies. The fire chief researched leading retention strategies for POC volunteer such as live-in work experience programs, POC station days, part-time staffing during peak periods, increased compensation and benefits that enhance POC volunteer retention and operational effectiveness. The move to a composite fire department with full-time career firefighting staff would only be prudent if a sustainable complement of POC volunteer firefighters cannot be maintained in some of MCFS fire stations.
- Establish a second fire prevention/training officer. The current requirement for MCFS fire chief to regularly provide some of these services are not consistent of that normally required of a fire chief. Opportunities to share fire prevention, public education, and investigation needs, along with MCFS training needs should be considered.
- Commence the design and tender process for the new aerial apparatus. The current and projected future development plans both, as detailed in the official Municipality of Middlesex Centre Plan, anticipate a significant increase in commercial, residential (low, medium, and high density) which will increase the need for an aerial apparatus.
- Consider options to mitigate changing risk profiles of station demand zones. There are several options identified to validate the concentration and distribution of MCFS resources to maintain service levels in alignment with anticipated growth and development primarily in the Komoka-Kilworth region. The foundation to monitor station demand zone performance and impacts of projected growth is the recommended SOC.
- Develop a comprehensive reserve fund process to meet life cycle emergency vehicle requirements for MCFS

Although each recommendation has a corresponding timeframe, it is important to note this FSMP needs to be revisited on a regular basis to confirm that the observations and recommendations remain relevant. The recommendations outlined in this FSMP will better position MCFS to mitigate and manage community risks, monitor response capabilities and performance, and maintain excellent community relationships and value for money.

Finally, our interactions with the Middlesex Centre staff revealed a highly professional and dedicated organization that is committed to providing the best possible service to the citizens of the Middlesex Centre.

APPENDICES

Appendix A: Glossary of Terms

Appendix B: List of Figures, Maps, and Tables

Appendix C: Theoretical Response Mapping Methodology

Appendix D: MCFS Online Firefighter Questionnaire Results

Appendix E: MCFS Job Descriptions

Appendix F: Apparatus and Light Duty Inventory

Appendix G: Community Risk Assessment

Appendix A: Glossary of Terms

Apparatus	Any vehicle provided with machinery, devices, equipment, or materials of the Fire department for firefighting as well as equipment used to transport firefighters or supplies.
Assembly Time	From the time the notification sounds in the fire station until the first vehicle leaves the station. In a full-time department this is expected to be within 80 seconds but for volunteer departments the time to collect a response crew can vary widely depending on location and time of emergency as well as all the factors that impact travel time.
Chute Time	See Assembly Time
Dangerous Goods	This term is synonymous with the terms hazardous materials and restricted articles. The term is used internationally in the transportation industry and includes explosives and any other article defined as a combustible liquid, corrosive material, infectious substances, flammable compressed gases, oxidizing materials, poisonous articles, radioactive materials, and other restrictive articles.
Discovery	This is the time between the start of the emergency and when someone or an engineered system has detected the incident.
Dispatch Time	This is the time required to extract the necessary information from the caller to allow the proper response to be initiated. The dispatcher identifies the correct fire location and initiates the dispatch by paging the appropriate fire station.
Emergency Call	This is the period between discovery and the actual notification of emergency services.
Emergency Communications Centre (ECC)	A facility dedicated to service receives calls, processes them, and then dispatches emergency units to the correct location in the appropriate time period.
Emergency Operations Centre (EOC)	The protected sites from which civil officials coordinate, monitor, and direct emergency response activities during an emergency or disaster.
Emergency	Any occasion or instance that warrants action to save lives and to protect property, public health, and safety. A situation is larger in scope and more severe in terms of actual or potential effects.
Fire Suppression	The application of an extinguishing agent to a fire at a level such that an open flame is arrested; however, a deep-seated fire will require additional steps to assure total extinguishment.
Hazard Analysis	A document, which identifies the local hazards that have caused, or possess the potential to adversely affect public health and safety, public and private property, or the environment.
Impact	The effect that each hazard will have on people such as injury and loss, adverse effects on health, property, the environment, and the economy.

Incident	A situation that is limited in scope and potential effects.
Intervention Time	The time from fire reporting to the point where the first arriving pumper, or other apparatus providing comparable functions, arrives at the fire scene and directs an extinguishing agent on the fire.
Mutual Aid Agreement	An agreement between jurisdictions to assist each other during emergencies by responding with available manpower and apparatus.
National Fire Protection Association	The National Fire Protection Association (NFPA) is an internationally recognized trade association established in 1896 that creates and maintains standards and codes for usage and adoption by local governments to reduce the worldwide burden of fire and other hazards. This includes standards and guidelines to which many fire departments utilize to carry on day-today operations.
Response	Those measures undertaken immediately after an emergency has occurred, primarily to save human life, treat the injured, and prevent further injury and losses. They include response plan activation, opening and staffing the EOC, mobilization of resources, issuance of warnings and direction, provision of aid, and may include the declaration of a State of Local Emergency.
Risk	The chance or likelihood of an occurrence based on the vulnerability and known circumstances of a community.
Setup Time	This is the time necessary on site to evaluate the necessary actions, position the required resources and commence the intervention. In the case of a fire, completing size-up, assigning the necessary tasks, and deploying resources can provide delays on scene. A well-trained crew can minimize these delays while providing a safe, successful response.
Standard Operating Guidelines (SOG)	A written organizational directive that establishes or prescribes specific operational or administrative methods to be followed routinely, which can be varied due to operational need in the performance of designated operations or actions.
Standard Operating Procedures (SOP)	A written organizational directive that establishes or prescribes specific operational or administrative methods to be followed routinely for the performance of designated operations or actions.
Travel Time	Once a vehicle leaves the station, it must negotiate the best route between that point and the location of the emergency. Factors to consider for travel time are driver skill, weather, traffic, topography, road conditions and vehicle capabilities.

Appendix B: List of Figures, Maps, Images and Tables

Appendix C: Theoretical Response Mapping Methodology

Response travel times are directly influenced by station location and can be varied based upon a cost/risk analysis and the development of performance targets.

Base Data Layers Requested

- Hydrology
- Single Line Road/Transportation Network
- Railways
- Municipal Boundaries
- Parks
- Projection File
- Orthophoto (GeoTIFF, Mr.SID), if available
- Emergency Services Locations

Data Formats

- Preference of ESRI Shapefiles

Purpose of Files

A. Hydrology
   i. Identify needs for response to water locations (if dependent on a water response unit)
   ii. Can be identified and analyzed with the rail network to locate spill contaminations, as well as containment for overland flow & flooding to water spills
   iii. Locations of bridge crossings which can convert to varying incidents, as MVC/MVA, spill contaminants, etc.
   iv. Assists in the definition of the map for locational awareness by others
   v. Completes the map

B. Single Line Road/Transportation Network
   i. Used to determine response times from emergency locations to determine a network based on road speeds
   ii. Roads are created into a network for response

C. Railways
   i. Identified risk areas for impeding response time when crossing a roadway or proximity to municipal areas will also determine the response and apparatus used for a derailment response or other rail emergency or risks, such as chemical spill evacuations.

D. Municipal Boundaries
   i. Identifies the limits to response for mutual aid and responsibilities when overlaps occur within a response area. Also identifies sub areas for specific mapping and identification of municipal and regional response zones. Provides information for gap analysis for future state locations or refinement of locations.

E. Parks
   i. Identifies the potential risk areas due to accessibility issues for tracts of land, as well as constraints and opportunities for new locational analysis for or against new stations within a municipality. Ability to determine development of new locations due to proximity. Parks are identified as local, regional, provincial, and national.

F. Projection File
   i. To ensure that we have the same data set up as being used by the Municipality or Client, measurements (both distance and time) and spatial location are correct when determining analysis.

G. Orthophoto (GeoTIFF, Mr.SID), if available
   i. We typically do not use the ortho on the output maps, but the analysis sometimes needs clarification of what is on the ground, and we use it to quickly ground truth locations and information needed prior to asking clients for clarification, or to substantiate clarification of an area.
   ii. Is a nice to have, yet hard to use, as it takes up a lot of memory/space and is difficult to ship/transfer.

H. Emergency Services Locations
   i. Identify the actual location rather than a theoretical location based on an address match to ensure that the data location is as correct as possible, and no mis-locations are identified on the initial running of the theoretical response times.
   ii. Locations may be moved from within a parcel to the front of the parcel whereby it touches the road network. Ensures the response from the station is captured. There are no corrections made to the movement of station to time, as it is typically within 50 metres.

Theoretical Response Zone

A. Assumptions
   i. Weather is average – no storms, rain, snow etc.
   ii. Roadway segments contain a node/junction at intersections
   - If not available, road network needs to be cleaned and fixed
   iii. Roadways need to sometimes extend beyond some municipalities
   iv. Emergency responders are trained on response vehicles
   v. Response vehicles are in good condition
   vi. Roads are dry and in good condition
   vii. Left turns are not reduced by a time %
   viii. Road speeds are provided by client, if not
   - Road class table used to populate speeds based on road classification
   - Road speeds are reduced from the posted sign, typically no more than 5%

ix. Traffic volume is average, there is no congestion or there is a free-flowing lane to be used
x. Rail crossings are free to cross and do not impede response
xi. Time of day is based on an average time from 9 am – 9 pm
xii. Opticoms (or similar product for traffic light manipulation) are present to allow for free moving response
xiii. Intersections of roads are not reduced (the roads are reduced from other project limits and averaged over time for generality of best fit)
xiv. School zones are not adjusted unless identified, then changes to road net are made

B. Response Time
i. Customized response based on Emergency Services Input
ii. Response time includes 80% of all calls for service
iii. Total drive time along roads (determined above by road speeds)
iv. Variances are identified and are tweaked based on known data or other trends

C. Response Polygons
i. Identify general area of response from the outer most limits driven
ii. Also identify response zones for mutual aid
iii. Identify gaps in response
iv. Aid in the development of Fire Zones for response
v. Assist in the identification of new stations
vi. Also identifies needs to move stations to another location, as required

Additional Analysis

A. Out of Scope Analysis (needs further discussion with client)
i. Transition from project to operationally based:
- Specific distance and travel
- Based on time of day
- Based on time of year
- Call volume
- Call types
- Modeling
- Scripting for batch work

B. Data Availability
i. When data available from clients is detailed enough, it is used
ii. Not all data is detailed enough, and assumptions are made

C. Analysis
i. Additional analysis can be performed (as reduction of road speeds to an intersection)

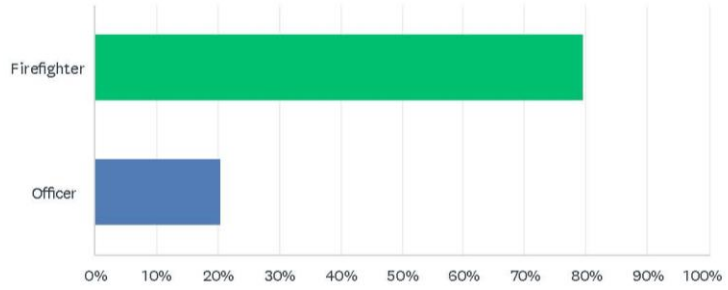
- For above example, identification of intersections can be complex, and data not always available:
    - Stop Sign
    - 3-Way Stop
    - Yield
    - Lights
    - Flashing Light

ii. Tends to be time consuming
    - Clients not willing to engage cost of this project
    - Levels of data may not be accessible
    - Missing detail
    - Usually is a one-off project and new data is typically not leveraged

Appendix D: MCFS Online Firefighter Questionnaire Results

Q1 What is your position?

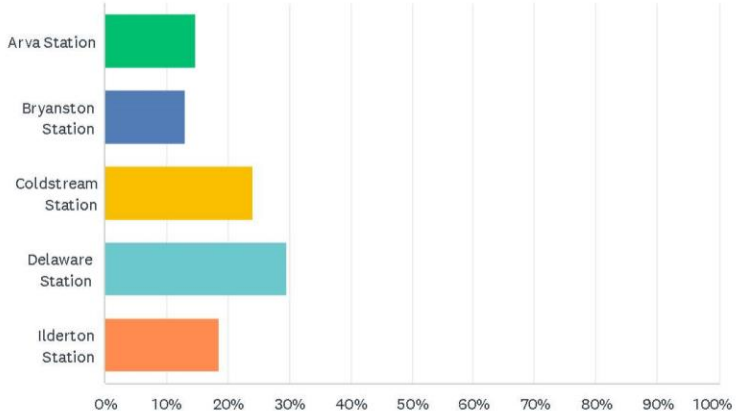
Answered: 54 Skipped: 0



ANSWER CHOICES	RESPONSES	
Firefighter	79.63%	43
Officer	20.37%	11
TOTAL		54

Q2 What station are you located at?

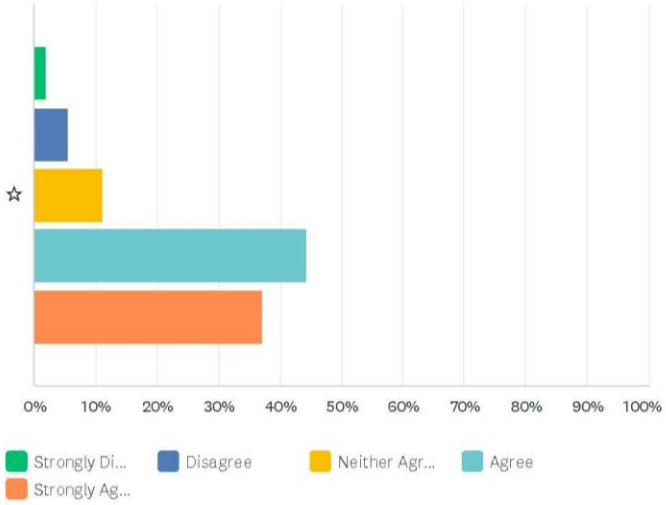
Answered: 54 Skipped: 0



ANSWER CHOICES	RESPONSES	
Arva Station	14.81%	8
Bryanston Station	12.96%	7
Coldstream Station	24.07%	13
Delaware Station	29.63%	16
Ilderton Station	18.52%	10
TOTAL		54

Q3 The public feels they are getting good value for their tax dollars for fire and emergency services.

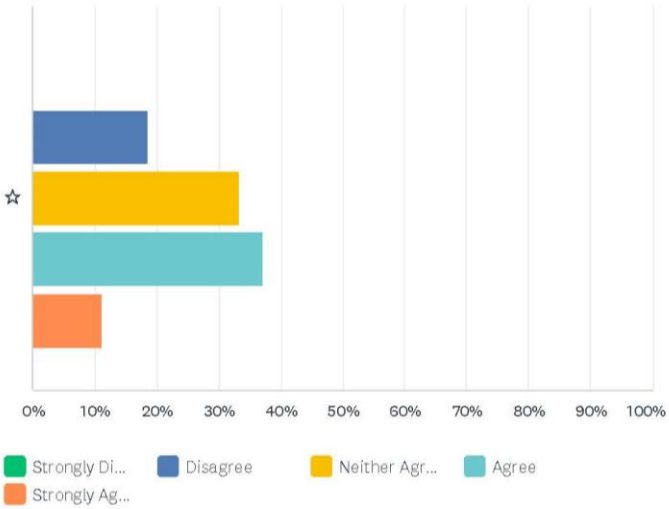
Answered: 54 Skipped: 0



	STRONGLY DISAGREE	DISAGREE	NEITHER AGREE NOR DISAGREE	AGREE	STRONGLY AGREE	TOTAL	WEIGHTED AVERAGE
☆	1.85% 1	5.56% 3	11.11% 6	44.44% 24	37.04% 20	54	0.00

Q4 The public has a good understanding of the fire service and its capabilities.

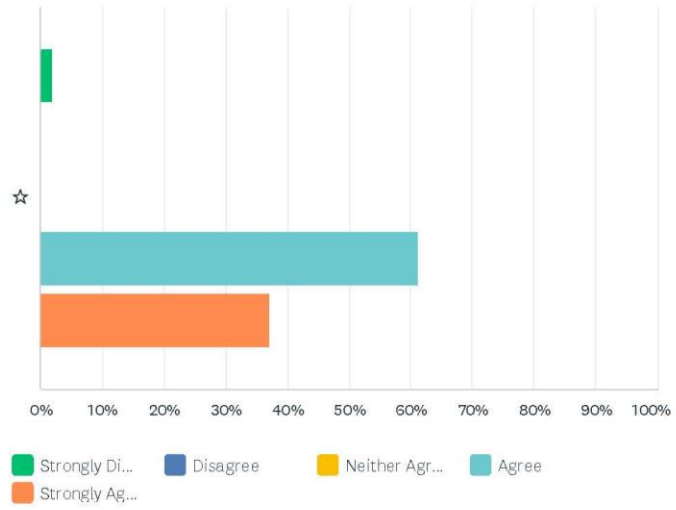
Answered: 54 Skipped: 0



	STRONGLY DISAGREE	DISAGREE	NEITHER AGREE NOR DISAGREE	AGREE	STRONGLY AGREE	TOTAL	WEIGHTED AVERAGE
☆	0.00% 0	18.52% 10	33.33% 18	37.04% 20	11.11% 6	54	0.00

Q5 Your community receives adequate fire/rescue protection.

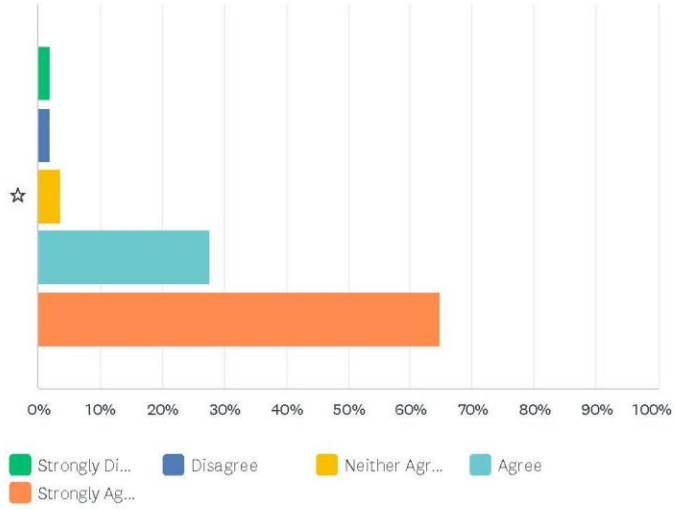
Answered: 54 Skipped: 0



	STRONGLY DISAGREE	DISAGREE	NEITHER AGREE NOR DISAGREE	AGREE	STRONGLY AGREE	TOTAL	WEIGHTED AVERAGE
☆	1.85% 1	0.00% 0	0.00% 0	61.11% 33	37.04% 20	54	0.00

Q6 Based on the rate of community and economic growth, fire service demands will increase in the future.

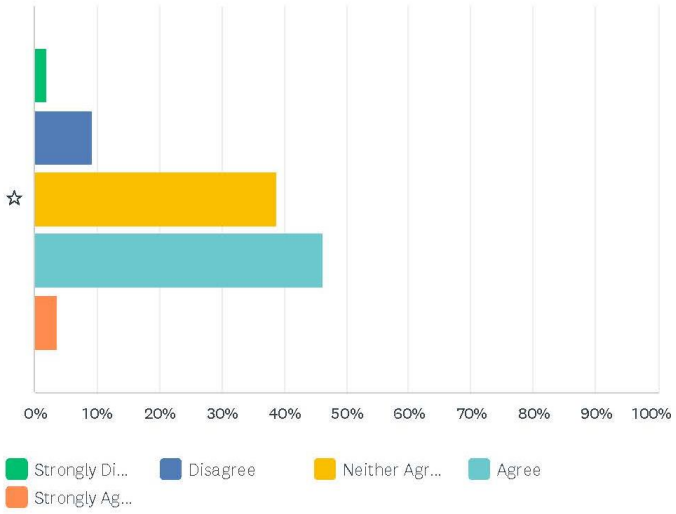
Answered: 54 Skipped: 0



	STRONGLY DISAGREE	DISAGREE	NEITHER AGREE OR DISAGREE	AGREE	STRONGLY AGREE	TOTAL	WEIGHTED AVERAGE
☆	1.85% 1	1.85% 1	3.70% 2	27.78% 15	64.81% 35	54	0.00

Q7 The community has adequate alternate fire risk reduction strategies (e.g. residential sprinklers, FireSmart program, public education).

Answered: 54 Skipped: 0



	STRONGLY DISAGREE	DISAGREE	NEITHER AGREE NOR DISAGREE	AGREE	STRONGLY AGREE	TOTAL	WEIGHTED AVERAGE
☆	1.85% 1	9.26% 5	38.89% 21	46.30% 25	3.70% 2	54	0.00

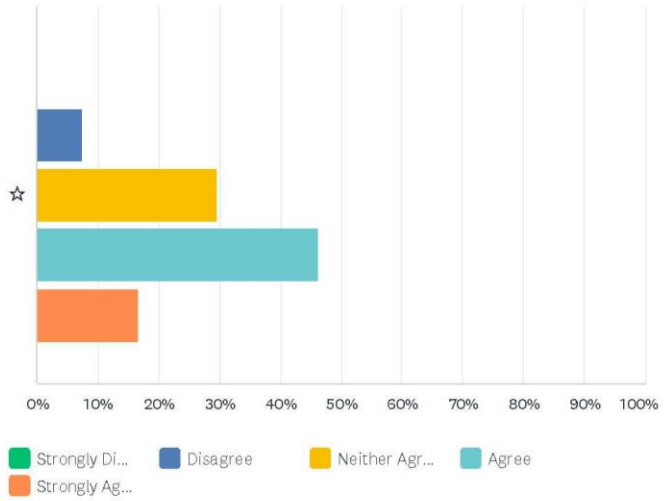
Q8 What are the top 5 risks to your community based on your community risk assessment?

Answered: 54 Skipped: 0

ANSWER CHOICES	RESPONSES	
#1	100.00%	54
#2	85.19%	46
#3	64.81%	35
#4	44.44%	24
#5	37.04%	20

Q9 The fire service's current response model is adequately staffed for fire/rescue response.

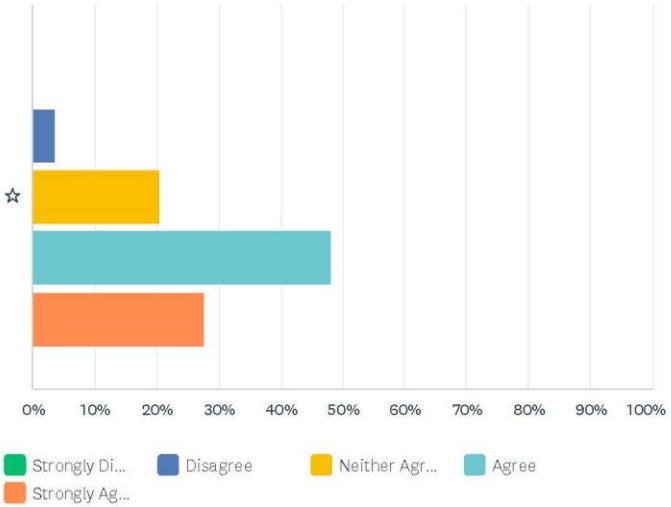
Answered: 54 Skipped: 0



	STRONGLY DISAGREE	DISAGREE	NEITHER AGREE NOR DISAGREE	AGREE	STRONGLY AGREE	TOTAL	WEIGHTED AVERAGE
☆	0.00% 0	7.41% 4	29.63% 16	46.30% 25	16.67% 9	54	0.00

Q10 The fire service's policies/procedures reflect fire/rescue industry best practices.

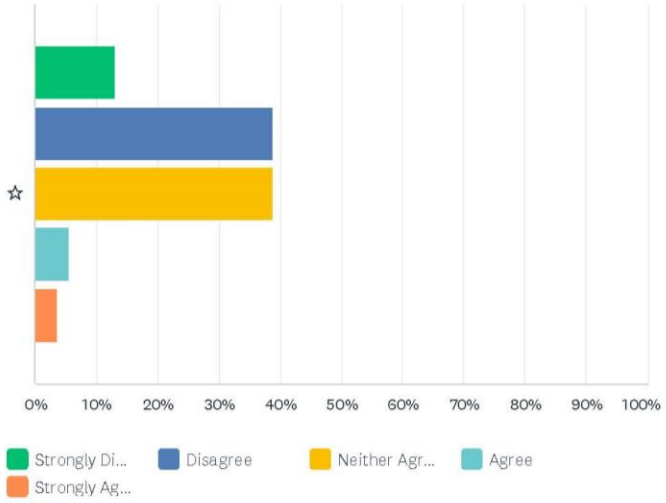
Answered: 54 Skipped: 0



	STRONGLY DISAGREE	DISAGREE	NEITHER AGREE NOR DISAGREE	AGREE	STRONGLY AGREE	TOTAL	WEIGHTED AVERAGE
☆	0.00% 0	3.70% 2	20.37% 11	48.15% 26	27.78% 15	54	0.00

Q11 Medical responses are over tasking the service's response capacity.

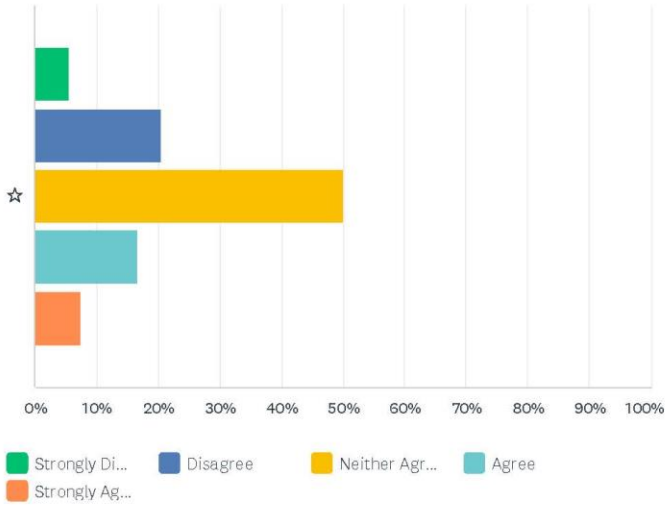
Answered: 54 Skipped: 0



	STRONGLY DISAGREE	DISAGREE	NEITHER AGREE NOR DISAGREE	AGREE	STRONGLY AGREE	TOTAL	WEIGHTED AVERAGE
☆	12.96% 7	38.89% 21	38.89% 21	5.56% 3	3.70% 2	54	0.00

Q12 Your fire service experiences a high rate of turnover.

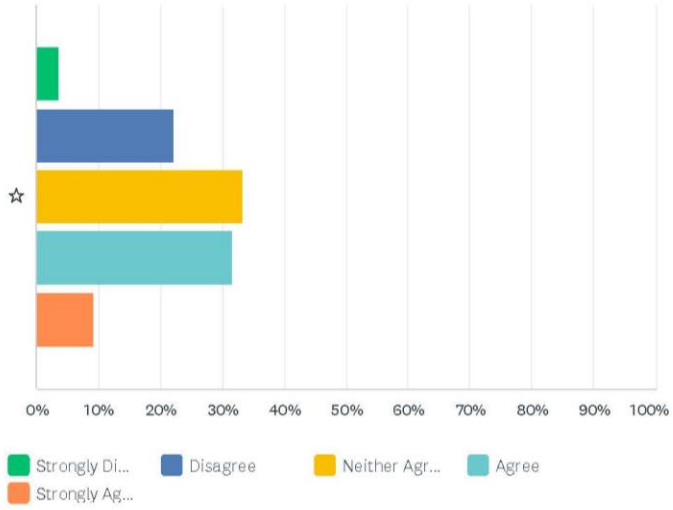
Answered: 54 Skipped: 0



	STRONGLY DISAGREE	DISAGREE	NEITHER AGREE NOR DISAGREE	AGREE	STRONGLY AGREE	TOTAL	WEIGHTED AVERAGE
☆	5.56% 3	20.37% 11	50.00% 27	16.67% 9	7.41% 4	54	0.00

Q13 Your current recruiting program is effective.

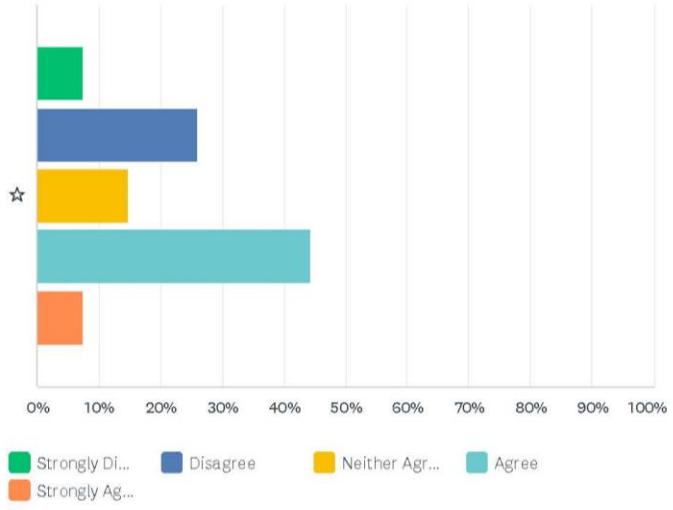
Answered: 54 Skipped: 0



	STRONGLY DISAGREE	DISAGREE	NEITHER AGREE NOR DISAGREE	AGREE	STRONGLY AGREE	TOTAL	WEIGHTED AVERAGE
☆	3.70% 2	22.22% 12	33.33% 18	31.48% 17	9.26% 5	54	0.00

Q14 The current level of live-fire and specialty team training is adequate for the services provided.

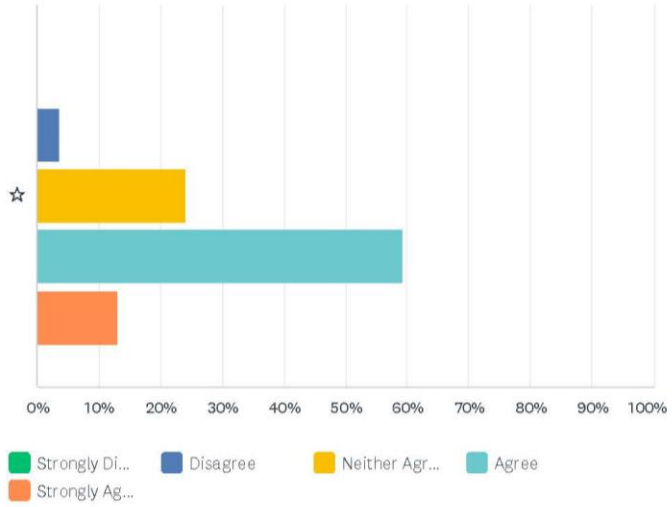
Answered: 54 Skipped: 0



	STRONGLY DISAGREE	DISAGREE	NEITHER AGREE NOR DISAGREE	AGREE	STRONGLY AGREE	TOTAL	WEIGHTED AVERAGE
☆	7.41% 4	25.93% 14	14.81% 8	44.44% 24	7.41% 4	54	0.00

Q15 The current level of theoretical fire/rescue or leadership training you receive is adequate.

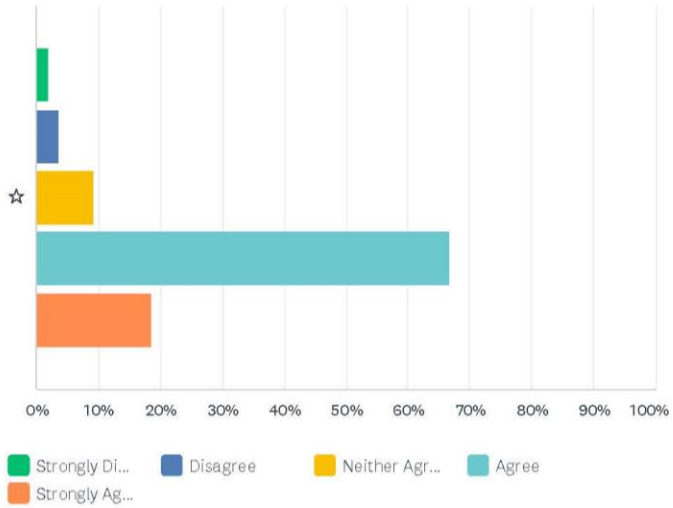
Answered: 54 Skipped: 0



	STRONGLY DISAGREE	DISAGREE	NEITHER AGREE NOR DISAGREE	AGREE	STRONGLY AGREE	TOTAL	WEIGHTED AVERAGE
☆	0.00% 0	3.70% 2	24.07% 13	59.26% 32	12.96% 7	54	0.00

Q16 You receive adequate training to maintain competencies and certifications.

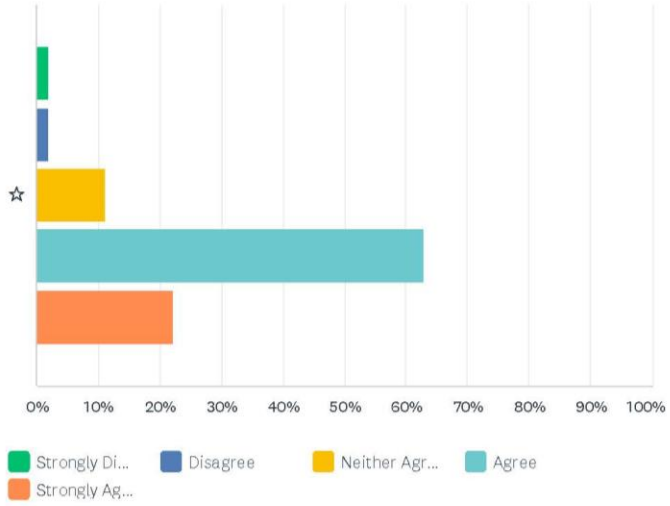
Answered: 54 Skipped: 0



	STRONGLY DISAGREE	DISAGREE	NEITHER AGREE NOR DISAGREE	AGREE	STRONGLY AGREE	TOTAL	WEIGHTED AVERAGE
☆	1.85% 1	3.70% 2	9.26% 5	66.67% 36	18.52% 10	54	0.00

Q17 Recruits are adequately trained before they are assigned to full duty.

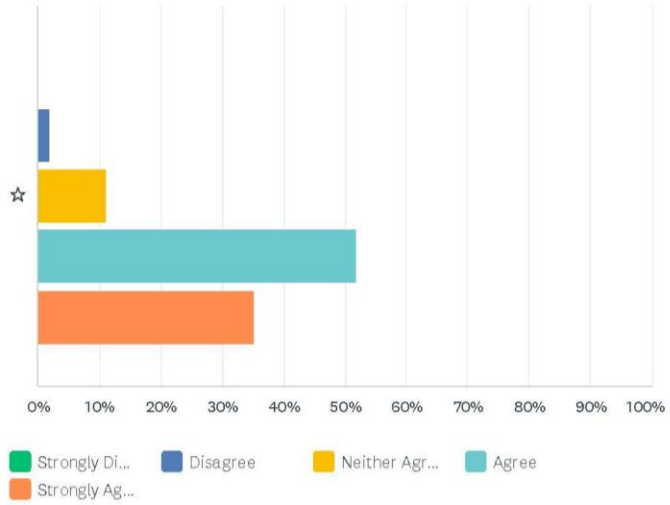
Answered: 54 Skipped: 0



	STRONGLY DISAGREE	DISAGREE	NEITHER AGREE NOR DISAGREE	AGREE	STRONGLY AGREE	TOTAL	WEIGHTED AVERAGE
☆	1.85% 1	1.85% 1	11.11% 6	62.96% 34	22.22% 12	54	0.00

Q18 The service is adequately resourced with small equipment (i.e. SCBA, light duty vehicles, loose equipment and consumables).

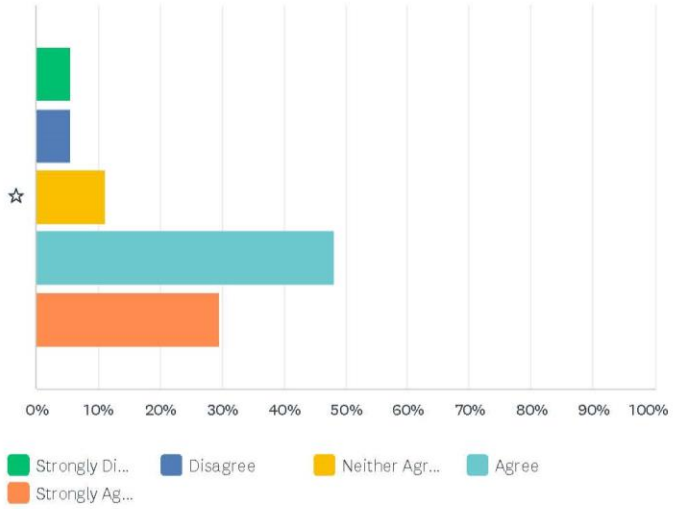
Answered: 54 Skipped: 0



	STRONGLY DISAGREE	DISAGREE	NEITHER AGREE NOR DISAGREE	AGREE	STRONGLY AGREE	TOTAL	WEIGHTED AVERAGE
☆	0.00% 0	1.85% 1	11.11% 6	51.85% 28	35.19% 19	54	0.00

Q19 The current vehicle fleet of fire apparatus provides the capacity/capability necessary to meet the demands and types of responses.

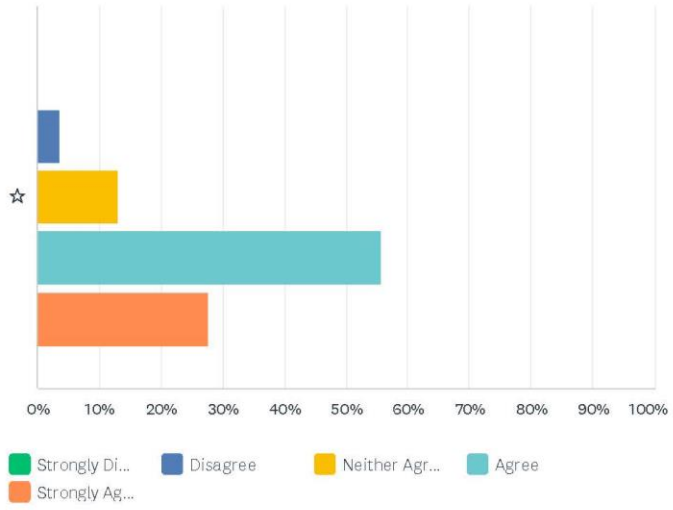
Answered: 54 Skipped: 0



	STRONGLY DISAGREE	DISAGREE	NEITHER AGREE NOR DISAGREE	AGREE	STRONGLY AGREE	TOTAL	WEIGHTED AVERAGE
☆	5.56% 3	5.56% 3	11.11% 6	48.15% 26	29.63% 16	54	0.00

Q20 Fire apparatus are appropriately life-cycled.

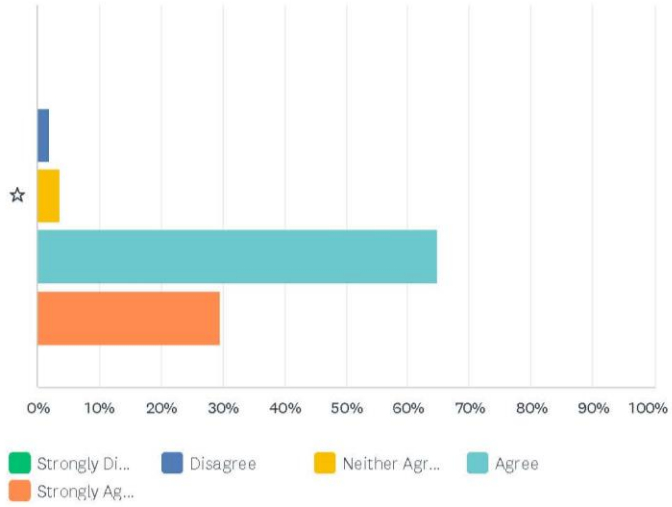
Answered: 54 Skipped: 0



	STRONGLY DISAGREE	DISAGREE	NEITHER AGREE NOR DISAGREE	AGREE	STRONGLY AGREE	TOTAL	WEIGHTED AVERAGE
☆	0.00% 0	3.70% 2	12.96% 7	55.56% 30	27.78% 15	54	0.00

Q21 The maintenance of fire apparatus is adequate.

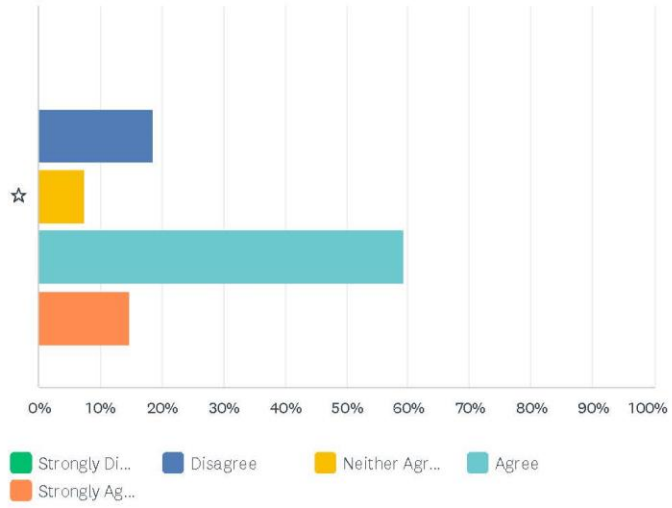
Answered: 54 Skipped: 0



	STRONGLY DISAGREE	DISAGREE	NEITHER AGREE NOR DISAGREE	AGREE	STRONGLY AGREE	TOTAL	WEIGHTED AVERAGE
☆	0.00% 0	1.85% 1	3.70% 2	64.81% 35	29.63% 16	54	0.00

Q22 The current fire stations are functional and meet the operational requirements of the department.

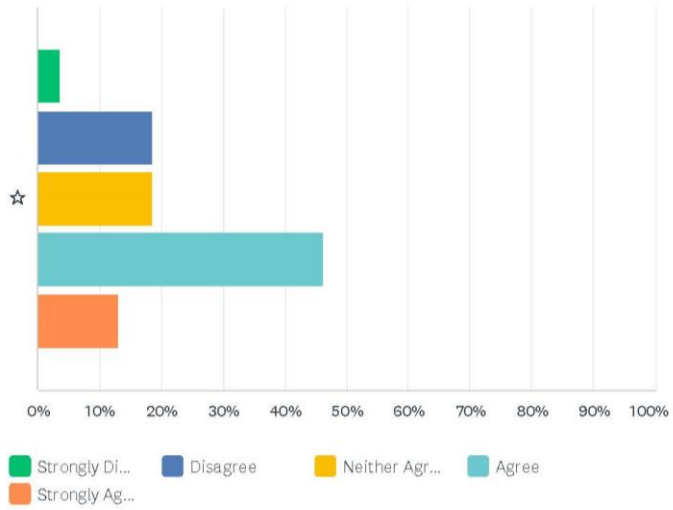
Answered: 54 Skipped: 0



	STRONGLY DISAGREE	DISAGREE	NEITHER AGREE NOR DISAGREE	AGREE	STRONGLY AGREE	TOTAL	WEIGHTED AVERAGE
☆	0.00% 0	18.52% 10	7.41% 4	59.26% 32	14.81% 8	54	0.00

Q23 The current fire stations are strategically located for adequate geographic coverage.

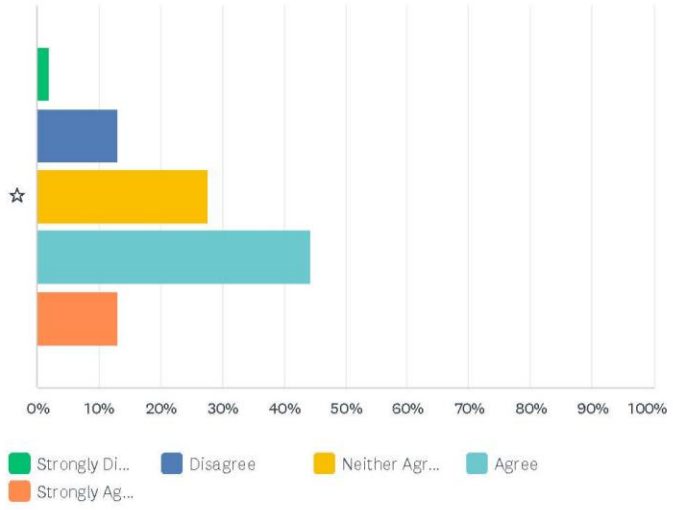
Answered: 54 Skipped: 0



	STRONGLY DISAGREE	DISAGREE	NEITHER AGREE NOR DISAGREE	AGREE	STRONGLY AGREE	TOTAL	WEIGHTED AVERAGE
☆	3.70% 2	18.52% 10	18.52% 10	46.30% 25	12.96% 7	54	0.00

Q24 The service keeps pace with leading technology in communications systems.

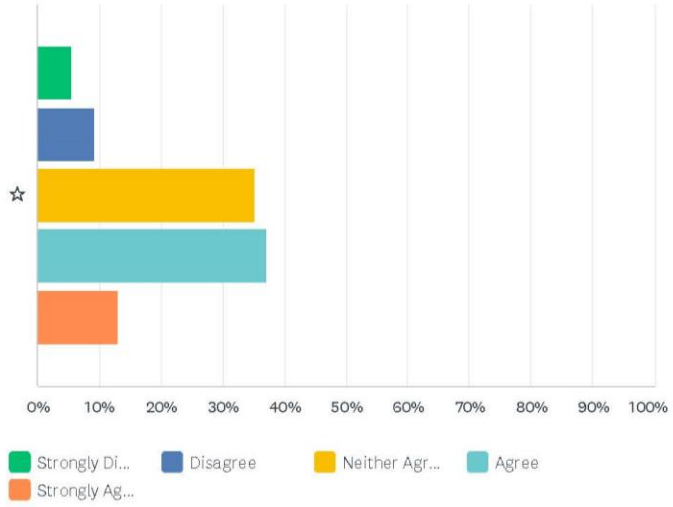
Answered: 54 Skipped: 0



	STRONGLY DISAGREE	DISAGREE	NEITHER AGREE NOR DISAGREE	AGREE	STRONGLY AGREE	TOTAL	WEIGHTED AVERAGE
☆	1.85% 1	12.96% 7	27.78% 15	44.44% 24	12.96% 7	54	0.00

Q25 The service keeps pace with leading technology in auto and mobile CAD systems.

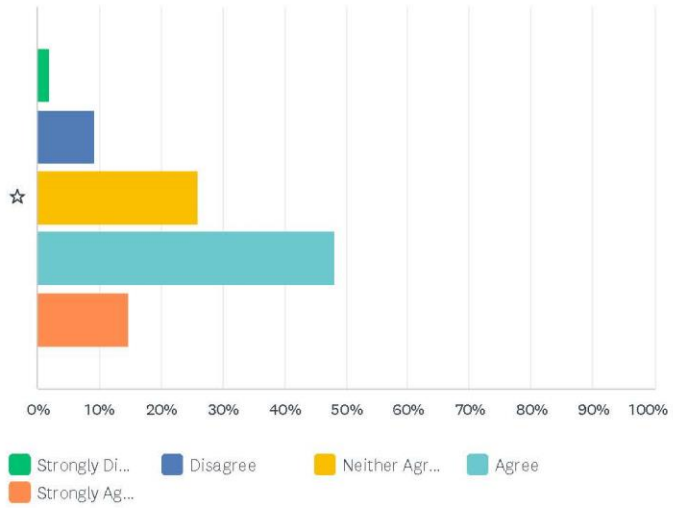
Answered: 54 Skipped: 0



	STRONGLY DISAGREE	DISAGREE	NEITHER AGREE NOR DISAGREE	AGREE	STRONGLY AGREE	TOTAL	WEIGHTED AVERAGE
☆	5.56% 3	9.26% 5	35.19% 19	37.04% 20	12.96% 7	54	0.00

Q26 The service keeps pace with leading technology in station alerting and pre-alerting.

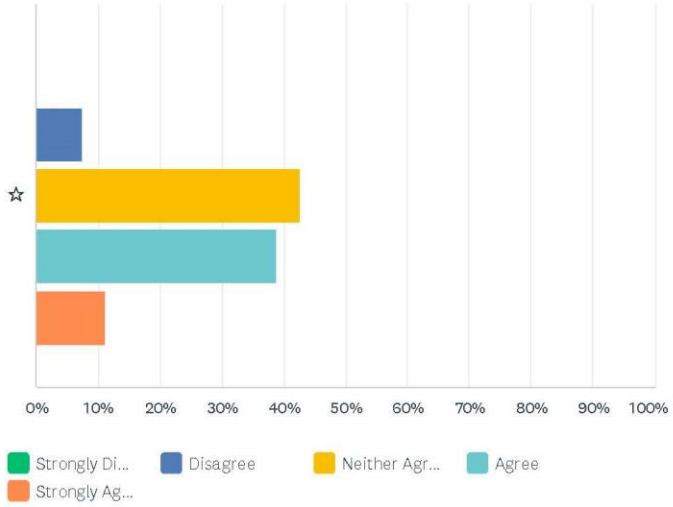
Answered: 54 Skipped: 0



	STRONGLY DISAGREE	DISAGREE	NEITHER AGREE NOR DISAGREE	AGREE	STRONGLY AGREE	TOTAL	WEIGHTED AVERAGE
☆	1.85% 1	9.26% 5	25.93% 14	48.15% 26	14.81% 8	54	0.00

Q27 The service keeps pace with leading technology in records management and fire reporting systems.

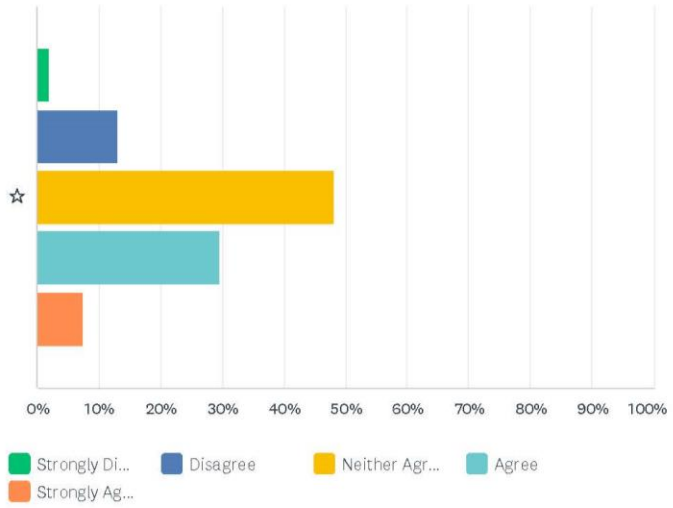
Answered: 54 Skipped: 0



	STRONGLY DISAGREE	DISAGREE	NEITHER AGREE NOR DISAGREE	AGREE	STRONGLY AGREE	TOTAL	WEIGHTED AVERAGE
☆	0.00% 0	7.41% 4	42.59% 23	38.89% 21	11.11% 6	54	0.00

Q28 The service keeps pace with leading technology in online learning management systems (LMS).

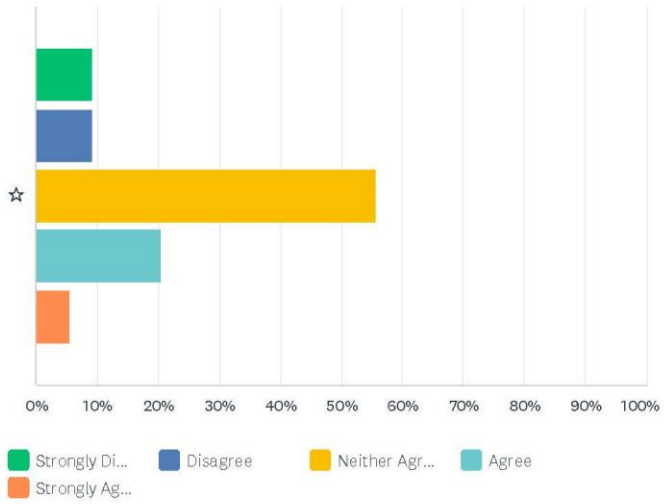
Answered: 54 Skipped: 0



	STRONGLY DISAGREE	DISAGREE	NEITHER AGREE NOR DISAGREE	AGREE	STRONGLY AGREE	TOTAL	WEIGHTED AVERAGE
☆	1.85% 1	12.96% 7	48.15% 26	29.63% 16	7.41% 4	54	0.00

Q29 The service keeps pace with leading technology in traffic pre-emption system.

Answered: 54 Skipped: 0



	STRONGLY DISAGREE	DISAGREE	NEITHER AGREE NOR DISAGREE	AGREE	STRONGLY AGREE	TOTAL	WEIGHTED AVERAGE
☆	9.26% 5	9.26% 5	55.56% 30	20.37% 11	5.56% 3	54	0.00

Appendix E: MCFS Job Descriptions

MCFS Administration Positions

Director of Emergency Services - Fire Chief

The director of emergency services-fire chief provides leadership and oversight in the delivery of essential fire services to the Municipality of Middlesex Centre and is responsible for the strategic and operational leadership of five stations, and a 118 retained (POC volunteer) firefighter fire service. The director of emergency services-fire chief is responsible for continually driving innovative thinking and best practices in a comprehensive program of administration, operations, fire prevention and fire and life safety, training, and community emergency management.

Responsibilities and time resource allocation expectations as follows:

- Strategic leadership – 50%
- Department administration – 30%
- Emergency management operations – 13%
- Community outreach – 2%
- Other – 5%

Fire and Emergency Services Coordinator

The fire and emergency services coordinator assists with the coordination and day-to-day activities of the fire service and is responsible for the operational administration of a progressive and professional five station, 118 retained (POC volunteer) firefighter fire service.

The fire and emergency services coordinator coordinates community outreach, public education and engagement initiatives working to increase the department's presence in the community and building relationships with individuals, citizen groups and other organizations focusing on fire safety education.

The fire and emergency services coordinator assumes the role of the Municipality's alternate community emergency management coordinator (CEMC) in the event of an emergency and coordinates/maintains the municipality's emergency response plan ensuring the municipality meets the legislative requirements set out in the Emergency Management and Civil Protection Act. In conjunction with the primary community emergency management coordinator in Middlesex County, arranges emergency related training and exercises for the emergency control group.

Responsibilities and time resource allocation expectations as follows:

- Strategic support – 15%
- Department administration and operations – 50%
- Emergency operations – 5%
- Community outreach – 25%
- Other duties – 5%

District Chief

The district chief oversees and directs activities at one of the five stations within Middlesex Centre Fire Services and oversees all station activities including suppression, training, administration, and fire prevention under the direction of the director of emergency services-fire chief. This senior leader is responsible for overseeing and maintaining the chain-of-command within the fire station ranks. The district chief may be required to relieve the director of emergency services-fire chief during his/her absence.

Responsibilities and expectations as follow:

- Responds to all emergencies and assumes command of the scene when necessary
- Supervises the fire ground to ensure the officers and firefighters operate in a safe manner consistent with established procedures and accepted firefighting methods
- Works with the assistant district chief to suggest purchasing of supplies and equipment as needed
- Maintains station equipment and apparatus in proper working order in accordance with current SOGs
- Maintains chain of command and morale within all firefighting ranks
- Assumes command of the fire department in the absence of the director of emergency services-fire chief as outlined in the Municipal Establishing and Regulating by-law
- Ensures that all fire employees are working safely in accordance with the *Occupational Health & Safety Act* and Section 21 Guidelines
- Work involves frequent contact with the public, requires appropriate tact to obtain co-operation and approval of action

MCFS Operational Positions

Assistant District Chief

The assistant district chief reports directly to and supports the district chief as to the direction and function of activities at one of five fire stations with Middlesex Centre Fire Services and is in charge in the absence of the district chief. The assistant district chief oversees three captains and one lieutenant/training officer regarding all station activities including suppression, training, administration, and fire prevention under the direction of the district chief. This senior leader is also responsible to ensure the chain of command within the fire station is upheld. The assistant district chief may be required to relieve the director of emergency services-fire chief in his/her absence.

Responsibilities and expectations as follow:

- Responds to all emergencies and assumes command of the scene when necessary
- Supervises the fire ground to ensure the officers and firefighters operate in a safe manner consistent with established procedures and accepted firefighting methods.
- Works with the district chief to suggest purchasing of supplies and equipment as needed.

- Maintains station equipment and apparatus in proper working order in accordance with current SOGs.
- Maintains discipline and morale of the POC volunteers in the firefighting ranks
- Assumes command of the fire department in the absence of the director of emergency services-fire chief as outlined in the Municipal Establishing and Regulating By-law
- Ensures that all fire employees are working safely in accordance with the Occupational Health & Safety Act and Section 21 Guidelines
- Work involves frequent contact with the public, requires appropriate tact to obtain co-operation and approval of action.
- Determines causes of fires in conjunction with the fire investigator and ensures the necessary forms and reports are completed from a station-level perspective.
- Advises the district chief of any changes in procedures or methods necessary to maintain or increase firefighting efficiency in a timely manner
- Advises the district chief of any repairs necessary to maintain vehicles, equipment, and stations in a timely manner
- Meets regularly with the station officers and senior leadership team to assist with the development and maintenance of progressive and efficient training, fire suppression, fire prevention and public education programs
- Ensures the station is maintained and kept in good repair
- Enforce policies and procedures
- Completes and maintains all station documentation and response reports as directed
- Conducts annual performance evaluations for the captain and lieutenant/training officer
- Maintains a personal duty book as directed

Captain

The captain reports directly to the assistant district chief and aids as to the direction and activities of firefighters at one of five fire stations within Middlesex Centre Fire Services. The captain oversees overseeing firefighting and training in a supervisory role under the direction of the assistant district chief. The work is performed in accordance with established policies and guidelines and requires the exercise of good judgment in emergency situations. This officer role takes responsibility for directing the activity of firefighters at an emergency scene or around the fire station as required.

Responsibilities and expectations as follow:

- Shall respond to emergencies and assumes command of the scene until relieved by a senior officer as required
- Supervises and inspects equipment, apparatus, and the station to ensure proper order, standards and conditions are maintained
- Must have the ability to attend the required minimum number of training sessions and meetings as defined in the current MCFS operating guidelines

- Advises the assistant district chief of any repairs necessary to maintain the vehicles, equipment, and stations in a timely manner
- Maintains chain of command and morale within the firefighting ranks
- Meets regularly with the station senior officers to assist in developing and maintaining the current training program
- Supervises the fire ground to ensure junior officers and firefighters operate in a manner consistent with established policies, procedures, and accepted firefighting methods
- Shall ensure that firefighters are working safely within the Occupational Health & Safety Act and Section 21 guidelines
- Work involves frequent contact with the public, requires appropriate tact to obtain co-operation and approval of action.
- Assigns personnel to lay out and connect hose lines and nozzles, turn water on and off, direct hose streams, raise ladders, ventilate buildings, perform salvage, perform rescue operations, stabilize hazardous materials scenes and any other life and property saving functions which the station may be involved in, within one's own capabilities
- Inspects the fire scene to prevent re-ignition
- Supervises the cleaning, checking and replacement of tools and equipment after an emergency
- Assist with the compiling of reports of each fire call, listing location, type, probable cause, estimated damage, and disposition
- Supervises the work of the firefighters to ensure work is done safely and in accordance with established policies and procedures
- Inspects equipment, grounds, and station to ensure proper order and working conditions and reports deficiencies to the assistant district chief
- Maintains a personal duty book as directed
- Meets on a regular basis with the district chief and assistant district chief to discuss the overall operation of his/her station and department
- One departmental captain will be assigned the title of chief training officer and will be additionally responsible for the design, coordination, and oversight of MCFS training program
- Directly reporting to the director of emergency services-fire chief, this captain is also responsible to lead the five lieutenant-training officers assigned to each station

Lieutenant

The lieutenant reports directly to the station captain(s) and aids as to the direction and activities of firefighters at one of five fire stations within Middlesex Centre fire services. The lieutenant also holds the title and responsibility of training officer and while operating in this role and oversees overseeing firefighter training under the direction of the chief training officer. This junior officer role ensures all duties are performed in accordance with established policies and guidelines and displays the use of good judgment in emergency situations.

Responsibilities and expectations as follow:

- Shall respond to emergencies and assumes command of the scene until relieved by a senior officer as required
- Supervises and inspects equipment, apparatus, and the station to ensure proper order, standards and conditions are maintained
- Must have the ability to attend the required minimum number of training sessions and meetings as defined in the current MCFS operating guidelines
- Advises the station captain(s) of any repairs necessary to maintain the vehicles, equipment, and stations
- Maintains chain of command and morale within the firefighting ranks
- Meets regularly with the station officers to assist in developing and maintaining the current training program.
- Supervises the fire ground to ensure firefighters operate in a manner consistent with established policies, procedures, and accepted firefighting methods
- Shall ensure that firefighters are working safely within the Occupational Health & Safety Act and Section 21 guidelines
- Advises the station captain(s) of any changes in procedures or methods necessary to maintain or increase the firefighting efficiency.
- Maintains chain of command and morale within the firefighting ranks
- Meets regularly with the station officers to assist in developing and maintaining the current training program.
- Work involves frequent contact with the public, requires appropriate tact to obtain co-operation and approval of action
- Assigns personnel to lay out and connect hose lines and nozzles, turn water on and off, direct hose streams, raise ladders, ventilate buildings, perform salvage, perform rescue operations, stabilize hazardous materials scenes and any other life and property saving functions which the station may be involved in, within one's own capabilities
- Assist with the inspection of a fire scene to prevent re-ignition
- Supervises the cleaning, checking and replacement of tools and equipment after an emergency
- Assist with the compiling of reports of each fire call, listing location, type, probable cause, estimated damage, and disposition
- Supervises the work of the firefighters to ensure work is done safely and in accordance with established policies and procedures
- Inspects equipment, grounds, and station to ensure proper order and working conditions and reports deficiencies to the assistant district chief.
- Maintains a personal duty book as directed
- Meets on a regular basis with other station officers to discuss the overall operation of his/her assigned station

- Each station lieutenant will be assigned the additional title of training officer and will be responsible for assisting in the design, coordination, and deployment of MCFS training program
- The training officer is directly responsible to the chief training officer while operating in this role

Fire Prevention and Training Officer

Reporting to the director of emergency services-fire chief, the fire prevention & training officer is responsible for providing fire code compliance, inspections, investigations, public education, and training, and for the ongoing development and implementation of a municipal prevention program. The fire prevention & training officer will conduct fire prevention activities in Middlesex Centre and several surrounding municipalities. They must be on-call for investigations and shall carry a cell phone for immediate response.

As a member of the municipal team, the incumbent will be responsible for serving Middlesex Centre by meeting the needs and expectations of residents, businesses, and community partners, and striving to be the best through attitude, training, and creativity.

Responsibilities and time resource allocation expectations as follows:

<u>Fire prevention and inspection (50% of time)</u>

- Reviews and comments on development and building permit applications at the request of the chief building official or their designate
- Carries out inspections to ensure compliance with the Ontario Fire Code, Fire Protection and Prevention Act, applicable sections of the Ontario Building Code, municipal by-laws related to fire protection, and other related codes and standards
- Identifies violations and facilitates and/or orders corrective action
- Prepares pre-plans of inspected buildings as required
- Prepares and maintains all required records, reports, statistics, correspondence, and other material as related to fire inspections/prevention operations
- Performs all the duties of an assistant to the fire marshal, as prescribed by the Fire Protection and Prevention Act.
- Evaluates, approves, and enforces fire safety plans
- Public education services (10% of time)
- Promotes and supports all aspects of public education related to fire safe and emergency response
- Develops and delivers programs related to public fire and life safety and emergency planning education to the public and identified specific groups within the community
- Provides fire safety education in elementary schools as required
- Conducts station tours as requested
- Assists with public education at the safety village

- Provides fire safety and emergency planning information and public service announcements to local media
- Aids and refers additional help as necessary to juvenile fire setters utilizing the guidelines of the TAPP-C Program

Training and development (10% of time)

- Develops and supervises the planning and implementation of fire training programs ensuring compliance with legislation and statutory regulations
- Works with the chief training officer to ensure training programs are available and assists in the implementation of these programs
- Attends weekly station training sessions and post-emergency evaluations as require

Investigations (15% of time)

- Determines the origin and cause of fires in conjunction with allied agencies
- Conducts all fire investigations, which requires the incumbent to be available 24-hours-per-day, 7-days-a-week on a rotation basis
- Liaises with municipal and provincial agencies
- Writes reports and collects fire statistics and data
- Provides advice and direction to businesses, community, and stakeholder groups as well as the local media
- Compiles the necessary legislation, gathers evidence as required, and completes the necessary forms and reports
- Provides witness testimony on behalf of the municipalities in civil and criminal court as to fire related matters, coroner's inquests, disclosure, etc.

Other duties (15% of time)

- Participates in emergency management planning meetings and exercises
- Undertakes special projects and performs other duties as assigned
- Maintains records with respect to fire related records
- Attends council and committee meetings as required to represent the department, make recommendations as appropriate, respond to inquiries and provide professional advice
- Performs other duties as assigned by the fire chief or their designate
- Assists the fire chief with developing and monitoring departmental policies, procedures and standards that guide and direct the activities within the department, and ensures full compliance with legislative and regulatory requirements to reduce corporate liabilities and mitigate risk
- Assists the fire chief with the identifying, establishing, and implementing best practices related to department activities with a focus on continuous improvement, efficiencies, and cost effectiveness
- Prepares reports and correspondence as required or requested by the fire chief

- Works in a manner and with the protective devices, measures and procedures required by the Municipality of Middlesex Centre and the Occupational Health and Safety Act and Regulations

Probationary Paid-On-Call Volunteer Firefighter

Firefighters respond to emergency situations protecting people, the environment and property from all types of occurrences. This position is of a hazardous nature and involves firefighting, rescue and patient care performed under the direction and supervision of fire officers. When not involved in emergency events, firefighters are participating in training and oftentimes, dispatched into the community promoting public education, fire prevention and life safety.

Responsibilities and expectations as follow:

Emergency duties

- Available to respond safely to emergency calls 24/7 in accordance with departmental guidelines. May involve working on weekends, holidays and in all types of weather conditions
- Drives, operates, and maintains emergency equipment, including personal vehicles, safely and in accordance with policies, guidelines, and applicable legislation
- While applying proper firefighting and rescue techniques, enters burning or contaminated structures or other areas to effect rescue and preserve life and property
- Provides advanced medical care prior to EMS arrival

Other duties and nature of work

Firefighters are expected to:

- Respect and follow the departmental chain of command, complying with direction provided by ranking department officers
- Make recommendations and communicate through the chain of command regarding general concerns, operational guidelines, equipment maintenance, etc.
- Don, maintain and properly use all assigned personal protective equipment (PPE) as supplied by Middlesex Centre Fire Service (MCFS) and the Municipality of Middlesex Centre
- Deal with the public in a polite, sympathetic, and respectful manner
- Always maintain a high degree of confidentiality, and refrain from disclosing municipal specific information to the news, social media or to other persons without authorization from the fire chief
- Abstains from any fire service operations/activities while under the influence of alcohol, cannabis, or illicit substances and/or prescription drugs, which may cause impairment
- Maintain a level of physical fitness necessary to carry out all the duties of a firefighter
- Perform all activities in a safe manner, in accordance with the Occupational Health and Safety Act and its regulations, along with corporate safety policies, guidelines and programs

- Meet attendance minimums, in alignment with established policies and operating guidelines, for weekly training, events and emergency calls
- The expectation from the time of being paged to arriving on scene, in most cases, is not more than 10 minutes

Appendix F: Apparatus and Light Duty Inventory

MCFS Headquarters					
					
Unit Number:	**Car 1**	Unit Number:	**2225**	Unit Number:	**N/A**
Year/Make:	2015 Dodge (Gas)	Year/Make:	2020 Ford (Hybrid)	Year/Make:	2006 Custom
Type:	1500 Pick-up	Type:	Escape SUV	Type:	Trailer
Odometer (kms.):	N/A	Odometer (kms.):	N/A	Odometer (kms.):	N/A
Pump Capacity:	N/A	Pump Capacity:	NA	Pump Capacity:	N/A
Tank Capacity:	N/A	Tank Capacity:	NA	Tank Capacity:	N/A
Foam:	N/A	Foam:	NA	Foam:	N/A
Delivery Method:	N/A	Delivery Method:	NA	Delivery Method:	N/A
Usage:	Chiefs' vehicle	Usage:	Fire Prevention and Training Officer	Usage:	Fire training equipment

Arva Fire Station					
					
Unit Number:	2255	Unit Number:	2256	Unit Number:	2203
Year/Make:	2019 Fort Garry Freightliner	Year/Make:	2019 Metalfab Freightliner	Year/Make:	2004 Superior E-One International
Type:	Engine (Diesel)	Type:	Rescue (Diesel)	Type:	Tanker
Odometer (kms.):	10154	Odometer (kms.):	4020	Odometer (kms.):	24507
Pump Capacity:	5000 LPM @1000KPA	Pump Capacity:	N/A	Pump Capacity:	840 IG
Tank Capacity: (water)	3630 L	Tank Capacity: (water)	N/A	Tank Capacity: (water)	1500 IMPG
Foam:	Yes	Foam:	No	Foam:	
Delivery Method:	FOAM PRO	Delivery Method:	N/A	Delivery Method:	
Usage:	Front line support Engine for fires, alarms, MVC, rescues and medical assist, etc.	Usage:	Front line support Rescue for fire suppression, rescue MVC	Usage:	Water Tanker

Bryanston Fire Station			
			
Unit Number:	2121	Unit Number:	2201
Year/Make:	2017 Metalfab Freightliner	Year/Make:	2009 Dependable Freightliner
Type:	Tanker (Diesel)	Type:	Rescue (Diesel)
Odometer (kms.):	7903	Odometer (kms.):	12918
Pump Capacity:	1057 USPM	Pump Capacity:	N/A
Tank Capacity:	2094 IMPG	Tank Capacity:	N/A
Foam:	Yes	Foam:	No
Delivery Method:	FOAM PRO	Delivery Method:	N/A
Usage:	Front line support tanker for fire suppression, water supply, water shuttle or drafting operations, MVC, rescue, safety	Usage:	Front line support Rescue for fire suppression, rescue MVC

Coldstream Fire Station					
					
Unit Number:	**2222**	Unit Number:	**2221**	Unit Number:	**2257**
Year/Make:	2010 Dependable International	Year/Make:	2008 Dependable GMC C5500	Year/Make:	2018 Ford F-250 (Gas)
Type:	Engine (Diesel)	Type:	Rescue (Diesel)	Type:	Rescue Air (Gas)
Odometer (kms.):	16148	Odometer (kms.):	7903	Odometer (kms.):	12888
Pump Capacity:	5000LPM	Pump Capacity:	N/A	Pump Capacity:	N/A
Tank Capacity:	4270 L	Tank Capacity:	N/A	Tank Capacity:	N/A
Foam:	Yes	Foam:	No	Foam:	No
Delivery Method:	Foam Pro	Delivery Method:	N/A	Delivery Method:	N/A
Usage:	Front line support Engine for fires, alarms, MVC, rescues and medical aid etc.	Usage:	Front line support Rescue for fire suppression, rescue MVC	Usage:	Special Ops. Trailer towing, Deliveries

Coldstream Fire Station			
			
Unit Number:	**2213**	Unit Number:	**N/A**
Year/Make:	2011 Metal Fab International	Year/Make:	2009 MELT and custom
Type:	Tanker (Diesel)	Type:	Boat and Trailer
Odometer (kms.):	13871	Odometer (kms.):	N/A
Pump Capacity:		Pump Capacity:	N/A
Tank:	Yes	Tank Capacity:	N/A
Foam:	FOAM PRO	Foam:	N/A
Delivery Method:		Delivery Method:	N/A
Usage:	Front line support tanker for fire suppression, water supply, water shuttle or drafting operations, MVC, rescue, safety	Usage:	Rescue boat for water rescue

Delaware Fire Station

Unit Number:	**2231**
Year/Make:	2007 Metalfab Freightliner
Type:	Engine (Diesel)
Odometer (kms.):	39138
Pump Capacity:	1050 USGPM
Tank Capacity:	NA
Foam:	Yes
Delivery Method:	FOAM PRO
Usage:	Front line support Engine for fires, alarms, MVC, rescues and medical aid etc.

Unit Number:	**2252**
Year/Make:	2016 Ford F 150
Type:	Rescue (Gas)
Odometer (kms.):	9955
Pump Capacity:	NA
Tank Capacity:	NA
Foam:	No
Delivery Method:	NA
Usage:	Front line support Rescue for fire suppression, rescue MVC

Unit Number:	**2225**
Year/Make:	2020 Metalfab Freightliner
Type:	Tanker (diesel)
Odometer (kms.):	3481
Pump Capacity:	NA
Tank Capacity:	NA
Foam:	Yes
Delivery Method:	FOAM PRO
Usage:	Front line support tanker for fire suppression, water supply, water shuttle or drafting operations, MVC, rescue, safety

Ilderton Fire Station					
					
Assigned Number:	**2243**	Assigned Number:	**2253**	Assigned Number:	2242
Year/Make:	2020 Fort Garry Freightliner	Year/Make:	2016 Ford F-150	Year/Make:	2005 Almonte/DOB International
Type:	Engine (Diesel)	Type:	Rescue (Gas)	Type:	Tanker
Odometer (kms.):	3416	Odometer (kms.):	7559	Odometer (kms.):	18,300
Pump Capacity:	6000LPM	Pump Capacity:	N/A	Pump Capacity:	840 GPM
Tank Capacity:	3750 L	Tank Capacity:	N/A	Tank Capacity:	1500 imp. gal.
Foam:	Yes	Foam:	No	Foam:	N/A
Delivery Method:	FOAM PRO	Delivery Method:	N/A	Delivery Method:	
Usage:	Front line support Engine for fires, alarms, MVC, rescues and medical aid etc.	Usage:	Front line support Rescue for fire suppression, rescue MVC	Usage:	Tanker

Ilderton Fire Station	
	
Unit Number:	2091 and 2258
Year/Make:	2019 John Deer
Type:	Gator and trailer (Gas)
Odometer (kms.):	881
Pump Capacity:	NA
Tank Capacity:	NA
Foam:	No
Delivery Method:	NA
Usage:	Second line support vehicle for off road/wild land

Appendix G: Municipality of Middlesex Centre Community Risk Assessment

Municipality of Middlesex Centre
2022 COMMUNITY RISK ASSESSMENT

Final Report: August 31, 2022

Presented by:

Behr Integrated Solutions Inc.
Unit 4, 545 Trillium Drive
Kitchener ON N2R 1J4

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ACRONYMS

CRA	Community Risk Assessment
EOC	Emergency Operations Centre
FPPA	Fire Protection and Prevention Act
HIRA	Hazard Identification and Risk Assessment
LVL	Laminated Veneer Lumber
LWC	Light Weight Construction
MAP	Mutual Aid Plan
MCFS	Middlesex Centre Fire Service
MVC	Motor Vehicle Collision
MVI	Motor Vehicle Incident
NFPA	National Fire Protection Association
OBC	Ontario Building Code
OFC	Ontario Fire Code
OFM	Office of the Fire Marshal
PFSG	Public Fire Safety Guideline

TABLE OF CONTENTS

SECTION 1
INTRODUCTION

This Community Risk Assessment (CRA) has been developed for the Municipality of Middlesex Centre, in accordance with the Ontario Regulation 378/18: Community Risk Assessments (O. Reg. 378/18), under the authority of the Fire Protection and Prevention Act, 1997 (FPPA). O.Reg. 378/18 "…requires that each municipality and every fire service in a territory without municipal organization complete a community risk assessment and use it to inform decisions on the provision of fire protection services."[1] The introduction of O. Reg. 378/18 is also now a core component to satisfy the FPPA requirements of developing an in-depth analysis of a community's fire-related risks through a comprehensive analysis of nine mandatory profiles.

Technical guidelines have been developed by the Office of the Fire Marshal (OFM) (TG-02-2019) to assist municipalities and fire services in developing their CRA and using the completed CRA to inform the municipality's decisions about complying with the FPPA[2]. The guideline provides sample worksheets and suggestions as how to obtain record and analyze the minimum required amount of data required for a full CRA. Completed worksheets for the Municipality of Middlesex Centre can be found in Appendix B.

1.1 Methodology

The methodology used to prepare this CRA has been directly informed by the OFM guideline *Community Risk Assessment OFM-TG-02-2019* as well as other current industry standards and best practices including:

- Office of the Fire Marshall and Emergency Management (OFM) Comprehensive Fire Safety Effectives Model: Fire Risk Sub-Model
- 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 and Inspection and Code Enforcement, Plan Review, Investigation and Public Education Operations (2019 Edition)

As required by O. Reg. 378/18, this CRA includes a comprehensive analysis of the nine mandatory profiles including[3]:

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

[1] *Community Risk Assessment: Office of the Fire Marshal OFM-TG-02-2019, 2019.*
[2] *Community Risk Assessment: Office of the Fire Marshal OFM-TG-02-2019, 2019.*
[3] *Ontario Regulation 378/18: Community Risk Assessments (O. Reg. 378/18).*

These profiles are based on an analysis of several sources of information, including data obtained from the Municipality of Middlesex Centre, MCFS, Statistics Canada, the OFM, and desktop research. Where applicable and where possible, the analysis within each of the nine mandatory profiles also includes a comparison to provincial fire-related and census statistics available through the OFM and Statistics Canada. Where possible the most current and verified data has been used.

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

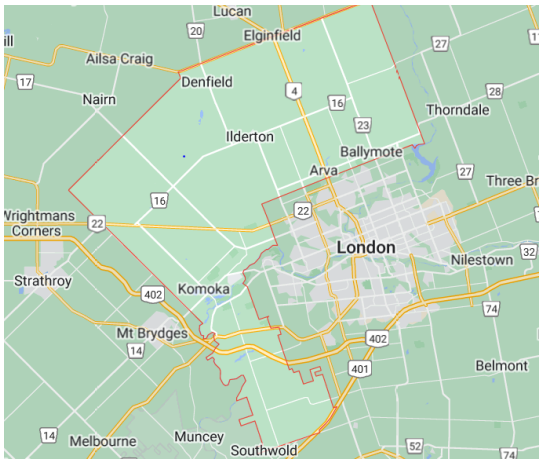
More information on how the key findings and identified risks will be calculated can be found in Section 11.

SECTION 2
GEOGRAPHIC PROFILE

The geographic profile of a community is an assessment of the physical features of a community such as highways, waterways, railways, bridges, landforms, quarries and wildland urban interfaces that may present an inherent risk to the community and impact fire service access to an incident and/or response times and capabilities[4]. This section contains a detailed analysis of these geographical features for the Municipality of Middlesex Centre to assist with the determination of the type and level of fire protection services needed for the community and any potential impacts to service.

2.1 Geographic Overview

Map 1: Middlesex Centre Overview



The Municipality of Middlesex Centre is located roughly in the centre of Middlesex County, bordered by the City of London to the south, Thames Centre to the east, North Middlesex and Lucan Biddulph to the north and Adelaide Metcalfe and Strathroy-Caradoc to the west. It has a land-based area of 588.11 km[25], which is predominantly rural and agricultural, but also has considerable forested areas and wetlands. Land designations are categorized as agriculture, rural industrial, rural commercial, parks and recreation, natural environment areas and flood plain. There are an abundance of small rivers and creeks running through the municipality, the largest being the Thames River which runs through the southern portion of the municipality through Killworth/Komoka. These tributaries are an important water source for the region and beyond, as they flow south to Lake St. Clair, eventually draining into Lake Erie which supplies many Canadian and American communities (including Middlesex County) with drinking water[6].

2.1.1 Urban Settlement Areas

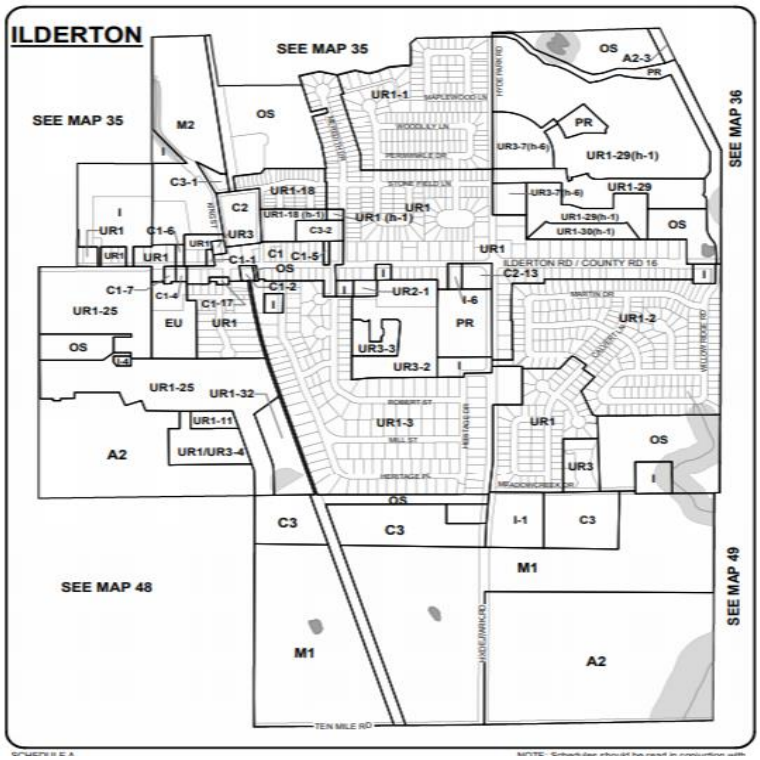
The hierarchy classification of settlement areas in the municipality are urban settlement areas, community settlement areas and hamlets[7]. While urban and community settlement areas have a combination of the above listed land use classifications, hamlets have not been separated into individual land use designations, but rather classified as a 'hamlet' in their entirety[8].

[4] *Community Risk Assessment: Office of the Fire Marshal OFM-TG-02-2019, 2019.*
[5] *Statistics Canada Census Profile, 2016.*
[6] *The Sydenham River Watershed as retrieved from https://www.sydenhamriver.on.ca/*
[7] *Middlesex Centre Official Plan Review Background Report, 2020*
[8] *Official Plan of the Municipality of Middlesex Centre, 2018*

2.1.1.1 Ilderton

Ilderton is located several kilometers from the outskirts of London. There are approximately 1,200 households in Ilderton, with an estimated population of 3,500 (2016). The community is, expected to account for 20% of the future projected population growth. The majority of the land use in Ilderton is residential (UR1-UR3); however, there is a small cluster of village, highway and office park land use designations (C1-C3). There are several small amenities including a medical and veterinary centre.

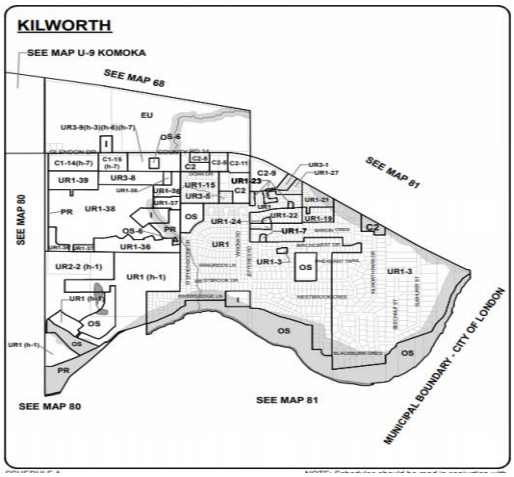
Map 2: Ilderton Land Use Map



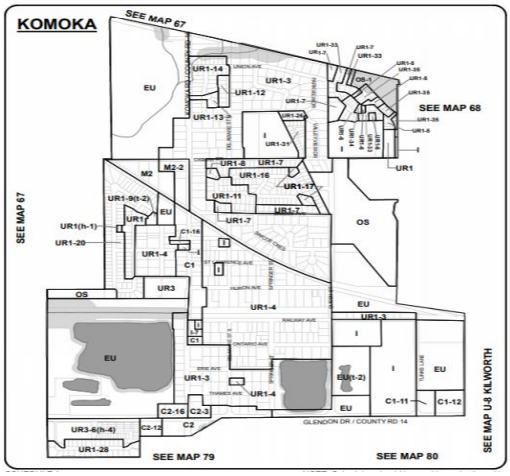
2.1.1.2 Komoka-Kilworth

Komoka/Kilworth are located 13.7 kilometers west of London. There are approximately 1,610 households in the area and a population of 4,600 (2016). While there are several commercial buildings, there is no central business district or focal point of the community. Much of the surrounding area/outskirts of the settlement area is designated as 'open space' (OS), generally used for light recreation; or as 'existing use' (EU), which limits development in these areas. It is noted however that the provisions of category EU were set to expire as of June 2020.

Map 3: Kilworth Land Use Map



Map 4: Komoka Land Use Map

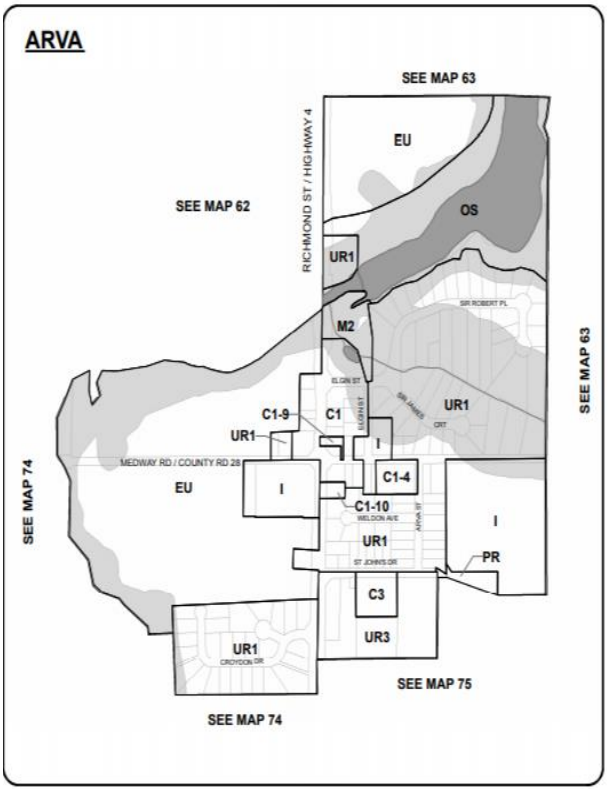


2.1.2 Community Settlement Areas

2.1.2.1 Arva

Arva is located approximately 1.3 kilometers from the northern boundary of London. The 2016 Census indicated that there were approximately 190 households in Arva, and it had a population of 500, however long-term population forecasts suggest that between 2016-2046, Arva and Delaware, will collectively account for an 14% of the area's population growth, which would be roughly estimated at 82 people per year.

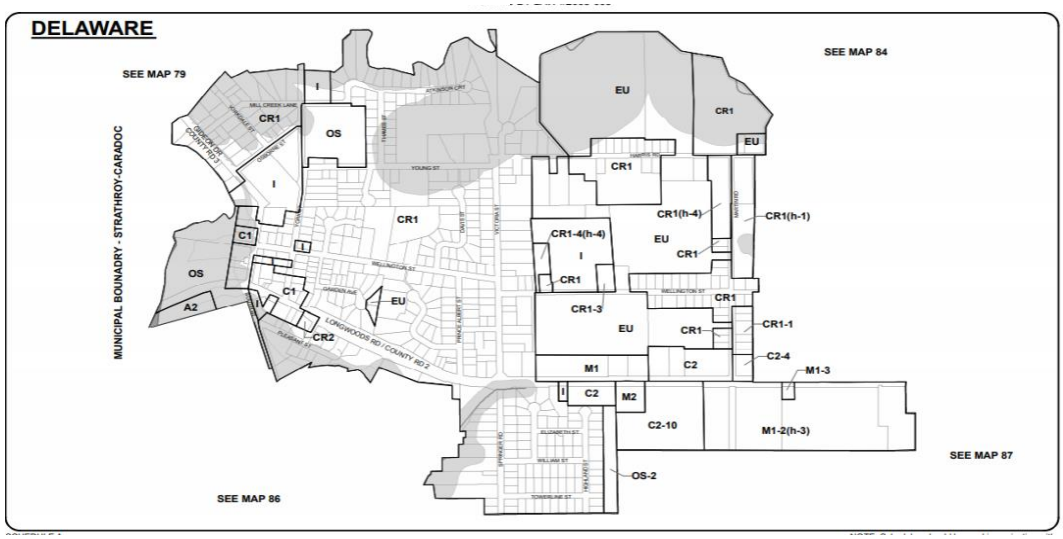
Map 5: Arva Land Use Map



2.1.2.2 Delaware

Located 5.09 kilometers from the western edge of London, the community of Delaware straddles the Thames River and is mostly surrounded by forests, farmland and floodplains. It has an estimated 550 households and population of 1,600 (2016)[9]. It has a small industrial area which is the site of manufacturing and wholesale farming equipment.

Map 6: Delaware Land Use Map



[9] *Statistics Canada Population Census (2016)*

2.1.3 Hamlet Areas

The remaining hamlet areas located throughout the municipality, account for 2,400 households and a population of 7,600 (2016). These areas are primarily designated as residential areas, with small lots dedicated to village commercial areas. The main hamlet areas are:

- Ballymote
- Birr
- Denfield
- Bryanston
- Lobo
- Melrose
- Poplar Hill/Coldstream

2.2 Roads, Transit, Bridges and Rail

2.2.1 Road Network

Road networks provide fire and emergency services with access throughout a community when responding to an emergency. Understanding the road network of a community is critical in determining risk from a response perspective for several reasons. The road network can present challenges and delays due to congested traffic, load restrictions and physical barriers (railway crossings, construction, and detours). Time of day may also be a factor when determining a response route to a call for these reasons. Roadways are also a common source of emergency call volume due to collisions and accidents.

Where possible, the municipality's transportation planning should involve the MCFS to provide input on emergency services challenges and needs as related to networks, traffic congestion and traffic calming if required.

The Municipality of Middlesex Centre has an extensive transportation network composed of provincial highways, arterial roads, collector roads, county roads, municipal roads and privately owned and maintained roads. Provincial highways 401 & 402 run east-west south of Delaware and along the southeastern corner of the municipality, respectively. Provincial Highway 7 serves as an arterial road and runs east-west in the northern portion of the municipality through Denfield. Highways 4 and 23 also serve as arterial roads in the north-south direction through Arva and into London, eventually connecting to the 400 series. In addition to major and secondary highways, there is approximately 567 kms of municipally maintained roads throughout the municipality[10].

Road conditions are generally rated as good throughout the municipality; however, roadways between communities can be poor. Almost half of the roadways (48%) are gravel[11].

Identified Risk: Poor roads can lead to damaged apparatus and delayed response to calls. Requests for mutual aid if needed may be challenged by poor connectivity due to road conditions, apparatus weight etc.

[10] *Asset Management Plan, Municipality of Middlesex Centre 2021*
[11] *Asset Management Plan, Municipality of Middlesex Centre 2021*

Considering many residents in the community commute for work, there is a considerable amount of traffic during peak times, particularly along the 400 series and major arterials, increasing the frequency of emergency call volume during these times. Call statistics from 2017 to 2021 indicate that on average, MCFS responds to 101 MVCs per year, accounting for 34% of all calls, which makes up the largest percentage of all calls, as per the table below.

Table 1: Unique Incidents within Middlesex Centre (2017 to 2021)

Incident Type	2017	2018	2019	2020	2021	Total	%
MVC	106	97	112	87	104	506	34
Public Service	53	64	52	52	67	288	20
Fire	53	48	45	65	66	277	19
Medical	36	47	44	42	42	211	14
Alarm	29	34	46	27	38	174	12
Rescue	1	1	4	3	7	16	1
Total	278	291	303	276	324	1472	100

Identified Risk: Large amounts of commuters, increases the potential for MVCs, particularly on major routes during peak times.

With the presence of provincial highways in the area, and small industrial sites, there is also the risk of transportation incidents involving dangerous goods. There are currently no formalized dangerous goods routes through the municipality. It is noted that all provincial highways are dangerous goods routes. The fire service currently has an Emergency Environmental Service Agreement with First Response, which serves as a hazardous materials response agreement. The response capabilities are wide ranging and available 24 hours; however, dispatch would be from Hamilton Ontario, which would be approximately 1 hr. and 45 minutes to the industrial area of the municipality.

Identified Risk: High potential for dangerous goods incident, particularly on 400 series (provincial highways). The municipality should have dangerous goods routes designated to limit risk on municipal roads.

Identified Risk: Mutual aid response for dangerous goods incidents would be coming from Hamilton, Ontario. Need sufficient resources and training to discover and contain an incident until assistance can arrive.

Identified Risk: With the 400 series highways and Highway 2 in proximity to Delaware, Kilworth/Komoka areas, it is suggested this station is most likely to respond to this type of call.

Throughout the municipality, there are a number of spring weight-load and several year-round restrictions, which present a challenge for response in these areas. From March 1 until April 30, the load limit is a maximum weight of five tonnes per axle in many parts of the municipality. There are currently 37 roadways with spring restrictions and two with year-round restrictions[12]. Many of these roads are the only point of access to rural properties. Weight restrictions may indicate poor conditions that may damage an apparatus or result in an incident with the apparatus.

Identified Risk: Certain times of the year, roadways may be unsuitable to be travelled by some apparatus, potentially resulting in reduced response times and/or damaged apparatus.

2.2.2 Bridges

Bridges must be considered when conducting a CRA, as they can create a physical barrier to a response and negatively impact response times. An apparatus may be restricted from crossing (i.e., load restrictions), or the roadway connectivity may be disrupted if a bridge is rendered out of service for maintenance/repairs. Further, incidents located on a bridge have an increased risk associated with spills, congestion and being unable to access, or have difficulty accessing the scene. Incidents may also require high-angle rescue which requires specialized skill and equipment.

There are 50 bridges maintained by Middlesex Centre[13]. Most of these bridges overpass waterways; however, some do cross over railways and other roadways. The bridges are largely found outside the areas of concentrated populations. Although not critical for areas of potential high call volume, they may pose a challenge when responding to rural areas, or when requests for mutual aid may be required. None of the bridges in the municipality currently have load or dimensional restrictions and the general condition of the bridges in the municipality are rated 'fair'[14]. There are seven bridges in the municipality rated as poor[15]. It is evident that aging infrastructure is a factor which could lead the bridges to become unreliable. There are currently several projects underway to repair bridges in the municipality.

[12] *As retrieved from https://middlesexcentre.ca/articles/reduced-load-limits-effect-march-and-april*
[13] *Asset Management Plan, Municipality of Middlesex Centre 2021*
[14] *Asset Management Plan, Municipality of Middlesex Centre 2021*
[15] *Asset Management Plan, Municipality of Middlesex Centre 2021*

Identified Risk: The large number of bridges in the municipality, and their deteriorating condition, have the potential to reduce connectivity of the road network due to restrictions or closures, resulting in potential delays to response time.

Identified Risk: Bridges over waterways pose the possibility for a hazardous release into waterways and/or high-angle rescue.

Key Finding: Bridges deemed to be in poor condition should be reviewed by the fire service and avoided where possible during a response. Alternate routes should be pre-identified.

Key Finding: MCFS should be consulted before improvement projects are approved in order to prepare for response challenges.

2.2.3 Rail

At-grade rail crossings (an intersection at which a road crosses a rail line at the same level) can create delays in emergency response by impeding access to a roadway. Also, 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.) within and throughout a municipality can impact emergency services travel times and overall emergency response times. In addition to the rail infrastructure, the frequency at which trains pass through a community and the goods they carry, poses varying degrees of risk due to derailment and potential dangerous goods releases.

There are two railway lines bisecting the municipality east-west, just north of Komoka/Killworth. Canadian Pacific Railway (CP) and Canadian National Railway Company (CN) offer freight services along this line, and VIA Rail Canada offers passenger services.

These rail systems pose inherent risk, as all rail systems do. The possibility of a derailment and release of dangerous goods is low, although could have a major impact and require specialized response. Hazardous materials are frequently transported along these routes which pass near populated areas. The tracks also cross several tributaries leading to the Thames River. A hazardous materials release into a waterway poses additional response challenges for containment and cleanup. Information sharing practices between the railway operators and emergency responders can provide insight to the types and frequencies of dangerous goods being shipped through the municipality.

In addition to the hazards associated with derailments, railways also create physical barriers to a response. A desktop search indicated there were 18 at-grade crossings (where the railway crosses a road at the same ground level) which could present a delay in response times should an apparatus be unable to pass a roadway.

Identified Risk: Grade level rail crossings have the potential to create a physical barrier to connectivity to the roadway network, causing delays in response time.

Key Finding: Any critical at-grade rail crossings should be identified and alternate routes mapped.

Identified Risk: The passage of dangerous goods along the rail line increases the risk of a derailment impacting the public as well as the surrounding environment (including waterways) and require a specialized response and equipment.

Key Finding: There is currently an emergency environmental service agreement between First Response and the Municipality of Middlesex Centre. This should be reviewed to ensure proper response coverage and adequate response times.

2.3 Waterways and Conservation Areas

2.3.1 Waterways

Waterways pose a natural hazard due to potential flooding, ice jams, erosion etc. Incidents of this nature can trigger the need for a rapid evacuation and/or a rescue response. Additionally, waterways that are frequently used for recreational activities require that responders have specialized technical rescue training and equipment.

There are several tributaries, creeks and rivers in the municipality, the largest of which is the Thames River. The Thames River is a popular site for recreational activities in the summer such as fishing, fly-fishing, canoeing, kayaking and swimming. Recreational activity of these types poses the risk of water rescue. This requires special training and gear for responders. Although infrequent, there is typically at least one or more water rescues each year. Currently the Coldstream Station houses the water rescue team and Delaware houses the rope rescue team for these types of incidents. The Ilderton Station also houses a UTV for difficult to access locations.

Identified Risk: Water rescues occur at least once annually in the region, prompting the deployment of specialized equipment and the requirement for technical rescue training.

In addition to recreationally used waterways, there are 10 stormwater ponds in the municipality. Five assumed by the municipality, four are unassumed and one is private. Table 2 below lists the location of these stormwater ponds and who assumes responsibility for them. Stormwater ponds in a community can pose an increased risk of water rescue, particularly in winter months. Community residents may take part in unsanctioned

recreational activities on storm water ponds; however, ice consistency, depths and currents can be unpredictable and unsafe. The threat of falling through ice creates a need for specialized equipment and techniques for rescue.

Table 2: Stormwater Ponds Location and Responsibility (2022)[16]

Settlement Area	Neighbourhood/Location	Responsibility
Ilderton	Deerhaven Park	Municipality
Ilderton	Meadowcreek	Municipality
Ilderton	Clear Skies	Unassumed
Ilderton	Timberwalk	Unassumed
Ilderton	Robert St.	Private
Komoka	Union Ave.	Municipality
Komoka	Caverhill	Unassumed
Kilworth	Jefferies Rd.	Municipality
Kilworth	Edgewater Estates	Unassumed
Melrose	Wynfield Fate/Wynfield Lane	Municipality

Identified Risk: There exists a risk of ice rescue during the winter months attributed to recreational activities on storm ponds. Proper signage and community awareness should address the risk of unauthorized recreation on storm ponds.

Due to the proximity of the municipality south of Lake Huron (45 kms), and north of Lake Erie (30 kms), Middlesex Centre often experiences what is termed a 'lake effect'. The region can experience heavy rains with over 100 mm in 24 hours, as well as heavy snowfall in the winter – the record snowfall in the area was a total of 177 cm in 102 hours (2010)[17]. Flooding, washed out and obstructed roads, poor driving conditions and low visibility all greatly impact call volume and can reduce response times. Calls for rescue, MVCs and injuries are more likely during these events. Responders are also at an increased risk of injury while responding due to poor driving and visibility conditions.

During summer months, the lake effect produces a great amount of humidity and the potential for severe storms in the region. In the summer of 1990, an F2 tornado hit Komoka, causing extensive damage to the village. Although no injuries or deaths were recorded, tornadoes pose an extreme danger to communities and responders, as they are unpredictable, can cause falling debris and destruction of buildings and create dangerous

[16] *Municipality of Middlesex Centre Asset Management Plan, 2020*
[17] *As retrieved from https://www.theweathernetwork.com/ca/news/article/this-day-in-weather-history-december-6-2010-lucan-ontario-record-snow*

rescue conditions[18]. In addition to the severe storms, the humidity in the region can reach levels that are particularly dangers to vulnerable populations. Inability to access cooling centres is a major risk which increases the number of medical calls.

Identified Risk: Due to the 'lake effect', severe weather events and temperatures are possible during any time of the year and may increase call volume and create hazardous conditions for responders.

2.3.2 Provincial Parks, Conservation Areas, and Natural Hazard Lands

Although recreational activities in these areas are generally considered low impact, they do increase the risk of medical, open fire and high-angle rescue calls, particularly in the summer months. Conservation authorities are responsible to oversee any development and natural hazard features of parks and conservation areas to reduce the instance of an incident.

There are six conservation areas in the Municipality of Middlesex Centre; Coldstream Conservation Area, Sharron Creek Conservation Area, Ausable Bayfield Conservation Authority, Kettle Creek Conservation Authority, Lower Thanmes Valley Conservation Authority and Upper Thames Conservation Authority, as well as one provincial park – Komoka Provincial Park. All offer a variety of trails for hiking, nature appreciation, skiing and snowshoeing as well as canoeing, fishing and camping in Sharon Creek Conservation Area[19].

Identified Risk: The risk of rescue calls in these areas increases during particularly during summer months.

2.4 Wildland Urban Interface

NFPA 1730: Standard on Organization and Deployment of Fire Prevention Inspection and Code Enforcement, Plan Review, Investigation, and Public Education Operations 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 a mix of woodlots, bush, or grass.

The rural nature of the municipality, coupled with outdoor camping and recreational sites, as well as open areas with light ground cover and bush could present a risk for open burning. Annually, an average of 20 calls are contributed to this[20]. Open burning in rural areas presents possible

[18] *As retrieved from Public Safety Canada https://cdd.publicsafety.gc.ca/dtpg-eng.aspx?cultureCode=en-Ca&provinces=9&eventTypes=%27TO%27&normalizedCostYear=1&dynamic=false&eventId=134*
[19] *As retrieved from https://www.middlesexcentre.on.ca/services/residents/arenas-community-centres-parks*
[20] *As retrieved from annual reports*

challenges to access in remote areas and have the ability to impact visibility and air quality in the area.

Identified Risk: Due to the rural nature of the area and recreational activities, open burning can pose a threat. Annual public education and re-enforcement activities may help curb the risk associated with open burning.

SECTION 3
BUILDING STOCK PROFILE

As referenced in O. Reg. 378/18, the building stock profile assessment includes analysis of the types and uses of building stock of a 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 time of construction and maintenance thereafter. This section considers these building characteristics within the municipality.

3.1 Ontario Building Code Occupancy Classifications

The Ontario Building Code (OBC) categorizes buildings by their major occupancy classifications. Each classification has definitions that distinguish it from other occupancy classifications. Using the OBC as the source for defining the occupancy classifications provides a recognized definition and baseline for developing the community risk profile. The OBC major classification groups and divisions are presented in Table 3 below.

Table 3: OBC Major Occupancy Classification[21]

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

[21] *As retrieved from https://www.buildingcode.online/11.html*

3.2 OFM Fire Risk Sub-Model Occupancy Classifications

The Fire Risk Sub-model developed by the OFM utilizes the major building occupancy classifications (i.e., Group A, B, C, D, E and F), but does not use the detailed division classifications as included in the OBC. This strategy provides the opportunity for further analysis of a specific occupancy group. Subject to any site-specific hazards or concerns, occupancies within this group can be assessed individually and then included where required within the scope of the broader CRA. The building stock for Middlesex Centre, combined with the OFM Fire Risk Sub-Model OBC classifications, definitions and associated fire-related risks are presented in Table 4 along with potential proactive measures to reduce risk within these occupancy types[22]. Building stock data was sorted using the Municipal Property Assessment Corporation (MPAC) building and property type codes. It should be noted that structures other than the primary structures were included in the analysis i.e. a residence with a Type I barn may be counted in both the residential and farm category. Additionally, general knowledge of the community was also incorporated in the analysis where specific property and building codes may not be reflected in the data from MPAC i.e. arenas. Numbers may not reflect data from census due to different classification standards i.e. mobile homes. No door-to-door site assessment was completed.

[22] OFM *Fire Risk Sub-Model, 2009*

3.2.1 Middlesex Centre Existing Major Building Classifications Summary

Table 4: Middlesex Centre Building Stock Summary (2022)

Occupancy Classification		# of Buildings	Issues/Concerns	Measures to Reduce Risk	Probability	Consequence	Assigned Risk Level
Group A1	Assembly for performing arts	0	• Heavy timber construction • High fire load (furniture and decorations)	• Regular inspections • Automatic fire detection and monitoring systems, education of operators on capital improvements for fire sprinkler upgrading on older facilities. • Fire drills as required by OFC • Pre-fire planning by fire suppression staff • Approved fire safety plans and staff training	Rare	Moderate	Low
Group A2	Assembly (not otherwise defined)	10	• Heavy timber construction • High fire load (furniture and decorations) • High occupancy unfamiliar with emergency exit protocols • Historical significance		Unlikely	Major	Moderate
Group A3	Assembly (arena)	2	• Heavy timber construction • High fire load • High occupancy unfamiliar with emergency exit protocols		Rare	Major	Moderate

Occupancy Classification		# of Buildings	Issues/Concerns	Measures to Reduce Risk	Probability	Consequence	Assigned Risk Level
Group A4	Assembly (open air)	3	• Limited access or egress (when controlled) • Difficulty in access of apparatus • High occupancy (for events etc.) with little knowledge of evacuation procedures, muster points etc.	• Regular inspections • Automatic fire detection and monitoring systems • Approved fire safety plans and staff training • Pre-fire planning by fire service	Rare	Moderate	Low
Group B1	Detention Occupancies	0	• High occupancy of detained individuals • Difficult to access site (security) • Risks associated with evacuating inmates in unsecured area Limited access/egress (security)	• Regular inspections • Automatic fire detection and monitoring systems • Approved fire safety plans and staff training Pre-fire planning by fire department	Rare	Major	Moderate

Occupancy Classification		# of Buildings	Issues/Concerns	Measures to Reduce Risk	Probability	Consequence	Assigned Risk Level
Group B2	Care and Treatment	4	• Elderly residents with mobility, cognitive behavioural issues • High fire load (furnishings, chemicals etc.) • Immediate needs following evacuation (shelter, medical needs) • Evacuated may need specialized transportation • Homes that were not required to upgrade with sprinklers	• Regular inspections • Automatic fire detection and monitoring systems, education of operators on capital improvements for fire sprinkler upgrading on older facilities • Pre-fire planning by suppression staff	Unlikely	Major	Moderate
Group C	Single-detached house	6,192	• Lack of smoke and CO alarms • Lack of escape plan • Lack of fire extinguisher • Lack of residential sprinklers • Many structures of an older age (balloon construction) • Cluttered conditions • Many homes in remote areas of the region • Secondary suites	• Increase public education on home fire safety, smoke alarm testing and escape planning. • Increase communications with development and renovation contractors on home fire sprinkler advantages	Likely	Moderate	Moderate

Occupancy Classification		# of Buildings	Issues/Concerns	Measures to Reduce Risk	Probability	Consequence	Assigned Risk Level
	Multi-residential (semi-detached, row, apartment and other attached)	165	• High occupancy • Lack of an escape plan • Lack of, or inoperable fire extinguisher and knowledge of their operation • Not constructed to OBC or OFC standards	• Regular inspections • Automatic fire detection and monitoring systems • Approved fire safety plans and staff training • Fire extinguisher training • Pre-fire planning by fire suppression staff • Regular fire drills	Possible	Moderate	Moderate
Group C	Hotels/ Motels	0	• Transient population not familiar with the building's safety features (i.e. emergency exits, location of pull stations, not familiar with location of fire extinguishers)	• Regular inspections • Automatic fire detection and monitoring systems, education of operators on capital improvements for fire sprinkler upgrading on older facilities • Approved fire safety plans and staff training • Pre-fire planning by fire suppression staff Employee/owner fire extinguisher training	Unlikely	Moderate	Moderate

Occupancy Classification		# of Buildings	Issues/Concerns	Measures to Reduce Risk	Probability	Consequence	Assigned Risk Level
	Mobile Homes and Trailers	8	• High combustibility due to construction materials • High fire loads and in some cases hoarding • Seasonal usage • Trailer parks with limited access routes	• Regular inspections • Automatic fire detection and monitoring systems • Fire extinguisher training	Unlikely	Moderate	Moderate
Group D	Personal Service	6	• Small local business • Possibly heavy timber construction or common basements • Office supplies and egress multi-unit office buildings	• Regular inspection cycles • Maintain OFC compliance	Unlikely	Major	Moderate
Group E	Mercantile	13	• Large number of occupants and combustibles • Occupants unfamiliar with evacuation plans • Potential for larger multi-occupancy with high content value fires increases negative financial impact	• Regular fire prevention inspection cycles to maintain OFC compliance • Approved fire safety plans and staff training • Pre-fire planning by fire suppression staff	Unlikely	Major	Moderate

Occupancy Classification		# of Buildings	Issues/Concerns	Measures to Reduce Risk	Probability	Consequence	Assigned Risk Level
Group F	Industrial	10	• Unknown chemicals on-site (flammable, explosive, combustible) • Many sources of ignition • Many occupants (workers) • Lack of current emergency plan • High fire loads • Lack of sprinklers/fire detection systems and alarm systems (not required by code)	• Regular fire prevention inspection cycles to maintain OFC. compliance • Approved fire safety plans and staff training in evacuation • Pre-fire planning by fire suppression staff • Fire Extinguisher training for staff	Unlikely	Major	Moderate
Other	Occupancies not classified in OBC such as farm buildings (Type I, II and III barns – may be residential or farm)	2,747	• Very old construction of heavy timbers • High fire loads i.e., hay, straw, farm equipment Risk to livestock • Open concept in driving sheds and barns • Lack of fire stops • Poor housekeeping • Vacant and abandoned structures • Farm structures being used for non-intended purposes i.e., illegal grow ops	• Fire Smart • Public education programs	Unlikely	Minor	Low

As shown in the table above, the majority of the municipality's existing property stock consists of Group C - Residential Occupancies (6,365). The second largest occupancy type within the municipality is those considered under the 'Other' category, such as farm buildings (2,747). Note only Types I, II and III barns were considered under this category, and no other outbuildings, i.e. milking parlours, silos etc.

Industrial, mercantile and personal services accounted for few properties in the inventory (again reflective of building type and not number).

This analysis confirms that Group C - Residential Occupancies represent the most prominent type of building occupancy type within the municipality. For the five-year period from 2016 to 2020 the Group C- Residential Occupancies accounted for 49.1% of the structure fires in the municipality. Similar historical data provided by the OFM indicates that the majority of structure fires within Ontario also occurred in Group C - Residential Occupancies (76%). See Section 10.1.1 for detailed analysis.

Identified Risk: Group C - Residential Occupancies represent 69.49% of the municipality's existing property stock and were associated with 49.1% of the historical structure fires from 2016 to 2020. Public education and awareness are key in any community.

Table 5 illustrates a comparison of the municipality's existing Group C - Residential building stock (by dwelling type)[23] with that of the province based on the most recent 2021 Statistics Canada Census data. This analysis highlights that the existing residential building stock within the municipality is significantly different to that of the province. The municipality has a 37% higher percentage of single-detached houses (90.59%) compared to the province (53.59%).

Middlesex Centre has a significantly lower proportion of most other dwelling types, when compared with the rest of the province. Of note, the municipality has no apartment buildings with five storeys or more and a 7.67% lower proportion of apartment units in a building that has fewer than five stories. These types of occupancies pose a higher risk of potential fire.

[23] *Note these numbers reflect number of dwellings not buildings*

Table 5: Group C Residential Dwellings Comparison Middlesex Centre and Ontario (2021)[24]

Dwelling Type	Middlesex Centre		Ontario	
	Total Dwellings	Total % Dwellings	Total Dwellings	Total % Dwellings
Single-detached	6,065	90.59	2,942,990	53.59
Semi-detached House	95	1.42	303,260	5.52
Row House	215	3.21	505,265	9.20
Apartment or Flat in Duplex	25	0.37	181,030	3.30
Apartment (less than 5-storeys)	155	2.32	548,785	9.99
Apartment (five or more storeys)	0	0.00	984,665	17.93
Other Single-attached House	10	0.15	10,220	0.19
Movable Dwelling	130	1.94	14,985	0.27
Total	6,695	100	5,491,205	100.00

3.3 Building Density and Exposure

NFPA 1730 Standard on Organization and Deployment of Fire Prevention Inspection and Code Enforcement, Plan Review, Investigation, and Public Education Operations (2019 Edition) lists building density as a key factor for understanding potential fire-related risk with consideration given to core areas (downtown) of a municipality. 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.

As the existing property stock is predominantly single-detached houses spread over a large geographic area, building density remains low throughout the municipality. There are however a number of row and semi-detached dwellings that, particularly, when in a concentrated area, pose a hazard of fire spread. As the municipality continues to grow and develop fire-related risks associated with building density and exposures will increase. The MCFS should continue to be considered a key stakeholder in future planning and development with regards to opportunities to mitigate and/or reduce the fire-related risks associated with building density and exposures.

Identified Risk: As the municipality continues to grow and develop the potential fire-related risks associated with building density and exposures will increase.

[24] *Statistics Canada 2021 Census of Population*

3.4 Building Age and Construction

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

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

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

- Occupancy
- Exits/means of egress including signs and lighting
- Fire alarm and detection equipment
- Fire service access
- Inspection, testing, and maintenance

Structures built before these codes were developed and adopted, may pose particular risk to firefighting, as they may not have been required to update materials, practices etc. to meet the improved standards. Although they pose less of a risk of structural collapse due to use of stronger materials used for structural integrity, fires may grow to a greater extent more quickly through concealed wall space with lack of fire stopping.

Table 6 presents the growth in residential building stock in the municipality and the province of Ontario based on 2016 Census Data[25]. This analysis indicates that 25.13% of the municipality's residential building stock was built prior to 1960, and that a further 21.95% was built prior to 1981 representing a total of 47.08% of this residential building stock being built prior to the adoption of the 1981 OFC. By comparison, 53.06% of the residential building stock in the province was built prior to the same time period. This municipality has a slightly newer residential building stock when compared to the province.

This analysis does indicate that nearly half of the residential building stock in the municipality was built prior to the adoption of the OFC and as such represents a higher fire risk as a result of its age. Although buildings older buildings used stronger materials and are structurally more sound and less likely to collapse during a fire; building practices pre-fire code increase the potential for rapid spread and greater loss.

[25] *Statistics Canada Census of Population 2016*

Table 6: Period of Construction of Residential Dwellings (2016)[26]

Period of Construction	Middlesex Centre		Ontario	
	Total Dwellings	% Dwellings	Total Dwellings	% Dwellings
Prior to 1960	1,505	25.13	1,293,135	25.02
1961 to 1980	1,315	21.95	1,449,585	28.04
1981 to 1990	685	11.44	709,135	13.72
1991 to 2000	935	15.61	622,565	12.04
2001 to 2005	585	9.77	396,130	7.66
2006 to 2010	565	9.43	368,235	7.12
2011 to 2016	400	6.68	330,390	6.39
Total	5,990	100.00	5,169,175	100.00

Identified Risk: 47.08% of the municipality's building stock was build prior to 1981, therefore presents a higher fire risk. The municipality has access to building stock data through MPAC.

3.6 Potential High-Fire Risk Occupancies

Special hazard occupancies are those which pose a significant and/or unique danger both to the occupants, as well as first responders, based on their structure, use and contents. Examples of these types of occupancies, are where the quantity and combustibility of contents increase the risk are chemical storage facilities, aircraft hangars, cereal and flour mills, grain elevators. The municipality has identified the following special hazard occupancies in Table 7 below.

Table 7: High-fire Risk Occupancies (2018)[27]

Occupancy	Address	Hazard
Masterfeeds	171 Railway Ave, Komoka	Combustible dust explosion
New Life Mills	24162 Denfield Rd, Denfield	Combustible dust explosion
Arva Flour Mill	2042 Elgin St., Arva	Combustible dust explosion
Arva Grain Corp	21741 Richmond St., Arva	Combustible dust explosion
Highbury Pools	21859 Highbury Ave. N., Arva	Hazardous chemicals
McRobert Fuels	4755 Egremont Dr/Hwy #22	Hazardous release and explosion potential, BLEVE, offloading and onloading propane
Middlesex Centre Water/Wastewater Treatment	Various	Hazardous release and explosion potential

[26] *As retrieved from 2016 Census*
[27] *As retrieved from Community Emergency Management Plan. 2018*

Identified Risk: High-fire risk occupancies can pose a serious risk to the occupants, as well as to first responders. These properties should be routinely inspected to ensure they are being properly maintained, have adequate fire water and are using safe storage practices.

3.7 Lightweight Construction

Lightweight construction is considered (for the purposes of this CRA) as any building constructed using

- Lightweight pre-engineered floor or roof systems containing lightweight elements such as wood I-joists, cold formed steel joists, wood truss assemblies with metal or wood plates and metal wood joists; or
- Lightweight floor or roof systems containing solid sawn lumber joist less than 38 mm by 235 mm.

The use of lightweight construction has become prevalent in residential and small industrial construction since the early to mid-1980s due to its cost effectiveness, sustainability and faster construction time and repeatability i.e., modular homes. Despite the many advantages of this type of construction system, it presents very hazardous and potentially life-threatening conditions for firefighting. Lightweight, wood-frame buildings may be more susceptible to pre-mature failure and rapid collapse under certain fire conditions.[28]Overhead and floor voids constructed with timber can burn quickly, spread quickly and cause collapse.

In response to this identified hazard, Fire Marshal Directive 2022-001 *Use of Information of Lightweight Construction to Inform Fire Suppression Pre-Planning Activities*, requires the identification of building stock where the presence of lightweight construction is known, to be included in a community's CRA. Further to this, any new building permits issued by a municipal Building Officer where lightweight construction will be used, must be reported to the fire chief upon issue.

The table below is a representation of the number of structures per occupancy class that are reasonably *assumed* to be constructed with lightweight systems based on their age and usage. This MPAC building stock data for the Municipality of Middlesex Centre was analyzed based on year built, property code, and total square footage.

[28] Fire Marshal Directive 2022-001 *Use of Information of Lightweight Construction to Inform Fire Suppression Pre-Planning Activities*

Table 8: Buildings with Lightweight Construction by Occupancy Classification

Occupancy Group	Number of Buildings with Lightweight Construction
A	2
B	0
C	3,412
D	1
E	1
F	2
Other	938

As demonstrated in Section 3.4, roughly half of the dwellings in the municipality were built prior to the adoption of the current fire code. As such, roughly half of the building stock considered for this analysis (4,356) are believed to have been build using lightweight construction materials and methods.

Identified Risk: Fires in buildings that use lightweight construction pose a significant risk of injury and death to firefighters, due to their potential rapid collapse. It is essential that fire services are aware of the use of lightweight construction materials when responding to a structure fire. The municipality has access to MPAC data to make a relative assumption based on construction date, however no absolute data exists. When known this information should be provided to the fire services.

3.7 Occupancies with Potential High-Fire Life Safety Risk

Occupancies with a potential high-fire life safety risk, are those where occupants may require evacuation support, have mobility issues, or require specialized medical equipment. Examples of occupancies of this type include medical facilities and hospitals, nursing homes, assisted living homes etc. The municipality has identified the following occupancies in Table 9 below with a high-fire life safety risk.

Table 9: High-Fire Life Safety Occupancies (2022)[29]

Occupancy	Address	Hazard
County Terrace Nursing Home	10072 Oxbow Drive, Komoka	• 120 extended-care residents • Two floors one elevator • Need to accommodate wheelchairs
Middlesex Terrace	2094 Gideon Drive, Delaware	• 105 extended-care residents • Three floors one elevator • Need to accommodate wheelchairs
Bruce Residence - Strathroy	25354 Wood Road, Strathroy	• 41-44 extended-care residents • 2 floors, no elevators

Identified Risk: High-fire life safety occupancies can pose a serious risk to the occupants, as well as to first responders. These properties should be routinely inspected to ensure they are being properly maintained, have adequate fire detection equipment and fire water. These types of occupancies may not have been required to update with sprinkler systems and should be inspected to ensure they are meeting new regulations/requirements.

[29] *As retrieved from Community Emergency Management Plan 2018*

SECTION 4
CRITICAL INFRASTRUCTURE PROFILE

4.1 Critical Infrastructure in Middlesex Centre

Critical infrastructure within the municipality includes the facilities and services required to meet essential needs, sustain the local economy, and ensure public safety and security and maintain continuity in government.

The Ontario Critical Infrastructure Assurance Program identifies nine categories of critical infrastructure: continuity of government, electricity, financial institutions, food and water, health, oil and natural gas, public safety and security, telecommunications and transportation networks. The interconnectedness of these critical infrastructures further increases the risk. 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.

For the purposes of this CRA, critical infrastructure of similar types were grouped into the categories listed below. General considerations and concerns related to each critical infrastructure as it pertains to the provision of fire protection services for the municipality are included in Table 10 below.

Table 10: Critical Infrastructure Overview

Identified Critical Infrastructure	Critical Infrastructure Sector	Issues / Concerns
Water Distribution and Reservoirs	Food and Water	• Water systems are owned by the municipality and the City of London. Water supply is essential for firefighting and is accessible through hydrant system • Only 50% of residences have access to fire water • Load restrictions travelling to rural areas with no fire hydrants may require additional water hauling • Damage to infrastructure could impede firefighting

Identified Critical Infrastructure	Critical Infrastructure Sector	Issues / Concerns
Electricity Transmission and Distribution	Electricity	• Downed power lines cause safety concern for firefighters responding • Lack of heat/cooling resulting in increased assistance calls • Rescue operations may be required for individuals improperly running generators • Fires can be sparked by downed lines and transformers • High voltage electrical hazards present with fires at electrical substation • Chemical hazards possible with presence of cooling agents for electrical conductors
Radio Communications	Telecommunications	• Loss of radio communications results in significant challenges for fire service operations such as inability to communicate with crew and with first responders • Lack of uninterrupted power supply to radio systems and computers results in disruption of communications
Cellular towers and phone lines (911 dispatch)	Telecommunications	• Damage to telephone lines and towers results in lack of means of notifying first responders • Downed communication lines results in inability to complete transactions (fuel, necessities, supplies etc.) • Some areas of the municipality have areas with no or poor cellular coverage when attempting to make calls for assistance • Calls not dispatched or not dispatched on time (unknown if there is a secondary backup location to route to?) • Delay or inability to use alerting system
Gas Distribution	Oil and Natural Gas Distribution	• Leaks in transmission lines and/or leaks in homes and/or places of assembly could require evacuation • Ignition sources may be unknown and create a risk to responders • Loss of heating for private homes when outside distribution fails, resulting in calls particularly from vulnerable population

Identified Critical Infrastructure	Critical Infrastructure Sector	Issues / Concerns
Roadways	Transportation	• Poor road conditions due to snow, ice, heavy rain create increased calls for assistance, as well as a hazard for responders • Damaged / impassable roads create a risk of damage to apparatus as well as increased calls for service where access may be difficult • Some rural roads not well maintained and are the only point of access/egress for certain residents outside of the main settlement areas
Data	Financial Institutions	• Disruption to commerce, and inability to access important systems and records necessary for fire service and/or emergency operations • Cyber attacks may also impede web-based Alerting System
Emergency Operations Centre (EOC)	Public Safety and Security	• The main EOC is located at the Coldstream Fire Station and alternate at Komoka Wellness Centre. If the location of the EOC is in proximity to an event, it may be rendered inaccessible or require a quick move with impending threat (i.e., wildfire, flood) • Widespread power loss and poor weather, or wide scale emergency may also impede access to one or both EOCs delaying major emergency response actions and communication, and potentially increasing losses associated with the emergency
Fire and Emergency Service Stations	Public Safety and Security	• There are five fire station locations in the municipality. The nearest police detachment is in Strathroy as well as a command post in Delaware and there is a two-bay paramedic service in Komoka. A large-scale emergency or frequent events affecting either the municipality, London or Strathroy region, could result in shortages of responders across the municipality
Government Operations	Public Safety and Security	• Municipal government closed due to extreme weather, cyber attack, health emergency, location, civil disruption causes disruption to decision-making, financial support, declaration of emergencies etc.

Identified Critical Infrastructure	Critical Infrastructure Sector	Issues / Concerns
Supply Chain Disruption	Public Safety and Security	• Prolonged disruptions to supply chains can impact apparatus replacement due to manufacturing delays (resulting in them going over lifetime) • Supply disruptions also have an unforeseeable but potentially impactful financially impact on running apparatus, as well as the ability to obtain/replenish PPE
Assisted Living Residences	Health	• Disruptions large number of people with mobility issues • Potential communication issues • Need for specialized medical equipment
Outbreak/Illness	Health	• A major outbreak or illness can create unexpected shortages in the workforce. Reduced staffing can result in inability to run an apparatus in a certain part of the municipality, as well as affect ambulance and police services for widespread illnesses • Illnesses and outbreaks can also increase medical calls in the region and have an increased cost in replenishing medical PPE
Middlesex Centre Family Medical Clinic	Health	• The Middlesex Centre Family Medical Clinic is the only medical clinic in Middlesex Centre. A long-term disruption to this centre may result in increased calls for emergency transportation to facilities outside of the municipality

4.1.1 Water Infrastructure

The Municipality of Middlesex Centre has three water distribution systems: Birr Well Supply System, Melrose Supply System and Middlesex Centre Distribution System. The Birr and Melrose Supply Systems derive their source from groundwater wells, while the Middlesex Centre Distribution System relies on the Lake Huron Primary Water Supply System or from the City of London Distribution System[30].

Water supply is a critical infrastructure that is essential for firefighting. Having access to the municipal water delivery systems is critical to service delivery. The municipal system consists of 11 facilities, 81.8 km of mains, 909 valves and 432 hydrants. The system overall is rated very good, with only a 30% useful life (UL%) percentage used. The reliability of the system – which quantifies any downtime of the system (due to main breaks etc.), is a loss of 0.029

[30] *Municipality of Middlesex Centre Asset Management Plan, 2020*

connection days per year, compared to the total number of properties connected to the system[31].

Fire flow, which is the available water supply for fire protection purposes, is available for all areas with service.

The risk to the fire service is the low percentage of the properties in the municipality that have connection to the water system. Only 56% of properties have connection to the water system where fire flow is available[32]. As such, the need to have additional apparatus available to haul water across the municipality is of major importance.

Alternate water supply sources can include fire service access to ponds, streams and alternative water supplies, and the use of fire suppression apparatus that have portable tanks that can support a tanker shuttle and a continuous supply of water to support fire suppression activities. According to the Fire Underwriter's Survey, an Accredited Superior Tanker Shuttle Service is a recognized equivalent to a municipal fire hydrant protection system if it meets all the requirements for accreditation. In areas without municipal water supply, a fire service should consider a water servicing strategy or formal plan for those areas requiring water flow for firefighting.

Identified Risk: With only 56% of properties serviced by the municipal water system, it is essential to develop a water servicing strategy for those areas requiring water flow for firefighting.

[31] *Municipality of Middlesex Centre Asset Management Plan, 2020*
[32] *Municipality of Middlesex Centre Asset Management Plan, 2020*

SECTION 5
DEMOGRAPHIC PROFILE

As referenced in O. Reg. 378/18W, 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 Middlesex Centre.

5.1 Population and Dispersion

Between 2001 and 2021, the Municipality of Middlesex Centre population changed variably, with a decrease in 2016, followed by a marked increase in 2021. Table 11 shows that over this twenty-year timeframe, the number of total private dwellings has also changed variably, with the highest increase occurring between 2016 and 2021 by 11.5%. This trend is seen in similar parts of Ontario, as affordability and availability for new developments outside cities is a popular and cost-effective choice for commuters.

Table 11: Population and Total Private Dwelling Change (2001 to 2021)[33]

Year	Population	% Change	Total Private Dwellings	% Change
2001	14,242	9.7	4,867	
2006	15,589	9.5	5,346	9.8
2011	16,487	5.8	5,808	8.6
2016	17,262	4.7	6,139	5.7
2021	18,928	9.7	6,845	11.5

5.2 Population Age

A community's population by age is an important factor in identifying specific measures to mitigate risks associated with a specific age group, such as seniors. Table 12 illustrates the results of an analysis of the OFM's Fire Statistics from 2011 to 2020. The figure illustrates fire death rate which is characterized by the percentage of fire fatalities per age group. Through this analysis, it is identified that those aged 60 and over have represented 49% of fire-related fatalities.

[33] *Statistics Canada Census of Population 2001 to 2021*

Table 12: Fire Fatalities by Age Group Ontario (2011 to 2020)[34]

Age Group	Percentage of Fatalities (%)
Under 10 years	2.0
10 to 19 years	4.0
20 to 29 years	5.0
30 to 39 years	9.0
40 to 49 years	11.0
50 to 59 years	20.0
60 to 69 years	20.0
70 to 79 years	18.0
80 years and older	11.0

Key Finding: With an aging population, measures should be taken to ensure planning and education for senior living.

Table 13 below shows the age distribution for the municipality. The current proportion of the population aged 60 and older is 4,980 (26.23%) and projected increase by 14.5% over the next decade. The data suggests that the city could see an increasing trend in their fire fatality risk for this age category.

Identifying Risk: Over 25% of the population of the municipality is aged 60 and over and expected to increase by an approximate 14.5% over the next decade. This age group has a higher over all fire life-safety risk and may indicate an increase in fire-related fatalities. Education and inspections should continue to target these demographics, in particular senior living facilities.

[34] *As retrieved from OFM Fire Statistics*

Table 13: Population by Age (2021)[35]

Ages of Population	Middlesex Centre		Ontario	
	Population	%	Population	%
0 to 4 years	1,000	5.3	683,515	4.8
5 to 9 years	1,225	6.5	764,430	5.4
10 to 14 years	1,420	7.5	803,850	5.7
15 to 19 years	1,260	6.7	801,455	5.6
20 to 24 years	900	4.6	895,600	6.3
25 to 29 years	765	4.0	975,400	6.9
30 to 34 years	865	4.6	981,210	6.9
35 to 39 years	1,160	6.1	948,030	6.7
40 to 44 years	1,285	6.8	890,160	6.3
45 to 49 years	1,315	6.9	894,580	6.3
50 to 54 years	1,275	6.7	941,270	6.6
55 to 59 years	1,475	7.8	1,040,160	7.3
60 to 64 years	1,410	7.4	966,575	6.8
65 to 69 years	1,195	6.3	813,215	5.7
70 to 74 years	955	5.0	691,280	4.8
75 to 79 years	715	3.8	469,485	3.3
80 to 84 years	390	2.1	325,110	2.3
85 to 89 years	195	1.0	205,480	1.4
90 to 94 years	90	0.5	101,430	0.7
95 to 99 years	25	0.1	28,000	0.2
100 years and over	5	0.03	3,705	0.03
0 to 14 years	3,650	19.3	2,251,795	15.8
15 to 64 years	11,705	61.8	9,334,440	65.6
65 years and over	3,575	18.9	2,637,710	18.5
85 years and over	315	1.7	338,620	2.4
Average age of the population	41.6		41.8	
Median age of population	43.6		41.6	

[35] *Statistics Canada Census Profile 2021*

5.3 Gender

NFPA 1730 Standard on Organization and Deployment of Fire Prevention Inspection and Code Enforcement, Plan Review, Investigation, and Public Education Operations (2019 Edition) considers sex as part of a CRA due to the finding that, based on historical data, males are more likely to be injured or lose their life in a fire. Table 14 displays the distribution of the population's gender by age for the Municipality of Middlesex Centre. The proportion of males versus females is fairly even at 49.7% male and 50.3% female[36]. When specific age groups are reviewed, there are minor variations. In almost all age categories, there is a greater proportion of females to males, particularly in the high-risk age categories. Based on these statistics, it is not anticipated that public education programming would be refined based on sex. The impact of sex distribution on public education programming would be more notable in a community with unique demographics such as those that have transient populations due to employment, for example.

Key Finding: Given the equal distribution of gender within the municipality, it is not anticipated that gender based public education measures would reduce fire risk.

Table 14: Gender Distribution by Age Group (2021)[37]

Age Group	Total Population	Male	%	Female	%
0 to 4 years	1,000	515	51.5	485	39.6
5 to 9 years	1225	620	50.6	605	49.4
10 to 14 years	1,420	700	49.3	715	50.4
15 to 19 years	1,260	645	51.2	610	48.4
20 to 24 years	900	445	49.4	450	50.0
25 to 44 years	4,075	1,970	48.3	2,105	51.7
45 to 54 years	2,590	1,285	49.6	1,310	50.6
55 to 64 years	2,885	1,430	49.6	1,450	50.3
65 to 74 years	2,150	1,095	50.9	1,055	49.1
75 to 84 years +	1,420	690	48.6	735	51.8
Total	18,928	9405	49.7	9525	50.3

5.4 Socioeconomic Circumstances

Socioeconomic factors intersect in several ways and have direct and indirect impacts on fire risk. One such example is outlined in the OFM's Fire Risk Sub-model. The sub-model refers 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,

[36] *Statistics Canada Census Profile 2021*
[37] *Statistics Canada Census Profile 2021*

etc.), which puts them at higher risk of experiencing consequences from a fire. Another consideration is that households living below the poverty line may have a higher number of persons per bedroom in a household and/or children who are more likely to be at home alone. These circumstances would impact both the probability and consequence of a fire. While these complex relationships between socioeconomic circumstances and the probability/consequence of a fire are not well understood, this CRA seeks to explore these factors.

The following socioeconomic factors have been examined:

- Household characteristics
- Labour force statistics
- Educational attainment
- Income decile groups
- Low-income status
- Household tenure, occupancy, suitability, and cost
- Cultural background and language considerations

5.4.1 Household and Family Characteristics

A Canadian study on the socioeconomic features as related to residential fire incidence and related casualties found that the average number of individuals in a household was significantly associated with the rate of casualties per person per year. It was found that for every increase in one person per household, there was an 25% decrease in the rate of death and severe injury. Studies have further shown that households with people living alone, and lone-parent households are at an increased risk of fire-related deaths and injuries[38]. The table below depicts the average household composition for the municipality in comparison to Ontario.

[38] *As retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6726466/*

Table 15: Household Size and Family Characteristics Middlesex Centre and Ontario (2021)[39]

Housing Category	Middlesex Centre	%	Ontario	%
Household Size				
1 person	980	14.64	1,452,540	26.45
2 person	2,530	37.79	1,798,040	32.74
3 person	1,070	15.98	872,480	15.89
4 person	1,380	20.61	825,445	15.03
5 or more person	735	10.98	542,700	9.88
Total households		6,695	5,491,205	
Average household size		2.8		2.6
Family Characteristics				
1 parent families	375	6.58	678,110	17.08
Total families		5,695		3,969,670
Children in one-parent household	780	12.25	1,058,775	24.39
Total children		6,365	4,340,235	

Key Finding: The statistics would indicate that when compared to the provincial percentages, Middlesex Centre has nearly half the fire risk from the perspective of household size and single-parent families. The need however for continued outreach and education for these vulnerable households should continue.

5.4.1 Labour Force Status

Those who are economically disadvantaged, including low-income families, the homeless and perhaps those living alone may experience a higher fire risk. The OFM's Fire Risk Sub-model references a number of reports that suggest there is a correlation between income levels and fire risk. The reports identify the following factors:

- The higher number of vacant buildings found in low-income neighbourhoods attract the homeless. This introduces risks such as careless smoking, drinking and unsafe heating practices.
- Building owners are less likely to repair building systems (electrical, mechanical, suppression) due to affordability, increasing fire risk from improper maintenance.
- Households with lower disposable income are less likely to purchase fire safety products (i.e., smoke alarms, extinguishers, cigarette ignition resistant furniture, etc.) due to affordability.

[39] *Statistics Canada Population Census 2021*

- Households with lower disposable income are more likely to have their utilities shut off due to non-payment, leading to increased risks related to unsafe heating, lighting, and cooking practices.
- Single-parent families are more economically challenged due to the fact that there is only one income. These households also have fewer resources to arrange childcare, increasing the likelihood of fires caused by unsupervised children.
- Studies have shown that cigarette smoking is inversely related to income. In Canada, findings by the Centre for Chronic Disease Prevention and Control through the National Population Health Survey established that there were nearly twice as many smokers in the lowest income group when compared against the highest (38% vs. 21% respectively), and
- Those with low education and literacy levels are inhibited in their ability to read instruction manuals and warning labels and less likely to grasp fire-safety messages.

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).

To determine labour force status, the number of individuals aged 15 and over receiving employment income was compared for Middlesex Centre and Ontario, shown in Table 16 below. Employment income is determined as income received as wages, salaries and commissions from paid employment and net self-employment income from farm and non-farm unincorporated businesses or professional practices. It does not include those receiving income from employment insurance or other personal or governmental business.

The table below shows that the Municipality of Middlesex Centre has a slightly higher percentage of those receiving employment income than the province of Ontario (68.8% versus 67.4%)[40] and the average employment income is $7,400 or 12% higher in the municipality. This would suggest that the municipality faces a slightly lower fire risk in comparison to the province from the perspective of labour force participation and average income.

Key Finding: Labour force statistics do not suggest an increased fire risk or need for public outreach to those not represented in the labour force.

[40] *Statistics Canada Census Profile, 2016*

Table 16: Income Recipients and Average Income Middlesex Centre and Ontario (2021)

Status	Middlesex Centre		Ontario	
	Population	%	Population	%
Employment Income Recipients	11,400	68.8	8,153,185	67.4
Average Employment Income		60,000		52,600

5.4.2 Educational Attainment

An analysis conducted by Statistics Canada has found that high-income Canadians are generally more likely to be highly educated. Over two-thirds (67.1%) of the top 1% had attained a university degree compared to 20.9% of all Canadians aged 15 and over. 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 17 displays educational attainment for the Municipality of Middlesex Centre and the province of Ontario.

Table 17: Educational Attainment Comparison Middlesex Centre and Ontario (2016)[41]

Educational Attainment	Middlesex Centre		Ontario	
	Population	%	Population	%
No Certificate/Degree	1,770	13.0	1,935,355	17.5
High School Diploma or Equivalent	3,385	25.0	3,026,100	27.4
Post-secondary Certificate; Diploma or Degree	8,390	62.0	6,076,985	55.1

According to the 2016 Census, 62.0% of residents in the municipality have a post-secondary Certificate, Diploma or Degree, which is higher 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 Middlesex Centre in 2015 was $108,971, which is significantly higher than the provincial median total income per household of $74,287.

[41] *Statistics Canada Census Profile, 2016*

Key Finding: Educational attainment and annual income statistics would suggest that most of the residents of the municipality have a post-secondary level of education and higher than provincial average income, and potentially pose a lower-than-average fire risk. Continual public outreach regarding fire safety in the home is suggested. Extraordinary measures may not reduce risk.

5.4.3 Low-Income Status

Low-income status refers to the threshold at which a family or person would devote a larger share (20% or more) of their after tax income to necessities such as food, shelter and clothing. The data used for this indicator is adjusted to account for household size, family income and population centre (rural, small population, medium population, large urban centres, territories and reserves)[42].

This percentage, in combination with previously reviewed metrics is indicative of what percentage of the population may be limited financially to invest in, maintain and replace fire detection and suppression equipment. In all age categories, the municipality has a lower percentage of the population that is considered low-income status when compared to the province. It should be noted however, that 12% of low-income status homes that also have high-fire risk age grouping. Over 6% of the population aged 65 and over are considered to also be of low-income status, further 15.8% of low-income status homes have children under the age of five.

Table 18: Prevalence of Low-Income Based on the Low-income Measure After Tax (LIM-AT) (2021)

Age Group	Middlesex Centre (%)	Ontario (%)
0 to 17 Years	4.4	11.5
0 to 5 years	5.8	12.4
18 to 64 years	3.4	9.1
65 years and over	6.2	12.1

Identified Risk: A cross analysis of age and low-income status would suggest that roughly 14% the municipality's population reside in low-income status. Although lower than the provincial percentages, low-income status, particularly combined with age (0 to 5 and 65 and over) have an increased fire risk and fire-safety risk. Public education and awareness should continue to target low-income households.

[42] *Statistics Canada Population Census 2021*

5.4.4 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 recent immigrant populations. A high proportion of immigrants could demonstrate a large population that has a potential for unfamiliarity with local fire life safety practices and/or may experience possible language barriers that hinder educational outreach and understanding of these practices.

Additionally, ethnic and cultural backgrounds can lend certain groups to be more vulnerable to the aforementioned conditions that contribute to a higher fire risk. A study conducted by the Canadian Centre for Policy Alternatives, indicated that Indigenous people in Canada are over five times more likely to die in a fire. For First Nations people living on a reserve, this number increases to over 10 times. Inuit are over 17 times more likely to die in a fire than non-Indigenous and Metis over 2.1 times higher[43]. These disproportionate rates can be attributed to a mixture of factors such as:

1. Stable and persistent income inequality in comparison to non-Indigenous Canadians. This inequality remains consistent despite levels of educational attainment and living on or off a reserve. As discussed in Section 5.4, income is a large predictor of fire risk.
2. No mandated fire protection codes or inspections on reserves.
3. Inadequate housing conditions without smoke alarms.

Table 19 below summarizes the municipality's Indigenous and immigration population in comparison to the province.

[43] *https://indigenousfiresafety.ca/research/mortality-and-morbidity-report-2021/*

Table 19: Immigration and Indigenous Population of Middlesex Centre and Ontario (2016)[44]

Immigration and Indigenous Status	Middlesex Centre		Ontario	
	Population	%	Population	%
Non-immigrants	15,020	88.93	9,188,815	69.39
Indigenous	195	1.15	301,430	2.40
Immigrants	1,805	10.69	3,852,150	29.09
Before 1981	1,090	6.45	1,077,745	8.14
1981 to 1990	300	1.78	513,995	3.88
1991 to 2000	160	0.95	834,510	6.30
2001 to 2005	205	1.21	490,560	3.70
2006 to 2010	100	0.59	463,170	3.50
2011 to 2016	50	0.30	472,170	3.57
Non-permanent residents	60	0.36	201,200	1.52
Total		16,890		13,242,165

5.4.4.1 Indigenous and Immigration Status

The city has a lower proportion of newcomers (10.69%) and those identifying as Indigenous (1.15%) when compared to Ontario (29.09% and 2.40%). Further, most of the immigrant population immigrated to the area before 1981, and there has been on average less than 1.00% immigration per year since. Some inference can be made that there is not a great risk in the area in terms of language and cultural barriers with newcomers and Indigenous populations.

Key Finding: With just over 10% of the residential population identifying as an immigrant to the area; and most of whom identify that they immigrated prior to 1981, there does not appear to be a risk associated with cultural or language barriers when considering community outreach, as well as response targeting permanent residents.

Key Finding: Middlesex Centre has a small Indigenous population 1.15%, and no reserves in their response area. There does not appear to be an increased fire risk due to Indigenous populations in the municipality.

5.4.4.2 Transient Populations and Employment

Transient population 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

[44] *Statistics Canada Census Profile, 2016*

year. Population shift can be a result of a number of factors including employment, tourism, and education. In some municipalities, as is the case for the Municipality of Middlesex Centre, residents regularly leave the community for employment. This can contribute to increased traffic volume resulting in an increase in the number of emergency responses related to motor vehicle accidents.

Table 20 shows the commuting destination trends for the residents of the municipality based on 2016 Census data. It appears that a large portion of the labour force (75.39%) commutes to a different census subdivision within Middlesex County. An additional 10.98% of the population commute outside the county, but within the province.

Table 20: Total and Percentage of Commuters (2016)[45]

Commute Destination	Total	%
Commute within census subdivision of residence	925	13.27
Commute to a difference census subdivision within census division of residence	5,255	75.39
Commute to a difference census subdivision and census division within province or territory	765	10.98
Commute to a different province or territory	30	0.43
Total Commuters		6,970

Identified Risk: The municipality relies significantly on the utilization of paid-on-call firefighters for the delivery of fire suppression services. If this portion of the municipality's population is required to travel outside of the assigned response areas for employment the efficiency and effectiveness of this organizational model may be at a higher risk of not being sustainable.

Identified Risk: With most of the population travelling some distance (mostly to London) for employment, there is a significant increase in the potential for MVCs during peak hours. Of particular concern, is the 400 series highways, closest to Kilworth/Komoka stations.

Middlesex Centre is well positioned for day activities for visitors and tourist centres such as London, Grand Bend, Port Stanley and Stratford. The region promotes agri-tourism, arts, and natural outdoor activities. There are several parks and conservation areas which are open year-round for recreational activity such as fishing, swimming, cross-country skiing, and hiking.

These activities may contribute to population fluctuation as they draw people into the municipality at various times during the year. While these features and properties may

[45] *Statistics Canada Census Profile, 2016*

contribute to some population shift that is mainly seasonal, overall, they do not contribute to a significant shift in population in terms of tourism accommodation. However, due to the topology and natural features of these places, they do present a risk which could increase the demand for emergency response, and a sufficient level of service.

Identified Risk: Middlesex Centre does experience an influx of tourists during the summer months; however, a large percentage tend to be day tourists. This does increase the risk of emergency calls, although does not substantially change call volume. Call statistics indicate that year over year, Delaware tends to have a higher call volume which is indicative of its proximity to major highways and recreational areas.

5.5 Household Tenure, Occupancy, Suitability and Costs

Table 21 below summarizes household statistics for the Municipality of Middlesex Centre and the province of Ontario including tenure, occupancy, suitability, and costs.

5.5.1 Housing Tenure

Housing tenure reflects socioeconomic status whereby a low home ownership rate may reflect lower incomes in the community and a higher overall fire risk. The municipality has a higher proportion of dwellings that are owned versus rented when compared to the province (89.72% owned in Middlesex Centre versus 69.78% in the province). This could be in part due to the overall lower housing costs in the municipality compared to the province.

5.5.2 Occupancy

A higher proportion of multiple persons per household can result in increased fire loss (consequence) resulting in a higher risk. There are only 10 households (0.17% of total households) that have more than one person per room in Middlesex Centre. This reflects a lower percentage compared to the province where 2.37% of households have more than one person per room.

5.5.3 Suitability

The 2016 Census reports on housing suitability which, according to Statistics Canada, refers whether a private household is a suitable accommodation according to the National Occupancy Standard. Suitable accommodations are defined by whether the dwelling has enough bedrooms based on the ages and relationships among household members. Based on this measure, 1.84% (or 110 households) are classified as “not suitable” within the municipality, compared to 6.02% for the province as a whole (resulting in nearly 311,005 “not suitable” households across Ontario). From the perspective of housing suitability, the municipality has a potential lower fire risk than that of the provincial statistics.

5.5.4 Housing Costs

The cost of shelter may also be indicative of the amount of disposable income within a household. Households with less disposable income have fewer funds to purchase household fire life safety items resulting in a higher risk. In the Municipality of Middlesex Centre, 13.16% of households (735) spend 30% or more of the household total income on shelter costs. This is 14.49% lower than the province, where 27.65% of households spend 30% or more of income on shelter costs.

The median value of dwellings in Middlesex Centre is $400,601, which is very comparable to the provincial average of 400,496. The municipality however has a slightly higher median monthly cost of owned dwellings ($1425 compared to $1299) and a lower monthly cost for rented ($1003 compared to $1049).

Table 21: Household Occupancy, Tenure, Suitability Middlesex Centre and Ontario (2016)[46]

Housing Category	Middlesex Centre	%	Ontario	%
Household Tenure				
Owner	5,370	89.72	3,601,825	69.78
Renter	610	10.19	1,559,720	30.22
Total Households	5,985	100.00	5,161,545	100.00
Household Occupancy				
One Person or Fewer per Room	5,975	99.83	5,046,810	97.63
More than One Person per Room	10	0.17	122,360	2.37
Total Households	5,985	100.00	5,169,170	100.00
Housing Suitability				
Suitable	5,870	98.07	4,858,170	93.98
Not Suitable	110	1.84	311,005	6.02
Total Households	5,985	100.00	5,169,175	100.00
Shelter Costs				
Spending Less than 30% on Shelter	4,840	86.66	3,694,385	72.35
Spending More than 30% on Shelter	735	13.16	1,411,900	27.65
Total Households	5,585	100.00	5,106,285	100.00
Median Value of Dwellings		$400,601		$400,496
Median Monthly Shelter Cost for Owned		$1,425		$1,299
Median Monthly Shelter Cost for Rented		$1,003		$1,045

[46] *Statistics Canada Census Profile, 2016*

Key Finding: Housing tenure, occupancy, suitability, and costs suggests that, compared to the provincial average, the risks associated with negative measures for these factors is lower. There does not appear to be a benefit in increasing measures to target individuals for additional public outreach on based on these measures.

SECTION 6
HAZARD PROFILE

6.1 Hazard Identification and Risk Assessment in Ontario (HIRA)

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

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

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

6.1.1 HIRA and the CRA

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

A HIRA is a comprehensive process to identify the hazards to a community. A CRA provides an opportunity to examine the impact that these hazards would have on the services provided by a fire service. 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 Middlesex Centre Hazard Identification and Risk Assessment

The Municipality of Middlesex Centre completed a review of its HIRA in December 2021, indicating its commitment to sustaining compliance with the municipality's legislative requirements. The current HIRA assigns likelihood and consequence levels to a list of hazards based on the potential for impacts to people, property, and the environment. As a result of this analysis, the top seven hazards in the rated as a medium threat to the municipality are:

- Tornado
- Infectious disease
- Lightening
- Flood
- Oil/natural gas
- Thunderstorm
- Rail

6.3 Impacts of Hazards on Fire Protection Services

In addition to the overall highest risks to the community, certain events pose an increased risk specific to firefighting. Table 22 reviews the risk to firefighting responders to the most hazardous events as per the community HIRA, as well as the most hazardous events they may encounter that pose a specific risk to them and their ability to respond, in particular:

- Snowstorms/hail/freezing rain
- Hazardous materials release/spill/fire
- Critical infrastructure failure
- Motor vehicle incident
- Industrial fire
- Dust explosion
- Swift water rescue

Table 22: Top Hazards and Possible Impacts on Fire Services

Hazard	Possible Impact on Fire Service
Critical Infrastructure Failure	• Inability to communicate with responders, stations and dispatch • Loss of backup power for communications • Increased medical calls • Traffic disruptions and MVCs causing increased calls and response delays
Dust Explosion	• May occur suddenly which responding to another alarm type • Inability to evacuate • Falling debris • Dangerous rescue conditions • High rate of fatalities
Flood	• Impassable, flooded roadways • Increased calls for rescue • Swift water rescue • Submerged debris on roads creating hazards for civilians and responders (drivers and on foot) • Delays in response due to road conditions • Increased MVIs
Hazardous Materials Release/Spill/Fire	• Lack of proper training and or response gear • Delay in assistance • Exposure to hazardous products • Fire or explosion
Industrial Fire	• Lack of knowledge of hazardous materials on location • Lack of proper training and or response gear • Delay in assistance with hazardous materials • Fire or explosion

Hazard	Possible Impact on Fire Service
Infectious Disease	• Staffing shortages – inability to run apparatus • Increased medical calls • Extended shifts to cover staff shortages resulting in fatigue and potential for injuries and accidents • Increased cost of running apparatus • Impact to supply chain • Increased overhead for PPE • Exposure of employees responding to medical calls
Lightening	• Igniting fire (structure, grass etc.) • Power outages – increasing calls and interfering with communication • Loss critical infrastructure • Danger to workers responding to calls
Motor Vehicle Incident	• MVC with apparatus • Oncoming traffic and potential for injury/death • Fire/explosion • Release of hazardous materials
Oil/Natural Gas	• Dangerous exposure to responders • Need for proper PPE • Ignition/explosion • May need hazmat support
Rail	• Hazardous materials release in populated area • Exposure to responders • Need for specialized response and coordination with rail carrier • Closure of roads and emergency routes
Snowstorms/Hail/Freezing Rain	• Loss of control of apparatus • Dangerous driving conditions • Delayed response
Swift Water Rescue	• Inexperience and or lack of proper equipment • Hypothermic conditions • Secondary drowning or injury • Obstructed view of debris in water
Tornado	• Sudden and dramatic increase calls for assistance, overwhelming capability • Multiple stations in demand at once, inability to offer mutual assistance • Potential damage to station and/or apparatus • Rescues due to structural collapse imposing danger on firefighters
Thunderstorm	• Risk of lightning strikes igniting structures, grass etc. • Power outages – increasing calls and interfering with communications • Risk of flooding • Potential for damaging hail and tornadoes

Identified Risk: MCFS should routinely review the municipality's HIRA as well as their most hazardous response calls and ensure members are properly equipped and prepared to respond.

SECTION 7
PUBLIC SAFETY RESPONSE PROFILE

7.1 Public Safety Response Agencies in Middlesex Centre

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 skill sets 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 23 lists the public safety response agencies within the municipality who could be able to assist in a collective emergency response effort and may contribute to the minimization of risk within the community. Identifying the public safety response agencies within the community can help the fire service understand the agencies that may be able to assist in the response to an emergency.

Table 23: Public Safety Response Agencies

Public Safety Response Agency	Types of Incidents they Response to	Agency Role in Incident
Ontario Provincial Police – Middlesex Detachment	• MVCs • Traffic incidents • Criminal incidents • Medical calls • Public assistance • Public disturbance	• Traffic control • Investigations • Scene stabilization • Public evacuation
Strathroy-Caradoc Police Services	• MVCs • Traffic incidents • Criminal incidents • Medical calls • Public assistance • Public disturbance	• Traffic control • Investigations • Scene stabilization • Public evacuation
Middlesex – London Paramedic Services	• Primary and advanced medical care • MVCs	• Patient stabilization • Patient transportation • Patient extrication standby
Victim Services of Middlesex - London	• Homicide / attempted • Serious assault • Domestic violence • Sexual assault • Hate crimes	• Vitim assistance • Victim support and needs assessment

Public Safety Response Agency	Types of Incidents they Response to	Agency Role in Incident
CANUTEC	• Hazardous spills/emissions	• Product information • Safe handling information • emergency actions
Ministry of Environment	• Spills	• Cleanup and remediation supervision and support
Emergency Management Ontario	• Large-scale emergencies requiring declaration of state of local emergency	• Provincial level support • Communication
First Response	• Hazardous spills/emissions	• Emergency cleanup • Technical specialists • Specialized equipment

7.1.1 Mutual Aid and Automatic Aid Agreements

Large emergency events can quickly overwhelm the response capacity of municipal fire services. This is especially true for smaller fire services with limited resources. As a result, mutual aid and automatic aid agreements are a necessary component in adding response capacity for these low frequencies but potentially high or extreme consequence events.

Mutual aid agreements between fire departments to assist each other across jurisdictional boundaries. Typically are requested when local emergencies exceed local resources. They may include fire response, and/or specialty response services including rescue, dangerous goods. Any response would need to be made by the requesting agency and is not pre-determined in the case of automatic aid. The requested agency may or may not be able to fulfill the request.

Automatic aid agreements ensure a provision of initial or supplemental response to fires, rescues and emergencies that may occur in a part of another municipality where a fire service situated in the municipality can provide a response quicker than any fire service situated in the other municipality.

The province of Ontario through the OFM has developed a provincial wide mutual aid plan (MAP) to formalize and maintain mutual aid and automatic aid agreements for identified areas coordinated through an Ontario Fire Marshal appointed fire coordinator. Each area will develop and maintain their respective MAP consistent with the Ontario plan.

The principle of operation of MAPs is to promote and ensure adequate and coordinated efforts to minimize loss of human life and property, as well as damage to the environment through the efficient utilization of fire service and provincial resources in the event of a mutual aid activation during times of natural or human-made emergencies.

Middlesex Centre is included in the Middlesex County MAP with the MCFS Fire Chief appointed as the fire coordinator for eight municipalities in the county. There are no boundaries when considering mutual aid assistance and may run into neighbouring counties.

The Middlesex County MAP contains Letters of Agreement between participating municipalities for both mutual aid and automatic aid structure fire response. This MAP is currently being reviewed and updated by the fire coordinator to be forwarded to the OFM for acceptance.

SECTION 8
COMMUNITY SERVICES PROFILE

The community services 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 service responds. The following sections consider these community service characteristics within the Municipality of Middlesex Centre.

8.1 Community Services in Middlesex Centre

Fires and other emergency events can have devastating effects on a community and at times can overwhelm public safety and security agencies' capacity to respond. In an emergency event, community-based agencies, organizations, and associations can provide surge capacity to the response and recovery efforts of first responders and a useful resource to call upon if integrated into the emergency management framework of a municipality early on. These types of affiliations can contribute a variety of capabilities essential to response and recovery efforts including support in the areas of communications, health care, logistics, shelter, food and water supply, emergency clothing, and more specialized skill sets. Table 24 lists the community agencies, as well as members of the network of Non-governmental Organizations (NGO) Alliance of Ontario, which area available to all municipalities.

Table 24: Community Service Agencies

Community Service Agency	Assistance Provided
Community Emergency Response Volunteers	• 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
2-1-1	• Emergency communications for public • Reporting and documenting incident reports
Women's Rural Resource Centre	• Emergency support for females experiencing domestic violence • Long-term recovery support for victims
Vanier Children's Mental Wellness	• Support to families with children struggling with mental health issues
Merrymount Family Support and Crisis Centre	• Support to families with children struggling with mental health issues
Children's Aid Society	• Protect needs of children • Facilitate adoption if necessary

Non-Governmental Organizations Alliance of Ontario	
Canadian Red Cross	• Assist with obtaining basic needs of those victims of large-scale disaster • Emergency shelter and feeding locations • Donation management
Salvation Army	• Donation management • Food/clothing • Victim support • Long-term recovery support for victims
St John's Ambulance	• Medical support for reception centres • Health related screening • Transportation for victims • Assist with evacuation of hospitals and health care facilities • Training
Ontario SPCA	• Responds to needs of animals in event of emergency/disaster
Mennonite Disaster Service	• Cleanup and debris removal
Samaritan's Purse	• Can remove damaged or destroyed content from homes • Clean and remediate flooded homes
Team Rubicon	• Incident management assistance • Disaster management • Infrastructure support • Hazard mitigation • Light demo and debris removal
Society of Saint Vincent de Paul	• Provide vouchers to obtain furniture, clothing, and accessories
ADRA	• Manages collection, triage, storing and distribution of in-kind donations
GlobalMedic	• Deploy large field tents for infrastructure and logistical needs, filed hospitals, clinics • Medically trained paramedics, first responders, doctors, and nurses
Billy Graham Rapid Response Team	• Chaplains trained for emotional and spiritual care following a disaster
World Renew Disaster Response Services	• Rebuilding projects • Unmet needs assessment

Key Finding: This list of community services demonstrates that the Municipality of Middlesex Centre is very well supported in the event of a major or serious emergency.

SECTION 9
ECONOMIC PROFILE

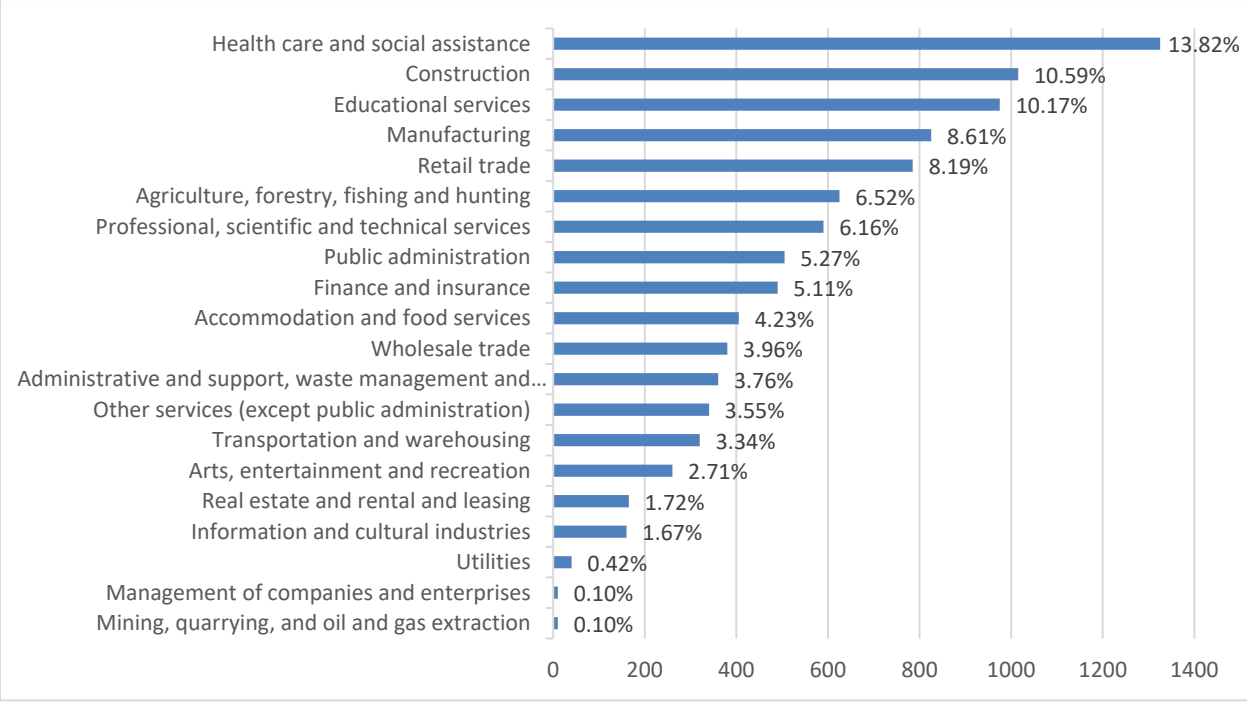
As referenced in O. Reg. 378/18, the economic profile assessment includes analysis of the economic sectors affecting the community that are critical to its financial sustainability. This involves economic drivers in the community that have significant influence on the ability of the community to provide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

9.1 Economic Sectors and Employers in Middlesex Centre

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.

The top industries that employ the Municipality of Middlesex Centre are summarized in Figure 1 below. As displayed, roughly 35% of the employed population works in health care and social assistance, construction, or educational services. It should be noted, as in Table 20, that 75% of the employed population travels outside of Middlesex Centre for employment, with 71.6% of those travelling to the City of London, and an additional 12% travel to other municipalities or out of province.

Figure 1: Economic Sectors



The business community within the municipality is generally one of long-standing small businesses. This sector employs approximately 925 individuals, or 13% of the total working population in the community. Although a large percentage of the population travels outside of

the region for employment, it should be noted that those who remain within the municipality are mainly reliant on the agriculture, manufacturing, and retail/admin sectors.

Currently the risk of a fire or emergency greatly upsetting the local economy is low, however with its strong reliance on the agriculture and related manufacturing of agricultural products, this is a potential risk. Further to this, with its ideal location to major transportation routes, vast lands for potential expansion and strong farm-based agricultural sector; there are proposed expansions in the agricultural and food processing, manufacturing, logistics and distribution as well as light industrial sectors. Plans forward are targeted towards larger scale expansion particularly in the Komoka-Kilworth area. Fire services should be consulted and involved with the planning of these expansion projects to determine the impact on emergency response service delivery.

Identified Risk: The local economy is heavily reliant on the agricultural sector, with potential future expansion. A major upset to the industry i.e., floods, drought, fires could have a negative impact on the local economy, although most of the residents travel outside the municipality for work.

Key Finding: The fire service should be involved in planning for community expansion and developing land use area plans to maintain an acceptable level of service.

SECTION 10
PAST LOSS AND EVENT HISTORY

The past loss and event history profile assessment includes the analysis of a community's past emergency response experience, including the number and types of emergency responses, the number of injuries and fatalities, the amount of dollar loss because of fires, and a comparison of the community's historical fire loss statistics with provincial fire loss statistics. The evaluation of previous emergency response data has shown to be an effective tool to inform the decision-making process with regards to future fire protection services and programs, including enhanced public fire and life safety education and fire safety inspection programs. The following sections consider these past loss and event history characteristics within Kenora, as compared to official provincial statistics. Where available, data has been compared for the past five years from 2016 to 2020. Provincial reports for 2021 were not yet available at the time of this report and although general data was released. Where data is not comparable, some inferences have been made using statistics provided by the OFM. Only data regarding structural and vehicle fires were used, as these fires represent the most frequent in the area as well as have the greatest associated loss.

10.1 Past Loss

Analysis of a community's historical emergency response data provides valuable insight into understanding the specific fire protection trends that may be present. Expanding this analysis to include assessing the life safety and fire risks in relation to provincial statistics provides a foundation for evaluating where specific programs or services may further enhance the fire services being provided.

10.1.1 Total Fire Loss

Table 25 below displays the total fire loss for structural and vehicle fires for the Municipality of Middlesex Centre and Ontario over the five-year period between 2016 to 2021 (note data for Ontario for 2021 not available). To directly compare these figures, Table 26 standardizes these results, to display the percentage of loss in each category.

In comparison to the province, there were a smaller percentage of structure fires accounting for a greater percentage of loss in Middlesex Centre. Structure fires accounted for 44.44% of fires (structural and vehicle) and 91.31% of losses in the municipality, and 69.35% and 89.79% respectively for the province. This difference is not unexpected provided the rural location of Middlesex Centre in comparison to similar cities in other parts of Ontario. The risk of vehicle fires is lower than the provincial average given that there are less frequented and fewer highways in the region, and most residents are not commuting in or out of the city on a regular basis for work etc.

Table 25: Total Fire Loss Middlesex Centre and Ontario (2016 to 2021)[47]

Year	Middlesex Centre						Ontario					
	Structure Fire		Vehicle		Total		Structure Fire		Vehicle		Total	
	# Fires	Loss ($)	# Fires	Loss ($)	# Fires	Loss ($)	# Fires	Loss ($)	# Fires	Loss ($)	# Fires	Loss ($)
2016	7	4,015,000	11	371,205	18	4,386,205	7,169	654,514,771	2,843	73,262,620	10,012	727,777,391
2017	15	5,525,600	12	322,500	27	5,848,100	6,679	657,580,390	2,931	67,570,020	9,610	725,150,410
2018	8	2,708,002	7	81,753	15	2,789,755	7,012	734,340,655	3,249	91,097,375	10,261	825,438,030
2019	4	83,500	21	477,512	25	561,012	6,715	860,432,756	3,263	92359,728	9,978	952,792,484
2020	12	1,527,351	15	259,513	27	1,786,864	6,841	790,693,587	2,921	96,218,612	9,762	886,912,199
2021	22	5,861,003	19	365,055	41	6,226,058	No Data					
Total	68	19,720,456	85	1,877,538	153	21,597,994	34,416	3,697,562,159	15,207	420,508,355	49,623	4,118,070,514
Average	11	3,286,743	14	312,923	26	3,599,666	6,883	739,512,432	3,041	84,101,671	9,925	823,614,103

Table 26: Loss Due to Structural Fire Middlesex Centre and Ontario (2016 – 2021)[48]

Year	Middlesex Centre				Ontario			
	Structure Fires	Loss ($)	% of Fires	% of Loss	Structure Fires	Loss ($)	% of Fires	% of Loss
2016	7	4,015,000	4.58	18.59	7,169	654,514,771	14.45	15.89
2017	15	5,525,600	9.80	25.5	6,679	657,580,390	13.46	15.97
2018	8	2,708,002	5.23	12.54	7,012	734,340,655	14.13	17.83
2019	4	83,500	2.61	0.39%	6,715	860,432,756	13.53	20.89
2020	12	1,527,351	7.84	7.07	6,841	790,693,587	13.79	19.20
2021	22	5,861,003	14.38	27.14	No Data			
Total for Structure Fires	68	19,720,456	44.44	91.31	34,416	3,697,562,159	69.35	89.79
Total All Fires (structure, vehicle)	153	21,597,994	100.00	100.00	49,623	4,118,070,514	100.00	100.00

[47] *Retrieved from OFM Fire Statistics and Annual Reports*
[48] *Retrieved from OFM Fire Statistics and Annual Reports*

Table 27 below compares the number of structure fires and the associated total property loss within Middlesex Centre for the period from 2016 to 2020 to the number of structure fires and total property loss that occurred across Ontario during the same period. In comparison to the province, even though a much lower percentage of fires involved structures in Middlesex Centre, the total loss of these fires amounted to a similar percentage of total loss. Over this period 75 structure fires were reported, representing 41.9% of all fires (structure and vehicle) and a fire loss of $17,444,871, representing 89.37% of all fire losses. 70.1% of all fires reported in the province were structure fires with a fire loss of $5,717,383,011, representing 90.52% of all fire loss.

Key Finding: The municipality and the province have a similar percentage of loss attributed to structural fires; however, the percentage of structure fires attributing to the total dollar loss was roughly 30% lower in the municipality. This would suggest that the relative dollar loss caused by structure fires in the municipality is higher than experienced in the province. This finding may be partially attributed to the occasional loss of high value structures such as agricultural buildings and high value residential properties (see Table 26).

10.1.2 Fires by Occupancy Type

This section assesses structure fires and related loss based on occupancy type. Loss is defined as fires with a reported injury, fatality or dollar loss. Data obtained from the OFM for the period of 2016 to 2020 is listed below in Table 27. While the municipality has a similar percentage of structure fires for most occupancy types when compared to the province, it has a significantly lower percentage of residential fires and significantly higher percentage of fires classed with the National Farm Building Code (NFBC) fires. The loss associated with the NFBC fires is also nearly five times compared to provincial average. Given the large percentage of farmland in the municipality in comparison to other regions in the province, this is not unexpected.

Table 27: Fires by Major Occupancy Classification (2016 to 2020)[49]

Group	Occupancy Type	Middlesex Centre				Ontario			
		# of Fires	% of Structure Fires	Fire Loss	% of Fire Loss	Fires	% of Structure Fires	Fire Loss	% of Fire Loss
A	Assembly	3	7.14	751,501	5.42	1,257	3.65	179,403,594	4.85
B	Care or Detention	0	0.00	0	0.00	518	1.51	40,046,983	1.08
C	Residential	20	47.62	6,708,902	48.41	25,254	73.38	2,403,580,228	65.00
D	Business and Personal Services	0	0.00	0	0.00	874	2.54	89,945,112	2.43
E	Mercantile	2	4.76	143,000	1.03	1,163	3.38	187,235,741	5.06
F	Industrial	4	9.52	177,000	1.28	2,607	7.57	462,061,252	12.50
Other	Not Classified with OBC	4	9.52	24,000	0.17	1,837	5.34	43,826,772	1.19
Farm	Classified with NFBC	9	21.43	6,055,050	43.69	906	2.63	291,462,477	7.88
	Total	42	100.00	13,859,453	100.00	34,416	100.00	3,697,562,159	100.00

[49] *Retrieved from OFM Fire Statistics and Annual Reports*

Identified Risk: A large percentage of agricultural buildings may attribute to a higher-than-average number of fires of this occupancy type. Further, farm properties are also significantly more valuable than a typical residence. These properties may be lacking inadequate fire sensing and suppression equipment and targeting private owners in this sector may be of benefit.

10.1.3 Civilian Fire Fatalities and Injuries

From 2016 to 2021, there was one civilian injury and no fatalities in the municipality. With an average of 11 fires analyzed in this time period, the resulting averages are 1.33 injuries and no fatalities per fire. The sample set for the municipality is very small, therefore a direct comparison with provincial averages is difficult to conclude. Overall, averages of injury are similar, and with no fatalities, significantly lower than the provincial average.

Table 28: Structural Fire Fatalities and Injuries Middlesex Centre and Ontario (2016 to 2021)[50]

Year	Middlesex Centre					Ontario				
	# of Fires	Injuries	Fatalities	% Injuries	% Fatalities	# of Fires	Injuries	Fatalities	% Injuries	% Fatalities
2016	7	0	0	0	0	7,169	646	70	9.01	0.98
2017	15	1	0	6.67	0	6,679	674	86	10.09	1.23
2018	8	0	0	0	0	7,012	722	81	10.30	1.16
2019	4	0	0	0	0	6,715	743	63	11.06	0.94
2020	12	0	0	0	0	6,841	610	109	8.92	1.59
2021	20	0	0	0	0	No Data				
Total	66	1	0			34,416	3,395	409		
Average	11	16.67	0	1.33	0	679	82	84.2	9.88	1.18

[50] *Retrieved from OFM Fire Statistics and Annual Reports*

10.1.4 Reported Fire Cause

Table 29 identifies the reported causes of fires for Middlesex Centre and Ontario from 2016 to 2020. The leading identified cause of fire in the municipality was misuse of ignition sources (34.29%), followed by unintentional/undetermined (31.43%) and design/construction/maintenance deficiencies (14.29%).

Overall, these trends are similar to the province. However, Middlesex Centre appears to have a disproportionally high rate of fires (14.29%) caused by design/construction/maintenance deficiency issues, where across Ontario the rate is 6.91%. It is difficult to determine whether this is a significant difference simply because the total number of these fires was only five during this period. However, this difference may be accounted for by fires in structures pre-dating fire/building codes or public education, however this would be contrary to previous findings that suggest that the proportion of older building in the municipality is similar to that of the province, and the risk due to the demographics of the municipality is lower than the province. The difference may be attributed to reporting errors or default reporting when cause is not specifically known.

Table 29: Fire Causes Middlesex Centre and Ontario (2016 to 2020)[51]

Nature	Fire Cause	Middlesex Centre		Ontario	
		# of Fires	% of Fires	# of Fires	% of Fires
Intentional	Arson	1	2.86	2,149	6.24
Intentional	Intentional Other	0	0.00	15	0.04
Intentional	Vandalism	1	2.86	561	1.6
Unintentional	Children Playing	0	0.00	142	0.41
Unintentional	Design/Construction/Maintenance Deficiency	5	14.29	2,379	6.91
Unintentional	Mechanical/Electrical Failure	4	11.43	5,271	15.32
Unintentional	Misuse of Ignition Source	12	34.29	10,167	29.54
Unintentional	Other Unintentional	0	0.00	2,399	6.97
Unintentional	Undetermined	0	0.00	2,838	8.25
Unintentional	Vehicle Collision	1	2.86	29	0.08
Other	Other	0	0.00	1,902	5.5
Unintentional	Undetermined	11	31.43	6,471	18.80
Unknown/Unreported	Unknown/Unreported	0	2.86	93	0.27
Total		35	100.00	34,416	100.00

[51] *Retrieved from OFM Fire Statistics*

10.1.5 Ignition Source

Table 30 identifies the reported ignition sources for fires in Middlesex Centre and Ontario from 2016 to 2020. The ignition source of approximately 74% of fires was reported as either miscellaneous or undetermined. This is more than double the provincial average (33%). Other ignition sources are generally aligned with provincial averages; however there seems to be a misrepresentation of reporting on sources such as appliances, exposure and cooking equipment in particular. The provincial numbers are stable year after year, suggesting a potential gap in reporting for the municipality in these areas.

Table 30: Ignition Source Middlesex Centre and Ontario (2016 to 2020)

Ignition Source	Middlesex Centre		Ontario	
	# of Fires	% of Fires	# of Fires	% of Fires
Appliances	0	0.00	1,528	4.44
Cooking Equipment	0	0.00	5,827	16.93
Electrical Distribution	3	6.52	2,991	8.69
Heating Equipment, Chimney etc.	4	8.70	2,616	7.60
Lighting Equipment	0	0.00	1,047	3.04
Open Flame/Smokers Articles	4	8.70	4,832	14.04
Other Electrical/Mechanical	1	2.17	1,734	5.04
Processing Equipment	0	0.00	440	1.28
Miscellaneous	11	23.91	3,474	10.09
Exposure	0	0.00	1,652	4.80
Undetermined	23	50.00	8,163	23.72
Unknown/Unreported	0	0.00	112	0.33
Total	46	100.00	34,416	100.00

Identified Risk: There may be a potential lack of reporting of ignition sources. However due to small sample size, this cannot be determined with certainty. Fire services should continue to monitor this.

10.1.6 Smoke Alarm Status

Of the 25 fires analyzed in the municipality between 2016 and 2020, there were seven instances where it was reported that a smoke alarm was operational and seven instances where it was reported there was no smoke alarm and one instance where it was reported that there was a smoke alarm that did not operate. Although the data set during this period is small, there does appear to be a significant and positive difference when comparing to provincial averages which indicate nearly twice the percentage of fires where smoke alarms are not present, and a quarter of the frequency of reporting that alarms were present and operational or present and non-operational.

Key Finding: Although only a small data set was analyzed, it appears that in general there is good public education and participation in fire safety measures related to having and maintaining smoke alarms. This is an effective way to reduce fire loss. Fire services should continue public awareness and education.

The instance where it was reported that the presence of a smoke alarm could not be determined is similar to that of the provincial experience. Although an important statistic when measuring public education and fire safety behaviour, making this determination is not always possible. There were however significantly more cases where the presence of a smoke alarm was not reported in relation to the provincial average – although low in comparison to the sample size. Due to the small sample size, it is difficult to decide, however there may be a lack of reporting on the presence of a smoke alarm, which as mentioned is an important statistic when considering public education and awareness programs.

Identified Risk: There may be a lack of reporting on the presence of a smoke alarm, however due to the small sample size, it cannot be determined with certainty. Fire services should monitor the reporting of this statistic.

Table 31: Smoke Alarm Status Middlesex Centre and Ontario (2016 to 2020)

Smoke Alarm Status on Floor of Origin	Middlesex Centre				Ontario			
	# of Fires	% of Fires	Loss	% of Loss	# of Fires	% of Fires	Loss	% of Loss
No Smoke Alarm Present	7	28.00	573,200	20.04	10,803	44.59	928,742,444	39.69
Smoke Alarm Present and Operated	7	28.00	2,340,522	81.83	1,909	7.88	222,830,897	9.52
Smoke Alarm Present, did not Operate	1	4.00	25,000	0.00	3,200	13.21	131,676,964	5.63
Smoke Alarm Present, Operation Undetermined	3	12.00	795,000	0.87	4,205	17.35	314,039,943	13.42
Smoke Alarm Presence Undetermined	4	16.00	2,860,200	0.00	4,052	16.72	736,271,732	31.47
Unknown, not Reported	3	12.00	25,000	27.80	61	0.25	6,181,450	0.26
Total	25	100.00	6,593,922	100.00	24,230	100.00	2,339,743,430	100.00

Identified Risk: There may be a potential lack of reporting on smoke alarm status. Although difficult to discern, not understanding this metric can hinder fire prevention efforts.

10.2 Event History

10.2.1 Incident Types and Frequency Analysis

Fire and rescue services typically have access to large amounts of incident and response data. Incident data can be used and reported for several purposes. Incident type and frequency data is used to analyze department activity levels and identify trends in demand for fire services. The breadth of services provided by the modern fire service is often surprising. Fire departments have evolved from responding primarily to fires to responding to a broad range of public service and emergency incidents and becoming a critical component of a community's social safety net.

Five years of response data provided by MCFS was analyzed. The data includes all incidents from January 2017 to December 2021. Incident data is aggregated into broader categories and more specific incident categories. For example, all types of fire incidents including structural, vehicle and wildland/brush/garbage/cropland fires may be combined into a single category. This differentiation is made to provide varying levels of information as stakeholder reporting and information needs vary depending on their level of interest in the MCFS activities.

MCFS stations respond to incidents within their demand zones, provide a second station response to concurrent or large incidents within the municipality and occasionally provide mutual aid outside of Middlesex Centre. Table 32 identifies all unique incidents occurring within the municipal boundary. This analysis provides a general overview of the types of emergencies occurring and their respective frequency. It does not include counts of second station incidents as the incident is already captured in the initial response or mutual aid responses which are outside of Middlesex. These incident types will be discussed in further detail in this section.

Table 32: Unique Incidents within Middlesex Centre (2017 to 2021)

Incident Type	2017	2018	2019	2020	2021	Total	%
MVC	106	97	112	87	104	506	34
Public Service	53	64	52	52	67	288	20
Fire	53	48	45	65	66	277	19
Medical	36	47	44	42	42	211	14
Alarm	29	34	46	27	38	174	12
Rescue	1	1	4	3	7	16	1
Total	278	291	303	276	324	1472	100

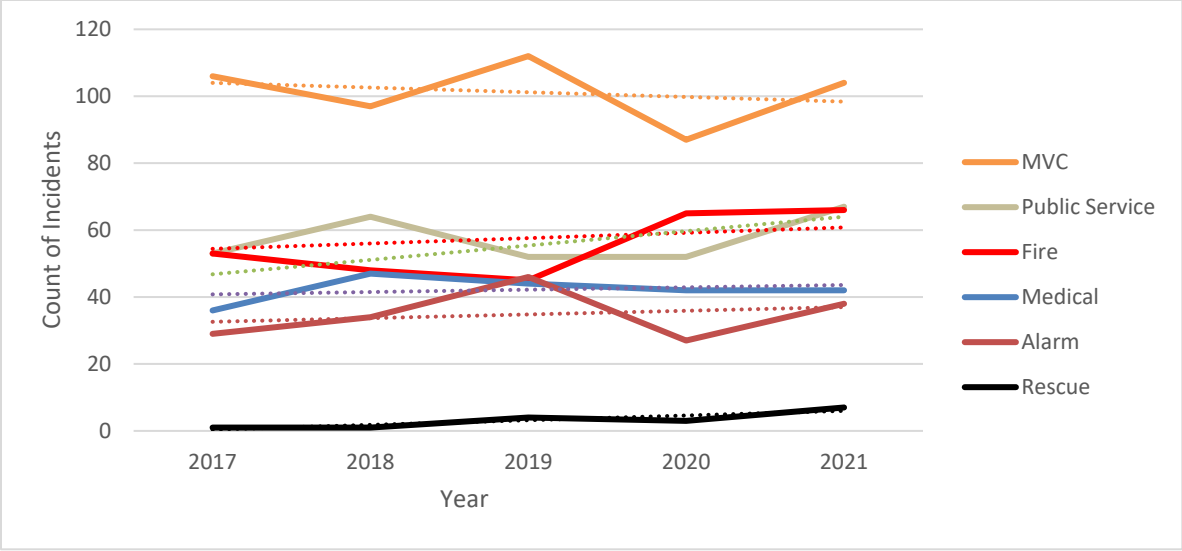
Key Finding:

- ***34% of all incidents were motor vehicle collisions***
- ***Public service incidents were a relatively high percentage of the incident types occurring in Middlesex Centre***
- ***Medical incidents accounted for a relatively low percentage of responses in comparison to many fire services providing first medical response where the percentage often exceeds 50%***
- ***Rescue related incidents were relatively infrequent***

Identified Risk: Motor vehicle collisions and public service incidents represent more than half (54%) of calls (all stations).

Figure 2 illustrates the general trends seen in the broad categories of unique incidents occurring in Middlesex Centre during this period. This analysis is intended to draw attention to the incident categories that are changing rapidly. A positive trend (increasing) may forecast a future need for additional resources to respond to these incidents or new mitigation strategies to address this type of community risk. A negative trend (decreasing) may identify successful mitigation efforts or a decreasing risk resulting from other changes in the community risk profile.

Figure 2: Unique Incidents by Incident Type (2017 to 2021)



Key Finding:

- ***Most incident types experienced considerable year over year variation, making it difficult to identify a clear trend***
- ***Fire incidents increased the most during this period in 2020 which was flattened in 2021, but decreased in 2018 and 2019 with a slight overall positive trend***
- ***Public service, medical, alarm and rescue incidents varied year over year but also demonstrated slightly positive trends overall***
- ***MVCs increased in 2019 and 2021, but decreased in 2018 and 2020 with a slight negative trend overall***

General or broad incident type categories can be broken out into subcategories of incident types to provide more specific information regarding community risks. For example, fire incidents may be categorized into specific fire types such as brush, structure fires, garbage fires or vehicle fires. This level of detail is useful in analyzing more specific trends in community risk and service requirements. It may also be useful in identifying the need for specific risk mitigation strategies such as increased property inspections, reduced speed limits, or targeted public education.

Table 33 reflects all incident types in greater detail that occurred in Middlesex Centre from 2017 to 2021. This dataset included mutual aid and second station responses to reflect the response activity from a department-wide and individual station response perspective. It is useful to include these categories to acknowledge and reflect the additional demand on the fire response system these types of incidents create.

Table 33: All Incidents/Responses by Incident Subcategory Type

Incident Subcategory	2017	2018	2019	2020	2021	Total	Total %
MVC	106	97	112	87	104	506	29.2
CO	24	28	23	30	34	139	8
Utilities	12	21	13	10	19	75	4.3
Public assist	17	15	16	12	14	74	4.3
Open burn	14	26	16	27	13	96	5.5
Fire - vehicle	14	11	22	20	19	86	5
Fire - structure	23	11	7	15	22	78	4.5
Fire - field	2	0	0	3	12	17	1
Medical	36	47	44	42	42	211	12.2
Monitor alarm	29	34	46	27	38	174	10
Low angle	0	1	0	1	4	6	.3
Water/ice	1	0	4	1	1	7	.4
UTV	0	0	0	1	2	3	.2
Second station	66	41	23	39	48	217	12.5
Mutual/auto aid	8	12	5	13	8	46	2.7
Total	352	344	331	328	380	1735	100%

Key Finding:

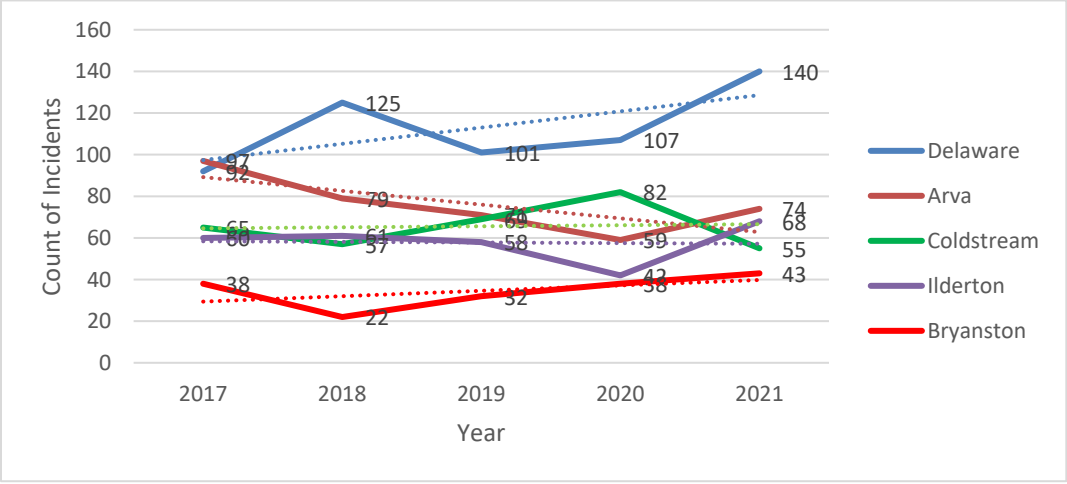
- ***Open burning varied considerably year over year***
- ***Structure fires decreased substantially in 2018 but have increased steadily since***
- ***Field fires quadrupled between 2020 and 2021, but were still relatively infrequent***
- ***Medical incidents were relatively constant during this period and but not overtaxing MCFS***
- ***At 10% of all incidents Middlesex Centre alarm incidents are a little lower than typically experienced***
- ***Low angle and water/ice rescue occurred relatively infrequently***
- ***Mutual aid accounted for 2.7% of incidents, providing critical assistance to neighbouring municipalities***

Identified Risk: Carbon monoxide (CO) related incidents accounted for 8% of all station responses, which is a relatively high number that warrants consideration of alternative strategies such as increased public education.

Identified Risk: Second station responses accounted for more than 12% of all incident types and occurred for almost 15% of all unique incidents (=217 incident of 1472 unique incidents). The frequency that a station provides a second station response and the frequency a station requests a second station response should be monitored and the cause considered. This is however typical for a rural all volunteer municipality.

Figure 3 includes counts of all MCFS incidents, including mutual aid and second station responses. This chart illustrates the general trends in activity levels and demand for service for each of the five MCFS stations. Positive trends indicate an increase in incidents and negative trends indicate incidents generally decreased.

Figure 3: All incidents by Station (2017-2019)



Key Finding:

- ***Delaware Station experienced a considerable increase in incidents in 2018, a decrease in 2019 and nearly twice the requests for service than the next nearest station in 2021 with an overall positive trend***
- ***Arva Station experienced a consistent decline in incidents from 2017 to 2020, with an increase in 2021 but maintained an overall negative trend***
- ***Coldstream Station experienced a 30% increase in incidents in 2020 which declined in 2021 but maintained an overall positive trend***
- ***Ilderton Station experienced a 40% decline in incidents in 2020 but an offsetting increase in 2021 with a very slight negative trend***
- ***Bryanston Station experienced nearly a 50% decline in incidents in 2018 but has increased steadily since with an overall positive trend***

Identified Risk: All stations apart from Coldstream Station experienced an increase between 2020 and 2021. A service level review will be conducted as a part of the 2022 Fire Master Plan.

Table 34. includes all MCFS incidents, including second station and mutual aid incidents. This perspective provides insight into the types of incidents each station responds to and differences in the frequency of incident types in each demand zone. The information can be used to inform service-level decisions in the five demand zones. It also provides insight into the response frequency and activity levels for each station.

Table 34: All Incidents by Incident Type by Station (2017 to 2021)

Incident Type	Delaware	Arva	Coldstream	Ilderton	Bryanston	Total
MVC	136	131	100	58	81	506
Public Service	113	40	45	69	21	288
Fire	108	47	40	43	39	277
Second station	11	102	52	40	12	217
Medical	81	33	34	48	15	211
Alarm	95	25	24	26	4	174
Mutual aid	15	0	28	2	1	46
Rescue	6	2	5	3	0	16
Total	565	380	328	289	173	1735
%	32.6	21.9	18.9	16.7	10	

Key Finding:

- ***Delaware Station was dispatched to 565 incidents and was the busiest MCFS station during this period***
    - ***MVCs were the most frequently occurring emergency incidents in this demand zone (136), accounting for nearly 25% of all incidents***
    - ***Fire and medical incidents occurred at approximately twice the frequency in this demand zone in comparison to the others, accounting for 34% of all incidents when combined***
    - ***Public service incidents accounted for approximately 20% the incidents in this demand zone***
    - ***Delaware Station responded to the least number of second station responses (11 incidents)***
    - ***It experienced the second highest number of requests for mutual aid (15 incidents)***
- ***Arva Station was dispatched to 380 incidents and was the second busiest MCFS station during this period***
    - ***MVCs were the most frequent incident in this demand zone (131), accounting for 34% of all incidents***
    - ***Fire and medical incidents occurred relatively frequently, accounting for 21% of all incidents when combined***
    - ***Arva Station responded to the most second station responses (102 incidents), accounting for approximately 27% of all incidents***
    - ***Arva Station did not respond to any mutual aid incidents***
- ***Coldstream Station was dispatched to 328 incidents and was the third busiest MCFS station during this period***
    - ***MVCs were the most frequent incident type in this demand zone (100 incidents), accounting for 30% of all incidents***
    - ***Fire and medical incidents occurred relatively frequently, accounting for 23% of all incidents when combined***
    - ***Coldstream Station received 28 requests for mutual aid, accounting for approximately 60% of all mutual aid incidents for MCFS during this period***
- ***Ilderton Station was dispatched to 289 incidents during this period***
    - ***Public service incidents were the most frequent incidents in this demand zone (69 incidents), accounting for 24% of all incidents***
    - ***MVCs was the second most frequent (58 incidents)***
    - ***Fire and medical incidents occurred relatively frequently, accounting for 32% of all incidents when combined***

- ***Bryanston Station was dispatched to 173 incidents during this period***
    - ***MVCs were the most frequent incident type in this demand zone (81 incidents), accounting for 47% of all incidents***
    - ***Fire and medical incidents occurred relatively frequently, accounting for 31% of all incidents when combined***
    - ***Bryanston Station responded to the least number of second station requests (12 incidents)***

Table 35 considers the frequency of specific types of fire-related station responses. It is a general indication of the types of fire risk occurring within each station's demand zones. Typically, structure fires would involve the highest risk to life and property. Except for wildland urban interface fires, structure fires typically involve the highest risk of firefighter injury and can tax fire department resources.

Table 35: Fire Incidents by Type by Station (2017-2021)

Incident Type	Delaware	Arva	Coldstream	Ilderton	Bryanston	Total
Open Burn	29	25	11	19	12	96
Fire-Vehicle	41	11	13	8	13	86
Fire-Structure	29	11	14	15	9	78
Fire-Field	9	0	2	1	5	17
Total	108	47	40	43	39	277

Key Finding:

- ***Generally, the frequency of structure fires is relatively low and accounted for approximately 28% of all fire-related incidents and 4.5% of all incidents***
- ***Delaware Station was dispatched to 108 fire-related incidents including 47% of all vehicle fires and 37% of all structure fires in Middlesex Centre***
- ***More than 50% of the fire incidents Arva Station responded to were open burn fires***
- ***Coldstream Station responded to nearly an equal number of open burn, vehicle and structure fires***
- ***Ilderton Station responded primarily to open burn fires and some structure fires***
- ***Bryanston Station responded to the open burn vehicle fires***

Second station responses are driven by several potential causes. They may occur when the resources required to safely manage an incident are expected to exceed the initial responding station's capacity or capability. They may also be driven by concurrent incidents, limited volunteer availability or apparatus mechanical issues. The frequency that a station provides

a second station response and the frequency a station requests a second station response should be monitored and the cause considered.

Table 36: Second Station Response Types (2017 to 2021)

	Second Responding Station					
Response Type	Arva	Bryanston	Coldstream	Delaware	Ilderton	Total
Assisting Arva Station		4	4	2	4	14
Assisting Bryanston Station	47		2	1	21	71
Assisting Coldstream Station	3	1		4	11	19
Assisting Delaware Station	2	0	24		1	27
Assisting Ilderton Station	12	7	9	0		28
Call cancelled on route	38	0	12	3	3	56
Total	102	12	51	10	40	215*

*of the 217 second station responses noted in Table 36, all Incidents by Incident type by Station, two records were incomplete did not identify the response type

Key Finding:

- ***Arva Station provided nearly half of all second station responses (64 incidents - 102 requests but cancelled on 38), which were primarily requested by Bryanston Station***
- ***Bryanston Station requested a second station most frequently of all stations by a considerable margin (71 incidents), and occasionally provided a second station response for Ilderton Station***
- ***Coldstream was requested to provide a second station response to 51 incidents, primarily by the Delaware Station (24 incidents), and requested it for 19 incidents***
- ***Delaware Station provided a second station response to 10 incidents, and requested it for 27 incidents***
- ***Ilderton Station provided a second station response to 40 incidents, primarily for Bryanston and to a lesser extent Ilderton Station, and requested it for 28 incidents***

Identified Risk: Bryanston Station, in comparison to other stations, frequently requests a second station response, particularly from Arva and Ilderton, potentially leaving these communities under serviced. A service level review will be conducted as a part of the 2020 Fire Master Plan.

The Municipality of Middlesex participates in the Province of Ontario Mutual Aid Plan. As such, it is useful to monitor the frequency and the regions requesting mutual aid. This information can be used to assess the potential impact on the MCFS's ability to provide aid and maintain services within the municipality.

Table 37: Mutual Aid Incidents by Response Type (2017 to 2021)

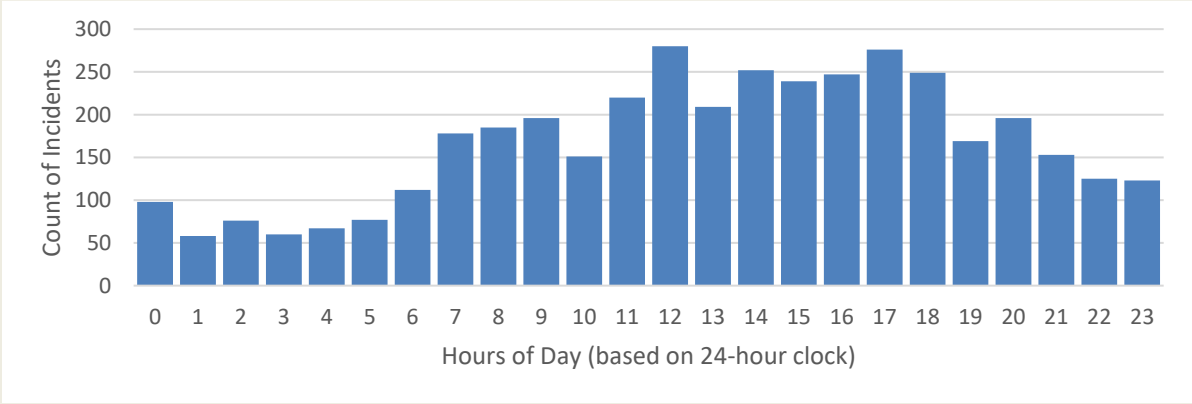
Response Type	Arva	Bryanston	Coldstream	Delaware	Ilderton	Total
Assisting Other FD: Automatic Aid	0	0	8	0	0	8
Assisting Other FD: Mutual Aid	0	1	3	7	0	11
Call Cancelled On Route	0	0	3	3	0	6
Mutual Aid - Ailsa Craig Station (North Middlesex)	0	0	5	0	1	6
Mutual Aid - Kerwood Station (Adelaide Metcalfe)	0	0	7	0	0	7
Mutual Aid - Oneida Station (Oneida)	0	0	0	5	0	5
Mutual Aid	0	0	1	0	1	2
Other Rescue	0	0	1	0	0	1
Station Total	0	1	28	15	2	46

Key Finding:

- ***In general, mutual aid was requested relatively infrequently over the five-year period***
- ***Coldstream Station was requested most frequently (28 incidents) by a considerable margin***
- ***Mutual aid was requested by the Adelaide Metcalfe Station most frequently, followed by the Alissa Craig Station and Oneida Station***
- ***The reporting available did not always identify the receiving agency or municipality***

The time incidents occur is useful in identifying periods of peak and lower demand for services. Typically, demand for emergency services is lowest in the early hours of the morning. The horizontal axis in Figure 4 Incidents by Time of Day begins with 0 hours (12 p.m. – 1 a.m.) and ends at 23 hours (11 p.m. to 12 p.m.).

Figure 4: 2018-2021 Incidents by Time of Day



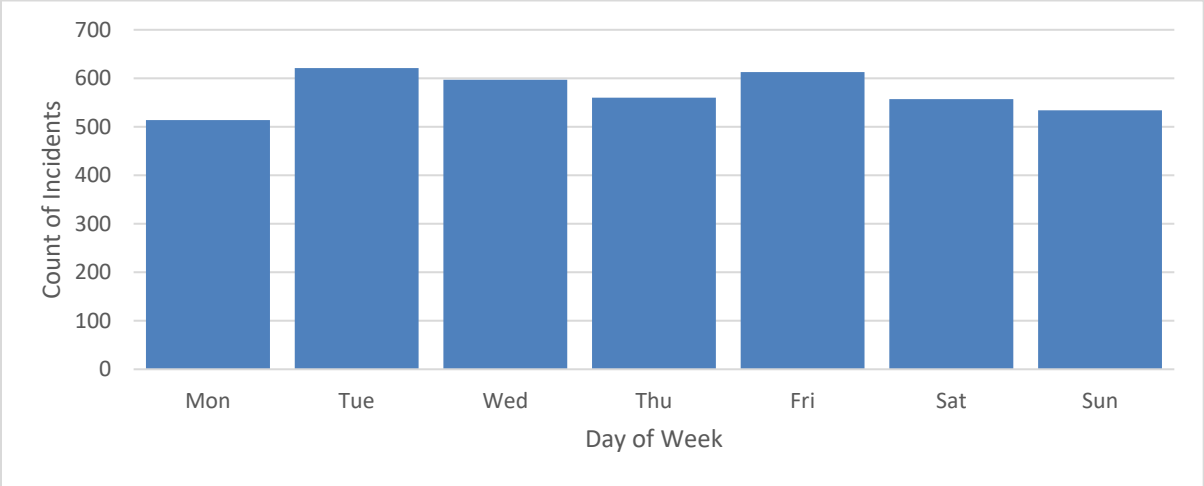
Key Finding:

- ***Incidents began to increase around 4 a.m. and peaked around 12 p.m. and then again around 6 p.m.***
- ***This two-peaked pattern is common in fire and emergency service***
- ***After 6 p.m. the number of incidents declined steadily until 4 a.m.***

Identified Risk: Most incidents are occurring during the daytime hours when people are most active and or traffic flow is highest, and the majority of paid-on-call volunteer firefighters are likely to be at work

Similarly, monitoring the days of the week in which MCFS respond most and least frequently provide additional insight into potential pressures in service delivery. Typically, emergency services respond most frequently on Friday and Saturday.

Figure 5: 2018-2021 Incidents by Day of Week



Key Finding:

- ***In general, incidents occurred with similar frequency throughout the week***
- ***The fewest incidents occurred on Mondays and the most occurred on Tuesdays, but the variation was very minimal***

SECTION 11
APPLYING KEY FINDINGS AND IDENTIFIED RISKS

11.1 Prioritizing Risk

Following the probability and consequence levels as outlined 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 service's decision-making regarding appropriate service levels.

11.1.1 Probability

The probability of an emergency incident is estimated by reviewing relevant historical data regarding past events that have affected the community or other communities, consulting with community members and experts, as well as using professional judgement. The OFM-TG-02-2019 categorizes probability into five levels as demonstrated in the table below:

Table 38: Probability Classification

Description	Specifics`
Rare	May occur in exceptional circumstances No incidents in the past 15 years
Unlikely	Could occur at some time, especially if circumstances change 5 to 15 years since the last incident
Possible	Might occur under certain circumstances Multiple or recurring incidents in the past 5 years
Likely	Will probably occur at some time under current circumstances Multiple or recurring incidents in the past 5 years
Almost Certain	Expected to occur in most circumstances unless circumstances change

11.1.2 Consequence Levels

The consequence of an emergency is the potential losses or negative outcomes associated with the event. Professional judgement in reviewing past examples, as well as determining outlook is essential for this determination. Consequence is broken down into the following categories:

- Life Safety: Injuries or loss of life due to occupant and firefighter exposure to life-threatening fire or other situation.
- Property Loss: Monetary losses relating to private and public buildings, property content, irreplaceable assets, significant historic/symbolic landmarks, and critical infrastructure.

- Economic Impact: Monetary losses associated with property income, business closures, a downturn in tourism and/or tax assessment value, and employment layoffs.
- Environmental Impact: Harm to human and non-human (i.e., wildlife, fish, and vegetation) species of life and a general decline in quality of life within the community due to air/water/soil contamination because of the incident and response activities.

The OFM-TG-02-2019 categorizes consequence into five levels as demonstrated in the table below:

Table 39: Consequence Classification

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

11.1.3 Assigning 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 6 shows a sample matrix.

Figure 6: Risk Matrix Sample

Almost Certain 10,000	Moderate Risk	Moderate Risk	High Risk	High Risk	High Risk
Likely 1,000	Moderate Risk	Moderate Risk	Moderate Risk	High Risk	High Risk
Possible 100	Low Risk	Moderate Risk	Moderate Risk	Moderate Risk	High Risk
Unlikely 10	Low Risk	Low Risk	Moderate Risk	Moderate Risk	Moderate Risk
Rare 1	Low Risk	Low Risk	Low Risk	Moderate Risk	Moderate Risk
	Insignificant 1	Minor 10	Moderate 100	Major 1,000	Catastrophic 10,000

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 41. Where possible, quantitative data was used to inform the risk assignment as described in the rationale in the table. It is important to recognize that with the availability of new or updated data, the probability levels could change or be refined. It should also be recognized that, as identified in. OFM T.G.-02-2019, "professional judgement based on experience should also be exercised in combination with historical information to estimate probability levels". Similarly, OFM T.G.-02-2019 acknowledges the role of professional judgement 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 T.G.-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.

11.2 Risk Treatment Options

NFPA 1300 and the OFM T.G.-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.

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

11.2.1 The Five 'E's of Community Risk Reduction

NFPA 1300 defines a Community Risk Reduction plan as a "document that outlines the goals, objectives, programs, and resources used to reduce the risks identified by the CRA". Establishing service levels regarding 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 FSMP 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 E's". The Five E's is a framework outlined in NFPA 1300, and the Institution of Fire Engineers' Vision 20/20 National Strategy for Fire Loss Prevention. The Five E's are summarized in Table 40 below.

Table 40: Five E's

Five E's	Description
Emergency Response	Ensuring the fire service's emergency response is optimized and fully functioning can reduce the impact of incidents. To do this, you must: • Determine the appropriate equipment needed • Train personnel • Determine staffing levels
Education	Education positively influences individuals to take action to reduce risk. Education includes: • Increasing knowledge of community risks • Changing attitudes • Encouraging behavioural changes
Enforcement	Enforcement involves identifying whether stronger enforcement is necessary or if newer codes and standards need to be adopted. Enforcement activities include: • Adopting and enforcing fire and life safety codes • Requiring sprinklers in residential occupancies • Requiring smoke alarms in residential occupancies
Engineering	Engineering is the determination of whether there are any engineering or technological solutions that can mitigate risk. Examples of engineering used to reduce risk: • Fire sprinklers • Smoke alarms • Ground fault circuit interrupters • Child safety seats
Economic Incentives	Economic incentives can improve compliance and increase awareness. Examples of economic incentives are: • Fines and penalties • Free smoke alarm installation • Tax credits for home sprinkler systems

It is important to note that NFPA 1300 discusses the application of the Five E's 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 this CRA. Focus of recommendations will be on a proactive reduction of risk through education, prevention, and enforcement with fire suppression as the fail-safe.

For those risk conclusions that will not be considered within the CRA, 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.).

11.3 MCFS Risk Matrix

As a result of the findings contained in this report, in combination with a review of the municipality's HIRA and in comparison, to provincial statistics, the risk matrix for MCFS was developed and presented below as Figure 7.

Figure 7: MCFS Risk Matrix

	Insignificant 1	Minor 10	Moderate 100	Major 1,000	Catastrophic 10,000
Almost Certain 10,000		• Motor vehicle incident • Severe thunderstorm • Snowstorm/hail/ freezing rain	• Dust explosion • Fire/explosion		
Likely 1,000	• Swift water rescue	• Fog	• Drought	• Industrial fire • Flood • Critical infrastructure failure • Hazardous materials spill/release/fire	
Possible 100			• Agriculture or food emergency • Illness/outbreak (local) • Oil and gas emergency • Potable water emergency • Tornado	• Cyber attack • WUI fire • Train derailment	• Illness/outbreak (pandemic)
Unlikely 10		• High-angle rescue			
Rare 1					• Aircraft incident • Chemical fire (ICFAR)

11.4 MCFS Risk Profile and Treatment Options

The following section is a summary of all identified risks for each mandatory profile as well as risk treatment options aligned with the OFM guidelines and in consideration of the 5 E's of community risk reduction.

Table 41: Risk Profiles and Risk Treatment Considerations

Mandatory Profile	Top Risk or Issues/Concerns	Preferred Treatment Option
Geographic Profile	***Poor roads can lead to damaged apparatus and delayed response to calls. Requests for mutual aid if needed may be challenged by poor connectivity due to road conditions, apparatus weight etc.***	Avoid and Mitigate – Maintain knowledge of status of key roadways to plan detours. Involve fire services in pre-planning for improvement projects and infrastructure projects that impact major roadways.
	Large amounts of commuters, increases the potential for MVCs, particularly on major routes during peak times.	Accept Risk – Implement appropriate response protocols, SOGs and activities. Ensure appropriate staffing and backup at peak times.
	High potential for dangerous goods incident, particularly on 400 series (provincial highways).	Accept Risk – Implement appropriate response protocols, SOGs and activities.
	Mutual aid response for dangerous goods incidents would be coming from Hamilton, Ontario. With the 400 series highways and Highway 2 in proximity to Delaware, Kilworth/Komoka areas, it is suggested this station is most likely to respond to this type of call.	Accept Risk – Implement appropriate response protocols, SOGs and activities. Ensure appropriate staffing and backup at peak times for Komoka and Delaware Stations.
	Certain times of the year, roadways may be unsuitable to be travelled by some apparatus, potentially resulting in reduced response times and/or damaged apparatus.	Avoid and Mitigate – Maintain knowledge of status of key roadways to plan detours. Involve fire services in pre-planning for improvement projects and infrastructure projects that impact major roadways.

Mandatory Profile	Top Risk or Issues/Concerns	Preferred Treatment Option
Geographic Profile	***The large number of bridges in the municipality, and their deteriorating condition, have the potential to reduce connectivity of the road network due to restrictions or closures, resulting in potential delays to response time.***	Avoid and Mitigate – Maintain knowledge of status of key roadways to plan detours. Involve fire services in pre-planning for improvement projects and infrastructure projects that impact major roadways.
	Bridges over waterways pose the possibility for a hazardous release into waterways and/or high-angle rescue.	Accept Risk – Implement appropriate response protocols, SOGs and activities.
	Grade level rail crossings have the potential to create a physical barrier to connectivity to the roadway network, causing delays in response time.	Any critical at-grade rail crossings should be identified and alternate routes mapped.
	The passage of dangerous goods along the rail line increases the risk of a derailment impacting the public as well as the surrounding environment (including waterways) and require a specialized response and equipment.	Accept Risk – Implement appropriate response protocols, SOGs and activities. Review and update response agreements.
	Water rescues occur at least once annually in the region, prompting the deployment of specialized equipment and the requirement for technical rescue training.	Avoid and Mitigate – ensure public education efforts for residents and tourists. Ensure signage in hazardous areas.
		Accept Risk – Implement appropriate response protocols, SOGs and activities.
	There exists a risk of ice rescue during the winter months attributed to recreational activities on storm ponds. Proper signage and community awareness should address the risk of unauthorized recreation on storm ponds.	Avoid and Mitigate – proper signage enforcement and community awareness should address risk.
		Accept Risk – Implement appropriate response protocols, SOGs and activities.

Mandatory Profile	Top Risk or Issues/Concerns	Preferred Treatment Option
Geographic Profile	***Due to the 'lake effect', severe weather events and temperatures are possible during any time of the year and may increase call volume and create hazardous conditions for responders.***	Accept Risk – Implement appropriate response protocols, SOGs and activities.
	The risk of rescue calls in parks increases during particularly during summer months.	Avoid and Mitigate – proper signage enforcement and community awareness should address risk.
		Accept Risk – Ensure service levels remain adequate during peak seasons.
	Due to the rural nature of the area and recreational activities, open burning can pose a threat of WUI fires.	Avoid and Mitigate - Annual public education and reinforcement activities may help curb the risk associated with open burning
Building Stock Profile	***Group C - Residential Occupancies represent 69.49% of the municipality's existing property stock and were associated with 49.1% of the historical structure fires from 2016 to 2020.***	Avoid and Mitigate - Public education and awareness are key in any community.
	As the municipality continues to grow and develop the potential fire-related risks associated with building density and exposures will increase.	Avoid and Mitigate – The fire service should be involved in community planning to maintain appropriate levels of service when there is growth or change expected in a community.
	47.08% of the municipality's building stock was build prior to 1981, therefore presents a higher fire risk. The municipality has access to building stock data through MPAC.	Accept Risk – buildings built prior to 1981 may not follow fire code standards and may be vulnerable to rapid spread. MPAC data can provide fire services with this building info.

Mandatory Profile	Mandatory Profile	Mandatory Profile
	High-fire risk occupancies can pose a serious risk to the occupants, as well as to first responders.	Avoid and Mitigate - These properties should be routinely inspected to ensure they are being properly maintained, have adequate fire water and are using safe storage practices.
Building Stock Profile	***Fires in buildings that use lightweight construction pose a significant risk of injury and death to firefighters, due to their potential rapid collapse.***	Avoid and Mitigate - It is essential that fire services are aware of the use of lightweight construction materials when responding to a structure fire. The municipality has access to MPAC data to make a relative assumption based on construction date, however no absolute data exists. When known this information should be provided to the fire services.
	High-fire life safety occupancies can pose a serious risk to the occupants, as well as to first responders.	Avoid and Mitigate - These properties should be routinely inspected to ensure they are being properly maintained, have adequate fire detection equipment and fire water. These types of occupancies may not have been required to update with sprinkler systems and should be inspected to ensure they are meeting new regulations/requirements.
Critical Infrastructure Profile	***Only 56% of properties serviced by the municipal water system.***	Accept Risk: It is essential to develop a water servicing strategy for those areas requiring water flow for firefighting.

Mandatory Profile	Top Risk or Issues/Concerns	Preferred Treatment Option
Demographic Profile	***Over 25% of the population of the municipality is aged 60 and over and expected to increase by an approximate 14.5% over the next decade.***	Avoid and Mitigate: This age group has a higher over all fire life-safety risk and may indicate an increase in fire-related fatalities. Education and inspections should continue to target these demographics, in particular senior living facilities.
	A cross analysis of age and low-income status would suggest that roughly 14% the municipality's population reside in low-income status.	Avoid and Mitigate: Although lower than the provincial percentages, low-income status, particularly combined with age (0 to 5 and 65 and over) have an increased fire risk and fire-safety risk. Public education and awareness should continue to target low-income households.
	The municipality relies significantly on the utilization of paid-on-call firefighters for the delivery of fire suppression services.	Accept Risk – Fire services must monitor retention levels and ensure this model remains sustainable.
	With most of the population travelling some distance (mostly to London) for employment, there is a significant increase in the potential for MVCs during peak hours. Of particular concern, is the 400 series highways, closest to Kilworth/Komoka stations.	Accept Risk – Fire services must monitor retention levels and ensure this model remains sustainable.
Hazard Profile	***MCFS should routinely review the municipality's HIRA as well as their most hazardous response calls and ensure members are properly equipped and prepared to respond.***	Accept Risk – Fire services must continue to monitor call response types and times to maintain adequate service levels.

Mandatory Profile	Top Risk or Issues/Concerns	Preferred Treatment Option
Economic Profile	***The local economy is heavily reliant on the agricultural sector, with potential future expansion.***	Accept Risk: A major upset to the industry i.e. floods, drought, fires could have a negative impact on the local economy. Fire services must continue to provide an adequate level of service to this sector.
Past Loss and Event History Profile	***A large percentage of agricultural buildings may attribute to a higher-than-average number of fires of this occupancy type. Further, farm properties are also significantly more valuable than a typical residence.***	Accept Risk Education, inspection (where applicable) and enforcement of fire protection standards for agricultural buildings should be routine.
	There may be a potential lack of reporting of ignition sources, however due to small sample size this cannot be determined with certainty.	Avoid and Mitigate – Fire services should continue to monitor reporting of ignition sources.
	There may be a lack of reporting on the presence of a smoke alarm, however due to the small sample size, it cannot be determined with certainty.	Avoid and Mitigate – Fire services should continue to monitor reporting of ignition sources.
	Motor vehicle collisions and public service incidents represent more than half (54%) of calls (all stations).	Accept Risk: Fire services should continue to monitor call volume and response times to ensure they maintain adequate levels of response to MVC at peak times.
	Carbon monoxide (CO) related incidents accounted for 8% of all station responses, which is a relatively high number in comparison to the province.	Avoid and Mitigate: Increased public education may be warranted.

Mandatory Profile	Top Risk or Issues/Concerns	Preferred Treatment Option
	Second station responses accounted for more than 12% of all incident types and occurred for almost 15% of all unique incidents (=217 incident of 1472 unique incidents). This may leave communities vulnerable.	Accept Risk: The frequency that a station provides a second station response and the frequency a station requests a second station response should be monitored and the cause considered. This is however typical for a rural all volunteer municipality.
Past Loss and Event History Profile	***Bryanston Station, in comparison to other stations, frequently requests a second station response, particularly from Arva and Ilderton, potentially leaving these communities under serviced.***	Accept Risk: A service level review will be conducted as a part of the 2020 Fire Master Plan to determine cause and if any need for changes to service levels.
	Most incidents are occurring during the daytime hours when people are most active and or traffic flow is highest, and the majority of POC volunteer firefighters are likely to be at work	Accept Risk: A service level review will be conducted as a part of the 2020 Fire Master Plan to determine cause and if any need for changes to service levels.

APPENDICES

Appendix A: List of Figures, Maps, Images, and Tables

Appendix B: Worksheets

Appendix A: List of Figures, Maps, Images, and Tables

Appendix B: Worksheets

Worksheet 1 Geographic Profile	
Geographical Feature	Potential Impact of Delivery of Fire Protection Services
Rivers	• Lower Thames River is prone to flooding in the Delaware and Killworth regions impacting response time and service delivery • Smaller creeks and streams throughout region used for recreation • Ice jams leading to flooding • Impacts training and equipment for response service delivery • Creates need for specialized training and equipment for ice and water rescue
Highways and Roadways	• 500 km of roadways • Highway 402 runs East to West south of Delaware • Highway 401 runs along southeastern corner of the boundary • Highway 4 running from London, north through Arva and Birr Highway 22 running west from London through Melrose, Lobo, and Poplar Hill • Many secondary and rural rods • Heavy machinery travelling on main and secondary routes • Dangerous goods routes and main heavily used transportation routes • Heavy traffic impacts response times • High instance of MVCs • May create need for heavy equipment lifting for accident cleanup or extrication • Potential need for specialized dangerous goods response training and equipment (or mutual aid partners) • Rural roads may damage apparatus (poorly maintained, inclement weather and not properly cleared)
Bridges	• 49 bridges maintained by Middlesex Centre • Disruption on bridge can lead to response delay • Construction may create long detours (particularly over the Thames River) • Creates hazards for motorists (falling debris, people jumping) • Creates potential for high-angle rescue and need for specific training and equipment
Lake	• Lake effect brings heavy precipitation in winter and spring months • Submerged, obstructed roadways slowing response time • Calls for vehicle extrication and rescue • Extreme humidity prompting more medical calls

Worksheet 1 Geographic Profile	
Geographical Feature	Geographical Feature
Recreational Area	• Two conservation areas for local camping and fishing activities • Increased activity in these areas during summer months for camping and recreation, • Prescribed burns, reducing visibility • Prompting false alarms, increased demand • Outdoor fire risk increases

Worksheet 2 – Building Stock Profile							
Occupancy Classification		# of Buildings /# of LWC Buildings (where known)	Issues/Concerns	Measures to Reduce Risk	Probability	Consequence	Assigned Risk Level
Group A2	Assembly (not otherwise defined)	10/2	• Heavy timber construction • High fire load (furniture and decorations) • High occupancy unfamiliar with emergency exit protocols • Historical significance	• Regular inspections • Automatic fire detection and monitoring systems, education of operators on capital improvements for fire sprinkler upgrading on older facilities. • Fire drills as required by OFC • Pre-fire planning by fire suppression staff • Approved fire safety plans and staff training	Unlikely	Major	Moderate
Group A3	Assembly (arena)	2	• Heavy timber construction • High fire load • High occupancy unfamiliar with emergency exit protocols		Rare	Major	Moderate

Worksheet 2 – Building Stock Profile							
Occupancy Classification		# of Buildings /# of LWC Buildings (where known)	Issues/Concerns	Measures to Reduce Risk	Probability	Consequence	Assigned Risk Level
Group A4	Assembly (open air)	3	• Limited access or egress (when controlled) • Difficulty in access of apparatus • High occupancy (for events etc.) with little knowledge of evacuation procedures, muster points etc.	• Regular inspections • Automatic fire detection and monitoring systems • Approved fire safety plans and staff training • Pre-fire planning by fire service	Rare	Moderate	Low
Group B1	Detention Occupancies	0/0	N/A	N/A	N/A	N/A	N/A

Worksheet 2 – Building Stock Profile							
Occupancy Classification		# of Buildings /# of LWC Buildings (where known)	Issues/Concerns	Measures to Reduce Risk	Probability	Consequence	Assigned Risk Level
Group B2	Care and Treatment	4/0	• Elderly residents with mobility, cognitive behavioural issues • High fire load (furnishings, chemicals etc.) • Immediate needs following evacuation (shelter, medical needs) • Evacuated may need specialized transportation • Homes that were not required to upgrade with sprinklers	• Regular inspections • Automatic fire detection and monitoring systems, education of operators on capital improvements for fire sprinkler upgrading on older facilities • Pre-fire planning by suppression staff	Unlikely	Major	Moderate

Worksheet 2 – Building Stock Profile							
Occupancy Classification		# of Buildings /# of LWC Buildings (where known)	Issues/Concerns	Measures to Reduce Risk	Probability	Consequence	Assigned Risk Level
Group C	Single Family	6,912/3,412	• Lack of smoke and CO alarms • Lack of escape plan • Lack of fire extinguisher • Lack of residential sprinklers • Many structures of an older age (balloon construction) • Cluttered conditions • Many homes in remote areas of the region • Secondary suites (legal and illegal)	• Increase public education on home fire safety, smoke alarm testing and escape planning. • Increase communications with development and renovation contractors on home fire sprinkler advantages	Likely	Moderate	Moderate
	Multi-residential	165	• High occupancy • Lack of an escape plan • Lack of, or inoperable fire extinguisher and knowledge of their operation • Not constructed to OBC or OFC standards	• Regular inspections • Automatic fire detection and monitoring systems • Approved fire safety plans and staff training • Fire extinguisher training • Pre-fire planning by fire suppression staff • Regular fire drills	Possible	Moderate	Moderate

Worksheet 2 – Building Stock Profile							
Occupancy Classification		# of Buildings /# of LWC Buildings (where known)	Issues/Concerns	Measures to Reduce Risk	Probability	Consequence	Assigned Risk Level
Group C	Hotels/ Motels	0	• Transient population not familiar with the building's safety features (i.e. emergency exits, location of pull stations, not familiar with location of fire extinguishers)	• Regular inspections • Automatic fire detection and monitoring systems, education of operators on capital improvements for fire sprinkler upgrading on older facilities • Approved fire safety plans and staff training • Pre-fire planning by fire suppression staff Employee/owner fire extinguisher training	Unlikely	Moderate	Moderate
	Mobile Homes and Trailers	8	• High combustibility due to construction materials • High fire loads and in some cases hoarding • Seasonal usage • Trailer parks with limited access routes	• Regular inspections • Automatic fire detection and monitoring systems • Fire extinguisher training	Unlikely	Moderate	Moderate
	Other	0	N/A	N/A	N/A	N/A	N/A

Worksheet 2 – Building Stock Profile							
Occupancy Classification		# of Buildings /# of LWC Buildings (where known)	Issues/Concerns	Measures to Reduce Risk	Probability	Consequence	Assigned Risk Level
Group D	Personal Service	6/1	• Small local business • Possibly heavy timber construction or common basements • Office supplies and egress multi-unit office buildings	• Regular inspection cycles • Maintain OFC compliance			
Group E	Mercantile	13/1	• Large number of occupants and combustibles • Occupants unfamiliar with evacuation plans • Potential for larger multi-occupancy with high content value fires increases negative financial impact	• Regular fire prevention inspection cycles to maintain OFC compliance • Approved fire safety plans and staff training • Pre-fire planning by fire suppression staff	Unlikely	Major	Moderate

Worksheet 2 – Building Stock Profile							
Occupancy Classification		# of Buildings /# of LWC Buildings (where known)	Issues/Concerns	Measures to Reduce Risk	Probability	Consequence	Assigned Risk Level
Group	Industrial	10/2	• Unknown chemicals on-site • Many sources of ignition • Many occupants • Lack of current emergency plan • High fire loads • Lack of sprinklers/fire detection/alarm systems (not required by code)	• Regular fire prevention inspection cycles to maintain OFC. compliance • Approved fire safety plans and staff training in evacuation • Pre-fire planning by fire suppression staff • Fire Extinguisher training for staff	Unlikely	Major	Moderate
Other	Occupancies not classified in OBC such as farm buildings	2,747/938	• Very old construction of heavy timbers • High fire loads i.e., hay, straw, farm equipment • Risk to livestock • Open concept in driving sheds and barns • Lack of fire stops • Poor housekeeping • Vacant and abandoned structures • Structures used for unintended purposes	• Fire Smart • Public education programs	Unlikely	Minor	Low

Worksheet 3 Critical Infrastructure Profile	
Identified Critical Infrastructure	Issues / Concerns
Electricity Transmission and Distribution	• Downed power lines • Lack of heat/cooling resulting in increased assistance calls • Rescue operations for individuals improperly running generators • Fires sparked by downed lines and transformers
Radio Communications	• Inability to communicate with crew • Lack of means to communicate with first responders • Lack of uninterrupted power supply to radio systems and computers
Telecommunications	• Telephone lines, cell towers go downs • Lack of means of notifying first responders • Inability to complete transactions • Some areas with no or poor coverage
Gas Distribution	• Leaks in transmission lines • Leaks in homes and/or places of assembly requiring evacuation • Loss of heating for private homes
Roadways	• Combination of high-class, low-class paved and gravel roads • 88% of roads are rural • 48% of roads are gravel • Overall road condition good, roads in residential areas good, however roadways between communities can be poor • Poor road conditions due to snow, ice, heavy rain • Traffic accidents in area with high traffic • Damaged / impassable roads • Rural roads not well maintained • Spring load restrictions
Financial Institutions	• Disruption to commerce to do power failure, cyber attack, health emergency
Emergency Operations Centre	• Inability to operate – location in proximity to event • Damage to property • Inability to access (power, weather, roadways)
Dispatch Centre	• Calls not dispatched or not dispatched on time (unknown if there is a secondary backup location to route to?)
Government Operations	• Municipal government closed due to extreme weather, cyber attack, health emergency, location, civil disruption

Worksheet 3 Critical Infrastructure Profile	
Identified Critical Infrastructure	Issues / Concerns
Supply Chain Disruption	• Delayed apparatus – going over lifetime • Inability to obtain/replenish PPE • Increase cost of running apparatus • Increase cost of workforce – potential for shortage
Assisted Living Residences	• Large number of people with mobility issues • Potential communication issues • Need for specialized medical equipment
Outbreak/Illness	• Reduced • Work • Force • Inability to run apparatus • Increase cost of PPE • Increased medical calls
Emergency Shelters	• Lack of or failure of back up power supply • Evacuations due to fire, flood, gas, or hazardous material release • Long-term evacuations due to damage to building • Unable to accommodate vulnerable citizens • Lack of potable water and sanitation • Mental disabilities, instabilities

Worksheet 4a Demographic Profile		
Ages of Population	# of People	% of Total Population
0 to 4 years	1000	5.3
5 to 9 years	1225	6.5
10 to 14 years	1420	7.5
15 to 19 years	1260	6.7
20 to 24 years	900	4.6
25 to 29 years	765	4.0
30 to 34 years	865	4.6
35 to 39 years	1160	6.1
40 to 44 years	1285	6.8
45 to 49 years	1315	6.9
50 to 54 years	1275	6.7
55 to 59 years	1475	7.8
60 to 64 years	1410	7.4
65 to 69 years	1195	6.3
70 to 74 years	955	5.0
75 to 79 years	715	3.8
80 to 84 years	390	2.1
85 to 89 years	195	1.0
90 to 94 years	90	0.5
95 to 99 years	25	0.1
100 years and over	5	0.03
0 to 14 years	3650	19.3
15 to 64 years	11705	61.8
65 years and over	3575	18.9
85 years and over	315	1.7
Average age of the population	41.6	
Median age of population	43.6	
Year-round tourists from London and other nearby cities		
Seasonal tourists in summer for recreation at conservation areas (low influx)		
Total Population 18929 (2021)		

Worksheet 4b Demographic Profile Risks	
Identified Demographic Group	Issues/Concerns
Immigrant Population	• Language barriers • Traditions that present fire safety concerns • Low immigration population
Senior Population	• Mobility issues • Cognitive issues • Currently 3 seniors' homes with
Tourist Population	• Not familiar with community risk factors • No familiar with location when calling 911 • Increased risk in summer months with recreational activity such as swimming, boating, fishing, and camping • Currently 1 number campgrounds with • Low seasonal influx of tourists
Homeless Population	• Homeless population is Middlesex County is less visible (staying with friends etc.) • Locating and obtaining housing is difficult, with a vacancy of bachelor apartments only 2.1% for the county.
Vulnerable Population (childcare, schools)	• Six Elementary Schools • One High School • Arva Grains • Masterfeeds • Two Nursing Homes • Three Seniors Homes • Crest Support Services • Bruce Residence – Strathroy (group home) • The total number of people included in the vulnerable groups is approximately 2,845 individuals – 2,575 are from schools and 270 are from nursing homes or special care facilities (2012)

Worksheet 5 Hazard Profile			
Identified Hazard	Probability	Consequence	Assigned Risk Level
Agricultural and food emergency	Possible	Major	Moderate
Aircraft Incident	Rare	Catastrophic	Moderate
Chemical Fire (ICFAR)	Rare	Catastrophic	Moderate
Critical infrastructure failure	Likely	Major	Moderate
Cyber Attack	Possible	Major	Moderate
Drought – Low Water	Likely	Moderate	Moderate
Dust explosion	Almost Certain	Major	High
Fire/explosion	Almost Certain	Major	High
Flood	Likely	Major	Moderate
Fog	Likely	Moderate	Moderate
Hazardous materials release/spill/fire	Likely	Major	High
Industrial fire	Likely	Major	Moderate
High-Angle Rescue	Unlikely	Minor	Low
Illness/Outbreak (local)	Possible	Moderate	Moderate
Illness/Outbreak (pandemic)	Possible	Catastrophic	High
Motor vehicle incident	Almost Certain	Minor	Moderate
Oil and gas emergency	Possible	Moderate	Moderate
Potable Water Emergency	Possible	Moderate	Moderate
Severe thunderstorm/lightning	Almost Certain	Minor	Moderate
Snowstorm/hail/freezing rain	Almost Certain	Minor	Moderate
Swift water rescue	Likely	Minor	Moderate
Tornado	Possible	Major	Moderate
Train Derailment	Possible	Major	Moderate
Wildland Urban Interface Fires	Possible	Major	Moderate

Worksheet 6 Public Safety Response Profile			
Identified Public Safety Response Agency	Types of Incidents they Response to	What is their role at the incident	Issues/Concerns
Ontario Provincial Police – Middlesex Detachment	• MVCs • Traffic incidents • Criminal incidents • Medical calls • Public assistance • Public disturbance	• Traffic control • Investigations • Scene stabilization • Public evacuation	• None
Strathroy-Caradoc Police Services	• MVCs • Traffic incidents • Criminal incidents • Medical calls • Public assistance • Public disturbance	• Traffic control • Investigations • Scene stabilization • Public evacuation	• What level of service will the fire service provide before and after EMS arrival? • Supporting role unless mass casualty
Middlesex – London Paramedic Services	• Primary and advanced medical care • MVCs	• Patient stabilization • Patient transportation Patient extrication standby	• Provide supportive response • Initial response during technical incidents • Lead incident during HazMat incidents
Victim Services of Middlesex - London	• Homicide / attempted • Serious assault • Domestic violence • Sexual assault • Hate crimes •	• Vitim assistance • Victim support and needs assessment •	• None
CANUTEC	• Hazardous spills/emissions	• Product information • Safe handling information • emergency actions	• Not on scene
Ministry of Environment	• Spills	• Cleanup and remediation supervision and support	• None

Worksheet 6 Public Safety Response Profile			
Emergency Management Ontario	• Large-scale emergencies requiring declaration of state of local emergency	• Provincial level support • Communication	• None
First Response	• Hazardous spills/emissions	• Emergency cleanup • Technical specialists • Specialized equipment	• Response time

Worksheet 7: Community Services Profile		
Community Service Agency	Types of Assistance they Provide	Issues/Concerns
Community Emergency Response Volunteers	• 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	• Inexperienced, potentially unequipped • Exact representation numbers may not be reliable • Secondary injuries
2-1-1	• Emergency communications for public • Reporting and documenting incident reports	• Quality of information received and communicated • Delays in communication • Public not aware of how to get information
Women's Rural Resource Centre	• Emergency support for females experiencing domestic violence • Long-term recovery support for victims	• Determining who will make contact and when • Victim may not want assistance
Vanier Children's Mental Wellness	• Support to families with children struggling with mental health issues	• Determining who will make contact and when • Victim may not want assistance
Merrymount Family Support and Crisis Centre	• Support to families with children struggling with mental health issues	• Determining who will make contact and when • Victim may not want assistance
Children's Aid Society	• Protect needs of children • Facilitate adoption if necessary	• Determining who will make contact and when • Victim may not want assistance
Canadian Red Cross	• Assist with obtaining basic needs of those victims of large-scale disaster • Emergency shelter and feeding locations • Donation management	• May need to be re-deployed • Temporary only

Worksheet 7: Community Services Profile		
Community Service Agency	Types of Assistance they Provide	Issues/Concerns
Salvation Army	• Donation management • Food/clothing • Victim support • Long-term recovery support for victims	• Low oversight of management of funds • Low availability of needed items
St John's Ambulance	• Medical support for reception centres • Health related screening • Transportation for victims • Assist with evacuation of hospitals and health care facilities • Training	• May need to be re-deployed
Ontario SPCA	• Responds to needs of animals in event of emergency/disaster	• Limited space or ability to move large livestock
Mennonite Disaster Service	• Cleanup and debris removal	• Hazardous materials exposure
Samaritan's Purse	• Can remove damaged or destroyed content from homes • Clean and remediate flooded homes	• Hazardous materials exposure
Team Rubicon	• Incident management assistance • Disaster management • Infrastructure support • Hazard mitigation • Light demo and debris removal	• May need to be re-deployed
Society of Saint Vincent de Paul	• Provide vouchers to obtain furniture, clothing, and accessories	• Low oversight of management of funds • Low availability of needed items
ADRA	• Manages collection, triage, storing and distribution of in-kind donations	• Low oversight of management of funds • Low availability of needed items

Worksheet 7: Community Services Profile		
Community Service Agency	Types of Assistance they Provide	Issues/Concerns
GlobalMedic	• Deploy large field tents for infrastructure and logistical needs, filed hospitals, clinics • Medically trained paramedics, first responders, doctors, and nurses	• May need to be re-deployed • Temporary only
Billy Graham Rapid Response Team	• Chaplains trained for emotional and spiritual care following a disaster	• None
World Renew Disaster Response Services	• Rebuilding projects • Unmet needs assessment	• High-cost solution

Worksheet 8 Economic Profile			
Identified Occupancy	Key Risk	Probability	Assigned Risk Level
Agriculture (farm)	Drought	Likely	Moderate
	Severe storm	Almost Certain	Moderate
	Tornado	Possible	Moderate
	Wildfire	Possible	Moderate
	Pests	Unlikely	Moderate
Agriculture (feed mill)	Fire/explosion	Likely	High
	Supply chain disruption	Possible	Moderate
Agriculture (agri-tourism)	Drought	Likely	Moderate
	Severe storm	Almost Certain	Moderate
	Tornado	Possible	Moderate
	Wildfire	Possible	Moderate
	Pests	Unlikely	Moderate
	Pandemic	Possible	Moderate
Arts	Fire/explosion	Likely	Low
	Pandemic	Possible	Low
75% of employed residents travel outside of the community (mostly to London) for various types of work. Biggest risk is inability to travel i.e. loss of roadway infrastructure, which is out of scope for this CRA.			

Worksheet 9a Past Loss and Event History Profile – Fire and Emergency Calls										
Occupancy Classification	Year: 2017					Year: 2018				
	Fires	$ loss	Injuries	Deaths	Causes	Fires	$ loss	Injuries	Deaths	Causes
Group A	0	0	0	0	Vandalism, mechanical failure, misuse of ignition source, undetermined, vehicle collision	0	0	0	0	Design/maintenance, misuse of ignition source, undetermined
Group B	0	0	0	0		0	0	0	0	
Group C	5	1,605,700	1	0		6	2,695,002	0	0	
Group D	0	0	0	0		0	0	0	0	
Group E	1	130,000	0	0		0	0	0	0	
Group F	2	150,000	0	0		0	0	1	0	
Other OBC	2	11,000	0	0		2	13,000	0	0	
NFBC	5	3,628,900	0	0		0	0	0	0	

Worksheet 9a Past Loss and Event History Profile – Fire and Emergency Calls										
Occupancy Classification	Year: 2019					Year: 2020				
	Fires	$ loss	Injuries	Deaths	Causes	Fires	$ loss	Injuries	Deaths	Causes
Group A	0	No Data	0	0	Design/maintenance, undetermined	2	No Data	0	0	Arson, design/maintenance, mechanical failure, misuse of ignition source, undetermined
Group B	0		0	0		0	0	0	0	
Group C	2	60,500	0	0		6	1,032,700	1	0	
Group D	0		0	0		0	0	0	0	
Group E	1	13,000	0	0		0	0	0	0	
Group F	1	10,000	0	0		1	17,000	0	0	
Other OBC	0	0				0	0	0	0	
NFBC	0	0	0	0		3	226,150	0	0	

Worksheet 9a Past Loss and Event History Profile – Non-Fire Emergency Calls										
Non-Fire Emergency Calls	2017		2018		2019		2020		2021	
	# Calls	%	# Calls	%	# Calls	%	# Calls	%	# Calls	%
MVC	106	30.11	97	28.20	112	33.84	87	26.52	104	27.37
CO	24	6.82	28	8.14	23	6.95	30	9.15	34	8.95
Utilities	12	3.41	21	6.10	13	3.9	10	3.05%	19	5.00
Public assist	17	4.83	15	4.36	16	4.83%	12	3.66	14	3.68
Open burn	14	3.98	26	7.56	16	4.83	27	8.23	13	3.42
Fire - vehicle	14	3.98	11	3.20	22	6.65	20	6.10	19	5.00
Fire - structure	23	6.53	11	3.20	7	2.11	15	4.57	22	5.79
Fire - field	2	0.57	0	0.00	0	0.00	3	0.91	12	3.16
Medical	36	10.23	47	13.66	44	13.29	42	12.80	42	11.05
Monitor alarm	29	8.24	34	9.88	46	13.90	27	8.23	38	10.00
Low angle	0	0.00	1	0.29	0	0.00	1	0.30	4	1.05
Water/ice	1	0.28	0	0.00	4	1.21	1	0.30	1	0.26
UTV	0	0.00	0	0.00	0	0.00	1	0.30	2	0.53
Second station	66	18.75	41	11.92	23	6.95	39	11.89	48	12.63
Mutual/auto aid	8	2.27	12	3.49	5	1.51	13	3.96	8	2.11
Total	352	100.00	344	100.00	331	100.00	328	100.00	380	100.00

Worksheet 9b: Past Loss and Event History				
Occupancy Type/Location/Risk	Causes	Probability	Consequences	Assigned Risk Level
Group A 3 Assembly (place of worship)	Fire	Likely	Major	High
Group B	Fire	Not applicable	n/a	n/a
Group C (detached dwelling)	Fire	Almost Certain	Moderate	High
Group D	Fire	Unlikely	Moderate	Moderate
Group E	Fire	Likely	Major	High
Group F (recycling facility)	Fire	Likely	Major	High
Group F (grain manufacturing facility)	Fire	Likely	Major	High
Other not Classified by OBC	Fire	Likely	Moderate	Moderate
Classified Under Farm Building Code	Fire	Likely	Minor	Moderate
MVC		Almost Certain	Minor	Moderate
CO		Almost Certain	Minor	Moderate
Utilities		Almost Certain	Minor	Moderate
Public Assist		Almost Certain	Insignificant	Moderate
Open Burn		Almost Certain	Minor	Moderate
Fire-vehicle		Almost Certain	Minor	Moderate
Fire-structure		Almost Certain	Moderate	High
Fire-field		Likely	Minor	Moderate
Medical		Almost Certain	Insignificant	Moderate
Monitor alarm		Almost Certain	Insignificant	Moderate
Low angle		Likely	Minor	Moderate
Water/ice		Likely	Minor	Moderate
UTV		Likely	Minor	Moderate
Second station		Almost Certain	Moderate	High
Mutual/auto aid		Almost Certain	Moderate	High

Worksheet 10: Identifying Treatment Options for Top Risks in Community		
Mandatory Profile	Top Risk or Issues/Concerns	Preferred Treatment Option
Geographic Profile	***Poor roads can lead to damaged apparatus and delayed response to calls. Requests for mutual aid if needed may be challenged by poor connectivity due to road conditions, apparatus weight etc.***	Avoid and Mitigate – Maintain knowledge of status of key roadways to plan detours. Involve fire services in pre-planning for improvement projects and infrastructure projects that impact major roadways.
	Large amounts of commuters, increases the potential for MVCs, particularly on major routes during peak times.	Accept Risk – Implement appropriate response protocols, SOGs and activities. Ensure appropriate staffing and backup at peak times.
	High potential for dangerous goods incident, particularly on 400 series (provincial highways).	Accept Risk – Implement appropriate response protocols, SOGs and activities.
	Mutual aid response for dangerous goods incidents would be coming from Hamilton, Ontario. With the 400 series highways and Highway 2 in proximity to Delaware, Kilworth/Komoka areas, it is suggested this station is most likely to respond to this type of call.	Accept Risk – Implement appropriate response protocols, SOGs and activities. Ensure appropriate staffing and backup at peak times for Komoka and Delaware Stations.
	Certain times of the year, roadways may be unsuitable to be travelled by some apparatus, potentially resulting in reduced response times and/or damaged apparatus.	Avoid and Mitigate – Maintain knowledge of status of key roadways to plan detours. Involve fire services in pre-planning for improvement projects and infrastructure projects that impact major roadways.
	The large number of bridges in the municipality, and their deteriorating condition, have the potential to reduce connectivity of the road network due to restrictions or closures, resulting in potential delays to response time.	Avoid and Mitigate – Maintain knowledge of status of key roadways to plan detours. Involve fire services in pre-planning for improvement projects and infrastructure projects that impact major roadways.

Worksheet 10: Identifying Treatment Options for Top Risks in Community		
Mandatory Profile	Top Risk or Issues/Concerns	Preferred Treatment Option
Geographic Profile	***Bridges over waterways pose the possibility for a hazardous release into waterways and/or high-angle rescue.***	Accept Risk – Implement appropriate response protocols, SOGs and activities.
	Grade level rail crossings have the potential to create a physical barrier to connectivity to the roadway network, causing delays in response time.	Any critical at-grade rail crossings should be identified and alternate routes mapped.
	The passage of dangerous goods along the rail line increases the risk of a derailment impacting the public as well as the surrounding environment (including waterways) and require a specialized response and equipment.	Accept Risk – Implement appropriate response protocols, SOGs and activities. Review and update response agreements.
	Water rescues occur at least once annually in the region, prompting the deployment of specialized equipment and the requirement for technical rescue training. With the Thames River in proximity to Delaware, Kilworth/Komoka areas, it is suggested this station is most likely to respond to this type of call.	Avoid and Mitigate – ensure public education efforts for residents and tourists. Ensure signage in hazardous areas.
		Accept Risk – Implement appropriate response protocols, SOGs and activities.
	There exists a risk of ice rescue during the winter months attributed to recreational activities on storm ponds. Proper signage and community awareness should address the risk of unauthorized recreation on storm ponds.	Avoid and Mitigate – proper signage enforcement and community awareness should address risk.
		Accept Risk – Implement appropriate response protocols, SOGs and activities.
	Due to the 'lake effect', severe weather events and temperatures are possible during any time of the year and may increase call volume and create hazardous conditions for responders.	Accept Risk – Implement appropriate response protocols, SOGs and activities.

Worksheet 10: Identifying Treatment Options for Top Risks in Community		
Mandatory Profile	Top Risk or Issues/Concerns	Preferred Treatment Option
Geographic Profile	***The risk of rescue calls in parks increases during particularly during summer months.***	Avoid and Mitigate – proper signage enforcement and community awareness should address risk.
		Accept Risk – Ensure service levels remain adequate during peak seasons.
	Due to the rural nature of the area and recreational activities, open burning can pose a threat of WUI fires.	Avoid and Mitigate - Annual public education and reinforcement activities may help curb the risk associated with open burning
Building Stock Profile	***Group C - Residential Occupancies represent 69.49% of the municipality's existing property stock and were associated with 49.1% of the historical structure fires from 2016 to 2020.***	Avoid and Mitigate - Public education and awareness are key in any community.
	As the municipality continues to grow and develop the potential fire-related risks associated with building density and exposures will increase.	Avoid and Mitigate – The fire service should be involved in community planning to maintain appropriate levels of service when there is growth or change expected in a community.
	47.08% of the municipality's building stock was build prior to 1981, therefore presents a higher fire risk. The municipality has access to building stock data through MPAC.	Accept Risk – buildings built prior to 1981 may not follow fire code standards and may be vulnerable to rapid spread. MPAC data can provide fire services with this building info.
	High-fire risk occupancies can pose a serious risk to the occupants, as well as to first responders.	Avoid and Mitigate - These properties should be routinely inspected to ensure they are being properly maintained, have adequate fire water and are using safe storage practices.

Worksheet 10: Identifying Treatment Options for Top Risks in Community		
Mandatory Profile	Mandatory Profile	Mandatory Profile
Building Stock Profile	***Fires in buildings that use lightweight construction pose a significant risk of injury and death to firefighters, due to their potential rapid collapse.***	Avoid and Mitigate - It is essential that fire services are aware of the use of lightweight construction materials when responding to a structure fire. The municipality has access to MPAC data to make a relative assumption based on construction date, however no absolute data exists. When known this information should be provided to the fire services.
	High-fire life safety occupancies can pose a serious risk to the occupants, as well as to first responders.	Avoid and Mitigate - These properties should be routinely inspected to ensure they are being properly maintained, have adequate fire detection equipment and fire water. These types of occupancies may not have been required to update with sprinkler systems and should be inspected to ensure they are meeting new regulations/requirements.
Critical Infrastructure Profile	***Only 56% of properties serviced by the municipal water system.***	Accept Risk: It is essential to develop a water servicing strategy for those areas requiring water flow for firefighting.
Demographic Profile	***Over 25% of the population of the municipality is aged 60 and over and expected to increase by an approximate 14.5% over the next decade.***	Avoid and Mitigate: This age group has a higher over all fire life-safety risk and may indicate an increase in fire-related fatalities. Education and inspections should continue to target these demographics, in particular senior living facilities.

Worksheet 10: Identifying Treatment Options for Top Risks in Community		
Mandatory Profile	Top Risk or Issues/Concerns	Preferred Treatment Option
Demographic Profile	***A cross analysis of age and low-income status would suggest that roughly 14% the municipality's population reside in low-income status.***	Avoid and Mitigate: Although lower than the provincial percentages, low-income status, particularly combined with age (0 to 5 and 65 and over) have an increased fire risk and fire-safety risk. Public education and awareness should continue to target low-income households.
	The municipality relies significantly on the utilization of paid-on-call firefighters for the delivery of fire suppression services.	Accept Risk – Fire services must monitor retention levels and ensure this model remains sustainable.
	With the majority of the population travelling some distance (mostly to London) for employment, there is a significant increase in the potential for MVCs during peak hours. Of particular concern, is the 400 series highways, closest to Kilworth/Komoka stations.	Accept Risk – Fire services must monitor retention levels and ensure this model remains sustainable.
Hazard Profile	***MCFS should routinely review the municipality's HIRA as well as their most hazardous response calls and ensure members are properly equipped and prepared to respond.***	Accept Risk – Fire services must continue to monitor call response types and times to maintain adequate service levels.
Economic Profile	***The local economy is heavily reliant on the agricultural sector, with potential future expansion.***	Accept Risk: A major upset to the industry i.e. floods, drought, fires could have a negative impact on the local economy. Fire services must continue to provide an adequate level of service to this sector.

Worksheet 10: Identifying Treatment Options for Top Risks in Community		
Mandatory Profile	Top Risk or Issues/Concerns	Preferred Treatment Option
Past Loss and Event History Profile	***A large percentage of agricultural buildings may attribute to a higher-than-average number of fires of this occupancy type. Further, farm properties are also significantly more valuable than a typical residence.***	Accept Risk Education, inspection (where applicable) and enforcement of fire protection standards for agricultural buildings should be routine.
	There may be a potential lack of reporting of ignition sources, however due to small sample size this cannot be determined with certainty.	Avoid and Mitigate – Fire services should continue to monitor reporting of ignition sources.
	There may be a lack of reporting on the presence of a smoke alarm, however due to the small sample size, it cannot be determined with certainty.	Avoid and Mitigate – Fire services should continue to monitor reporting of ignition sources.
	Motor vehicle collisions and public service incidents represent more than half (54%) of calls (all stations).	Accept Risk: Fire services should continue to monitor call volume and response times to ensure they maintain adequate levels of response to MVC at peak times.
	Carbon monoxide (CO) related incidents accounted for 8% of all station responses, which is a relatively high number in comparison to the province.	Avoid and Mitigate: Increased public education may be warranted.
	Second station responses accounted for more than 12% of all incident types and occurred for almost 15% of all unique incidents (=217 incident of 1472 unique incidents). This may leave communities vulnerable.	Accept Risk: The frequency that a station provides a second station response and the frequency a station requests a second station response should be monitored and the cause considered. This is however typical for a rural all volunteer municipality.

Worksheet 10: Identifying Treatment Options for Top Risks in Community		
Mandatory Profile	Top Risk or Issues/Concerns	Preferred Treatment Option
Past Loss and Event History Profile	***Bryanston Station, in comparison to other stations, frequently requests a second station response, particularly from Arva and Ilderton, potentially leaving these communities under serviced.***	Accept Risk: A service level review will be conducted as a part of the 2020 Fire Master Plan to determine cause and if any need for changes to service levels.
	Most incidents are occurring during the daytime hours when people are most active and or traffic flow is highest, and the majority of POC volunteer firefighters are likely to be at work	Accept Risk: A service level review will be conducted as a part of the 2020 Fire Master Plan to determine cause and if any need for changes to service levels.