TOWNSHIP OF MUSKOKA Lakes™


# Fire Station Location Study – Phase II: Development and Identification

EMG Emergency Management Group


FIRE
TOWNSHIP OF MUSKOKA Lakes
RESCUE

# Fire Station Location Study – Phase II: Development and Identification

Prepared for the Muskoka Lakes Fire Department

Muskoka Ontario

FINAL REPORT

April 2024

Prepared by:

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TOWNSHIP OF MUSKOKA Lakes

FIRE RESCUE

EMG Emergency Management Group

# INTRODUCTION

# INTRODUCTION

This project is a result of a recommendation that came out of the 2022 Fire Master Plan (FMP). In that report, the Emergency Management Group Inc. (EMG) (formerly known as Emergency Management & Training Inc.) presented three fire station alignment recommendations and suggested that a more in-depth study be conducted to review those recommendations.

The Phase I report involved a comprehensive data collection process as well as an assessment process that examined three aspects of the existing fire stations – their structural condition, their operational functionality, and the financial performance of each. This Phase II report builds on the Phase I findings and includes the recommended options for fire stations realignment and/or relocation as needed.

In Phase II of the project, a continued analysis of the data collected (updated review of call locations and condition of the facilities), and any required stakeholder engagement will follow. At the acceptance of this Phase II report, a final report will then be prepared for Council's consideration that incorporates this stakeholder feedback.

## The Needs Assessment

The first consideration of facility planning should be a needs assessment of the community and Department to list specific requirements for the station in terms of the following:

- Station – is it large enough to meet the response needs of the Department and community serves?
- Equipment (e.g., apparatus), and accommodation to house all the required equipment to meet the fire station and firefighters needs, and
- Firefighter safety and health (e.g., cancer prevention and fitness). Does the fire station meet all health and safety requirements?

The goal of this Phase II study is to build upon the fire station and equipment assessments, along with reviewing current response capabilities of the existing layout of fire station and staff resources.

Regarding the fire station assessment, what the station will house should be considered. Further, does the present design of the fire station meet the existing needs of the Department, and will the station continue to meet the needs of the Department and the community is serves?

Further information will be presented in report regarding:

- Designing a Level of Service for the Community
- Fire Station Alternatives
- Evaluation and Preferred Alternative
- Implementation
- Station Design and Considerations

# SECTION 1
## PHASE I SUMMARY

Emergency Management Group

# SECTION 1 – PHASE I SUMMARY

## 1.1 Current State

Currently, the Township of Muskoka Lakes has 10 fire stations housing more than 20 fire apparatus (not including small vehicles and fire boat docking/housing facilities). The Department has separated the community into seven response zones called districts.

The 2022 FMP was a comprehensive analysis of all aspects of the services delivered by the Muskoka Lakes Fire Department (MLFD). It examined the administrative elements of the Department as well as various functional elements, including emergency operations, staff development, and fire prevention measures being actively undertaken in the Township.

Focusing on the issue of fire stations, the FMP described the current state of the fire facilities as follows:

> *"Throughout the walk-through by EM&T, it was evident that many of the Muskoka Lakes fire stations are nearing or at maximum capacity for storage of vehicles and equipment. It was also noted that even though some improvements have been made since 2014, there are still quite a few concerns remaining, such as:*
>
> - *The proximity of the firefighter's gear in relation to the vehicle exhaust, which is a known health concern.*
> - *None of the fire stations' apparatus bays have floor drains with oil separator (catchment) systems that is an environmental concern.*
> - *All the stations except for Port Carling appear to be at maximum capacity for vehicles and equipment storage. There was a notable shortage of proper storage areas/facilities for the equipment.*
>
> *For many of the fire stations space is at a premium, and some type of storage facility should be incorporated at many of the fire stations. Future stations should be built with this space requirement in mind.*[i] *Space between vehicles must allow for safe and easy access between vehicles to reduce the possibility of persons becoming trapped between vehicles as they are being driven in and out of the fire station."*

The FMP went on later to offer the following commentary:

> *"During the review of response data and station facilities in both this 2022 review and the previous 2014 master plan document it was noted that there is an opportunity to close the Glen Orchard and Torrance fire stations and utilize the equipment and staffing by merging them within the Foot's Bay, Bala, and Port Carling stations.*
>
> - *The Glen Orchard station is a one-bay garage that houses one vehicle and related firefighting equipment. Absent of on-site showers, washrooms, office space, or even a proper training room. To renovate this station to bring it up to a more functional level would be cost-prohibitive.*
> - *The Torrance Fire Station is better equipped than the Glen Orchard fire station to meet the needs of the firefighters but due to its proximity to the Bala Fire Station, an opportunity also exists to merge the two stations into one.*

## 1.2 ASSESSMENT OF CURRENT FIRE STATION FACILITIES

In Phase I of this project an assessment of the existing fire stations was conducted. Due to the significance of the information, an excerpt is being reiterated in this Phase II report.

### Structural and Building Assessments

Each of the fire stations were independently assessed. Where they form part of a larger building envelope (with a community centre or other facility), only the fire station elements were evaluated. The individual building assessment reports for each station which totals more than 200 pages in length – have been provided to the Fire Chief and Director of Public Works for their information. A summary of the results from each structural assessment follows.

| Structural Assessments | | |
|---|---|---|
| **Station #** | **Station** | **Assessors Evaluation / Summary** |
| 1 | Foot's Bay | While this station does have a large storage area, it is not well set up and may be the cause of trip and fall accidents.<br><br>The roof splash/guttering needs repairs, the driveway needs to be sealed, and the repair patching at the apron needs to be done.<br><br>The stain or painting of cladding and fascia, the repair/replacement of the fascia, and the sealing of parging and foundation need to be done, as well as replacing the water heater.<br><br>Installation of a fan in the washroom, flooring at the base of stairs, fire separation of the ceiling, and emergency lighting for exits need attention.<br><br>Repairs to this fire station and costs for proper storage would exceed $14,000, but an addition would also be required. An addition allowing for both larger trucks and proper storage could be possible. Foot's Bay does appear to have room in front to expand the building, allowing for a proper storage area and future use of larger suitable fire units. Even a modest 10 ft addition will run into the $400,000 mark and will go higher depending on the anticipated size of future firefighting vehicles. |
| 1 | Glen Orchard | Storage is non-existent, minimal electrical, no plumbing - space constrictions are extreme.<br><br>Due to space constraints, the vehicle barely fits into this single bay. There is simply no practical safe work or storage area left.<br><br>Glen Orchard building cannot practically be expanded to fit current or future needs without impacting other necessary operations on the property. |

| Structural Assessments | | |
|---|---|---|
| **Station #** | **Station** | **Assessors Evaluation / Summary** |
| 3 | Bala | Missing or outdated GFCI outlets; asphalt needing repair/replacement in the parking lot; water intrusion into the wall at the rear; a louver cove missing; single pane windows needing to be replaced for thermal efficiency; improper drainage for gutters; parge/ wall cladding repair is required; TPR valve extended; bath fan; replacement of washroom; humidity damage in meeting rooms; serious water seepage from the roof into the wall/ ceiling of room over the cell; pest removal; storage issues need attention.<br><br>While repairs to this fire station would certainly exceed $40,000 (when the walls and ceiling are opened, this will likely increase significantly depending on structural damage), repairs would still not address the serious space constraints for storage of materials and safe working space.<br><br>The property does not appear to lend itself to an expansion of the building. Future needs will envision larger trucks to serve a growing community with more personnel and more equipment, all of which this building and site would not accommodate. |
| 4 | Torrance | There is a mold and ventilation issue within the station which needs to be addressed for health and safety along with a water source to be maintained and made potable. Worn flooring, missing or outdated GFCI outlets, damaged vinyl trims, siding to be replaced, and guttering and backflow protection to be installed. Lack of proper storage for equipment and chemicals is also a serious concern.<br><br>Currently, this fire station lacks the floor space adjacent to the vehicle parking areas to properly locate the necessary amount of storage containers, racking, floor cabinets, and wall racks, and still leave walking/ working room for safety. |

| Structural Assessments | | |
|---|---|---|
| **Station #** | **Station** | **Assessors Evaluation / Summary** |
| | | The mold issue can be addressed by the removal of quite a large area of drywall and with better ventilation for the building. Approximate costs of $4,000 to 5,000 for drywall and labour along with a humidistat-controlled vent fan at $700 to $1,000 for an expected outlay of $6,000 to address these concerns.<br><br>Storage cabinets, containers, and racking chemical safety cabinets would take up 20 $ft^2$ of floor space directly with an additional 20 $ft^2$ of floor area to be clear in front for access (40 $ft^2$ per bay). Necessary wall cabinets and racking for storage, arranged so as not to intrude on the aisles, would be additional to that.<br><br>The primary issue is the lack necessary storage space. With the present vehicles, there is not enough floor space without expanding the building; with future growth, a modest expansion would not fully serve the anticipated vehicles and proper storage of materials for worker safety.<br><br>Currently, builder pricing for open space construction, (i.e., empty storage buildings and parking area) is running at about $500/ ft with heavier concrete to take anticipated loads $600 would be more approximate a cost figure. Repair and proper storage necessitating a very modest 10-foot-deep addition to this fire hall would cost close to $400,000 – much more if a larger ladder or pumper unit were anticipated for this area. |
| 4 | Walkers Point | Storage, repairs to driveway, repair shower head, missing kick out flashing on the roof, GFCI outlets to replace. "Moss Boss" is recommended for the roof.<br><br>Walkers Point Fire Station is a newer building needing only some minor repairs. Sufficient space to install proper storage is available. |

| Structural Assessments | | |
|---|---|---|
| **Station #** | **Station** | **Assessors Evaluation / Summary** |
| 5 | Minett | There are a considerable number of issues to be dealt with for this fire station. The retaining wall and safety sensors on the door, replacement gutters, backflow valves, ejector pump for sewage serviced (or replaced), storage, roof "Moss Boss" installation, cladding replacement, backflow prevention, foundation repairs to plywood, etc. Severe lack of serviceable storage space and space for present equipment.<br><br>Although the retaining wall is failing, it has some years left; however, costs keep rising and putting off replacement will result in increased expenses. Approximate costs for retaining wall in stone, $30,000; safety sensors, backflow valves, and other minor repairs add $4,000 - $6,000 to that. There is no cost estimate for extra storage as the current building is not able to have readily accessible storage installed.<br><br>Total costs less any proper storage for this site $45,000 to $50,000.<br><br>The special allocation in the truck bays is inadequate to allow for proper safe walk and aisle ways - this is an accident waiting to happen and is therefore a liability issue. There is also the issue of vehicles being parked outside due to the lack of space in the station. This has been ongoing since the original master plan was completed in 2014.<br><br>**The costs associated with rebuilding the retaining wall along with other repair costs and the lack of space make this building unsuitable for even its current use.** |

| Structural Assessments | | |
|---|---|---|
| **Station #** | **Station** | **Assessors Evaluation / Summary** |
| 6 | Port Carling | For the newest fire station in the group, there are still a few issues to be dealt with. Repair ponding areas in the driveway and replace blown thermal units in all doors; proper drainage from downspouts; replace GFCI - out of date; service or replace the TPR valve for the water heater. Like all the other stations, it needs proper storage, being the largest station with more personnel and equipment.<br><br>The fire station seems to be the appropriate size to service the current and near-future size equipment and personnel anticipated as it has some extra floor space.<br><br>The station requires a minimal outlay for repairs amounting to between $8,000 and $9,000 dollars but also needs properly allocated and safe storage for a considerable amount of goods.<br><br>Estimated costs for storage cabinets and wall racking are $4,000 to $6,000 per bay for a total cost of approximately $20,000 to 24,000. |
| 7 | Windermere | Repair glazing, storage is lacking, 2 GFCI need to be replaced, and seal driveway.<br><br>This station is otherwise in good condition. |
| 7 | Raymond | Storage is inadequate, repairs to driveway, repair cladding, scrape and paint wood trims, missing proper kitchen facilities.<br><br>Raymond Fire Station is an older metal-clad building needing only some minor repairs outside, but the interior lacks the space for safe storage of equipment and materials, proper kitchen facilities, along with the bathroom that at best is minimal for current needs.<br><br>It can be difficult to retain quality staff; adding unsafe or inconvenient and unpleasant working environments into the workplace is counterproductive. |

| Structural Assessments | | |
|---|---|---|
| **Station #** | **Station** | **Assessors Evaluation / Summary** |
| | | A bathroom and kitchen renovation would cost upwards of $16,000 to $25,000 and yet still would not provide the extra storage space needed on the floor. An addition to the building to remove the current kitchen and bath areas and replace them with storage while installing a new kitchen and bath in the addition would be about $300,000.<br><br>The property restrictions noted suggest that an addition may not be possible on this site due to ownership of the land that is owned by the MTO. |
| 9 | Milford Bay | Cladding repair, window, and door caulking, parging of foundation, GFCI outlets, proper storage of materials and equipment, pavement and concrete aprons, vinyl siding, blockwork, brick vent, rear deck stairs, water heater, and ceiling repair all need attention.<br><br>The building is suffering from a lack of maintenance and repair. Wood siding has rotted at the base and the wall framing and sill plate behind are likely involved. Rear deck, stairs, and minor blockwork repairs will be needed. Exterior building repair costs are estimated at $7,000 to $10,000. Repairs to the interior and system repairs are estimated at $3,000 to $ 4,000 and will be less expensive.<br><br>Repairing/patching the driveway would be a short-term solution as it is getting close to the condition where the base has eroded/ deteriorated and needs to be repacked; concrete aprons should be replaced at the same time. Recommended is a complete repaving, and base repacking /leveling along with recycling old pavement and removal of the concrete apron with a new concrete apron estimated at $45,000 to $60,000. Total estimated for repairs to the building would be $55,000 to $70,000.<br><br>The primary issue is the lack of safe working or storage space around the current trucks. Although an addition is needed just for safety in the current working environment, any growth in the community surrounding the fire station or increase of equipment to properly service the community would necessitate an addition as well. The Fire Chief informs EMG that no stock fire trucks will fit into the |

| Structural Assessments | | |
|---|---|---|
| **Station #** | **Station** | **Assessors Evaluation / Summary** |
| | | station (due to the building's size). This will increase cost of a fire truck due to the fact that it will need to be custom built. |

### *1.2.1 Additional Assessor Comments Regarding Storage*

With most of the fire stations reviewed, there seems to be a lack of storage appropriate to the materials and tools in use that are kept on premises. Vehicles seem to have grown in both length and height while the storage buildings have remained the same. Material is being stored on floors, leaning against walls and other items. Equipment is stored in bags left on floors, often protruding into walkways, etc. These and other items should have organized and specific storage spaces, allowing for readily available access that prevents trip/fall hazards.

It is recognized that firefighting tools and materials must be located within quick and easy access. Needing extra time to assemble material and equipment when responding to a time-sensitive emergency is not practical. It is of primary importance that the areas around these vehicles be safe for walking and working; therefore, proper contained storage which will help keep material, chemicals, and equipment stored safely is necessary.

Storage of flammables, oxidizers, corrosives, and general cleaning materials is a serious liability issue, as a leak or spill could result in a serious health hazard. Proper chemical storage keeps hazardous items separated and safe from contact damage, spills, and possible interaction. EMG recommends providing adequate storage for all materials to maintain a clear three-foot-width walkway; when moving /working actively wearing bulky gear, anything less presents a hazardous trip/ fall issue.

The costs for these cabinets are modest – roughly $1,500 each for chemical safety cabinets; a rolling cabinet to access each side of a truck at $400 each; and several wall cabinets at $250 each along with 2 wall racks at $200 each should suffice to store and house the necessary gear adequately. Additional equipment-specific holders or racks may be needed to ensure walkways stay clear and safe. Expect an approximate total outlay of $4,000 to $6,000 per bay.

Currently, many fire stations' space constraints make it difficult and unsafe to work around the trucks. From a liability standpoint, this condition should not be allowed. Looking toward the community's future growth, this lack of space needs to be addressed before an accident happens.

Importantly, many older buildings have asbestos or asbestos-containing materials. The Township has recently conducted an audit of this issue for all municipal buildings. We have therefore not commented on the issue herein other than to note this as an issue to be contemplated when considering remediation costs and the current structural condition of each station (SEE STAFF REPORT PW-2023-74).

The end score ranking of each station is listed in the table on the following page.

## TABLE #1: FIRE STATION OPERATIONAL PERFORMANCE ASSESSMENT SCORES

| Station # | Station | Essential | Full Function | Future/ Risk Focus | Total/ 50 |
|---|---|---|---|---|---|
| 1 | Foot's Bay | 9 | 2 | - | 11/ 50 |
| 1 | Glen Orchard | 5 | 1 | - | 6/ 50 |
| 3 | Bala | 15 | 1 | - | 16/ 50 |
| 4 | Torrance | 9 | 1 | - | 10/ 50 |
| 4 | Walkers Point | 16 | 1 | - | 17/ 50 |
| 5 | Minett | 8 | - | - | 8/ 50 |
| 6 | Port Carling | 15 | 10 | - | 25/ 50 |
| 7 | Windermere | 11 | 1 | - | 12/ 50 |
| 7 | Raymond | 2 | - | - | 2/ 50 |
| 9 | Milford Bay | 6 | - | - | 6/ 50 |

The Port Carling facility – the newest fire station - ranks the highest in overall functionality but lacks future-facing amenities such as electric vehicle charging stations, LEEDS certification, site and facility security, enhanced exterior training features, and heritage, wellness, and community spaces.

### *1.2.2 Ongoing Maintenance/ Financial Assessments*

Assessing the need for facilities replacement is a critical aspect of facilities management, and past financial and maintenance records play a pivotal role in this process. Here are several key reasons why using these records is of utmost importance:

- Historical Performance Analysis: Past financial and maintenance records provide a historical perspective on the facility's performance and condition. By analyzing these records, facility managers can identify trends and patterns in terms of maintenance costs, breakdowns, and repairs. This historical data allows them to make informed decisions about whether the facility is becoming increasingly costly to maintain and if replacement is a more cost-effective option.

- Budgeting and Planning: Accurate financial records help budget for facility maintenance and replacement. These records provide insights into the annual maintenance expenses, the cost of repairs, and depreciation over time. With this information, organizations can develop long-term financial plans and allocate budgets for facility replacement projects well in advance.

- Risk Assessment: Maintenance records can highlight the level of risk associated with the current facility. Frequent breakdowns, costly repairs, and increasing maintenance expenses indicate a higher level of risk. By assessing this risk, organizations can proactively plan for a replacement to avoid unexpected disruptions, downtime, and safety hazards.

- Asset Lifecycle Management: Every facility has a finite lifespan, and maintenance records help track the facility's condition over time. Comparing the facility's age with its maintenance history can provide insights into whether it has reached the end of its useful life. This information is crucial for strategic asset lifecycle management.

- Energy Efficiency and Sustainability: Analyzing records can also help in assessing the facility's energy efficiency and environmental impact. Older facilities may not meet current sustainability standards or energy efficiency requirements, which can lead to higher operational costs and non-compliance with regulations. Replacing outdated facilities with more energy-efficient alternatives can lead to cost savings and environmental benefits.

- Compliance and Regulatory Requirements: Some facilities may be subject to specific regulatory requirements that evolve. Records can help assess whether the facility complies with the latest regulations. If compliance is at risk due to the facility's age or condition, replacement may be necessary to avoid legal issues and penalties.

- Facility Performance Improvement: Maintenance records can also reveal opportunities for performance improvement. If a facility consistently underperforms or is unable to meet the evolving needs of the organization, replacement with a more modern and efficient facility can enhance productivity, safety, and overall operations.

- Return on Investment (ROI) Analysis: Financial records, coupled with cost estimates for replacement, enable organizations to conduct a thorough ROI analysis. This analysis helps determine whether the investment in a new facility will yield long-term cost savings and benefits that outweigh the initial capital expenditure.

Past financial and maintenance records are essential tools for making informed decisions about facility replacement because they can identify what type of construction, interior finishes, and equipment have outlasted previous systems. However, they do not provide Council with the true story of other ongoing costs such as insurance, and additions to the structure due to space needs for equipment and vehicle storage. All these things need to be considered and discussed with an architect in designing and building a new fire station.


# Section 2

## Designing an Appropriate Level of Service

# SECTION 2 – DESIGNING AN APPROPRIATE LEVEL OF SERVICE

## 2.1 Deployment Analysis

### *2.1.1 Staffing Requirements*

The MLFD, like any other fire department, refers to two key standards as guides: the Fire Underwriters (FUS) program and the National Fire Protection Association (NFPA). Both programs assist the fire chief in identifying fire service industry best practices relating to fire station staffing levels, and response goals. By utilizing these two standards, the fire department will be able to provide the best possible level of emergency response to the community they serve.

The size of the community and the population level provide an expected response time and staffing goal, as noted in the following NFPA chart. It is worth noting that the Establishing and Regulating Bylaw for the fire department notes that they will follow the FUS recommendations that coincide with the NFPA standards. The National Fire Protection Association (NFPA) 1720 standard – *Standard for Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Volunteer Fire Departments* identifies the recommended number of volunteer firefighters to respond to an emergency (based on population). For Muskoka Lakes that has a land mass of 794.26 km2 (306.67 sq mi) and a permanent population of around 7,700 that ballons to a seasonal population of approximately 27,000, for a total maximum population of 34,700. This equates to a population density of 113 per 2.6km$^2$, which places Muskoka Lakes into the" Rural Area" category.

**Table 4.3.2 Staffing and Response Time**

| Demand Zone[a] | Demographics | Minimum Staff to Respond[b] | Response Time (minutes)[c] | Meets Objective (%) |
|---|---|---|---|---|
| Urban area | >1000 people/mi$^2$ (2.6 km$^2$) | 15 | 9 | 90 |
| Suburban area | 500–1000 people/mi$^2$ (2.6 km$^2$) | 10 | 10 | 80 |
| Rural area | <500 people/mi$^2$ (2.6 km$^2$) | 6 | 14 | 80 |
| Remote area | Travel distance ≥ 8 mi (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 AHJ's department and automatic aid
[c]Response time begins upon completion of the dispatch notification and ends at the time interval shown in the table.

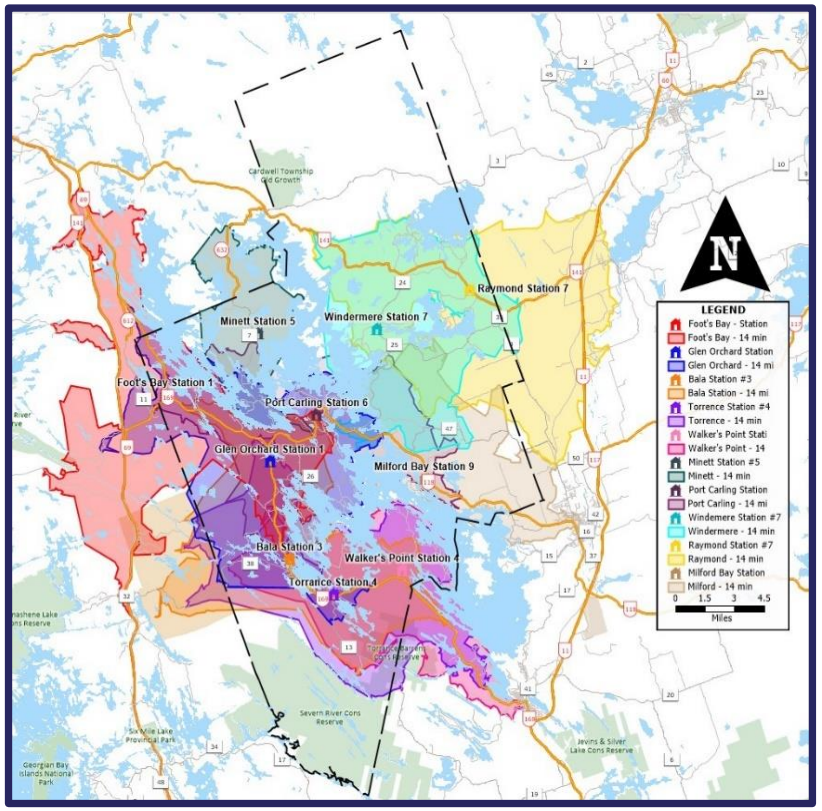
As such, to receive a passing grade in relation to station staffing, each volunteer fire station should have a minimum of 15 volunteer firefighters on its roster. This does not mean that 15 firefighters must respond to every call, just that there should be a total of 15 volunteers available for response. As noted in the previous NFPA chart, the standard only requires 6 firefighters to arrive on the scene of the fire incident within 14 minutes, 80% of the time.

The fire department does have a minimum staffing expectation when it comes to fire responses, but during medical responses, the fire truck can respond with less than four volunteers on board, which is acceptable based on the type of call.

During EMG's review of the response times, the Port Carling fire station was the only one to meet the NFPA response time requirement with a response time that fluctuated around the 14 -minute mark. In general, the overall response times for the Department ranged from a low of 13 minutes and 45 seconds, up to a high of 25 minutes and 9 seconds.

The following two maps outline the 14-minute response zones with all 10 fire stations identified on the map. EMG also developed a call cluster map to identify and highlight the areas where the bulk of the calls are occurring.

As can be noted in the "Present 10 Station Response Coverage" map. There appears to be quite a bit of overlapping of response zones between the fire stations. This presents an opportunity to reduce the number of fire stations without reducing the coverage and service levels for the community.

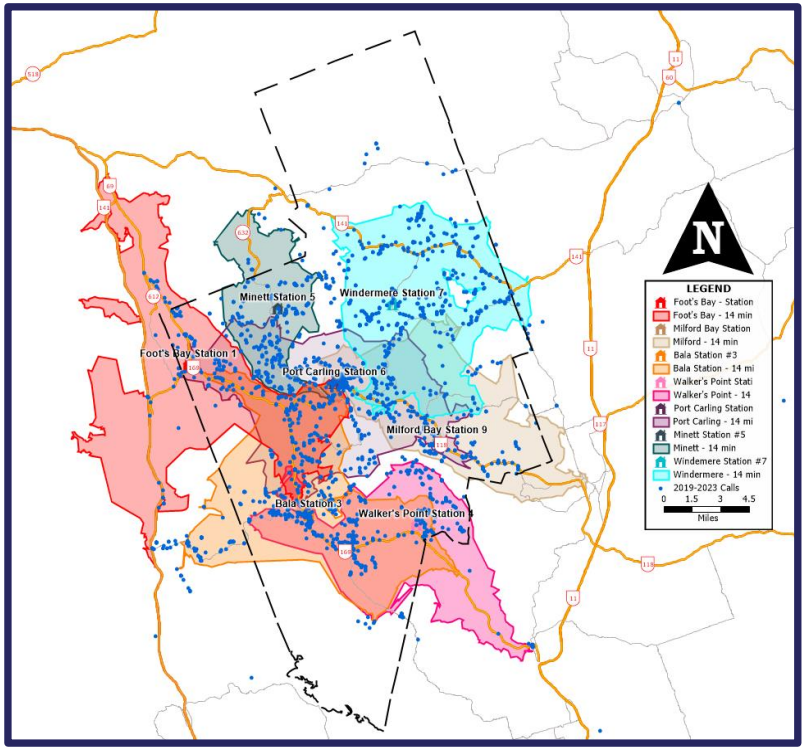



*Present 10 Station Response Coverage*

Based on the call cluster map, it appears that the bulk of the calls are occurring in the following areas:

- Minett
- Foot's Bay
- Windermere
- Port Carling
- Bala

*Call Cluster Map*




As a result of the call location findings, options were presented in the 2022 master plan report. The fire station options will be presented in Section 3, and the preferred option will be recommended.

## 2.2 Community Growth

Future growth and community development issues can impact conversations about fire station location and distribution, especially considering the current position of the provincial government with respect to promoting residential development. Unfortunately, the discussion in the case of Muskoka Lakes is limited to near-term growth. This is what we know:

- The comprehensive redevelopment of the Resort Village of Minett is an active discussion. Official Plan policies have recently been updated (approved by District of Muskoka, but currently under appeal). The Township is in receipt of a Zoning Application to implement the first phase, but it has not been deemed complete. To provide context, the updated policies would allow a total of 2,020 units in Minett (a combination of commercial and residential, including those that already exist).
- Regarding the 'Hannas Landing' subdivision proposal on the east side of Port Carling, initial discussions have begun with the new owner, however, no application has been submitted at this time. The property is

approximately 23 hectares in size, and policies permit a density of 15 (low density), 20 units (medium density), and 30 units (high density) per hectare.

- Regarding the 'water tower' subdivision proposal on the west side of Port Carling, the District is in receipt of a subdivision application and a public meeting was held at the Township last summer. The draft plan of the subdivision currently proposes the creation of 85 single detached residential lots and 3 multiple residential blocks containing a combined proposed maximum of 206 multiple residential units.
- A third proposal pending for the Port Carling area relates to the 'Ripplewood' development on the west side of Port Carling. The first 12-unit apartment building has recently been constructed, and approvals are in place for two similar buildings. Construction of these two additional buildings is pending a favourable business environment.
- The 'Diamond Trails' development near Utterson adjacent to Diamond in the Ruff golf course relates to a condominium application that has been received by the District but has not been actioned by the Developer. The last update received by the Township in 2022 identified 21 residential lots.
- Similarly, a small residential development has been proposed for the Mary Jane Lake area. This 14-unit residential development received conditional approval from the District in 2020 but the Township has yet to be advised of current plans to construct this site.

## 2.3 Human Resources

whatever station model is adopted (8, 7 or 5 stations), the Fire Chief will need to ensure proper levels of firefighting equipment and staffing at each station.

Although there are FUS and NFPA standards relating to fire truck specifications and lifecycle recommendations, there is no standard other than the FUS assessment that makes recommendations relating to what apparatus should be at a fire station. Much of the equipment requirements are based on the type of community the fire department is servicing (e.g. suburban and rural). EMG has reached out to the FUS staff to obtain the information based on how they assess a community fire equipment and staffing needs, but since this is proprietary information, it would not be shared with EMG. The FUS staff advised that Muskoka Lakes would need to commission a full assessment by FUS.

EMG can confirm two points; the first is that each fire station should have a minimum of 15 volunteers to be considered a functional fire station (and receive a passing grade from FUS).

This would mean that if MLFD was to adopt the five-station or seven-station model, they would require at least 75 to 105 VFFs to meet this FUS requirement.

The NFPA recommends in its 1720 Standard for Volunteer Fire Departments that a minimum of one officer and three firefighters are on the initial responding apparatus and that there will eventually be six staff members on scene within 14 minutes for a community with the population of Muskoka Lakes.

The second point concerns firefighting apparatuses – the FUS recommends one replacement vehicle for each eight pieces of apparatus. For example, if the five-station model is adopted, the Department would require a total of six pumper trucks and six tankers – one for each station plus a spare. If the seven-station model is adopted, then a total of eight of each would be required. There is no recommended standard for support vehicles. This would depend on the types of services supplied by a fire department, along with recommendations for its fire chief.

Personal Protective Equipment (PPE)

It is recommended that each fire truck is supplied with enough PPE for each member on the vehicle. As such, there should be at least five self-contained breathing apparatus (SCBA) and an equal number of portable radios for each person on the vehicle.

It is also recommended that each firefighter is equipped with their own face mask for health and safety reasons.

All other equipment such as rescue hydraulics, ladders, water rescue equipment, etc., would be dependent on the level of services provided and recommended by the Fire Chief.

## 2.4 Site Selection

Site selection can be a challenge to any organization. There are multiple considerations for selecting a site. The two up-front considerations are finding a site location that optimizes the response time and service delivery and getting community acceptance. Poor site selection can result in poor service delivery and additional costs that could be applied to aiding the organization's most valuable asset — its members, specifically their safety and health.

Response time and service delivery are the fundamental concerns of any site selection. Response time is always a concern if a community is experiencing any of the following:

- Expanding population, or even the infilling of its geographical area.
- The consideration of adding a fire station to take some of the workload off existing station(s), and
- The possibility of having to relocate an existing station.

Fire and emergency services organizations have two methods for justifying the need for a new station that are based on service delivery and response time. The first method is time and distance. A common response benchmark is for an

organization to respond to 80 percent of emergency calls within a specific timeline based on the type of fire department – volunteer or career[ii].

Using response time data, the Department can identify where it is not able to meet this benchmark, and it can, therefore, justify the need for an additional facility.

### 2.4.1 Operational Assessments

How the facility functions operationally as a fire station is important to the efficiency of the fire department. Beyond the obvious emergency response activities, this aspect of the evaluation process also examines how well the facility meets the training and non-operational aspects of day-to-day activities in addition to how well they function operationally. This includes an assessment of:

- building and site access
- parking
- security
- disaster resilience
- emergency power
- provisions for inside and outside training activities
- apparatus floor special provisions and configuration
- storage capacity
- office capacity
- air circulation, and diesel exhaust systems
- washroom, shower, and locker facilities
- clean-up and decontamination facilities
- lighting (natural and artificial)
- on-site water supply
- fire protection systems
- kitchen and eating facilities
- the provision of fitness rooms
- community and heritage space allocation

### 2.4.2 Flexibility for future requirements

Facility requirements change with time. This can occur as service needs change or as department functions are added or deleted. What is often built to meet the Department's current needs requires periodic re-evaluation and possible upgrading or expansion to meet future demands. As the fire and emergency services grow and expand, new facilities are needed to house equipment, training, and possibly personnel. Examples of changes that have occurred in recent years:

- Special training props (such as mezzanines or training towers)
- Decontamination rooms or areas
- Fitness rooms
- Accommodations for female emergency responders

- Dedicated PPE storage rooms
- Addition of more personnel
- Additional apparatus (particularly specialized vehicles)
- Consolidation with law enforcement or EMS
- Emergency management services

# SECTION 3


## Fire Station Alternatives

Emergency Management Group

# SECTION 3 - FIRE STATION ALTERNATIVES

## 3.1 Alternatives

When considering the location or relocation of a fire station, a key consideration is response time relative to three factors:

- Where are the bulk of the calls occurring?
- Where is the main population located within the response zone, and
- What are the future growth-related expectations for that specific area?

As noted in the following Call Cluster and Seven Station Model map, there are six key areas where the bulk of calls for the Fire Department are occurring:

i. Minett
ii. Foot's Bay
iii. Windermere
iv. Port Carling
v. Bala

By utilizing this information, along with the information relating to the stations conditions, the following options are being submitted.

This first option is status quo, the second option recommends a three-station reduction, with the equipment and volunteers to be reassigned to nearby fire stations. And the final option is a five-station model.

### *3.1.1 Option #1 – Status Quo*

Although maintaining the status quo a potential consideration, EMG does not recommend this due the present condition of the stations.

In fact, the 2014 Fire Master Plan identified concerns with the fire stations in relation to health and safety issues, such as no diesel exhaust systems. Space at many of the stations was also a concern – Minett fire station had vehicles parked outside in 2014 due to lack of floor space at the fire station.

In the updated 2022 Fire Master Plan review, many of the 2014 concerns were again noted – lack of diesel exhaust and storage space. With 10 years passing since the 2014 FMP, the stations are showing even more concerns that revolve around the cost of repairs, upgrades, or even rebuilding some of the fire stations, which may prove to be cost prohibitive as opposed to adopting the seven- or five-station models being presented.

### *3.1.2 Option #2 – Seven-Station Model*

In this option…

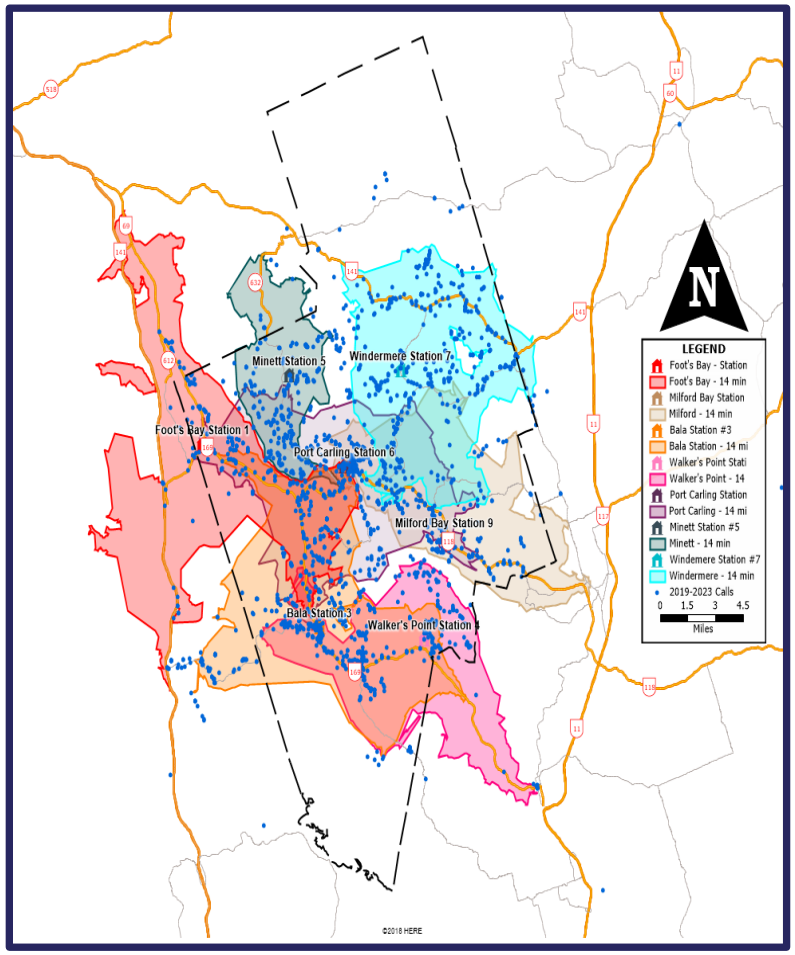
- The Glen Orchard garage to be consolidated into the Foot's Bay station.
    - The closing of the Glen Orchard station has been a consistent recommendation with all the options presented. Foot's Bay would require some possible expansion to accommodate the Glen Orchard crew and equipment.
- The Walkers Point and Torrence stations to be consolidated into one.
    - Based on the facilities assessment, the Walkers Point station is the better of the two stations, and it makes financial sense to use it instead of the Torrance station.
- The Raymond Station being consolidated into the Windemere Station.
    - Based on the facilities assessment, the Windermere station is the better of the two stations and it would make better financial sense to use it over the Raymond station.
- The challenge with this option is the Minett Fire Station, as it is too small to meet the needs of the fire department.
    - As such, the Minett station should be relocated on municipal-owned property, close to its present location.

These alterations of the seven-station model continue to designate one station in each of the existing seven response zones.

As can be seen in the following map, the seven-station model provides very good coverage to the community based on the NFPA 14-minute response requirement. This model also provides some overlapping of coverage areas, which demonstrates the ability of bordering stations to aid or back up other stations if more than one fire truck and crew are required.

Building or renovating up to four new fire stations at an estimated replacement cost of $5 to $6 million each would amount to $10 to $24 million (depending on renovation or replacement).

Call Cluster and Seven Station Model Map

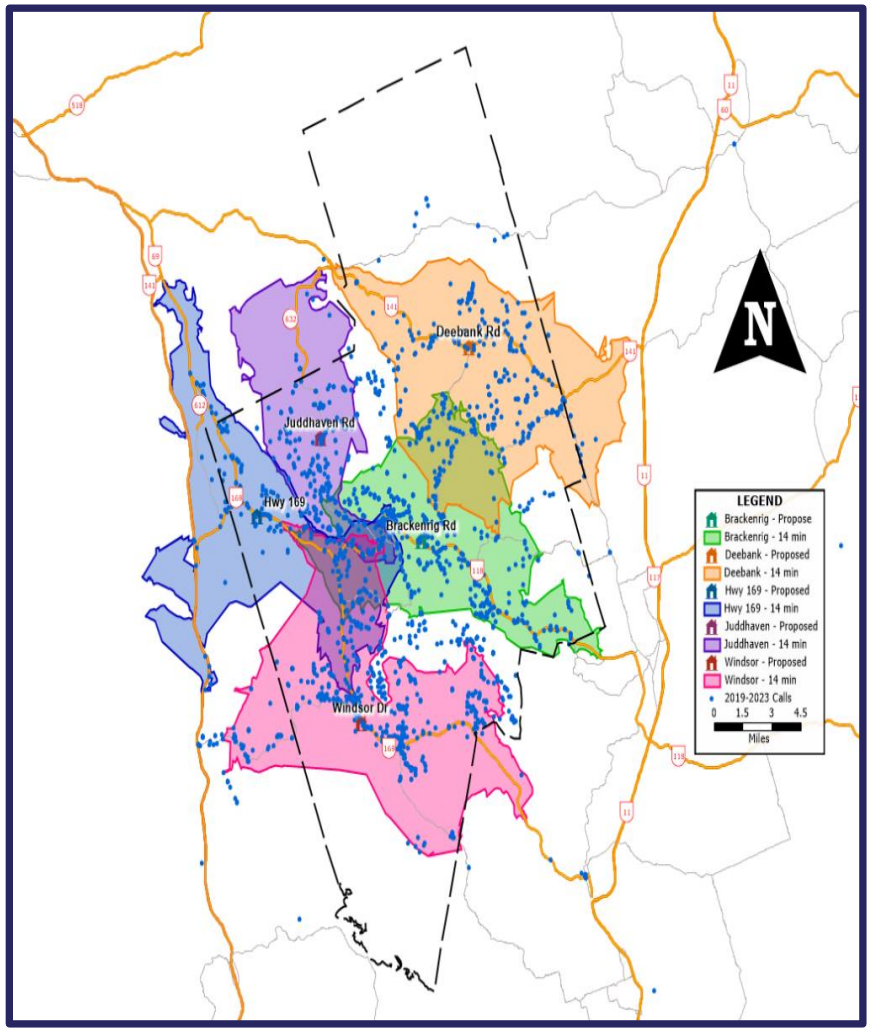



### *3.1.3 Option #3 – Five Station Model*

In the third option, EMG, working with the Fire Chief, identified a five-station model. As can be seen in the following Call Cluster and Five Station Model map, the coverage for the community is rather good in relation to covering the main bulk of calls.

- However, the issue with this option is the cost of building four to five new fire stations with post-disaster components at an approximate cost of $5 to $6 million each, depending on size and overall design. This could theoretically be an overall cost of $20 to $30 million. If this option were to be considered, it would be a long-term implementation over the course of 10 to 20 years.
    - ***Note:*** *Building costs have escalated, and it is estimated that a new fire station could eventually range from a minimum of $5 million to $6 million or more, depending on size and overall design.*

Call Cluster and Five Station Model Map




## Conclusion

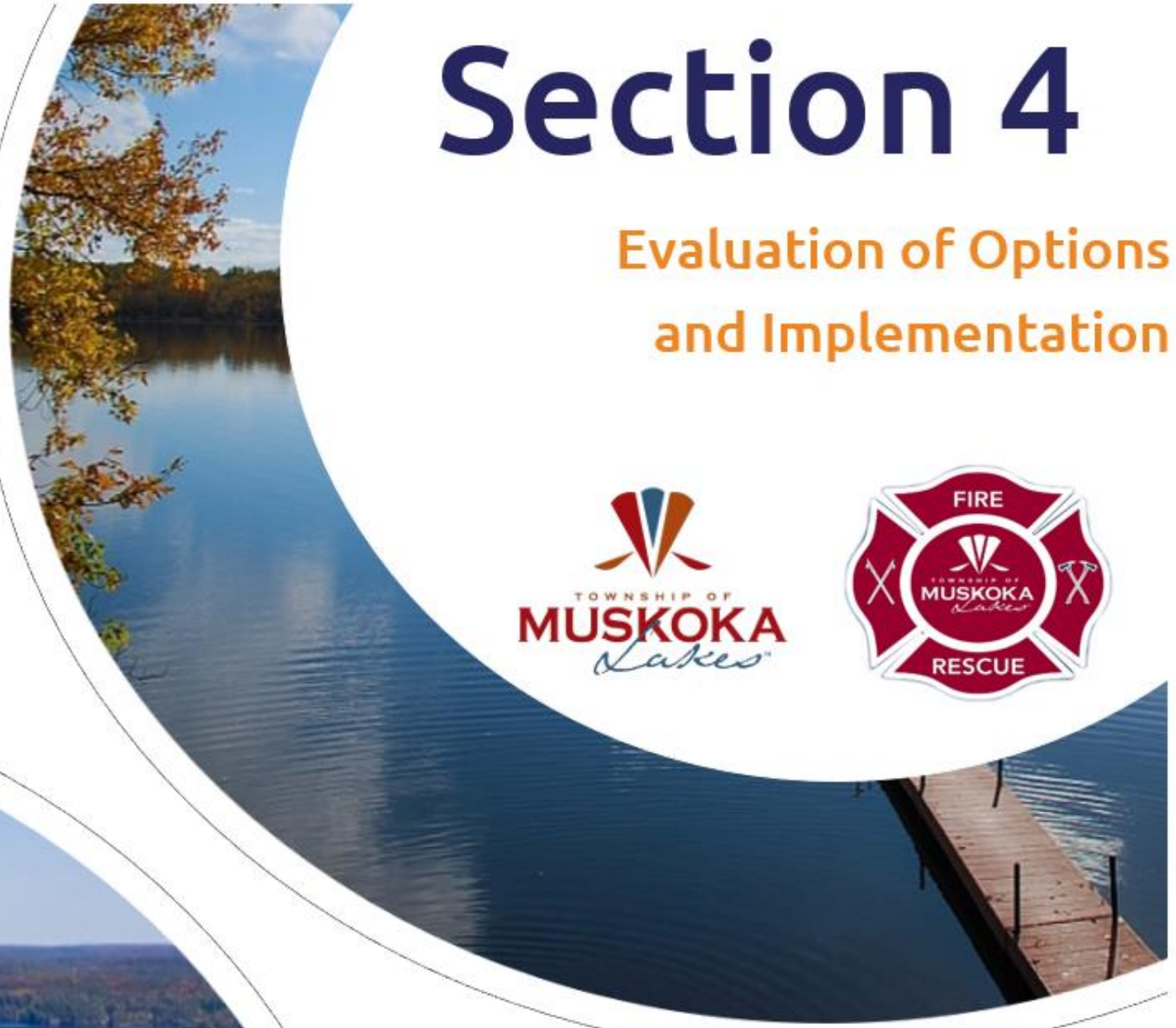
While the seven and five station options provide good coverage to the community, due to the overall size of the Township, Option 2 does provide slightly better coverage than that of Option 3. However, the benefit of Option 3 is that the Township now only has five fire stations to maintain and equip for the next 30 to 40 years.

Both Options 2 and 3 make recommendations relating to the relocation and building of new stations to meet the future needs of the community.

It should be noted that with the closure of any fire stations, there is the benefit of selling off equipment that will no longer be required. A second benefit is that with either option, there will be less vehicle/ large equipment replacement required in the long term. This could save the Township millions of dollars.

# Section 4

## Evaluation of Options and Implementation



TOWNSHIP OF MUSKOKA Lakes

FIRE RESCUE

EMG Emergency Management Group

# SECTION 4 – EVALUATION OF OPTIONS AND IMPLEMENTATION

## 4.1 Comparison of Station Options

In this section a comparison of the three options have been presented in terms of benefits versus risks.

| Option # | Description | Benefits | Risks |
|---|---|---|---|
| 1 | Status Quo – No change to station locations. | Although status quo is an option for consideration, EMG does not recommend this due the present condition of the stations. | The 2014 Fire Master Plan identified concerns with the fire stations in relation to health and safety issues, such as no diesel exhaust systems. Space at many of the station was also a concern – Minett fire station had vehicles parked outside back in 2014 due to lack of floor space at the fire station.<br><br>With 10 years passing since the 2014 FMP, the stations are showing even more concerns that revolve around the cost of repairs, upgrades or even rebuilding some of the fire stations, which may prove to be cost prohibitive as opposed to adopting the seven or five station models being presented. |

| Option # | Description | Benefits | Risks |
|---|---|---|---|
| 2 | Seven-Station Model – Closing of Glen Orchard, Raymond, and Torrance stations. | Utilization of some stations based on present condition.<br><br>Eventual savings gained by closing three fire stations. Recommended upgrades and rebuilds will bring stations in line with meeting the present and future needs of the fire department.<br><br>Response coverage still addresses where the bulk of calls originate. | Eventual decommissioning of existing stations and the reallocation of equipment and volunteers to the remaining stations.<br><br>Transition could take 10 - 20 years.<br><br>The estimated cost is $10 to $24 million, depending on the timing of implementation. |

| Option # | Description | Benefits | Risks |
|---|---|---|---|
| 3 | **Five-Station Model** – Closing of all present fire stations with the construction of five new fire stations. | Creation of new fire stations that meet post-disaster requirements and can incorporate all health and safety requirements for firefighters.<br><br>**Although this would be the costliest option, it does provide the municipality and its fire department with a life expectancy of 30 to 50 years for all five fire stations.** | Eventual decommissioning of existing stations and the reallocation of equipment and volunteers to the five new stations.<br><br>*NOTE: Transition could take up to 10 years or more, with an estimated cost of $25 to $30 million depending on timing of implementation, and cost of land.*<br><br>*This estimate does not include cost of decommissioning and demolition of the existing fire stations.* |

Although each option has its merit, it is option #1 that EMG is recommending for the following key reasons:

- Due to the geographical size of the Township, the five-station model (Option #2) is not able to provide the level of coverage that a seven-station model can. This option would also entail the building of four to five new fire stations and the demolition of up to 10 fire stations.
- Option #1 also takes advantage of some of the fire stations that are in good shape and still have a respectable life expectancy on them. The health and safety needs, such as updated showers, diesel exhaust systems, and additional storage, can all be incorporated into in the stations that will be kept.
- The relocation and building of the suggested new stations will provide increased response capabilities of the Fire Department and will provide the Township with facilities that will last for 30 to 50 years with minimal upkeep. The stations to be replaced are past their useful life and could potentially cost more to repair and upgrade than it would to build new ones.
    - It should be noted that the fire department headquarters, which is the newest and largest of all the fire stations, will require replacement within the next 30 to 40 years. The present cost of a station of that size is approximately $7 to $8 million dollars.

## 4.2 Phased Approach – Option #1: Recommended Option

The following would be part of the implementation of the 7-station model. Specifications can be adjusted based on the Township's plans and further recommendations from the Fire Chief.

### Immediate Replacement Needs – Next 10 Years

- Co-locate Glen Orchard and Foot's Bay into a new facility in the Foot's Bay area – $5-6 million.
    - Prior to amalgamation, it might be worth entering into discussions with the bordering community (of Foot's Bay) that could identify a response agreement for MLFD to respond to the bordering community for a fee, or as noted in a previous master plan, the opportunity to build a joint facility.
- Based on the facility's condition, Minett will need to be relocated and rebuilt. It should be in the same area, preferably on Township owned property. New facility - $5-6 million.
- Co-locate Walkers Point and Torrance in the same building. From a financial and response perspective, Walkers Point makes the most sense as it is in better condition. Some relatively modest

renovations/additions would likely be required - $500K-$1 million.

- Co-locate Raymond Station into the Windemere Station. This could be done with a renovation/addition in Windemere - $500K-$1 million.
- Port Carling station remains as is – no cost.

Approach for the Next 10-20 Year Horizon (or sooner if financially feasible)

- Bala must be relocated and rebuilt based on the condition of the facility. It should be relocated on already owned township land on Highway 169 across from the OPP detachment. New facility $5-6 million.
- Milford Bay needs to be relocated and rebuilt based on the facility's condition. It should be located on the same property as the community centre (Township owned), or on the main road (118 West). New facility - $5-6 million.

***Note:*** *Whether the Council supports the five or seven-station model, either program can be implemented in phases. The first phase could start with the reduction of fire stations as noted in Option #1. From there, Council should rely on the Fire Chief for the further implementation of the adopted fire station model.*

## 4.3 Additional Cost for Consideration

The following overview of costs is to be considered within any of the noted recommendations. These costs relate to purchasing of land for the fire stations, estimated cost of an architect firm to design the fire stations, and anticipated maintenance costs over the life of a new fire station.

### *4.3.1 Land*

The estimated cost of an acre of land in Muskoka Lakes fluctuates between $100,000 to $500,00. If land by water is desired, then an acre of land could be as much as $700,000. With the need for approximately 1.5 acres for the average fire station, the land cost could range from $150,000 to $750,000.

### *4.3.2 Architect and Commissioning Fees*

Architectural/engineering fee. For a new fire station project, the architect/engineering fee is usually established as a percentage of the construction costs. The higher the construction cost, the lower the percentage will be. (Many states have published fee guidelines for reference.) For example, the fee range for a new $5 million fire station would be 6.13 percent–9.21 percent. Percentages typically are higher for renovation work.

Building commissioning. Commissioning engineers engage in pre-occupancy testing of facilities and mechanical equipment to ensure that the facilities/equipment function correctly and

produce the expected results. (Services are required by code in most parts of the country.) Costs depend on the scope, size, and complexity of systems, ranging from $1.20–$3.50 per square foot.

Materials/construction inspection. This expense covers required code inspections, such as soil-bearing capacity, concrete strength, rebar placement, fire-resistive materials, and seismic design components. You should budget between 0.25 percent–0.75 percent of hard costs. [iii]

### *4.3.3 Building Costs*

To understand what soft costs are, it is important to first understand what constitutes the total project cost for a new fire station: hard costs, owner contingencies, and soft costs.

Hard costs are the brick-and-mortar expenses that cover all the fixed construction elements of the project. They usually account for approximately 60 percent–80 percent of total cost. Items that are included are: site development costs; concrete and steel; the building envelope; interior finishes; building systems; and design contingencies and construction escalation.

Soft costs are the non-construction costs to design, furnish, document, and finance the project. They usually account for approximately 10 percent to 30 percent of a project budget. There are eight categories of soft costs: professional services, fixtures, furniture, and equipment (FF&E); special fees; financing costs; insurance; in-house staff costs; surveys; and land costs.

Presently, it can cost from $275 to $400 per square-foot to build a fire station. Therefore, the base construction cost for a 5,000 square foot fire station can range from $1,375,000 to $2,000,000. However, this price does not include all the other interior components and equipment required in the station; this cost is just for the basis shell and HVAC construction.

Recent cost estimates in Ontario would put the realistic cost of up to $4,000,000 for an average 5,000 square-foot building.

### *4.3.4 Maintenance Cost for Life of Station*

There are no set criteria for projecting maintenance costs over the lifespan of a fire station due to factors such as size of the station and staff composition – is it used by volunteers or career? Volunteers are not in the station 24/7, which is a cost consideration. Further, weather plays a key role in overall costs and fatigue of the building due to weather extremes.

One option is to identify the maintenance costs of a similar facility in the community based on a five-to-ten-year average and use this as a general cost projection. For example, if the fire station was costing $10,000 per year on average over a 10-year assessment, then using this as a general operating cost would be considered acceptable until you have a few years of actual operating costs to base your future projects on.

# SECTION 5

## Fire Station Requirements and Design

Emergency Management Group

# SECTION 5 – FIRE STATION REQUIREMENTS & DESIGN

## 5.1 Fire Station Requirements

Current industry standards for designing and constructing a fire station have identified the enhancements, amenities, and features a fire service would require. The following is a partial list of necessities when building a fire station for a volunteer fire department:

- Post-disaster-engineered structure
- Emergency backup power supply
- Gender-neutral washrooms, locker rooms, showers, and dormitory (for when the fire stations have 24-hour staff)
- Barrier-free, *AODA*-compliant
- Negative pressure storeroom for active bunker gear
- A storeroom for bunker gear and another for equipment.
- Vehicle exhaust extraction system
- Water runoff separation tanks in the apparatus floor
- Emergency eye wash and decontamination station
- Offices for the station officer and firefighters
- Study room
- Communications Office (radio system to receive fire calls)
- Technologies room (i.e., phone, computer, radio, etc.)
- Kitchen
- Drive-through apparatus bays
- Lounge
- Fitness room
- Tool/repair room
- Station supply storeroom
- Clean maintenance room for cleaning/disinfecting and repairing items such as face masks, SCBA, medical equipment, etc.
- Bunker gear extraction machine and dryer
- Domestic washing machine and clothes dryer
- Training/meeting room
- Emergency shut-off for cooking equipment.

- Given that the station would be a 30–40-year investment, a new station must include amenities required for full-time staffing.
- Red/green lights installed at the overhead doors to notify the drivers when the overhead door is fully open.
- Sensors at a low level should be installed on overhead doors to prevent closing if the sensor's beam is blocked, indicating an obstruction in the doorway.
- Smoke and CO alarms and, in some instances, fire sprinklers.

### *5.1.1 Fire Station Design and Build Options*

Traditionally, emergency response stations have been stand-alone structures. However, many municipalities have been shifting to integrating services into shared-use buildings, with emergency service response stations built into community centres, libraries, public works buildings, etc. Some of the present fire stations within Muskoka Lakes have adopted this joint facility concept (partnering them with community centres).

It is common across Canada to have different emergency services co-located, including fire and police; fire and paramedics; or all three in the same building. These stations typically have separate quarters within the same building, with separate entrances and facilities. This arrangement permits each service to operate independently of each other while taking advantage of the efficiencies of a single structure.

Municipalities seek opportunities to create more efficient use of space and financial resources and integrate municipal services within the community. Several models operate in different jurisdictions, including public/private partnerships, partnerships with non-profit organizations, and leasing available commercial space.

As technology, community demographics, and operational requirements evolve, maintaining flexibility in the station design, construction, and location will benefit the community in the long-term. Leasing a facility (where available) reduces the initial capital outlay, placing building maintenance responsibility on the landlord and allowing the municipality the flexibility to relocate should there be a change in community development.

The following is the City of Vancouver Fire Station #5, which cohabitates a community housing project run by the YWCA. The two main floors comprise the fire station, with the upper four floors of the six-storey building providing 31 affordable housing units for single mothers and their children.

While the City of Vancouver funded the fire station, the YWCA housing portion of the building received funding from the municipal, provincial, and federal governments and the YWCA, which launched a capital fundraising campaign. Integrating the two services provides safety and security for single mothers and their children.

In Calgary, a unique fire station includes a two-storey podium building with two high-rise towers. The 11-storey east tower contains 88 affordable housing units, while the 18-storey west tower contains 132 market housing units. The fire hall is at the base of the building, composing two storeys. This initiative is a very successful public/ private partnership.

The City of Barrie has leased the end unit of a commercial strip mall as a fire station *(pictured)*. The landlord constructed the unit to meet the city's requirements.

Leasing buildings long-term is a viable option for the Township. A monthly payment manageable by the Township presents less financial exposure than the $5 to $7.5 million or more outlay for each station.[iv]

EXTREME fire stations are a new concept, a Canadian-built product out of Lethbridge, Alberta. It is a modular-based building, built to seismic and building code standards, using high efficiency, energy code compliant HVAC systems and fire suppression systems; these are standard on EXTREME stations.

The positive aspects of EXTREME fire stations are that they are custom-built at a factory and transported to the site, where they are quickly ready for occupancy.

Extreme Fire Station Assembly (On-Site)

A typical fire station has a life expectancy of approximately 30 to 50 years before the cost/benefit ratio starts to work against the municipality in terms of maintenance, essential function, and design. The EXTREME fire stations can meet and exceed that life cycle because they are made from steel and aluminum and can add modules if the station needs to expand its footprint.

## Extreme Fire Station (Multi-Bay Example)


The West Conrad station is an example of the diversity of EXTREME fire station designs and how they are constructed and expanded to meet the customer's needs.

A partnership with non-profit organizations, EMS, or leasing available space in a new fire station are options as municipalities become more innovative in incorporating a fire station into the community. These models may not be appropriate in every community, but these options are worth exploring to decrease costs while increasing the fire department's response capacity.

## Calgary Fire Department Waldon Station

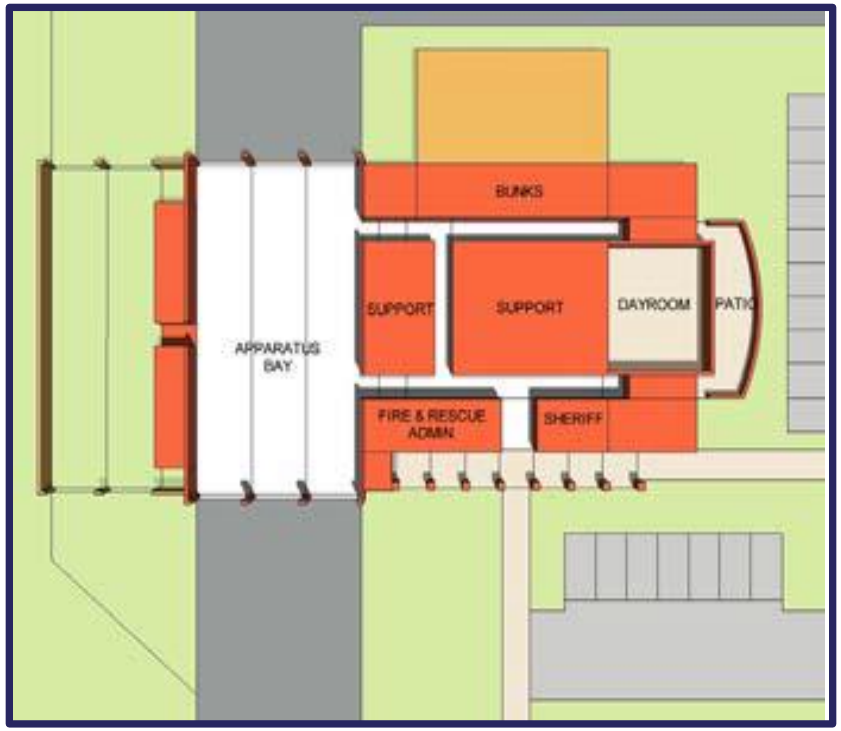

Before March 2021, a two-bay EXTREME fire station with appliances, an exhaust extraction system, an exercise room, and administration space had an estimated cost of $2.4 million. Unfortunately, the construction industry is experiencing unprecedented spikes in building materials like wood, cement, and steel, creating challenges in projecting the final price.

Extreme fire stations are cost-effective and can be built to the client's specifications. As can be seen, this is an option considered by some Canadian communities.

### *5.1.2 Station Design*

In general, a fire station needs to be designed to meet the requirements of the staffing situation. Is it a volunteer fire department that does not require dormitory requirements, or is it a career fire department that would require 24/7 occupancy?

The community may be moving to a full-time component in the near future due to the anticipated growth of the community, and 24/7 facilities need to be a design consideration.




Nonetheless, a fire station needs to ensure:

- Maintained access to the apparatus bays in a generally straight line with one or more access points provided.
- Avoid access hallways with turns or hallways that connect in a crossing condition to prevent staff from colliding with each other while responding to the fire apparatus.
- Design access points in the apparatus bays so members can get to the bay with a minimum number of turns.

A minimum 4-foot clearance shall be maintained (designed) around apparatus parked within the station if permitted by the structure.

### Cancer

Cancer rates among active and retired firefighters far exceed rates for the public. Cancer has become an epidemic in the fire service. Several experts are now saying that the fireground is more of a health hazard than a hazardous materials incident, particularly because of the safety precautions that are used to mitigate hazardous materials incidents.

The products of combustion, including diesel exhaust, contain carcinogens and other chemicals that are known to be hazardous to human health. From the Firefighter Cancer Support Network's white paper, "Taking Action Against Cancer in the Fire Service":[v]

The design of fire stations, whether for new construction or renovation, must include such standard design features as state-of-the-art equipment and systems for adequate airflow, removal and capture of carcinogens and particulates, appropriate location, and ventilation of storage rooms for contaminated PPE and other equipment, washer-extractor and gear drying equipment, as well as clear separation of living quarters from the apparatus floor. In short, architects should be working to design cancer-fighting elements in fire stations. Responsible elected and appointed officials should require this type of expertise when hiring design professionals for fire stations.

### Diesel Exhaust Capturing Systems

Source capture diesel exhaust systems are recommended for stations. There are source capture systems that are mounted on the apparatus, as well as systems that are installed in the station and manually connected directly to the exhaust tailpipe. However, they should be supplemented with other exhaust systems to filter the air from off-gassing of contaminated firefighting equipment and PPE. Advanced and cost-effective sensors can detect a wide range of unhealthy gases, including carbon monoxide. When quantities reach unsafe levels, fresh air intake and exhaust fans are automatically activated to exchange the volume of air in the building with fresh air. These systems can also be manually activated to assist with air circulation on hot days.

## 5.2 Overall Functional Requirements

When first responders think about NFPA standards, it is often focused on fireground operations or safety and apparatus policies, but two architects are focused on the NFPA standards that need to be implemented into fire station design.

Jennifer Bettiol and Ray Holliday, from BRW Architects, discussed how NFPA standards 1500, 1710, 1720 and 1851 are critical to the layout and construction of new fire stations to keep firefighters healthy when they are not responding to calls.[vi]

"One of the things we came to understand in fire station design is that we can help them achieve these goals when we look at the standards and requirements when we begin to design the station."

## NFPA 1500

NFPA 1500 is *the Standard on Fire Department Occupational Safety, Health, and Wellness Program,* and it impacts fire station design in areas including cancer prevention, firefighter fitness, and creating spaces where firefighters can unwind from the stresses of the job.

Cancer is a hot topic that does not just focus on the fireground but involves aspects of fire station design and use.

Bettiol said new fire stations include airlocks—the areas between the living space and apparatus bay—where positive-pressure airflow or an air curtain can help remove contaminants in the bays from living spaces.

Cardiac events continue to be the leading cause of firefighter deaths, and efforts are being made to reduce the strain on the heart during nighttime emergencies.

Since departments are required to have fitness programs, many departments opt for a physical fitness space.

Designs need to include safety features such as windows to the workout area to ensure firefighters are safe. Indoor and outdoor fitness areas have been used when space is limited, but they need to have easy access to the apparatus bays.

Training areas allow crews to learn about the latest safety and health programs, so ample space that provides a functional learning space is part of this standard.

Suppose hands-on training areas are built into the station's layout. In that case, considerations need to include the decontamination of equipment and gear used before members return it to service or re-enter the living spaces.

Allowing firefighters to unwind and communicate in the station can help lower stress levels. Designs can include common spaces for crews to talk and debrief; comfortable seating are common practices.

The storage of PPE needs to be kept in areas away from the sun, and with little fluorescent lighting. The space needs ventilation to remove particulates from the area, and it needs to be separated from the living area.

## NFPA 1851

The standard that covers the maintenance and care of firefighter PPE is NFPA 1851, and it requires departments to

have separate laundry facilities for contaminated PPE and uniforms and station clothing, towels, and bedding.

Laundry areas continue to evolve and are being separated where personal belongings can be cleaned in the living areas where PPE does not enter the living space and is laundered near the apparatus bay. Waste water removal and airflow need to be considered when designed.

## NFPA 1710, 1720

NFPA 1710 and 1720 are the standards for the operations of career fire departments (NFPA 1710) and volunteer departments (1720).

"While we can't control what happens outside the station, what we can do is translate the design into how fast we can get them out of the station."

Designs can significantly impact turnout times for departments, including access from the second floor to the first-floor apparatus bay and from first-floor common areas.

"When we consider getting from Point A to B, it's at a walk, not a run," Bettiol said. "We need to understand what actions are going on in certain areas, such as putting things away in the kitchen that can add time to their response."

The easiest way to decrease response time is to give firefighters direct access without bends or turns in hallways, which will slow the firefighter down and create hazards. Door swings need to be designed so that firefighters will not open a door into another firefighter's path of travel.

Poles can reduce response times from an upper level by 50 percent or more, but safety features need to be included on both levels to prevent falls and hard landings. The location and design need to be discussed because the openings create airflow and fire spread areas.

As volunteer fire stations transition to around-the-clock staffing, departments need to be honest as they plan living spaces that will be used more frequently.

## Other Areas of Consideration

NFPA 13 is the standard for fire sprinkler installations and fire flows and designs need to be looked at for the various spaces around the station.

ISO ratings also include fire station features, including turnout time, station locations and accessibility.

It should be remembered that the standards and requirements do not just affect the fireground, but also the facilities where firefighters work, live and train. Those standards, when applied properly, can help with the firefighter's overall mission to protect the community and themselves.

## 5.3 Training and Recruitment

The Office of the Fire Marshal has recently announced the training and certification requirements for all positions within the fire service, which include firefighters, fire prevention officers, and training officers. As such, the Fire Chief is provided with clear direction on what training is required for each position within the fire department.

As for recruitment, the Fire Chief, will need to ensure a minimum of 15 VFFs at each fire station. Based on the Department's retention rate, the need for a recruitment drive and related and training program will depend on the actual retention rates.

# Appendix 'A'

## FIRE STATION DESCRIPTORS & 14-MINUTE RESPONSE COVERAGE

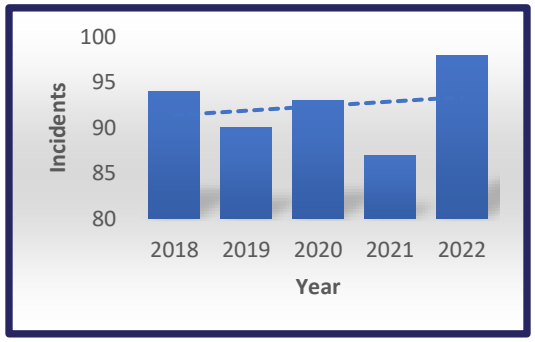
FIRE
TOWNSHIP OF MUSKOKA Lakes
RESCUE

TOWNSHIP OF MUSKOKA Lakes

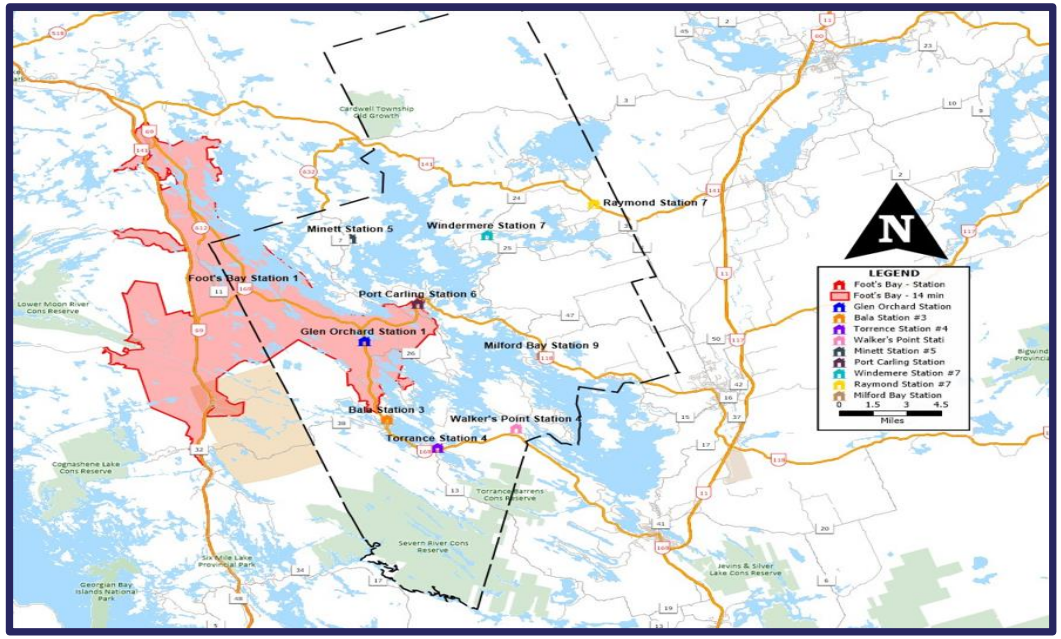
EMG | Emergency Management Group

# APPENDIX A – FIRE STATION DESCRIPTORS & 14-MINUTE RESPONSE COVERAGE

*Facility Overview: Station 1 – Foot's Bay*

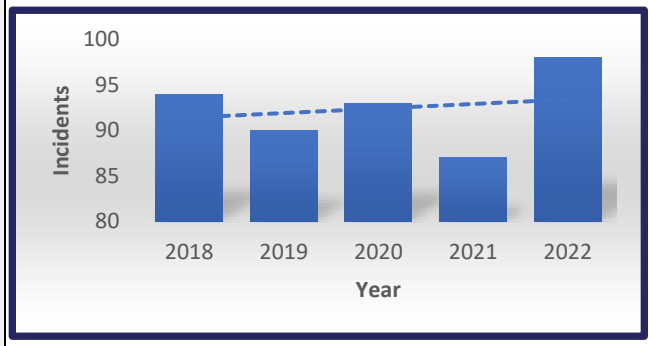

| | | |
|---|---|---|
| **Year of Construction** | 1971 (52 Years), renovation in 1978 | |
| **Building Size** | 4,241 ft$^2$ | |
| **Apparatus Assigned** | Tanker / Rescue / Snowmobile | |
| **Firefighters Rostered** | 14 | |
| **Incident Volume**<br>**NOTE: Call volumes are reflective of Foot's Bay and Glen Orchard incidents combined.** | 2018: 94<br>2019: 90<br>2020: 93<br>2021: 87<br>2022: 98 |  |
| **Additional** | Attached to 2,800 ft$^2$ community centre | |

## FIGURE A.1: FOOT'S BAY – 14-MINUTE DRIVE TIME

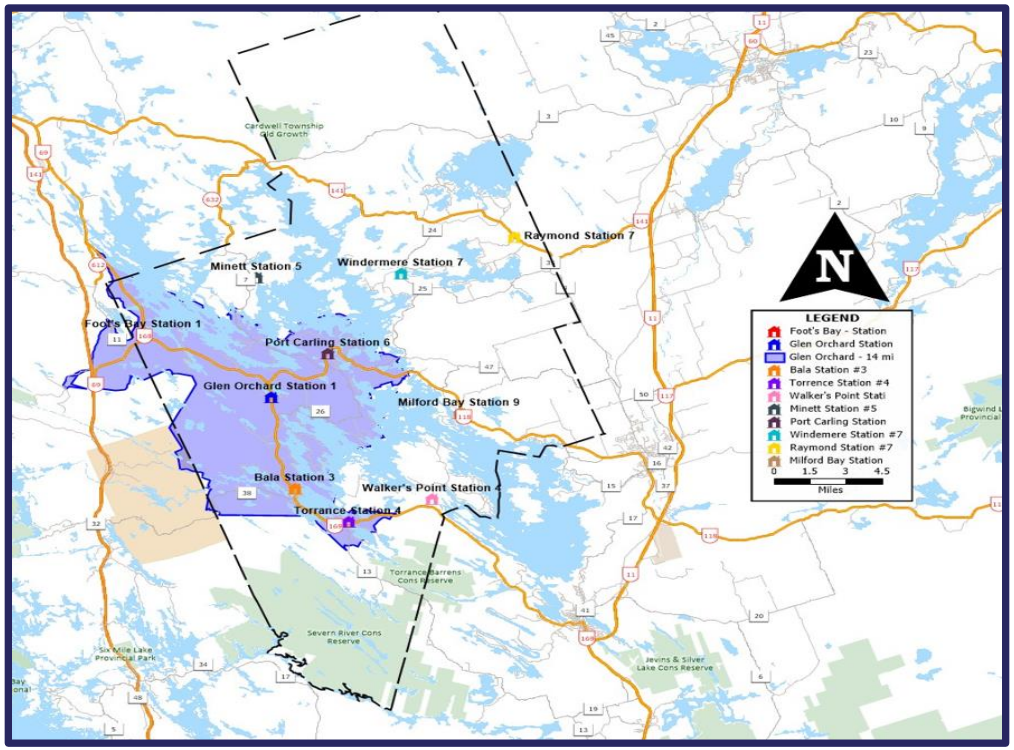



| YEAR | TURN OUT TIME (AVERAGE) | RESPONSE TIME (AVERAGE) |
|---|---|---|
| **2018** | 9 minutes: 3 seconds | 25 minutes: 9 seconds |
| **2019** | 9 minutes: 8 seconds | 17 minutes: 21 seconds |
| **2020** | 9 minutes: 58 seconds | 17 minutes: 13 seconds |
| **2021** | 9 minutes: 51 seconds | 18 minutes: 30 seconds |
| **2022** | 9 minutes: 55 seconds | 19 minutes: 1 second |

*Facility Overview: Station 1 – Glen Orchard*

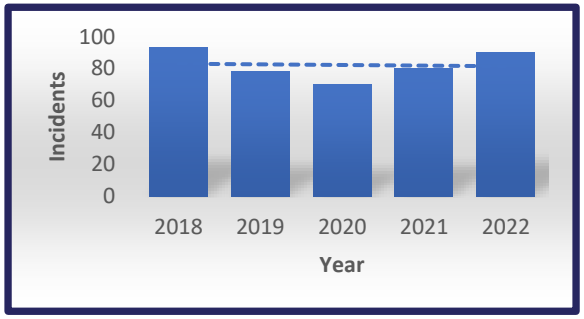
| | | |
|---|---|---|
| **Year of Construction** | 1991 (32 Years) | |
| **Building Size** | 1,079 $ft^2$ | |
| **Apparatus Assigned** | Pumper | |
| **Firefighters Rostered** | 14 | |
| **Incident Volume**<br>**NOTE: Call volumes are reflective of Foot's Bay and Glen Orchard combined incidents.** | 2018: 94<br>2019: 90<br>2020: 93<br>2021: 87<br>2022: 98 |  |
| **Additional** | Attached to a Public Works Facility | |

## FIGURE A.2: GLEN ORCHARD – 14-MINUTE DRIVE TIME

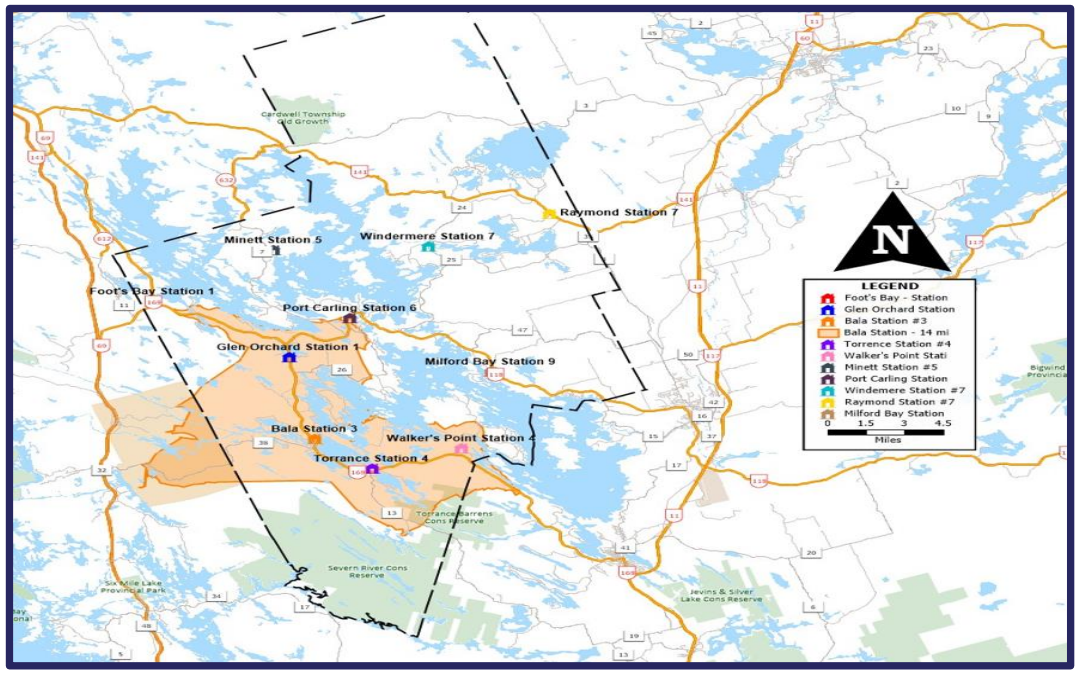



| YEAR | TURN OUT TIME (AVERAGE) | RESPONSE TIME (AVERAGE) |
|---|---|---|
| **2018** | 9 minutes: 3 seconds | 25 minutes: 9 seconds |
| **2019** | 9 minutes: 8 seconds | 17 minutes: 21 seconds |
| **2020** | 9 minutes: 58 seconds | 17 minutes: 13 seconds |
| **2021** | 9 minutes: 51 seconds | 18 minutes: 30 seconds |
| **2022** | 9 minutes: 55 seconds | 19 minutes: 1 second |

*Facility Overview: Station 3 – Bala*

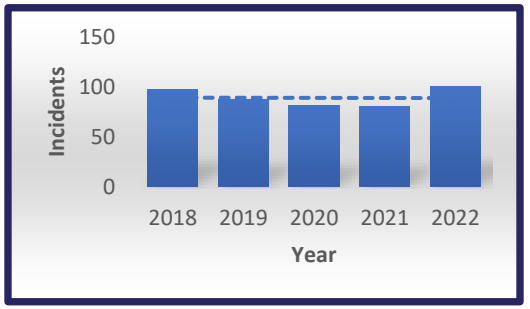

| | | |
|---|---|---|
| **Year of Construction** | 1945 (78 Years), renovation in 2010 | |
| **Building Size** | 4,764 $ft^2$ | |
| **Apparatus Assigned** | Pumper / Tanker / Rescue / Snowmobile | |
| **Firefighters Rostered** | 22 | |
| **Incident Volume**<br>**NOTE: Call volumes are reflective of Bala and Glen Orchard combined incidents** | 2018: 93<br>2019: 78<br>2020: 70<br>2021: 80<br>2022: 90 |  |
| **Additional** | Attached to a community centre | |

## FIGURE A.3: BALA– 14-MINUTE DRIVE TIME

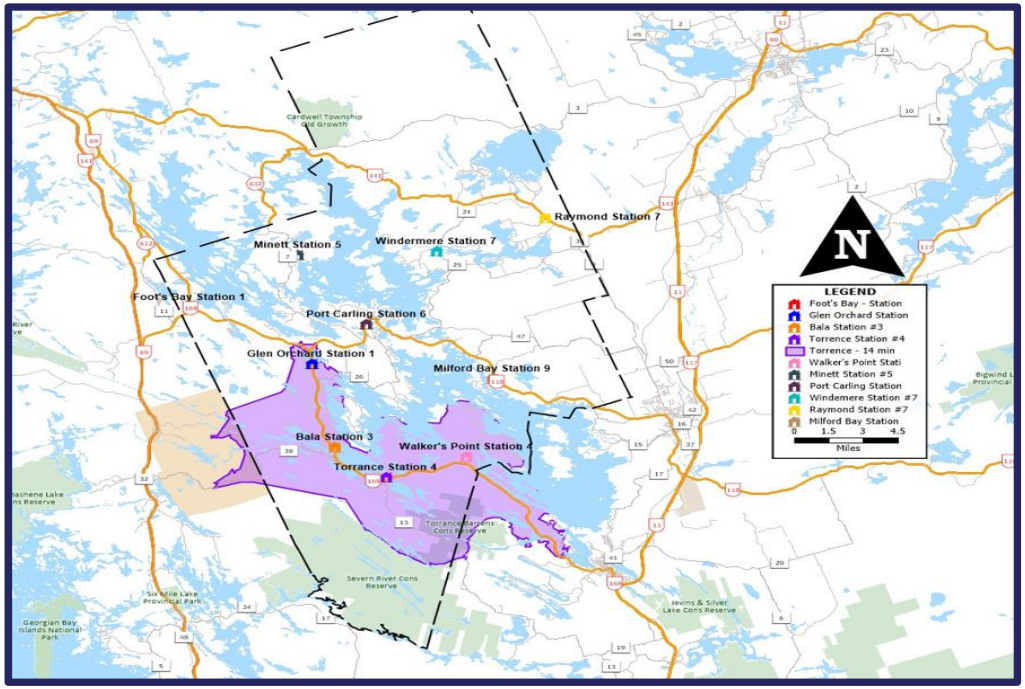



| YEAR | TURN OUT TIME (AVERAGE) | RESPONSE TIME (AVERAGE) |
|---|---|---|
| **2018** | 11minutes: 52 seconds | 18 minutes: 22 seconds |
| **2019** | 9 minutes: 1 second | 16 minutes: 23 seconds |
| **2020** | 9 minutes: 56 seconds | 15 minutes: 52 seconds |
| **2021** | 7 minutes: 40 seconds | 19 minutes: 53 seconds |
| **2022** | 8 minutes: 50 seconds | 15 minutes: 48 seconds |

*Facility Overview: Station 4 – Torrance*

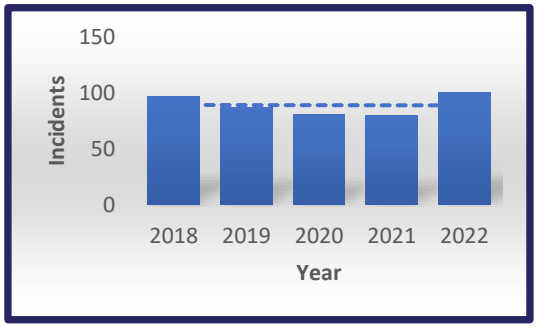

| | | |
|---|---|---|
| **Year of Construction** | 1992 (31 years) | |
| **Building Size** | 2,240 $ft^2$ | |
| **Apparatus Assigned** | Tanker / Spare Pumper | |
| **Firefighters Rostered** | 15 | |
| **Incident Volume**<br>**NOTE: Call volumes are reflective of Torrance and Walkers Point combined incidents.** | 2018: 97<br>2019: 87<br>2020: 81<br>2021: 80<br>2022: 100 |  |
| **Additional** | | |

## FIGURE A.4: TORRANCE – 14-MINUTE DRIVE TIME

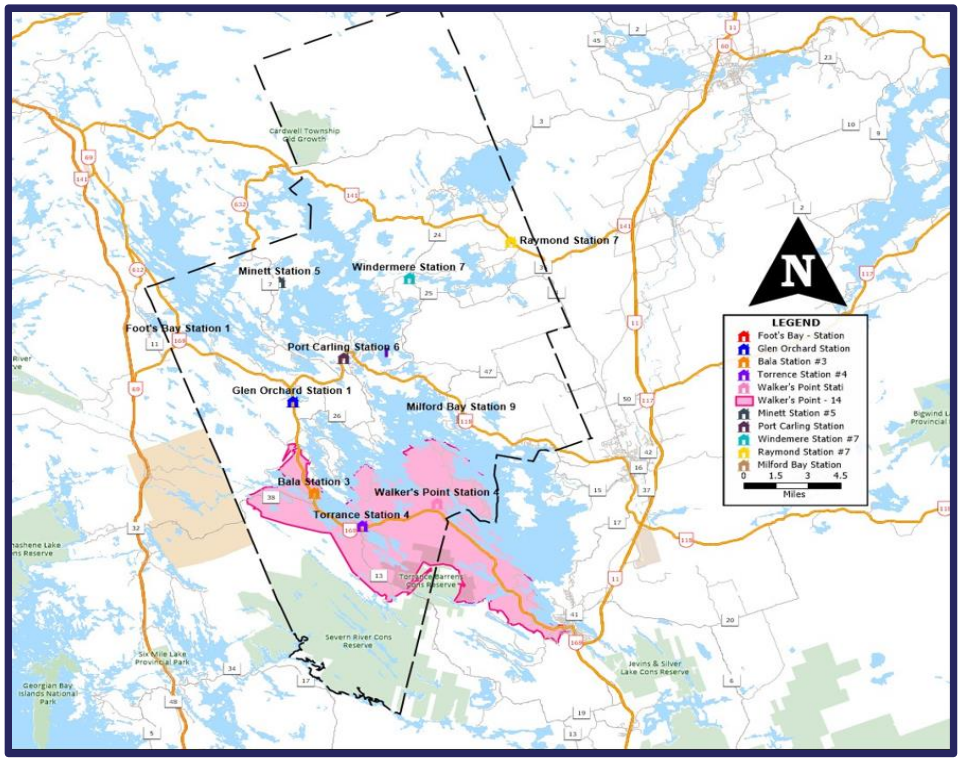



| YEAR | TURN OUT TIME (AVERAGE) | RESPONSE TIME (AVERAGE) |
|---|---|---|
| **2018** | 9 minutes: 21 seconds | 18 minutes: 51 seconds |
| **2019** | 11 minutes: 42 seconds | 19 minutes: 42 seconds |
| **2020** | 10 minutes: 33 seconds | 19 minutes: 30 seconds |
| **2021** | 10 minutes: 55 seconds | 20 minutes: 49 seconds |
| **2022** | 10 minutes: 53 seconds | 19 minutes: 53 seconds |

*Facility Overview: Station 4 – Walkers Point*

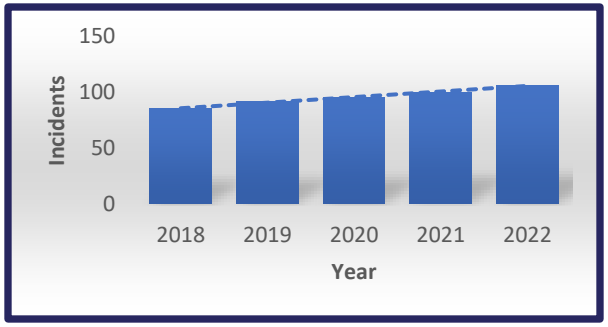
| | | |
|---|---|---|
| **Year of Construction** | 2009 (14 years) | |
| **Building Size** | 5,326 ft$^2$ | |
| **Apparatus Assigned** | Pumper / Rescue / ATV | |
| **Firefighters Rostered** | 15 | |
| **Incident Volume**<br>**NOTE: Call volumes are reflective of Torrance and Walkers Point combined incidents.** | 2018: 97<br>2019: 87<br>2020: 81<br>2021: 80<br>2022: 100 |  |
| **Additional** | Attached to a 5,505 ft$^2$ community centre | |

## FIGURE A.5: WALKERS POINT – 14-MINUTE DRIVE TIME

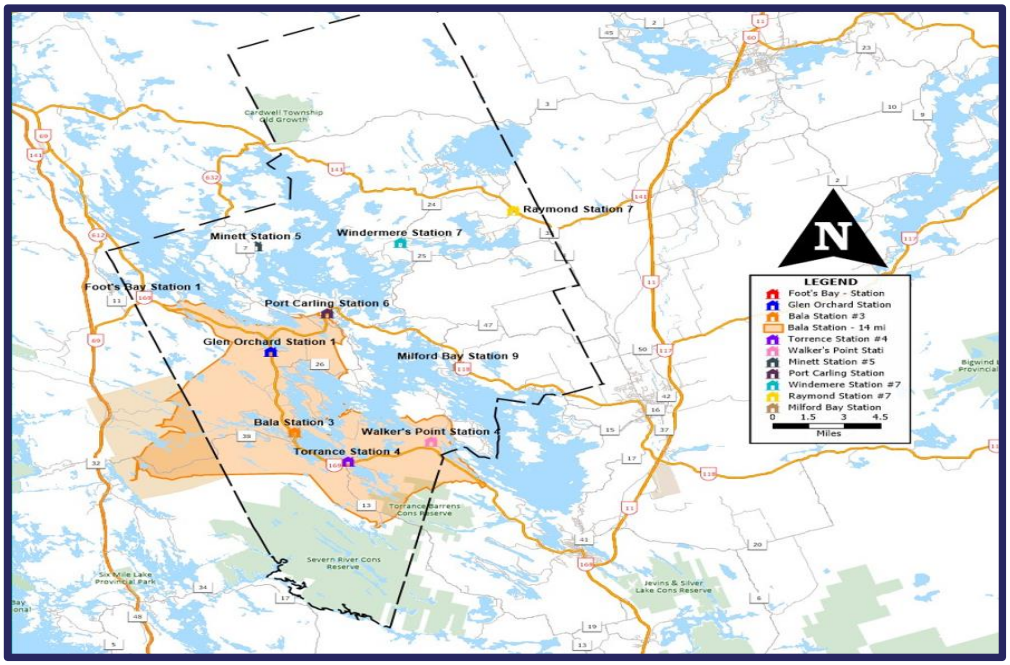



| YEAR | TURN OUT TIME (AVERAGE) | RESPONSE TIME (AVERAGE) |
|---|---|---|
| **2018** | 9 minutes: 21 seconds | 18 minutes: 51 seconds |
| **2019** | 11 minutes: 42 seconds | 19 minutes: 42 seconds |
| **2020** | 10 minutes: 33 seconds | 19 minutes: 30 seconds |
| **2021** | 10 minutes: 55 seconds | 20 minutes: 49 seconds |
| **2022** | 10 minutes: 53 seconds | 19 minutes: 53 seconds |

*Facility Overview Station 5 – Minett*

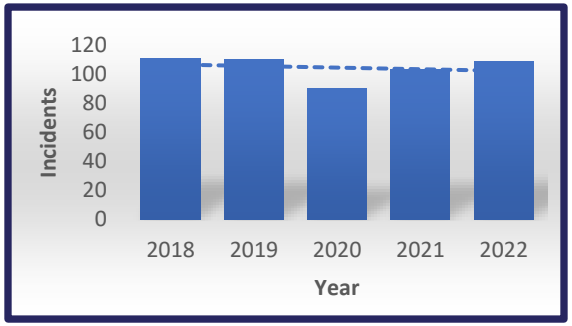

| | | |
|---|---|---|
| **Year of Construction** | 1940 (83 years) | |
| **Building Size** | 3,748 $ft^2$ | |
| **Apparatus Assigned** | Pumper / Tanker / Rescue / ATV | |
| **Firefighters Rostered** | 15 | |
| **Incident Volume** | 2018: 85<br>2019: 92<br>2020: 95<br>2021: 100<br>2022: 106 |  |
| **Additional** | Attached to a community centre | |

## FIGURE A.6: MINETT – 14-MINUTE DRIVE TIME

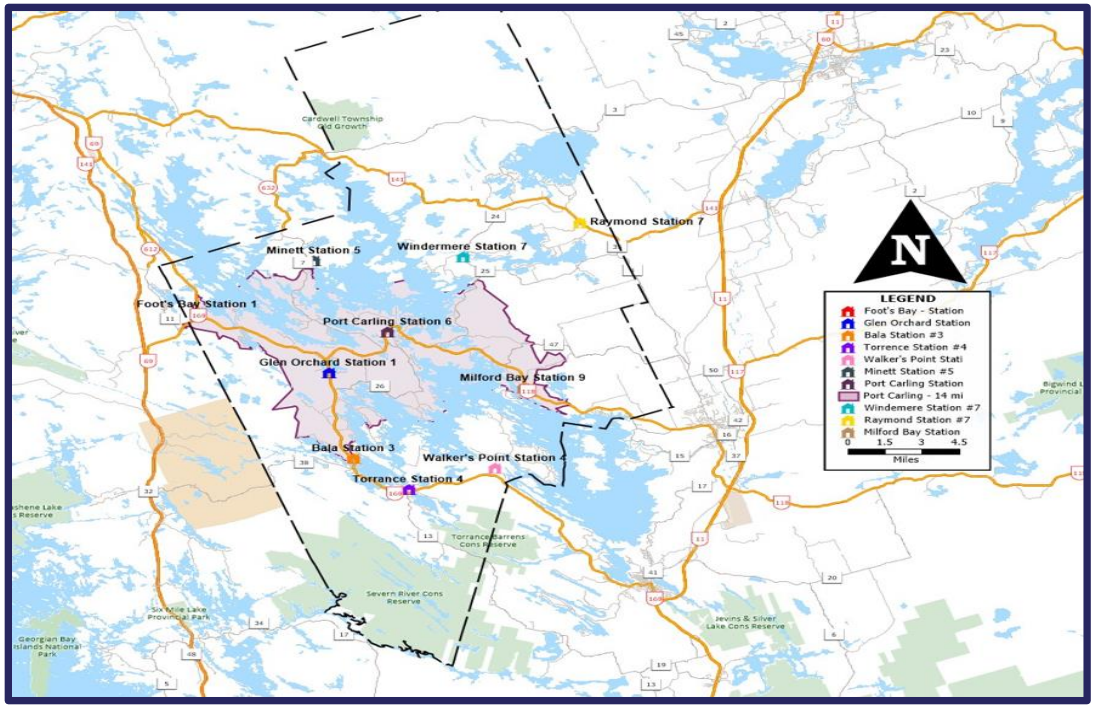



| YEAR | TURN OUT TIME (AVERAGE) | RESPONSE TIME (AVERAGE) |
|---|---|---|
| **2018** | 10 minutes: 37 seconds | 17 minutes: 33 seconds |
| **2019** | 11 minutes: 29 seconds | 21 minutes: 22 seconds |
| **2020** | 10 minutes: 53 seconds | 19 minutes: 33 seconds |
| **2021** | 11 minutes: 57 seconds | 20 minutes: 32 seconds |
| **2022** | 11 minutes: 51 seconds | 20 minutes: 50 seconds |

*Facility Overview: Station 6 – Port Carling*

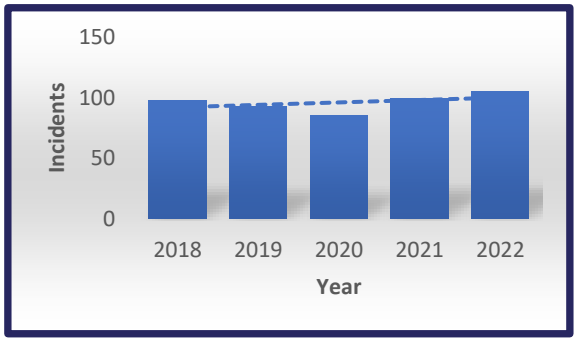

| | | |
|---|---|---|
| **Year of Construction** | 2009 (14 years) | |
| **Building Size** | 6,367 $ft^2$ | |
| **Apparatus Assigned** | Pumper / Tanker / Rescue / Marine (Inflatable) | |
| **Firefighters Rostered** | 19 | |
| **Incident Volume** | 2018: 111<br>2019: 110<br>2020: 90<br>2021: 103<br>2022: 109 |  |
| **Additional** | | |

## FIGURE # A.7: PORT CARLING – 14-MINUTE DRIVE TIME

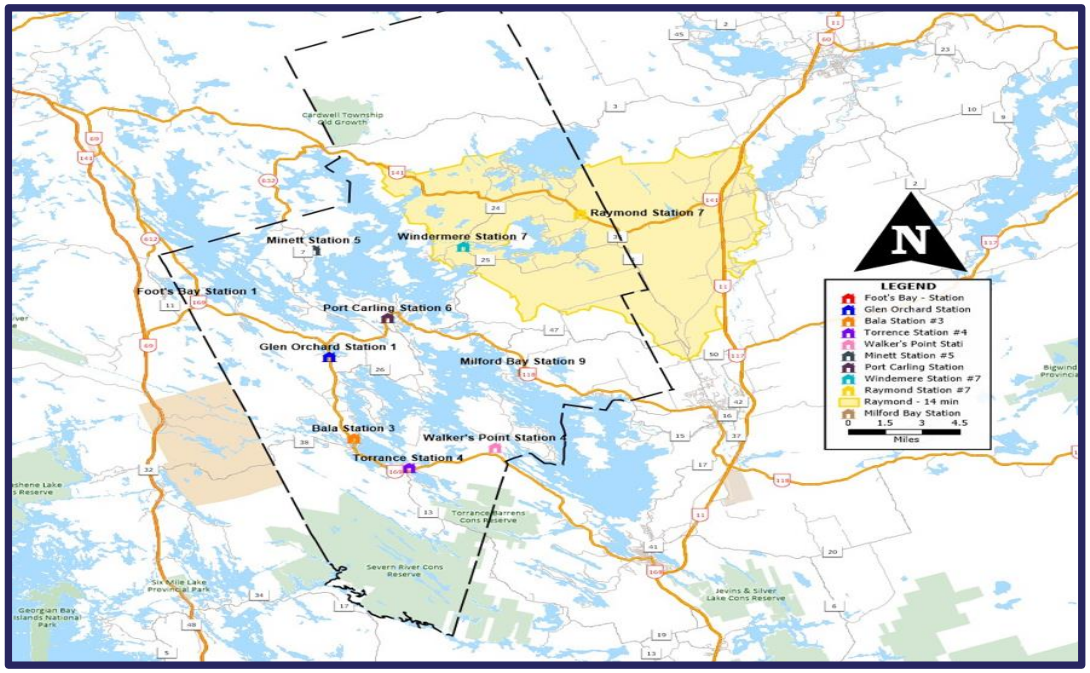



| YEAR | TURN OUT TIME (AVERAGE) | RESPONSE TIME (AVERAGE) |
|---|---|---|
| **2018** | 15 minutes: 35 seconds | 16 minutes: 27 seconds |
| **2019** | 9 minutes: 11 seconds | 15 minutes: 2 seconds |
| **2020** | 9 minutes: 17 seconds | 15 minutes: 46 seconds |
| **2021** | 9 minutes: 36 seconds | 14 minutes: 16 seconds |
| **2022** | 8 minutes: 48 seconds | 13 minutes: 45 seconds |

*Facility Overview: Station 7 – Raymond*

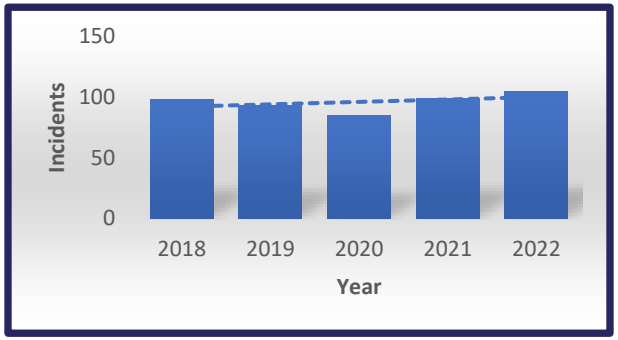

| | | |
|---|---|---|
| **Year of Construction** | 1980 (43 years) | |
| **Building Size** | 2,050 $ft^2$ | |
| **Apparatus Assigned** | Pumper / Tanker / Rescue | |
| **Firefighters Rostered** | 17 | |
| **Incident Volume**<br>**NOTE: Call volumes are reflective of Windermere and Raymond incidents combined.** | 2018: 98<br>2019: 93<br>2020: 85<br>2021: 99<br>2022: 105 |  |
| **Additional** | | |

## FIGURE A.8: RAYMOND – 14-MINTE DRIVE TIME

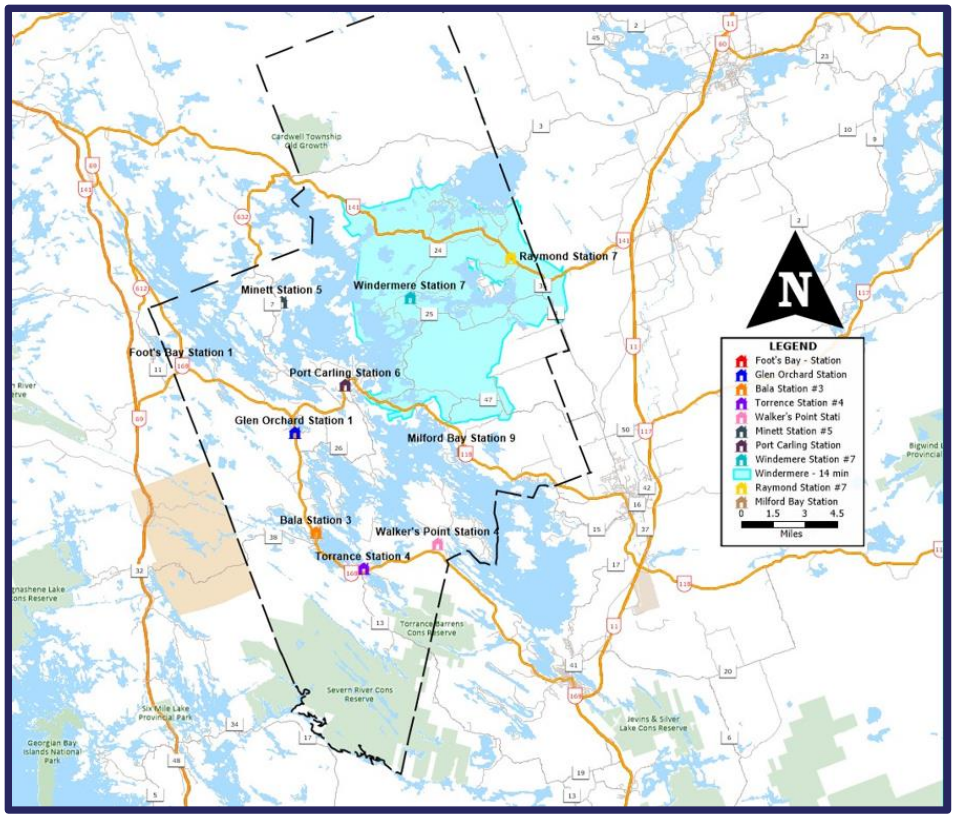



| YEAR | TURN OUT TIME (AVERAGE) | RESPONSE TIME (AVERAGE) |
|---|---|---|
| **2018** | 8 minutes: 53 seconds | 16 minutes: 48 seconds |
| **2019** | 12 minutes: 48 seconds | 20 minutes: 45 seconds |
| **2020** | 9 minutes: 19 seconds | 18 minutes: 3 seconds |
| **2021** | 8 minutes: 51 seconds | 17 minutes: 45 seconds |
| **2022** | 11 minutes: 31 seconds | 20 minutes: 45 seconds |

*Facility Overview: Station 7 – Windermere*

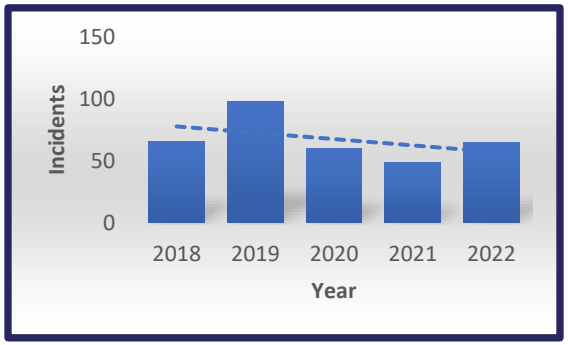
| | | |
|---|---|---|
| **Year of Construction:** | 1995 (28 years) | |
| **Building Size:** | 2,930 $ft^2$ | |
| **Apparatus Assigned:** | Pumper / Tanker / ATV | |
| **Firefighters Rostered:** | 17 | |
| **Incident Volume:**<br>**NOTE: Call volumes are reflective of Windermere and Raymond incidents combined.** | 2018: 98<br>2019: 93<br>2020: 85<br>2021: 99<br>2022: 105 |  |
| **Additional** | | |

## FIGURE A.9: WINDERMERE – 14-MINUTE DRIVE TIME

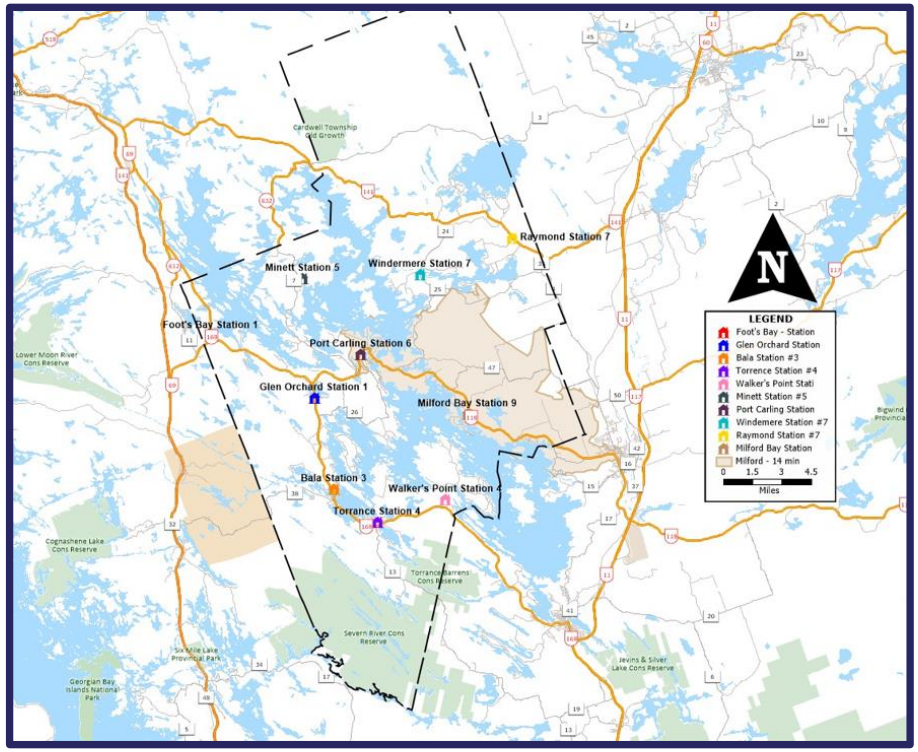



| YEAR | TURN OUT TIME (AVERAGE) | RESPONSE TIME (AVERAGE) |
|---|---|---|
| **2018** | 8 minutes: 53 seconds | 16 minutes: 48 seconds |
| **2019** | 12 minutes: 48 seconds | 20 minutes: 45 seconds |
| **2020** | 9 minutes: 19 seconds | 18 minutes: 3 seconds |
| **2021** | 8 minutes: 51 seconds | 17 minutes: 45 seconds |
| **2022** | 11 minutes: 31 seconds | 20 minutes: 45 seconds |

*Facility Overview: Station 9 – Milford Bay*


| | | |
|---|---|---|
| **Year of Construction** | 1955 (78 years) | |
| **Building Size** | 2,374 $ft^2$ | |
| **Apparatus Assigned** | Pumper / Tanker / Rescue / ATV (ARGO) | |
| **Firefighters Rostered** | 20 | |
| **Incident Volume** | 2018: 85<br>2019: 92<br>2020: 95<br>2021: 100<br>2022: 106 |  |
| **Additional** | | |

## FIGURE A.10: MILFORD BAY – 14-MINUTE DRIVE TIME




| YEAR | TURN OUT TIME (AVERAGE) | RESPONSE TIME (AVERAGE) |
|---|---|---|
| **2018** | 11 minutes: 57 seconds | 20 minutes: 20 seconds |
| **2019** | 13 minutes: 49 seconds | 22 minutes: 40 seconds |
| **2020** | 12 minutes: 20 seconds | 22 minutes: 59 seconds |
| **2021** | 11 minutes: 13 seconds | 20 minutes: 25 seconds |
| **2022** | 15 minutes: 6 seconds | 24 minutes: 15 seconds |

# ENDNOTES

[i] Township of Muskoka Lakes Fire Master Plan 2022, Section 6.2

[ii] FEMA 2018 Safety and Health Considerations for the Design of Fire and Emergency Medical Services Stations (pgs. 13 and 41)

[iii] Station Design: Station Construction: Budgeting for Soft Costs. Retrieved 15 March 2024. https://www.firehouse.com/stations/article/21150704/station-design-station-construction-budgeting-for-soft-costs

[iv] "838 – 4th Avenue SW," ITC Construction Group, Accessed August 24, 2023, https://www.itc-group.com/project/solaire-louise-station

[v] Taking Action Against Cancer in the Fire Service (2013), Retrieved 18 March 2024. https://firewipes.com/wp-content/uploads/2017/10/fcsn-white-paper.pdf

[vi] Station Design: Integrating NFPA Standards into Your Fire Station. Retrieved 19 March 2024. https://www.firehouse.com/stations/architects/news/21011092/station-design-integrating-nfpa-standards-into-your-fire-station