



Guelph-Wellington Paramedic Service Master Plan 2018-2022



November 2017

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Preface

The Guelph-Wellington Paramedic Service is the designated provider of emergency Paramedic ambulance service for the City of Guelph and the County of Wellington. The service is dedicated to provide compassionate quality 'patient focused' emergency medical care and transport service in Guelph and Wellington County. (Figure 1)

The relatively large coverage area serviced by the Guelph-Wellington Paramedic Service is unique, not only in size but by its population's unequal distribution throughout the County of Wellington. The county's 2,600 square kilometre stretch from Mount Forest in the north to Puslinch in the south, east to the Town of Erin and nearly as far west as Listowel. The size and shape of the county make navigating the overall response area very difficult and time consuming, providing for response-time challenges that are unique to the Guelph-Wellington Paramedic Service.

Ontario provincial legislation requires Paramedic service providers to set target performance levels for the ambulance service. Performance targets are set in the form of a Response Time Performance Plan (RTPP), which establishes a target response time and compliance level to that target for each of the five categories of medical emergencies.

The large geographical area of Wellington County, its distinctive population, and the

call volume distribution creates significant challenges in determining the RTPP as it is a service-wide target. The majority of emergency responses are focused in Guelph's urban boundaries. Responding within city limits, where the population density requires short ambulance travel distances, is fundamentally different than responding to a sparsely populated rural area in the county.

All of the above factors contribute to the uniqueness of the Guelph-Wellington Paramedic Service. This Master Plan addresses these incomparable challenges with unique staffing, station location and vehicle deployment solutions.

Figure 1 Overview of service territory and Paramedic staff

- Total covered area:
 - 2,600 Km², travel time from Minto to Puslinch is 1.5 hours
- Total population served:
 - 225,000
- Current staffing:
 - 160 full- and part-time Paramedics
 - 5 Superintendents
- System support:
 - 1 Administrative assistant
 - 1 Scheduler
 - 3 Commanders
 - 1 Deputy chief
 - 1 Chief
- Superintendent coverage:
 - Day shift:
 - 25 Paramedics
 - 1 Superintendent based at the city
 - night shift:
 - 18 Paramedics
 - 1 Superintendent covering the city only

State of the Guelph-Wellington Paramedic Service

The Guelph-Wellington Paramedic Service is managed as a division of Emergency Services within Public Services at the City of Guelph. Its administrative offices are located on Clair Road in Guelph. Approximately 160 full- and part-time Paramedics respond to emergency 911 calls throughout the city and county from one of 10 Paramedic stations and posts located across the coverage area. (Figure 2)

The Paramedic service employs highly trained, dedicated Paramedics who use sophisticated advanced equipment to assess and treat patients with life-threatening injuries or illnesses and transport them to one of four hospitals in the area or to a designated trauma or cardiac centre outside of the area, as appropriate.

In 2016, Paramedics responded to more than 21,700 calls for assistance. The service has seen the number of responses or calls for service continue to rise by three to seven per cent annually. These increases are attributed to an increasing population and age distribution changes in that population. It is also caused by changes in the overall healthcare system where more treatment is provided in the home and hospital stays are shorter.

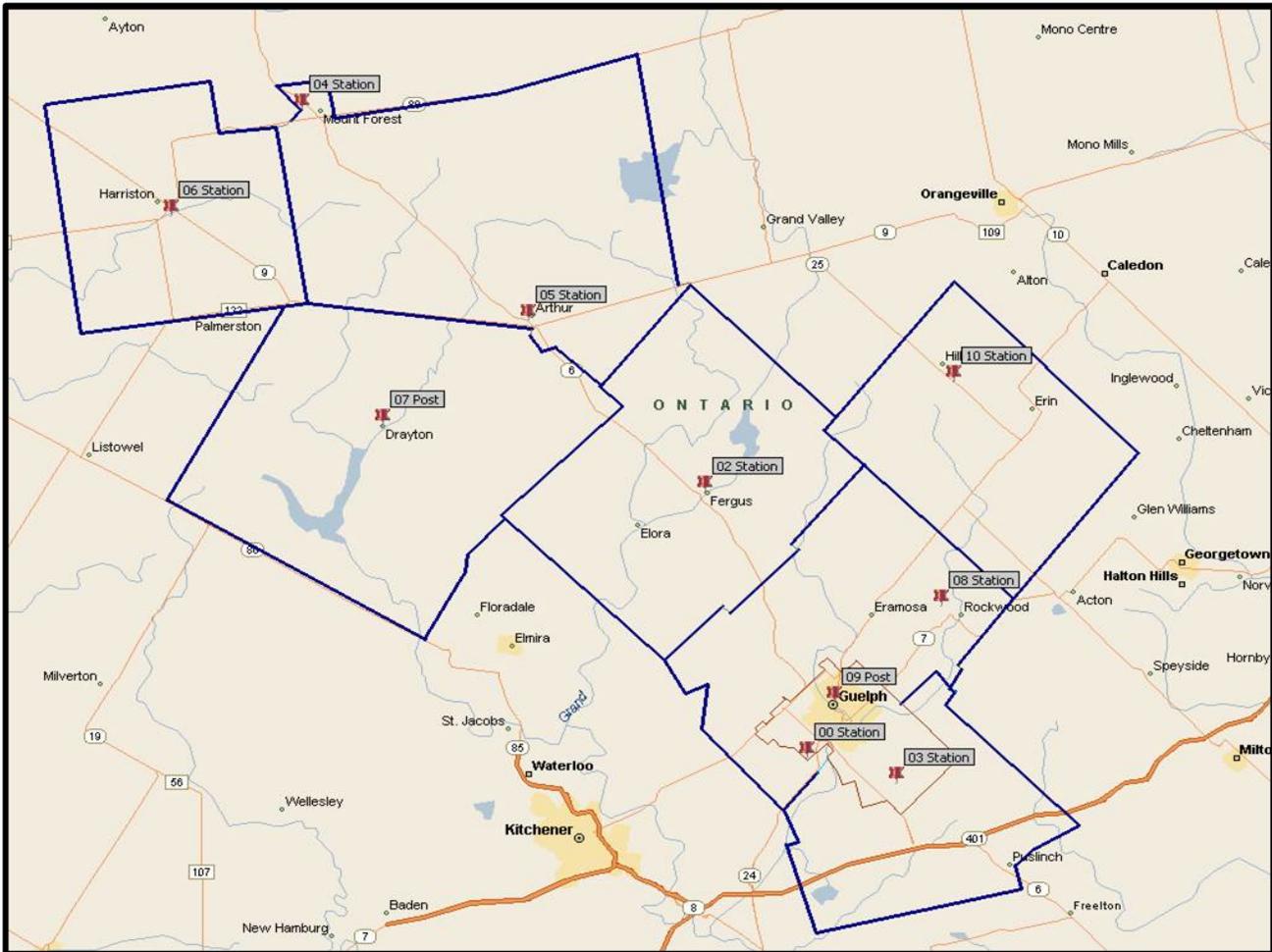
In addition to increasing call volumes, the Paramedic service is pressured by increasing time intervals after arriving at a hospital with a patient, where the hospital emergency room department is at or above their capacity and unable to assume responsibility for care of the patient. In some circumstances, notably at peak periods, Paramedics must stay at the emergency room department and care for the patient until the hospital is able to assume care. This is referred to as offload delay. The increase in call volumes and increases in offload delay time are straining the ability to respond to calls in a timely manner.

Response times are an important factor in the provision of Paramedic services in that timely administration of care to the most severely ill or injured can affect a patient's condition and outcome.

The most serious category of patient injury and illness (CTAS 1) includes patients that are unstable and require immediate care to prevent death. Examples include patients, who are unconscious, are choking, have severe injuries or who are in cardiac arrest.

Heart&Stroke research shows that for every minute defibrillation is delayed the chance of survival for a patient in cardiac arrest drops by seven to 10 per cent.

Figure 2 Service coverage area and stations



Coverage

Paramedics are based at 10 stations (eight full stations and two posts) spread throughout the coverage area of more than 2,600 square kilometres. Post locations do not have full facilities and Paramedics do not report to work at these locations. However, Paramedic vehicles starting at other stations are moved to posts during shifts for optimal response time coverage.

At the time when they were established, staffing levels at the individual stations were determined based on historical call volumes and response times. In some cases, decisions on staffing were based on available operating budgets. Currently, some stations are staffed 24 hours per day while others are only staffed 12 hours per day.

Twenty-four hour staffing is attained by scheduling two Paramedics at a time, working 12 hour shifts. Four teams are required for a total of eight Paramedics per 24/7 ambulance. (Figure 3)

Figure 3 Station and resource distribution

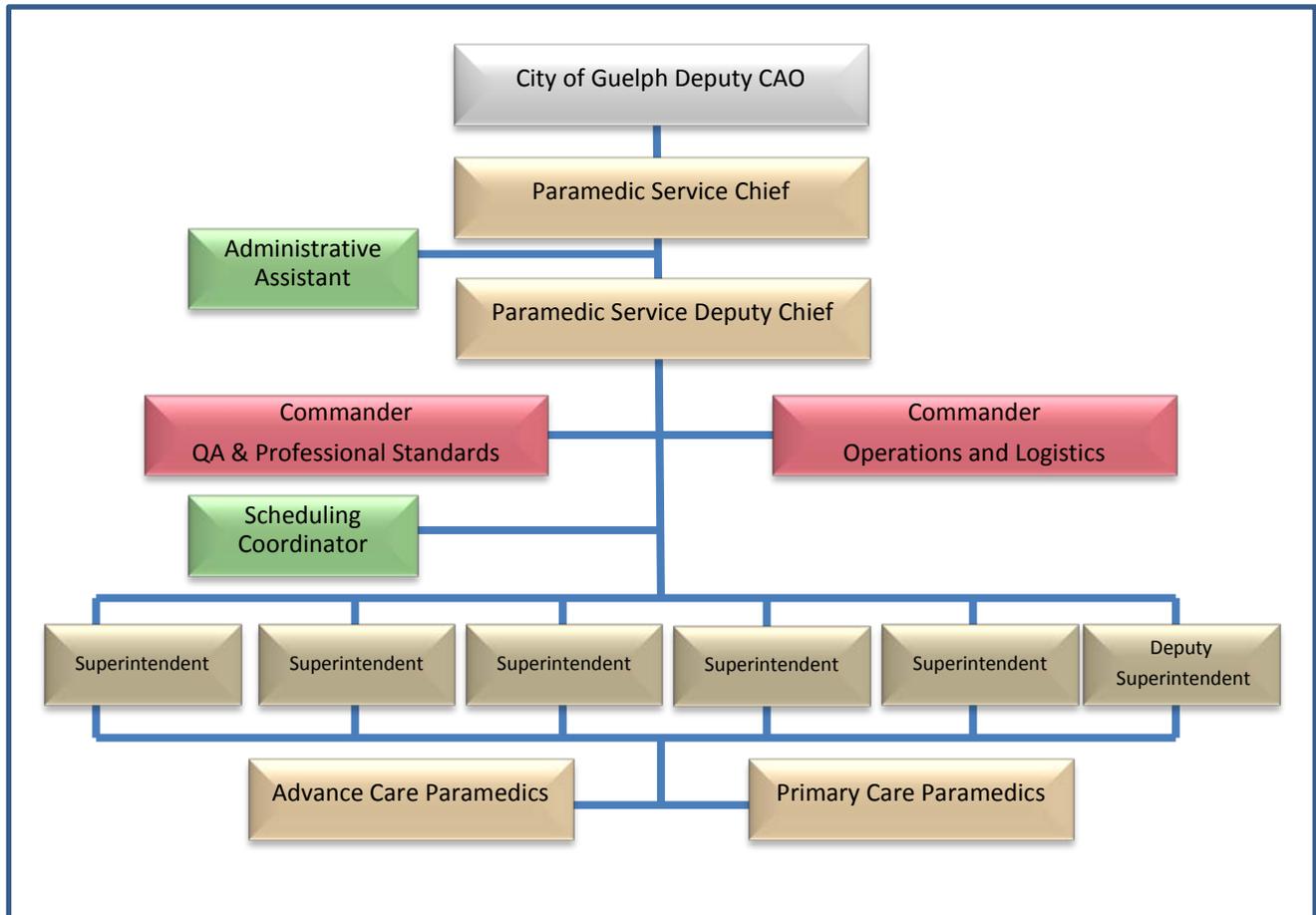
Station location		hours /day	Staff and fleet
Minto Township	Harriston	24/7	4 Paramedics/2 ambulances daytime 2 Paramedics/1 ambulance nighttime (total 12 full-time Paramedics)
	Mount Forest	24/7	2 Paramedics/1 ambulance (total 8 full-time Paramedics)
Wellington North Township	Arthur	24/7	2 Paramedics/1 ambulance (total 8 full-time Paramedics)
	Drayton Post*	12/7	Deployed from Harriston Station during day shift
Centre Wellington	Fergus	24/7	2 Paramedics/1 ambulance (total 8 full-time Paramedics)
Guelph Eramosa	Rockwood	12/7	2 Paramedics/1 ambulance (total 4 full-time Paramedics)
Erin Township	Hillsburgh	24/7	2 Paramedics/1 ambulance (total 8 full-time Paramedics)
City of Guelph	Elmira Road Station**	24/7	4 Paramedics/2 ambulances
		12/7	2 Paramedics/1 ambulance (total 20 full-time Paramedics)
	Clair RoadStation* *	24/7	4 Paramedics/2 ambulances
		8.4/5	1 Paramedic/1 Emergency Response Vehicle (total 17 full-time Paramedics)
Delhi Post	24/7	Deployed from 2 Guelph stations	
* One 12 hour day shift ambulance is deployed from Harriston to the Drayton post each day ** One 24 hour ambulance is deployed to the Delhi Post in Guelph from each of the above city of Guelph stations each day			

Service governance and funding

The Guelph-Wellington Paramedic Service management team consists of a chief, deputy chief, two commanders and five superintendents. The team is supported by one administrative assistant and one Paramedic scheduler. The service uses the rank and

insignia designations of Paramedic services as recommended by the Paramedic Chiefs of Canada. (Figure 4)

Figure 4 Organizational chart



The Guelph-Wellington Paramedic Service management team reports operationally to the City of Guelph’s Emergency Services department in Public Services, and specifically to the Deputy CAO of Public Services.

The Ontario provincial Ministry of Health and Long-Term Care (MOHLTC) sets the standards by which the City of Guelph must provide the Paramedic service through the Ambulance Act of Ontario and associated regulations. The MOHLTC receives reports, conducts occasional inspections, and on a tri-annual basis conducts a thorough review of each service to ensure that the regulations are being followed.

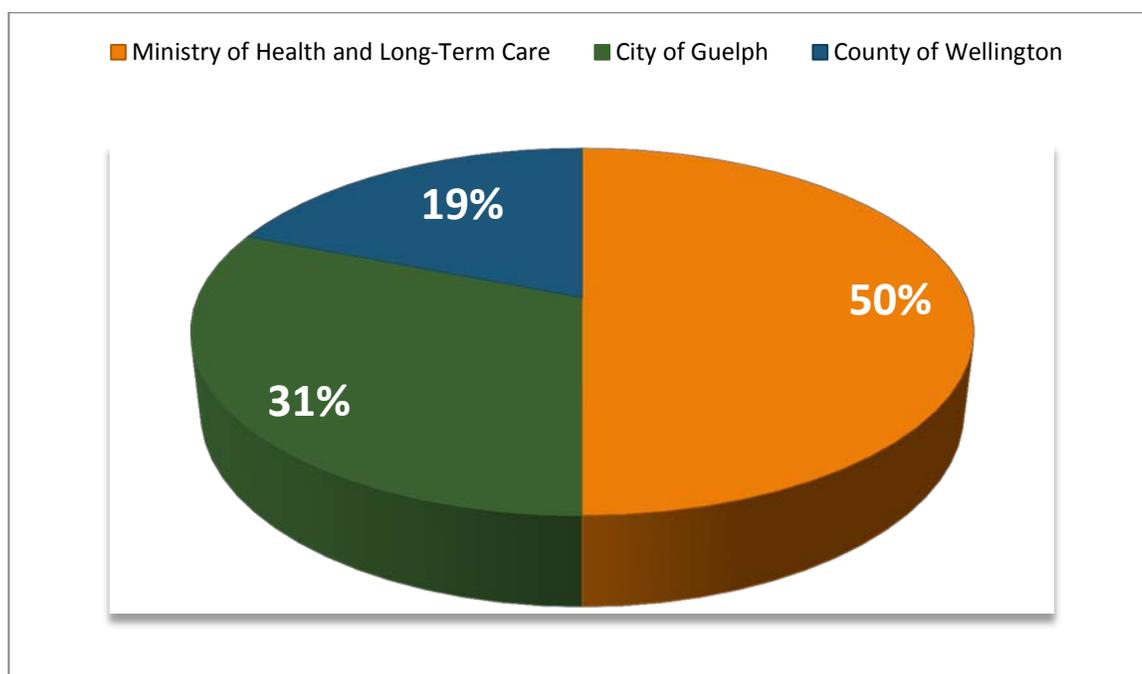
The MOHLTC also maintains an Investigative Branch to review significant concerns. The Investigations Branch assists the City in its efforts to review the concerns received.

The MOHLTC is a funding partner for the Paramedic service in Ontario, contributing an amount equal to 50 per cent of the previous year's budget.

The County of Wellington, through its Social Services Committee, receives occasional reports and provides feedback to the City on the operations of the Paramedic service. The service collaborates with the County of Wellington to ensure transparency and accountability.

The County of Wellington is also a funding partner for the Paramedic service. An arbitration decision, dated October 2010, determined that the County of Wellington pay a portion of the costs of running the service, net of the contributions from the MOHLTC, equal to proportion of ambulance calls responded to the in county compared to the city. This statistic is taken from the MOHLTC database quarterly. In 2016, about 62 per cent of responses were in the city of Guelph with 38 per cent occurring in Wellington County. (Figure 5)

Figure 5 Guelph-Wellington Paramedic Service funding sources



As stated, the MOHLTC funding is based on 50 per cent of the previous year's budget. As such, the costs of any enhancements to the service must be absorbed by the City of Guelph and the County of Wellington in the initial year.

In addition to the reporting relationships within governing councils, Guelph-Wellington Paramedic Service management also maintains, cooperates and coordinates efforts with a number of agencies and boards. These include the Joint Emergency Services Advisory Group (Guelph Police Service and Guelph Fire Department) and the County of

Wellington Fire Chiefs, as well as several committees that include the Local Health Integration (LHIN) Emergency Department Council and the local Family Health Teams, who represent family practice physicians.

Call volumes and staffing hours

The Guelph-Wellington Paramedic Service has seen a significant increase in emergency call volumes over the past several years. This trend is consistent with what is being experienced in other Paramedic services in Ontario and internationally.

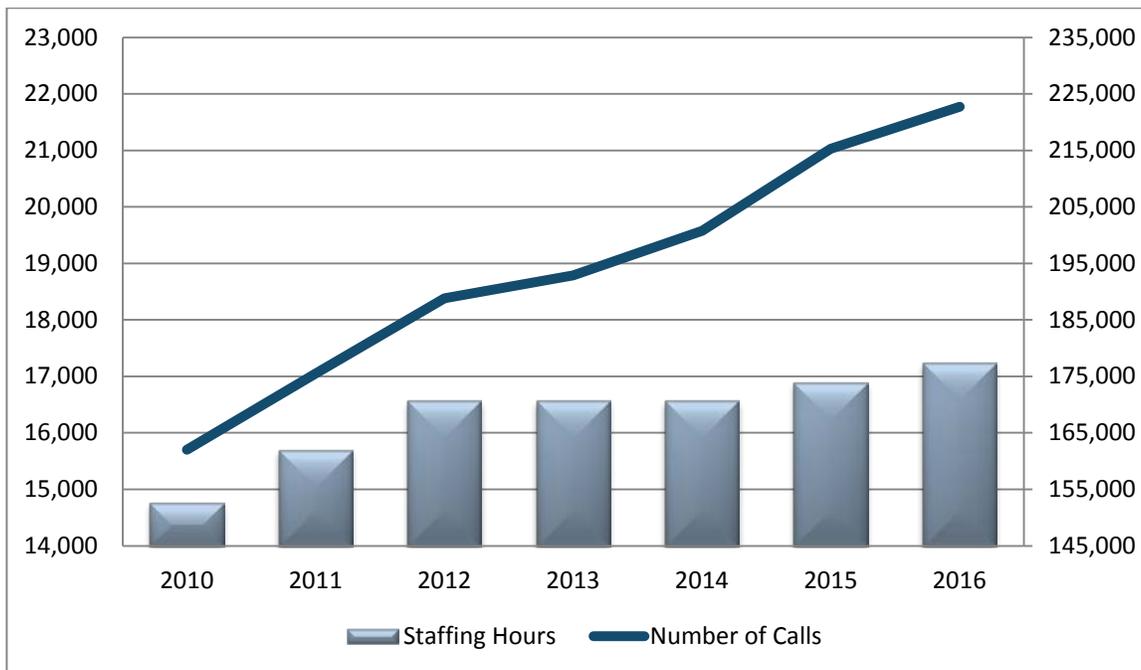
In 2016, Paramedics responded to more than 21,700 calls for assistance. The service has seen the number of responses or calls for service increase more than 20 per cent in the last five years. There are multiple factors affecting the increase.

Some of the factors that affect variations in call volumes include the following:

- Increasing population in the service area
- An aging population
- An increased propensity of members of the public to use Paramedic services
- A shift in the healthcare system to more care at home and earlier release from hospital

Although the staffing levels of the service have increased over the same time period, the increases in staffing have not been to the same level as that of the call volumes. (Figure 6)

Figure 6 Call volume and staffing hours



The effect of the higher call volume is that response times are lengthened as ambulances are not available to respond in the area that emergencies occur and respond from further away. High call volumes can also lead to an increase in Paramedic injuries, mechanical issues with vehicles and challenges in meeting legislated training and quality assurance targets.

Base hospital delegation

The MOHLTC has facilitated the ability of Paramedics to treat patients with Controlled Medical Acts by establishing a base hospital system, through which a physician is designated as the medical director for local ambulance services. Controlled Medical Acts are defined under law and restricted so that they can only be performed by a physician or recognized health care professional.

Base hospital physicians delegate the authority to perform the Controlled Medical Acts to Paramedics, and this enables Paramedics to perform skills that are normally restricted to a physician.

Part of the role of the base hospital program is to perform quality assurance and training on behalf of the medical director, which is required to allow delegation of Controlled Medical Acts. The medical director must have assurance of Paramedic competence.

Therefore, Paramedics in Ontario must meet the quality assurance requirements of three separate services: the municipality that employs them, the Ministry of Health and Long-Term Care Investigations Branch and the designated base hospital system for their area.

Guelph-Wellington Paramedics fall under the catchment area of the Centre for Paramedic Education and Research, the base hospital managed by the Hamilton Health Sciences Corporation based in Stoney Creek, Ontario.

Staffing

The Guelph-Wellington Paramedic Service maintains enough staff to have two Paramedics on every ambulance scheduled to be on duty and one Paramedic assigned to the Emergency Response Unit, during the designated hours of operation. The service currently staffs at a minimum staffing level meaning there is exactly the minimum number of staff scheduled to be on duty with no float or surplus staff. All vacancies due to vacation and sickness need to be filled by part-time staff to ensure that the staffing levels are always maintained.

Guelph-Wellington Paramedic Service employs two levels of Paramedics. Primary care Paramedics (PCPs) are community college graduates of a two-year program dedicated to the Paramedic profession. Advanced care Paramedics (ACPs) have the PCP level of training and experience and have an additional one year community college post-diploma program.

The skills that each level of certified Paramedic has are detailed in the following chart (Figure 7).

Figure 7 Paramedic skill set

Primary Care Paramedic (PCP)	Advanced Care Paramedic (ACP)
<p>The PCP functions to provide:</p> <ul style="list-style-type: none"> · Emergency patient care · Cardiopulmonary resuscitation (CPR) · Patient immobilization · Oxygen therapy · Basic trauma life support · Blood glucose testing · Monitor intravenous line (IV) with normal saline, thiamine, 	<p>In addition to the PCP skill set, ACP providers are qualified to perform and/or use:</p> <ul style="list-style-type: none"> · Advanced airway management equipment · Orotracheal and nasotracheal intubation equipment · Lighted stylet intubation equipment · Orogastric and nasogastric tubes

Primary Care Paramedic (PCP)	Advanced Care Paramedic (ACP)			
<p>multivitamin preparations and potassium chloride (KCL)</p> <ul style="list-style-type: none"> · Lead 2 ECG interpretation · Pulse oxymetry monitoring · Manual defibrillation · 12-lead ECG application and STEMI diagnosis 	<ul style="list-style-type: none"> · SPO2 monitoring · Side stream ETCO2 monitoring (capnography and capnometry) · Mechanical ventilation · Laryngoscopy and removal of foreign body obstruction using macgill forceps · Intravenous therapy · Pharmaceutical therapy · 12 lead ECG interpretation · Needle thoracostomy · Chest tube monitoring · Intraosseous and external jugular IV starts · Manual defibrillation, synchronized cardioversion and external transcutaneous cardiac pacing · Treatment of cardiac emergencies according to heart & stroke foundation advanced cardiac life support (ACLS) guidelines 			
<p>The PCP skill set and medications also include:</p> <ul style="list-style-type: none"> · Acetaminophen (Tylenol) · Acetylsalicylic acid (ASA) · Dimenhydrinate (Gravol) · Epinephrine · Glucagon · Ibuprofen (Advil) · Ketorolac (Torodol) · Naloxone (Narcan) · Nitroglycerine spray · Salbutamol (Ventolin) 	<p>In addition to the PCP medication list, the ACP skill set and medications include:</p> <table border="1" data-bbox="748 1276 1386 1604"> <tbody> <tr> <td data-bbox="748 1276 1081 1604"> <ul style="list-style-type: none"> · Adenosine, · Atropine, · Dextrose, · Diphenhydramine · Dopamine, </td> <td data-bbox="1081 1276 1386 1604"> <ul style="list-style-type: none"> · Epinephrine (IV), · Lidocaine, · Midazolam · Morphine · Sodium Bicarbonate </td> </tr> </tbody> </table> <p>The drug list may vary at the discretion of the base hospital medical director, as new medications are trialed in the prehospital setting. (see section 1.4)</p>		<ul style="list-style-type: none"> · Adenosine, · Atropine, · Dextrose, · Diphenhydramine · Dopamine, 	<ul style="list-style-type: none"> · Epinephrine (IV), · Lidocaine, · Midazolam · Morphine · Sodium Bicarbonate
<ul style="list-style-type: none"> · Adenosine, · Atropine, · Dextrose, · Diphenhydramine · Dopamine, 	<ul style="list-style-type: none"> · Epinephrine (IV), · Lidocaine, · Midazolam · Morphine · Sodium Bicarbonate 			

With the additional skills, medications and treatments that advanced care Paramedics provide, they have greater capacity to lessen severe symptoms, reduce pain and distress and potentially improve the overall outcome of patients. The preferred model of staffing consists of one ACP and one PCP on every ambulance on every shift.

Paramedics must maintain their base hospital certification annually by completing a prescribed number of hours of education and successfully completing recertification examinations. They must also provide care for a specified number of patients who require treatment at the Paramedic's level of certification or participate in an equivalent educational experience. In addition, all patient care records completed by Paramedics are subject to review to assure appropriate care was delivered, and Paramedics are responsible to answer to the provincial base hospital, the Ministry of Health and Long-Term Care as well as the City of Guelph management team for any errors or omissions discovered. Annual recertification could be affected by these quality assurance reviews.

The Guelph-Wellington Paramedic Service employs (as of October 2017) 159 full- and part-time Paramedics.

- 53 full-time primary care Paramedics
- 53 part-time primary care Paramedics
- 30 full-time advanced care Paramedics
- 14 part-time advanced care Paramedics

Paramedic dispatching

In managing the Paramedic service, the City of Guelph regulates budgetary expenditures, staffing, and equipment and supply provision and maintenance. The service is also responsible for training and quality assurance initiatives. The management team monitors response times to emergency calls in the area and determines future needs of staffing and resources to meet expected demands.

The service's management team maintains an active deployment plan through which, as emergency calls occur, remaining resources are fluidly relocated to the most appropriate locations so as to respond to further calls in as timely a manner as possible. Through this plan, two additional ambulance movements could result from one ambulance responding to a call. This plan is updated as travel routes, call volumes and response time analysis dictate. The Central Ambulance Communications Centre (CACC) in Cambridge, managed directly by the Ministry of Health and Long-Term Care, controls all ambulance movements. The service management team does not directly control which ambulance is sent to a call for assistance or direct its own resources to deployment areas and relies on the CACC to adjust deployment as per the plan provided by the management team.

The CACC answers 911 medical calls and dispatches the closest ambulance to the call regardless of where they are stationed or who provides the service in what is known as a seamless service. For example, Guelph-Wellington Paramedic Service ambulances can be sent into neighbouring municipalities if there are no closer ambulances available, and ambulances from other areas are dispatched to calls in Wellington County or the city of Guelph when periods of high call volumes limit Guelph-Wellington Paramedic Service resources.

Data from 2016 shows that the Guelph-Wellington Paramedic Service responded to about the same number of calls in bordering municipalities, as other Paramedic services responded into the Guelph-Wellington coverage area.

Superintendent coverage

Guelph-Wellington Paramedics are supervised by Paramedic superintendents. While the superintendents' primary operational role is supervision of Paramedic activities, a more important role is the support of Paramedic wellness. Due to the nature of the work performed by Paramedics and the prevalence of trauma induced stress, it is vital that superintendents are accessible to the Paramedics 24/7.

The superintendent staffing level currently allows for one superintendent on duty 24/7 stationed in Guelph. A second superintendent is on duty for 42 hours per week and is stationed in Wellington County, but beyond those hours the superintendent stationed in Guelph is responsible for Paramedics throughout the whole coverage area.

The superintendent roles include the general management duties of providing direction and ensuring compliance with policies, procedures and standards. They support the Paramedics in addressing health and safety concerns as required by the Ontario Occupational Health and Safety Act. Superintendents also investigate concerns about service performance, perform after-hours scheduling duties, issue discipline and provide coaching where required.

Superintendents are also required to support the delivery of quality patient care by:

- Providing direct management intervention of unusual and sensitive issues such as employee injuries, collisions involving ambulances or other service vehicles, and major station or equipment problems that threaten the ability of Paramedics to perform their work. These issues can arise at any emergency scene location in the coverage area.
- Providing coordination and management of multi-patient or complex emergency scenes, frequently involving coordination with other Paramedic services, hospitals and allied agencies.

- Act as the lone representative of the management team for the entire city and county area after business hours and when senior management representatives are not available, with only an on-call duty manager to assist with the complex issues and circumstances that can arise in emergency situations.
- Superintendents also provide front line emergency medical care when required

In reality, the geography of the Guelph-Wellington coverage area is such that Paramedics in some circumstances are required to address issues without the aid of Guelph-Wellington Paramedic Service management as the Paramedic superintendent cannot reach them in a reasonable time. As the area is comprised of more than 2,600 square kilometres, travel time from one end to the other can take more than 90 minutes.

Alternative care delivery

The Guelph-Wellington Paramedic Service is continuously creating and evaluating strategies to mitigate call volume and increase diversion from hospital emergency room departments. The service's emergency call volumes continue to increase annually, as is being experienced in Paramedic services across Ontario and internationally. Additionally it has been noted that transportation to a hospital may not meet some of our patient's needs and that an alternative service may be more appropriate for specific patients and conditions.

In 2014, the service created and has maintained a Community Paramedicine program to support individuals who are identified by Paramedics as being vulnerable. Paramedics responding to emergency calls are in a unique position to see vulnerable people in their homes and determine that they are in need of community health resources that they may not know exist. The Community Paramedicine program works collaboratively with the Waterloo Wellington Local Health Integration Network and other organizations in the community to improve the conditions of these patients and potentially reduce the potential for future 911 calls and transportation to an emergency department.

Components of the Community Paramedicine program include:

- clinics in low income/high emergency volume apartment buildings;
- referrals of vulnerable patients to other agencies in our community;
- follow up of repeat 911-use patients; and
- Remote Patient Monitoring, through which community Paramedics can monitor equipment provided to high-risk individuals in the community, and can contact the patient and or their physician when measurements such as blood pressure,

oxygen saturation or blood sugar readings suggest that the patient may be heading for a crisis.

Main goals:

- Reduce the number of repeat emergency medical service calls
- Reduce the number of low acuity patients in the emergency department transported by Paramedics
- Enable vulnerable/at risk individuals and older adults to live safely in their own homes and reduce the use of more costly care, such as acute care hospitals and long-term care

There is evidence and many case examples that the program is having a positive effect. Scientific studies are ongoing through Queens and McMaster universities, but many of the patients affected by the Community Paramedicine program have provided positive feedback and expressed their appreciation for the program.

The Community Paramedicine program was established through a grant from the MOHLTC, and the majority of the costs of the program continue to be provided by Provincial grants, announced and provided annually. Additional financial support was provided by the Guelph Family Health Team, and the City has provided funding through the annual operating budget process and that portion of the costs is shared with the County of Wellington.

The provincial grant is not automatically renewed or guaranteed, and much of the work of the Community Paramedicine program would need to be discontinued if that funding were to be no longer provided in the future.

Infrastructure

The Guelph-Wellington Paramedic Service currently deploys resources to 10 locations including eight full stations and two Paramedic posts. Stations are fully equipped ambulance locations. Posts are not fully equipped; they are satellite depots. Six stations and one post are in Wellington County and two stations and an additional post are in Guelph.

Seven of the current Paramedic locations are leased from various landlords, which may not be consistent with the most cost effective options. Most of the stations were not purpose-built as Paramedic response stations and some were intended to be temporary locations only. Furthermore, the MOHLTC Service Review indicates that service vehicles must be sheltered from the climate.

In addition to providing inadequate space and capacity to provide the appropriate amenities and station requirements, the current locations are not designed for the most efficient response times for Paramedics. (See section 4.1.1) A station design that reduces response time by allowing Paramedics rapid access from crew quarters to garage bays can have an impact on overall response times and ultimately on patient outcome.

In 2016, the City hired Operational Research in Health Limited (ORH) to produce a report that determined the optimal deployment and resources needed to satisfy current and future (2026) service demand. ORH used sophisticated analysis and modelling to recommend the most appropriate station locations and staffing levels that would be required at each station. While several of the current Guelph-Wellington Paramedic Service stations are located in appropriate areas, others were established in less than optimal locations based on the availability of commercial space. The report recommends relocating several stations.

In addition to geographic location, Paramedic station design needs to consider ease of access and egress for ambulances, proximity to signalled intersections and traffic flow and other potential obstructions to rapid responses. The stations then need to be designed for optimal flow for Paramedics within the structure to facilitate minimal response times.

Figure 8 provides a summary review of the current Guelph-Wellington Paramedic Service concerns per station and post.

Figure 8 Station and resource distribution

Station location		Garage bays	Location concerns	Station layout concerns
Minto Township	Harriston	3	Geographic	Lack amenities
Wellington North Township	Mount Forest	2	Geographic	Lack amenities
	Arthur	2	Geographic, specific	Lack amenities, inefficient layout
Mapleton Township	Drayton post	1	Geographic, specific	Lack amenities
Centre Wellington	Fergus	2		Lack some amenities
Guelph Eramosa	Rockwood	1	Geographic	Undersize, lack amenities
Erin Township	Hillsburgh	1	Geographic	Undersize, lack amenities
City of Guelph	Elmira Rd Station*	4	Geographic, specific	Inefficient layout, lack amenities
	Clair Rd Station*	6		Lack some amenities
	Delhi post	0	Specific	Inefficient layout, lack amenities
Guelph-Wellington Paramedic Service Headquarters (Clair Road)				Insufficient space

Fleet and equipment

Guelph-Wellington Paramedic Service uses a fleet of:

- 18 ambulances (including spare vehicles)
- 2 supervisory response vehicles
- 1 Emergency Response Unit (ERU)
- 4 administration vehicles

- Additional specialized equipment includes an Emergency Support Unit that is utilized in mass casualty events and an all-terrain vehicle to extricate patients from difficult to access locations (shared with the Guelph Fire Department)

The standards established by the MOHLTC and supported by the Ambulance Act and regulations require that ambulances and emergency vehicles are maintained to a high standard. Vehicles need to be inspected by a qualified technician every 90 days and have the wheels removed and the brakes inspected at least every 180 days. All vehicles must undergo a complete safety inspection at least once per year. The rigorous standard for maintenance requires that the service fleet includes spare vehicles to be able to rotate front-line equipment through the maintenance cycle and to ensure full service in the event of any mechanical failures.

Modern emergency vehicles incorporate complex electrical and mechanical systems in order to run efficiently and allow Paramedics to provide optimal care to patients. For example, the electrical system contains three independent batteries that are connected but isolated from each other, thus if one fails the systems will still operate. Options to improve braking for emergency driving and other modifications to improve reliability have also been incorporated in some vehicles.

Automotive mechanics who regularly repair and maintain emergency vehicles can participate in specific training to become more familiar with these complex systems. A mechanic who has completed sufficient training earns the designation of Emergency Vehicle Technician (EVT).

The Guelph-Wellington Paramedic Service fleet is maintained by the City of Guelph Operations department and, when required based on work load, by external automotive repair facilities. The timing of service is monitored to ensure technical compliance with the MOHLTC standards.

Despite the rigorous maintenance schedule, the service's vehicles continue to experience mechanical issues and failures between scheduled services. These issues lead to ambulance downtime and reduced coverage while vehicles are shuttled for extra maintenance work in addition to the risks of mechanical failure affecting the time required to transport a critically ill patient to a hospital.

These additional issues may be avoided if regular scheduled maintenance were performed by EVT's who can anticipate the demands on emergency vehicles and proactively service vital components. Unfortunately, EVT's are not available at public automotive repair facilities and not all City mechanics are trained to the EVT standard.

The Guelph Fire Department (GFD), also managed within Public Services at the City of Guelph, shares the need for vehicle maintenance program that includes EVT's. The GFD currently employs an EVT separate from the Operations maintenance staff. Future plans

include harmonizing the maintenance functions within Guelph-Wellington Paramedic Service and the GFD. Timing of these plans rests on future capital expansion in a maintenance facility and the associated staffing.

Complex equipment utilized by the service also requires ongoing preventative maintenance. These include cardiac monitors, stretchers and patient conveyance devices, oxygen and suction devices and ventilation devices. This maintenance is facilitated through various contracts with service experts or, in some cases, training of supervisory staff to complete the work as part of their duties.

Guelph-Wellington Paramedic Service legislative obligations

The Ontario Ministry of Health and Long-Term Care (MOHLTC), through its Emergency Health Services Branch, provides a licence to the City of Guelph to operate the Land Ambulance service in Guelph and Wellington County. Conditions to qualify and maintain this licence includes compliance these laws and related standards, confirmed by a complete review of the service every third year by a MOHLTC review team.

In that review, the service must demonstrate excellence in areas covered by the legislation and standards to maintain the ability to provide the service. The Review Team audits patient care records, employee files and credentials, vehicle and equipment maintenance records, training records and the policies and procedures of the service and looks for evidence that they are enforced. They also inspect all ambulances and stations for appropriate stocking, cleanliness and safety equipment and ride along with Paramedics for a real-time audit of care being delivered.

The Guelph-Wellington Paramedic Service underwent a complete review in 2014 and is due for another review in the fall of 2017.

The MOHLTC sets the standards by which the service must operate through the Ambulance Act of Ontario and associated regulations and standards.

Regulations and standards supported by the Ambulance Act include:

- Regulation 257, 129 and 497
- Land Ambulance Response Time Standard
- Advance Life Support Patient Care Standards
- Ambulance Service Communicable Disease Standard
- Basic Life Support Patient Care Standards
- Provincial Equipment Standards for Ontario Ambulance Services
- Ontario Ambulance Documentation Standards
- Patient Care and Transportation Standard
- Land Ambulance Certification Standards

In addition, the service must comply with legislation which includes:

- The Coroner's Act
- Child and Family Services Act
- Good Samaritan Act
- Health Care Consent Act

- Highway Traffic Act
- Mental Health Act
- Controlled Drugs and Substances Act
- Employment Standards Act.
- Occupational Health and Safety Act
- Personal Health Information Protection Act
- Municipal Freedom of Information and Protection of Privacy Act
- The Patients First Action Plan

Training

Legislation requires that the City provide training and education to ensure that Paramedics are able to deliver excellent patient care. Paramedics are required to complete specified hours of education to maintain their certification. Some annual training is also required by MOHLTC and by the Ministry of Labour for safety-related issues. The Guelph-Wellington Paramedic Service current training program meets the requirements of the standards enforced by the Ambulance Act of Ontario, but the program will not be sustainable as service demands grow without the addition of dedicated training staff.

The Guelph-Wellington Paramedic Service training program consists of both classroom education and use of computer-based learning. Classroom training is challenging for the Guelph-Wellington Paramedic Service as it is for most Paramedic services as call volumes are not conducive to training while on duty and Paramedics must be removed from service and backfilled so that emergency service continues to be delivered.

Preparing, delivering and evaluating the effectiveness of quality education on an ongoing basis are a significant challenge. The individuals developing and delivering the education must remain informed on current trends in medicine and Paramedicine as well as developments in equipment and techniques used in the Paramedic field. They must also be content experts on health and safety and wellness related issues, and able to develop and deliver other topics as required.

The Guelph-Wellington Paramedic Service currently uses Paramedics who express interest in researching, developing and delivering education on specific topics to their peers. The program is managed by the Commander of Quality Assurance and Training, but the increase in demands of this role over the past several years as call volumes and staffing levels increase are affecting the ability to ensure that training remains optimal and meets the standards as set by the MOHLTC.

Quality Assurance (QA)

The MOHLTC legislation and standards require that the service maintain an adequate level of quality assurance for proper patient care. In addition, quality assurance initiatives are required to ensure that Paramedics are performing their duties appropriately and adequately.

The provision of quality emergency medical care is uniquely challenging. Paramedics work in pairs and are not directly supervised in most cases. Calls occur in unpredictable locations that may have inadequate lighting, inhospitable climate or even dangerous conditions that can affect patient care. They also occur at unpredictable times, and each call is unique based on the patient's location, symptoms and circumstances.

Current Guelph-Wellington Paramedic Service QA initiatives include:

- Peer review of ambulance call reports (documentation completed by Paramedics on each call)
- On-scene evaluations of Paramedic actions on emergency calls to ensure excellence in care is provided; this is completed by Paramedic superintendents
- Spot checks of staff not on calls completed by Paramedic superintendents to ensure compliance with policies and procedures
- Maintenance of records to ensure that all Paramedics have all required certifications and licences

As with training, some of the QA initiatives are primarily fulfilled by Paramedics who have expressed an interest in performing these duties (peer reviews). Other evaluations and checks are completed by the Paramedic superintendents as part of their duties. The program is managed by the Commander of Quality Assurance and Training, but the increase in demands of this role created by the increased call volumes over the past several years are affecting the ability to ensure that the quality assurance initiatives are adequate and meet the standards as set by the MOHLTC.

Response times

The timely intervention of Paramedics in providing care can improve the overall condition and outcome of a patient suffering from a potentially life threatening event. Provincial legislation requires the City of Guelph to set the target response time performance levels for the ambulance service annually. Performance targets are set in the form of a Response Time Performance Plan (RTPP), which sets five different time targets that differ based on the severity of the patient's illness or injury. Its purpose is to provide accountability and transparency around the provision of the Land Ambulance Service.

The targets in the RTPP are different depending on the severity of the patient's condition. The severity is categorized by a scoring system called Canadian Triage Acuity Scale (CTAS), which is shared by hospitals and Paramedic services in Canada. The most serious category of patient injury and illness (CTAS 1) includes patients that are unstable and require immediate care to prevent death. The least severe and most stable patients (CTAS 5) have targets that allow for longer response times. This allows Paramedics to respond without emergency warning systems (lights and sirens) for patients that are known to be stable based on information provided by the person who called for assistance.

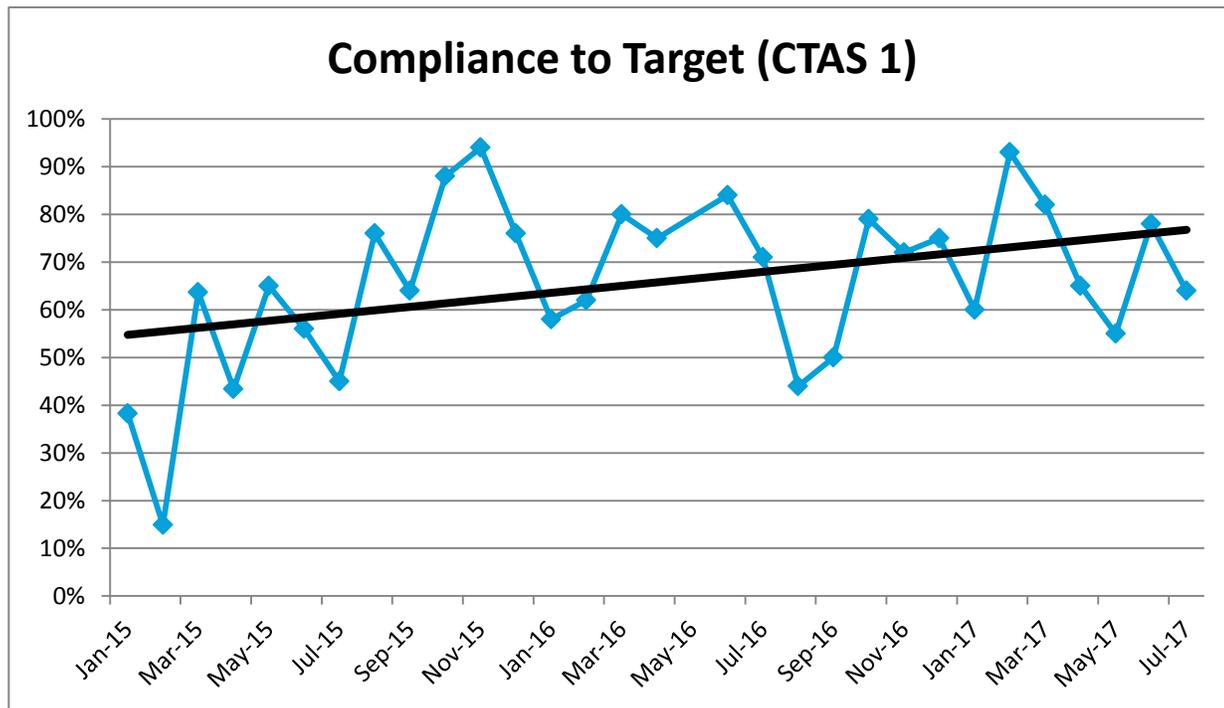
A sixth target measures the response time for a defibrillator to a call for a patient suffering a sudden cardiac arrest. Although this time is not necessarily the same as the response time for a Paramedic to arrive at the scene, it can be affected by activities conducted by the service including the promotion of Public Access Defibrillators (PADs) and tiered response agreements with local fire departments. The Guelph-Wellington Paramedic Service takes an active role in promoting PADs in the community and is responsible for registering PADs into the 911 system.

As mentioned previously, response times are an important factor in the provision of Paramedic services in that timely administration of care to the most severely ill or injured can affect a patient's condition and outcome. The relationship between time without pre-hospital care and patient outcomes can be deduced using physiologic data. If a person does not receive any oxygen for one (1) to two (2) minutes they will become unconscious. Further deprivation of oxygen will result in cardiac arrest followed by death if circulation and oxygenation cannot be restored promptly. Similarly, if a person has a blood pressure that is insufficient to provide adequate oxygen to the tissues, the tissue will cease to function normally or may stop functioning entirely.

While all CTAS measurements are important, the Guelph-Wellington Paramedic Service focuses on the response time to CTAS 1. The target response time to CTAS 1 patients is set by the MOHLTC at eight (8) minutes. The City of Guelph has set the desired compliance rate for 65 per cent of calls, which is based on estimates of what is a reasonable benchmark with existing staffing and resources.

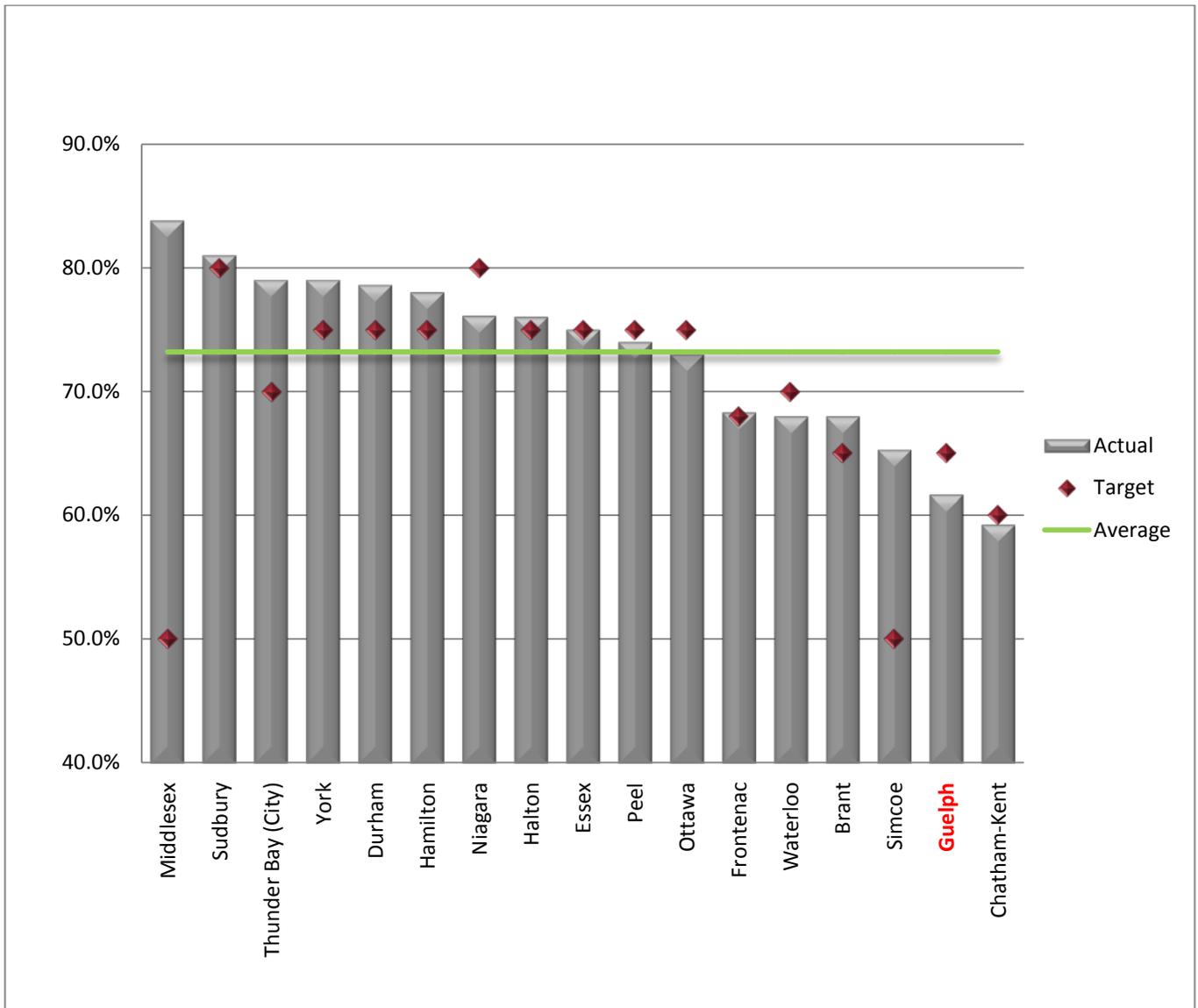
Recent changes in staffing and deployment have proven to positively affect service performance by reducing average response times. The changes included enhancements in staffing, addition of the Emergency Response Unit and the use of a temporary station in Guelph's downtown. The resultant upward trend in response time performance is shown on the graph in Figure 5.

Figure 9 Compliance to target for CTAS 1 patients (8-minute response time goal)



The Guelph-Wellington Paramedic Service has made significant efforts to improve the response time to CTAS 1 emergencies, and improving the compliance rate so as to exceed 65 per cent in 2016. A comparison with other neighbouring ambulance services shows that higher performing services have compliance rates of up to 80 per cent or greater. (Figure 10) Response times for Paramedic services are primarily affected by ambulance location deployment strategies and staffing level—shaving enough staffed ambulances at the right place on duty to be able to respond to the expected call volumes in a timely manner.

Figure 10 8-minute response compliance



Population and service demand growth

As the city of Guelph and Wellington County's populations grow, the Guelph-Wellington Paramedic Service has the responsibility to ensure that service levels to the community are maintained. As mentioned above, one of the most significant service levels is the response time to emergency situations. Response times are measured from the time a call is received by the Guelph-Wellington Paramedic Service to the arrival of the first ambulance to the incident point. Many factors, as outlined below, may affect the response time.

- The location of the ambulance when the call is received
- The traffic situation: It may be affected by the layout and location of the station, the population density in the area and the rush hours
- Size of the area covered
- Service demand, measured as number of emergency calls
- Type of area: industrial, commercial, residential
- Availability of Paramedics
- Season, time of day and weather

In 2016, the City hired ORH to produce a report that analyses current and future call volumes through statistical review, population growth predictions and computer-based modelling and then creates recommendations for optimal deployment to satisfy current and future (2026) service demand. Call volumes in 2017 are already trending higher than the study predicted.

As part of this process, ORH investigated and documented current locations and used sophisticated analytical and modeling tools to identify improvements and make recommendations with regard to the implementation of the optimal resource deployment.

The study included an analysis of population and emergency response demand in order to determine optimal resource needs. A population-based projection was calculated by age group and gender for each Lower Tier Municipality (LTM) for 2016 to 2026. Historical demand rates per 1,000 population were calculated for each age group and then projected forward on a linear basis. These demand rates were applied to projected populations in order to accurately predict demand volumes. Using his method, ORH determined that high acuity call demand is projected to increase by 46.1 per cent from 2016 to 2026. This includes an increase to the highest acuity calls by more than 43 per cent, and a modest increase in low acuity calls. These increases are a result of an increasing population, an ageing population and an increasing demand rate. Call volumes in 2017 are already trending even higher than the study predicted.

The analysis points out that the total ambulance demand has been rising at a higher rate than the increase in the overall population. This is in part due to an increasing proportion of elderly within the population, and also in part because of a gradually increasing propensity to call for an ambulance. The overall population is projected to increase by 17.5 per cent from 2016 to 2026 and the biggest increases are in the elderly groups aged 65 and older.

Using the demand rates by age group projections and gender in each LTM for the last five years, ORH projected the service demand for 2026 to be 46.1 per cent above 2016 levels.

The study concentrated exclusively on resources directly related to delivery of services: station location, the vehicles and the personnel. It did not include the analysis of administration staff needs, increases in training time or supervision resources.

The results of the study, in addition to explicitly indicating changes in the direct line of service, serve to define the necessary increments to assure an integral system of support for the delivery of the expected quality of that service.

Station and staffing recommendations by ORH

Station and deployment changes and additional Paramedic staffing are required over the next 10 years to meet the demand and improve overall call response times. Optimal location of stations and required staffing levels were determined using research algorithms and computer-based modelling that use population, demand and response times as criteria.

The analysis concluded that a combination of relocation of existing stations, an increase in personnel hours and an increase in the number of ambulances is needed to reach the response time targets and compliance rates currently set for the service. Although the service is generally meeting the response time plan parameters overall, the targets and compliance rates are not being met in Wellington County. The rural nature of the county and the greater travel distances make response time targets difficult to achieve. ORH used a complex calculation of population density and overall area to determine a reasonable response time for each LTM and based recommendations on those targets.

The necessary changes as identified by ORH have been grouped into three phases: 2017-2020; 2020-2023; 2023-2026. This allows a distinction to be made between high (phase I) and low (phase III) priority developments. (Figure 10)

Figure 11 Recommendations of the ORH Review

Phase	Estimated Timescale	GWEMS	
		City	County
I	2017 to 2020	New EMS City Site 2 (Co-Located with Optimal Fire HQ)	Move Hillsburgh to Optimal Site (Close Existing)
		Close Delhi Street	Additional Ambulance night shift at Hillsburgh & Rockwood
		Extend Clair Road ERU to 24/7	
		Additional Ambulance day shift at City Site 2	
II	2020 to 2023	New EMS City Site 1 (Co-Located with Optimal Fire Station 4) and New EMS City Site 3	Move Rockwood to Optimal Site (Close Existing)
		Close Elmira Road	Additional Ambulance 24/7 at Fergus
			Additional Ambulance night shift at Drayton
III	2023 to 2026		Move Mount Forest to Optimal Site (Close Existing)
			Move Harriston to Optimal Site (Close Existing)
			Additional Ambulance day shift at Mount Forest & Harriston

Guelph-Wellington Paramedic Service Master Plan

This Master Plan contains all the actions necessary to allow the Guelph-Wellington Paramedic Service to continuously ensure that service levels to the community are maintained.

The Master Plan addresses the factors that contribute to the uniqueness of the Guelph-Wellington Paramedic Service, especially those that create incomparable challenges in Paramedic supervision.

The recommendations of the ORH report concentrated exclusively on resources directly related to delivery of services and did not include the analysis of administration staff needs, increases in training time or supervision resources. This Master Plan addresses both, the ORH recommendations for deployment of resources directly related to the delivery of services and, the administrative staffing requirements to enable the ORH recommendations to be effective.

Guelph-Wellington Paramedic Service recommends to:

1. Hire Paramedic frontline staff to address the increase in the service demand
2. Increase supervision and administrative support to ensure that the service is sustainable.
3. Implement infrastructure changes to the current station locations

These changes have been phased in over multiple years from 2018 to 2022.

If approved by Council, Guelph-Wellington Paramedic Service will report the progress of the Master Plan implementation annually through the budget process of the Corporation of the City of Guelph and the annual Response Time Performance Plan report.

Paramedic Hiring Plan

Between 2018 and 2022, 19 new full-time Paramedics are needed to improve response time performance and the address the increases in the service demand. This is based on the projections in the ORH report and may need to be adjusted based on actual call volume data. These Paramedics will be deployed in Guelph and Wellington County.

In 2018, the service will add one Paramedic to increase the Emergency Response Unit staffing from 8.4 hours per day, five days per week to 12 hours per day, seven days per week. The Emergency Response Unit has been shown to be an effective means of reducing response times in the urban setting. Four more Paramedics will be added to

staff an ambulance for 12 hours per day, seven days per week in Guelph. The current call volumes in the city require additional resources, and this additional vehicle will improve response times in Wellington County by reducing the pull of vehicles into the city during peak demand periods.

In 2019, four additional Paramedics will be required to add an additional ambulance for 12 hours per day, seven days per week in the town of Fergus in Centre Wellington Township. The call volume in the Centre Wellington area is such that additional resources are required to maintain adequate response times.

In 2020, four more Paramedics will increase the staffing in the town of Rockwood from 12 hours per day to 24 hours per day. The current staffing pattern of providing ambulance service only during the day hours does not provide adequate service to the residents of Guelph/Eramosa. There are longer response times during off hours as ambulances need to travel greater distances from other stations. The ambulance stationed in Rockwood is also the first and closest resource called into Guelph during peak demand periods so that the additional resource will aid in stabilizing city response times during the night hours.

In 2021, the additional ambulance added at the Fergus station will be increased from 12 hours per day to 24 hours per day. This will require an additional four Paramedics. Projections by ORH indicate that call volumes will have increased to make this enhancement essential to the response times in the area and this resource will also aid response times in Guelph and other parts of the county.

In 2022, two more Paramedics will be added to increase the staffing of the Emergency Response Unit in Guelph from 12 hours per day to 24 hours per day. These additional hours will improve the response times to high priority calls.

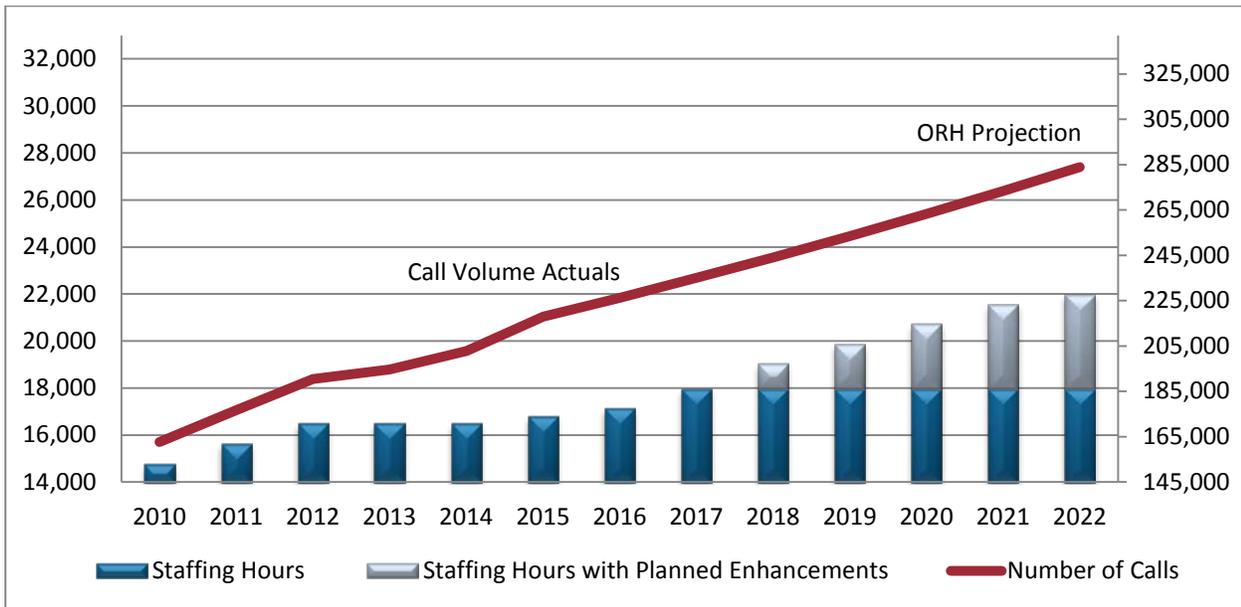
By phasing in the increase in staffing over several years, the increase in funding from the MOHLTC can be realized incrementally. Phasing in the enhancements also allows the service to measure each increment for effectiveness and re-evaluate the impact of each change so as to update the plan as required.

Projected call demand growth compared to staffing levels

The recommended changes represent a significant increase to staffing levels at the Guelph-Wellington Paramedic Service. The service has created a specific plan for the five-year period of 2018–2023. Each increment would be brought forward for consideration in the annual budget planning process and then analysed for effectiveness as further enhancements are considered.

Figure 12 shows the relationship between predicted call volumes and proposed staffing levels.

Figure 12 Call volume and staffing level forecast



Supervision and Administrative Support Plan

The recommended increased staffing levels and the anticipated increase in call volumes will have a significant direct impact on the managerial and administrative systems at the Guelph-Wellington Paramedic Service, already functioning at maximum capacity. Efficient operations require better direct supervision, supply inventory management, station and fleet coordination and Paramedic support.

The large geographical area, coupled with the high call volume in Guelph’s urban centre make it impossible for one superintendent located in Guelph to provide adequate support and supervision to Paramedics in the county.

Paramedics are commonly faced with emergency scenes that may induce trauma induced stress. Daily contact by superintendents can mitigate the impact those scenes may have. Paramedic superintendents are trained to provide that support, through personal contact, both on-scene and at post-call locations.

Superintendents provide on-scene support to Paramedics attending to complex emergencies where multiple ambulances respond and there is a need to coordinate the actions of Paramedics with other responding emergency services. Superintendents can assume the role of scene command and incident management, respond to media queries, and manage and support bystanders and others at the scene

When not providing direct support superintendents provide:

- quality assurance, scheduling and employee management
- ensuring Paramedics have vehicle and equipment support- logistics
- First two cannot be accomplished remotely or with a prolonged response time

The increases to administrative and support staff are made necessary by the need to protect the health and safety of Paramedic staff and to address the predicted increase call volumes and staffing and the resulting need for additional training, quality assurance, supervision and administration.

Figure 13 summarizes the Hiring Plan for Paramedics and supervision and administrative support

Superintendent expansion

The current supervision ratio is one superintendent for up to 25 Paramedics depending on the time of day and other factors. Superintendents are responsible for all operations occurring in all of the 2,600 square kilometre coverage area. The ratio of staff to superintendent is alarmingly high for the territory covered by the Guelph-Wellington Paramedic Service.

The rural nature of the Wellington County and the large geographic area creates relatively common occurrences where Paramedics working in the county work virtually without supervision. When circumstances require that they request management assistance, they advised to address whatever issue to the best of their ability as the Superintendent can be up to 90 minutes away.

This is not only inappropriate for the Paramedics working in the area but also to the residents of Wellington County, who should be able to expect that Paramedics are properly supervised. They should also be able to speak to a Paramedic superintendent should they have an issue with the services that they have received.

Given the current workload assigned to the Paramedic superintendents and the demands on their time with the existing call volumes, there are some critical tasks that are not accomplished in a timely manner. Clearly the increased demands of rising call volumes and increasing staffing levels will require additional supervision hours.

Contingent on budget approval, the Guelph-Wellington Paramedic Service planning is to have a superintendent ratio of not more than one superintendent for 20 Paramedics at all times, and for there to be a superintendent on duty in Wellington County 24/7.

Figure 13 summarizes the Hiring Plan for Paramedics and supervision and administrative support

Administrative support

The following full-time employees need to be added in order to improve efficiencies in the operational and administrative support.

1. Superintendent frontline

Basic job profile: Superintendent will support scheduling, support administrative personnel, and coordinate hiring. He/she will also support operations as required by colleagues.

Primary benefits: Increase capacity of superintendent coverage in the north zone to provide at least some support every day. Paramedics require and deserve support from the City in the provision of emergency services to the community. Paramedic supervisors provide that support in a front-line capacity.

Risk of not hiring this position: Paramedic health and safety risks increase. There will be non-compliance with MOHLTC legislation. There will be a reduction of the effectiveness of service delivery. Paramedic wellness support is not provided in a timely manner. Paramedic morale and engagement decrease. Public and Paramedic concerns and accidents are not investigated in a timely manner. Superintendents are qualified counsellors in critical incident stress mitigation. Without face-to-face support of a superintendent on a regular basis, the risk of trauma related stress increases for our Paramedics.

There have been recent examples of delays in the ability of a supervisor to attend and support injured staff members being treated in a hospital because of multiple competing high priority tasks. Other incidents include delays in returning a Paramedic crew to service after a vehicle breakdown until a supervisor is able to arrange for a spare ambulance to be moved to where it is needed.

These incidents will continue to occur and increase in frequency as the service becomes busier and resources are increasingly stretched.

2. Superintendent of training

Basic job profile: Superintendent will support the commanders with the training program, its scheduling, implementation and support. He/she will also support operations as required by colleagues.

Primary benefits: Increase capacity of superintendents and commanders, as call volume and service demand increases.

Risk of not hiring this position: Effectiveness of programs is reduced and risk of failure of service delivery increases. Paramedics may not maintain certifications if educational needs are not met.

3. Superintendent of Quality Assurance

Basic job profile: Superintendent will support the commanders with the Quality Assurance program, audits, support, and program implementation. He/she will also support operations as required by colleagues.

Primary benefits: Increase capacity of superintendents and commanders, as call volume and service demand increases.

Risk of not hiring this position: Effectiveness of programs is reduced and risk of failure of service delivery increases.

4. Resource coordinator

Basic job profile: New position for the service. Person will work fleet logistics by moving vehicles and equipment between stations, or before/after services, supply/restocking stations and ambulances, manage expiration medicines and narcotics inventory

Primary benefits: Increase capacity of superintendent, follow compliance to the MOHLTC equipment and vehicle standards and decrease Paramedic time out of service.

Risk of not hiring this coordinator: The superintendent is currently performing these duties along the ones related directly to the supervision of Paramedics, their patients. Vehicles are moved out of communities for service.

5. Clerical assistant 2

Basic job profile: Person will manage HR files, process POs, manage uniform inventory, coordinate office work, and assist reception and administrative assistant duties.

Primary benefits: Increase capacity of administrative support by reducing ration of one clerk for every 165 employees to two clerks per 165 employees.

Risk of not hiring this clerk: One administrative assistant is currently performing these duties. Oversights and slow processing times on any responsibilities are not to blame on clerk but the overload of duties under the current job's umbrella.

6. Scheduler –Part-time

Basic job profile: Person will cover regular scheduler during the weekends (16 hours a week)

Primary benefits: Increase capacity of schedule support to superintendents during the weekends, process continuity

Risk of not hiring this part time: Coverage over the weekend falls under the superintended, failure and lack of continuity are higher for the scheduling process

7. Data Analyst –Part time

Basic job profile: Mining, management and analysis of data regarding among others: call volume, call quality, service profile, MOHLTC statistics, RRTP

Primary benefits: Supports chief and deputy chief decisions regarding strategic planning, risk analysis, staff planning and service performance

Risk of not hiring this part time: Trends would be overlooked or will be taken by the deputy chief who is already committed with the Quality and Training programs

Figure 13 2018 to 2022 Service Staff Hiring Plan



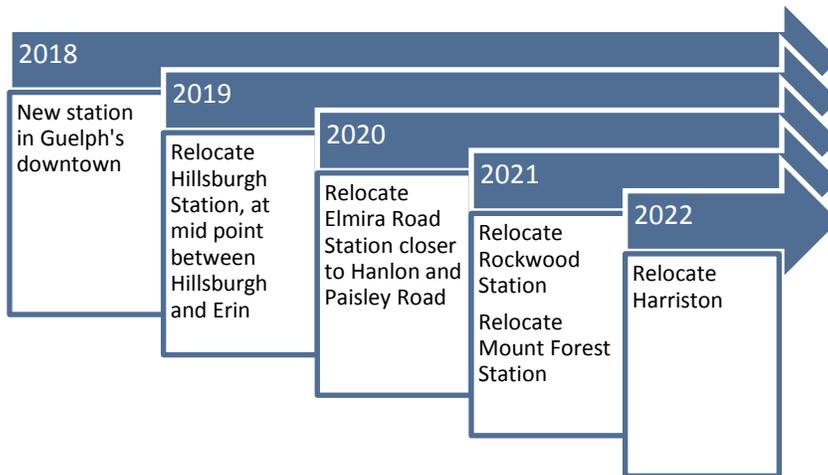
Station Facility Standardization and Location Plan

Relocating Paramedic stations or opening a new station is a complex and cost intensive process. It involves the purchase of property and constructing or renovating structures to meet the service needs. While the initial costs for purchasing property are high, the long-term business case shows that this is a more cost-effective solution than leasing space. Leased space also has the disadvantage of generally not being purpose built and

not meeting the needs of the service as described in section State of the Guelph-Wellington Paramedic Service.

Figure 13 shows the plan recommended by ORH regarding the relocation or addition of stations.

Figure 14 Station Location Plan



Station Facility Standardization Plan

In addition to relocating stations, the goals of the service include creating efficient and effective purpose-built stations that will better meet the needs of staff, be more financially sound and facilitate better response times.

Station requirements include:

- Rapid access to a major road, without obstacles
- Preferably drive through
- Parking for eight vehicles and one accessible
- 3,000 square feet
- two bay garage
- Living quarters, day room and kitchen
- Duty office
- Male/female facilities, locker area and washrooms
- Decontamination facilities, male and female
- Fitness area
- Storage
- Washing/cleaning room
- Compliant with AODA requirements