Region of Waterloo and Area Municipal Councils

All Council Meeting

Agenda

Thursday, June 19, 2014
3:00 p.m. – 5:00 p.m.

Regional Council Chamber
2nd Floor, 150 Frederick Street
Kitchener Ontario

1. Welcome: Chair Ken Seiling, Region of Waterloo

2. Waterloo Region Economic Development Strategy Update
   Presenters a. Mike Murray, CAO Region of Waterloo
                   b. Lee Parsons, Partner, Malone Given Parsons
                   c. Gary Dyke, CAO City of Cambridge

3. Consolidated Dispatch Update
   Presenters a. Inspector Mark Bullock, Waterloo Regional Police Service
                           b. Shawn Walker, Senior Consultant, L. R. Kimball
                              Sherri Griffith-Powell, Consultant, L.R. Kimball
                           c. Chief Tim Beckett, City of Kitchener Fire Department

4. Closing Comments: Chair Ken Seiling, Region of Waterloo

5. Adjourn

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EXECUTIVE SUMMARY

In an effort to provide the community with the highest level of 9-1-1 services possible, the Region of Waterloo and Cities of Cambridge and Kitchener contracted L.R. Kimball (Kimball) to evaluate the feasibility of consolidating the Waterloo Regional Police Services (WRPS) public safety answering point (PSAP) and the Cambridge and Kitchener Fire Department PSAPs. Of significant importance to the project was the need to identify potential governance models for a consolidated centre.

Challenges in the Current Emergency Communications Environment

Although each of the existing PSAPs are staffed with dedicated employees that perform excellent work every day, the emergency communications system within which they work is deficient in key areas including:

- The separation of police, fire and emergency medical services (EMS) communications into separate PSAPs. This creates a disjointed environment where 9-1-1 calls must be, at times, transferred one or more times to receive service from all necessary agencies. Although technology can help mitigate the delays inherent to call transfers, it cannot completely resolve the impact on response times.
- Separation of the PSAPs complicates the coordination of major incidents as was the case in the November 2011 helicopter crash at the Waterloo Regional Airport. In addition, the more PSAPs involved in an incident, the more opportunity for human error, especially under high-stress situations.
- Tiered call taking methodology results in multiple call takers from different PSAPs being tied up on the same call simultaneously. At minimum, this practice is expensive as it requires a duplication of effort by call takers and may delay field response since there are time delays inherent in any call transfer scenario.
- Quality control/quality assurance (QA/QC) is not being conducted in all PSAPs due to a lack of resources.

In Kimball’s opinion, substantial benefits could be reaped by consolidating the three PSAPs. However, as long as the Ministry of Health EMS Dispatch remains separate, maximum efficiencies and service levels cannot be achieved. Benefits include:

- Improved situational awareness. This benefit of consolidation is one that is often discounted in its importance when, in fact, it is critical to establishing the most efficient emergency communications system possible for the communities and the agencies a PSAP serves.
- A reduction in the number of 9-1-1 calls that are transferred from the primary PSAP to either a fire or EMS secondary PSAP which will help eliminate duplication of call taker efforts between multiple PSAPs. A reduction will help reduce the call handling delays inherent when a tiered system is used.
- Improved control and coordination of major incidents such as the Waterloo Region Airport helicopter crash in 2011. Working with and deciphering confusing or conflicting addresses and other information reported by citizens is part of what a PSAP does. However, conflicts and confusion are identified more quickly and resolved much more easily within a single PSAP than when split among three PSAPs.
- Improved utilization of law enforcement and fire resources when coordinated from a single point.
- Costs such as those associated with the Bell Canada BID-0013 project would be incurred by a single PSAP rather than by each PSAP. Moving forward with a consolidation within the next few years could mean substantial cost savings related to anticipated expensive technology requirements.
- Procurement of replacement technology for a single PSAP rather than three individual PSAPs will be more cost efficient.
- Individual PSAPs have or will incur costs such as those related to Bell Canada’s in-call location update and migration to Next Generation 9-1-1 (NG9-1-1) whereas, in a consolidation scenario, only the single PSAP would incur the costs rather three individual PSAPs.
Key Roadblocks and Challenges to a Successful Consolidation Effort

- Lack of participation by the Ministry of Health EMS Dispatch. Consolidation between police and fire is certainly advantageous, but maximum efficiencies in service levels and costs cannot be achieved without participation by the Ministry of Health EMS Dispatch.
- Deciding upon mutually agreeable governance and cost distribution models
- Funding

Key Recommendations

- Kimball recommends that WRPS, Cambridge Fire and Kitchener Fire move ahead with the next step in the consolidation process. During the next phase governance and cost distribution models are determined. There is no final commitment to participate in an actual consolidation by the agencies. The commitment is in spending the time to determine if consensus can be reached on these two key elements. Once these elements are determined, then agencies will have the information needed to decide whether they will participate in a consolidated centre.
- Maximum efficiencies in the Region’s emergency communications services can only be achieved if law enforcement, fire and the Ministry of Health EMS Dispatch participate. Discussions with the Ministry of Health should be initiated to see what options may be available for EMS in terms of consolidation with police and fire. Some form of consolidation in the form of a pilot program or co-location inclusive of EMS will especially benefit Cambridge Fire since they do not utilize technology interoperability framework (TIF).
- Of the two facility options, Kimball recommends the expansion of the WRPS facility. Although the PSAP would be located in a Region-owned facility, the PSAP should be an independent entity as previously recommended.
- Better management and control of dispatching protocols geared to the specific needs of the individual agencies and the citizens of Waterloo Region. By having police and fire dispatch consolidated an element of control can be achieved with respect to customized dispatch practices that can lead to quicker response times for certain calls for service.
1. INTRODUCTION

1.1 Scope of Work Summary

Kimball was contracted by the Region of Waterloo, Ontario to conduct an emergency dispatch centre / PSAP consolidation assessment and feasibility study for implementing various consolidated emergency dispatch centre models. Regional participants to this study include the Waterloo Regional Police Service and the Kitchener, Cambridge, and Waterloo Fire Departments. The intent of the assessment and analysis is to assist in identifying and analyzing a potential consolidated emergency communications model and associated requirements and to make recommendations to effectively provide services that suit the needs of the public and the Region’s public safety stakeholders.

The scope of work included an examination of current conditions, identification of equipment and technology requirements, identification of space and infrastructure requirements. Also included was an assessment of the region’s communications facility for potential, operational analysis, creation of a funding model and cost analysis and recommendation of a high level implementation plan.

1.2 Key Definitions

1. Public Safety Answering Point (PSAP) – An emergency communications facility with enhanced 9-1-1 capabilities, operated on a 24-hour basis, assigned the responsibility of receiving 9-1-1 calls and dispatching, transferring, or relaying emergency 9-1-1 calls to other public safety agencies or private safety agencies.

2. Primary PSAP – A PSAP that receives 9-1-1 calls directly from the callers.

3. Secondary PSAP – A PSAP that does not receive 9-1-1 calls directly, but instead receives 9-1-1 calls that are transferred from the primary PSAP. In this case, the Waterloo Regional Police Communications Centre serves as the primary PSAP.

4. Consolidated PSAP – A PSAP where communications for one or more public safety agencies choose to operate as a single emergency communications entity.

5. Dispatch Functions – Dispatch functions include all functions and tasks associated with sending a police, fire, or EMS response to a 9-1-1 call and any field personnel support. Dispatching is done via radio or mobile data device. These functions may begin once the call taking process is complete or simultaneously with the call taking process, depending on the PSAP/dispatch configuration.

1.3 Methodology

Kimball held an initial kick-off meeting with key stakeholders to establish a communications plan, review the scope of work, finalize the project schedule and methodology and discuss distribution of a spreadsheet-based survey tool.

Determining if consolidation is feasible and, if it is, developing potential consolidation model recommendations require the collection of a wide variety of data from stakeholders, including PSAPs, municipal decision-makers and law enforcement and fire agencies.
Several methods were used to collect the necessary data for the study including:

- **Data Collection Survey.** A comprehensive data collection survey was distributed to the study participants. This survey collected comprehensive information on a wide variety of topics including:
  - Organizational Structure
  - Staffing
  - Technology
  - Call Processing Methodology
  - Workload
  - Human Resources Information
- **Stakeholder Meetings.** Kimball met with stakeholders such as township and city mayors and labor union representatives to gain an understanding of the political environment and solicit input from the stakeholders.
- **On-site PSAP Visits.** Kimball visited the primary WRPS PSAP as well as the secondary Cambridge and Kitchener Fire PSAPs. The purpose of the visits included:
  - Confirming and clarifying data collected through the data collection survey
  - Observing actual PSAP operations
  - Talking with on-duty PSAP staff about their views on consolidating

Once data collection was complete, Kimball used a variety of methods to analyze the data and arrive at the conclusions and recommendations found in this report. Standards from public safety organizations such as the National Emergency Number Association (NENA), the National Fire Protection Association (NFPA), the Association of Public-Safety Communications Officials – International (APCO), as well as others, were used. Kimball also utilized its collective and extensive public safety experience and its subject matter experts to provide knowledge regarding the project.
2. PSAP CONSOLIDATION OVERVIEW

The purpose of this section is to provide a high level overview of what PSAP consolidation is and typical reasons for considering consolidation. It will also address common roadblocks that may prevent consolidation from occurring or being successful post-consolidation.

2.1 Historical Background

Historically, 9-1-1 call answering and dispatch services have been provided by small PSAPs, except in larger urban areas. The PSAPs were commonly part of a larger law enforcement, fire or EMS agency. These PSAPs typically had a small staff that answered 9-1-1 calls and dispatched field units for a single primary agency in addition to a host of other non-9-1-1 or dispatch related job tasks. Little specialized training was necessary for the staff to perform these functions and advanced technology was not yet present. In fact, sworn personnel with no 9-1-1 training routinely filled temporary vacancies in the PSAP. However, over the last 25 years several key factors have caused public safety communications to evolve into a profession that requires highly skilled people with extensive on-going training and advanced technology. These key factors include:

- The explosion of cellular phone usage which created two major issues:
  1. A dramatic increase in 9-1-1 call volume.
  2. The need for Wireless 9-1-1 Phase I and II technology to locate cell phone callers and improved mapping abilities.

- Increased public awareness regarding available 9-1-1 technology and services such as the ability to locate 9-1-1 callers through technology and emergency medical dispatch (EMD) raised public expectations and drove the need for higher service levels.

- The U.S. terrorist attacks of September 11, 2001 on the World Trade Center and the Pentagon raised awareness for the need for interoperability among responder agencies and the PSAPs that serve them.

- New technology such as wireless devices with video, photos, and text capabilities as well as automatic crash notification (ACN) through such companies as OnStar.

As this evolution progressed, those agencies managing PSAPs found that as training and technology needs increased so did the costs associated with operating a PSAP. In fact, the evolution is continuing as 9-1-1 service levels in the near future will include the ability to handle text messages, video and photos over IP based networks also known as Next Generation 9-1-1 (NG9-1-1). As time progresses those agencies that maintain individual PSAPs will be faced with supplying even higher levels of training and procuring expensive new technology without which they will no longer be able to meet the 9-1-1 service level expectations of the community.

Key public safety industry organizations recognize that the on-going evolution of 9-1-1 requires establishing minimum standards for PSAP employee training, operations, technology, and facilities. These organizations include:

- International City/County Management Association (ICMA)
- National Emergency Number Association (NENA)
- Association of Public-Safety Communications Officials – International (APCO)
- International Association of Fire Chiefs (IAFC)
- Commission on Accreditation for Law Enforcement Agencies (CALEA) – U.S.
- National Fire Protection Association (NFPA) – (U.S.)
The evolution of 9-1-1 and the associated technology coupled with difficult economic times have encouraged provinces and local governments and public safety agencies to investigate the concept of shared services or consolidation. The simplest definition of consolidation is the combining of two or more PSAPs into a single facility and/or organization with a single set of critical PSAP technology and protocols. Different consolidation models exist and are customized to meet unique regional and stakeholder needs. The consolidation process is a complex and difficult process that can yield substantial improvements in service levels, responder safety, employee retention, and potential cost savings if implemented correctly.

2.2 Reasons to Consider Consolidation

Municipalities and agencies consider consolidation for a number of reasons. Commonly cited reasons include:

1. Service level improvements – An important benefit of consolidation is service level improvements. The degree and nature of the improvements will vary depending on the efficiency of each individual PSAP considering consolidation.

   9-1-1 call takers and dispatchers are truly the “first responder on the scene” and can substantially influence the outcome of an incident. The types of service improvements typically achieved following consolidation include:

   - Regional awareness of workload and the deployment of field personnel. This awareness leads to improved usage of resources regionally and better management of large scale or multi-jurisdictional events from a single point of control.
   - Reduction or elimination of the transfer of 9-1-1 calls between PSAPs which improves response times and lowers the potential for human or technology errors.
   - Quicker call processing and dispatch times, resulting in potentially faster on-scene times for field personnel. To Kimball’s knowledge, case studies demonstrating this point are not available. However, an examination of the typical call process where one dispatcher performs both call taking and dispatch functions does support better service. Typically, when one person (the telecommunicator) is performing both functions, he or she answers the 9-1-1 call, interviews the caller long enough to confirm basic information and identify the call has a high priority. The telecommunicator then turns to the radio and dispatches field personnel and handles the initial brief flurry of radio traffic. During this time, however short it may be, the caller is essentially on-hold, perhaps not mechanically, but certainly has been asked to hold while units are dispatched and no further information is being obtained by the telecommunicator. Once the field units are enroute and the initial radio traffic is handled, the telecommunicator can turn his or her full attention back to the caller and obtain additional information. However, from this point forward the telecommunicator must split his or her attention between the caller and the radio.
   - When call taking and dispatch functions are split, the call taker answers the 9-1-1 call and does the same basic interview as shown in the previous example. When a call is identified as high priority, the call is entered into CAD while the call taker continues to gather information. The CAD incident is instantaneously received by the dispatcher(s) and field personnel is sent. There is no lag in gathering potentially critical information from the caller while the telecommunicator balances two tasks. As the call taker gathers new information, it is added to the CAD incident and sent to the dispatcher(s) to be communicated to the responding units. In Kimball’s experience, this call processing methodology is
highly efficient and more accurate. In reality, a telecommunicator, no matter how talented, is still limited in the number of tasks he or she can perform efficiently by virtue of being human.

In further support of this model, the 2013 version of NFPA 1221 Standard for Installation, Maintenance and Use of Emergency Communications Systems Section A.7.3.1 (Annex to Chapter 7 Staffing) states “…Consider the following two concepts of communications centre operations:

- Vertical Centre. A telecommunicator performs both the call taking and dispatching functions
- Horizontal Centre. Different telecommunicators perform the call taking and dispatch functions.

Telecommunicators working in a vertical centre are known to engage in multitasking that can inhibit their ability to perform assigned job functions. …”

- Sharing of physical space enables communications between call takers, law enforcement and fire dispatchers to be virtually instantaneous. This improved communications enables field personnel to receive information more quickly and accurately which is particularly important in multi-jurisdictional incidents. This communication is the least tangible or quantifiable benefit of consolidation, but is one of the most key.
- If large enough, a consolidated PSAP can utilize a call taker/dispatcher organizational structure. This structure enables the call takers to focus solely on the incoming call and obtain the best information possible. The dispatcher’s ability to focus solely on field personnel improves field personnel safety.
- Standardized training of all PSAP employees increases regional consistency.
- A consolidated environment will offer the opportunity for smaller participants to benefit from state-of-the-art technology, improved training, and expanded career opportunities that would not be otherwise financially or organizationally feasible.

2. Individual agencies no longer wish to or are able to support the training and technology needed or handle the human resource demands for PSAP staff. Reassigning sworn personnel functioning as PSAP management and support staff to other positions is possible by eliminating the PSAP.

3. Another primary reason cited for consolidation is cost savings. In general, while cost savings are possible, it is critical that potential participants understand two points. First, not all consolidations result in cost savings. A common misconception is that consolidating will result in significant personnel reductions thus significant cost savings. Consolidations do not normally involve large staff reductions. The real cost savings come from the elimination of redundant and expensive technology such as CAD, 9-1-1 answering equipment, radio consoles and logging recorders. The single set of technology and systems found in a consolidated environment reduces costs associated with procurement, connectivity, and maintenance costs.

Second, in those scenarios where cost savings are achievable, the actual realization of the savings may not occur for several years. The consolidation process can be expensive and can generate substantial one-time start-up and capital costs for facility and technology needs. These costs delay the actual cost savings.

2.3 Roadblocks to Consolidation

PSAP consolidation is a complex process and one that has potentially negative as well as positive aspects. The negative aspects most commonly raised include:

1. Loss of control. Depending on the consolidation model and organizational structure chosen, law enforcement and fire agencies that have had 9-1-1 call taking and dispatch staff as part of their organizations must often relinquish control of the PSAP employees as they become part of the new organization. Complaint and other personnel investigations and any resulting training or disciplinary actions
become the responsibility of the new PSAP management which can be seen as a negative by participating agencies.

Often, the level of control the new PSAP would have over the responses of the participating agencies is misunderstood as well. The role of any PSAP is to implement dispatch plans developed by each individual agency not to dictate response levels to each agency. For example, a law enforcement agency will still have complete control over the type or nature of the incidents they respond to and the level of that response. While standardization among participating agencies is recommended to the degree possible, each agency is still able to customize its responses to the unique needs of the community it serves. Finally, the PSAP dispatches calls for service according to each agency’s dispatch plan, but any dispatch can be overridden by an agency command officer if he or she feels it necessary.

2. Start-up costs or increased operational costs. It is important to understand that comparing the cost of current, non-consolidated PSAP operations with that of a consolidated environment is not an apples-to-apples comparison. The typical emergency communications system that has been in place for the last 25 years cannot provide the level of service expected by today’s technologically savvy citizens.

3. Ancillary or non PSAP or emergency communications related duties. In many small PSAPs where the call volume is low, staff members are often responsible for a host of other non-9-1-1 or dispatch related responsibilities. These include tasks such as handling walk-in complaints, holding cell monitoring, dispatchers performing jail duties, releasing impounded animals and vehicles, management of business key holder/contact files, entering records, tickets, and permits, tracking municipal fees such as dog licenses and functioning as a receptionist and switchboard for the parent agency and/or the entire municipality.

Not only do PSAP staff perform necessary functions outside what would be considered 9-1-1 and dispatch duties, but also often provide a 24/7 presence within the public safety agency. Many agencies consider this 24/7 presence to be a vital part of the service level provided to the community and do not wish to lose it. Not having a 24/7 presence can be managed in a number of ways such as a direct phone in the lobby of the agency that dials the consolidated PSAP or installing “safe room” capabilities in the facility entrance. However, each community will need to assess if compromises such as these are acceptable when considering consolidation.

Each entity considering consolidation must determine how these types of tasks will be managed if consolidation becomes a reality. This may mean adding tasks to current non-PSAP employees within the entity, hiring new employees or altering the service levels provided. The hiring of new staff will affect the potential cost savings for the municipality and should be considered when assessing whether to consolidate.

4. Loss of geographical knowledge of the community and/or personal knowledge of callers. There is no question that PSAP employees in small communities often know the local citizens and geography well. When moving to a larger, consolidated environment, it is also true that some of this knowledge will be lost. However, it is important to recognize that the employees from the small PSAP will likely move over to the consolidated centre, taking their knowledge with them to share with other employees. In addition, mapping software is commonly available which reduces the need for a high level of local geographical knowledge.
3. IN-CALL LOCATION UPDATE AND NG9-1-1 MIGRATION

Bell Canada is in the process of implementing technology upgrades/changes to the 9-1-1 Public Safety Reporting Service (9-1-1 PERS). 9-1-1 PERS is the provincial-based 9-1-1 network that transports and delivers dialed 9-1-1 calls to the PSAP. These changes will most likely have a significant impact on all PSAPs, both technologically and financially. A new extensible mark-up language (XML) based IP data/automatic location identification (ALI) platform is planned for deployment and the technical document released describing the upcoming changes was Bell Technical Document (BID)-0013, version 16. This transition was scheduled to begin in the third quarter of 2012 and it is anticipated that all PSAPs will be required to migrate to the new data network in 2013/2014.

This change only affects the data network and does not impact the 9-1-1 voice interface unless the PSAP is using a line digital trunk (LDT) voice interface. This new ALI platform will transition the current data network to a natively based transmission control protocol (TCP) /IP network. Moving forward Bell Canada will only support ALI query service as outlined in current NENA specifications, 04-005, version 1, and all PSAPs will be required to make these changes. This change will have network, equipment and budgetary impacts for all PSAPs.

These changes to the data network are necessary and are being made for the following reasons:

1. T9-1-1 – SMS Text to 9-1-1 for Deaf, Hard of Hearing and Speech Impaired (DHHSI) subscribers
2. Wireless Phase II Stage II – In call Location Update (ICLU)
3. NG9-1-1 – Migration towards NG9-1-1 and ESINet (Emergency Service IP Network)

3.1 T9-1-1

Initially under Phase I of the project, T9-1-1 service would only be provided to hearing or speech impaired persons who have pre-registered for this service with their wireless carrier. Once registered, the subscriber would be able to call 9-1-1 in the traditional way by dialing the digits “9-1-1” on their wireless phones. At that point, the 9-1-1 call would be flagged as coming from a pre-registered person with a hearing or speech impairment. Upon receiving a flagged 9-1-1 call, the 9-1-1 operator would respond by sending an SMS text message to the caller, and the caller and 9-1-1 operator would continue to communicate back and forth via text messages.

Phase II of the project, which has not yet been scheduled, will allow the PSAP to receive text messages from all wireless subscriber phones, whether they are registered or not. Phase III of the project, also not yet scheduled, will allow wireless phones to send multi-media data (e.g. pictures, video) to the PSAP.

3.2 In-Call Location Update (ICLU)

In-call location update (ICLU) known as Wireless Phase II, Stage 2 is the ability for a PSAP to manually perform location updates for wireless callers. The PSAP can activate a query request either by a feature button on a telephone, within a CTI position or within their CAD software. The need for these updates may be associated with one or more of the following events:

1. The PSAP call taker needs an updated location determination for the wireless caller’s handset (e.g., caller may be moving);
2. The wireless caller’s handset latitude and longitude location is unavailable at the time the Wireless E9-1-1 Phase II Stage 1 location is initially delivered to the PSAP;
3. To request a more accurate geo-location e.g., the radius of uncertainty is at the high end of the acceptable range;
4. The wireless caller is located inside a building and can move safely to another location.

3.3 Next Generation 9-1-1 Migration

NG9-1-1 is the next evolutionary step in the development of the 9-1-1 emergency communications system known as enhanced 9-1-1 (E9-1-1). NG9-1-1 is a system comprised of managed IP-based networks and elements that augment present-day E9-1-1 features and functions and add new capabilities. NG9-1-1 will eventually replace the present E9-1-1 system. NG9-1-1 is designed to provide access to emergency services from all sources, and to provide multimedia data capabilities for PSAPs and other emergency service organizations. In addition to calling 9-1-1 from a phone, it enables the public to transmit text, images, video and data to the PSAP. The initiative also envisions additional types of emergency communications and data transfer.

It important to note that this migration to a new data network is a fundamental building block towards NG9-1-1 and more specifically in building an ESI Net.

3.4 Public Safety Answering Point Impact

There will be a number of required network and equipment changes within both the existing telephone network and the PSAPs. A summary of the required technology components and the entity responsible for each is listed in the following table.

<table>
<thead>
<tr>
<th>ICLU &amp; NG9-1-1 Migration Technology</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>9-1-1 IP-VPN Fiber Circuits</td>
<td>Bell Canada</td>
</tr>
<tr>
<td>Customer Edge (CE) Routers</td>
<td>Bell Canada</td>
</tr>
<tr>
<td>Ethernet Switches</td>
<td>PSAP</td>
</tr>
<tr>
<td>Router(s) or Firewalls</td>
<td>PSAP</td>
</tr>
<tr>
<td>ALI Query Server (AQS)</td>
<td>PSAP</td>
</tr>
<tr>
<td>CAD Interfaces</td>
<td>PSAP</td>
</tr>
</tbody>
</table>

With the new IP data platform, the ALI data will no longer include answering position data embedded in the data return as it had in the past. The ability to route returned call data to the correct answering position is critical to an operation that has more than one answering position. The data returned needs to be displayed at the position that generated the request. As the PSAPs work to implement the changes needed to implement the new data platform they will have to consider this change and implement a solution in which this data can be routed to the correct position either answering the call or requesting a manual ALI query.
The current legacy 9-1-1 data network and method for ALI retrieval will be decommissioned in 2015 as this technology will not support T9-1-1, ICLU or any future NG9-1-1 requirements.

With the addition of the IP based data network, PSAPs will be responsible for the management and support of network components and hardware on their end. They will need to have local IP resources with sufficient skills and training in this area. If the PSAPs require additional local area network (LAN) expertise which are outside of the scope of basic data delivery, the PSAP will have to contract Bell Canada or another IT vendor for these additional services. This, of course, would be an additional cost that the PSAP would have to incur.

### 3.5 Costs

While some of this equipment and connectivity will be provided by Bell Canada, other network components, hardware and CAD interface requirements will be the responsibility of the PSAPs.

The installation of dedicated 9-1-1 IP-VPN circuit(s) and router(s) is being provided free of charge to all 9-1-1 PERS PSAPs by Bell Canada. The number of circuits and routers is determined by the type of PSAP.

The Police Regionalized Information Data Entry (PRIDE) cooperative has been working with their CAD vendor, Intergraph, to provide a solution that will enable them to migrate to this IP ALI system. Although still in negotiation, Intergraph was able to provide the consortium with some budgetary pricing. The total cost for the project is estimated at approximately $625,000. Waterloo Regional Police’s share of this cost would be approximately $270,000. The three other agencies in the consortium would share the remainder of the costs. This estimated cost includes a turnkey solution that includes all required hardware, cabling, software, middleware, interface programming, installation, training, support and maintenance.

Since each PSAP will be required to implement its own solutions it would be expected that both the Cambridge Fire Communications and the Kitchener Fire Communications will have similar costs. Both will need to work with their CAD vendor, CriSys, to determine if it can provide a similar interface and a cost estimate. If CriSys can provide the interface, Kimball would estimate that the costs would range between $50,000 and $150,000 per PSAP. It is difficult to estimate costs for a custom CAD interface as they can vary significantly from vendor to another. Kimball’s estimate is based on our past experience with similar type interfaces provided by comparable sized CAD vendors.

### 3.6 Recommendations

All three PSAPs should work with Bell Canada to implement the new XML IP data ALI data platform. None of the PSAPs utilize 9-1-1 answering equipment that has computer telephony integration (CTI) and depend on a CAD interface to display enhanced 9-1-1 data. Kimball recommends enhancing the respective CAD interfaces to include:

- Interface with the new IP ALI system
- Display and communicate T9-1-1 callers via CAD
- Ability to display ICLU data, including the ability to manually query an update from CAD via a button or command
The complexity of the network and the necessary IT components will require that PSAPs ensure that sufficient IT/LAN infrastructure and the resources to manage their own internal network are in place. This may have significant IT resource implications for a PSAP if they do not have the required local resources. If resources are not available locally, management and support for the new system may have to be obtained from a third party vendor, most likely at a cost to the PSAP.

The PSAPs need to consider data storage needs for upcoming T9-1-1 call data and the future addition of other multimedia data such as pictures, video and telematics type information. These data storage needs could be accomplished via CAD or through a logging recorder.

Based on the current call flow in the Region, there will have to be significant coordination in the implementation of this new data platform between the primary and secondary PSAPs. Operational implications could occur should the PSAPs not be coordinated. For example, if the primary PSAP installs this new platform prior to a secondary PSAP, a T9-1-1 arriving cannot be transferred to the secondary PSAP. This would place additional workload on the Waterloo Regional Police to handle the call along with significant risk since their call takers are not currently trained in processing fire and EMS calls.

3.7 Observations

This network change is an example of potential cost savings for a consolidated communications centre. Under the current configuration there is a need for network, hardware and software changes within three separate PSAPs, each facing significant cost to implement the change. In a single PSAP serving police and fire this cost would only have to be incurred by one PSAP. Unfortunately, based on the timing of these required network changes, these costs most likely cannot be averted. However, at the pace in which technology is changing, especially with NG9-1-1 and other personal communication devices, similar type projects and changes can be expected as new technology platforms are implemented in the future.
4. CURRENT ENVIRONMENT

The following sections provide an overview of the current emergency communications environment for each of the study participants. The overviews include demographics, workload, organizational structure, technology and budget for each of the participants.

There were some differences in how each agency listed and/or categorized their costs. In order to provide an apples-to-apples comparison, Kimball created the six line items in the sections that follow and re-categorized expenses as needed to fit this criteria. This allows the expenditures to be more easily viewed within the document and allows for consistency when evaluating the budgets of all three PSAPs. The categories are defined in the table below:

Table 2 – Expense Category Definitions

<table>
<thead>
<tr>
<th>Expense Category</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network Costs</td>
<td>Includes charges for 9-1-1 trunks, connectivity costs, and administrative phones</td>
</tr>
<tr>
<td>Equipment Costs</td>
<td>Includes CPE, software, maintenance and call interpretation charges</td>
</tr>
<tr>
<td>CAD Costs</td>
<td>Includes maintenance, CAD software and all other CAD charges</td>
</tr>
<tr>
<td>Radio Costs</td>
<td>Includes radio console maintenance, radio service calls and all radio connectivity charges</td>
</tr>
<tr>
<td>Office Expenses</td>
<td>Includes non-CPE computer equipment, base building charges, electricity, gas, water, sewer, snow removal, paper, UPS generator maintenance, uniforms and any other office related charges</td>
</tr>
<tr>
<td>Personnel Expenses</td>
<td>A total of all the personnel expenses provided in the survey. Includes telecommunicator pay and benefits as well as personnel costs associated with support from other departments and/or sworn personnel.</td>
</tr>
</tbody>
</table>

4.1 Waterloo Regional Police Services Communications Centre

The PSAP is located within Waterloo Regional Police Headquarters at 200 Maple Grove Road in the City of Cambridge. As the primary PSAP for the Region of Waterloo, all 9-1-1 calls are received here and then, if necessary, transferred to the appropriate secondary PSAP. This PSAP dispatches for the Waterloo Regional Police and the By-Law agencies attached to each municipality within the region.
4.1.1 Demographics

The Region of Waterloo is located at the southern end of the Province of Ontario, Canada and encompasses 1,368.94 square kilometers (528.55 sq. mi) and is the home to an estimated 533,883 people. As one of the fastest growing regions in Ontario, Waterloo’s population is expected to grow to 729,000 by 2031. The region consists of seven municipalities including the cities of Cambridge, Kitchener and Waterloo and the townships of North Dumfries, Wellesley, Wilmot and Woolwich.

The Region is bordered by Wellington County to the north and east, City of Hamilton to the southeast, County of Brant to the South, Oxford County to the southwest and Perth County to the west.

The region’s governing body is the 16-member Waterloo Regional council. The council consists of the regional chair, the mayors of the seven cities and townships, plus four additional councilors from Kitchener and two additional councilors each from Cambridge and Waterloo.

The following table summarizes population estimates for each municipality. These estimates are based on the last official census in 2011. The 2011 region population was updated based on an average increase per year of 1.73 percent as reported by the Region of Waterloo. The table also summaries the percent of population and square kilometers per municipality:

<table>
<thead>
<tr>
<th>Municipality</th>
<th>2014 Population</th>
<th>Municipality % of Total Population</th>
<th>Square Kilometers</th>
</tr>
</thead>
<tbody>
<tr>
<td>City of Cambridge</td>
<td>133,441</td>
<td>24.99</td>
<td>114</td>
</tr>
<tr>
<td>City of Kitchener</td>
<td>230,725</td>
<td>43.22</td>
<td>136</td>
</tr>
<tr>
<td>North Dumfries Township</td>
<td>9,827</td>
<td>1.84</td>
<td>187</td>
</tr>
<tr>
<td>City of Waterloo</td>
<td>104,006</td>
<td>19.48</td>
<td>64</td>
</tr>
<tr>
<td>Wellesley Township</td>
<td>11,279</td>
<td>2.11</td>
<td>277</td>
</tr>
<tr>
<td>Wilmot Township</td>
<td>20,238</td>
<td>3.79</td>
<td>263</td>
</tr>
<tr>
<td>Woolwich Township</td>
<td>24,367</td>
<td>4.56</td>
<td>326</td>
</tr>
<tr>
<td>Total</td>
<td>533,883</td>
<td>100.00</td>
<td>1,367</td>
</tr>
</tbody>
</table>

Two police agencies have primary law enforcement responsibilities within the Region of Waterloo including WRPS and the Ontario Provincial Police (OPP). The OPP provides primary services for incidents on Routes 8 and 401.

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2 Ibid 1
Ambulance service in the Region of Waterloo is the responsibility of the Emergency Medical Services (EMS) division of Waterloo Public Health Department. All ambulances are dispatched by the Cambridge Central Ambulance Communications Centre.

Seven fire departments, operating out of twenty-nine stations, provide first due fire protection within the Region. All of the fire departments are dispatched either by Cambridge Fire Communications or Kitchener Fire Communications.

<table>
<thead>
<tr>
<th>Table 4 – Fire Agencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agency</td>
</tr>
<tr>
<td>Cambridge Fire Department</td>
</tr>
<tr>
<td>Kitchener Fire Department</td>
</tr>
<tr>
<td>Waterloo Fire Department</td>
</tr>
<tr>
<td>North Dumfries Fire Department</td>
</tr>
<tr>
<td>Wellesley Fire Department</td>
</tr>
<tr>
<td>Wilmot Fire Department</td>
</tr>
<tr>
<td>Woolwich Fire Department</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
</tr>
</tbody>
</table>

4.1.2 Organizational Structure

Management of the PSAP is overseen by a WRPS staff sergeant. Front-line supervision of the PSAP is provided by WRPS sergeants who report to the staff sergeant. Newer sergeants within the agency are being rotated through the centre in the supervisor position. These assignments are for a three year period but typically last between two and three years.

There are five platoons for the communications centre staff. Each platoon has a sworn sergeant and sworn constable assigned. The sergeant supervises the shift. Typically the constable is assigned call taking duties but if there is no sergeant on duty, whether on break or off the floor, they act as the supervisor. All the call takers and dispatchers are civilians and union members. The call takers and dispatchers work either an 8 or 10 hour shift. A study of different types of shifts was recently conducted and employees expect to vote on their shift preference in September 2013.

The PSAP provides dispatch services for WRPS’ nine platoons for which there are nine different starting times. The region is divided into four regional divisions; north, south, central and rural. Each division is subdivided into six sectors or beats. All officers are required to rotate through all sectors of the division.

The PSAP is configured for a split operational model in that there are dedicated call takers and dispatch positions. The authorized staffing is sixty-five full-time call takers and dispatchers and the agency currently employs sixty-nine. There are no part-time telecommunicators at this time but the agency will be authorized to hire part-time employees by the fall of 2013. There are currently five sergeants and five constables assigned to communications.
Minimum staffing for the PSAP is ten including a supervisor and a switchboard operator. WRPS is considering discontinuing the switchboard operator position.

The employees are scheduled to rotate through all dispatch positions. Approximately 90 percent of the staff has been cross-trained in both call taking and dispatching. The other 10 percent are newer employees who have not yet received the required cross training.

The union for all communications staff is the Waterloo Police Association. Civilian and sworn employees are covered by separate contracts.

### 4.1.3 Workload

The workload of a PSAP is generally comprised of three components including call volume, radio traffic and ancillary duties.

The PSAP operations floor is configured to handle this combined workload by designating specific physical positions to handle specific tasks such as call taking and dispatching. These job tasks require different technology; therefore all types of technology are not necessarily located at all physical positions. There are a total of eighteen physical positions installed in the communications centre and two in the trainer’s office. However, only fourteen of these positions are used and have technology installed at the position. Four positions are furniture only and are currently not being used in the operations of the centre. Further, some of the positions have the technology for all functions, which allow them to be utilized as overflow, tactical or special event or spare positions as needed. The following table summarizes the physical positions by intended function.

<table>
<thead>
<tr>
<th>Description</th>
<th># Positions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supervisor</td>
<td>1</td>
</tr>
<tr>
<td>Call Taker (Including constable position)</td>
<td>9</td>
</tr>
<tr>
<td>Radio Dispatch</td>
<td>3</td>
</tr>
<tr>
<td>Back-up Radio Dispatch (Including training room position)</td>
<td>3</td>
</tr>
<tr>
<td>Vacant</td>
<td>4</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>20</strong></td>
</tr>
</tbody>
</table>

Call volume is broken down into 9-1-1 calls and non-emergency calls or those received on 10-digit lines. Calls received on 10-digit lines may be of an administrative nature and may or may not require a field response. The recorded telephone volume for the previous three years for WRPS is as follows:
Table 6 – 9-1-1 Call Summary

<table>
<thead>
<tr>
<th>Call Type</th>
<th>2010*</th>
<th>2011*</th>
<th>2012</th>
<th>Annual Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>9-1-1 Calls</td>
<td>123,000</td>
<td>123,000</td>
<td>124,949</td>
<td>123,650</td>
</tr>
<tr>
<td>Non-Emergency</td>
<td>170,000</td>
<td>170,000</td>
<td>174,747</td>
<td>171,582</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td>293,000</td>
<td>293,000</td>
<td>299,696</td>
<td>295,232</td>
</tr>
</tbody>
</table>

*Call count is estimated as actual data was unavailable.

As the primary PSAP, WRPS receives all 9-1-1 calls. If necessary, the calls are then transferred to one of four secondary PSAPs. The secondary PSAPs include:

- Cambridge Fire
- Kitchener Fire
- Cambridge Central Ambulance Communications Centre (CACC)
- Ontario Provincial Police (OPP)

The primary dispatch positions in the communications centre are Central, North and a combined South/Rural position.

Staffed back-up dispatch positions assist the radio dispatchers with their daily tasks and responsibilities. This includes making phone calls, running queries, checking records, dispatching tows and filling in for dispatchers during breaks. The back-up dispatch positions also help out with call taking responsibilities during periods of high call volume when they are available.

Radio traffic is generated by the dispatcher assigning calls for service as well as from the field as personnel supply status updates and make requests for support services from the dispatcher. The recorded event volume (from CAD system statistics) for the previous three years is as follows:

Table 7 – WRPS Annual CAD Incidents Summary

<table>
<thead>
<tr>
<th>Waterlooo Regional Police</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>277,232</td>
<td>299,302</td>
<td>302,522</td>
<td>293,019</td>
</tr>
</tbody>
</table>

All of the participating municipalities have by-law officers who have the responsibility to enforce the local municipal by-laws. By-laws are local codes or ordinances passed by that municipality that have a need to be regulated. WRPS communications centre receives and processes by-law complaints for each of their member municipalities. These calls are entered into CAD by the call takers and then the dispatchers notify the by-law officers via radio. Common by-laws include vehicle parking and stopping regulations, animal control, building and construction, licensing, noise, zoning and business regulation and management of public recreation areas.

The hours of operation for the by-law officers vary from one municipality to another so the municipalities are required to provide schedules to the communications centre with the days and times their officers will be on duty. In addition, there are differences in how some complaints are handled from one municipality to another. The communications
centre staff must be trained in these differences and may have to refer to standard operating policies (SOP) documents to review how complaints are handled within the various jurisdictions.

Table 8 – WRPS Annual By-Law Events

<table>
<thead>
<tr>
<th>WRPS By-Law CAD Event Summary</th>
<th>2010*</th>
<th>2011*</th>
<th>2012</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waterloo Regional Police</td>
<td>9,500</td>
<td>9,500</td>
<td>10,500</td>
<td>9,833</td>
</tr>
</tbody>
</table>

*Estimated as the actual data was not available.

All EMS calls are transferred to the CACC. The call taker remains on the line and listens to the call to determine if the Regional Police are needed on the event. Regional Police routinely respond to the following types of EMS events:

- Cardiac Arrest/Ventricular Septal Aneurysm (VSA)
- Choking
- Overdose/Poisoning
- Blunt Trauma
- Trauma/Penetrating Wound
- Unconscious
- Unknown
- Motor vehicle accidents with injuries
- Farm and Industrial

Using a tiered system, most transferred calls are those which require an EMS response. If fire is needed as well, CACC will then transfer or otherwise notify the appropriate fire department.

For calls that require a fire response, but not EMS, the calls are transferred to either the Cambridge Fire Department or the Kitchener Fire Department. The call taker remains on the line, typically on mute, and listens to the call to determine if the Regional Police are needed on the event. WRPS normally respond to structure fires and other high priority fire calls.

The agency has several service level objectives for both incoming emergency and non-emergency calls.

- Emergency Calls – ninety percent of calls within ten seconds or less (NENA standard)
- Non-Emergency Calls – ninety-five percent of calls within twenty seconds or less (NENA recommendation)
- Non-Emergency Calls – ninety percent of calls within thirty seconds or less

As the primary PSAP the Waterloo Regional Police provides all TDD communications with callers for the secondary PSAPs. These calls are received at a designated call taker position. This position is typically staffed by the constable and is staffed on a 24/7 basis.

The final workload component is ancillary duties. These duties are those that are outside the scope of “true” emergency communications functions such as 9-1-1 call taking and dispatching and are most commonly found in smaller PSAPs. Examples include monitoring holding cells, staffing walk-in windows for the public, issuing a variety of licenses and permits and so on. The WRPS PSAP does not perform these types of duties.
4.1.4 Call Flow

The region is divided into four law enforcement divisions; north, south, central and rural. Each division is subdivided into six sectors or beats. There are three primary dispatch positions within the communications centre; North, Central and a South/Rural combined position.

The Waterloo Regional Police operates a 24/7 switchboard position in which all non-emergency calls are directed and answered. The primary non-emergency number for the Waterloo Regional Police is (519) 653-7700. All of these calls are answered by the switchboard, which is located in a room adjacent to the communications centre. If the call requires a police response the caller is transferred into the communications centre via the non-emergency call queue and is answered by a call taker who then processes the call.

If there is no switchboard operator on duty (sick, vacation, etc.) then a call taker is assigned to that position. The switchboard operator is considered part of minimum staffing for the communications centre. There are discussions in progress to abandon this position and place an automated attendant on the incoming ten digit phone lines.

The switchboard answers incoming alarm calls from third party alarm companies and those calls are then transferred into the communications centre for processing. There are no residential or business alarms that directly terminate which are monitored by the Water Regional Police Communications Centre.

All ambulance dispatch is conducted by the Cambridge CACC. The Regional Police do not do any emergency medical dispatching (EMD). All EMD questioning and pre-arrival instructions are conducted and provided by the CACC call takers and dispatchers.

All fire department dispatching within the region is either provided by the Cambridge Fire Communications Centre or the Kitchener Fire Communications Centre. Cambridge Fire Communications dispatches for the Cambridge Fire and North Dumfries Fire Departments. Kitchener Fire Communications dispatches for Kitchener, Waterloo, Wellesley, Wilmot and Woolrich Fire Departments.

The Regional Police maintains a back-up communications centre in an annex building at their Central Division office located at 134 Frederick Street in the City of Kitchener. There are seven positions located at the back-up centre: three dispatch, three call take and one supervisor. Critical technology such as 9-1-1 answering equipment, CAD and radio consoles are all installed and operational in the back-up centre.

4.1.5 Training and Quality Assurance/Quality Control

The training program for new WRPS PSAP staff is comprehensive and includes:

- 4-5 weeks of classroom training
- Observation on the operations floor
- Written exams
- On-the-job training with a mentor
- Scheduling progressively longer periods of time for employee to work independently until able to fully work alone.
- Employees are trained as call takers initially and then as dispatchers approximately six months later.
No quality assurance or control is done at this time due to a lack of staffing resources. PSAP management would like to be able to implement a QA/QC program in the future.

### 4.1.6 Automated Systems

The Waterloo Regional Police Services is a member of the Police Regionalized Information Data Entry (PRIDE) cooperative that was established in 1978. The communities that are members of this cooperative include:

- Region of Waterloo
- City of Guelph
- City of Brantford
- City of Stratford

All of the agencies that belong to this cooperative are using the same public safety software applications that include Intergraph CAD, Intergraph I/Mobile and Niche law enforcement records management software (LERMS).

The Police Services IT department monitors, supports and maintains all computerized operating and network components for the member municipalities to ensure optimal functionality. These applications include, but are not limited to, Intergraph CAD and Mobile, Niche RMS, Canadian Police Information Centre (CPIC), Integrated Court Offences Network (ICON), Major Case Management (MCM), Sexual Offender Registry (SOR). Essentially, IT maintains and supports all software applications and computer hardware with the exception of typical desktop packages such as Microsoft© office products.

The PRIDE agencies, including the Regional Police Services PSAP, are currently using an Intergraph CAD system, software version 9.2. The system was originally installed in October 2008 and the software was last updated in April 2013. The original servers and workstation PCs were replaced in April 2013. Both the production and back-up servers are installed in the IT equipment room, which is located on the third floor of the building, and failover to the back-up server is automatic.

The Regional Police are not using CAD to make unit recommendations for police responses. Dispatchers manually dispatch units assigned to law enforcement sectors and rotate units on events in which multiple units are assigned to a single sector.

The following table depicts typical interfaces found within law enforcement public safety CAD systems and the status of those interfaces at the WRPS PSAP:
Table 9 – WRPS CAD Interface Summary

<table>
<thead>
<tr>
<th>CAD Interfaces</th>
<th>Yes/No</th>
<th>CAD Interfaces</th>
<th>Yes/No</th>
</tr>
</thead>
<tbody>
<tr>
<td>E9-1-1</td>
<td>Yes</td>
<td>Mobile Mapping</td>
<td>Yes</td>
</tr>
<tr>
<td>Alarm Monitoring</td>
<td>Yes</td>
<td>Phase 2 Wireless Mapping</td>
<td>Yes</td>
</tr>
<tr>
<td>AVL</td>
<td>Yes</td>
<td>Pictometry</td>
<td>No</td>
</tr>
<tr>
<td>Call Taker/Dispatcher Mapping</td>
<td>Yes</td>
<td>Radio Console/PTT/Emergency</td>
<td>No</td>
</tr>
<tr>
<td>Police Field Reporting</td>
<td>Yes</td>
<td>TDD/TTY</td>
<td>Yes</td>
</tr>
<tr>
<td>Police Mobile Data</td>
<td>Yes</td>
<td>Text/Alphanumeric Paging</td>
<td>No</td>
</tr>
<tr>
<td>Police RMS</td>
<td>Yes</td>
<td>CPIC/NCIC</td>
<td>Yes</td>
</tr>
<tr>
<td>Logging Recorder</td>
<td>Yes</td>
<td>Web Access/Web CAD</td>
<td>Yes</td>
</tr>
<tr>
<td>Master Clock</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The Regional Police are using an Intergraph mobile data solution (I/Mobile) with mounted rugged notebook computers and is using the NetMotion software application to help manage mobile data connectivity and provide a mobile virtual private network (VPN) solution. The mobile software version being used is 8.1 and the next software update is scheduled for next year. The application provides a secure connectivity between the mobile server and the MDCs. The interface provides silent dispatch, message switching, status changes and CPIC/NCIC queries. Connectivity to the message switch is accomplished through a commercial radio vendor’s wireless network (Bell Mobility) 3G and High Speed Packet Access (HSPA). Officers out in the street can self-initiate traffic stops and place themselves on administrative type details from the computers.

The CAD has integrated mapping and updated GIS/mapping data is received from the Region of Waterloo. Once the IT department gets the data, staff must first massage the data and then upload it onto the CAD and associated systems. Currently GIS/mapping updates are provided every six months, however the goal is to have this data updated every three months. The CAD mapping includes all the municipalities that participate in the PRIDE group.

The agency uses Intergraph’s I/Informer interface for CAD and mobile data access to the Ministry Transportation Office (MTO) of Ontario for driver’s license and vehicle registration queries. I/Informer is also being used for CAD and mobile data queries in the Canadian Police Information Centre (CPIC) for other critical informational databases that include, but are not limited to:

- Vehicles/marine
- Stolen or abandoned vehicles/boats
- Persons
  - Wanted persons
  - People who are accused of crime(s)
  - People on probation or parolees
  - Special Interest Police (SIP)
  - Missing
  - Wandering Persons Registry
- Judicial orders
Access to the Offender Management System of Correctional Service of Canada  
Stolen property  
Dental characteristics  
Canadian Firearms Registry of the Canadian Firearms Program  
CPIC criminal surveillance  
Criminal Record Synopsis

WRPS utilizes a Niche LERMS with software version 5.01. This application was originally installed in 2004 and the software was last updated in January 2013. Communication centre staff has the ability to query the Niche RMS.

WRPS operates a 24/7 CPIC desk in their records department and staff assigned are responsible for the entry, deletion and modification of all CPIC records. Communications does not have any record entry, deletion or modification responsibilities. There is an interface between the agency’s LERMS Niche and CPIC/NCIC.

There is a CAD interface to the agency’s Cry Wolf alarm monitoring software application. The CAD sends alarm information to agency’s alarm monitoring software, Cry Wolf. Staff within the communications centre has the ability to query alarm records and data in the Cry Wolf software. An alarms coordinator position is staffed with the agencies records department.

Eyezon is a personal SOS device with GPS tracking that allows push button emergency activation. Upon activation, the Eyezon call centre receives GPS coordinates that pinpoint the device location. Eyezon employees then contact the WRPS PSAP to relay the coordinates. The WRPS call taker enters the GPS coordinates into Eyezon software that is installed at the console positions. The software will then provide location information and information regarding the person to whom that particular device is assigned to the call taker so that police can be sent. Eyezon is a new system for which implementation is just being completed.

The communications department does not use a master clock for synchronized timing of the communications equipment and depends on synchronized timing provided by active directory.

### 4.1.7 Customer Premise Equipment

E9-1-1 service is provided by Bell Canada via the provincial-based 9-1-1 Public Emergency Reporting Service (9-1-1 PERS). The Bell network transports and delivers dialed 9-1-1 calls from various subscriber phones and carriers to the primary PSAPS. The E9-1-1 service is associated with all primary exchange services for the province and region. The characteristics of the service area include:

- Universally recognized 3-digit calling (9-1-1) for connection to emergency response agencies serving the location of the caller.
- High grade of service (maximum 0.1% probability of call blocking)
- Special features to support the proficiency and effectiveness of E9-1-1 answering attendants.

A citizen generated 9-1-1 call within the Region of Waterloo is routed through Bell Canada and is selectively routed to the primary PSAP, WRPS. Once the E9-1-1 call is delivered and answered at the primary PSAP, the call taker determines the nature of the emergency and either processes the call or forwards the call to the appropriate police, fire or ambulance dispatch centre.
The transfer of 9-1-1 calls to the secondary PSAPs is completed using Bell Canada facilities. There are programmed buttons on the 9-1-1 answering phones that allow one button transfer and conference of these calls. The call is transferred to the secondary PSAPs utilizing dedicated trunks and speed dials programmed within the 9-1-1 tandem switches. This allows the transfer of not only the voice of the caller but also the ANI which is used to retrieve ALI data. Utilizing the ‘fire’ or ‘ambulance’ buttons on the telephone sets allows the transfer to the correct secondary PSAP based on the location of the event in the 9-1-1 ANI/ALI data. The call takers also have the ability to select and manually transfer a 9-1-1 call to a specific secondary PSAP, if necessary.

Bell Canada is the incumbent local exchange carrier (ILEC) and there are a number of various competitive local exchange carriers (CLECs) providing service within the Region. Wireless carriers that provide service within the Region include Bell Mobility, Rodgers Wireless, Wind Wireless and Telus Mobility.

Incoming calls are received on Nortel Networks M3905 digital telephones that are installed at all of the console positions. The answering equipment allows the display of automatic number identification (ANI), but does not display automatic location identification (ALI). The PSAP does not utilize answering equipment that has computer telephony integration (CTI) and depends on a CAD interface to display enhanced 9-1-1 data such as an address, location, calling party name and other call data. The same CAD interface displays the call location on the integrated mapping for wireline calls, tower location for wireless Phase I calls or callers location for wireless Phase II calls.

All 9-1-1 back room and answering equipment installed at the PSAP is provided and maintained by Bell Canada. Bell Canada provides 24/7 support and maintenance for all 9-1-1 answering equipment. The telephone CPE back room equipment consists of a Nortel Meridian Option 61 PBX and Nortel CC7 call management software and hardware. The CC7 application provides for call routing and handling, automatic call distribution (ACD), real-time statistics and a historical database that can be used for operational and management reporting. Real-time agent activity is monitored via Agent Desktop Display Software at the supervisor’s position. This application displays each position, agent ID, current status, elapsed time in that status and is configured to provide alerts based on agency defined parameters. There is a 9-1-1 printer installed in the equipment room.

The switchboard is using Komutel SITPBX answering software that is interfaced to the Nortel Meridian PBX. This interface allows the transfer of non-emergency calls from the switchboard into the non-emergency queue allowing these calls to be answered by the call takers out on the communications centre floor. The PSAP has a wallboard (Symon board) that captures and displays critical answering position information for the 9-1-1 answering equipment. Audible alerts have been configured based on operational criteria set by the agency.

The information displayed on this wallboard includes:
- Skill or Call Queue (9-1-1, Non-Emergency)
- Available Agents
- Calls Waiting (per queue)
- Longest Call Waiting (per queue)
- Agents not Available
- Total Calls Arrived (per queue)

An audible alert is sounded for an incoming emergency call if no call taker is available to take that call.
There are nineteen 9-1-1 trunks installed from the Bell Canada selective routers into the primary PSAP. The PSAP is served by a primary selective router and a secondary selective router. Bell Canada provides ALI service to the PSAP through redundant centralized ALI databases located in Toronto.

The Regional Police maintains a back-up centre in an annex building at their Central Division office located at 134 Frederick Street in the City of Kitchener. A Nortel Norstar Modular ICS PBX ANI/ALI controller and 9-1-1 answering phones are installed within the back-up centre. There are nineteen 9-1-1 trunks installed from the Bell Canada selective routers the 9-1-1 answering equipment in the back-up centre.

The communications centre is using Jabra wired headsets.

The PSAP has a 25 channel NICE recorder that was installed in November, 2012 and all 25 channels are currently being used. The logging recorder is being used to record both telephone positions and radio traffic. The Nice recorder is also being used for telephone and radio instant recall recording (IRR).

**4.1.8 Budget**

The following table summarizes the current WRPS PSAP budget:

<table>
<thead>
<tr>
<th>Expense Category</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network Costs</td>
<td>$21,145</td>
</tr>
<tr>
<td>Equipment Costs</td>
<td>$336,650</td>
</tr>
<tr>
<td>CAD Costs</td>
<td>$136,800</td>
</tr>
<tr>
<td>Radio Costs</td>
<td>$39,900</td>
</tr>
<tr>
<td>Office Expenses</td>
<td>$19,200</td>
</tr>
<tr>
<td>Personnel Expenses</td>
<td>$7,765,838</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>$8,319,533</strong></td>
</tr>
</tbody>
</table>

**4.2 Cambridge Fire Department Communications Centre**

The PSAP is located within Cambridge Fire Department Headquarters at 1625 Bishop Street North in the City of Cambridge. It is a secondary PSAP and dispatches the Cambridge Fire Department and Ayr Fire Department (North Dumfries Township).
4.2.1 Demographics

The City of Cambridge encompasses 112.86 square kilometers and is home to approximately 126,748 citizens. The city is the result of the 1973 amalgamation of the City of Galt, Towns of Preston and Hespeler and the Hamlet of Blair.

The City is governed by a mayor and city council. The councillors represent eight wards citywide.

4.2.2 Organizational Structure

The communications centre is operated under the administration and oversight of the City of Cambridge Fire Department. The Division Chief of Communications (Chief Communications Officer) is the front line manager for the Communications Centre.

The PSAP is configured for a single operational model in that they operate within a combined call taker/dispatcher scenario. The authorized staffing for communications is six full-time employees; five communication operators and one support technician. The employees work a rotating schedule that consists of ten hour day shifts (08:00 to 18:00) and fourteen hour night shifts (18:00 to 08:00) where the shifts rotate on four days, off four days and then on four nights. There are four fire platoons and a communication operator is assigned to each platoon and follows that platoon’s schedule. The fifth position is a floater that covers shifts for the employees when they are on paid time off such as vacation, sick leave and training. If no coverage is needed then that floater employee works the daylight shift Monday thru Friday as a second communications officer on duty.

Minimum staffing for the PSAP is one person and typically the only time there are two communication officers on duty is Monday through Friday during the daylight shift when the floater position is not needed to cover any other shifts.

The union for the communication employees is the Cambridge Professional Fire Fighters Association Local 499.

4.2.3 Workload

There are a total of two physical work positions installed in the communications centre. Each of the positions has the required technology needed both call taking and dispatching functions. This equipment includes 9-1-1 answering position, CAD and a radio dispatch console.

The agency has a service level objective of dispatching emergency event(s) within 60 seconds from the time of call pick-up.

Call volume is broken down into 9-1-1 calls and non-emergency calls or those received on 10-digit lines. Calls received on 10-digit lines may be of an administrative nature and may or may not require a field response. Cambridge Fire Communications was not able to provide any 9-1-1 or non-emergency phone call statistics.

The PSAP calls back all 9-1-1 hang-up calls based on the ANI/ALI information that drops into CAD.
Radio traffic is generated by the dispatcher assigning calls for service as well as from the field as personnel supply status updates and make requests for support services from the dispatcher. The recorded event volume (from CAD system statistics) for the previous three years is as follows:

<table>
<thead>
<tr>
<th>PSAP</th>
<th>CAD Events</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2010</td>
</tr>
<tr>
<td>Cambridge Fire Communications</td>
<td>5,563</td>
</tr>
</tbody>
</table>

All EMS calls are transferred to the Cambridge Central Ambulance Communications Centre by the primary PSAP, Waterloo Regional Police. Fire resources are dispatched to EMS events based on a mutually agreed upon tiered response. If the Cambridge CACC processes an event that requires fire department first responders then the CACC will telephone Cambridge Fire Communications to have fire units dispatched.

Waterloo Regional Police provides all TDD communications with callers for the secondary PSAPs including Cambridge Fire Communications Centre.

There is an automated attendant on the primary non-emergency administrative phone system and the communications centre is the default answering location for that system.

The Cambridge Fire Department currently has a one hour response contract serving a portion of Puslinch Township in Wellington County. The Cambridge fire resources are dispatched into the designated areas and dispatch contacts Guelph Fire Dispatch to dispatch Puslinch Fire Department if and when they are needed.

In addition to call taking and dispatch responsibilities, the Cambridge Fire PSAP staff receives administrative calls for the fire department, handle alarm testing and place alarms in and out of service.

### 4.2.4 Call Flow

All 9-1-1 calls in the Region of Waterloo are routed to the primary PSAP, Waterloo Regional Police Services. If the nature of the emergency is for fire, and the location is in the first due area for the Cambridge Fire Communications Centre, then the call is transferred to them by the Waterloo Regional Police. The Regional Police stay on the line and monitor the call to determine if their agency will need to respond to the event. If the call type requires an EMS response, then WRPS will transfer the call to CACC. In turn, CACC will transfer or otherwise notify Cambridge Fire of the call.

The call taker/dispatcher in Cambridge Fire Communications answers the incoming 9-1-1 call, processes the call information in their CAD system and then dispatches the event to the appropriate fire resources. The CAD system provides unit recommendations based on the location of the event and the nature of call. The dispatcher has the ability to accept the recommendation or manually over-ride it if needed.

The communications centre has provided third party alarm companies with an unpublished ten-digit phone line to call and report fire alarms.
The Cambridge Fire Communications Centre uses Fire Monitoring Technologies International (FMTI) Open Access alarm monitoring interface to their CAD system to receive incoming alarm information. This interface allows the incoming alarm events to dump directly into their CAD system’s pending events window. Upon activation of a fire alarm for a participating location the alarm is sent to the alarm company monitoring station and then automatically forwarded to the communications centre via a secure bi-directional IP gateway. The direct connectivity alleviates the need and associated delay for the alarm company monitoring station to telephone the communications centre and relay the alarm information.

### 4.2.5 Training and Quality Assurance/Quality Control

The training for Cambridge Fire PSAP staff includes six weeks of on-the-job training and two additional weeks of observations. The new hires are then assigned to a shift.

The Cambridge PSAP does QA/QC.

### 4.2.6 Automated Systems

The PSAP is currently using a CriSys Limited Xpert CAD and Fire software system, release 30. The system was originally installed in December 1994 and the software was last updated in June 2013. The original servers and workstation PCs were replaced in April 2013. Both the production and back-up servers are installed in the equipment room and failover to the back-up server is automatic. The Xpert fire software package includes the following modules:

- Call Handling and Dispatch
- Incident Management
- Critical Event Response Management Functions
- Reporting
- Personnel Management
- Equipment Management
- Pre-Incident Planning
- Fire Prevention

The CAD has integrated mapping and updated GIS/mapping data is received from a variety of external sources. Once the City GIS department gets the data, it is compared to the existing data so that all additions, deletions or changes can be reviewed. Once this review process is completed a decision can be made if all updates, only selected updates or no updates will be loaded onto the CAD and associated systems. Currently GIS/mapping updates are provided and uploaded every three months.

The following table depicts typical interfaces found within public safety CAD systems and the status of those interfaces at the Regional Police PSAP:
Table 12 – Cambridge Fire Communications CAD Interfaces

<table>
<thead>
<tr>
<th>CAD Interfaces</th>
<th>Yes/No</th>
<th>CAD Interfaces</th>
<th>Yes/No</th>
</tr>
</thead>
<tbody>
<tr>
<td>E9-1-1</td>
<td>Yes</td>
<td>Master Clock</td>
<td>No</td>
</tr>
<tr>
<td>Alarm Monitoring</td>
<td>Yes</td>
<td>Mobile Mapping</td>
<td>No</td>
</tr>
<tr>
<td>AVL</td>
<td>No</td>
<td>Phase 2 Wireless Mapping</td>
<td>Yes</td>
</tr>
<tr>
<td>Call Taker/Dispatcher Mapping</td>
<td>Yes</td>
<td>Pictometry</td>
<td>No</td>
</tr>
<tr>
<td>Fire RMS</td>
<td>Yes</td>
<td>Radio Console/PTT/Emergency</td>
<td>No</td>
</tr>
<tr>
<td>Fire Mobile Data</td>
<td>No</td>
<td>TDD/TTY</td>
<td>No</td>
</tr>
<tr>
<td>Radio Tone Encoding</td>
<td>No</td>
<td>Text/Alphanumeric Paging</td>
<td>No</td>
</tr>
<tr>
<td>Fire Station Alerting</td>
<td>No</td>
<td>Web Access/Web CAD</td>
<td>Yes</td>
</tr>
<tr>
<td>Logging Recorder</td>
<td>No</td>
<td>Rip &amp; Run Printers</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Cambridge Fire is using Zetron Model 26 control panels for fire station alerting and Zetron Model 6 transponders in the fire stations to receive the calls. The fire station alerting provides an audible alert tone and the dispatch announcement. Currently there is no CAD interface to the fire station alerting but one is being considered.

There is a CAD interface to FMTI Open Access alarm monitoring. This interface allows the incoming alarm events to dump directly into their CAD system’s pending events. Upon activation of a fire alarm for a participating location the alarm is sent to the alarm company monitoring station and then automatically forwarded to the communications centre via secure bi-directional IP gateway. The direct connectivity alleviates the need and associated delay for the alarm company monitoring station to telephone the communications centre and manually relay the alarm information. Currently there are approximately fifty locations using this interface.

The Cambridge Fire Communications Centre uses WCP Dispatch to monitor and view AVL GPS-based locations of subscriber radios in their lead units. This is a stand-alone client application viewed on a monitor in dispatch and is not interfaced with CAD or any other mapping applications.

There is a CAD monitor installed in the apparatus bay in fire headquarters that displays unit status and active events.

There are currently no mobile data computers on the system; however, they are being considered with a winter 2013 or spring 2014 time frame.

The communications centre does not use a master clock for synchronized timing of the communications equipment.

4.2.7 Customer Premise Equipment

A 9-1-1 call generated within Cambridge Fire Communications area by a subscriber is routed through Bell Canada and is selectively routed to the Waterloo Regional Police Services, the primary PSAP for the region. If the nature of the emergency is for fire, and the location is in the first due area for the Cambridge Fire Communications Centre,
then the call is transferred to them by the Waterloo Regional Police. The Regional Police stay on the line and monitor the call to determine if their agency will need to respond to the event.

The transfer of 9-1-1 calls to the secondary PSAPs is completed using Bell Canada facilities. The call is transferred to the secondary PSAPs utilizing dedicated trunks and speed dials programmed within the 9-1-1 tandem switches. This allows the transfer of not only the voice of the caller but also the ANI data that is then used to retrieve the ALI data.

Incoming calls are received on Norstar MOD/ICS digital telephones that are installed at both of the console positions. The answering equipment allows the display of ANI, but does not display ALI. The PSAP does not utilize CTI with their answering equipment and depends on a CAD interface to display enhanced 9-1-1 data such as address, location, calling party name and other call data. The same CAD interface displays the call location on integrated mapping for wireline calls, tower location for wireless Phase I calls or callers location for wireless Phase II calls.

All 9-1-1 back room and answering equipment installed at the PSAP is provided and maintained by Bell Canada. Bell Canada provides 24/7 support and maintenance for all 9-1-1 answering equipment. The telephone CPE back room equipment consists of Norstar PBX software and hardware. There is no CPE management information software that logs call detail records and can be used to generate statistical reports. There is a 9-1-1 printer in the equipment room.

There are four 9-1-1 trunks installed from the Bell Canada selective routers into the PSAP. The PSAP is served by a primary selective router and a secondary selective router. Bell Canada provides ALI service to the PSAP through redundant centralized ALI databases located in Toronto. This network provides redundancy should problems occur and flexibility for future enhancements.

There are four back-up analog Bell AASTRA phone sets in the communications centre with access to the 9-1-1 trunks, direct dials and the non-published emergency number for the alarm companies.

The communications centre is not using any headsets.

The PSAP has a ComLog NP logging recorder that is being used to record both telephone positions and radio traffic. The ComLog recorder is also being used for telephone and radio instant recall recording (IRR).
4.2.8 Budget

The following table summarizes the budget for the Cambridge Fire PSAP:

Table 13 – Current Cambridge Fire PSAP Budget

<table>
<thead>
<tr>
<th>Expense Category</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network Costs</td>
<td>$1,190</td>
</tr>
<tr>
<td>Equipment Costs</td>
<td>$1,100</td>
</tr>
<tr>
<td>CAD Costs</td>
<td>$50,705</td>
</tr>
<tr>
<td>Radio Costs</td>
<td>$0</td>
</tr>
<tr>
<td>Office Expenses</td>
<td>$17,714</td>
</tr>
<tr>
<td>Personnel Expenses</td>
<td>$751,000</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>$821,709</strong></td>
</tr>
</tbody>
</table>

4.3 Kitchener Fire Department Communications Centre

The PSAP is located within Kitchener Fire Department Headquarters at 270 Strasburg Road in the City of Kitchener. It is a secondary PSAP and dispatches the Kitchener Fire Department, Waterloo Fire Department, Wellesley Fire Department, Wilmot Fire Department and the Woolwich Fire Department.

4.3.1 Demographics

The City of Kitchener encompasses 136.89 square kilometers (52.85 sq mi) and is home to 219,153³ people. The City is seat for the Regional Municipality of Waterloo located and is located in the central portion of the region. The Kitchener City Council consists of a mayor and ten councillors, each representing a ward.

The Township of Wellesley encompasses 277.79 square kilometers (107.26 sq mi) and is home to 10,713 people. It is a rural township located in the northwest portion of the Regional Municipality of Waterloo, Ontario. The township is represented by a mayor and four councillors, each representing a ward.

The Township of Wilmot encompasses 269.72 square kilometers (101.82 sq mi) and is home to 19,223 people. It is a rural township located in the western portion of the Regional Municipality of Waterloo, Ontario. The township is represented by a mayor and five councillors, each representing a ward.

The Township of Woolwich encompasses 326.17 square kilometers (125.93 sq mi) and is home to 23,145 people. It is a rural township located in the northwest portion of the Regional Municipality of Waterloo, Ontario. The township is represented by a mayor and four councillors, each representing a ward.

³ Ibid
The Kitchener Fire Department Communications Centre dispatches for five fire departments, the Cities of Kitchener and Waterloo and the Townships of Wellesley, Wilmot and Woolwich. Kitchener and Waterloo are career departments while Wellesley, Wilmot and Woolwich are volunteer agencies but all have paid fire chiefs. The dispatched fire departments operate out of a total of twenty-three fire stations.

<table>
<thead>
<tr>
<th>Agencies Dispatched by Kitchener Fire</th>
<th>Stations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kitchener Fire Department</td>
<td>7</td>
</tr>
<tr>
<td>Waterloo Fire Department</td>
<td>4</td>
</tr>
<tr>
<td>Wellesley Fire Department</td>
<td>3</td>
</tr>
<tr>
<td>Wilmot Fire Department</td>
<td>3</td>
</tr>
<tr>
<td>Woolwich Fire Department</td>
<td>6</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>23</strong></td>
</tr>
</tbody>
</table>

Ambulance service in the Cities of Kitchener and Waterloo and the Townships of Wellesley, Wilmot and Woolwich are the responsibility of the Emergency Medical Services (EMS) division of Waterloo Public Health Department. All ambulances are dispatched by the Cambridge Central Ambulance Communications Centre; however, on events with a tiered response the fire departments are dispatched to assist the ambulance as first responders. There is an EMS-TIF, which is a CAD-to-CAD interface that allows the automatic transfer of EMS calls to the Kitchener CAD system when a fire department response is required.

### 4.3.2 Organizational Structure

The communications centre is operated under the administration and oversight of the City of Kitchener Fire Department. There are two Communication Officers that supervise the communications centre. Both Communications Officers work an 11 hour day (07:00 to 18:00) rotating schedule with four days on and four days off.

The PSAP is configured for a single operational model in that they operate within a combined call taker/dispatcher scenario. The authorized staffing for communications is ten full-time telecommunicators and four part-time telecommunicators, but currently there is only one part-time employee. The employees work a rotating schedule that consists of two ten hour days (08:00 to 18:00), two fourteen hour nights (18:00 to 08:00) and four days off. The part-time employee covers paid time off such as vacation, sick leave and training. A Communications Officer is only permitted to fill in for a telecommunicator when no other telecommunicators are available to fill the shift.

Minimum staffing for the PSAP is two per shift.

All full time employees are union members. The communications officers and telecommunicators are civilian members of the Kitchener Professional Fire Fighters Association.
4.3.3 Workload

There are a total of three physical work positions installed in the communications centre. Each of the positions has the required technology needed for call taking and dispatch functions. This equipment includes 9-1-1 answering position, CAD and a radio dispatch console.

Call volume is broken down into 9-1-1 calls and non-emergency calls or those received on 10-digit lines. Calls received on 10-digit lines may be of an administrative nature and may or may not require a field response. The following table summarizes the recorded telephone volume for 2012.

![Table 15 – Kitchener Fire PSAP Call Summary](image)

<table>
<thead>
<tr>
<th>Call Type</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>9-1-1 (Transferred)</td>
<td>4,050</td>
</tr>
<tr>
<td>Non-Emergency</td>
<td>45,952</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>52,014</strong></td>
</tr>
</tbody>
</table>

The PSAP calls back all 9-1-1 hang-up calls based on the ANI/ALI information that drops into CAD.

Radio traffic is generated by the dispatcher assigning calls for service as well as from the field as personnel supply status updates and make requests for support services from the dispatcher. The recorded event volume from CAD system statistics for the previous three years is as follows:

![Table 16 – Kitchener CAD Events Summary](image)

<table>
<thead>
<tr>
<th>Kitchener Fire Communications</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>15,839</td>
<td>15,908</td>
<td>16,670</td>
<td>16,139</td>
</tr>
</tbody>
</table>

All EMS calls are transferred to the Cambridge Central Ambulance Communications Centre by the primary PSAP, Waterloo Regional Police. Fire resources are dispatched to EMS events based on a mutually agreed upon tiered response criteria. If the Cambridge CACC processes an event that requires fire resources as first responders there is an EMS-TIF, which is a CAD-to-CAD interface that allows the automatic transfer of EMS calls in the CACC CAD system to transfer and dump in the pending call window of the Kitchener CAD system.

Waterloo Regional Police provides all TDD communications with callers for the secondary PSAPs.

There is an automated attendant on the primary non-emergency administrative phone system and the communications centre is the default answering point for that system.
Kitchener Fire Communications Centre uses MasterMind alarm monitoring software in conjunction with the City of Kitchener’s Direct Detect fire alarm program. The Direct Detect program can provide the installation or rental of alarm monitoring equipment for any business or residence located in the Cities of Kitchener and Waterloo or Townships of Wilmot, Woolwich or Wellesley. Direct Connect can also integrate with existing alarm equipment and provide 24/7 monitoring service provided by the Kitchener Fire Communications Centre. The system is capable of monitoring dialer, dedicated point to point circuit, IP and commercial wireless radio type connectivity. There is no CAD interface to the MasterMind monitoring software.

The communications staff monitors the MasterMind alarm monitoring software for the Direct Detect system. The alarms are displayed on a dedicated workstation/screen at the dispatch positions. Upon receiving an incoming alarm the information is manually entered by a telecommunicator as a CAD event who then dispatches the appropriate fire resources. In addition to monitoring the alarms, staff also provide trouble shooting assistance to customers and technicians, place systems in and out of service being tested and make any alarm related phone calls to emergency contacts on file for the accounts.

In addition to call taking and dispatching the Kitchener PSAP staff is responsible for the following tasks and projects:
- Direct Detect Alarm Monitoring
- Lock Box Information and Updates
- Responsible Person Information and Updates
- Tactical Surveys
- Resource Book Updates
- Portable batteries including inventory, upkeep, repair and budgeting

4.3.4 Call Flow

All 9-1-1 calls in the Region of Waterloo are routed to the primary PSAP, Waterloo Regional Police Services. If the nature of the emergency is for fire, and the location is in the first due area for the Kitchener Fire Communications Centre, then the call is transferred to them by the Waterloo Regional Police. The Regional Police stay on the line and monitor the call to determine if their agency will need to respond to the event.

The call taker/dispatcher in Kitchener Fire Communications answers the incoming 9-1-1 call, processes the call information in their CAD system and then dispatches the event to the appropriate fire resources. The CAD system provides unit recommendations based on the location of the event and nature of call. The dispatcher has the ability to accept the recommendation or over-ride it if there is reason.

A CAD unit is created for any event that requires the response of a fire resource. Some fire departments also get a CAD event created for other events such as training and inspections. Mutual aid events require a separate CAD event for each responding agency.

The communications centre has provided third party alarm companies with an unpublished ten-digit phone line to call and report fire alarms. This number automatically rolls over to a second number if an additional call is received. Ring lines from the fire station vestibules, but not from inside the fire station, also ring into the centre on this line. These calls are answered with the same priority as an emergency line.
The Kitchener Fire Communications Centre uses MasterMind alarm monitoring software in conjunction with the City of Kitchener’s Direct Detect alarm monitoring program. The Direct Detect program can provide the installation or rental of alarm monitoring equipment for any business or residence located in the City of Kitchener or Waterloo or Townships of Wilmot, Woolwich or Wellesley. Direct Connect can also integrate with existing alarm equipment and provide 24/7 monitoring service at the Kitchener Fire Communications Centre. The system is capable of monitoring dialer, dedicated point to point, IP and commercial wireless radio type connectivity. There is no CAD interface to the MasterMind monitoring software.

### 4.3.5 Training and Quality Assurance / Quality Control

The training for new hires for the Kitchener Fire PSAP includes five to six weeks of classroom training and an additional three to four weeks of shift training with a mentor.

### 4.3.6 Automated Systems

The PSAP is currently using a CriSys Limited Xpert CAD and Fire software system, release 30A. The system was originally installed in December 1994 and the software was last updated in June 2013. The servers were last replaced in July 2013 and the workstations are replaced every three years. Both the production and back-up servers are installed in the equipment room and failover to the back-up server does require some manual intervention. The Xpert fire software package includes the following modules:

- Call Handling and Dispatch
- Incident Management
- Critical Event Response Management Functions
- Reporting
- Personnel Management
- Equipment Management
- Pre-Incident Planning
- Fire Prevention

The CAD has integrated mapping and updated GIS/mapping data is received from a variety of external sources including GIS departments in the Cities of Kitchener and Waterloo and the Region of Waterloo. Once data is received, it is compared to the existing data so that all additions, deletions or changes can be reviewed. Once this review process is completed a decision can be made if all updates, only selected updates or no updates will be loaded onto the CAD system. Currently GIS/mapping updates are provided by the cities every month and from the region every three months. The primary map layers include address points, street centrelines and hydrants. The following table depicts typical interfaces found within public safety CAD systems and the status of those interfaces at the WRPS PSAP:
Table 17 – Kitchener Fire Communications CAD Interfaces

<table>
<thead>
<tr>
<th>Kitchener Fire Communications CAD Interface Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAD Interfaces</td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>E9-1-1</td>
</tr>
<tr>
<td>Alarm Monitoring</td>
</tr>
<tr>
<td>AVL</td>
</tr>
<tr>
<td>Call Taker/Dispatcher Mapping</td>
</tr>
<tr>
<td>Fire RMS</td>
</tr>
<tr>
<td>Fire Mobile Data</td>
</tr>
<tr>
<td>Radio Tone Encoding</td>
</tr>
<tr>
<td>Fire Station Alerting</td>
</tr>
<tr>
<td>Logging Recorder</td>
</tr>
</tbody>
</table>

Kitchener Fire Communications is using Zetron Model 26 control panels for fire station alerting and Zetron Model 25 tone encoders to alert the volunteer fire stations. The fire station alerting provides an audible alert tone, dispatch announcement and shuts off gas.

The rip and run printer interface connectivity to the Kitchener and Waterloo fire departments is an IP connection while the connectivity to the Township fire departments is via fax.

There are currently no mobile data computers (MDC) on the system, however MDCs are being considered.

The Kitchener Fire Communications Centre participates in the Emergency Medical Services Technology Interoperability (EMS-TIF) project. A Fire Service Advisory Group consisting of members from the Ontario Association of Fire Chiefs, the Ontario Provincial Fire Fighters Association, the Fire Fighters Association of Ontario and the Ontario Fire Marshal’s Office worked with the Ministry of Health and Long Term Care (MOHLTC), Emergency Health Services Branch, to create the EMS-TIF project.

The project provides for a bi-directional CAD-to-CAD interface between Kitchener’s CriSys CAD system and Cambridge CACC’s TriTech CAD system. This interface provides the ability to automatically and simultaneously notify fire services dispatched by the Kitchener Fire Communications Centre of events where fire resources are required on medical calls based on existing tiered response agreements. The software also maintains a link between the EMS incident and the fire incident so that updates can flow back and forth. The connectivity between the systems is a Telus circuit which provides secure connectivity between the two systems.

The project utilizes FATPOT CADFusion data repository software in which each CAD system publishes data to an application programming interface (API). The software then completes the necessary data mapping and applies the appropriate business rules to allow communications between the two disparate CAD systems. The CAD systems can publish data into or subscribe specific data from the data repositories.

This bi-directional CAD-to-CAD connectivity decreases the call handling time for both the CACC and Kitchener Fire Communications. New calls for service are automatically populated in the fire CAD system’s pending call window.
and available for immediate dispatch. This interface alleviates the need for any telephone communications between the two agencies to request and/or coordinate a response. The initial call information is automatically sent and the interface allows updates to be shared between the two systems (e.g. call acknowledgement, if units are responding, units on scene, updates from scene, etc.)

The fire agencies are required to send reporting data to the Ontario Fire Marshal (OFM) office on a quarterly basis. Automatic reports are generated using the CriSys system for the Kitchener and Waterloo fire departments. CAD reports are sent to the township fire departments and they enter the event data into either FireHouse or FirePro FRMS system and they are used to generate the required OFM reports.

Kitchener Fire Communications is using Zetron Model 26 control panels for fire station alerting and Zetron Model 25 transponders in the fire stations. The fire station alerting provides an audible alert tone and the dispatch announcement. Currently there is no CAD interface to the fire station alerting but one is being considered.

Dispatchers have the ability to place hydrants in and out of service in the CAD system.

### 4.3.7 Customer Premise Equipment

A 9-1-1 call generated within the geographical area covered by Kitchener Fire Communications by a subscriber phone is routed through the Bell Canada network and is selectively routed to the Waterloo Regional Police Services, the primary PSAP for the region. If the nature of the emergency is for fire, and the location is in the first due area for the Kitchener Fire Communications Centre, then the call is transferred to them by the Waterloo Regional Police. The Regional Police stay on the line and monitor the call to determine if their agency will need to respond to the event.

The transfer of 9-1-1 calls to the secondary PSAPs is completed using Bell Canada facilities. The call is transferred to the secondary PSAPs utilizing dedicated trunks and speed dials programmed within the 9-1-1 tandem switches. This allows the transfer of not only the voice of the caller but also the ANI/ALI data.

Incoming calls are received on Avaya 9650 IP desk phones that are installed at all three console positions. The answering equipment allows the display of automatic number identification (ANI); but does not display automatic location identification (ALI). The PSAP does not utilize computer telephony integration (CTI) and depends on a CAD interface to display enhanced 9-1-1 data such as address, location, calling party name and other call data. The same CAD interface displays calls on the integrated mapping with the location for wireline calls, tower location for wireless Phase I calls or the callers location for wireless Phase II calls.

All 9-1-1 back room and answering equipment installed at the PSAP is provided and maintained by Bell Canada. Bell Canada provides 24/7 support and maintenance for all 9-1-1 answering equipment. The telephone CPE back room equipment consists of an Avaya IP PBX software and hardware.

There are five 9-1-1 trunks installed from the Bell Canada selective routers into the PSAP. The PSAP is served by a primary selective router and a secondary selective router. Bell Canada provides ALI service to the PSAP through redundant centralized ALI databases located in Toronto. This network provides redundancy should problems occur and flexibility for future enhancements.

The communications centre is using a variety of wired headsets.
The PSAP has a ComLog NP forty channel logging recorder that is being used to record both telephone positions and radio traffic. Currently 32 of the 40 channels are in use and one of the recorders running in parallel with the other can be expanded. The recorder was installed in March 2006 and was last updated in November 2011. There are a number of remote client applications installed throughout Kitchener Fire Headquarters. The ComLog recorder is also being used for both telephone and radio instant recall recording (IRR).

The communications centre does not use a master clock for synchronized timing of the communications equipment.

### 4.3.8 Budget

The following table summarizes the current Kitchener Fire PSAP budget:

<table>
<thead>
<tr>
<th>Expense Category</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network Costs</td>
<td>$0</td>
</tr>
<tr>
<td>Equipment Costs</td>
<td>$2,400</td>
</tr>
<tr>
<td>CAD Costs</td>
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</tr>
<tr>
<td>Radio Costs</td>
<td>$24,500</td>
</tr>
<tr>
<td>Office Expenses</td>
<td>$11,500</td>
</tr>
<tr>
<td>Personnel Expenses</td>
<td>$1,299,268</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>$1,462,668</strong></td>
</tr>
</tbody>
</table>

### 4.4 Regional Radio System

Kimball was tasked with providing an overview of the existing radio system, identifying the options available to improve and enhance the system and assessing it from a PSAP consolidation perspective. Kimball conducted a field visit at WPRS with Support Services Inspector Mark Bullock and Region of Waterloo Voice Radio Systems Supervisor Marcel Pare. The following topics were discussed:

- System performance
- Geographic coverage
- Capacity
- Interoperability capabilities
- End-of-life issues
- Feature deficiencies of the existing system
### 4.4.1 Radio System Overview

The Region is currently using a trunked 800 MHz simulcast enhanced digital access communications system (EDACS). EDACS was developed in the late 1980’s as a response to the APCO 16 standard which created basic performance standards. Later, it was developed into a proprietary standard controlled by General Electric, M/A-Com and is now currently controlled by Harris Corporation.

The original system was installed in the early 1990’s and is now well over 20 years old. In 2009, the Region performed limited upgrades to the trunked radio infrastructure to improve portable in-building radio coverage and increase user and voice capacity. GPS-based frequency and simulcast control were also added for more reliable coverage. These upgrades also reduced the need to keep the various radio sites within the system in the proper technology phase.

The EDACS voice radio backbone system provides functionality for the existing primary user groups of law enforcement and fire departments. In addition, the system supports several other affiliated departments such as public transportation, animal control, highway, water and public works. The PSAPs use MA/COM Maestro C3 radio consoles, installed in the mid-1990s. The Region currently supports approximately 2,000 mobile and 1,000 portable radio subscriber users.

### 4.4.2 Infrastructure

Originally designed with six trunked radio sites the system has since been upgraded and expanded to a total of seven sites geographically located throughout the Region. One of the sites is the regional police headquarters on Maple Grove Road and one receive only site has been added to the system and is located in Ayr.

Current Waterloo Region voice radio sites include:

- Cambridge, 39 Dalkeith Drive, Cambridge
- Conestoga, 1448 Jerusalem Road, Waterloo
- Crosshill, 2574 Hackbart Road, St. Clements
- Baden, 1209 Snyders Road, Baden
- 81 Church, 81 Church Street, Kitchener
- Maple Grove, 230 Maple Grove, Cambridge
- Ayr, 501 Scott Street, Ayr (Receiver Site)

The current EDACS backbone now uses up to 25 channel pairs in the 800 MHz band. Exact channel distribution is based on specific geographical location demands for radio traffic. This is to allow the highest number of conversations on the system without the user getting a busy channel indication.

The Region currently is currently satisfied with their area wide mobile data system utilizing broadband cellular “air cards” which is utilized by law enforcement agencies. Vehicles, have been configured with data modems and computer terminals, and are able to provide advanced query capabilities.

The existing radio system EDACS trunked simulcast voice radio systems has enjoyed a high degree of reliability and has experienced few problems since the most recent upgrade, however some minor issues and coverage problems still exist.
4.4.3 Fire Station Alerting and Paging

Cambridge Fire Communications utilizes a Zetron model 6/26 fire station alerting system for the Cambridge Fire Department. When a station is alerted an audible tone is sounded and the dispatch announcement is then transmitted over the station’s public address system.

Kitchener Fire Communications is using a Zetron model 26 fire station alerting system for the Kitchener and Waterloo Fire Departments. When a station is alerted an audible tone is sounded, the dispatch announcement is transmitted over the station’s public address system and gas service is automatically shut off.

Tone and voice is used as the primary method for paging and alerting the volunteer fire personnel dispatched by Cambridge and Kitchener fire communication centres. Kitchener is using a Zetron model 25 radio tone encoder to page out their volunteers. Firefighter personnel also use their pagers to monitor the fire dispatch channel. The use of pagers to monitor the fire channel reduces the need to equip the volunteer personnel with two-way radios. Voice paging of volunteer personnel cannot be completed using trunked radio architecture. This type of dispatch notification must remain on the existing conventional radio channel.

4.4.4 Emergency Medical Services Radio

Emergency medical services calls within the Region are transferred to the Cambridge CACC. The CACC and Waterloo Regional EMS use the Bell Mobility Provincial Fleet NET system for dispatch and normal day-to-day radio communications. The system consists of a Motorola Smart Zone Type II system licensed and operating in the VHF radio spectrum. Waterloo Regional EMS units do have some capabilities to operate on the Region’s EDACS system, but that is not a common practice.

4.4.5 Coverage

During the interview process, the radio service coverage footprint was described as being limited to the geographical area comprising the Region. Some coverage problems persist for users inside critical buildings with hardened construction and geographically shielded areas. Overall, the user agencies rely on coverage through the use of simulcast technology and voting receivers. All agencies within the Region have indicated that the current radio system meets the coverage needs for the majority of their users; however, there are some coverage holes within the system.

In the WRPS PSAP, the South Division dispatch channel was described as being a problem area because it is overloaded. This condition is because there are too many units operating on that channel and the issue was recently enhanced when the Rural Division and Cambridge City By-Law were added to this position.

Although not specifically identified in the original system performance requirements, in-building coverage has been identified as extremely important for the user agencies during their normal day to day operations. In-building radio coverage is especially important for the public safety first responder community when conducting their daily operations.
Providing adequate coverage requires a thoroughly engineered and robustly constructed infrastructure. The Region of Waterloo contains both urban and rural terrain. This varied topography results in continuous challenges in attempting to meet coverage requirements imposed by public safety users for whom in-building penetration is a necessity.

4.4.6 End-of-Life Concerns

The greatest obstacle to maintaining the Region’s current radio infrastructure is that the system is at “published equipment end-of-life.” This means that the system vendor, Harris, has publicly announced an end date for support for this type of equipment. Harris also intends to eliminate all EDACS service support. The risk in continuing to operate on this system will increase as each subsequent year passes. Replacement parts for the system, along with resources who have a good working knowledge and familiar with such a system, will become harder and harder to find.

Although the Region's radio system department continues to do an excellent job in creatively supporting the system to a very high level, this end of life equipment issue will put increasing demands on their services and ultimately will make long term system sustainability virtually impossible.

In late 2010, Harris announced the planned end of life support for the following Region of Waterloo equipment and support services:

- **Network Equipment:**
  - EDACS Mastr III
  - EDACS Simulcast
  - EDACS Site Equipment
  - Last Equipment Order Date 12/2011
- **Subscribers / Terminal Equipment:**
  - EDACS XG75
  - EDACS P/M 7300
  - No Spares after 2017
- **Service Support**
  - Harris has indicated it will continue to provide EDACS software support only through 2014 on the heels of the most recent upgrade.

All existing transmitters, receivers, voting selectors and controllers would need to be replaced. It may be possible to realize some cost savings with the use of some of the existing antennas, transmission lines, antenna combiners, multi-couplers, GPS units and backup power systems. However, it would ultimately be up to the successful radio vendor to credit and incorporate as much of the legacy hardware as possible. They will ultimately be required to guarantee total radio coverage performance and quality of service criteria.
4.4.7 APCO Project 25

Recognizing the need for common standards for first responders and response professionals, representatives from the Association of Public Safety Communications Officials International (APCO), established Project 25 (P25), a steering committee for selecting voluntary common system standards for digital public safety radio communications.

P25 provides backwards compatibility and interoperability among varied manufacturer systems, as they are based on a standard protocol. Radios capable of P25 digital common air interface (CAI) radio transmissions are also capable of standard analog transmissions. P25 9600 baud trunked systems are interoperable between and among trunked 9600 baud P25 systems. The digital advantage is best understood when using simulcast technology on narrowband frequencies, and also provides many user capabilities, such as user identification and encryption.

The Region of Waterloo has recognized deficiencies in its aging radio communications system. These deficiencies include system end of life, coverage, capacity, inoperability, features and reliability. In addition, the Region desires to build a communications system that will provide state-of-the-art communications for emergency services and to prepare for anticipated changes that will impact their systems.

Like all local governments throughout Canada, the Region has recognized the importance of providing interoperable communications for emergency responders. These interoperable communications are the only way to ensure effective responses to critical incidents, disasters and planned events requiring coordination among the emergency services. Planning and establishing a preliminary design for a new communications system will properly position the Region well into the future.

4.4.7.1 Migration to APCO P25 Phase 1 Digital Standard

The current APCO P25 standard that was envisioned by the public safety radio communications community in 1989, with major elements tested and approved in 1995, is a user-based voluntary interoperable suite of standards based on the defined requirements of participating agencies.

Multi-casualty events in the past, including the terrorist attack in the United States on September 11, 2001, have highlighted the current challenges faced by incident command everywhere to align equipment and human resources during major disasters. An increased demand on public safety services that operate on inefficient legacy radio systems with channels that continue to be increasingly more congested has forced public safety users to constantly do more with fewer resources.

As a consequence, P25 Phase 1 has become the widely accepted standard for all Federal, Province (State) and local municipality public safety land mobile radio systems that is able to satisfy the users need for an interoperable radio solution that is scalable from smallest to largest systems.

Major needs identified and satisfied during the Phase 1 standardization process include:

- High quality clear audio
- Assured interoperability with mutual aid partners
- Constraint only by available spectrum: it allows tens of thousands of talk groups with nearly unlimited individual user capacity
- Intra-agency and inter-agency interoperability within in the same municipalities
- Increased efficiency, loading and high Quality of Service on available spectrum
- Enables roaming between systems
- Easily encrypted with multiple protocols
- Allows for data services such as GPS, text messaging, user id and over the air programming
- Numerous methods of connectivity to user radios, consoles, local and wide area networks including a unit to unit “direct” feature useful for in-building or on site tactical communications
- Architecture allows for full network control from a single assigned control point
- Future Phase 2 upgrades will allow for doubling subscriber capacity

In addition, one of the most important aspects of P25 is the concept of standardization itself. The public safety user community, with few exceptions, has long complained it has been held captive by individual manufacturers’ proprietary architecture and signaling formats. Building a new P25 system allows the agency to break up the vendor procurement process into its various elements. This eliminates the need to purchase the backbone or subscriber equipment from a single source, allowing choices to be made and hopefully providing the agencies with potential cost benefits.

Giving choices to the Region always promotes competition from the vendors. This competition would allow user agencies to make cost-effective choices for low, mid and high tier subscriber equipment based on current and future needs. These choices would be available to various municipal services and would afford previously unachievable economies before, during and after deployment of the new system.

### 4.4.7.2 P25 System Neighbors

Agencies surrounding the Region include the Ontario Provincial Police and Guelph Police Service who currently operate on the Bell Mobility FleetNet system, Stratford Police Services who is operating on a conventional VHF system and Brantford Police Services who is operating on a P25 trunked radio system. Upgrading to the P25 standard will allow communications between the Region and the adjacent municipalities already using the P25 protocol. This interoperable communications will allow for effective incident operations and command during incidents that require mutual aid assistance.

### 4.4.8 Voice Radio Systems Recommendations

It should be pointed out at the outset of this discussion that making recommendations for the development of any new radio system for a region, county or city involves some very complex considerations.

There is no one answer to all of the users’ needs and desires when taking into consideration all of the constraints imposed by technological limitations, the physical environment, tower sites and regulatory requirements. Each possible course of action involves tradeoffs in the cost-benefit equation as well as risks associated with uncertain future political and technological developments.

In making the following recommendations, Kimball has taken into consideration the Region’s desire to develop a maintainable and truly interoperable P25 Phase I communications system. Kimball has also assumed that the Region desires to provide a communications system that will meet future capacity needs for voice radio communications with a potential to grow the system by upgrading to Phase II.
It is also clear that all of the current users need and desire voice communications interoperability. This is a top priority for emergency communications systems and any solution proposed for the Region should include interoperability as a priority.

All existing transmitters, receivers, voting selectors and controllers would need to be replaced. It may be possible to realize some cost savings with the use of some of the existing antennas, transmission lines, antenna combiners, multi-couplers, GPS units and backup power systems. However, it would ultimately be up to the successful radio vendor to credit and incorporate as much of the legacy hardware as possible. They will ultimately be required to guarantee total radio coverage performance and quality of service criteria.

It is easy to conclude from the challenges posed, based on end of life support and maintenance, ability to expand the system and need for interoperability, that the best solution for meeting the Region’s current and future need for two-way voice communications is to build a new P25 Phase I simulcast digital voted trunked radio system. Any new subscriber and backbone infrastructure should be capable of Phase II 2 slot TDMA without any heavy forklift upgrade accomplished through software upgrades only.

4.4.9 Consolidation Recommendations for Radio

All of the PSAPs participating in the consolidation project are currently utilizing the region’s Harris EDACS radio system. Any consolidation of the police and fire disciplines would not change the existing radio system coverage footprint. The decision to participate in the consolidation centre would not have any impact on the user’s current radio system coverage.

All of the PSAPs are currently using Harris Maestro C3 EDACS radio console equipment for dispatch operations. These radio consoles could easily be integrated into the new consolidated centre facility with no major technical challenges. User agencies can continue to use their existing proprietary Harris EDACS portable and mobile radio equipment, which would provide communications continuity during the migration to the consolidated environment.

The consolidated centre would be required to maintain the fire agency’s station alerting and radio tone encoding functionality. If possible, the fire station alerting and radio tone encoding should be interfaced with the consolidated centre’s CAD system.

To increase radio interoperability within the Region, existing discipline talk groups could be programmed into radios or additional interoperability talk groups could be added. Agencies working the same multi-discipline event should have the capability to talk to each other, especially for significant events. During the planning of the consolidated centre, consideration should be given to further enhancing this cross discipline communication functionality.

The Region acknowledges that the current EDACS-based infrastructure, along with associated consoles and subscriber units, has become completely outdated. The availability of replacement parts is currently limited and as time goes on they will become even more difficult to find and most likely will only be found in the used marketplace.

It is evident that the Region will need to build a new P25 Phase I simulcast digital voted trunked radio system in the upcoming future. Migrating to the new system would have a significant impact on the consolidated centre. The
consolidated centre will need to participate in any discussions for the new system and provide input. Considerations for the consolidated centre would be for existing and future system capacity requirements, quality of service, connectivity to other agencies for interoperability and providing public safety grade communications with no single point of failure. The future addition of EMS on the radio system and in the consolidated centre should be considered during the planning process.

4.5 Emergency Medical Services

The Emergency Health Services (EHS) branch of the Ministry of Health and Long Term Care (MOHLTC) is responsible to oversee all land and air emergency medical services within the province. The proper provision of land ambulances is the responsibility of local municipalities, and in this case, provided for by the Region of Waterloo Emergency Medical Services.

Waterloo EMS employs approximately 190 primary/advanced care paramedics and support staff. It operates a fleet of approximately 27 vehicles including 19 ambulances, and operates out of nine stations located within Kitchener, Waterloo, Cambridge, St. Jacobs and Baden. Waterloo EMS is partnered with, and is dispatched by, the Cambridge Central Ambulance Communications Centre.

The EHS oversees a series of interrelated land and air emergency medical services and programs designed to provide a timely response to emergency medical events and to provide pre-hospital care. This is accomplished by:

- Overseeing air and land ambulance services, as well as the communications centres responsible for dispatching those ambulance services
- Managing and regulating the land ambulance services provided by upper tier municipalities and district Social Services Administration Board, as well as providing administrative, operational, and technical support of ambulance services
- Establishing standards for the management, operation, and use of ambulance services and ensuring compliance with those standards
- Maintaining close working relationships with the following:
  - Municipalities and designated delivery agents responsible for the proper provision of land ambulance services
  - Health care providers and facilities
  - Ambulance communications centres
  - Other ministries and system stakeholders
- Monitoring, inspecting and evaluating ambulance services and investigating complaints regarding ambulance service delivery.

The Ministry does provide financial assistance to local municipalities through various grants that can be used for providing land ambulance service.

There are 11 CACCs directly operated by MOLHTC throughout the province. There are an additional five CACCs that are operated by local hospitals: three that are operated by municipalities and three locally-based ambulance communication services that dispatch specific ambulance services.
The entire Waterloo Region is serviced by the Cambridge CACC. This CACC also provides medical dispatch services to portions of Dufferin County, Oxford County and Wellington County. 9-1-1 calls that require a medical response are transferred to the Cambridge CACC by the region’s primary PSAP, Waterloo Regional Police. The CACC prioritizes the request, dispatches the closest available ambulance, determines the appropriate destination hospital and provides the caller with pre-arrival first aid instructions. The CACC coordinates the movement of all ambulances and emergency response vehicles within their primary response area ensure the best response by the closest unit.

The CACC utilizes TriTech computer aided dispatch (CAD) software that includes automatic vehicle location (AVL) using GPS. This technology assists the EMS dispatcher to determine and assign the closest available and most location appropriate ambulance to each event.

All of the CACCs utilize the same CAD software, TriTech VisiCAD, and each has their own independent server. However, on a daily basis, the local servers do upload their data to a central data warehouse that contains both summary and detailed information for ambulance service responses with the province.

4.5.1 Tiered Response Agreements

Within the Waterloo Region, emergency response to incidents requiring medical aid by the local fire department and regional police are included within a Tiered Response Agreement between the ambulance service and the local department. These agreements define the levels of service (event types) that a fire or police department will respond to within the provision of emergency ambulance responses. The agencies are tiered by the CACC on behalf of Waterloo Emergency Medical Services.

A tiered medical response is the provision of treatment to citizens by first responders (fire/police), including first aid, CPR, defibrillation and other elementary procedures for which the responders are trained and equipped, prior to arrival, or in conjunction with paramedic services, for the possible transfer to a hospital.

The CACC does not tier local agencies to nursing homes, medical clinics or facilities or retirement homes where there is a medical doctor (MD), registered nurse (RN) or registered practical nurse (RPN) on scene with access to oxygen. However, all calls reporting an absence of vital signs will be tiered regardless if there is a MD, RN or RPN on scene with access to oxygen.

Fire or police emergencies take precedence over requests for tiered response, but the agencies will respond to the identified criteria if they are not already engaged in another event.

The CACC will tier calls, via the EMS-TIF, for the fire departments dispatched by Kitchener Fire Department Communications, if applicable. The CACC must telephone both the Waterloo Regional Police and the Cambridge Fire Communications Centre. This tiered response ensures that the quickest assistance and aid is provided within the Region to assist medical call victims under the current environment.
4.5.2 EMS – TIF (CAD-to-CAD)

The EMS-TIF project provides a centralized interface platform between the ambulance TriTech CAD system and participating municipal fire communication centre CAD systems. Created by A Fire Service Advisory Group consisting of members from the Ontario Association of Fire Chiefs, the Ontario Provincial Fire Fighters Association, the Fire Fighters Association of Ontario and the Ontario Fire Marshal’s Office worked with the MOHLTC, Emergency Health Services (EHS) Branch.

The project provides for a bi-directional CAD-to-CAD interface between Kitchener Fire’s CriSys CAD system and the Cambridge CACC’s TriTech CAD system. This interface provides the ability to automatically and simultaneously notify fire services dispatched by the Kitchener Fire Communications Centre of events where fire resources are required on medical calls based on existing tiered response agreements. The software also maintains a link between the EMS incident and the fire incident so that updates can flow back and forth. The connectivity between the systems is a Telus circuit which provides secure connectivity between the two systems.

The project utilizes a FATPOT Technologies product, CADFusion data repository software, in which each CAD system publishes data to an application programming interface (API). The software then completes the necessary data mapping and applies the appropriate business rules to allow communications between the two disparate CAD systems. The CAD systems can publish data into or subscribe specific data from the data repositories.

This bi-directional CAD-to-CAD connectivity decreases the call handling time for both the CACC and Kitchener Fire Communications. New calls for service are automatically populated in the fire CAD system’s pending call window and available for immediate dispatch. This interface alleviates the need for any telephone communications between the two agencies to request and/or coordinate a response. The initial call information is automatically sent and the interface allows updates to be shared between the two systems (e.g. call acknowledgement, if units are responding, units on scene, updates from scene, etc.)

4.5.3 Emergency Medical Services Summary

As the third branch of field response agencies, along with police and fire, the absence of the Ministry of Health EMS Dispatch in a consolidation feasibility study and/or in an actual consolidated PSAP is significant. Without the participation of the Ministry of Health EMS Dispatch, the most effective and efficient system for handling emergencies cannot be fully developed. Under the existing tiered call environment, calls must be transferred at least once, if not twice before police, fire and the Ministry of Health EMS Dispatch has the necessary information needed for an appropriate response. Utilization of TIF has mitigated the delay that is inherently present anytime calls are transferred. However, TIF alone does not resolve the entire call transfer/EMS issue. This is especially true for Cambridge Fire which does not have TIF in place. The following issues prevent the call handling and dispatch of police, fire and EMS personnel from being as efficient as possible:

- When 9-1-1 calls must be transferred, the call handling process is lengthened by the time it takes for WRPS to conduct an initial interview, transfer the call to CACC and the re-interview of the caller by the CACC employee. Again, Kitchener Fire benefits from TIF technology, Cambridge Fire does not.

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4 FATPOT Technologies, LLC was acquired in 2011 and is now a Communications International (CI) company.
If an incident is police related, but requires an ambulance, the WRPS call taker must stay on the phone with CACC to be sure all information needed to ensure a safe police response is gathered. This process ties up two employees, one WRPS call taker and one CACC employee, for the duration of the call.

According to information provided to Kimball, CACC may transfer a call to the appropriate fire department if necessary or it may take incident information from the caller and then call the fire department by phone. Either of these scenarios is less than optimal.

4.5.4 Emergency Medical Services Recommendations

Although the Region, including WREMS has been a partner in this initiative in the past, WREMS has not been able to actively participate in the Work Group during this study. Kimball recommends that WREMS participate as actively as possible as the planning process moves forward.

Both the Ministry of Health EMS Dispatch and the Cambridge CACC should be encouraged to participate in current consolidation meetings and discussions, although not as voting participants. Participation in discussions will ensure that they are aware of the current status of the project and can offer suggestions on the best methodology for interaction between the agencies and any consolidated PSAP created in the future.

Maximum efficiencies in the Region’s emergency communications services can only be achieved if law enforcement, fire and the Ministry of Health EMS Dispatch participate. Discussions with the Ministry of Health should be initiated to see what options may be available for EMS in terms of consolidation with police and fire. Two options that could be considered are:

1. Co-locating the CACC dispatchers in the same PSAP with police and fire. Calls requiring an EMS response would be processed by the same call takers currently handling police and fire. This would eliminate call transfer and speed the call processing and dispatch times for EMS calls. The dispatchers for EMS field units would be located on the operations floor in close proximity with police and fire dispatchers which will improve overall situational awareness for all. However, the employees would remain CACC employees.

2. Establishing a pilot program where the Ministry of Health EMS Dispatch becomes part of the regional center. The need for consolidation of 9-1-1 and dispatch services is becomingly increasingly apparent for improvement of service levels and cost efficiency. Moving the Ministry of Health EMS Dispatch to a regional PSAP is a natural fit and would be a good opportunity for a pilot program. The purpose of the program would be to determine if service levels improve and if the program is cost efficient.

4.6 Interest in Consolidation / Stakeholder Input

To determine the level of stakeholder interest in a PSAP consolidation, Kimball spoke to various decision makers and stakeholders including:

- Township and City Mayors
- WRPS, Kitchener and Cambridge Fire Department Personnel (On-duty)
- WRPS, Kitchener and Cambridge PSAP Personnel (On-duty)
- Labor union representatives for each PSAP

To be successful, a consolidation of PSAPs must have support politically. Without exception, the Mayors of Wellesley Township and the Cities of Waterloo, Cambridge and Kitchener expressed a willingness to examine a
potential consolidation, in concept, if it would be beneficial to public safety in their respective municipalities. However, understandably, before any commitment can be made more details would be needed. Specifically, the cost savings or increases must be determined, governance agreed upon and specific details on what public safety improvements could be expected from a consolidation effort.

The labor unions also expressed a mix of opinions that ranged from strong opposition to being willing to look at the issue once more details were available. None of the unions were in favor of consolidation at the time of this meeting. During this meeting, Kimball explained there was a limited amount of information that could be shared given that the study was still in the data collection process, but shared typical consolidation scenarios and options.

4.7 Operational Observations

This section contains Kimball's observations regarding operational issues that would be improved through consolidation.

4.7.1 Situational Awareness

Situation awareness is one of the key benefits of consolidation. Situational awareness in the PSAP can best be defined as having the following components:

- Awareness of public safety activity regionally rather than a view that is limited to a single jurisdiction or type of service such as police, fire and EMS.
- The ability to connect seemingly unconnected information by reducing the number of PSAPs or filters that the information must go through.
- The ability to make well informed decisions based on information received first hand from incident commanders or command officers.

The presence of multiple PSAPs, especially when the disciplines (police, fire and EMS) are separated can cause delayed responses, poor decision making and an increase in miscommunications and/or human error. Much like the “telephone game” of years’ past, during major incidents the more hands information must pass through the more distorted it becomes and the longer it takes to achieve the correct incident response. Critical information regarding incident location, injuries, and information relevant to scene and responder safety takes longer to be disseminated to each PSAP and may or may not be conveyed accurately. The most efficient method of managing a major incident is from a single point of control, the PSAP. Scene commanders are able to communicate updates and requests to a single point of contact. The PSAP maintains the larger picture and is able to meet the requests, anticipate future needs and line up resources and recognize the need to move available resources to other parts of the region for coverage purposes. A key example of this is the November 2011 helicopter crash at the Waterloo Region Airport. The response would have been improved with the level of situational awareness a consolidated centre would provide.

On a smaller, but no less important scale, situational awareness is critical in the everyday functioning of a PSAP. Examples of the daily benefits of situational awareness in a consolidated PSAP include:

- Coordination of multi-jurisdictional vehicle pursuits is instantaneous when the dispatchers are in close proximity and can hear the incident in real time.
Dissemination of key information to field responders is almost instantaneous and can facilitate apprehension of suspects. A real life example includes the quick apprehension of a bank robbery suspect because two dispatchers working side by side were able to immediately re-transmit suspect vehicle information to adjacent jurisdictions. A patrol unit in the adjacent jurisdiction was behind the suspect vehicle at the time of the broadcast.

Use of AVL technology within a single regional PSAP can graphically show the field response to an incident therefore resources can be managed more effectively.

The ability of call takers and dispatchers to see and hear regional activity, understand how it may impact the areas for which they are responsible and quickly take action.

In summary, the situational awareness benefit of consolidation is one that is often discounted in its importance when, in fact, it is critical to establishing the most efficient emergency communications system possible for community and the agencies a PSAP serves.

4.7.2 Other Observations

During the PSAP visits and observations Kimball made several observations of note. These include:

- Although the system of transferring fire calls to the fire PSAPs and EMS calls to the CACC does result in the desired field response(s), anytime a call is transferred there is a delay in processing that call. EMS-TIF does help reduce this delay, but the process of tiering calls inherently includes more processing time.

- Multiple PSAPs also present multiple opportunities for human error which can also impact responses. This is not a criticism of the PSAP employees, but an acknowledgement that human error occurs no matter how much training done, how well an employee does his or her job or how much care is given. The more hands that touch a call, the more opportunity for human error to occur.

- Transferred calls tie up more staff, reducing efficiencies within the PSAP. For example, when WRPS transfers a call to the CACC and remains on the phone during the CACC interview, two employees are tied up, one from WRPS and one from the CACC.

- Police and fire PSAP staff would benefit from an increased knowledge of each other’s environment. Police and fire call taking and dispatching are apples and oranges by comparison. Similar in many ways, but also different in a number of key aspects. Understanding the needs of both services would foster a high level of cooperation and improve information sharing.

- The current call taking standard for WRPS includes an average talk time of 120 seconds and 120 seconds of wrap up time (the time needed to finish the CAD entry and prepare for the next call) for a total of 240 seconds. This total time is higher than what is typically seen in PSAPs. More commonly found is an average talk time of 90 – 120 seconds and an additional 30 seconds of wrap up time. Kimball did not conduct an in-depth analysis of all potential reasons for the WRPS times to be higher, but the project team did observe the following:
  - WRPS call takers reported they will often stay on the phone with a caller after the CACC interview is over. There are times when staying on the line with the caller is absolutely appropriate. However, it was reported to Kimball that call takers will do so, for example, to calm down a caller even if the nature of the situation does not require staying on the phone for caller or field personnel safety reasons. While calming citizens is admirable, it is typically outside the realm of 9-1-1 call taker responsibilities. Ultimately, this is a service level decision that needs to be made by WRPS command staff.
Call takers will question callers extensively to obtain background information on the participants of the incident being reported. This information is used to research prior arrests, outstanding warrants and other contact with police. This process is time consuming and may not be necessary. *Kimball is not in any way suggesting that officer safety be compromised for the sake of lower call processing times.* What is being suggested is that such research may be redundant to what officers will need to do in the field after the immediate situation has been brought under control. A more in-depth examination is needed, in conjunction with WRPS policies for officers in the field, to determine what is needed, outside the circumstances of the immediate situation, and what is not.

Lower call processing times will help manage personnel costs. Although it is important to note that a PSAP is not a standard commercial call centre where the lowest possible call times are desired. There is a balance needed between the time it takes to gather the information necessary for safe field responses and what may be excessive gathering of background information.

Increased use of mobile data may help reduce the call processing times. This is especially true with respect to the dispatching of by-law services. Currently, the WRPS PSAP is providing all call taking and dispatching services for municipal by-law agencies. If this practice is to continue it would make operational sense to have the ability to dispatch these services via mobile data. This could reduce PSAP dispatch resources currently dedicated to this function.

### 4.8 Current Environment Summary

This section summarizes budget and call volume information, summarizes the feasibility of a consolidation and provides recommendations.

#### 4.8.1 Budget and Call Volume Summaries

The following tables summarize budgets, staffing numbers and call volume of the participating agencies.

**Table 19 – Current PSAP Budget Summary**

<table>
<thead>
<tr>
<th>Expense Category</th>
<th>Waterloo Regional Police</th>
<th>Cambridge Fire</th>
<th>Kitchener Fire</th>
<th>Subtotals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network Costs</td>
<td>$21,145</td>
<td>$1,190</td>
<td>$0</td>
<td>$22,335</td>
</tr>
<tr>
<td>Equipment Costs</td>
<td>$336,650</td>
<td>$1,100</td>
<td>$2,400</td>
<td>$340,150</td>
</tr>
<tr>
<td>CAD Costs</td>
<td>$136,800</td>
<td>$50,705</td>
<td>$125,000</td>
<td>$312,505</td>
</tr>
<tr>
<td>Radio Costs</td>
<td>$39,900</td>
<td>$0</td>
<td>$24,500</td>
<td>$64,400</td>
</tr>
<tr>
<td>Office Expenses</td>
<td>$19,200</td>
<td>$17,714</td>
<td>$11,500</td>
<td>$48,414</td>
</tr>
<tr>
<td>Personnel Expenses</td>
<td>$7,765,838</td>
<td>$751,000</td>
<td>$1,299,268</td>
<td>$9,816,106</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>$8,319,533</strong></td>
<td><strong>$821,709</strong></td>
<td><strong>$1,462,668</strong></td>
<td><strong>$10,603,910</strong></td>
</tr>
</tbody>
</table>

**Table 20 – PSAP Staffing Summary**
Table 21 – Combined Call Volume Summary

<table>
<thead>
<tr>
<th>Agency</th>
<th>Total 9-1-1 or Emergency Calls</th>
<th>7/10 Digit Calls*</th>
<th>Total Call Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>WRPS</td>
<td>124,949</td>
<td>174,747</td>
<td>299,696</td>
</tr>
<tr>
<td>Cambridge Fire</td>
<td>N/A</td>
<td>25,951</td>
<td>25,951</td>
</tr>
<tr>
<td>Kitchener Fire</td>
<td>N/A</td>
<td>45,952</td>
<td>45,952</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>124,949</strong></td>
<td><strong>246,650</strong></td>
<td><strong>371,599</strong></td>
</tr>
</tbody>
</table>

*Cambridge Fire call volume is estimated. Kitchener Fire also handles calls received via alarm software and TIF which are not reflected in this table.

4.8.2 Consolidation Feasibility

Each of the agencies participating in this study have expressed a desire to provide the best possible public safety services to their communities and have instilled this desire in their PSAP staff. This desire was further supported during Kimball’s conversations with key decision makers from each of the municipalities. Although opinions differed on what the definition of “best possible service” might be, all were committed to providing it. Factors such as the cost of Bell Canada’s In-call location update, the migration to NG9-1-1 and the need for extensive call transfers and multiple PSAPs encourages an examination of a new way to handle emergency communications within the Region.

In Kimball’s opinion, a consolidation of the agencies in the study would be beneficial and recommended, even though maximum benefit cannot be achieved while the Ministry of Health EMS Dispatch remains separate and in its own facility. However, there are some substantial roadblocks to a successful consolidation.

Key benefits that can be achieved without participation by the Ministry of Health EMS Dispatch participation include:

- Improvement in interagency communication / interoperability (situational awareness) that results from having all disciplines in the same room and able to instantaneously communicate critical information. While this benefit cannot be quantified numerically, it is one of the most valuable benefits of consolidation as it helps alleviate miscommunication and reduces human error by reducing the number of people handling information.
- Shortened call times which may translate to quicker responses
- Consistent, region-wide training for PSAP employees
- Career ladder for PSAP employees
Costs such as those associated with Bell Canada’s BID-0013 would be incurred once by the consolidated PSAP rather than three times.

4.8.3 Recommendations

Kimball recommends that the three agencies in this study commit to the next early planning stage. This stage is discussed more fully later in this document, but does not commit any of the agencies to participating in a consolidation. Rather, this phase works out two key issues that must be agreed upon before a consolidation takes place: governance and cost distribution. This phase could also include any other information the municipalities deem necessary for making the decision on whether to consolidate, understanding that costs will vary to some degree depending on the decisions made on personnel, technology and facility needs as the implementation phase moves forward.

Kimball also recommends that conversations with the labor unions continue as soon as it is determined if agreement on governance and cost distribution models can be reached.

Kimball recommends that a full assessment of call handling and dispatch processes be conducted to see if the WRPS total call handling times can be reduced.

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5. CONSOLIDATED PSAP MODELS

5.1 Governance Model Options

One of the key decisions that must be made during the consolidation process is which governance structure will best fit the consolidation participants. This section provides an overview of three common governance models found across North America. Consolidation participants may also find that the best fit for the participants in Waterloo Region is one of the models listed in this section, but customized to fit the specific needs of this consolidation effort.

5.1.1 Separate Department within a Participating Municipality

This structure would establish the PSAP as a separate department within the Region, the City of Cambridge or the City of Kitchener.

The primary positives of this structure include:

- A clean reporting structure for not only the PSAP director, but for the participating agencies as well. Since the director reports to a senior management position within the municipal organizational structure, there is a single point of contact for disputes that cannot be resolved otherwise.
- This model provides protection for the PSAP from politics that can affect the PSAP under other governance structures.
- This model also provides the PSAP protection from changes in direction that result from personnel changes in decision-making positions, thus creating a more stable environment for the PSAP long-term.
- Independent leadership that allows the director to effectively manage PSAP resources and provide equitable service to all participating law enforcement, fire, and EMS agencies.
- An advisory board comprised of participating agency and/or municipal representatives, and, if desired, community leaders to act in an advisory capacity to the PSAP manager. It is important that this board have advisory input only to make certain that the director is not placed in the untenable position of reporting to multiple bosses each with conflicting needs.
- Utilizing civilian staff rather than sworn personnel creates a more developed career path for PSAP staff.
- As part of a region or municipal structure, the PSAP has access to administrative support such as human resources, building facilities, and computer and network support.
- The department director will need specific technical and operational skills related to 9-1-1. Ideally, the director should be a 9-1-1 professional with experience in consolidation and providing services for police, fire and EMS.

The primary negatives of this structure include:

- The adjustment to the loss of direct control of PSAP staff by participating agency personnel.
- The cost of a civilian director as opposed to managing the PSAP with lower level sworn command personnel can be more expensive.
5.1.2 Part of a Participating User Agency

In this governance model, the consolidated PSAP is part of one of the existing law enforcement or fire agencies. Under this type of structure, sworn personnel often manage the PSAP and fall under the authority of the hosting agency head such as the sheriff, police or fire chief.

The primary positives of this structure include:
- Avoiding the costs of hiring a civilian director is possible and the parent agency’s budget can absorb management costs.
- As part of an existing region or municipal structure, the PSAP has access to administrative support such as human resources, building facilities, and computer and network support.
- Buy-in for consolidation is sometimes more palatable if the managing agency is the same type of agency as those considering consolidation. For example, some law enforcement agencies find it more palatable to consolidate with law enforcement PSAP than with a fire or independently operated PSAP.

The primary negatives include:
- The adjustment to the loss of direct control of PSAP staff by participating agency personnel.
- Participating agencies perceive that distribution of PSAP resources is not equitable. Generally, the perception is that the host agency receives a higher level of service.
- Political infighting among the participating agencies can impact the PSAP and/or entities represented on the oversight board. Although initially all agencies and entities may agree on the direction for the PSAP, over time, as the people and political agendas change, the PSAP can become the focus of political disputes. This structure requires a carefully crafted governance agreement to protect the PSAP from the impact of political disputes. Such an agreement will ensure that the PSAP can focus on its primary mission.
- A more limited career path for the operational staff as management positions since sworn personnel commonly hold PSAP management positions.

5.1.3 Separate Entity within the Regional Government

In this governance model, the consolidated PSAP is part of the Regional government, but reports to an oversight board separate from the Regional Council. The PSAP is supported administratively by the Region, but the director reports to an oversight board.

The primary positives of this model include:
- This model also provides the PSAP protection from changes in direction that result from personnel changes in decision-making positions and politics, thus creating a more stable environment for the PSAP long-term.
- Leadership independent of the participating law enforcement, fire and EMS agencies allows the director to effectively manage PSAP resources and provide equitable service to all agencies.
- An advisory board comprised of participating agency and/or municipal representatives, and, if desired, community leaders to act in an advisory capacity to the PSAP manager. It is important that this board have advisory input only to make certain that the director is not placed in the untenable position of reporting to multiple bosses each with conflicting needs.
- As part of a region or municipal structure, the PSAP has access to administrative support such as human resources, building facilities, and computer and network support.
Utilizing civilian staff rather than sworn personnel creates a more developed career path for PSAP staff. The department director will need specific technical and operational skills related to 9-1-1. Ideally, the director should be a 9-1-1 professional with experience in consolidation and providing services for police, fire and EMS.

The primary negatives include:
- The adjustment to the loss of direct control of PSAP staff by participating agency personnel.
- The cost of a civilian director as opposed to managing the PSAP with lower level sworn command personnel can be more expensive.

5.2 Organizational Structure
Based on the size of the consolidated PSAP in this alternative, Kimball recommends the following as an initial organizational structure. Key changes in this structure include:
- A civilian director or manager
- 100% civilian staff
- The inclusion of 24/7 shift supervision that are not assigned to work a call taking or dispatch position
- Assignment of quality assurance/training to a shift supervisor(s) or the establishment of a separate QA coordinator.

This recommended structure should be viewed as a starting point that will be altered as necessary to fit the needs of the new PSAP as decisions regarding how IT and technology needs will be supported and the actual workload better defined.

5.2.1 Position Definitions
The organizational structure is based on the following position definitions:

1. **Director or Manager**
   This position has overall responsibility for providing leadership and has ultimate responsibility for all PSAP operational, technology, budget and administrative tasks. The director is charged with setting the direction for the PSAP, planning for future operational and technological changes, and ensuring that the PSAP is meeting the mission set by the PSAP’s oversight body. The reporting relationship for this position is determined by the type of governance chosen.

2. **Deputy Director – Operations**
   This position reports to the director. This position oversees the shift supervisors, may function as the shift supervisor during the day shift or as needed. This position is also responsible for assisting the director in budget preparation, making staffing decisions, performing complaint investigations, working with agencies served by the PSAP and other operational support.

3. **Deputy Director - Technology**
   This position reports to the director or manager. This position oversees all technical and equipment issues concerning the PSAP’s technology. This position oversees IT and GIS support staff, works with vendors on maintenance and repair issues, plans for upgrades and supports the technology needs of the PSAP.

4. **GIS and IT Support**
   This position reports to the IT manager and is responsible for providing GIS and/or IT support for the PSAP.
5. **Telecommunicators**

This position reports to the shift supervisors and is responsible for call taking and dispatch functions. Other sections of this report refer to call takers and dispatchers. Since all staff are currently cross trained and hold essentially the same job title, call taking and dispatching are functions rather than job titles. In a consolidated environment, separate job titles could be established within the PSAP. The entry level position would be call taker. ALL staff, regardless of job title, should be trained in call taking to maximize the pool of resources in the event of a major incident. Dispatching police or fire would then become a job title and would be a promotional opportunity for the call takers.

6. **Shift Supervision**

To properly manage a consolidated PSAP, a strong supervisory structure is recommended for two primary reasons: public safety best practices and operational efficiency. Although in smaller PSAPs shift supervisors are not always present for financial reasons or because sworn personnel function in this role, the PSAP in this alternative will be too large to operate efficiently without the presence of 24/7 supervision. In Kimball’s view, it is essential that shift supervision not be assigned to a call taker or dispatch position and are present on a 24/7/365 basis.

7. **Administrative Support**

This position reports to the director or manager and is responsible for providing administrative support and managing office responsibilities.

Such functions as human resources, payroll and facility maintenance are not covered within this structure. These functions can be provided in several different ways such as adding in-house staff or contracting with one of the participating municipalities to provide support. Therefore, the final organizational structure may change during the implementation planning process.

### 5.3 Human Resources

Resolving human resource issues in a consolidation may be a daunting task. Understandably, these issues are among the most emotionally charged for existing PSAP employees. Resolving these issues begins with deciding upon an organizational structure as discussed in the previous section. Key issues include:

- Establishing new job titles and descriptions based on the organizational structure for the PSAP.
- Pay scales and achieving parity between consolidating agencies. Ensuring that employees are not “harmed” in terms of pay and benefits is recommended, if at all possible.
- Benefits such as vacation, seniority, sick time, health insurance and retirement.
- Hiring of key staff.
- Disposition of staff employed by consolidating PSAPs. Is the hiring of all existing PSAP employees automatic or will each employee need to apply for a position?
- Union Contracts

The following table summarizes current pay ranges, exclusive of benefits, for each PSAP.
### 5.4 Staffing

Three separate areas must be examined to determine the total number of employees needed to staff a consolidated PSAP. These areas include call taking, dispatch and administration. The staffing levels needed for each of these is determined and then added together to reach the final organizational staffing level needed.

#### 5.4.1 Call Taker Staffing

The first step in estimating staffing levels for the appropriate number of call takers needed is to determine the total call volume or call taker workload for the new consolidated PSAP.

The 9-1-1 call volume received by WRPS was 124,949 in 2012. The non-emergency or calls for service received on 7/10 digit lines totaled 247,351 for all agencies in 2012. The total estimated call volume for a consolidated PSAP is 372,300. The following table provides a summary of the estimated call volume.

<table>
<thead>
<tr>
<th>Agency</th>
<th>Total 9-1-1 or Emergency Calls</th>
<th>7/10 Digit Calls*</th>
<th>Total Call Volume</th>
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</tr>
<tr>
<td>Kitchener Fire</td>
<td>N/A</td>
<td>45,952</td>
<td>45,952</td>
</tr>
<tr>
<td>Total</td>
<td>124,949</td>
<td>246,650</td>
<td>371,599</td>
</tr>
</tbody>
</table>

*Cambridge Fire call volume is estimated. Kitchener Fire also handles calls received via alarm software and TIF which are not reflected in this table.
When estimating call taker workload for a newly consolidated PSAP several key points must be kept in mind including:

- Decisions regarding what type of non-emergency and/or administrative calls will be handled by the new PSAP will need to be made during the implementation planning phase. These decisions may increase or decrease the total call volume. Any change in total call volume may change the number of call takers needed.
- Other operational efficiencies that may be achieved through consolidation or changes in call processing methodology could potentially change the number of call takers needed.
- This initial call volume estimate and subsequent staffing recommendations is high-level and a “first pass.” These numbers will need to be updated throughout the planning and implementation process due to the many variables and decision points that will need to be addressed.

Once the total call volume is determined the number of call taker positions that need to be staffed can be determined.

The methodology used to determine the number of call taker positions follows:

Since the distribution of incoming 9-1-1 calls does not fall evenly around a 24-hour clock, Kimball first determined the times of the day when incoming calls are the highest and lowest. The average number of hourly calls in a 24-hour period is approximately 42. The following table summarizes the average call volume per hour.

<table>
<thead>
<tr>
<th>Time Block</th>
<th>Sunday</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
<th>Saturday</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>24:00 to 03:00</td>
<td>48.37</td>
<td>19.73</td>
<td>21.21</td>
<td>20.10</td>
<td>21.17</td>
<td>24.34</td>
<td>42.87</td>
<td>28.26</td>
</tr>
<tr>
<td>03:00 to 06:00</td>
<td>21.23</td>
<td>11.96</td>
<td>13.04</td>
<td>12.36</td>
<td>12.94</td>
<td>14.05</td>
<td>21.36</td>
<td>15.28</td>
</tr>
<tr>
<td>06:00 to 09:00</td>
<td>20.91</td>
<td>30.25</td>
<td>32.72</td>
<td>33.39</td>
<td>34.03</td>
<td>31.44</td>
<td>25.89</td>
<td>29.81</td>
</tr>
<tr>
<td>09:00 to 12:00</td>
<td>36.46</td>
<td>49.75</td>
<td>50.18</td>
<td>48.93</td>
<td>51.85</td>
<td>50.23</td>
<td>44.54</td>
<td>47.42</td>
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<td>12:00 to 15:00</td>
<td>49.74</td>
<td>57.67</td>
<td>57.03</td>
<td>56.77</td>
<td>58.28</td>
<td>58.65</td>
<td>53.70</td>
<td>55.98</td>
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<tr>
<td>15:00 to 18:00</td>
<td>49.37</td>
<td>64.88</td>
<td>65.70</td>
<td>67.92</td>
<td>71.15</td>
<td>70.50</td>
<td>55.39</td>
<td>63.56</td>
</tr>
<tr>
<td>18:00 to 21:00</td>
<td>49.07</td>
<td>52.98</td>
<td>52.39</td>
<td>52.58</td>
<td>57.50</td>
<td>55.99</td>
<td>49.51</td>
<td>52.86</td>
</tr>
<tr>
<td>21:00 to 24:00</td>
<td>40.37</td>
<td>40.67</td>
<td>41.79</td>
<td>42.78</td>
<td>44.57</td>
<td>55.94</td>
<td>57.19</td>
<td>46.19</td>
</tr>
<tr>
<td>Average</td>
<td>39.44</td>
<td>40.99</td>
<td>41.76</td>
<td>41.85</td>
<td>43.94</td>
<td>45.14</td>
<td>43.81</td>
<td>42.42</td>
</tr>
</tbody>
</table>

Once the hourly call count average is determined, the average number of physical call taker work positions that must be staffed on a 24-hour basis can be determined by use of an Erlang C calculator. Erlang C is a tool that is commonly used to determine staffing levels in call centres. It is based on the performance levels desired by the user. In this case, Kimball used the existing WRPS performance standard which is 240 seconds. This number breaks down into an average of 120 seconds of call time and 120 seconds of wrap up time. Wrap up time is the time needed after the call has ended to enter the CAD incident and prepare for the next call.
Once the average number of actual call takers is determined, the total number of job positions the PSAP will need to have to meet this number can be determined. When estimating PSAP staffing it is important to take into account the busy and slow times of the day and alter minimum staffing levels accordingly. Since this estimate should be considered a starting point for planning, Kimball used the average hourly staffing level (understanding that at times minimum staffing will be higher and at times lower) to determine the actual number of employees needed.

To determine the number of employees needed, Kimball used APCO Project RETAINS (Responsive Effort to Address Integral Needs in Staffing). RETAINS takes into consideration criteria such as annual number of hours available, vacation and training. A total of 33 employees are needed to cover call taker staffing requirements.

### 5.4.2 Dispatch Staffing

Estimating the number of dispatchers needed is not quite as straightforward and data based as is call taker staffing.

Based on the number of physical dispatch positions that need to be covered on a 24/7 basis, which is six (three WRPS and three fire), Kimball estimates that 33 employees will be needed to meet staffing needs. However, operational changes may increase or decrease this number. Fire dispatch should be examined in depth during the planning phase to determine if three is an appropriate number. If the number of positions is changed, then the number of dispatchers needed to cover those positions will change as well.

Initially, the call taking and dispatch functions may be performed by staff that are able to perform both functions. An option to be considered would be to establish separate call taking and dispatcher positions. Call takers would be the entry level position for which ALL employees are trained. Dispatch positions, either police or fire, would be considered a promotion. This creates a career path for employees and allows the PSAP to lower its personnel costs.

### 5.4.3 Supervisor Staffing

To provide sufficient supervision in a consolidated PSAP, Kimball believes there should be two supervisors on duty the majority of the time. A reduction to one may be possible during the slowest hours of the day, but two should be planned for initially. According to RETAINS, between 10 and 12 supervisors will be needed to meet this need.

Kimball assumes that the supervisors will not be assigned to work a console position and will be solely focused on supervisory responsibilities. Two supervisors on-duty may allow for them to provide training, quality assurance feedback, employee counseling and perform other administrative tasks during slow periods.

### 5.4.4 Administrative Support

In addition to the operational staffing needs, the PSAP will need the following administrative support in the form of a director, deputy director, technology manager, GIS tech, IT support and clerical support. Trainer and QA/QC coordinator positions are also highly recommended. The following table summarizes the support positions a consolidated PSAP will require.
Table 25 – Administrative PSAP Positions

<table>
<thead>
<tr>
<th>Administrative Positions</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Title</strong></td>
<td># of Employees</td>
<td></td>
</tr>
<tr>
<td>Director/Manager</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Deputy Director</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Technology Manager</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>GIS Tech</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Quality Control/QA</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Trainer</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>IT Support</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Clerical Support</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

The establishment of these positions represents an ideal situation. In reality, compromises may be needed to meet fiscal constraints. What is ultimately important is that these position functions are present within the PSAP, regardless of who performs them.

5.4.5 Staffing Summary

The following table summarizes the number of employees needed to staff the PSAP according to the parameters outlined in this document. This summary should be considered a preliminary estimate. Once call taking and dispatch methodology and governance are decided upon during the planning phase, a more accurate summary can be determined.
Table 26 – Consolidated PSAP Staffing Summary

<table>
<thead>
<tr>
<th>Title</th>
<th>Current Combined PSAP Staffing</th>
<th>Estimated Consolidated PSAP Staffing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Director / Manager</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Deputy Director</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Technology Manager</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Telecommunicators (call takers/dispatchers combined)</td>
<td>85</td>
<td>66</td>
</tr>
<tr>
<td>Shift Supervisors</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>GIS Tech</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Quality Control/Quality Assurance</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Trainer</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>IT Support**</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Clerical Support</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>96</strong></td>
<td><strong>88</strong></td>
</tr>
</tbody>
</table>

**Support is provided by departments outside the PSAPs

When comparing the current staffing levels for the three PSAPs to the estimated number of staff needed in a consolidated environment the following should be noted:

- The comparison is not an apples-to-apples comparison as two of the three PSAPs utilize a different operational model than was assumed for the consolidated PSAP.
- Since 9-1-1 calls are answered by WRPS and then transferred to one of the fire PSAPs or CACC, there is no significant increase in the current WRPS call volume by consolidating into a single center. Under the current individual PSAP model, each of the fire PSAPs must staff sufficiently to receive the transferred calls. The consolidated PSAP staffing estimates accounts for the elimination of this duplication of effort.
- The staffing numbers for the consolidated PSAP are based on six dispatch positions, three for WRPS and three for fire. If the number of dispatch positions changes, these numbers will change.

5.5 Technology

5.5.1 Computer Aided Dispatch

In any consolidation where there are multiple CAD systems in use, stakeholders must decide on a single CAD system to be used in the new PSAP. The selected CAD system must be able to support multiple jurisdictions, disciplines and departments within a jurisdiction as well as be able to apply unique algorithms to generate specific unit recommendations for incident responses according to the standard operating procedures of each agency. The CAD system should utilize intelligent workstations with multiple monitors capable of displaying location, type of incident, assigned units and current unit status, time in status, mapping and pending incidents, “at-a-glance” without the need to switch monitors or views to access key information.
To ensure end user acceptance of a consolidated communications centre, Kimball recommends that first responders do not lose any existing functionality once the consolidated centre is brought on-line. It is important to note that maintaining existing functionality does not necessarily mean an exact duplication of existing systems. The same or higher service levels can be provided by different vendors or systems albeit in a different “package.”

There are no substantial, technical roadblocks to this consolidation in regards to CAD, mapping, mobile data and other sub-systems/interfaces.

### 5.5.1.1 Recommendations

1. Kimball recommends expansion of the Intergraph CAD system in use by the PRIDE consortium and WRPS for use in a consolidated PSAP that would include the dispatch of both law enforcement and fire agencies. Intergraph is considered one of the top tier CAD vendors in the market and could be reasonably expected to be capable of handling the needs of a consolidated PSAP that included all three study participants. Although the CriSys CAD system has done well to serve the existing fire communication centres in the past, it is not a top tier CAD vendor and in our opinion they do not have the experience or the expertise that would be needed to operate in a large consolidated, multi-discipline communications centre.

2. The Intergraph CAD system has a very functional and robust fire module that could be turned on within the existing system. Currently, there is no need for this functionality, but with the addition of fire services to the system it would need to be added. Typically within a CAD build, the entry of fire runcards is one of the largest and most time consuming tasks required. The consolidated centre will need to ensure they have sufficient staff on board to enter and maintain the fire runcards along with other fire specific databases. Intergraph would be able to provide this additional system administration and maintenance training.

The following list defines interfaces that are already supported by an Intergraph CAD system and would be available for use in a consolidated environment.

- E9-1-1
- Alarm monitoring
- Automatic vehicle location (AVL)
- Call taker/Dispatcher mapping
- Fire mobile computers
- Fire station alerting
- Law enforcement field reporting
- Law enforcement records management system
- Law enforcement mobile data
- Master clock
- Mobile mapping/routing
- Radio system—push-to-talk/emergency
- Rip and run
- TDD
- CPIC/NCIC
- Radio tone encoding
- WebCAD
- Wireless E9-1-1 Phase II mapping
- Text to 9-1-1
Wireless In Call Location Updates (ICLU)

3. The consolidated centre should work with the Ministry of Health and the Cambridge CACC to implement the EMS-TIF CAD interface so that this existing functionality with the Kitchener Fire Communications Centre is not lost. The ability to tier Waterloo Regional Police and the fire departments dispatched by Cambridge Fire Communications would be added.

4. Both fire communications centres monitor various incoming fire alarms via monitoring equipment installed in their dispatch centres. The monitoring of these alarms will need to be migrated to the consolidated centre. It is recommended that a CAD interface to these systems be investigated so that when an incoming fire alarm arrives an event is automatically created in the CAD systems pending events window.

5. The CAD system should interface with Bell Canada’s Agent 511 application for processing of T9-1-1 calls.

6. The CAD system should interface with the 9-1-1 answering equipment allowing wireless ICLU updates to be manually queried via a CAD button or command.

7. The new consolidated centre should take advantage of the software’s unit recommendation features and functionality especially for the fire services. Using this functionality would allow those agencies to pre-plan for various event types and allow the dispatcher to automatically send initial aid agencies on the initial event dispatch, should those agencies desire this functionality.

8. A CAD system should provide fault-tolerant or high level of availability, security, and reliability. The system should be capable of taking advantage of current fail-over and other backup technologies that enable continued operation, notwithstanding single or multiple component failure. Sufficient redundancy should exist within the system to guarantee that no single point of failure exists whereby the entire CAD system would go down. Kimball recommends that production server(s) be located on the communications centre premises with additional back-up servers off premise to ensure data security.

9. With the addition of the new fire agencies, verify that the current hardware configuration has the required system capacity to guarantee that all systems run reliably. A system assessment should be completed to ensure that it is sized appropriately to meet performance criteria for the new consolidated centre, including significant periods of high call volume, accommodate anticipated future workload increases and store sufficient event/unit history.

10. The consolidated centre should continue to maintain vendor 24/7 system support and maintenance. This 24/7 support will provide coverage should there be any problems with the system and also provide routine software updates.

11. Identify what interfaces already exist and identify those interfaces that need to be added along with the ability for the current vendor to provide these interfaces. These may include either standard or customized interfaces that may be needed for the consolidated centre. Examples could be fire records management, fire station alerting, etc. The need for these interfaces would be dependent on decisions by the local agencies of the applications that they choose, decide to retain or want to add.

12. The PSAP should implement a backup plan and ensure that all staff are trained on this plan should there be a failure in the CAD system. This could simply mean moving to a paper-based tracking system, such as a radio log or a manual card system with a time stamp. Kimball recommends a “CAD crash kit” that includes all necessary paperwork, backup instructions, resource lists, standard operating procedures/guidelines, incident/unit status cards and time stamps.

5.5.1.2 Computer Aided Dispatch Consolidation Steps

1. Select a single CAD vendor for use in the consolidated centre. Kimball recommends using Intergraph, the existing vendor used by the PRIDE consortium and Waterloo Regional Police.
2. Since the Intergraph system is part of the PRIDE consortium the addition of the fire discipline would have to be approved by that group. Since all the agencies participating in the consortium contribute to the operation of the system, a new funding mechanism would need to be approved that includes the addition of the fire agencies.

3. Complete a thorough CAD assessment to ensure that the functionality currently in place at the two fire communication centres is present in the Intergraph CAD system. Ensure that no functionality is lost for any of the user agencies.

4. Through the CAD assessment identify any additional functionality needed or modifications needed to current interfaces (e.g. FRMS, fire station alerting).

5. Consider additional interfaces to supplement the current system that is not available in current systems.
   These interfaces are commonly used and would enhance both field and communications centre operations:
   - Fire station alerting
   - Radio tone encoding
   - Fire mobile data
   - Alarm monitoring

6. Verify a geo-diverse hardware solution with back-up servers is in place.

7. Install, configure and utilize the systems unit recommendation features, especially for fire services.

8. Verify system capacity is sufficient for adding the additional agencies and for future growth.

9. The consolidated centre needs to continue to maintain 24/7 system support and maintenance from the vendor.

10. The consolidated centre should develop and test manual back-up process routinely for system outages, both planned and unplanned. Prepare and keep current a CAD crash kit.

11. Investigate the ability and feasibility to integrate fire alarm monitoring systems with the CAD system.

12. Have sufficient support staff to administer and maintain the CAD system. With any CAD system used by fire agencies the entry and maintenance of the fire run cards is one of the most detailed and time consuming tasks.

13. The vendor’s secure web access should be utilized to provide the fire agencies access to event call details, times and other reports. This would especially be important to the volunteer fire departments.

5.5.2 Mapping/Geographic Information System

A process needs to be in place so that the mapping/GIS data used in the CAD system and associated modules remains accurate, current and is always up to date. The centre will need to work with the CAD vendor, Intergraph, to identify any missing GIS data sets that would be needed for a fire dispatch module. The maintenance of the GIS mapping data must include steps to ensure that updated mapping information is routinely provided by the member municipalities, the region and/or agencies. The procedure to provide information to the GIS support staff should streamlined so that any changes can be processed and uploaded into the CAD system in a timely manner.

Intergraph CAD has an integrated mapping platform and updated mapping/GIS data is received from the Region of Waterloo and other sources. Once the IT department receives the data, staff must first massage the data and then upload it onto the CAD and associated systems. Currently mapping/GIS updates are provided every six months, however the goal is to have this data updated every three months. The CAD mapping does include all the municipalities in the Region and those that participate in the PRIDE consortium.
1. For mapping/GIS consolidation, it will be required to work with the CAD vendor to identify the additional GIS polygon or point layers that will be necessary to add fire dispatch capabilities. These are typically layers such as runcards, agencies, fire stations, fire reporting areas, hydrants, etc.
2. Implement a standard procedure for receiving GIS mapping updates directly from the member municipalities, region and/or user agencies.
3. Provide a standard procedure to ensure that when any GIS mapping updates, additions or deletions are received they are processed in a timely manner and then uploaded to the CAD system as quickly as possible.

5.5.3 Mobile Data

In a consolidated PSAP environment with a single CAD system, Kimball recommends that all agencies dispatched by the centre use the same vendor’s integrated mobile data application. An integrated mobile data solution would allow inter-agency message switching, and if the agencies would like, the ability to share active events and display unit locations.

Past experience with consolidated dispatch environments indicate that the communications centre is usually responsible for providing all of the back room equipment needed for the mobile data application. This includes the mobile data server and any required interfaces to other applications, such as CAD. Field equipment including the laptops, GPS units and connectivity costs are most commonly the responsibility of the user agencies.

Dependent on the consolidated project’s situation and available funding, either the agencies or the communications centre would be responsible for the mobile data software licenses needed. Typically these are provided and priced by the vendor as separate modules:

- Mobile Application
- Mobile Mapping
- AVL
- Routing

The consolidated centre should assist in any way they can to get more of the fire agencies to install and use mobile data computers along with the associated mapping and AVL technology. Currently WRPS is using mobile data, but it is not prevalent within the fire agencies although there is interest in adding that functionality.

5.5.3.1 Mobile Data Consolidation Steps

1. Research the feasibility of and develop a plan to implement additional fire service mobile data computers.
2. Kimball recommends using an integrated mobile data solution with the recommended CAD vendor, Intergraph.
3. Complete an assessment regarding the number of additional software licenses and mobile hardware units that will be needed for the additional fire agencies.
4. Verify that the current hardware configuration has the capacity to handle the additional fire mobile data units.
5. Determine the procurement and funding process for the additional mobile data units. (e.g. determine what costs will be the responsibility of the consolidated centre and what costs, if any, to the user agencies).
6. Research and consider the need for turn-by-turn routing.
7. Identify if there are any additional interfaces needed from the mobile data computers for the new fire agencies to access other applications or databases (e.g. FRMS).

5.5.4 Records Management Systems

Typically, records management is not considered a function of the communications centre but rather an agency required or specific application. The only dispatch centre functionality typically required is an interface between the CAD system and the RMS application(s). This interface provides the ability to automatically transfer data fields captured in the CAD system to the RMS application and this transfer is most commonly triggered when the event is closed. This data includes, but is not limited to, event and incident numbering, locations, phone numbers, complainant names, event types, units/personnel assigned, unit times, narrative, disposition, etc.

WRPS currently utilizes a law enforcement records management system (LERMS) made by Niche Technology. The communication centre staff does have the ability to query the Niche application and it is common for them to utilize that system to query various names, locations, vehicle, etc. during dispatch operations.

The career fire departments are currently using a CriSys Limited Xpert Fire software system. In addition to other typical fire records modules this application does have a call handling and dispatch module that is being used in the existing fire communication centres for CAD. Within the consolidated centre the same call handling and dispatch software, Intergraph, would be used to process both law enforcement and fire events so the module would no longer be needed by the fire departments. The volunteer fire departments are currently using either FireHouse or FirePro for records management.

If the career agencies are satisfied with their current fire records applications being provided by CriSys they can continue to use it and the consolidated centre would then provide an interface to transfer call data from CAD to the records management system. If the fire agencies are not satisfied with their existing RMS applications the best time to migrate to a new system would be during the consolidation project with cutover to the new system at the start-up of the new consolidated centre.

The ‘perfect-world’ scenario would be if all of the fire agencies utilized the same FRMS application. This single solution would allow for the least amount of interfaces to the CAD system. However, because records management is an agency specific application, agencies that are satisfied with their current FRMS will most likely be reluctant to change.

It is common to see agencies refuse or be reluctant to change their current RMS applications simply to achieve an integrated solution that benefits the consolidated dispatch centre and/or other agencies. Typically change is only possible when there is some type of financial or operational benefit seen by that agency. For that reason, in some past projects the consolidated centre actually purchased and implemented an integrated FRMS solution just to encourage the agencies to participate. However this generally only occurs when sufficient funding is available and/or RMS is an allowable expense by 9-1-1 fees that are collected or grants obtained.
5.5.4.1 Records Management Consolidation Steps

WRPS would continue to utilize their Niche records management software so no additional steps are necessary for LERMS.

Fire agencies have essentially two options for RMS including:

Option 1 – Agencies Retain Existing FRMS Systems

1. Identify which RMS applications will need to be interfaced with the consolidated centre’s CAD system. To simplify the interface process and associated costs it would be beneficial to limit the number of application servers to as few as possible.
2. For each system that will be interfaced, identify the CAD data fields that will need to be transferred to the RMS systems.
3. Work with the various vendors to develop a statement of work for the required interfaces and to provide cost estimates.

Option 2 – All Fire Agencies Consolidate to a Single RMS Systems

1. Investigate the feasibility of all participating fire agencies installing and utilizing the same FRMS system. Kimball recommends using an integrated FRMS solution with the recommended CAD vendor, Intergraph.
2. Complete a FRMS assessment to ensure that at a minimum the same functionality exists with the selected FRMS application as the agencies had with their old application. At the same time any desired functionality in which the agencies are interested could also be identified and investigated.
3. Complete an assessment on the number of software licenses and hardware that will be needed for all of the agencies.
4. Determine the procurement and funding process for the additional RMS users including both software licenses and hardware (e.g. what costs belong to the communications centre, if any and what will be the cost to the user agencies).
5. Identify the need for any data conversion from current RMS systems to the new system.

5.5.5 9-1-1 Answering Equipment

None of the PSAPs utilize answering equipment that has computer telephony integration (CTI) and are dependent on a CAD interface to display enhanced 9-1-1 data such as an address, location, calling party name and other call data. The same CAD interface displays the call location on the integrated mapping for wireline calls, tower location for wireless Phase I calls or caller location for wireless Phase II calls.

The primary PSAP, WRPS currently has the most robust system of the agencies in this study. The back room telephone equipment consists of a Nortel Meridian Option 61 PBX and Nortel CC7 call management software and hardware. The CC7 application provides for call routing and handling, automatic call distribution (ACD), real-time statistics and a historical database that can be used for operational and management reporting. Since this system already processes all incoming 9-1-1 calls, Kimball recommends the continued use of this system in the consolidated centre.
5.5.5.1 9-1-1 Answering Equipment Consolidation Steps

1. Select a single 9-1-1 answering equipment solution for use in the consolidated centre. Kimball recommends using the existing call answering equipment in use at WRPS, the primary PSAP.
2. Complete a telephone audit to determine if there are any ten-digit emergency or non-emergency phone lines that will need to be migrated to the consolidated centre.
3. Verify that the system capacity is sufficient for adding any additional answering positions that will be needed.
4. The consolidated centre should continue to maintain 24/7 system support and maintenance from the vendor.
5. Continue work with Bell Canada to implement the new XML IP data ALI data platform (BID-0013).
6. Kimball recommends that the phone system’s CAD interface includes T9-1-1 and ICLU functionality.

5.5.6 Logging Recorder

The WRPS PSAP has a 25 channel NICE Systems logging recorder that could potentially be used in the consolidated centre. In addition to recording telephone positions and radio traffic, it is being used for telephone and radio instant recall recording (IRR).

If the consolidation project moves forward, a digital recorder needs assessment should be conducted to determine if the existing recorder has sufficient functionality as it relates to the type of resources needed (analog, digital and/or IP) and anticipated channel capacity. All primary dispatch and operational radio talk groups (channels), 9-1-1 trunks, telephone positions and radio console audio will need to be recorded in the consolidated PSAP.

The consolidated PSAP should individually record all 9-1-1 trunks, incoming and outgoing phone lines, answering positions, radio positions and all radio channels or talk groups.

5.5.6.1 Logging Recorder Consolidation Steps

1. Select a logging recorder solution for use in the consolidated centre. Kimball recommends using an existing solution, the NICE Call Focus III recorder that is currently being used by the Waterloo Regional Police PSAP, if possible.
2. Conduct a recorder needs assessment to determine if the existing recorder has sufficient capacity and capability to record the necessary resources. If not, determine if additional capacity or functionality can be added.
3. Ensure that sufficient licensing is added to provide access to remote client applications (management, supervisory, training and quality assurance).
4. The consolidated centre needs to maintain 24/7 system support and maintenance for the logging recorder.

5.5.7 Master Clock

In the consolidated centre a fully redundant master clock solution should be installed and integrated with each and every critical system that will be used to establish synchronized time. This includes, but is not limited to, CAD, 9-1-1 answering equipment, radio consoles and logging recorder.
5.5.7.1 Master Clock Recommendations

Confirm that all critical systems are interfaced to the master clock (CAD, 9-1-1 answering equipment, radio consoles and logging recorder).

5.5.8 Cost Estimates

The following table provides budgetary costs for new technology that will be needed to support the consolidated emergency communications centre. These costs are based on a 22 position PSAP including two supervisor, six dispatcher, 12 call takers, four overflow and four training positions.

Table 27 – Required Technology Cost Estimates

<table>
<thead>
<tr>
<th>System</th>
<th>Description</th>
<th>Quantity</th>
<th>Individual Cost</th>
<th>Total Estimated Cost</th>
<th>Estimated Maintenance</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAD</td>
<td>Workstation Licenses/Hardware</td>
<td>14</td>
<td>$30,000</td>
<td>$420,000</td>
<td>$71,400</td>
</tr>
<tr>
<td>CAD</td>
<td>Fire Module</td>
<td>1</td>
<td>$250,000</td>
<td>$250,000</td>
<td>$42,500</td>
</tr>
<tr>
<td>CAD</td>
<td>Interfaces</td>
<td>4</td>
<td>$25,000</td>
<td>$100,000</td>
<td>$17,000</td>
</tr>
<tr>
<td>CAD</td>
<td>FRMS Interface</td>
<td>2</td>
<td>$20,000</td>
<td>$40,000</td>
<td>$6,800</td>
</tr>
<tr>
<td>9-1-1</td>
<td>Answering Positions</td>
<td>14</td>
<td>$2,500</td>
<td>$35,000</td>
<td>$5,950</td>
</tr>
<tr>
<td>Radio</td>
<td>Radio Consoles</td>
<td>10</td>
<td>$35,000</td>
<td>$350,000</td>
<td>$59,500</td>
</tr>
<tr>
<td>Recorder</td>
<td>Additional Capacity</td>
<td>95</td>
<td>$1,500</td>
<td>$142,500</td>
<td>$24,225</td>
</tr>
<tr>
<td>Master Clock</td>
<td>Redundant Master Clock Solution</td>
<td>1</td>
<td>$20,000</td>
<td>$20,000</td>
<td>$0</td>
</tr>
<tr>
<td>Furniture</td>
<td>Ergonomic System Furniture</td>
<td>28</td>
<td>$17,500</td>
<td>$490,000</td>
<td>$0</td>
</tr>
<tr>
<td>Furniture</td>
<td>24/7 Chairs</td>
<td>28</td>
<td>$1,200</td>
<td>$33,600</td>
<td>$0</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
<td><strong>$1,881,100</strong></td>
<td><strong>$319,787</strong></td>
<td></td>
</tr>
</tbody>
</table>

The following assumptions were used in calculating the above budgetary estimates:

- The technology systems used in the consolidated centre would be:
  - CAD (Intergraph)
  - Mobile (Intergraph)
  - FRMS (agency current vendors)
  - 9-1-1 (no computer telephone integration)
  - Radio Consoles (Maestro)
    - Recorder (NICE Call Focus III)
  - 9-1-1 answering equipment and CAD is installed at all the positions and radio is only installed at the supervisor, dispatcher, overflow and training positions.
  - No CTI for the 9-1-1 answering equipment. CTI would add approximately $75,000 per position.
 All primary talk groups, 9-1-1 trunks and console positions would be individually recorded at the consolidated communications centre.
 The fire departments would continue to utilize their existing RMS solutions. Therefore, no costs, other than a CAD interface to existing systems, are included.
 The technology cost does not include adding mobile data for the fire departments.
 Maintenance was calculated at 17.5% of the purchase price. This is the estimated additional annual cost for vendor support and maintenance.

There are no hard or fast rules that apply to a consolidation project when it comes to who is the responsible party, either the agency(s) or the communications centre, for a technology cost or a portion of the cost. This funding decision must be made locally and depends on a number of factors, such as, but not limited to the technology involved, project participants, local politics, and available funding. Other factors, including whether the cost is eligible to be paid for using collected local fees and/or grants or an effort to entice an agency, agencies or a discipline to participate in the consolidation project by providing them additional technology and functionality.

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6. FACILITY REQUIREMENTS

In conjunction with the consolidation study for Regional emergency communications, review and assessment of facility operations for the proposed new operation were conducted. Timothy Lisle, AIA, a partner with Jacobs/Wyper Architects, LLC, conducted the review and assessment on behalf of Kimball.

Study activities included:

- Tour and review of existing centre within the Waterloo Regional Police Headquarters located at 200 Maple Grove Road, Cambridge, Ontario.
- Review of agency needs and development of a Facility Program listing spaces, space sizes, and some specific space needs related to critical spaces.
- Tour and preliminary assessment of potential sites for the development of a facility sized to properly house the new consolidated emergency communications centre. Sites included:
  - An addition to the eastern side of the existing Waterloo Regional Police Headquarters
  - An addition to west side of the administration and training building located at the Waterloo Region Police & Fire Training Centre, Erbs Road just west of Wilmot Line, west of Waterloo.
- Development of initial planning concept sketches for each site to determine feasibility, fit and integration into the site and existing facilities.

The current Waterloo Region Police Dispatch accommodates five call-takers, four dispatchers, and one combination call-taker/dispatcher position. Additionally there are two supervisor positions that are elevated one step above the main floor level and four to five open positions on the communications centre floor. The agency also plans to increase staffing which will most likely fill out these open positions. Given the projected scale of the new emergency communications requirements, it was determined that expansion of the current communications floor is not feasible and would be better accommodated in new, purpose-built space. This approach also allows continued operations while the new site is constructed until agency cut-over to new site.

PSAPs supporting other public safety agencies considered for consolidation were not toured.

6.1 Facility Program

Overall emergency communication operations and activities were reviewed with Inspector Mark Bullock, Waterloo Regional Police, to determine basic facilities needs supporting the newly proposed consolidated emergency communications agency. Accommodations for future growth were also discussed and factored into the overall room and dispatch position count such that operations currently projected out to ten to 15 years can be housed in the facility before expansion beyond current footprint may be required.

The Facility Program is built upon a table of space types that are utilized for various functions within the new facility. These space types represent space standards used for similar facilities and were adjusted to best meet the needs of Waterloo Region. This table, whose area requirements are referenced within the program document, is found at the bottom of the Facility Program document. A factor of thirty five percent (35%) is applied to net areas within the Facility Program and accounts for building structure, wall thicknesses, mechanical shafts, and similar building elements not otherwise addressed in the program to develop a final gross building area. Total Facility Program area is 1,717 M² (18,840 SF).
Key programmatic features as provided in the document include:

- Administrative space for eleven people in enclosed offices or open-office workstations
- One administrative Conference Room
- Emergency Communications Floor sized for:
  - Two (2) supervisor consoles
  - Sixteen (16) call-taker positions
  - Six (6) dispatcher positions
  - Six (6) future call-taker/dispatcher positions
  - Four (4) training consoles (in space adjacent to but acoustically segregated from primary communications floor)
- Staff kitchen and break area
- Staff lockers and toilets with showers
- Critical equipment rooms and PSAP mechanical and electrical spaces

It should be further noted that the two sites under consideration are extensions from existing facilities and may utilize certain existing functions in support of PSAP needs.

Facility conceptual plan and space allocation planning can be found in Appendices A and B.

6.2 Site Observations

The suitability of the two sites was reviewed with Inspector Bullock with regard to security and adequacy of site area to support the proposed PSAP use. Observations presented represent initial review by the consultants and should be followed up by detailed site assessment including Threat & Security Assessment identifying potential site vulnerabilities and mitigation strategies to address such in the development of a specific site. In the case of both sites, it is anticipated that new building HVAC and electrical equipment supporting the emergency communications functions shall be provided new as separate, dedicated systems.

6.2.1 Regional Police and Fire Training Centre

This site is part of a large land tract owned by the Region and home to various Region functions. This location is just outside the western edge of the jurisdiction boundary for the City of Waterloo. The property is generally oriented along a north-south axis with northern frontage on Erbs Road. Access to the site is adequate, primarily made via Ira Needles Boulevard from Conestoga Parkway to the south. Otherwise there is a sufficient network of surface roads serving the site providing diverse access routes. It should be noted however that Ira Needles Boulevard has extensive commercial development generating significant car traffic that may produce congestion and hamper ease of access to the site at certain times.

Surrounding land-use is a mixture of agriculture and some form of surface mining. However land-use patterns appear to be changing as previously mentioned commercial development is pushing westward from the City of Waterloo. The Region owns a significant amount of land which provides an adequate buffer for purposes of security that may be required for the new facility.
To the western side of the site is the Region Police and Fire Training Centre comprised of an administration and training building, multiple burn buildings for fire training, miscellaneous training props, and a driving EVOC course looping the burn buildings to the southern portion of the site. To the eastern side of the property is an inactive land fill that is currently capped and a methane capture and co-generation plant along the border with Police and Fire Training Centre relatively near the administration and training building.

It is proposed that the new PSAP be situated as an addition to the existing administration and training building on the Police and Fire Training Centre site. By doing so, some of the existing functions within the existing facility (locker/showers, kitchen/break area, training spaces) may be used to support PSAP operations as well. Based on the plan of the existing facility, it was deemed that an addition to the western side of the building best extends from the current layout for integration of the PSAP function into the overall plan. This location places the proposed PSAP away from the apparatus bay on the opposite side of the facility and away from the exposure to the co-generation
plant on the land fill portion of the property. There is a water course to the west of the existing building that affects the planning of an addition as described. The buffer setbacks are indicated on conceptual planning documents. While this is an imposition on planning options for the PSAP addition, it is not insurmountable as demonstrated by conceptual planning. However, the restriction created by the setback may impact options related to future expansion of the facility. Additionally, planning for the PSAP addition requires reconfiguration of the EVOC driving course to provide more building pad at the corner nearest the administration building. Conceptual planning will illustrate the required adjustments.

An item to note is that currently only a single access route serves the site from Erbs Road. If it is opted to place the new PSAP facility on this site, investigation into developing a second alternative vehicular route for diversity site access is recommended.

### 6.2.2 Waterloo Regional Police Headquarters

The Regional Police Headquarters is also situated on a large parcel of Region-owned land that is part of a government services campus. The existing HQ building is a two-story structure that includes WRPS administrative and operational unit offices. The existing regional police emergency communications centre is located to the northern end of the lower floor level. The headquarters (HQ) building fronts Maple Grove Road, a significant vehicular thoroughfare in the western portion of Cambridge. Parking and a generous site setback from Maple Grove for the headquarters building are provided.

The pattern of development surrounding the site has been traditionally agricultural but is subject to recent manufacturing and transportation industry development. The site is also within 500 meters of an industrial rail line, which should be further considered as to types and patterns of typical shipment and potential threats to PSAP operations that may result from a related incident.
Figure 2– Potential Consolidated PSAP Site - Option 2

As a functioning police headquarters facility, the site is relatively secure providing building perimeter access control and secure entrance lobby for control and admission of the public. Perimeter security fencing is not present and has been suggested as part of the PSAP development.

6.3 Conceptual Planning Studies

The development of the conceptual planning schemes was based on the Facility Program document and information made available by the Region of Waterloo or developed related to the respective sites. Schemes generated were reviewed with Inspector Mark Bullock and represent both a test of facility program developed into a functional planning option for the new facility as well as of the ability for each site to accommodate and support the proposed expansion. Each conceptual scheme has a site plan and floor plan(s) illustrating the facility planning at the respective sites.

6.3.1 Regional Police and Fire Training Centre

The development of the conceptual planning schemes was based on the Facility Program document and information made available by the Region of Waterloo or developed related to the respective sites. Schemes generated were
reviewed with Inspector Mark Bullock and represent both a test of facility program developed into a functional planning option for the new facility as well as of the ability for each site to accommodate and support the proposed expansion. Each conceptual scheme has a site plan and floor plan(s) illustrating the facility planning at the respective sites.

6.3.2 Waterloo Regional Police Headquarters Site

The open site area to the north of the existing main police headquarters building provides an adequate and secure location for the development of the PSAP addition. This location allows for the creation of a separate and distinct entrance to the new facility along with new site parking and perimeter security fencing for the PSAP if required.

To best connect and integrate with the existing facility, it is proposed that the existing fire stair on the northern edge is removed and that the 2nd level corridor is extended to an outside discharge point as part of the new PSAP addition. The addition would fully house the new PSAP functions, freeing the existing PSAP space for re-purposing. It is suggested in the conceptual plans that this space may be ideal for conversion to an emergency operations centre serving the Region.

The addition would extend from the first floor level and provide all needed PSAP functions. The addition will cut into grade along the back side (away from Maple Grove Road) utilizing a retaining wall system along that face. The plan arrangement is organized along a linear spine primarily arraying administration and support functions along the back side and emergency communications spaces along the front side. The 45° rotation of the emergency communications centre floor responds to the similar orientation of the headquarters main entry element and aligns with the Maple Grove Road frontage.

Mechanical/electrical areas are indicated in a penthouse configuration, generally above the locker areas and abutting the existing headquarters building at the 2nd level. The mechanical/electrical spaces can be access via the main 2nd floor hallway extension described above.

Approximately thirty (30) parking spaces are indicated on the site plan. The new parking lot extends from the parking area serving the main headquarters entrance and along the front of the proposed addition to connect with the northern site access drive. A gated, perimeter security fence is also indicated should it be determined to be required with the PSAP expansion.

6.4 Cost Analysis

Preliminary opinion of construction costs (Concept Estimate) has been prepared based on the conceptual site plan and floor plan for schemes and preliminary scope review related to development of emergency communications additions for each site. The estimate was prepared by the Architect based on historical cost data for similar emergency communications centre projects.

The Concept Estimate includes:

General Conditions/Contractor Overhead & Profit.
Project contingency of twenty percent (20%).

The Concept Estimate does not include:
- Hazardous abatement costs should that be required.
- Escalation of costs to mid-point of construction period
- Racked or terminal equipment.
- Furniture and Fixed Equipment.
- Dispatch console furniture.
- Audio/visual and special systems equipment.

Given the preliminary nature of the proposed project, all costs are also similarly preliminary in nature and should be further developed and made more definitive as the project moves forward. Preliminary Rough Order of Magnitude (ROM) costs are projected as follows:

### Police & Fire Training Site

<table>
<thead>
<tr>
<th>Bldg. Area</th>
<th>$/M²</th>
<th>ROM Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Construction</td>
<td>$4,435 CAD</td>
<td>$6,208,624 CAD</td>
</tr>
<tr>
<td>Modifications to Extg. Building</td>
<td>Lump Sum</td>
<td>$100,000 CAD</td>
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<tr>
<td>Site Improvements Allowance</td>
<td>Lump Sum</td>
<td>$350,000 CAD</td>
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<tr>
<td>Subtotal:</td>
<td></td>
<td>$6,658,624 CAD</td>
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<tr>
<td>Project Contingency:</td>
<td>20%</td>
<td>$1,331,725 CAD</td>
</tr>
<tr>
<td>Total ROM Cost Estimate:</td>
<td></td>
<td>$7,990,348 CAD</td>
</tr>
</tbody>
</table>

### Regional Police HQ

<table>
<thead>
<tr>
<th>Bldg. Area</th>
<th>$/M²</th>
<th>ROM Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Construction</td>
<td>$4,435 CAD</td>
<td>$7,406,001 CAD</td>
</tr>
<tr>
<td>Modifications to Extg. Building</td>
<td>Lump Sum</td>
<td>$250,000 CAD</td>
</tr>
<tr>
<td>Site Improvements Allowance</td>
<td>Lump Sum</td>
<td>$150,000 CAD</td>
</tr>
<tr>
<td>Subtotal:</td>
<td></td>
<td>$7,806,001 CAD</td>
</tr>
<tr>
<td>Project Contingency:</td>
<td>20%</td>
<td>$1,561,200 CAD</td>
</tr>
<tr>
<td>Total ROM Cost Estimate:</td>
<td></td>
<td>$9,367,201 CAD</td>
</tr>
</tbody>
</table>

### 6.5 Project Timeline

Preliminary opinion of construction costs (Concept Estimate) has been prepared based on the conceptual site plan and floor plan for schemes and preliminary scope review related to development of emergency communications additions for each site. The estimate was prepared by the Architect based on historical cost data for similar emergency communications centre projects.
6.6 Recommendations

As has been previously mentioned and demonstrated by conceptual planning schemes, each site provides ample opportunity for development of the new regional emergency communications centre. Factors relating to proximity of current staff, facility back-up location and capabilities, utility infrastructure features for both sites, and extended synergies with functions related to either site have had cursory review and may influence detailed development of schemes on either site.

It is anticipated that fulfillment of some portion programmatic needs shall be achieved within the existing facility, thus the addition as planned for the administration and training building at the Police and Fire Training Centre is somewhat smaller than the scheme developed for the Regional Police Headquarters. Accordingly the projected construction cost reflects the smaller sized project. The differential in both building area and new construction costs as indicated above cost table reflects such. Should sharing of certain staff support elements such as locker/shower rooms, break areas, and training/meeting rooms not become available for use and require construction with the PSAP addition, building areas and construction costs between the two sites would equalize.

It should be further noted that the concept plan for the Police and Fire Training Centre site requires some significant re-alignment of the existing EVOC driving course which should be reviewed by Region emergency management staff as to the suitability to do so and maintain a functioning course.

Due to the existing stream and stream buffers, certain restrictions are imposed and thus constrictions on the planning of a PSAP addition and associated site amenities and features typically provided for this type of facility.

The Regional Police Headquarters offers ample space for enhanced parking, secure perimeter, and independent planning separate from the HQ building allowing for a co-located but independent operation. Adequate site area for the planning of the facility and accommodation of site support functions best integrated with other site development features creates a suitable location. Additionally, as indicated in the concept documents, the area currently occupied by the PSAP and vacated with the new addition is suggested as redevelopment for a Region emergency operations centre (EOC). This would allow for leverage of enhanced communications systems and building infrastructure installed with the PSAP addition for support of the EOC.

Based on the above, it is this consultant’s opinion that, of the two sites considered, the Regional Police Headquarters site provides the best location for the planned emergency communications facility.
7. COST ANALYSIS

The cost of consolidation has several components including those associated with an operating budget, transition costs and one-time capital costs.

7.1 PSAP Operating Budget

The estimated operating budget for a consolidated centre includes personnel, annual maintenance for technology, and other administrative costs. Personnel cost estimates should be considered as rough estimates only. Actual personnel costs cannot be estimated until pay scales and benefits are decided upon in future implementation planning processes.

The following table estimates personnel costs for a consolidated PSAP. When developing these costs the following assumptions were used:

- The highest benefits rate, 33%, among the three agencies was used.
- Positions such as the trainer and QA/QC positions are assumed to be at the supervisory level
- Pay rates for telecommunicators are based on a midpoint of the three agencies' pay ranges.

Table 29 – Consolidated PSAP Personnel Costs Estimate

<table>
<thead>
<tr>
<th>Position Title</th>
<th>Number of Employees</th>
<th>Estimated Base Pay Per Position</th>
<th>Estimated Total Base Pay</th>
<th>Benefits @ 33%</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSAP Director/Manager</td>
<td>1</td>
<td>$115,000</td>
<td>$115,000</td>
<td>$37,950</td>
<td>$152,950</td>
</tr>
<tr>
<td>Deputy Director - Operations</td>
<td>1</td>
<td>$97,000</td>
<td>$97,000</td>
<td>$32,010</td>
<td>$129,010</td>
</tr>
<tr>
<td>Deputy Director - Technology</td>
<td>1</td>
<td>$97,000</td>
<td>$97,000</td>
<td>$32,010</td>
<td>$129,010</td>
</tr>
<tr>
<td>Shift Supervisors</td>
<td>12</td>
<td>$85,000</td>
<td>$1,020,000</td>
<td>$336,600</td>
<td>$1,356,600</td>
</tr>
<tr>
<td>Telecommunicators*</td>
<td>66</td>
<td>$63,000</td>
<td>$4,158,000</td>
<td>$1,372,140</td>
<td>$5,530,140</td>
</tr>
<tr>
<td>GIS Tech</td>
<td>1</td>
<td>$80,000</td>
<td>$80,000</td>
<td>$26,400</td>
<td>$106,400</td>
</tr>
<tr>
<td>QA/QC</td>
<td>1</td>
<td>$85,000</td>
<td>$85,000</td>
<td>$28,050</td>
<td>$113,050</td>
</tr>
<tr>
<td>Trainer</td>
<td>2</td>
<td>$85,000</td>
<td>$170,000</td>
<td>$56,100</td>
<td>$226,100</td>
</tr>
<tr>
<td>IT Support</td>
<td>2</td>
<td>$85,000</td>
<td>$170,000</td>
<td>$56,100</td>
<td>$226,100</td>
</tr>
<tr>
<td>Clerical Support</td>
<td>1</td>
<td>$40,000</td>
<td>$40,000</td>
<td>$13,200</td>
<td>$53,200</td>
</tr>
<tr>
<td>Total Staff Needed</td>
<td>88</td>
<td>$6,032,000</td>
<td>$1,990,560</td>
<td>$8,022,560</td>
<td></td>
</tr>
</tbody>
</table>

*Initially all call takers/dispatcher will be under the job title of telecommunicators with the same pay. Once established, the PSAP can create two separate job titles and pay ranges.
The remaining portions of the estimated operating budget for a consolidated PSAP include technology maintenance and administrative costs such as supplies, travel, uniforms, office equipment, etc.

For purposes of this preliminary estimate, Kimball used an equation that allows personnel costs to equate to approximately 80% of the total operating budget. Therefore, technology maintenance and other administrative costs comprise the remaining 20%. Since technology maintenance is estimated to be $319,787, and other administrative costs are estimated at $1,660,996. The table below summarizes these calculations.

Table 30 – Estimated Consolidated PSAP Operating Budget

<table>
<thead>
<tr>
<th>Estimated PSAP Operating Budget</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Expense</td>
<td>Cost</td>
</tr>
<tr>
<td>Personnel</td>
<td>$8,022,560</td>
</tr>
<tr>
<td>Administrative</td>
<td></td>
</tr>
<tr>
<td>Technology Maintenance</td>
<td>$319,787</td>
</tr>
<tr>
<td>Other Operating Costs</td>
<td>$1,660,996</td>
</tr>
<tr>
<td>Total</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
</tr>
</tbody>
</table>

The following table compares the combined budgets for the existing PSAPs with the estimated operating budget for a consolidated PSAP.

Table 31 – Existing and Estimated PSAP Budget Comparison

<table>
<thead>
<tr>
<th>Budget Comparison</th>
<th>Amount</th>
</tr>
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<tbody>
<tr>
<td>Existing Combined PSAP Budget</td>
<td>$10,603,910</td>
</tr>
<tr>
<td>Estimated Consolidated PSAP Budget</td>
<td>$10,003,343</td>
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<tr>
<td>Difference</td>
<td>-$600,567</td>
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While the budget comparison shows a potential savings of approximately $600,000, caution should be exercised when considering this number. So many variables come into play in regards to personnel, technology and facility decisions that this number could be higher or it could disappear entirely. Further, the estimated personnel costs for the consolidated centre include positions that do not exist currently such as a dedicated QA/QC person, trainer and other critically needed support.
7.2 One-time Consolidation Costs

Municipalities can expect to encounter certain one-time costs during the consolidation process. Some of these costs can be determined in advance while some cannot be estimated with any accuracy until the planning and implementation phases occur. Examples of one-time costs include personnel costs associated with transitioning to a new PSAP and training on new systems, facility costs and the cost of professional services that may be needed such as architects and/or consultants.

Transition Related Personnel Costs
Personnel costs during transition will increase. There is the cost to the participating agencies to maintain existing operations and staff during training and transition activities. There is also the cost to train the existing staff on the new systems, equipment and protocols so that they are able to migrate successfully to the new operation. These costs will be determined by the choices made during the planning and implementation phases.

Costs for hiring the administrative staff during the transition planning period will depend on the positions selected as necessary to the operation of a consolidated communications centre. Other factors that affect cost include when each staff member is hired, which entity will bear these costs, and what the pay and classification will be. The cost of hiring existing staff into the new operation will also depend on existing pay and classification, seniority, position to be hired into, and if/where adjustments are needed to create the parity in pay necessary to bring all staff to a fair and equitable level. Benefits usually prove to be the most difficult aspect of this effort. In order to not create roadblocks in the transition process, difficult decisions may be needed and/or specific decisions to ‘grandfather’ some benefits and/or address via natural attrition may be necessary.

Through this process, some staff may be able to remain at a pay and benefit level that differs from the majority of the staff for the remainder of their career or some pre-determined time period. This is sometimes necessary when an employee has considerable time in, may be close to retirement, or would suffer loss that cannot be reasonably compensated from changes in benefits.

The consolidation process will require one-time expenditures as well. The best example of this type of expense would be renovation or construction of a new facility to house the consolidated PSAP.

Facility Costs
The costs associated with building or renovating a facility are significant examples of initial capital expenses. The cost estimates for two potential sites in the Waterloo Region range from just under $8 million dollars to approximately $9.3 million dollars.

Professional Services
To assist and support the planning, transition and implementation of consolidation, temporary professional services with experience conducting multiple consolidation planning and transition projects should be engaged. This will provide appropriate coordination of resources, planning documents and timelines, and necessary coordination between all stakeholders, vendors, contractors, and user agencies. Planning costs are determined by the level of support needed and calculated in hours of effort and time on-site. These costs will be dependent upon the level of support needed during the transition and implementation.
7.3 Technology Costs

Technology costs can be difficult to estimate with accuracy in the preliminary phases of consolidation. There will be a variety of decision points for each critical system that may increase or decrease the total cost. However, as a starting point, Kimball examined the current systems in use to determine what systems could be reused, expanded or would need total replacement. Kimball used the results of this examination to provide an estimate of approximately $1.9 million dollars to replace or expand the key technology needed in a consolidated PSAP. Section 5.5.8 provides full details.

7.4 Consolidation Cost Summary

Initial cost estimates for consolidation include:
1. Annual estimated PSAP operating budget of $1,881,100. This estimate is a rough estimate only. Estimates will need to be re-visited during the planning and implementation phases once decisions have been made regarding the final organizational structure, call taking and dispatch methodology, staffing plan and actual personnel and benefits costs.
2. Consolidation related technology costs of $1,881,100.
3. Facility costs of $9,367,201. This cost estimate represents the recommended renovation of the WRPS HQ building.

Not included in these costs are items such as:
- Personnel costs associated with training and transitioning to a new PSAP
- Any professional services required
- Any changes to technology
- Any changes to organizational structure that would increase staffing levels

7.5 Cost Distribution Models

The distribution of costs associated with a newly consolidated PSAP requires that all participants agree on the distribution formula. Achieving consensus is often a contentious and difficult task. The criteria used to determine the distribution of costs frequently yield different results for participants so agreeing on what is fair and equitable can be difficult, and largely a matter of perspective. For example, using strictly population as the basis for cost distribution may provide Agency A significant cost savings while Agency B’s costs increase. Using 9-1-1 call volume only may reverse those results with Agency A incurring cost increases while Agency B saves. Commonly, more than one criterion is used to reach a formula that is considered fair and equitable by all participants.

Clearly, establishing an acceptable formula can be a “show stopper” in the consolidation process. Most often, this issue is addressed early in the pre-implementation process, along with governance, to determine if the consolidation will be able to move forward. If agencies are unable to agree on a distribution formula, then the rest of the implementation process cannot take place.

The following sections contain cost distribution models that may be used as a starting point for discussions.
7.5.1 Population-based Model

With population-based funding, a formula would determine the contribution rate for individual municipalities to PSAP costs, based on the census information for that municipality.

Positive attributes include the following:
- Easy formula to use, as contribution is based on the percentage of total population each municipality contains.
- Population can be used as part of a more complex formula similar to this:
  - One-third calls for service
  - One-third property value
  - One-third population

Negative attributes include the following:
- May not take into account the transient, seasonal, or unique populations such as prisons, resort areas or universities.
- Does not take into account significant increases in population that occur during normal business hours.

7.5.2 Usage-based Model

Usage-based funding is a mechanism based on the number of 9-1-1 calls received and/or dispatched for each municipality.

Positive attributes include the following:
- Would take into account the higher burden placed on the PSAP by municipalities that have a high transient or visitor population, or include areas that generate higher than normal 9-1-1 calls.
- A simple formula to calculate based on records maintained through PSAP systems.

Negative attributes include the following:
- Funding can vary from year-to-year depending on crime rates, major incidents, such as storms and other disasters, while PSAP operational costs remain constant.
- The number of 9-1-1 calls alone may not accurately reflect the work load generated by a particular municipality, user agency or county. The actual work load will depend on the number of administrative calls received and handled by the PSAP, and the performance of any ancillary duties that may be specific to a particular user agency.

7.5.3 Call Volume-based Model

This model has two variations. In the first variation, cost distribution is based on each municipality’s portion of the total number of 9-1-1 calls handled by the PSAP. In the second variation, the distribution is based on each municipality’s portion of the total number of 9-1-1 and administrative calls handled by the PSAP.

Positive attributes include the following:
- Simple methodology
Actual call counts can be easily determined with management information system (MIS) software that is part of most 9-1-1 telephony systems.

Negative attributes include the following:

- Basing cost distribution on 9-1-1 calls only does not accurately reflect the workload each municipality brings to a consolidated centre as it does not include administrative calls, which are actually the larger portion of the call volume.
- Dispatch activity is not reflected in the cost distribution. While it is logical to assume that the level of dispatch activity would be in line with the number of 9-1-1 calls, this is not always the case. An agency that gets few 9-1-1 calls, but whose field personnel are very active in initiating their own activities (parking, traffic stops, fire inspections etc.) could impact the overall workload of the PSAP much more than the 9-1-1 call count indicates.

When first consolidating, Kimball recommends that the cost distribution model be as simple as possible and based on data that is measurable and consistent across all participants. Once the consolidation has taken place and other measurable data is developed, the cost formula should be re-visited.
8. SUMMARY AND RECOMMENDATIONS

In general, although each of the existing PSAPs are staffed with dedicated employees that perform excellent work every day, the emergency communications system regionally within which they work is deficient in key areas including:

➢ The separation of police, fire and emergency medical services (EMS) communications into individual PSAPs creates a disjointed environment where 9-1-1 calls must be, at times, transferred one or more times to receive service from all necessary agencies. Although technology can help mitigate the delays inherent to call transfers, it cannot completely resolve the impact on response times.

➢ Separation of the PSAPs complicates the coordination of major incidents as was the case in the November 2011 helicopter crash at the Waterloo Region Airport. In addition, the more PSAPs involved in an incident, the more opportunity for human error, especially under high-stress situations.

➢ Tiered call taking methodology results in multiple call takers from different PSAPs being tied up on the same call simultaneously. At minimum, this practice is expensive as it requires a duplication of effort by call takers and may delay field response since there are time delays inherent in any call transfer scenario.

➢ Quality control/quality assurance (QA/QC) is not being conducted in all PSAPs due to a lack of resources.

In Kimball’s opinion, substantial benefits could be reaped by consolidating the three PSAPs, although as long as the Ministry of Health EMS Dispatch remains separate, maximum efficiencies and service levels cannot be achieved. Benefits include:

➢ A reduction in the number of 9-1-1 calls that are transferred from the primary PSAP to either a fire or EMS secondary PSAP which will help eliminate duplication of call taker efforts between multiple PSAPs. A reduction will help reduce the call handling delays inherent when a tiered system is used.

➢ Greater efficiencies in call handling will equate to lower personnel costs over time with no reduction in service levels or field personnel safety.

➢ Improved control and coordination of major incidents such as the Kitchener Airport helicopter crash in 2011. Working with and deciphering confusing or conflicting addresses and other information reported by citizens is part of what a PSAP does. However, conflicts and confusion is identified more quickly and resolved much more easily within a single PSAP than when split among three PSAPs.

➢ Improved utilization of law enforcement and fire resources when coordinated from a single point.

➢ Costs such as those associated with the Bell Canada Bid-0013 project would be incurred by a single PSAP rather than by each PSAP.

➢ Procurement of replacement technology for a single PSAP rather than three individual PSAPs will be more cost efficient.

➢ Individual PSAPs have or will incur costs such as those related Bell Canada’s in-call location update and migration to NG9-1-1. Whereas, in a consolidation scenario, only the single PSAP would incur the cost rather three individual PSAPs.

➢ Potential personnel cost savings. When comparing the estimated budget of a consolidated PSAP with the combined budgets of the individual PSAPs, the budget for a consolidated PSAP is approximately $600,000 less and includes positions such as a QA/QC manager, trainer and GIS specialist.

Based on the data collected during this study, Kimball recommends pursuing consolidating the WRPS, and Cambridge and Kitchener Fire Department PSAPs. However, a consolidation effort would not be without challenges including:
The following sections summarize the recommendations made throughout this report.

**In-call Location Update & NG9-1-1 Migration Recommendations**
- All three PSAPs should work with Bell Canada to implement the new XML IP data ALI data platform.
- Kimball recommends enhancing the respective CAD interfaces to include:
  - Interface with the new IP ALI system
  - Display and communicate with T9-1-1 callers via CAD
  - Ability to display ICLU data, including the ability to manually query an update from CAD via a button or command

**Radio System Recommendations**
It is evident that the Region will need to build a new P25 Phase I simulcast digital voted trunked radio system in the upcoming future. Any new subscriber and backbone infrastructure should be capable of Phase II 2 slot TDMA without any heavy forklift upgrade accomplished through software upgrades only.

**EMS Recommendations**
- Maximum efficiencies in the Region’s emergency communications services can only be achieved if law enforcement, fire and EMS participate. Both the Ministry of Health EMS Dispatch and the Cambridge CACC should be encouraged to participate in current consolidation meetings and discussions, although not as voting participants. Participation in discussions will ensure that they are aware of the current status of the project and can offer suggestions on the best methodology for interaction between the agencies and any consolidated PSAP created in the future.
- Maximum efficiencies in the Region’s emergency communications services can only be achieved if law enforcement, fire and EMS participate. Discussions with the Ministry of Health should be initiated to see what options may be available for EMS Dispatch in terms of consolidation with police and fire including co-location or establishment of a pilot program for control of EMS at the regional level.

**Current Environment Recommendations**
- Kimball recommends that the three agencies in this study commit to the next early planning stage.
- Kimball also recommends that conversations with the labor unions continue once it is determined that agreement on governance and cost distribution can be reached.
- A full assessment of call handling and dispatch methodology is recommended for WRPS to attempt to maximize efficiencies when transferring calls and identifying any opportunities to reduce call handling talk time.

**Governance Recommendations**
Kimball recommends that common governance models, such as those listed in Section 5, be evaluated for adoption in the Region. Consolidation participants may also find that the best fit for the participants in Waterloo Region is one of the models listed in this document, but customized to fit the specific needs of this consolidation effort.
CAD Recommendations

- Kimball recommends expansion of the Intergraph CAD system in use by the PRIDE consortium and RPS for use in a consolidated PSAP that would include the dispatch of both law enforcement and fire agencies.
- The consolidated centre should work with the Ministry of Health and the Cambridge CACC to implement the EMS-TIF CAD interface so that this existing functionality with the Kitchener Fire Communications Centre is not lost.
- Both fire communications centres monitor various incoming fire alarms via monitoring equipment installed in their dispatch centres. The monitoring of these alarms will need to be migrated to the consolidated centre. It is recommended that a CAD interface to these systems be investigated so that when an incoming fire alarm arrives an event is automatically created in the CAD systems pending events window.
- The CAD system should interface with Bell Canada’s Agent 511 application for processing of T9-1-1 calls.
- The CAD system should interface with the 9-1-1 answering equipment allowing wireless ICLU updates to be manually queried via a CAD button or command.
- Kimball recommends that production server(s) be located on the communications centre premises with additional back-up servers off premise to ensure data security.
- The consolidated centre should continue to provide vendor 24/7 system support and maintenance.
- Kimball recommends a PSAP have a “CAD crash kit” that includes all necessary paperwork, backup instructions, resource lists, standard operating procedures/guidelines, incident/unit status cards and time stamps.
- Ensure that all critical systems are interfaced to the master clock (CAD, 9-1-1 answering equipment, radio consoles and logging recorder).

Cost Distribution Recommendation

- When first consolidating, Kimball recommends that the cost distribution model be as simple as possible and based on data that is measurable and consistent across all participants.
- Once the consolidation has taken place and other measurable data is developed, the cost formula should be re-visited.

Facility Recommendation

Based on the information provided in Section 6, of the two sites considered the Regional Police Headquarters site provides the best location for the planned emergency communications facility.
9. NEXT STEPS

Completion of the feasibility study is only the first real step in the consolidation. A common roadblock to each region, municipality or user agency deciding whether to participate occurs at this point in the process. Each entity understandably needs to know how much the initial capital and recurring costs will be for participating and how much, if any, cost savings is achievable. However, identifying these costs requires that the number of actual participants be determined in order to calculate workload, staffing, and required physical space needs. In addition, key and often contentious decisions must be made. Governance and cost distribution models must be agreed upon by all potential participants before per-entity costs can be determined with any reliability. One method to resolve this issue is to have all potential participants agree to continue in the process until governance and cost distribution models and entity-specific financials are determined. In other words, once consolidation is determined to be feasible, all potential partners agree to come to the table and work out governance, cost distribution and facility decisions so that per-entity costs can be established. No region, user agency, or municipality is committed to consolidating at this point in time.

Consolidation efforts often derail during discussion on two points, the governance and cost distribution models. Therefore, these decisions should be made first before spending additional time and money on in-depth planning. Discussion should examine and consider the recommended governance models first. A successful consolidation will require that participants agree to a governance model and a new way of doing business. The participants must be open to change and be willing to provide dispatch services in a different manner. Waterloo Region has been studying this issue for several years and should give serious consideration to moving forward.

Once these key decisions are made and costs can be determined, those that wish to commit to being part of the new PSAP can sign an intergovernmental agreement and the "real" planning begins.

Once participants have committed to the consolidation process, initial planning begins including:

- Begin construction or renovation process for the chosen facility.
- Begin procurement of any needed technology including a complete CAD-to-CAD functionality study
- Begin recruitment of a director.
- Identify professional services support needed and begin process to procure them.
- Begin resolving human resource issues such as labor agreements, pay, seniority, vacation, job titles, and deciding whether existing PSAP staff will be automatically grandfathered in or if an interview and hiring process will take place.
- Begin development of standard operating procedures or guidelines for the new PSAP.
- Establish work groups to focus on facility, human resources, policy, and technology components of the project.
APPENDIX A – FACILITY CONCEPTUAL PLAN

The conceptual plans can be found on the following pages.

The remainder of this page is intentionally left blank.
REMOVE EXISTING LIBRARY / REBUILD IN NEW ADDITION

APPROXIMATE REALIGNMENT OF EVOC DRIVEWAY COURSE

EXISTING ADMIN & TRAINING

POSSIBLE ADDITIONAL PARKING

PROPOSED PSAP ADDITION

APPROX. LINE OF EXISTING WATER COURSE

PSAP ENTRANCE

ADM & TRAINING ENTRANCE

(PARKING)

9-1-1 EMERGENCY COMMUNICATIONS CENTRE CONSOLIDATIONS FACILITIES PROGRAM

REGION OF WATERLOO

SITE: FIRE TRAINING WATERLOO, ON
DATE: 9/13/2013
SCALE: 0 2 4 10 20m
APPRAO. GROSS AREA OF ADDITION: 1400 M²
LOSE 8 PARKING SPACES
EXTEND 2ND LEVEL HALLWAY EXIT TO ON-GRADE EXIT
REMOVE EXISTING STAIR TOWER
SECURE COURTYARD
SECURE PARKING SPACES
H.C.
FENCE LINE
GATE
MAPLE GROVE RD.
SITE SECURITY WALL
SITE:
REGIONAL POLICE
CAMBRIDGE, ON
DATE:
9/13/2013
SCALE:
0 2 4 10 20m
REGION OF WATERLOO
9-1-1 EMERGENCY COMMUNICATIONS CENTRE
CONSOLIDATIONS FACILITIES PROGRAM
MECH. PENTHOUSE
EXISTING REGIONAL POLICE HEADQUARTERS
PROPOSED PSAP ADDITION
ECC
PSAP ENTRANCE
SECURE PARKING 1-30 SPACES
FENCE LINE
GATE
SITE SECURITY WALL
GATE
9-1-1 EMERGENCY COMMUNICATIONS CENTRE
CONSOLIDATIONS FACILITIES PROGRAM
EMERGENCY COMMUNICATION CENTER

MALE LOCKER/SHOWER

FEMALE LOCKER/SHOWER

BREAK AREA

KITCHEN/VENDING

CRITICAL EQUIPMENT ROOM

DEP. DIR. DEP. DIR. DIR. DIR.

COATS STORE

A/V COATS

SUPPORT

CONF.

QC OFF.

ACCRED. MGR.

A/A

SECURE LOBBY

VEST.

SHIFT CHANGE

SYSTEMS TRAINING

QUIET ROOM

DEP. DIR.

DEP. DIR.

KITCHEN/VENDING

BOLLSARDS

(SECURE COURTYARD)

(SECURE COURTYARD)

FACE OF EXISTING BUILDING

MODIFICATIONS TO CONNECT TO EXISTING CORRIDOR

REMOVE EXISTING STAIR TOWER

CONVERT TO FOC?

NEW HALLWAY EXTENSION @ 2ND LEVEL ABOVE

MECHANICAL PENTHOUSE ABOVE

LINE OF EXISTING UPPER FLOOR LEVEL

APPROX. GROSS AREA OF ADDITION: 1670 M²

MECHANICAL PENTHOUSE ABOVE

EMERGENCY COMMUNICATION CENTER

9-1-1 EMERGENCY COMMUNICATIONS CENTRE
CONSOLIDATIONS FACILITIES PROGRAM

REGION OF WATERLOO

STYLE: REGIONAL POLICE

DATE: 9/13/2013

SCALE: 0 2 5 10m
APPENDIX B – FACILITY SPACE ALLOCATION

The facility space allocation can be found on the following page.

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### Region of Waterloo - Ontario, Canada

#### 2.1.1 EMERGENCY COMMUNICATIONS CENTRE

**Consolidation Facilities Program**

_July 2013 Program Development_

<table>
<thead>
<tr>
<th>Ref #</th>
<th>Space Description</th>
<th># of Spaces or Occupants</th>
<th>Space Type (See details below)</th>
<th>Unit Sq. Ft.</th>
<th>Total Sq. Ft.</th>
<th>Total M²</th>
<th>Remarks</th>
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<tbody>
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<td>100</td>
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<td></td>
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<tr>
<td>101</td>
<td>Director</td>
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<td>PO1</td>
<td>235</td>
<td>235</td>
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<tr>
<td>102</td>
<td>Second Director - Operations</td>
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<td>PO2</td>
<td>235</td>
<td>235</td>
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<tr>
<td>103</td>
<td>Legal Advisor - kangaroo</td>
<td>1</td>
<td>PO2</td>
<td>235</td>
<td>235</td>
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<tr>
<td>104</td>
<td>Legal Advisor - kangaroo</td>
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<td>PO2</td>
<td>235</td>
<td>235</td>
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<tr>
<td>105</td>
<td>Engineering Manager</td>
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<td>PO2</td>
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<td>Human Resource</td>
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<td>107</td>
<td>Administration Assistant</td>
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<td>PO2</td>
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<td>21.95</td>
<td></td>
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<tr>
<td>108</td>
<td>Conference Room</td>
<td>1</td>
<td>PO2</td>
<td>235</td>
<td>235</td>
<td>21.95</td>
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<td>109</td>
<td>Telecommunications</td>
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#### 5.09 A.C.T. (Area of Concern - Productive Areas)

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<th>Total M²</th>
<th>Remarks</th>
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<tr>
<td>200</td>
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<td>1</td>
<td>WS1</td>
<td>45</td>
<td>45</td>
<td>4.18</td>
<td></td>
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<tr>
<td>201</td>
<td>Trainers</td>
<td>2</td>
<td>WS1</td>
<td>95</td>
<td>190</td>
<td>17.65</td>
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<tr>
<td>202</td>
<td>Break Area</td>
<td>24</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>203</td>
<td>Chair Storage</td>
<td>1</td>
<td>WS1</td>
<td>125</td>
<td>125</td>
<td>11.61</td>
<td></td>
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<tr>
<td>204</td>
<td>A/V Control</td>
<td>1</td>
<td>WS1</td>
<td>125</td>
<td>125</td>
<td>11.61</td>
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#### 3.08 C.A.G. (Area of Concern - Support Areas)

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<th>Total Sq. Ft.</th>
<th>Total M²</th>
<th>Remarks</th>
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<tbody>
<tr>
<td>300</td>
<td>Security/ID Card Station</td>
<td>1</td>
<td>WS1</td>
<td>95</td>
<td>95</td>
<td>8.83</td>
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<td>301</td>
<td>Public Toilet Rooms</td>
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<td>SO</td>
<td>95</td>
<td>190</td>
<td>17.65</td>
<td>Accessibility compliant for public use off main entry</td>
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<tr>
<td>302</td>
<td>Men Locker/Shower Room/Toilet</td>
<td>1</td>
<td>SO</td>
<td>600</td>
<td>600</td>
<td>55.74</td>
<td>Hallway lockers in staff secure corridor</td>
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<tr>
<td>303</td>
<td>Women Locker/Shower Room/Toilet</td>
<td>1</td>
<td>SO</td>
<td>600</td>
<td>600</td>
<td>55.74</td>
<td>Hallway lockers in staff secure corridor</td>
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<tr>
<td>304</td>
<td>Kitchen/Vending Area</td>
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<td>SO</td>
<td>200</td>
<td>200</td>
<td>18.58</td>
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<td>305</td>
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<td></td>
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<tr>
<td>306</td>
<td>Equipment Storage/Staging Room</td>
<td>1</td>
<td>ER</td>
<td>150</td>
<td>0</td>
<td>0.00</td>
<td>Laptop, telephone storage</td>
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<tr>
<td>307</td>
<td>Copier/Work Areas</td>
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<td>WR</td>
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<td>308</td>
<td>Closets/Coats/Storage</td>
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<td>SO</td>
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#### 4.07 C.E.C. (Area of Concern - Emergency Services Operations CENTRE)

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<th>Ref #</th>
<th>Space Description</th>
<th># of Spaces or Occupants</th>
<th>Space Type (See details below)</th>
<th>Unit Sq. Ft.</th>
<th>Total Sq. Ft.</th>
<th>Total M²</th>
<th>Remarks</th>
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<td>1</td>
<td>SF</td>
<td>400</td>
<td>0</td>
<td>0.00</td>
<td>Current EOC - 20 seats</td>
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<td>401</td>
<td>Conference Room</td>
<td>1</td>
<td>SF</td>
<td>25</td>
<td>0</td>
<td>0.00</td>
<td>R-56 Room with four (4) positions</td>
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<td>402</td>
<td>Dispatch Consoles</td>
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<td>DISP</td>
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<tr>
<td>403</td>
<td>Call-takers Room</td>
<td>16</td>
<td>C/T</td>
<td>125</td>
<td>2000</td>
<td>185.81</td>
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#### Notes

_Region of Waterloo - Ontario, Canada_

**Building Efficiency Factor (NSF to GSF) 35%**

<table>
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<tr>
<th>Section</th>
<th>Subtotal NSF</th>
<th>Subtotal GSF</th>
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<tbody>
<tr>
<td>100</td>
<td>1,945 NSF</td>
<td>1,80.70 M²</td>
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<td>200</td>
<td>880 NSF</td>
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<td>300</td>
<td>0 NSF</td>
<td>0.00 M²</td>
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<tr>
<td>400</td>
<td>5,000 NSF</td>
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<td>500</td>
<td>585 NSF</td>
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<tr>
<td>800</td>
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<td>0.00 M²</td>
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**Building Size (In GSF):**

- 1,887 M²

**Building Efficiency Factor (NSF to GSF):** 35%

**Building Size (In NSF):**

- 1,362 NSF

---

_July 2013 Program Development_

**Consolidation Facilities Program**

- Region of Waterloo - Ontario, Canada

**NOTES**

- **Space Type Designations:**
  - PO1: Private Office - Direct(1) Level
  - PO2: Private Office - Non Direct(2) Level
  - PO3: Private Office - Non Direct(3) Level
  - WO: Work space - \* a combination of work space (W) and office (O) space

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_July 2013 Program Development_

**Region of Waterloo - Ontario, Canada**

**NOTES**

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  - PO2: Private Office - Non Direct(2) Level
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---

_July 2013 Program Development_

**Region of Waterloo - Ontario, Canada**

**NOTES**

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  - PO1: Private Office - Direct(1) Level
  - PO2: Private Office - Non Direct(2) Level
  - PO3: Private Office - Non Direct(3) Level
  - WO: Work space - \* a combination of work space (W) and office (O) space
# ACRONYMS

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Definition</th>
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<tbody>
<tr>
<td>ACN</td>
<td>Automatic Crash Notification</td>
</tr>
<tr>
<td>ALI</td>
<td>Automatic Location Identification</td>
</tr>
<tr>
<td>ANI</td>
<td>Automatic Number Identification</td>
</tr>
<tr>
<td>ANSI</td>
<td>American National Standards Institute</td>
</tr>
<tr>
<td>APCO</td>
<td>Association of Public-Safety Communications Officials</td>
</tr>
<tr>
<td>API</td>
<td>Application Programming Interface</td>
</tr>
<tr>
<td>AQS</td>
<td>ALI Query Server</td>
</tr>
<tr>
<td>AVL</td>
<td>Automatic Vehicle Location</td>
</tr>
<tr>
<td>CACC</td>
<td>Cambridge Central Ambulance Communications Centre</td>
</tr>
<tr>
<td>CAD</td>
<td>Computer Aided Dispatch</td>
</tr>
<tr>
<td>CE</td>
<td>Customer Edge</td>
</tr>
<tr>
<td>CALEA</td>
<td>Commission on Accreditation for Law Enforcement Agencies</td>
</tr>
<tr>
<td>CEMP</td>
<td>Comprehensive Emergency Management Plan</td>
</tr>
<tr>
<td>CLEC</td>
<td>Competitive Local Exchange Carrier</td>
</tr>
<tr>
<td>CPE</td>
<td>Customer Premise Equipment</td>
</tr>
<tr>
<td>CPIC</td>
<td>Canadian Police Information Centre</td>
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<tr>
<td>CPR</td>
<td>Cardiopulmonary Resuscitation</td>
</tr>
<tr>
<td>CTI</td>
<td>Computer Telephony Integration</td>
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<td>DHHSI</td>
<td>Deaf, Hard of Hearing and Speech Impaired</td>
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<tr>
<td>DHS</td>
<td>U.S. Department of Homeland Security</td>
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<tr>
<td>E9-1-1</td>
<td>Enhanced 9-1-1</td>
</tr>
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<td>EMD</td>
<td>Emergency Medical Dispatch</td>
</tr>
<tr>
<td>EMS</td>
<td>Emergency Medical Services</td>
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<tr>
<td>EMS-TIF</td>
<td>Emergency Medical Services - Technology Interoperability Framework</td>
</tr>
<tr>
<td>EOC</td>
<td>Emergency Operations Center</td>
</tr>
<tr>
<td>ESINet</td>
<td>Emergency Service IP Network</td>
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<tr>
<td>EVOC</td>
<td>Emergency Vehicle Operator Course</td>
</tr>
<tr>
<td>FCC</td>
<td>Federal Communications Commission (U.S.)</td>
</tr>
<tr>
<td>FMTI</td>
<td>Fire Monitoring Technologies, International</td>
</tr>
<tr>
<td>FRMS</td>
<td>Fire Records Management System</td>
</tr>
<tr>
<td>GIS</td>
<td>Graphic Information System</td>
</tr>
<tr>
<td>HSPA</td>
<td>High Speed Packet Access</td>
</tr>
<tr>
<td>HVAC</td>
<td>Heating, Ventilation and Air Conditioning</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Description</td>
</tr>
<tr>
<td>--------------</td>
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</tr>
<tr>
<td>IAFC</td>
<td>International Association of Fire Chiefs</td>
</tr>
<tr>
<td>ICMA</td>
<td>International City/County Management Association</td>
</tr>
<tr>
<td>ICON</td>
<td>Integrated Court Offences Network</td>
</tr>
<tr>
<td>ICU</td>
<td>In-call Location Update</td>
</tr>
<tr>
<td>ICS</td>
<td>Incident Command System</td>
</tr>
<tr>
<td>ILEC</td>
<td>Incumbent Local Exchange Carrier</td>
</tr>
<tr>
<td>IP</td>
<td>Internet Protocol</td>
</tr>
<tr>
<td>IRR</td>
<td>Instant Recall Recorder</td>
</tr>
<tr>
<td>LAN</td>
<td>Local Area Network</td>
</tr>
<tr>
<td>LDT</td>
<td>Line Digital Trunk</td>
</tr>
<tr>
<td>LERMS</td>
<td>Law Enforcement Records Management System</td>
</tr>
<tr>
<td>MCM</td>
<td>Major Case Management</td>
</tr>
<tr>
<td>MDC</td>
<td>Medical Doctor</td>
</tr>
<tr>
<td>MDC</td>
<td>Mobile Data Computer</td>
</tr>
<tr>
<td>MIS</td>
<td>Management Information System</td>
</tr>
<tr>
<td>MOHLTC</td>
<td>Ministry of Health and Long Term Care</td>
</tr>
<tr>
<td>MTO</td>
<td>Ministry Transportation Office</td>
</tr>
<tr>
<td>NCIC</td>
<td>National Crime Information Center (U.S.)</td>
</tr>
<tr>
<td>NENA</td>
<td>National Emergency Number Association (U.S. and Canada)</td>
</tr>
<tr>
<td>NFPA</td>
<td>National Fire Protection Association (U.S.)</td>
</tr>
<tr>
<td>NG9-1-1</td>
<td>Next Generation 9-1-1</td>
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<tr>
<td>NIMS</td>
<td>National Incident Management System (U.S.)</td>
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<tr>
<td>NIOSH</td>
<td>National Institute for Occupational Safety and Health (U.S.)</td>
</tr>
<tr>
<td>NPGP</td>
<td>National Preparedness Grant Program</td>
</tr>
<tr>
<td>OCPC</td>
<td>Ontario Civilian Police Commission</td>
</tr>
<tr>
<td>PC</td>
<td>Personal Computer</td>
</tr>
<tr>
<td>PERS</td>
<td>Public Emergency Reporting Service</td>
</tr>
<tr>
<td>POTS</td>
<td>Plain Old Telephone Service</td>
</tr>
<tr>
<td>PRIDE</td>
<td>Police Regionalized Information Data Entry</td>
</tr>
<tr>
<td>PSO</td>
<td>Public Safety Officer (trained to perform both law enforcement and fire duties)</td>
</tr>
<tr>
<td>QA/QC</td>
<td>Quality Assurance and Quality Control</td>
</tr>
<tr>
<td>RETAINS</td>
<td>Responsive Effort to Address Integral Needs in Staffing</td>
</tr>
<tr>
<td>RMS</td>
<td>Records Management System</td>
</tr>
<tr>
<td>RN</td>
<td>Registered Nurse</td>
</tr>
<tr>
<td>RPN</td>
<td>Registered Practical Nurse</td>
</tr>
<tr>
<td>SIP</td>
<td>Special Interest Police</td>
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<tr>
<td>Abbreviation</td>
<td>Description</td>
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<td>--------------</td>
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</tr>
<tr>
<td>SOR</td>
<td>Sexual Offender Registry</td>
</tr>
<tr>
<td>TCP/IP</td>
<td>Transmission Control Protocol / Internet Protocol</td>
</tr>
<tr>
<td>TDD / TTY</td>
<td>Telecommunications Device for the Deaf / Teletypewriter</td>
</tr>
<tr>
<td>TIF</td>
<td>Technology Interoperability Framework</td>
</tr>
<tr>
<td>UHF</td>
<td>Ultra-high Frequency</td>
</tr>
<tr>
<td>UPS</td>
<td>Universal Power Supply</td>
</tr>
<tr>
<td>VHF</td>
<td>Very-high Frequency</td>
</tr>
<tr>
<td>VPN</td>
<td>Virtual Private Network</td>
</tr>
<tr>
<td>XML</td>
<td>Extensible Markup Language</td>
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</tbody>
</table>