

Government of the Northwest Territories

The Implementation of 9-1-1 in the Northwest Territories

Pomax Consulting Inc.
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1. Executive Summary

The purpose of this report is to present recommendations and an implementation plan for a territorial-wide 9-1-1 service.

The Scope outlined in the Territories’ Request for Proposals requires that the implementation plan will include options and cost estimates for aspects such as infrastructure, maintenance, organizational structure, and project management. Part of the intent of the implementation plan is to provide an effective basis for discussion and eventual decision-making by key stakeholders.

A 9-1-1 Public Safety Answering Point or PSAP is a call centre responsible for answering emergency calls for police, fire services, and paramedic service. A Public Safety Answering Point call taker (employee) follows strict protocols while determining to which emergency service the call for assistance should be sent. Call handling by a PSAP call taker usually takes no longer than 45 seconds. In many cases dispatch centres of local emergency services, such as the police, also act as 9-1-1 Public Safety Answering Points because costs are lower due to a more effective use of human resources and available staff time.

There are three types of 9-1-1 systems that can be considered by any jurisdiction, including the Northwest Territories: basic, enhanced, and in the near future, Next Generation:

Basic 9-1-1	Enhanced 9-1-1	Next Generation 9-1-1
<p>Achieves connection to a Public Safety Answering Point (PSAP), by a caller simply keying or dialing 9-1-1. No location or caller number identification is transmitted so a caller must verbally identify his or her location to the 9-1-1 call taker who then looks up the phone numbers of, and manually transfers the call to, the police, paramedic, or fire departments serving the area.</p> <p>Basic 9-1-1 can be implemented now by NorthwTel with no significant technology changes.</p>	<p>Refers to the additional availability of Automatic Number Identification (ANI) and Automatic Location Identification (ALI). ANI is similar to the commercially available calling line identification available to the public, except that the caller cannot block the display of his or her number. Automatic Number Identification is used by telephone companies to reference the location of the telephone number and service; therefore, comprehensive civic addressing – which isn’t available in many NWT communities – must be in place to properly set-up an E9-1-1 system.</p> <p>Enhanced 9-1-1 is possibly end-dated technology due to the expected arrival of Next Generation 9-1-1. Significant capital, annual, and project management costs will be incurred to achieve E9-1-1 implementation.</p>	<p>Will not be available in Canada until 2017 at the earliest but will establish the foundation for public emergency communications services in a wireless mobile society, possibly making text, images, and video from an incident available to emergency services. The future need for text, images, and video to be transmitted to a public safety answering point serving the Northwest Territories, other than for the hearing impaired community, is still to be determined.</p> <p>Current state of readiness is being examined by CRTC. The baseline will not be known until 2017, at which time the CRTC will begin making recommendations with respect to implementation across Canada.</p>

1.1 Financial Considerations in the Implementation of 9-1-1

Enhanced 9-1-1 requires the implementation of technology not currently available in the Northwest Territories, civic addressing, a partnership between a major telephone carrier and NorthwTel, and may require one to two years' of planning before it can come to fruition. The challenge that would take the longest time to resolve would be that of civic addressing. By the time that occurs, Next Generation 9-1-1 is expected to become available in Canada at a cost comparable to or lower than Enhanced 9-1-1. Hence, a move towards Enhanced 9-1-1 appears to be impractical. Therefore, with E9-1-1 appearing unrealizable before NG9-1-1 becomes available, and NG9-1-1 not being expected until at least 2017, Pomax has considered three options within the implementation of **Basic 9-1-1** service in the Northwest Territories:

Option 1: 9-1-1 call answer at a new NWT Public Safety Answering Point in an existing or new facility

Option 2: 9-1-1 call answer through a Public Safety Answering Point (PSAP) Fee for Service contract with an existing emergency service dispatch centre within the Territory

Option 3: 9-1-1 call answer through a Public Safety Answering Point (PSAP) Fee for Service contract with an existing emergency service dispatch centre outside the Territory

The estimated costs for the three options, shown in Table 7 and Table 8 on pages 24 and 25, are based on information gathered during the project period but, because firm data is sparse, we have also relied on information learned during other projects and the best advice of the project stakeholders. The costs and recovery could vary from those shown in the tables however, we expect the actual figures to become progressively firmer as the Northwest Territories decides on its best options and puts plans into action.

Table 1 and Table 2 provide costs estimates for the three options being proposed prior to start up (Table 1), and during operation (Table 2) which includes cost recovery estimates as a result of a NorthwTel Service Fee and a Legislated Cost Recovery fee. Details about service fees and cost recovery fees are provided in Section 5.2 and 5.3.

Table 1 – Public Safety Answering Point Options: Costs Prior to Start-up

Public Safety Answering Point Options: Costs Prior to 9-1-1 Service Start-up	Option 1	Option 2	Option 3
Capital and Overhead:	\$725,000	\$100,000	\$0
Preparatory Operating Costs (4 months for training and equipment troubleshooting)	\$83,333	\$95,667	\$158,333
Staff Requirements	\$133,333	\$50,000	\$50,000
Other Activities	\$132,500	\$132,500	\$132,500
Costs related to preparation prior to 9-1-1 implementation	\$1,074,167	\$378,167	\$340,833

Option 1: New PSAP

Option 2: Fee for Service contract

Option 3: Fee for Service contract outside the Territory.

Table 2 – Public Safety Answering Point Options Post Implementation Continuing Costs (Year 1 to 5)

Public Safety Answering Point Options Post Implementation Continuing Cost (Year 1 - 5)	Option 1	Option 2	Option 3
Annual Operating Costs	\$440,000	\$477,000	\$665,000
Staff Requirements	\$1,137,200	\$87,200	\$87,200
Other Activities	\$297,500	\$147,500	\$147,500
Annual operating costs operating year one in 2015 dollars	\$1,874,700	\$711,700	\$899,700
Cost Recovery			
NWTEL Tariff	(\$190,000)	(\$190,000)	(\$190,000)
Legislated	(\$450,000)	(\$450,000)	(\$450,000)
Estimated annual impact based on tariff and legislation cost recovery year one	\$1,234,700	\$71,700	\$259,700
Estimated annual impact based on tariff and legislation cost recovery year two to five - Project Manager no longer required	\$1,037,200	\$24,200	\$212,200

Option 1: New PSAP

Option 2: Fee for Service contract

Option 3: Fee for Service contract outside the Territory.

1.2 Summary

Based on our research, analyses, experience, and the information presented in this report, Pomax has concluded:

- A. The Northwest Territories is very well positioned to move forward with Basic 9-1-1 which is the most cost effective and timely option available for implementation.
- B. Enhanced 9-1-1 is not viable in the Northwest Territories for the following reasons:
 - Proper civic addressing is a fundamental requirement for E9-1-1, and this remains a significant challenge. (NOTE: a recent government incentive program is starting to help with this issue; however it will take several more years to see the results of these efforts.);
 - The interconnection of telephone switching equipment required for proper E9-1-1 call processing across the Northwest Territories could cost an estimated \$2,000,000 annually; a less expensive interconnection will be required for the pending Next Generation 9-1-1 (NG9-1-1) infrastructure;
 - Expensive network components required for E9-1-1 use obsolete technology that are planned for replacement as NG9-1-1 rolls out across Canada starting in 2017.
- C. Basic 9-1-1 is the logical preparation step for the future move to Next Generation (NG) 9-1-1. NG9-1-1 is not expected to be implemented in Canada until at least 2017. Furthermore, NG9-1-1 will be implemented in larger centres such as Toronto, Montreal, and Vancouver first. This suggests that NG9-1-1 will not be ready for implementation in the Northwest Territories until well beyond 2017.
- D. Pomax further concludes that a Fee for Service primary PSAP arrangement with an existing Northwest Territories emergency dispatch provider is the most economical option. The next step is to analyze the technical, operational, financial and administrative steps required to ensure this is a viable option.

1.3 Recommendation

Considering the findings and conclusions in this report, our recommendation is for the Northwest Territories' 9-1-1 Stakeholders Group to seek the necessary approvals to move forward with Basic 9-1-1 implementation with a fee for service contract with an existing Territorial dispatch agency as detailed in Section 7 Implementation Plan Option 2: Contract with a Public Safety Dispatch Agency in the Northwest Territories.

1. Purpose and Scope

The purpose of this report is to present recommendations and an implementation plan for a territorial-wide 9-1-1 service.

The Scope outlined in the Territories' Request for Proposals requires that the implementation plan will include options and cost estimates for aspects such as infrastructure, maintenance, organizational structure, and project management. Part of the intent of the implementation plan is to provide an effective basis for discussion and eventual decision-making by key stakeholders.

The work leading up to the implementation plan included, to the extent possible:

- utilizing previous territorial and municipal studies, analysis, research, and consultation;
- identifying required infrastructure, technology, and resources;
- identifying elements that will require special consideration, such as NWT official languages requirements;
- establishing an inventory of current municipal and government resources which may contribute towards implementation and operation of a territorial 9-1-1 service;
- consulting key stakeholders to determine the roles they might assume in 9-1-1 implementation and operation in the NWT; and
- considering recent and future improvements in northern telecommunications connectivity and technology.

Pomax worked extensively with the NWT 9-1-1 Stakeholders Group members, including government, emergency service, and telephone company representatives. They provided a unique understanding of the challenges faced in the NWT, as well as the opportunities to move forward with this important work.

2. Background Information

2.1 Estimate of the Number of Landline and Wireless Phones

A reasonable estimate of the number of wired and wireless telephones in the Territory is necessary in order to calculate costs and potential offsetting revenue within a 9-1-1 system. However, because telephone and wireless companies cite competitive and proprietary reasons for not revealing subscriber levels, Pomax turned to a variety of sources to develop an estimate. In some cases, Northwest Territory specific statistics were not available, so country-wide data were used to estimate the per capita results.

- The Northwest Territories Bureau of Statistics indicates the population¹ is estimated at 43,459 (April 2014) and there are 14,700 households² (2011).
- Statistics Canada indicates that more households are abandoning their traditional landline telephones in favor of wireless phones only. In 2013, 21% of households across Canada reported they used a cell phone exclusively³. Due to the fact that cell phone coverage is limited in the Territories, we assumed that this number will be lower so decided to use 15% in our calculations (2,205 households).
- According to Jobs North, there are currently 2,206 registered employers⁴ with 21,500 persons employed (Northwest Territories Bureau of Statistics—June 2014 Labour Force Survey). We estimated – admittedly somewhat arbitrarily because of the lack of firm statistics – that 50% of those employed would have a business landline assigned to them (10,750 landlines).
- The Canadian Wireless Telecommunications Association, an advocacy group representing wireless service providers and associated companies, indicates that there were 27,693,491 wireless subscriptions in Canada in calendar Q1 of 2014⁵. With a Statistics Canada estimated total population of 35,000,000, this means the national market penetration rate is at 79%. Given that cell phone coverage is limited in the Territories, we used 75% of the population, or 32,594, to estimate the number of wireless subscribers.

Based on this statistical data, the following estimates are provided for the landline and wireless phone subscriber base in Northwest Territories (Table 3).

Table 3 – Estimated landline and wireless subscribers

Type of Subscriber	Calculation	Number of Devices/Lines
Landline	12,495 (households) + 10,750 (business lines)	23,245
Wireless	43,459 (population) x 75% (market penetration)	32,594
Total		55,839

¹ [Northwest Territories Population Estimate](#)

² [Northwest Territories Households Estimate](#)

³ [Cell Phone Only Households](#)

⁴ [Business Numbers Estimate](#)

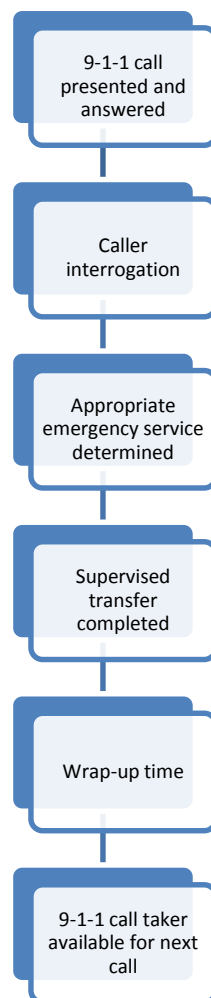
⁵ [CWTA Wireless Subscriptions for Canada](#)

2.2 Estimate of Staffing Needs for a Primary Public Safety Answering Point

The main consideration in estimating the cost of 9-1-1 call handling is the length of the 9-1-1 call determination process. Pomax has extensive experience in the analysis of 9-1-1 call processing times, and we have determined, within other studies, that the average regular 9-1-1 call handling time is 43 seconds. Initial 9-1-1 call handling time must be considered separately from the detailed call handling time required for police, fire or EMS dispatch calls since detailed call taking is a responsibility of the emergency response agency, not the 9-1-1 centre. The initial 9-1-1 call handling time is the time the call taker uses to: (a) interrogate the caller to determine the appropriate emergency response agency, (b) ensure an effective transfer to the appropriate emergency service agency, and (c) get prepared to accept the next 9-1-1 call.

When a primary PSAP is integrated as part of an existing emergency service dispatch centre (a centre where the call taker performs the duties of both the 9-1-1 call taker and emergency service call taker/dispatcher), the 9-1-1 call handling time is for these initial determination steps only (Figure 1):

Figure 1 – Steps in Primary Call Taking Used to Calculate Call Handling Time



Public Safety Answering Point staffing levels are calculated based on full time equivalent (FTE) positions. To determine the required number of FTEs, an industry-standard telecommunications engineering formula, called Erlang C, is applied. This non-linear equation takes into account the relationship between randomly arriving calls and staff levels, and assists in determining traffic load, the number of telephone trunks required for a call centre, appropriate staffing levels, and predicts the resources required to keep caller waiting times within required service level parameters.

In public safety telecommunications modelling, strict performance standards, such as answering calls within a minimum time period, the time required to process a call, and the fact calls have a random arrival time, can often have a significant effect on staffing requirements.

Appendix D – Estimated Emergency Call Volume in the Northwest Territories, indicates that 26,880 (rounded), 9-1-1 calls are expected to be handled annually. Based on Pomax's experience in primary PSAP staffing calculations, the number of FTEs required to handle 26,880 9-1-1 calls, while meeting the National Emergency Number Association (NENA), Call Answering Standard⁶, is 1.0 full-time equivalent (FTE) position. In fact, 1.0 FTE position can, in theory, handle in excess of 43,000 annual 9-1-1 calls while meeting the NENA standard. However, even though expected peaks are considered within Erlang C, this does not account for all occasions when a high number of calls are received concurrently.

There is no industry standard for calculating the total number of FTEs required for fully staffing a PSAP. There are a number of different methods and recommendations, but the industry accepted method is known as the Relief Factor as described in the NENA PSAP Staffing Guidelines Report⁷. In order to estimate the total FTEs required, the following influencing factors have been considered:

- Average number of days off per year for each call taker
- Total number of annual earned sick leave days for all call takers
- Total (or estimated) number of annual training days for each call taker
- Total number of annual days off for all call takers

To calculate the Relief Factor, the total number of days off is divided by the number of call takers to obtain the average number of days off for each call taker on an annual basis. This value is subtracted from the total number of days in a year (365) to obtain the total number of available work days. Then, the total number of days in a year (365) is divided by the calculated value of total available work days to obtain the Relief Factor. Typically, this value should range between 1.4 minimum to 1.7 maximum. In Pomax's experience a Relief Factor of 1.4 to 1.5 is reasonable in order to provide effective staffing coverage. Therefore, the total FTE staffing levels for a primary PSAP centre, assuming a typical working shift pattern of two day shifts and two night shifts followed by four days off, is:

(FTE) position x 1.5 (Relief Factor) x 4 (Shifts) = 6.0 FTEs staff

⁶ [NENA Call Answering Standard/Model Recommendation](#)

⁷ [NENA PSAP Staffing Guidelines Report](#)

This is the *base* FTE value to be used when calculating the 9-1-1 service provider's staffing for a dedicated primary PSAP configuration.

2.3 Other Staffing and Cost Considerations

In a typical 9-1-1 service, the primary PSAP receives the initial call, determines the appropriate emergency service agency (police, fire, or EMS), and completes a supervised transfer of the 9-1-1 call to a police, fire, or EMS secondary PSAP.

However, in the Northwest Territories, only the Yellowknife RCMP Operational Communications Centre operates similarly to a typical secondary PSAP. In all other cases, emergency call handling for fire and EMS is almost exclusively managed through local seven-digit calling where calls are answered within the community.

As a result of this operational situation, a typical primary PSAP staffing model that channels calls to secondary local police, fire, and EMS PSAPs will not meet the operational requirements for the Northwest Territories since they don't exist in the Territory.

Therefore, for fire and EMS calls, a Northwest Territories' primary PSAP would also be required to notify appropriate emergency services by way of the various established local community protocols. These protocols may include:

- Calling a seven-digit number answered by a dedicated resource in the local community and ensuring the emergency call details are successfully delivered
- Calling a seven-digit number that activates a community notification system (i.e. fire phone), and ensuring the call is answered and the emergency call details are successfully delivered
- Following a prescribed call out list until someone in the local community answers and ensuring emergency call details are successfully delivered
- No emergency service available – requires a Standard Operating Procedure to deal with the call that cannot be routed where no emergency service exists

In this regard, the role of a Northwest Territories primary PSAP is expanded to include local emergency community notification, which is not a typical arrangement. As a result, the operation of a dedicated Northwest Territories primary PSAP that includes the additional workload associated with local community emergency notification for fire and EMS emergencies would require an increased number of FTEs to safely and efficiently manage call volumes. These types of manual notification processes are labor and time consuming and add a significant amount of time to the average call handling time. There are no industry standard times associated with additional notification work; however, based on Pomax's experience it is expected that notification calls can take up to two minutes, and possibly longer, to complete. This time is in addition to the 43 seconds required for the initial 9-1-1 call handling function.

This dedicated Northwest Territories primary PSAP model was analyzed using the Erlang C formula. The results indicate that to meet the National Emergency Number Association (NENA) Call Answering Standard

for 9-1-1 calls, 2.0 FTE positions would be required to handle the estimated 26,880 annual 9-1-1 calls, as well as manage the estimated approximately 13,500 actual fire and EMS community notification calls.

Therefore, the total FTE staffing levels for a dedicated Northwest Territories primary PSAP configuration that includes both 9-1-1 call answer and the community notification for fire and EMS emergencies, assuming a typical working shift pattern of two day shifts and two night shifts followed by four days off, is:

$$2.0 \text{ (FTE) positions on shift} \times 1.5 \text{ (Relief Factor)} \times 4 \text{ (Shifts)} = 12.0 \text{ FTEs staff}$$

Assuming an average full time staff salary of \$65,000 annually, plus 28% in benefits, the average cost per staff member would be (\$65,000 + 28% =) \$83,200. Therefore, the annual staff costs for 12 full time equivalents would be approximately \$998,400 (\$1,000,000 for rounding purposes).

3. Public Safety Answering Points and a Description of 9-1-1 Types

There are two types of **Public Safety Answering Points**: Those that stand-alone and route emergency calls to an appropriate response agency (Bell Canada in Ontario offers this service to many provincial and municipal police, fire, and paramedic agencies), and those that are part of a response agency's dispatch center such as a police service. In the latter case, the emergency service's call taker also acts in the role of 9-1-1 call taker and transfers a 9-1-1 caller to another emergency service as required; or switches from the role of a 9-1-1 call taker to the agency call taker if the incident is for his or her service. The latter service model often makes more effective use of human resources since they serve a dual role.

The National Emergency Number Association and the National Fire Protection Association publish recommendations for public safety answering points which have become accepted as industry targets in Canada and the United States. *NENA Document 56-005, Call Answering Standard/Model Recommendation*⁸ addresses the various metrics associated with answering and transferring 9-1-1 calls. *NFPA Standard 1221: Installation, Maintenance, and Use of Emergency Service Communication Systems*⁹ details the various requirements associated with a primary PSAP facility and proper telephone interconnection. Both standards have been addressed in previous reports, by Pomax and other consulting teams.

There are three types of **9-1-1 systems** that can be considered by any jurisdiction including the Northwest Territories: basic, enhanced, and in the near future, Next Generation.

Basic 9-1-1 service achieves connection to a Public Safety Answering Point (PSAP), by a caller simply keying or dialing 9-1-1. The telephone company's central office recognizes the 9-1-1 digits and routes the call to the designated PSAP for the area. No location or caller number identification is transmitted when the call is placed so a caller must verbally identify his or her location to the 9-1-1 call taker who then looks up the phone numbers for the appropriate emergency response agencies. The call taker then manually transfers the call to police, paramedic, or fire departments serving the area.

Basic 9-1-1 calls may travel via a protected, dedicated network for the emergency voice call, or via a central office translation (call forwarding), which routes 9-1-1 dialed calls to a seven-digit number or ten-digit number that terminates at the applicable PSAP.

Enhanced 9-1-1 (E9-1-1) refers to the additional availability of Automatic Number Identification (ANI) and Automatic Location Identification (ALI). ANI is similar to the commercially available calling line identification available on home telephones, except that the caller cannot block the display of his or her number. Automatic Number Identification is used by telephone companies to reference the location of the telephone number and service; therefore, comprehensive civic addressing – which isn't available in many NWT communities – must be in place to properly set-up an E9-1-1 system.

⁸ *NENA Document 56-005—[Call Answering Standard/Model Recommendation](#)*

⁹ *National Fire Protection Association (NFPA)—[Standard 1221 Download Page](#)*

When an Enhanced 9-1-1 call is placed from a landline or wireless phone, the Enhanced 9-1-1 technology recognizes the call and forwards it to a special telephone company central office switch known as a Tandem switch. The switch uses a feature called selective routing which routes the call to a PSAP designated for the calling location and automatically provides the 9-1-1 operator with the caller's phone number and address, or location, via a dedicated central office network. The selective router software also allows the 9-1-1 call taker to transfer the call to the appropriate downstream emergency response centre using a single button automatic transfer.

Next Generation 9-1-1 will not be available in Canada until 2017 at the earliest but will establish the foundation for public emergency communications services in a wireless mobile society. The National Emergency Number Association¹⁰ describes Next Generation 9-1-1 as:

a network that replaces the existing narrowband, circuit switched 9-1-1 networks which carry only voice and very limited data.

NENA goes on to say that:

Currently, there are difficulties in supporting such things as text messages for emergencies, images and video (including support for American Sign Language users), and easy access to additional data such as telematics data, building plans and medical information over a common data network.

The future need for text, images, and video to be transmitted to a public safety answering point serving the Northwest Territories, other than for the hearing impaired community, is still to be determined. Additionally, while some jurisdictions in the United States have implemented limited NG9-1-1 trials, the service will not be available in Canada until after 2017.

3.1 Implementation Status and Opportunities

3.1.1 Basic 9-1-1

NorthwestTel indicates that its switching equipment is currently capable of providing Basic 9-1-1 service if the Northwest Territories chooses that model. However, a few months lead time will be required to provision sending calls to a specific answering point, once identified. The company is actively updating its switching equipment to provide additional capabilities across the Territory. These upgrades are taking place, not for 9-1-1, but for the purpose of providing more flexibility for additional trunk configurations, local number portability, and better competitor interconnection.

Northwestel notes that a network single point-of-failure will be a significant issue for remote communities served by satellite network transport facilities. Other jurisdictions have considered deploying satellite

¹⁰ The National Emergency Number Association describes itself as The Voice of 9-1-1. The association serves its members and the greater public safety community by focusing on 9-1-1 policy, technology, operations, and education issues. NENA promotes the implementation and awareness of 9-1-1, as well as international three-digit emergency communications systems.

back-up systems that are independent of the main network to provide a basic voice and internet connection.

3.1.2 Enhanced 9-1-1

There are significant obstacles to the implementation of Enhanced 9-1-1 since it requires a Tandem switch selective router, and a managed database for automatic number identification and automatic location identification; however, neither the selective router nor databases exist in the Northwest Territories. The company has indicated that this would be a complex and expensive investment from an interconnection and maintenance perspective. In 2009 the cost for dedicated 9-1-1 interconnection to all communities was estimated by Planetworks Consulting, in their City of Yellowknife final report, to be almost \$4.4 million annually. Based on discussions with NorthwesTel, and existing tariffed fees, today's cost is estimated to be at least \$2,000,000. The required civic addressing to make Enhanced 9-1-1 work in the Northwest Territories has changed very little since 2009.

As with Basic 9-1-1, NorthwesTel noted that a *network single point of failure* will exist for communities that have wireless (satellite) switches as most remote communities do not have a network back-up.

3.1.3 Next Generation 9-1-1

NG9-1-1 facilities have not been designed or built yet in Canada and won't be available for several years. Next Generation 9-1-1 infrastructure will require fiber optic interconnection for PSAPs in the expectation that if the public moves to contacting PSAPs via text or video, PSAPs will have to have the capacity to receive and process large amounts of data. Whether this expectation will manifest in reality won't be answered for several years. Nevertheless, once the NorthwesTel Modernization Plan upgrades are completed, fiber optic capability will be available in communities which could be considered as PSAP locations, as well as offering higher speed interconnection to other communities in the Territories.

Table 4, below, summarizes the readiness status of the three 9-1-1 options indicated above

Table 4 – Readiness status of 9-1-1 system options

Option Type	Readiness Status
Basic 9-1-1	Can be implemented now by NorthwesTel
Enhanced 9-1-1	Possibly end-dated technology due to the expected arrival of NG9-1-1. Significant capital, annual, and project management costs to achieve implementation.
NG9-1-1	Current state of readiness is being examined by CRTC. The baseline will not be known until 2017, at which time the CRTC will begin making recommendations regarding implementation across Canada.

3.1.4 Civic Addressing

Civic addressing (proper street signs and housing/business numbers) is a requirement for the most effective and timely response of police, fire, and/or EMS in emergency situations. Previous studies and reports about 9-1-1 in the Northwest Territories have detailed the necessity for civic addressing to be completed before Enhanced 9-1-1 can be implemented, since it is an integral component.

The lack of civic addressing adds to the complexity of implementing 9-1-1 in the Northwest Territories. On the other hand, emergency responders currently cope with the lack of addressing and they probably will have to continue in that manner until an addressing methodology can be put in place. Considering that Enhanced 9-1-1 will be replaced by NG9-1-1 in the next three to seven years, and since NG9-1-1 is expected to include a geo-addressing component, an implementation plan that moves from Basic 9-1-1 to NG9-1-1 and skips the Enhanced 9-1-1 path – and the considerable effort of civic addressing – is a reasonable consideration. However, readers should be aware that geo-addressing, sometimes known as address points, is a time consuming, sometimes effort intense process that will require coordination between several levels of government. The advantage of geo-addressing is that it provides a wider range of information opportunities than civic addressing. Please see [Appendix C – Importance of Civic Addressing and Location Data for 9-1-1](#) for additional information.

3.2 Implementation Status and Opportunities Conclusions

We have found that the implementation of Enhanced 9-1-1 in the Northwest Territories includes a number of technical and addressing challenges, a protracted planning phase, and high associated costs. It is also reasonable to expect that Next Generation 9-1-1 will be available, possibly at a similar or even lower cost than E9-1-1, before an E9-1-1 system is implemented in the Northwest Territories.

Next Generation 9-1-1 is not expected in Canada until after 2017. The current state of readiness of Next Generation 9-1-1 is being examined by the CRTC but the baseline will not be known until 2017, at which time the CRTC will begin making recommendations regarding implementation across Canada.

Because of the technology, cost, and timing challenges associated with Enhanced 9-1-1, and because of the fact that NG9-1-1 will not be available for an estimated two to five years, we conclude that the Northwest Territories best option is the implementation of Basic 9-1-1 services.

The next decision is to determine the most applicable public safety answering point model.

4. Public Safety Answering Point Options and Considerations

The Northwest Territories has three public safety point operational models to consider as part of its decision making process. These are:

Option 1: Operate or contract a standalone Public Safety Answering Point

Option 2: Contract with an existing public safety dispatch agency in the Northwest Territories to act as a Public Safety Answering Point

Option 3: Contract an existing Public Safety Answering Point in another jurisdiction

4.1 Option 1: A Standalone Public Safety Answering Point

Building a standalone PSAP specifically to handle 9-1-1 calls for the Northwest Territories could cost \$250,000 to \$560,000, or more, plus approximately \$1.2 million annually, including staff, for operating expenses. A standalone PSAP would require two call takers at all times in order to handle the unique community notification process, for break relief, and personnel safety. These estimates are based on Pomax's experience in other jurisdictions and are subject to territorial specific considerations and factors. Capital costs may be lower than those indicated here if a suitable building already exists. In Canada, due to the high costs, there are only a few PSAPs that handle 9-1-1 call taking only; the vast majority of PSAPs are co-located or integrated with police, fire, and/or EMS call taking and dispatch.

Details can be found in Table 7 and Table 8 on pages 24 and 25.

4.2 Option 2: Contract with an Existing Public Safety Dispatch Centre Within the Northwest Territories

Considering the estimated annual 9-1-1 call volume of 26,880 for the Northwest Territories, a cost effective option that can be implemented comparatively quickly is to obtain PSAP services from an existing Northwest Territories dispatch center within a fee-for-service contract. Potential dispatch centres include the City of Yellowknife Fire Division Communications Centre or the Yellowknife RCMP Operational Communications Centre. Other service providers may be available.

The Fire Division Communications centre for the City of Yellowknife is currently not in a position to act as a PSAP. Nevertheless, construction of a dispatch centre within the fire service headquarters is projected to start in mid-2015 and Yellowknife Fire has expressed an interest in becoming the primary PSAP for the Northwest Territories. Existing staffing levels would have to be reassessed and probably increased to two call taker – dispatchers 24 hours a day but an advantage of a fee-for-service model is that FTE levels related to 9-1-1 call answering workload should be incrementally calculated as a function of the contracted centre's current call volumes. Often a contracted PSAP has existing staffing capacity that can be readily leveraged to take on additional workload at a fraction of the cost of establishing a dedicated primary PSAP.

The Yellowknife RCMP Operational Communication Centre has most of the capabilities required to become a primary PSAP. However, the RCMP has clearly stated that the current technical, operational, and administrative challenges of handling police dispatch responsibilities for all of the Northwest Territories do not make them a viable solution for a primary PSAP. Furthermore, in other jurisdictions, the RCMP has signaled their intent not to engage new services or continue to provide PSAP services. However, the RCMP may be a viable back-up to the Northwest Territories' 9-1-1 centre.

No other existing emergency dispatch centre in the Northwest Territories is readily positioned to act as a Public Safety Answering Point. Creating a PSAP in a community with a larger population base, such as Hay River or Inuvik, is possible but the cost of building and equipping a centre could range from \$50,000 to \$560,000 (see Table 7 and Table 8 on pages 24 and 25 for details), depending on the site selected and whether the centre is newly constructed or retrofitted. In addition, annual staffing and maintenance/backup expenses could be up to \$1.1 million depending on existing staff levels.

4.3 Option 3: Contract Public Safety Answering Point Services from a Jurisdiction Outside the Northwest Territories

The option exists to contract with a 9-1-1 centre outside the Northwest Territories; however the associated interconnection costs and Territories' unique call handling requirements may cause increased costs relative to the other options.

There are many regional PSAPs in Alberta, for instance. The closest, the Grande Prairie Fire Department, handles 9-1-1 call taking and fire dispatch for more than 60 fire departments covering much of the northwest area of Alberta.

For an Alberta PSAP (or any other PSAP in the prairies) to act as the primary PSAP for the Northwest Territories, NorthwesTel, Iristel, Bell Mobility, TELUS Mobility, and ICE, all serving the Northwest Territories, would need to enter into an agreement with TELUS to terminate the Northwest Territories landline and wireless 9-1-1 calls on the TELUS 9-1-1 switches located in Edmonton and Sherwood Park, Alberta. While these types of agreements are often in place throughout Canada, most often for Enhanced 9-1-1, this option is expected to be at least \$250,000 annually due to the tariffed 9-1-1 interconnection requirements. Unfortunately, we are not able to identify the exact tariff costs since they would have to be established as part of an application to the CRTC by the telephone companies. In addition, the non-standard Northwest Territories community notification processes, in a Basic 9-1-1 configuration, could be difficult to handle for PSAPs that are unfamiliar with the unique emergency dispatch protocols for fire and emergency medical services in the Northwest Territories.

Nevertheless, if 9-1-1 services were contracted with a PSAP outside the territories, 9-1-1 calls from the Northwest Territories would be routed to the TELUS router in Edmonton, then to the contracted external PSAP. Upon answering a call, if the call was for the Northwest Territories RCMP, the call taker would transfer the call, on a designated outgoing line, to the Northwest Territories RCMP at which point the RCMP would assume responsibility for incident details and appropriate response as it does now. If the call

was for an emergency service other than the RCMP, the contracted PSAP would have to employ whatever notification procedure was established for each community and fire or medical service.

Our assessment did not include consulting with PSAPs outside the Northwest Territories about the possible provision of call answering services.

4.4 Requirements for an Emergency Dial Plan

A 9-1-1 Emergency Dial Plan is essential to the efficient operation of a public safety answering point and ensures that the 9-1-1 public safety answering point has the ability to reach police, fire, EMS, medical clinics, and other important agencies at any moment, and transfer the caller to that emergency service provider.

To implement a 9-1-1 system, each Northwest Territories community – in coordination with local emergency services – must create an emergency dial plan which includes:

- Local RCMP detachment phone number and hours of operation (where applicable)
- Alternate RCMP phone number (likely the Yellowknife RCMP OCC)
- Local fire department phone number – 24x7x365 days (as applicable)
- Alternate fire department phone number (a neighboring community fire department and/or possibly Yellowknife Fire)
- Local EMS/medical clinic phone number and hours of operation (where applicable)
- Alternate EMS/medical phone number (a neighboring community medical clinic and/or possibly the new Med-Response Program)
- Other agencies

In some communities, a call out tree may be required for fire and EMS. This type of community notification process is unique; however, it can be managed if set up and maintained properly. The Northwest Territories Association of Communities (NWTAC) already has a list of the official community contacts that could assist directly with creating and maintaining this essential tool.

4.5 Unique PSAP Challenges for the Northwest Territories

There are unique challenges in the Northwest Territories for a 9-1-1 Public Safety Answer Point (PSAP). In many cases, there are no proper downstream agencies to accept 9-1-1 calls for fire or EMS, and these calls are often handled by non-agency personnel such as hotel staff or medical clinic personnel. The lack of proper fire and EMS downstream agencies will often mean longer handling times for the interrogation and proper transfer of 9-1-1 calls for these types of emergencies; transfer to police will not provide any difficulties because the RCMP have a single dispatch centre for the Northwest Territories. There are additional challenges in creating a dialing and call routing plan for communities that do not have established fire departments or EMS agencies. Most civilians expect a 9-1-1 call will immediately connect them to police, fire, or EMS services.

With these challenges in mind, and having reviewed the preceding PSAP Options, the importance of having a PSAP with a robust understanding of the Northwest Territories is vital for the successful implementation and future operation of the type of PSAP selected by the Government of the Northwest Territories.

5. Financial Considerations in the Implementation of 9-1-1

5.1 Background

Pomax has considered three options within the implementation of **Basic 9-1-1** service in the Northwest Territories. We have determined that Enhanced 9-1-1 requires the establishment of civic addressing, Tandem switches, a partnership between a major telephone carrier and NorthwesTel, and may require one to two years' of planning before it can come to fruition. The challenge that would take the longest time to resolve would be that of civic addressing. By the time that occurs, Next Generation 9-1-1 is expected to become available in Canada at a cost comparable to or lower than Enhanced 9-1-1.

Therefore, we have concluded that the Territory is left with three implementation options within Basic 9-1-1:

Option 1: Operate or contract a standalone PSAP in an existing or new facility within the Northwest Territories

Option 2: Contract with an existing public safety dispatch agency in the Northwest Territories

Option 3: Contract an existing Public Safety Answering Point (PSAP) outside the Territory

The estimated costs for the three options, are based on information gathered during the project period but, because firm data is sparse, we have also relied on information learned during other projects and the best advice of the project stakeholders. The costs and recovery could vary from those shown in the tables however, we expect the actual figures to become progressively firmer as the Northwest Territories decides on its best options and puts plans into action.

Table 7 and Table 8 on pages 24 and 25 provide costs estimates for the three options being proposed and also estimates cost recovery as a result of a NorthwesTel Service Fee and a cost recovery fee. Details about service fees and cost recovery fees are provided in Section 5.2 and 5.3.

Cost recovery to offset annual 9-1-1 operating costs can be accomplished through a service fee, or tariff approved by the CRTC, for each landline and wireless phone, which is collected by the incumbent local exchange carrier (NorthwesTel for example); or through legislation. In the latter, phone companies can collect a *cost recovery fee* on a set rate per landline, and from wireless subscribers, on behalf of the governing jurisdiction for 9-1-1.

5.2 NorthwesTel Service Fee (Tariffed)

A service fee is a tariff approved by the CRTC that is collected by the incumbent local exchange carrier (NorthwesTel for example) for each landline and wireless phone. The service fee covers the costs of implementing and maintaining a 9-1-1 network including: trunk lines, selective routing software and hardware, ANI/ALI database development and maintenance, and the termination of 9-1-1 lines at the primary PSAP and the applicable secondary PSAP dispatch centre. However, if the choice is made to move

forward with Basic 9-1-1, then only the network interconnection (trunked lines) and 9-1-1 lines to the primary PSAP and secondary PSAPs would be required.

In the 2009 Planetworks Study, the estimated monthly tariffed NorthwesTel Service Fee was up to 60 cents per landline subscriber and up to 30 cents per wireless subscriber (the normal tariff fee for wireless is 50% of the landline fee). However, this was specific to an implementation of Enhanced 9-1-1 in a limited number of communities. Basic 9-1-1 interconnection will be less expensive although the costs to cover all 33 communities will also need to be considered.

NorthwesTel has indicated that pending the required CRTC approvals, implementation of Basic 9-1-1 can be achieved from a technical perspective in a few months. The exact cost of a Basic 9-1-1 service will have to be determined in confidence during the CRTC tariff approval process. For the purpose of understanding the potential service fee impact for the citizens and businesses in the Northwest Territories, the following projection is provided (Table 5). This is an estimate only, based on the approved NorthwesTel tariff in place for the Whitehorse B9-1-1 system with adjustments for the different coverage and subscriber base in the Northwest Territories.

Table 5 – Estimated annual NorthwesTel service fee

Fee	Amount	Subscribers	Monthly	Annual
Landline	\$0.40	23,245	\$9,298.00	\$111,576.00
Wireless	\$0.20	32,594	\$6,518.80	\$78,225.60
Total Service Fee (Rounded)				\$190,000.00

The amount of the monthly service fee has not been finalized, however a projected monthly amount of \$.40 (wireline) and \$.20 (wireless) is used. The projected fee is based on the CRTC approved 9-1-1 tariff for the City of Whitehorse, albeit the fee does not reflect Yukon Territory-wide service.

The CRTC reviews and approves 9-1-1 rates across Canada based on cost and design inputs, and ensures that rates are fair and reasonable.

5.3 Cost Recovery Fee (Legislated)

Phone companies can collect a *cost recovery fee* on a set rate per landline, and sometimes wireless subscribers on behalf of the governing jurisdiction for 9-1-1. The authority is normally provided through legislation as detailed in Section 6. The fee is remitted to the jurisdiction, by the telephone company, and is used to offset the jurisdiction’s costs in connection with the provision of 9-1-1 Services. It is also traditionally used to cover all costs and expenses incurred by a jurisdiction to provide 9-1-1 capability and functionality including, but not limited to:

- Equipment purchases, installation and maintenance/backup
 - Computer Telephony Interface equipment—for handling the call taking and downstream transfer process (this is not a necessity for the Northwest Territories)

- Development of the Master Street Address Guide (MSAG) database [Enhanced 9-1-1]
- Software acquisition and maintenance (if required)
 - Interfaces to the Computer Aided Dispatch Systems to support changes typically required by Enhanced 9-1-1 and ultimately by NG9-1-1
- 9-1-1 call answer center staffing (for the 9-1-1 portion of the call only, not dedicated police, fire or EMS call handling)
- Other personnel enhancements i.e. management, mapping specialist (if required)
- Costs of public awareness campaigns

In some circumstances, telephone companies are allowed an administration charge to collect and remit the cost recovery fee on behalf of the government. For example, in Alberta it is \$0.07 cents per telephone subscriber.

In order to understand the potential cost recovery fee impact for the citizens and businesses in the Northwest Territories, the following preliminary projection is provided (Table 6).

Legislated fees are normally the same amount for landline and wireless, whereas wireless is traditionally half the amount of landline fees in a tariff (Table 5).

The amount shown in Table 6 does not include the phone company’s 7 cent collection fee.

Table 6 – Preliminary annual Northwest Territories cost recovery fee

Fee	Amount	Subscribers (Table 3)	Monthly	Annual
Landline	\$0.67	23,245	\$15,574.15	\$186,890
Wireless	\$0.67	32,594	\$21,837.98	\$262,056
Total Cost Recovery Fee (Rounded)				\$450,000

Table 7 – PSAP Options Cost Prior to Start-up

Public Safety Answering Point Options: Costs Prior to 9-1-1 Service Start-up	Option 1	Option 2	Option 3	Remarks
Capital and Overhead:				
Estimated construction or renovation costs	\$560,000	\$50,000	N/A	Costs will vary depending on space available and renovation required; space rental may reduce capital costs; estimates are based on 1400 square feet @ \$400 per square foot for a new or extensively renovated site and 400 square feet of renovated area at \$400 a square foot for an existing site; Option 2 amounts are dependent on the contract PSAP readiness.
Furniture and Equipment	\$165,000	\$50,000	N/A	Telephone system: 30K, Computers: 20K, Recording: 10K, Consoles: 25K, UPS and Generator: 80K
Preparatory Operating Costs (4 months for training and equipment troubleshooting)				
Estimated Operating Costs (operating costs in a non-standalone option are expected to be included in the contract fee)	\$83,333	N/A	N/A	Building, equipment, overhead (starting in year two)
Service Contract with an existing public safety entity	N/A	\$95,667	\$158,333	(Rounded) Sections 4.2 and 4.3
Staff Requirements				
Hiring and training year one	\$100,000	\$0	\$0	Investment of 160 - 180 hours per person for recruitment, selection, and training
9-1-1 Program Manager or Supervisor (4 months)	\$33,333	\$50,000	\$50,000	1 FTE for Option 1, or .5 FTE for Option 2 or 3
Other Activities				
Communications plan development and execution	\$20,000	\$20,000	\$20,000	First year
Project Resource	\$112,500	\$112,500	\$112,500	nine months of a two year contract for a standalone entity; one year is assumed to be required in an existing agency option
Research and develop legislation	N/A	N/A	N/A	Government resource although staff costs may be associated with the activity
Develop an emergency dial plan	N/A	N/A	N/A	Government resource although staff costs may be associated with the activity
Civic addressing improvements	Not Known	Not Known	Not Known	Existing grant program funds may be available
Costs related to preparation prior to 9-1-1 implementation	\$1,074,167	\$378,167	\$340,833	

Option 1: Operate or contract a standalone PSAP in an existing or new facility within the Northwest Territories.

Option 2: Contract with an existing public safety dispatch agency in the Northwest Territories

Option 3: Contract an existing Public Safety Answering Point outside the Territory.

Table 8 – PSAP Options Year 1 to 5 Operating Costs

Public Safety Answering Point Options Post Implementation Continuing Cost (Year 1 - 5)	Option 1	Option 2	Option 3	Remarks
Annual Operating Costs				
Estimated Operating Costs (operating costs in a non-standalone option are expected to be included in the contract fee)	\$250,000	N/A	N/A	Building, equipment, overhead (starting in year two)
NWTEL Annual Costs for a Basic 9-1-1 system	\$190,000	\$190,000	\$190,000	Section 5.2
Service Contract with an existing public safety entity	N/A	\$287,000	\$475,000	(Rounded) Sections 4.2 and 4.3
Staff Requirements				
12 FTE @ \$83,000 annually including benefits	\$1,000,000	N/A	N/A	Section 2.3
Replacement staff hiring and training annually	\$7,200	\$7,200	\$7,200	Investment of 160 - 180 hours per person for recruitment, selection, and training
Continuing education and quality assurance	\$30,000	\$30,000	\$30,000	Ongoing program costs
9-1-1 Program Manager or Supervisor	\$100,000	\$50,000	\$50,000	1 FTE for Option 1, or .5 FTE for Option 2 or 3
Other Activities				
Next Generation 9-1-1 Activities Budget	\$100,000	\$100,000	\$100,000	Mapping improvements, equipment, other
Communications plan development and execution	\$10,000	\$10,000	\$10,000	First year
Project Resource	\$187,500	\$37,500	\$37,500	15 months of a two year contract for a standalone entity; 3 months of a one year contract in an existing agency option
Research and develop legislation	N/A	N/A	N/A	Government resource although staff costs may be associated with the activity
Develop an emergency dial plan	N/A	N/A	N/A	Government resource although staff costs may be associated with the activity
Civic addressing improvements	Not Known	Not Known	Not Known	Existing grant program funds may be available
Annual operating costs operating year one in 2015 dollars	\$1,874,700	\$711,700	\$899,700	
Cost Recovery				
NWTEL Tariff	(\$190,000)	(\$190,000)	(\$190,000)	Section 5.2
Legislated	(\$450,000)	(\$450,000)	(\$450,000)	Section 5.3
Estimated annual impact based on tariff and legislation cost recovery year one	\$1,234,700	\$71,700	\$259,700	
Estimated annual impact based on tariff and legislation cost recovery year two to five - Project Manager no longer required	\$1,037,200	\$24,200	\$212,200	

5.4 Cost Recovery Summary

The annual recoverable amount through the tariffed NorthwesTel Service Fee (\$190,000) and the legislated Cost Recovery Fee (\$450,000) would total \$640,000. Stated differently, the minimum monthly phone bill 9-1-1 fee would be \$1.07 per landline (home and business subscribers), and \$0.87 per wireless subscriber (based on a total subscriber base of 55,839 as noted in Table 3); plus an additional \$0.07 cent charge on each bill for NorthwesTel to collect these fees.

These cost recovery calculations are specific to a Basic 9-1-1 service with a Fee for Service Public Safety Answering Point contract arrangement. They do not include any one-time or ongoing funding from communities or the Government of the Northwest Territories that may be required to support the 9-1-1 provision model or facility options determined to be in the best interest of the Northwest Territories.

6. Governance and Legislation

6.1 The Northwest Territories Could Follow One of Three Existing Governance Models

Governance models, within the scope of a territory/province-wide 9-1-1 system, vary from providing oversight through to direct control and regulation. In a territory/province-wide 9-1-1 system, authority and decision making normally reside with the territory/province or an agency designated by the territory/province. The alternative is to let authority and decision-making reside within local communities, which would result in a greater probability that the delivery of 9-1-1 would be inconsistent across the territory/province.

An important question is how much governance does the Northwest Territories want to undertake, either directly or through a designated agency? For example, the Northwest Territories could restrict its role to setting enabling legislation and regulations and monitoring of compliance, but leave the implementation of 9-1-1 (within the legislation and regulations) to local communities. Alternatively, the Northwest Territories could take the lead in such things as directly operating or contracting 9-1-1 PSAPs, assuming responsibility for setting PSAP standards, as well as the addressing and mapping requirements.

As examples:

- In Nova Scotia
 - 9-1-1 emergency service is administered by the Emergency Management Office (EMO), a division of the Department of Justice, which provides all training, specialized computer software and standard operating procedures for the 9-1-1 centers.
 - Civic addressing is assigned and managed at the local municipal level. EMO is responsible to notify local exchange carriers (i.e., Bell Aliant & EastLink) of any updates or changes reported. This information is supplemented, stored and managed with a central geo-referenced mapping database referred to as the Nova Scotia Civic Address File (NSCAF).
 - Applicable legislation is the Nova Scotia [Emergency 911 Act](#), and the [Emergency 911 Cost Recovery Fee Regulations](#) made under Section 14 of the Emergency “9-1-1” Act (N.S. Reg. 8/2001).

- In Alberta
 - The Alberta Emergency Management Agency (AEMA), a division of the Municipal Affairs Department, has the authority to collect a 9-1-1 levy from Alberta cellular subscribers and remit it through a grant program to 9-1-1 primary PSAPs. The Act also allows for the creation of PSAP standards, which are currently under development.
 - The province does not directly contract with the 21 municipal/private PSAPs; responsibility for the set-up and operations is at the municipal level or as contracted by a municipality with a private or larger regional provider.

- There is no provincial civic addressing legislation, however the vast majority of municipalities have an agreement with TELUS to ensure proper addressing is maintained for 9-1-1.
- Applicable legislation is the Alberta [Emergency 911 Act](#), plus the [Emergency 911 Levy Regulation](#) and the [Emergency 911 Grants Regulation](#).
- In Newfoundland & Labrador
 - the province created a corporation, the Newfoundland & Labrador 911 Bureau Inc., with the authority to establish and implement a province-wide 9-1-1 telephone service for the reporting of emergencies and every municipality, emergency service provider and public safety answering point is required to participate with the corporation.
 - The NL 911 Bureau Inc. may enter into agreements with a person, a municipality, an emergency service provider, a public safety answering point, or a telecommunications service provider in relation to the development, establishment, and operation of the emergency 9-1-1 telephone service.
 - Applicable legislation is the Newfoundland and Labrador [Emergency 911 Act](#), plus the *NL 911 Service Fund (still under development; however a [September 25, 2014 News Release](#) provides significant details)* made under Section 24 of the *Emergency 911 Act*.

6.2 Legislation Considerations

Upon deciding to move ahead with a territory-wide 9-1-1 system, the Government of the Northwest Territories will have to decide upon the extent of legislation and governance structure it wishes to implement. A governance model which is the same or similar to the types outlined in Section 6.1 may be a good fit for the Northwest Territories. If that is the case, once a designated authority is identified to provide the oversight for the 9-1-1 system and operations, the responsible government Minister or The Lieutenant-Governor in Council would be identified as the authority within the legislation. For example, in Nova Scotia, the authority lies with the Minister of Justice; in Alberta, it is the Minister responsible for Municipal Affairs; and in Newfoundland Labrador, it is the Board appointed by The Lieutenant-Governor in Council.

Areas that may be considered for inclusion in legislation and regulations are:

- Purpose of the Act
- Definitions/Interpretations
- Administration of the Act (identifying who has designated authority)
- Responsibilities of the designated authority (including agreements for development, establishment and operation of a 9-1-1 service; administration of policies, standards, guidelines, objectives, codes of practice, etc.)
- Agreements with telecommunications carriers
- Agreements with municipalities and emergency service providers
- Cost recovery fee arrangements and delegations

- Restriction on information supplied (such as the design, development, implementation, operation, and maintenance/backup of a 9-1-1 system)
- Application of certain provisions
- Exemption and protection from liability
- Prohibitions (such as the programming of 9-1-1 into speed dial on phones)
- Offences and penalties (e.g. misuse of the 9-1-1 service)
- Regulations or Schedules (i.e., Cost Recovery Fee amount)
- Civic Addressing clause (i.e., who is responsible, municipal obligations, standards, etc.)
- Amendments required to other legislation (i.e., Municipal Act)

Although Pomax recommends that legislation should be enacted to govern 9-1-1 in the Northwest Territories, political and fiscal realities also have to be taken into account. In fact, it is quite possible to effect a basic 9-1-1 service within the Territory, without legislation, yet be available for the general population to use if they wish. Alternatively, the population can continue to contact local emergency services in the same way they do now with basic 9-1-1 serving as a 'safety net' in those circumstances when the local contact is not known.

There are drawbacks to such a system: for example, it will be more difficult to gather emergency services statistics; it does not preclude the necessity for one or more territorial public safety answering centres; policies, procedures, oversight and other operating standards will still be required for the PSAP(s), even if no legislation is implemented; and, of great importance, a way of recovering the cost of providing 9-1-1 service would have to be found. Cost recovery options are presented in Section 5, Financial Considerations in the Implementation of 9-1-1

Our recommendation is to adopt a legislative and governance model similar to that in Newfoundland and Labrador; however, the Northwest Territories could take an alternate approach that does not include legislation.

7. Implementation Plans

Pomax advises against pursuing an Enhanced 9-1-1 configuration. And Option 3 for basic 9-1-1 service provision, *'Contracting an existing Public Safety Point outside the Territory'* presents logistical and technical problems that appear to make it the least attractive of the three basic 9-1-1 options. Two options remain:

1. Operate or contract a standalone PSAP in an existing or new facility within the Northwest Territories
2. Contract with an existing public safety dispatch agency in the Northwest Territories

Two Gantt charts are included overleaf. The first is a plan for implementation of a standalone PSAP; the second is a plan for contracting with an existing public safety agency in the Northwest Territories. Both Gantt charts indicate an expected duration for plan implementation but we have not included a start date due to the logistics that may be required to prepare for implementation.



Implementation Plan Option 1: Operate or Contract a Standalone Public Safety Answering Point

ID	Task Name	Quarter 1			Quarter 2			Quarter 3			Quarter 4			Quarter 5			Quarter 6			Quarter 7			Quarter 8			Quarter 9		
		M-1	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24	M25	M26
1	OPTION 1 - Approval process and initial preparation steps	[Summary bar with arrowheads]																										
2	Share this report with the applicable Government of the Northwest Territories decision makers	[Teal bar with arrowheads]																										
3	Determine which government department will be responsible for the 9-1-1 program	[Teal bar with arrowheads]																										
4	Obtain approval to initiate the Project	[Teal bar with arrowheads]																										
5	Assign/hire a project manager to guide the implementation process on behalf of the NWT 9-1-1 stakeholders	[Teal bar with arrowheads]																										
6	Develop and table appropriate 9-1-1 legislation	[Teal bar with arrowheads]																										
7	Provide NWTel with a confirmation letter that Basic 9-1-1 implementation is planned for a launch at the beginning of the third year in all thirty-three communities	[Teal bar with arrowheads]																										
8	Find and develop a Primary PSAP facility	[Summary bar with arrowheads]																										
9	Request the NWT Infrastructure Department to determine if a suitable building exists or if a new building space is required in Yellowknife, Hay River, Inuvik, or other acceptable location (NWTel facilities will not be ready in Inuvik until 2016)	[Teal bar with arrowheads]																										
10	Develop a PSAP location selection process based on the results of the facility search, as well as the critical capacity to meet staffing requirements – hiring, training, and managing a new primary PSAP operation.	[Blue bar]																										
11	Develop a new (or existing) facility as the new NWT PSAP location	[Blue bar]																										
12	PSAP equipment and staffing processes	[Summary bar with arrowheads]																										
13	Purchase the base telephone, computer, recording, sit/stand consoles, and back-up power equipment.	[Blue bar]																										
14	Develop the hiring process	[Blue bar]																										
15	Hire and Train the required PSAP staff	[Blue bar]																										

Project: NWT Date: Wed 17-12-14	Task		External Tasks		Manual Task		Finish-only	
	Split		External Milestone		Duration-only		Deadline	
	Milestone		Inactive Task		Manual Summary Rollup		Progress	
	Summary		Inactive Milestone		Manual Summary			
	Project Summary		Inactive Summary		Start-only			

ID	Task Name	Quarter 1			Quarter 2			Quarter 3			Quarter 4			Quarter 5			Quarter 6			Quarter 7			Quarter 8			Quarter 9		
		M-1	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24	M25	M26
16	Emergency Service and Community coordination process																											
17	Coordinate with the Yellowknife RCMP Operational Communication Centre to receive transferred calls from the City of Yellowknife Fire Division primary PSAP																											
18	Work with all communities to develop the Emergency Dial Plan for police, fire, and EMS																											
19	Work with all communities to enhance street and building addressing																											
20	NWTel tariff approval and Basic 9-1-1 System implementation																											
21	Develop an annual operating budget with an ongoing Cost Recovery Fee mechanism																											
22	Support the NWTel Service Fee (Tariffed) application to the CRTC																											
23	NWTel completes the work required for Basic 9-1-1 implementation																											
24	Develop and implement the Communication Plan																											
25	Develop a comprehensive internal and external Communications Plan for the preparation, implementation, and ongoing support stages of the process																											
26	Launch Basic 9-1-1 service across the Northwest Territories and put the new PSAP in service																											
27	Start the initial Next Generation 9-1-1 action steps i.e. participation with the national 9-1-1 stakeholder group, and improved mapping																											

Project: NWT Date: Wed 17-12-14	Task		External Tasks		Manual Task		Finish-only	
	Split		External Milestone		Duration-only		Deadline	
	Milestone		Inactive Task		Manual Summary Rollup		Progress	
	Summary		Inactive Milestone		Manual Summary			
	Project Summary		Inactive Summary		Start-only			



Implementation Plan Option 2: Contract with a Public Safety Dispatch Agency in the Northwest Territories

ID	Task Name	1	Quarter 1			Quarter 2			Quarter 3			Quarter 4			Quar
		M-1	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13
1	OPTION 2 - Approval process and initial preparation steps														
2	Share this report with the applicable Government of the Northwest Territories decision makers														
3	Determine which government department will be responsible for the 9-1-1 program														
4	Obtain approval to initiate the Project														
5	Assign/hire a project manager to guide the implementation process on behalf of the NWT 9-1-1 stakeholders														
6	Develop and table appropriate 9-1-1 legislation														
7	Provide NWTel with a confirmation letter that Basic 9-1-1 implementation is planned for a launch at the beginning of the second year in all thirty-three communities														
8	Primary PSAP preparations and Fee for Service contract negotiation														
9	Undertake negotiations with an existing Emergency Services Provider (inside or outside the NWT) to provide Fee for Service 9-1-1 Call Answer that meets or exceeds call handling and facility standards														
10	Primary PSAP preparations (NOTE: Staffing and training responsibilities are borne by the Fee for Service PSAP as part of the contracted 9-1-1 call answer service)														
11	Emergency Service and Community coordination process														
12	Coordinate with the Yellowknife RCMP Operational Communication Centre to receive transferred calls from the City of Yellowknife Fire Division primary PSAP														
13	Work with all communities to develop the Emergency Dial Plan for police, fire, and EMS														
14	Work with all communities to enhance street and building addressing														
15	NWTel tariff approval and Basic 9-1-1 System implementation														
16	Develop an annual operating budget with an ongoing Cost Recovery Fee mechanism														
17	Support the NWTel Service Fee (Tariffed) application to the CRTC														
18	NWTel completes the work required for Basic 9-1-1 implementation														

Project: NWT Option 2 Gantt Cha Date: Wed 17-12-14	Task		External Milestone		Manual Summary Rollup	
	Split		Inactive Task		Manual Summary	
	Milestone		Inactive Milestone		Start-only	
	Summary		Inactive Summary		Finish-only	
	Project Summary		Manual Task		Deadline	
	External Tasks		Duration-only		Progress	

ID	Task Name	1	Quarter 1			Quarter 2			Quarter 3			Quarter 4			Quar
		M-1	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13
19	Develop and implement the Communication Plan														
20	Develop a comprehensive internal and external Communications Plan for the preparation, implementation, and ongoing support stages of the process														
21	Launch Basic 9-1-1 service across the Northwest Territories and put the new PSAP in service														I
22	Start the initial Next Generation 9-1-1 action steps i.e. participation with the national 9-1-1 stakeholder group, and improved mapping														

Project: NWT Option 2 Gantt Cha Date: Wed 17-12-14	Task		External Milestone		Manual Summary Rollup	
	Split		Inactive Task		Manual Summary	
	Milestone		Inactive Milestone		Start-only	
	Summary		Inactive Summary		Finish-only	
	Project Summary		Manual Task		Deadline	
	External Tasks		Duration-only		Progress	

8. Summary and Recommendation

8.1 Summary

Based on our research, analyses, experience, and the information presented in this report, Pomax has concluded:

- A. The Northwest Territories is very well positioned to move forward with Basic 9-1-1 which is the most cost effective and timely option available for implementation.
- B. Enhanced 9-1-1 is not viable in the Northwest Territories for the following reasons:
 - Proper civic addressing is a fundamental requirement for E9-1-1, and this remains a significant challenge. (NOTE: a recent government incentive program is starting to help with this issue; however it will take several more years to see the results of these efforts.);
 - The interconnection of telephone switching equipment required for proper E9-1-1 call processing across the Northwest Territories could cost an estimated \$2,000,000 annually; a less expensive interconnection is expected for the pending Next Generation 9-1-1 (NG9-1-1) infrastructure;
 - Expensive network components required for E9-1-1 use obsolete technology that are planned for replacement as NG9-1-1 rolls out across Canada starting in 2017.
- C. Basic 9-1-1 is the logical preparation step for the future move to Next Generation (NG) 9-1-1. NG9-1-1 is not expected to be implemented in Canada until at least 2017. Furthermore, NG9-1-1 will be implemented in larger centres such as Toronto, Montreal, and Vancouver first. This suggests that NG9-1-1 will not be ready for implementation in the Northwest Territories until well beyond 2017.
- D. Pomax further concludes that a Fee for Service primary PSAP arrangement with an existing Northwest Territories emergency dispatch provider is the most economical option. The next step is to analyze the technical, operational, financial and administrative steps required to ensure this is a viable option.

8.2 Recommendation

Considering the findings and conclusions in this report, our recommendation is for the Northwest Territories' 9-1-1 Stakeholders Group to seek the necessary approvals to move forward with implementation of Basic 9-1-1 at an existing public safety agency within the Northwest Territories.

Appendix A – Glossary

Acronyms used in this report are presented below for reference purposes.

ALI	Automatic Location Identification
ANI	Automatic Number Identification
B9-1-1	Basic 9-1-1 (network configuration)
CAD	Computer Aided Dispatch
CISC	CRTC Interconnection Steering Committee
CLEC	Competitive Local Exchange Carrier
CLID	Calling Line Identification (automatic display of telephone number)
CPE	Communications and/or terminal equipment located in the customer’s facility with local call control
CRTC	Canadian Radio-Television and Telecommunications Commission
E9-1-1	Enhanced 9-1-1 (network configuration)
EMS	Emergency Medical Services
ESInet	Emergency Services IP Network
ESWG	CRTC CISC Emergency Services [E9-1-1] Working Group
ESZs	Emergency Service Zones
FTE	Full-time Equivalent
GIS	Geographic Information System
ILEC	Incumbent Local Exchange Carrier e.g. NorthwesTel, TELUS, Bell
IP	Internet Protocol
MSAG	Master Street Address Guide
NENA	National Emergency Number Association
NFPA	National Fire Protection Association
NG9-1-1	Next Generation 9-1-1 (network configuration)
NL	Newfoundland Labrador
NWT	Northwest Territories
NorthwesTel	Northwest Territories Incumbent Local Exchange Carrier
OCC	Operational Communication Centre i.e. RCMP Dispatch
PBX	Private Branch Exchange i.e. local telephone switch
PSAP	Public Safety Answering Point
RCMP	Royal Canadian Mounted Police
SR	Selective Router (one component in an Enhanced 9-1-1 system)
SS7	Signalling System No. 7 (telephone central office switching protocol)
WSP	Wireless Service Provider

Appendix B – Understanding 9-1-1 Systems

Emergency Calls in Canada, United States, and the Northwest Territories

The purpose of a 9-1-1 system is to facilitate the contact of emergency services. Canada and the United States use 9-1-1 systems, while the Northwest Territories remains one of the last areas in North America without a 9-1-1 system. Citizens in the Northwest Territories use the well-established, seven-digit number system for requesting emergency services. Historically it works well with few complaints from the local users or emergency service providers, but it does not differentiate between emergencies, non-emergencies, and informational calls; nor is it of any use for visitors who don't know the system.

9-1-1 Systems Stand Alone

Knowing what operational and technical components comprise a current 9-1-1 system is important because the general public—and often the public safety community—often consider 9-1-1 systems to be broad in scope. For example, Basic 9-1-1 and even Enhanced 9-1-1 systems do not include components such as computer aided dispatch, mapping systems, geographic information systems, automatic vehicle locating, computer-telephony interfaces, and radio systems. 9-1-1 systems stand by themselves although a suite of products, such as those noted in this paragraph, are often implemented at the same time as new or upgraded 9-1-1 systems. The primary components of a 9-1-1 platform are the special telephone company circuits, and the voice/data call answer and display equipment at the public safety answering point.

Classes of 9-1-1 Systems

This report focuses on 9-1-1 systems only (not emergency agency specific call taking and dispatching), and there are three classes of systems:

- Basic 9-1-1
- Enhanced 9-1-1
- Next Generation 9-1-1

The Next Generation 9-1-1 system is planned but not yet implemented in Canada.

The distinction in features provided by 9-1-1 service-types is provided in Table 9.

Table 9 – Descriptions for the three classes of 9-1-1 systems¹¹

<p>Basic 9-1-1</p>	<p>An emergency telephone system which automatically connects 9-1-1 callers to a designated answering point based on the Telco central office that processed the call. This system does not automatically determine or show the location of the caller as is accomplished with an Enhanced 9-1-1 system. The answering point must manually determine the appropriate police, fire, or ambulance (EMS) authority and then initiate the transfer by dialing the specific telephone number for that centre.</p>
<p>Enhanced 9-1-1</p>	<p>A telephone system which includes smart network switching, an ANI (telephone number)/ALI (location data), and the ability to automatically provide an address and/or mapping coordinate. This system automatically determines the primary 9-1-1 call answering point and the one-button transfer associated to the appropriate police, fire, or ambulance (EMS) dispatch centre (as applicable).</p>
<p>Next Generation 9-1-1</p>	<p>Next Generation 9-1-1 (hereafter called NG9-1-1) is the planned Internet Protocol (IP) based system that will have features similar to Enhanced 9-1-1, as well as the ability to handle text, pictures and video from a variety of different devices. NG9-1-1 will be able to provide <i>real-time</i> location data based on information from the device and calling location. The system will also be much more robust in terms of short- and long-term 9-1-1 network failures, providing immediate overflow to other PSAPs in the event of a network failure.</p> <p>You can find a detailed description of NG9-1-1 at: www.nena.org/resource/resmgr/ng9-1-1_project/whatisng911.pdf</p> <p><i>Note: A multi-year transition to NG9-1-1 started in the United States in 2011. Individual jurisdictions with authority for 9-1-1 services will have to decide when to implement NG9-1-1 depending on local circumstances. In Canada, the baseline report on NG9-1-1 readiness is targeted for 2017.</i></p>

9-1-1 Systems Used in Canada

The *Canadian 9-1-1 Interconnection Guidelines Document V6.0—Introduction—October 2013*, describes the types of 9-1-1 systems currently in use in Canada as vintages.

“The 9-1-1 systems deployed in Canada by the Incumbent Local Exchange Carriers (ILECs) can be grouped into the following generic vintages¹²:

¹¹ Adapted from the [National Emergency Number Association Glossary of 9-1-1 Terms](#)—September 2013

¹² Adapted from the *Canadian 9-1-1 Interconnection Guidelines Document V6.0—Introduction—October 2013*

- Standalone Basic 9-1-1 provides voice call routing and telephone number capability only e.g. Prince Rupert (British Columbia), St. John's (Newfoundland), and Whitehorse (Yukon).
- Standalone Enhanced 9-1-1 adds call display of subscriber name and address information to the basic platform e.g. Thunder Bay (Ontario).
- Province-Wide 9-1-1 Service provides centralized E9-1-1 voice and data platforms for all participating municipalities within that province. These are the most prevalent systems in Canada and are currently deployed in British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, Quebec, New Brunswick, Nova Scotia, and Prince Edward Island.

Each telephone company (Bell, TELUS, etc.) deploys 9-1-1 services differently. Hence, there is no standard approach to system design in Canada nor within provinces or territories served by more than one 9-1-1 system provider.

Currently, the only new 9-1-1 implementation activity in Canada is in Newfoundland Labrador where they are implementing a Province-Wide Basic 9-1-1 Service effective January 1, 2015.

Figure 2 – Typical Logo Used to Advertise 9-1-1 Availability



Appendix C – Importance of Civic Addressing and Location Data for 9-1-1 1

Addressing and Location Data Would Need to Be Developed

Civic addressing (proper street signs and housing/business numbers) is a requirement for the most effective and timely response of police, fire, and/or EMS in emergency situations. Previous reports have detailed the necessity for civic addressing to be completed before 9-1-1 can be implemented, since it is an integral component of an Enhanced 9-1-1 system.

The lack of civic addressing has become an unintended road block for the implementation of 9-1-1 in the Northwest Territories. It is expected that Enhanced 9-1-1 will be replaced by NG9-1-1 in the next three to seven years, so an implementation plan that moves from Basic 9-1-1 to NG9-1-1 and skips the Enhanced 9-1-1 path will streamline the process. Community opportunities would exist to improve civic addressing in parallel with the 9-1-1 implementation process.

Location Data Would Need to be Developed¹³

As noted above, skipping Enhanced 9-1-1 is an important cost and time saving consideration. However, in order to understand the evolution, this section provides some background for 9-1-1 location data.

In today's Enhanced 9-1-1 architecture, mapping displays have become a fundamental element of effective public safety emergency response. Maps allow 9-1-1 call takers and dispatchers to accurately identify the location of wireless callers and effectively coordinate response units. Geographic Information Systems (GIS) are the data management tools behind map displays. GIS will also drive many of the advanced features of NG9-1-1.

Next-generation geographic information systems are designed to capture, store, manipulate, analyze, manage, and present a wide variety of geographical data. Ultimately, layers of information will correlate with a specific PSAP, police service, fire department, medical response agency, poison response and so on. If a call originates in a specific geographic area, the call will be routed and the response will be dispatched according to the rules assigned within the geographic information database.

Next-generation 9-1-1 functionality will require the geocoding (also called geo-tagging) of property parcels or building envelopes so that PSAPs can determine the exact location of a caller within a structure. With the development of more enhanced data, NG9-1-1 will allow citizens to optionally provide details about a geographic location, such as the number of residents, medical information, floor plans and the presence of hazardous materials or other important information. Next generation GIS and associated technology will be able to correlate this valuable information with an incoming

¹³ Section paraphrased and edited from an excerpt from [CRTC ESCO0447](#)—NG9-1-1 Canada's Essential Guide to Getting Started

request for assistance in order to improve response times and provide first responders with better situational awareness.

To make this idea a reality as migration begins to take place, PSAPs will need precise GIS databases that are accurate, up-to-date, and synchronized at the local, regional, provincial/territorial level. Typical sources of GIS information must be supplemented with 9-1-1 attributes and modified to support the special needs of public safety applications and processes. Additionally, workflows and processes will need to be created to collect, verify, correlate, maintain, and manage the vast amount of data that is associated with these systems.

Future preparation for the delivery of geo-tagged mapping and creation of data for a location information server could begin immediately following the choice of a logical migration path which could include NG9-1-1.

Future Considerations—NG9-1-1 Mapping & Improved Civic Addressing Opportunity

Enhanced 9-1-1 versus NG9-1-1 Preparations

The time, effort, costs, and logistics associated with creating the complex Enhanced 9-1-1 data management tools are not justifiable given the planned national availability of NG9-1-1 in the next three to seven years. Time would be better invested in preparing for the delivery of geo-tagged mapping and creation of data for a Location Information Server; which could begin implementation in 2015 as a specific action item for a future NG9-1-1 Migration Plan.

Improved Civic Addressing Opportunity

As highlighted at the start of this appendix, *civic addressing is a requirement for the most effective and timely response of police, emergency medical services, and/or fire in emergency situations.*

Though this is not mandatory for a B9-1-1 to NG9-1-1 implementation plan, the move to a new 9-1-1 system creates the opportunity for the Government of the Northwest Territories to strongly support and promote the importance of improving civic addressing signage as needed across the Territories to ensure this important tool is available for future emergency service responses.

Appendix D – Estimated Emergency Call Volume in the Northwest Territories

Police, fire, and EMS in the Northwest Territories do not have the telephone software necessary to provide actual call demand data, so estimates and rationale follow below.

Northwest Territories RCMP Call Data Analysis

A review of the 2013 Northwest Territories RCMP dispatch call statistics provided by the Yellowknife RCMP Operational Communications Centre (OCC) showed the following:

- Police dispatch calls for 2013 totaled 30,218 (10,439 calls were Yellowknife calls);
- 1,475 (5%) of the dispatch calls were categorized as emergency response;
- The Yellowknife RCMP Operational Communications Centre, which often answers police calls for communities across the Territories, estimates the total incoming annual call volume is 300,000, a 10 to 1 ratio between calls received and dispatched events;
- Based on CRTC analysis of Public Safety Answering Points, the average calls to dispatch ratio in Canada at police dispatch centres that are also a PSAP is 4 to 1;
- The 10 to 1 telephone call to dispatch ratio at the Yellowknife Operational Communications Centre is unusually high compared to the 4 to 1 ratio at other police centres. This is probably because the Yellowknife OCC answers emergency, non-emergency, and administrative telephone calls whereas other police centres usually have an alternate number and separate answering for non-emergency and administrative calls;
- Therefore, in keeping with other police dispatch centres within 9-1-1 jurisdictions, we decided to use a 4 to 1 ratio for our calculations;

Hence, the estimated 9-1-1 police call volume would be $(1,475 \times 4) = 5,900$ annually

The Yellowknife RCMP Operational Communication Centre could realize a benefit from implementing 9-1-1. The Centre is currently overwhelmed by an estimated 300,000 emergency, non-emergency, and administrative calls received annually; it could be reconfigured to answer 9-1-1 calls only. This would enable the detachments to answer 1111 non-emergency and administrative calls locally; they could also introduce a Yellowknife detachment switchboard capability as an overflow/off-hours answer point for all the other detachments. Taking these steps could reduce the Centre's workload from a very high 10-to-1 ratio back towards a more manageable 4-to-1 ratio. *(Note: for other reasons detailed earlier in this report, they would still be an unlikely candidate as a primary PSAP.)*

Fire/EMS Call Data Analysis for the Yellowknife Area

In order to estimate the potential call volumes for fire and EMS calls, a review of the 2013 Yellowknife Fire Division statistics¹⁴ showed the following:

¹⁴[City of Yellowknife Fire Division Statistics](#)

- Total fire and EMS calls for 2013 combined were 3,297 (470 fire and 2,827 EMS);
- 9-1-1 records from other jurisdictions (although more densely populated), indicate some fire-related incidents generate more than one 9-1-1 calls. To account for this, we applied a multiplier of 1.5 to the 470 fire incidents would result in an estimated annual fire call volume of 705 for Yellowknife;
- Estimates indicate some EMS calls, such as those related to collisions or public injury, will generate more than one 9-1-1 call. Applying a multiplier of 1.25 would place the estimated annual EMS call volume for Yellowknife at 3,534

Hence, the estimated Yellowknife 9-1-1 fire and EMS call volume would be $(705 + 3,534) = 4,239$ annually.

Fire/EMS Call Data Analysis for the Rest of the Northwest Territories Excluding Yellowknife

Providing an accurate count for fire and EMS calls outside Yellowknife is difficult because the majority of communities have volunteer fire departments where call data is not readily available. The Yellowknife service area has almost half the population of the Northwest Territories and many of the remaining 32 communities have less than 1,000 people where fire and EMS services are met locally. The NWT Bureau of Statistics estimates Yellowknife's population at approximately 20,000 in 2014 which means that the per capita fire and EMS call volume is $(4,239 \div 20,000 =) .21$. The per capita call volume in other areas of the Territory is expected to be lower than in Yellowknife, therefore we have applied a per capita of .14

The adjusted call ratio for the balance of the Territory could be $(43,623 - 20,000 = 23,623 \times .14) = 3,300$ (rounded).

Summary of Estimated 9-1-1 Call Demand

Based on the calculations provided in the three preceding sections, the estimated 9-1-1 call volume for a 9-1-1 system across the Northwest Territories is almost **27,000 calls annually**.

	Estimated Number of Calls
RCMP for the Northwest Territories	5,900
Yellowknife Fire & EMS	4,239
Fire & EMS for the balance of the Territory	3,300
Factor for incorrectly dialed 9-1-1 calls (times 2) (please see note 1 below)	X 2
Estimated Total Telephone Calls	26,880 (rounded)

Note 1: Information from 9-1-1 centres throughout Canada also indicates that for each call that should be placed to 9-1-1, an almost equal number of incorrectly dialed calls, or calls that should be placed to a non-emergency number, are received.