Township of North Kawartha
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www.northkawartha.ca

Report to Council

To: Mayor and Council Members

From: Edward Hilton, Economic Development Officer

Date: July 6, 2026

Subject: Woodview STN 1 Fire Repeater

Recommendation:

That Council approve the procurement, installation, and integration of a second VHF/DMR-capable radio repeater to enhance emergency communications coverage in the southern portion of the Township of North Kawartha, as the first phase of a long-term emergency communications improvement strategy;

And further that the project be funded from funds originally allocated to Fire SCBA equipment from OMPF funding;

And further that staff continue to assess future communications enhancements, including potential vehicle repeater systems as part of the 2027 capital budget process.

Background:

The North Kawartha Fire Department currently operates a VHF radio communications system that relies primarily on the Apsley Repeater Tower for dispatch and operational communications. Reliable two-way radio communications are essential to fire service operations. They support incident command, firefighter accountability, dispatch coordination, mutual aid operations, and firefighter safety. Ontario firefighter guidance identifies effective communication devices and procedures as a critical component of emergency operations and notes that firefighters should have two-way communication suitable for the circumstances, particularly in immediately dangerous to life or health environments.

The southern portion of the Township, particularly around the Woodview and Stoney Lake areas, has experienced limitations in VHF radio coverage. These limitations are affected by geography, distance from the existing repeater, building construction materials, interference and antenna shadowing, and the increasing radio frequency noise floor.

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In addition to addressing current operational coverage concerns, the proposed repeater installation provides an opportunity to plan for future communications requirements. Municipal staff have had discussions with County staff regarding the potential for a future County-wide emergency radio communications system. At this time, no formal budgetary request has been brought forward to County Council. It is also understood that, should a County-wide system proceed, the planning, approval, procurement, funding, and implementation process would likely take multiple years at the earliest.

Staff view the proposed second repeater as the first phase of a broader, multi-step approach to improving emergency communications. The immediate priority is to strengthen the Township's core repeater coverage, particularly in the southern portion of the municipality where mobile and handheld radio coverage is currently limited. This foundational improvement is important because future enhancements, such as vehicle repeater systems, remain dependent on reliable mobile radio coverage between apparatus and the main repeater network. Improving fixed repeater infrastructure first will therefore support both current operational needs and future communications upgrades.

As a result, staff are recommending an approach that addresses current operational needs while also considering future interoperability, mutual aid requirements, potential frequency pair changes, and the ability to strategically relocate or adapt physical assets where feasible.

Analysis:

Several operational, technical, and environmental factors support the need for a second repeater in the southern portion of the Township. This project should also be viewed as the first phase of a phased emergency communications improvement strategy. Strengthening fixed repeater coverage is a necessary foundation before additional enhancements, such as vehicle repeaters, are considered in future budgets.

Interference and Shadowing at the Existing Apsley Repeater Tower

The existing Apsley Repeater Tower site has experienced coverage limitations due, in part, to antenna shadowing. The Fire Department antenna is mounted on the side of the Rogers tower rather than at the top of the structure with a clear 360-degree transmission path. As a result, the tower structure itself can obstruct or reduce radio signal propagation in certain directions, contributing to reduced coverage in portions of the Township.

In recent months, Rogers has installed additional equipment on the existing Apsley tower in close proximity to the Fire Department antenna. This additional equipment

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appears to have contributed to increased signal obstruction and a significant reduction in the usable coverage area of the repeater, particularly in areas that were already experiencing marginal radio coverage.

These coverage limitations have resulted in fire operations occasionally relying on neighbouring fire department repeaters to contact Fire Control. Although this has served as an interim measure, it creates operational risk and is not a reliable long-term solution. If both departments are responding to incidents simultaneously, shared use of neighbouring repeater infrastructure may result in competing radio traffic, reduced dispatch effectiveness, and challenges maintaining clear incident communications.

Rogers has been advised of the issue; however, the Township has not received a proposed solution or timeline for resolution. Staff have also contacted the Innovation, Science and Economic Development Canada (ISED) Spectrum Management Office to bring the matter to their attention.

A second repeater would provide improved system redundancy and allow for better geographic coverage, particularly in areas affected by shadowing or fringe reception from the existing Apsley site. It could also support improved channel management and reduce reliance on a single repeater location. This would strengthen the overall resiliency of the Fire Department's emergency communications system and improve operational reliability during emergency responses.

Increased Reliance on Repeater Channels for Radio Traffic

The Fire Department's reliance repeater radio traffic is not limited to emergency command and fireground safety. Repeater-channel radio traffic also supports incident documentation, Fire Control updates, response-time tracking, and post-incident reporting. Ontario requires every fire department to complete a Standard Incident Report for each response, and the Office of the Fire Marshal has announced expanded SIR reporting requirements that will take effect January 1, 2027.[1] As a result, firefighters and officers are increasingly required to communicate accurate incident details, benchmarks, actions taken, and resource updates during the incident so that Fire Control / dispatch can record key information in real time. Recorded repeater-channel voice traffic can also support completion of SIR documentation, KPI review, response timeline verification, and post-incident analysis. Reliable repeater coverage is therefore important not only for dispatch and fireground operations, but also for accurate reporting and accountability.

[1] https://www.ontario.ca/page/fire-marshals-communiques-2026

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The Fire Department increasingly relies on radios for dispatch, on-scene reporting, firefighter accountability, and fireground operations. Handheld radios operate at lower power (5 watts or less) compared to vehicle-mounted mobile radios (25 watts) and are more susceptible to weak signal areas, particularly in fringe coverage zones.

Land Mobile Radio guidance notes that public safety agencies rely on land mobile radio systems for mission-critical voice communications and that these systems typically include handheld portable radios, mobile radios, base stations, networks, and repeaters. It also notes that handheld portable radios tend to have limited transmission range and that repeaters are used to increase the effective communication range of handheld, mobile, and base station radios.[2]

Improving repeater coverage in the southern portion of the Township would strengthen radio performance and provide firefighters with more reliable communication during emergency responses.

In-Building Coverage Challenges

Many modern buildings include construction materials, insulation, windows, and energy-efficient features that can reduce radio signal penetration. NFPA notes that radio waves weaken when passing through objects and are particularly affected by modern building materials and energy-efficient building features.[3] This can create communication challenges when firefighters are operating inside structures. A second repeater would improve signal strength in the southern area and support safer and more effective interior operations.

Rising Radio Frequency Noise Floor

The radio frequency environment has become more complex over time due to increased development, electronic devices, communications equipment, power supplies, utilities, and other sources of unintended or incidental radio frequency emissions. The FCC's Technological Advisory Council[4] has examined whether the radio spectrum noise floor is increasing and noted that unwanted human-made RF energy can come from sources such as electric motors, light dimmers, switching power

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[2] Examples include Ontario Firefighter guidance Notes https://www.ontario.ca/document/firefighter-guidance-notes/2-3-radio-communications & RP-25 – Policy Principles for Public Safety Radio Interoperability https://ised-isde.canada.ca/site/spectrum-management-telecommunications/en/spectrum-allocation/policies/radio-systems-policies-rp/rp-25-policy-principles-public-safety-radio-interoperability

[3] https://www.nfpa.org/news-blogs-and-articles/Blogs/2024/02/12/An-Introduction-to-Emergency-Responder-Communications-Enhancement-Systems & https://www.ontario.ca/document/firefighter-guidance-notes/2-3-radio-communications

[4] https://docs.fcc.gov/public/attachments/DA-16-676A1.pdf

supplies, utility transformers, power lines, computers, portable electronic devices, and high-efficiency lighting.

For land mobile radio systems, the noise floor represents the background RF energy that a desired radio signal must overcome. When the background noise level increases, the usable signal-to-noise ratio decreases, which can reduce effective coverage even if the radio system infrastructure and transmit power remain unchanged. This is particularly important for portable VHF radio communications, where handheld radios operate at lower power and may already be near the edge of reliable coverage in fringe areas.[5]

Phased Communications Improvement Strategy

The proposed second repeater should be considered the first phase of a broader communications improvement strategy. The immediate goal is to improve the reliability of the Township's repeated radio system, particularly for mobile radios and handheld portable radios operating in the southern portion of the municipality.

A future second phase may include the addition of vehicle repeater systems, which staff intend to review as part of the 2027 capital budget process. Vehicle repeaters can improve portable radio communications between firefighters operating away from apparatus and the vehicle-mounted mobile radio. This can be particularly useful where handheld radios have difficulty reaching the main repeater directly due to terrain, building construction, distance, or other obstructions.

However, vehicle repeater systems are not a substitute for reliable main repeater coverage. A vehicle repeater depends on the apparatus mobile radio being able to communicate effectively with the primary repeater system. If the vehicle-mounted radio is operating in a weak or unreliable coverage area, the vehicle repeater may improve short-range portable-to-apparatus communications but may still be limited in its ability to relay communications through the broader radio network.

For this reason, improving fixed repeater coverage should be completed before, or in conjunction with, the deployment of vehicle repeaters. The proposed second repeater would strengthen the underlying radio network and provide a more reliable foundation for future vehicle repeater deployment. This phased approach allows the Township to address immediate operational coverage concerns while positioning the Fire Department for future enhancements, including possible vehicle repeaters and eventual

[5] https://www.psicompany.com/wp/2025/06/10/what-is-noise-floor-and-how-does-it-effect-lmr-system-performance/

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alignment with a broader County-wide emergency communications system if one proceeds.

Future Growth, Interoperability, and Mutual Aid Considerations

The proposed second repeater would be planned with future system growth in mind. While the immediate objective is to improve radio coverage in the southern portion of the Township, the project also supports a phased approach to emergency communications planning.

Phase 1 would focus on strengthening the Township's fixed repeater infrastructure and improving mobile and handheld radio coverage in areas currently experiencing weak or unreliable communications. Phase 2 may include consideration of vehicle repeater systems through the 2027 and onwards capital budget process. A longer-term phase may involve potential participation in a County-wide emergency radio communications system, should such a system be approved and funded in the future.

This sequencing is important because vehicle repeaters depend on reliable mobile radio coverage to communicate effectively with the main repeater system. Improving the repeater network first will improve the effectiveness of any future vehicle repeater deployment and reduce the risk of investing in equipment that remains constrained by weak fixed-system coverage.

Municipal staff have had discussions with County staff about the potential for a County-wide emergency radio system. At this time, no formal budgetary request has been brought forward to County Council. It is also believed that implementation timelines for such a system, if approved in the future, could be multiple years at the earliest.

Where possible, staff are focused on selecting infrastructure and physical assets that support interoperability and can be strategically adapted or relocated in the future to address changing coverage, operational, or regional communications requirements.

Digital Mobile Radio (DMR) Benefits

As part of the proposed repeater installation, the equipment and system design would support Digital Mobile Radio, or DMR, capability already used by the North Kawartha Fire Department. DMR is an open digital radio standard developed by the European Telecommunications Standards Institute and is designed to operate within existing licensed land mobile radio frequency bands. DMR Tier II conventional systems use two-slot Time Division Multiple Access within a 12.5 kHz channel.[6]

[6] https://www.dmrassociation.org/dmr-standards.html

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A key benefit of DMR is that it can provide two separate time slots, effectively allowing two voice paths on one frequency pair when operating through a DMR repeater. This can increase system capacity without requiring a separate repeater or additional frequency pair for each communication path.[7]

This is beneficial for operations because one time slot could support dispatch or operational traffic while the second time slot could support a separate operational, administrative, or future interoperability function, depending on final system design, licensing, and radio programming.

DMR can also improve portable radio battery life. Because DMR uses TDMA transmission, radios transmit in short bursts rather than continuously, helping conserve battery power during digital operation.

DMR also supports future interoperability planning. As an open standard supported by multiple manufacturers, DMR provides flexibility in future hardware selection and can assist with interoperability where neighbouring departments, mutual aid partners, or a future County-wide radio system use compatible DMR technology.

While analog radio remains important, particularly for simplex or tactical fireground communications, DMR capability would provide the Township with greater flexibility for repeated communications, future frequency pair changes, expanded system capacity, and possible interoperability with neighbouring departments. Maintaining the ability to operate in both digital and analog modes, where supported by equipment and licensing, would allow the Fire Department to preserve current tactical practices while preparing for future communications requirements.

Proposed Solution

Staff recommend the installation of a second VHF/DMR-capable radio repeater to improve emergency communications coverage in the southern portion of the Township, with particular focus on the Woodview and Stoney Lake areas.

This project is recommended as the first phase of a phased emergency communications improvement strategy. The second repeater would improve the core fixed radio network and strengthen mobile and handheld radio coverage in areas currently experiencing limitations. This improvement would also provide an important foundation for future consideration of vehicle repeater systems, which staff intend to review as part of the 2027 capital budget process.

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[7] https://www.motorolasolutions.com/content/dam/msi/docs/business/products/_documents/apac/brochures/_staticfiles/m1224_-_mototrbo_fact_sheet_aw.pdf

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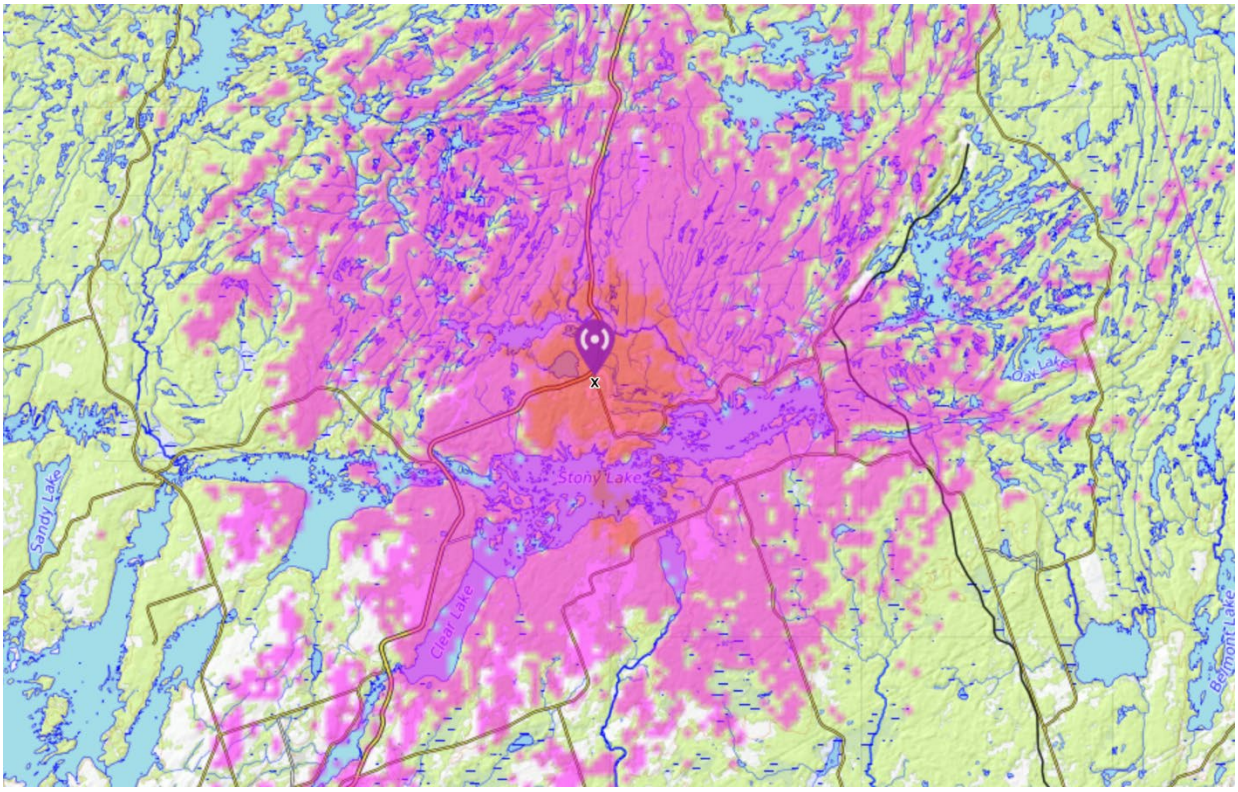

Coverage area predication for the proposed repeater at Station 1

The location on the existing tower at Station 1 (Woodview) would be subject to radio frequency review, licensing requirements, and any necessary approvals. Innovation, Science and Economic Development Canada (ISED) confirms that radio licences authorize the use of specific radio equipment at specified locations or areas of operation, on assigned frequencies, with specified power levels and technical specifications.

The proposed repeater would be selected and configured to ensure compatibility with the Fire Department's existing radio system while also allowing for potential future growth and interoperability.

Key considerations include:

- Compatibility with existing VHF radio equipment;
- Improved handheld radio coverage in the southern portion of the Township;
- Enhanced redundancy for emergency communications;
- DMR-capable repeater hardware to support two time slots/two voice paths;
- Improved system capacity and portable radio battery performance;

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- Continued support for analog/simplex tactical radio usage where required;
- Ability to accommodate possible future frequency pair changes;
- Potential future alignment with a County-wide emergency radio communications system, should one proceed;
- Improved interoperability with neighbouring departments and mutual aid partners;
- Selection of physical assets that can be strategically relocated or adapted in the future, where feasible;
- Technical assessment and radio coverage review;
- Installation, licensing, and ongoing maintenance requirements;
- Recognition of the second repeater as Phase 1 of a broader communications improvement strategy.

In summary, the proposed second repeater is not intended to be the final step in addressing all emergency communications challenges. Rather, it is a necessary first phase that strengthens the Township's core radio infrastructure. Once improved repeater coverage is in place, staff can more effectively assess and recommend future enhancements, including vehicle repeaters, additional radio programming changes, interoperability improvements, and participation in any future County-wide emergency communications system.

Financial Implications:

The estimated capital cost for the second repeater equipment and installation is $40,000, inclusive of HST and a project contingency of 10% to address potential site, licensing, equipment, or installation requirements that may arise during implementation. The capital costs associated with this project would be funded from OMPF funding that was previously allocated for Fire SCBA equipment.

This capital cost estimate includes:

- Repeater controller
- Radio equipment
- Multicoupler
- Equipment cabinet
- Uninterruptible Power Supply (UPS)
- Installation time &
- Applicable HST

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The new antenna, coax and the addition new grounding and lightning arrestors was already budged through the CESG grant received earlier this year and scheduled for installation this summer.

Pricing was obtained from the vendor currently responsible for operating, maintaining, and supporting the Fire Department's radio communications equipment. Staff recommend proceeding with this vendor as a single-source procurement due to the specialized nature of the work, the need to ensure compatibility with the existing radio system, and the potential for hardware, software, programming, or integration issues if equipment or services were obtained from another supplier.

The current vendor has direct knowledge of the Township's radio infrastructure, existing equipment configuration, dispatch interface, programming requirements, and operational needs. The vendor also has an established working relationship with Fire Dispatch, which is important to ensure the proposed repeater is properly integrated into the existing emergency communications system.

Given the operational importance of emergency radio communications, staff believe that using the existing radio service provider will reduce implementation risk, support system continuity, and ensure accountability for installation, integration, testing, and ongoing maintenance.

The additional annual operating costs are estimated to be $2,200 per year for the new repeater. These operating costs would relate to the frequency licensing for the repeater, mobile and portables from ISED.

This investment represents the first phase of a phased emergency communications improvement strategy. The proposed repeater would address current operational coverage concerns and provide the foundation for future communications enhancements.

Staff intend to review vehicle repeater systems as part of the 2027 capital budget process. While vehicle repeaters may improve portable radio performance near fire apparatus, they are dependent on reliable apparatus mobile radio coverage to communicate with the main repeater system. The proposed second repeater would therefore improve the effectiveness and value of any future vehicle repeater investment.

Strategic and/or Other Plans:

- North Kawartha Strategic Plan (Infrastructure — Investments in Municipal Infrastructure)

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In Consultation With:

- Jesse Lambe, North Kawartha Fire Chief
- Mackenize Sykes, Financial Analyst / IT Supervisor

Attachment:

None