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The Canadian Earthquake Early Warning Programme

Transportation Sector Information Booklet

Seconds save lives!

Version 4.0 –September 2023

Canada

The Canadian Earthquake Early Warning Programme

Transportation Sector Information Booklet

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Version 4.0 –November 2023

Prepared by NIVA Inc. (www.niva.com)

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Purpose of this Booklet

Earthquake Early Warning (EEW) has the potential to reduce significantly the impacts of major earthquakes to various critical infrastructure sectors, including to the transportation sector. The Canadian Earthquake Early Warning (EEW) programme's **Transportation Sector Information Booklet** is designed to be used by Transportation Service Providers who have implemented or intend to implement automated technologies and/or human response protocols, which will be initiated by EEW alert messages from the national EEW system at their facilities. It is also intended to inform their public messaging.

This booklet is part of a Transportation sector toolkit containing materials for:

- Transportation executives and system administrators (decision-makers)
- Transportation providers' staff, and contractors
- For transportation providers to inform passengers, facility visitors, and the public on various modes of transportation or at transportation hubs

The intent of the toolkit is to:

- Provide pertinent, consistent, and useful information about the Canadian EEW programme; and
- Promote the value of EEW automated and personal protective actions in the Transportation sector.

FACT: Earthquakes in Canada are most common along the Pacific Coast of British Columbia and in the Yukon Territory, with approximately 20% also occurring along the St. Lawrence River and Ottawa River valleys.

The Canadian EEW system has the potential to:

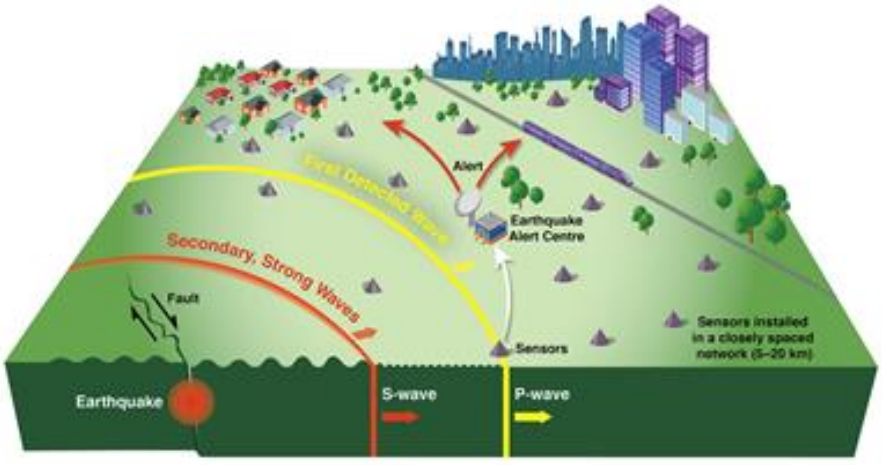
- Save lives and minimize injuries by enhancing protection for staff, volunteers, and the public
- Reduce damage to infrastructures, facilities, and equipment
- Enable a faster return to normal operations after an earthquake.
- Reduce economic impacts

The **Transportation Sector Toolkit** contains communication products, such as factsheets and infographics. This information within the toolkit is meant to:

- **Guide** preparedness, planning, response, and recovery actions
- **Inform** immediate and long-term decision making
- **Encourage** positive actions and behaviours
- **Reduce** or eliminate impacts and injuries
- **Prevent** ineffective or damaging responses or inaction
- **Build** trust in the EEW system and its alerts

Canadian Earthquake Early Warning

The Canadian EEW programme is intended to reduce impacts from earthquakes and increase the safety of people in Canada. It is an initiative led by Natural Resources Canada (NRCan) in collaboration with provincial, territorial, and municipal governments, and First Nations. EEW is the rapid detection, real-time estimation, and warning of an earthquake in progress and of shaking hazard.



In an EEW system, sensors detect the initial P-wave from an earthquake, these data are sent to datacentres where the potential impact of the event is rapidly assessed and an alert is disseminated, providing usually seconds to tens-of-seconds of warning before the stronger shaking of the S-waves arrives.

The national EEW system consists of a network of sensor stations designed for EEW, rapid communications technologies, and datacentres running EEW processing and alerting software.

See Appendix A for answers to Frequently Asked Questions on EEW.

Implications for the Transportation Sector

Transportation providers and organizations within Canada can use alerts from the Canadian EEW system to improve their earthquake risk mitigation. Transportation providers and organizations across the country that implement automated technologies and/or human response protocols, to be initiated by EEW alert messages, can offer enhanced protection to staff and the public, and reduce impacts and costs to infrastructure and vital systems.

Alerts from the Canadian EEW system have the potential to reduce damage, save lives, and minimize injuries during an earthquake, and enable a faster return to operations after. These measures can also reduce the economic impacts of a major earthquake.

Rapid Information, Rapid Action!

The Transportation sector can benefit from EEW-powered warnings to improve earthquake hazard mitigation, in earthquake prone regions across Canada.

Transportation facilities and operations can benefit by integrating technologies and protocols that will be initiated by alerts from the national EEW system through:

- Automated Alarms
- Automated Actions

Benefits of automated actions and alerts for the transportation sector

Scientists have estimated that EEW technologies can reduce the number of injuries in earthquakes by more than 50%.[1] Automated technologies can be triggered by specialised EEW messages to enact protective measures to systems and to alert people. For example:

Trains and similar modes of transportation can be halted, protecting people, emergency services, and cargo (including chemicals and other potentially hazardous materials) from damage due to derailment and other risks. Public modes of transportation able to be halted in an area of safe egress, can open doors.

For cargo terminals, cranes can be secured.

[1] Strauss, JA, Allen, RM (2016) Benefits and costs of Earthquake Early Warning. Seismological Research Letters 87(3): 765–772.

Air traffic can be diverted from landing, to protect them from experiencing shaking and from landing on runways which could be damaged by the earthquake.

Additionally, ships can be delayed from docking, to prevent seismic shaking being transferred from wharfs and docks to vessels; the strongest waves in an earthquake are shear, which do not transmit through water, but which transmit strong, horizontal forces through solids. For cargo ports, cranes can be secured.

Through signage, lights, and/or physical barriers, vehicles can be prevented from driving onto bridges or into tunnels. On- and off-ramps are particularly vulnerable to earthquake damage. Drivers can be alerted to pull over somewhere safe.

Valves can be closed to protect water sources and prevent spillage of fuels and other hazardous substances into the environment. This further reduces the potential for fire following an earthquake and ensures greater availability of fuel.

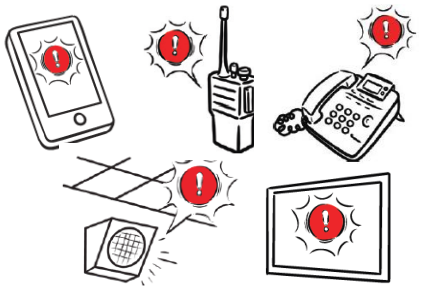
Doors and gates can be opened to ensure egress or access for people and vehicles. Doors can be vulnerable to jamming shut.

At airports, train or ferry stations, and other publicly accessible buildings for transit, elevators can be halted at the nearest floor and its doors opened, minimizing the risk of trapped occupants.

Computer hard drives and other delicate equipment can be secured to protecting data and enable continued operations, such as for traffic control at airports, and at operations centres for public and cargo transportation.

Audio-visual alerts for staff, passengers, and visitors

Alerts can be delivered to mobile devices, public address (PA) systems, internal radio system, Voice over Internet Protocol (VoIP) 'phones, display monitors (e.g., in operations centres), and other means. Alerting people (public, staff, etc.) means that they have more time to take protective actions and are less likely to be injured. These alerts can prompt workers to pause dangerous operations and move out of



hazardous environments. Organizations should reflect on the needs of their staff, passengers, and clients; diverse alerting methods (audio and visual) will make EEW more accessible, helping to keep everyone safe.

Intrusive alerts (an EEW message accompanied by an alarming sound, light, and/or vibration) will be delivered to mobile devices, radio, and television through NPAS and/or purpose-built EEW applications.[2]

Audible alerts can be broadcast to people in/near facilities via Public Address (PA) and internal radio systems, and by Voice over Internet Protocol (VoIP) phones. These are most likely to aid people who are blind or visually impaired.

Digital message boards throughout facilities can alert that shaking is expected, especially in areas with high foot traffic.

Visual alerts can notify people in areas where noise levels may be high and audible alerts may not be heard. For example, flashing strobe alerts can prompt individuals to perform protective actions. These can be helpful to people who are deaf or hard-of-hearing.

Personnel considerations

Facilities that implement EEW-triggered automated systems must ensure proper training is taken by staff, regarding automated technologies in place and policies that have been implemented, that may be triggered by an EEW alert. This includes what to expect when alerts are received, what automated actions will be triggered, and how they are expected to respond in their respective roles and environments. It is also recommended that transportation organizations and companies consider conducting drills during Great ShakeOut events (held annually).

Staff should practise how they can self-protect when they receive an EEW alert or feel shaking indoors, outdoors, or in transit. Additionally, staff might encourage passengers and clients to protect themselves. For most people, the most appropriate protective actions to take are to Drop, Cover, and Hold On. Other protective actions may be taken based on specific situations and/or environments (see Appendix A). Instructive signage that is strategically placed throughout the facility, particularly in high traffic areas, can help ensure this information is readily available.

As complementary training, people in Canada should refer to Preparing for Earthquakes resources.

[2] To avoid confusion, any third-party alerts to the public must be consistent with NPAS alerts.

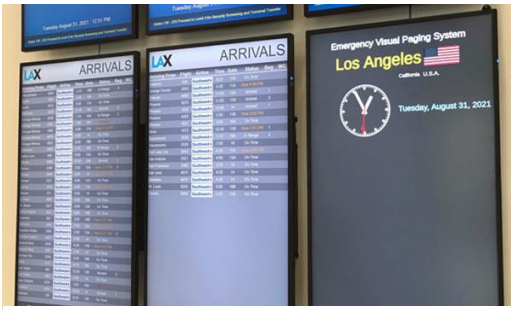
EEW in Practice

EEW-triggered automated response technologies are in place and have proven effective in several countries with EEW systems. Below are a few examples.

United States

Although the EEW system in the United States is relatively new, several automated EEW technologies have been adopted by the transportation sector.

San Francisco's BART (Bay Area Rapid Transit) was an early adopter of EEW, developing EEW-triggered technologies which reduce the possibility of derailment and alert staff and passengers to protect themselves. For LA Metro, EEW technologies ensure all trains stop when a particular intensity is exceeded. Similarly, the Metrolink commuter rail service in Southern California uses EEW technology to slow or stop trains when certain levels of shaking are expected.



LAX notice board showing an emergency alert (Ekky Wicaksono)

At LAX airport, a pilot project is in place to send alerts to emergency notification screens and shut down the aircraft fuel hydrant system.

Japan

One of the first implementations of EEW technologies in any country was the automated stopping of trains. This technology has proven extremely effective in the strong earthquakes which have struck Japan in the years since.

For example, when a magnitude 7.4 earthquake occurred off Japan's northeastern coast in 2022, many rail lines were badly damaged. Trains, including those operated as Shinkansen, carrying hundreds of passengers were, however, halted upon receipt of an EEW message, and only minor derailments resulted. No one was injured.


Minor Shinkansen derailment (The Asahi Shimbun).

Romania

In Romania, alerts to Basarab Bridge, in Bucharest, halt automobile and tram traffic.

Technical Partnership

As described above, Canada's resilience to earthquakes via the EEW system will be significantly enhanced through implementation of automated response devices and applications which are triggered by EEW messages. NRCan will grant Technical Partners[3] (TP) access to the national EEW Servers and the EEW messages it produces. This enables the triggering of automated response actions, through EEW technologies installed by the TP, based on the anticipated level of shaking (Peak Ground Acceleration and/or Peak Ground Velocity) and/or shaking intensity (Modified Mercalli Intensity) for a TP's infrastructure within the region of impact.

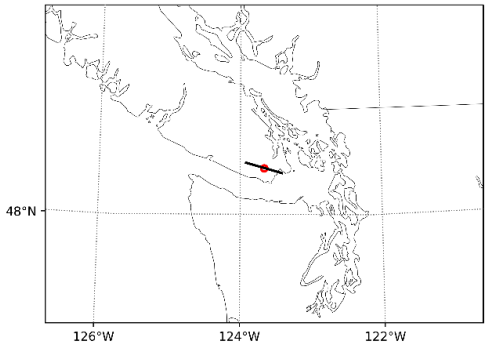
The TP will need to establish beforehand the desired actions based on these parameters. Different actions can be prescribed for varying levels of ground motion and intensity. TPs should also keep in mind that warning times are unknown and are likely to be short (often on the order of seconds). Additionally, close to the earthquake's epicentre there is often a "Late Alert Zone" within which it is not possible to receive an alert prior to the onset of strong shaking.

While NRCan has, for several years, provided post-earthquake messages to Canadian railway companies, EEW can provide greater ability to respond to the earthquake and reduce potential impacts. EEW therefore augments the various earthquake products offered by NRCan. For information on other earthquake-related products, please see: [link].

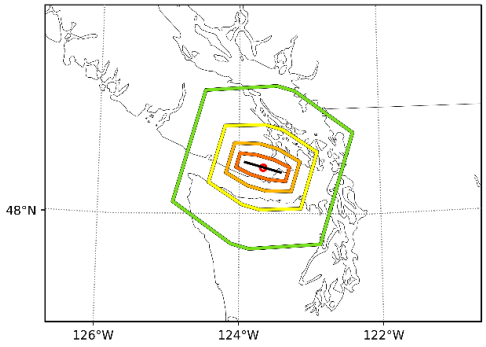
EEW Messages

NRCan's EEW system publishes EEW Messages in XML format on its alert servers, which may be accessed by subscription. Messages contain estimated earthquake magnitude and location. Some message types include the distribution of expected shaking intensities. The three Message types are described as follows:

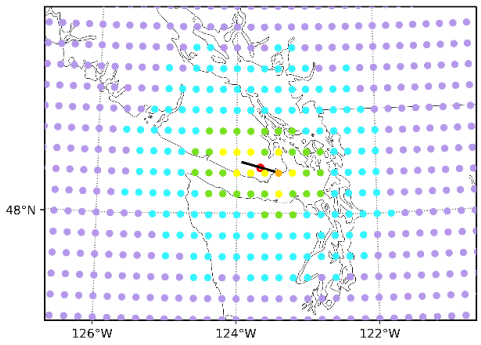
3 Technical Partners include Critical Infrastructure Operators, Technology Providers, and other End-user organizations that subscribe to alerts EEW messages (in XML format for automated systems). For greater certainty, the term "Technical Partner" in this document does not mean, nor should it be construed as meaning that there is a legal partnership between the Government of Canada and any of the Technical Partners.



Event only: magnitude and location



Event and Contours: magnitude, location, and polygons indicating areas with estimated levels of Modified Mercalli Intensity (MMI), Peak Ground Acceleration (PGA), and Peak Ground Velocity (PGV)



Event and Grid: magnitude, location, and grid map of estimated MMI, PGA, PGV

Technical Partners may subscribe to more than one EEW Message type.

The initial Message regarding an earthquake is labelled as “New”. Updates are sometimes necessary as large earthquakes develop over time and, hence, their size and the extent and severity of shaking, requires reassessment; such messages are labelled as “Update”. After the final “Update Message”, a human review of the earthquake will be published as a “Follow-up” and posted to the Earthquakes Canada website.

For further information on Technical Partnership, please see: [link].

Regulatory considerations

The Government of Canada does not prescribe any ways or means by which Technical Partners or other EEW alert recipients should comply with any regulations, statutes, or legal orders that apply to them. Further, neither NRCan nor the Government of Canada offers any legal advice or warranty to either Technical Partners or other EEW alert recipients related to statutory or regulatory requirements.

Final Comments

User Expectations

The contents included in this Information Booklet have been carefully reviewed by NRCan for scientific accuracy. It is expected that additional materials will be added, or amendments made, to this and other materials in the Transportation Sector Toolkit, as well as inclusion of feedback and lessons learned along the way.

User Responsibilities

Technical Partners are expected to adhere to and maintain the informational integrity of this booklet and of its toolkit's contents, and the science reflected therein. Information contained in this booklet respects all confidentiality considerations related to Technical Partner intellectual property.

Please direct any questions about these materials to: EEWinfo-infoASP@nrcan-rncan.gc.ca

Conclusions

The Canadian EEW system will only be effective if systems and people take appropriate protective actions. Installation of EEW automated response technologies can greatly reduce the impacts of earthquakes on transportation infrastructure and the people who work and travel within it. Provision of consistent, accurate, accessible messaging on EEW and how to respond is key to ensuring the reduction of damage and injuries as a result of strong earthquake shaking. NRCan appreciates the efforts of Transportation providers to include EEW technologies in their facilities and operations, and to educate their staff about EEW. Incorporating these technologies and processes will help make Canada more resilient to strong earthquakes.

Contact Information

Please contact us should you have any questions or concerns regarding the Canadian EEW programme.

For **general information**, contact the Earthquake Early Warning Programme at 613-995-1006.

For **media inquiries**, contact NRCan Media Relations or the Earthquake Early Warning Programme at 613-995-1006.

For more information on **earthquakes in Canada**, please visit Earthquakes Canada.

Appendix A: Earthquake Early Warning FAQs

What is Earthquake Early Warning?

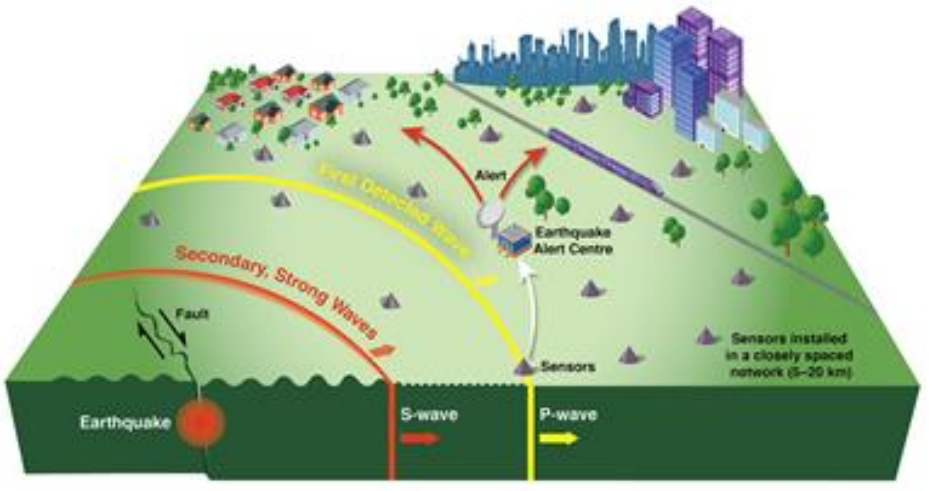
EEW is the rapid detection, real-time estimation, and warning of an earthquake in progress and of shaking hazard. *NOTE: The Canadian EEW system is not an earthquake prediction tool; it is not alerting that an earthquake will happen in the future, but rather that an earthquake has been detected and strong shaking is imminent.*

What does it do?

It detects that an earthquake has begun and sends a warning that shaking is imminent. An EEW alert provides seconds to (in some cases) tens-of-seconds for people and systems to take protective actions to avoid injuries and damages. It has the potential to reduce damages, injuries, and even fatalities.

How does it work?

Earthquakes release energy that travels as seismic waves through the Earth in all directions, like sound waves travel through air. The first waves are known as P (or Primary) waves; they travel about 20 times the speed of a commercial plane and are followed by S (or Secondary) waves, which are slower, yet generally much more damaging. In an EEW system, seismic sensors detect the first (P-wave) energy released by an earthquake. The Canadian EEW system uses a network of sensors, each about the size of a shoebox, to detect the P-waves in advance of the S-waves.



To learn more about the national EEW system for Canada, please visit: https://earthquakescanada.nrcan.gc.ca/eew-asp/system-en.php

The delay between the arrival of P-waves and S-waves influences the amount of advance warning that can be given and is dictated by the distance from the source. This system uses software which rapidly analyzes the seismic data to determine the location and magnitude of the earthquake, and then it estimates the strength of shaking that will occur in the region. A warning is generated, if significant shaking is anticipated, before the arrival of the secondary, generally stronger S-waves, which can cause the most damage.

See this video on how the Canadian EEW system works!

What is Canada doing about Earthquake Early Warning?

As part of the Emergency Management Strategy for Canada, launched in 2019, the federal government funded NRCan to develop an EEW system, with partners, including USGS. The USGS's EEW software has been adopted for use in Canada and it facilitates sharing data between the countries. This cooperation will ensure earthquakes close to the Canada-United States border are managed as effectively as those that occur well within each country's own EEW network.

The EEW system is designed to alert for potentially harmful earthquakes, including for strong shaking from earthquakes outside Canada's borders. The partnership with the USGS includes resources from its Earthquake Early Warning programme, which is currently operational in California, Oregon, and Washington.

In 2024, more than 10 million people in earthquake-prone regions of Canada will be able to receive EEW alerts, providing them with a few precious seconds to take protective actions.

How much warning will the EEW system provide?

EEW systems can provide up to tens-of-seconds of warning of an earthquake as it is detected. Warning times depend on how far you are from the earthquake. The farther you are from the epicentre, the more warning time you will have. The area very close to an earthquake's epicentre may not receive an alert before the onset of strong shaking; this is called the "late alert zone".

How can an Earthquake Early Warning system help?

The EEW system will add protection by providing notice before strong shaking starts. A few seconds of warning can be enough time for people to protect themselves (generally, to **Drop, Cover,** and **Hold On**) and for systems to initiate safety protocols. This warning can therefore help reduce injuries, deaths, and property losses. EEW works optimally when coupled with a good understanding of how to respond efficiently and appropriately in those seconds leading up to the arrival of strong shaking.

What safety measures can be triggered by EEW?

Via a subscription process, EEW alerts will also be sent directly from the EEW system to Technical Partners. These alerts can be used by recipients to trigger automated actions to protect people and property. Some examples across sectors include:

Move elevators to the nearest floor and open doors, minimizing the risk of trapped occupants

Automatically close or open doors to ensure egress or access for people and emergency vehicles

Halt transportation of people, emergency services, and cargo (including chemicals and other potentially hazardous materials) in safe locations

Prevent vehicles from driving onto bridges or into tunnels

Close valves to protect water sources and prevent spillage of hazardous materials, to mitigate earthquake-induced accidents, hazardous spills, and flooding.

Divert planes (and other air transportation) from landing

Halt surgical and medical procedures

Secure computer hard drives and other delicate equipment, protecting critical data, applications, and operations, enabling an efficient return to operations.

How will people receive an EEW alert?

The public will receive EEW messages automatically, through the National Public Alerting System's intrusive alerting, via cellular telephone, radio, and television. There is no need to register for this service and it is free of charge.

How should people protect themselves?

EEW alerts only reduce the impacts of strong shaking if people and systems take appropriate and immediate **protective actions**. Recipients of an EEW alert should always assume that strong shaking is imminent.

Basic personal protective actions

There are several protective actions people can take within seconds of receiving an EEW alert.

Basic protective actions for people include:

- **Drop, Cover,** and **Hold On** as soon as you feel shaking or receive an alert that shaking is expected. *Note: The protective action for most situations is to Drop, Cover, and Hold On, with variations based on mobility and other situations).*
- Practising **Drop, Cover,** and **Hold On** creates muscle memory, which improves likelihood of appropriate actions being taken and reduces reaction time.
- When receiving an alert or feeling shaking, do not run outside as buildings in Canada are at very low risk of collapsing. Once in a safe location, remain there until 60 seconds after shaking stops as items may still be unstable, then cautiously evacuate building if damaged.
- It is important to **Cover** your head and close your eyes to protect yourself from debris (broken glass, loose objects, bricks, etc.), even if you find shelter under a table. If you do not take protective actions, you are more likely to fall or get injured.

Other protective actions

In particular situations, there are other protective actions recommended by scientists, engineers, and public safety programs, such as The Great ShakeOut Earthquake Drill (ShakeOutBC, ShakeOut Yukon, and La GrandeSecousse du QC):

- If outside, move away from hazards. **Drop, Bend Over**, and **Cover** your head. Watch out for hazards like buildings, powerlines, and overpasses.
- If in a vehicle, pull over, set the parking brake, and stay inside the vehicle. Activate the emergency flashers. Avoid stopping under or near utility wires, overpasses, bridges, or gas stations.
- If in a store or where there is no place to take cover, move away from overhead objects to an interior space, then **Drop** and **Bend Over** to protect vital organs, and **Cover** your head and neck with both arms and hands until shaking stops.
- If in a “big box” store or warehouse, **Crawl** into one of the shelves, **Cover** your head with one arm, and **Hold On** with the other.
- If in bed, **Stay** there, lay on your stomach, and **Cover** your head and neck with pillows.
- If in a wheelchair, turn away from windows, **Lock** your wheels, and bend over to **Cover** your head and torso, and **Hold On**.
- If unable to take cover under a desk or table, you will have to adapt to your situation. If possible, **Crouch Down** against an interior corner or wall and **Cover** your head. Do not get into a doorway as they are rarely structural, provide no protection, and doors can slam violently due to the strong horizontal forces of the S-wave.
- If with young children, *if they are within reach*, pick them up and hold them to your chest when you **Drop, Cover,** and **Hold On**. *If they are not within reach*, avoid moving to search for them until 1 minute after shaking stops.

What are missed, false, and late alerts?

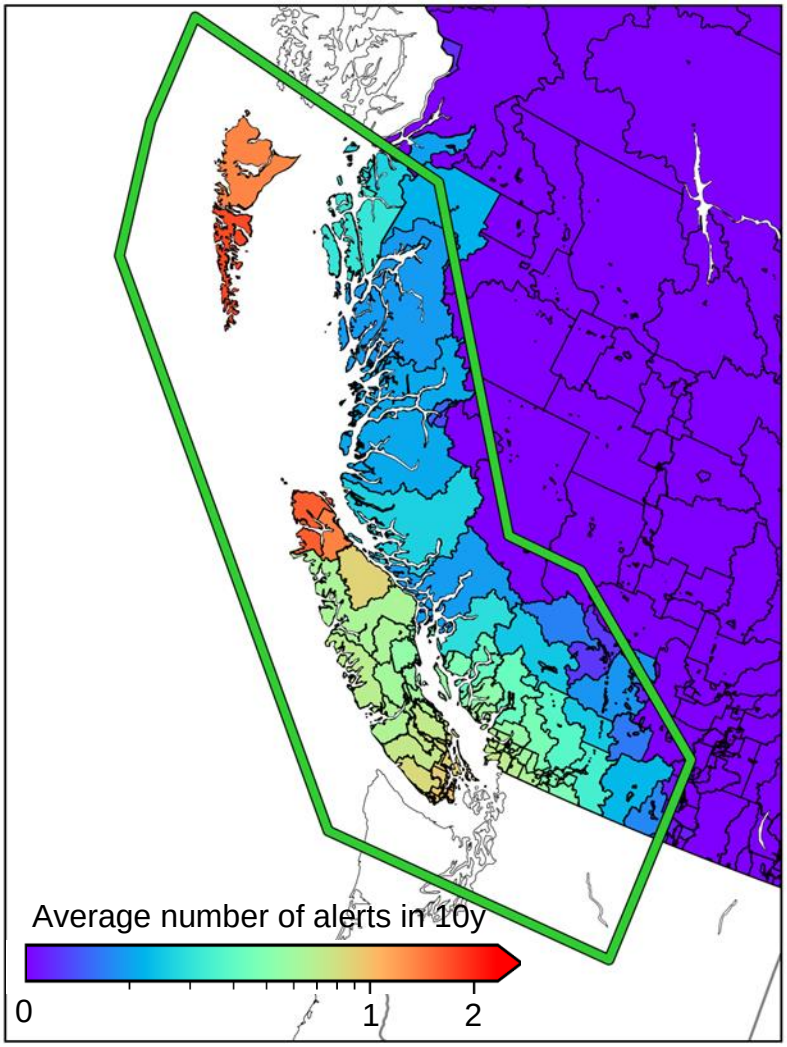
- **Missed alerts** occur when no alert is sent for an event within the threshold parameters for EEW alerting. Additionally, people may feel an earthquake but not receive an alert. The system will only alert for potentially harmful earthquakes within the regions of coverage; the system may not alert for small earthquakes that pose little or no threat.
- **False alerts** are when an alert is disseminated erroneously (e.g., when an earthquake's magnitude is over-estimated, or the system records other seismic activity). Receipt of an alert without the experience of shaking does not imply a false alert; certain situations can make it difficult for people to perceive shaking.
- **Late alerts** are alerts received after the arrival of the S-wave. Sites very close to an earthquake's epicentre may be in the event's "late alert zone", within which alerting is not possible before strong shaking from earthquake arrives.

Do Earthquake Early Warning systems have limitations?

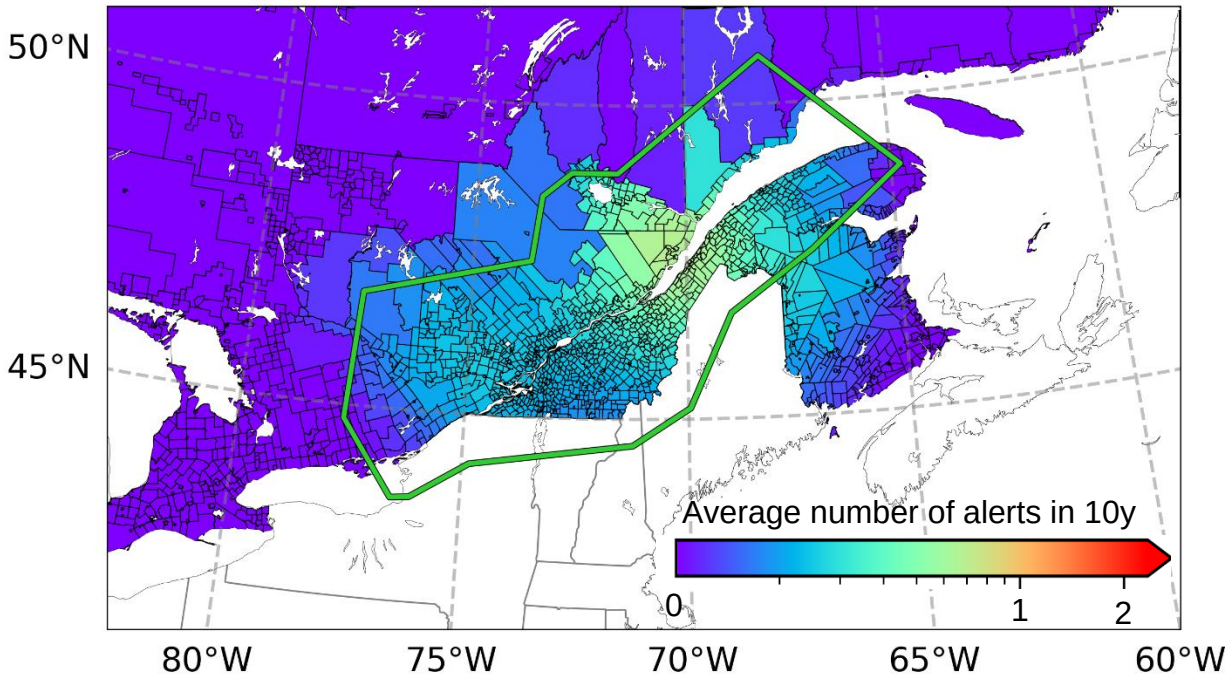
EEW systems cannot predict earthquakes; they do not provide hours of advanced warning or even, in most cases, enough time to evacuate a building. The EEW system will only be operational in the highest risk areas of Canada (see below). Having an EEW system does not eliminate the need for other earthquake risk reduction, preparedness, and response measures, such as constructing to building code requirements. EEW systems do, however, provide valuable seconds of warning which enables protective actions; they have been proven effective in several countries.

What regions will be covered by the Earthquake Early Warning system?

EEW will be installed in areas of both moderate-to-high seismic hazard (where strong shaking from earthquakes is relatively probable), and moderate-to-high concentrations of population and critical infrastructure. Initially the region of coverage will include western British Columbia, eastern Ontario, and southern Quebec, as shown in the EEW Coverage Area Maps below.



Green polygon shows EEW Coverage area for western Canada, within which the Canadian EEW system is designed to alert reliably for potentially harmful shaking from earthquakes. For very large earthquakes, people and systems outside this area may be alerted. Coloured regions indicate the estimated average number of alerts for a ten year period, by census subdivision.



Green polygon shows EEW Coverage area for eastern Canada, within which the Canadian EEW system is designed to alert reliably for potentially harmful shaking from earthquakes. For very large earthquakes, people and systems outside this area may be alerted. Coloured regions indicate the estimated average number of alerts for a ten year period, by census subdivision.

Is the EEW system protected against malicious threats?

The EEW system's infrastructure will comply with Canada's ITSG-33 cyber security requirements. All EEW sensor stations have both cyber and physical protections in place.

Will the EEW system warn of tsunami?

The EEW system does not monitor or alert for tsunami.

The National Tsunami Warning Center (NTWC), run by the United States' National Oceanic and Atmospheric Administration, monitors for tsunami events along the coasts of North America in collaboration with other countries, including Canada. Seismic data recorded by NRCan are shared with NTWC to identify potential sources of tsunami by earthquake activity, and Canada's Department of Fisheries and Oceans monitors the ocean for tsunami waves.

For people within a tsunami inundation zone, if shaking is long (lasts more than a minute) and/or strong (difficult to stand), or if a tsunami warning is received (see here for more information), it is advisable to move to high ground and stay there. In many cases, the earthquake is the warning. Tsunami waves can be fast, strong, and dangerous, and the first wave is usually not the highest. Even low-amplitude tsunami waves can cause hazardous, erratic currents. Additionally, a tsunami can continue for several hours.

Are all EEW systems in Canada (public and private) connected?

NRCan's EEW system is national in scope and provides an authoritative source of warning information as a public good. The Canadian EEW system is designed to alert for all earthquakes within the regions of coverage (western BC, eastern ON, and southern QC). Questions regarding EEW activities by other organizations should be directed to those organizations.

Appendix B: Additional Resources

Earthquake Early Warning Blog: https://earthquakescanada.nrcan.gc.ca/eew-asp/blog-en.php

How the Government of Canada is helping to protect Canadians with Earthquake Early Warning System: https://www.canada.ca/en/natural-resources-canada/news/2022/03/government-of-canada-helps-protect-canadians-with-earthquake-early-warning-system.html

Earthquakes Canada: https://earthquakescanada.nrcan.gc.ca/index-en.php

Earthquake Database: https://earthquakescanada.nrcan.gc.ca/stndon/NEDB-BNDS/bulletin-en.php

Seismic Hazard Tools: https://earthquakescanada.nrcan.gc.ca/hazard-alea/interpolat/index-en.php

CN Station Book Index: https://earthquakescanada.nrcan.gc.ca/stndon/CNSN-RNSC/stnbook-cahierstn/index-en.php

Seismogram viewers to see the shaking: https://earthquakescanada.nrcan.gc.ca/stndon/wf-fo/index-en.php

Canada's Emergency Management Strategy: https://www.publicsafety.gc.ca/cnt/rsrcs/pblctns/mrgncy-mngmnt-strtgy/index-en.aspx

Other Earthquake Related Links: https://earthquakescanada.nrcan.gc.ca/info-gen/links-liens-en.php

Canadian Red Cross Earthquake Page: https://www.redcross.ca/earthquake

Great British Columbia ShakeOut earthquake drill: https://www.shakeoutbc.ca/

La Grande Secousse du Québec: https://www.grandesecousse.org/quebec/

Articles on EEW technologies in use by the Transportation Sector:

United States

BART: https://www.bart.gov/news/articles/2022/news20220816

LA Metro : https://www.masstransitmag.com/safety-security/press-release/21243151

LAX: https://www.airport-technology.com/news/los-angeles-airport-earthquake-early-warning-system/

Metrolink: https://metrolinktrains.com/news/metrolink-news/metrolink-completes-systemwide-deployment-of-earthquake-early-warning-technology

Japan

Shinkansen: https://www.asahi.com/ajw/articles/14574865 and https://www.japantimes.co.jp/news/2022/03/18/national/tohoku-train-derailment-shinkansen/

End