

## CASE STUDY

# Wheatley, Ontario Explosion

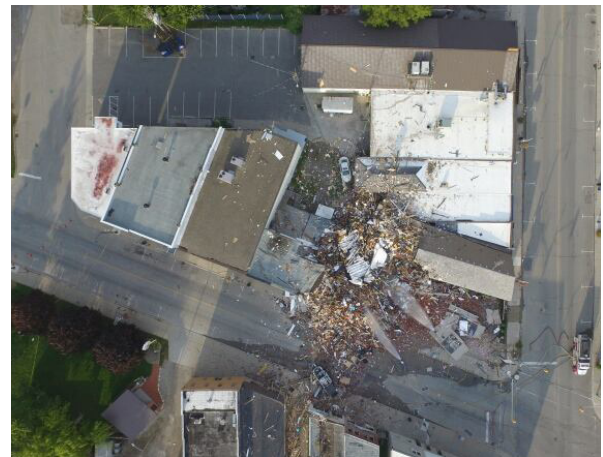
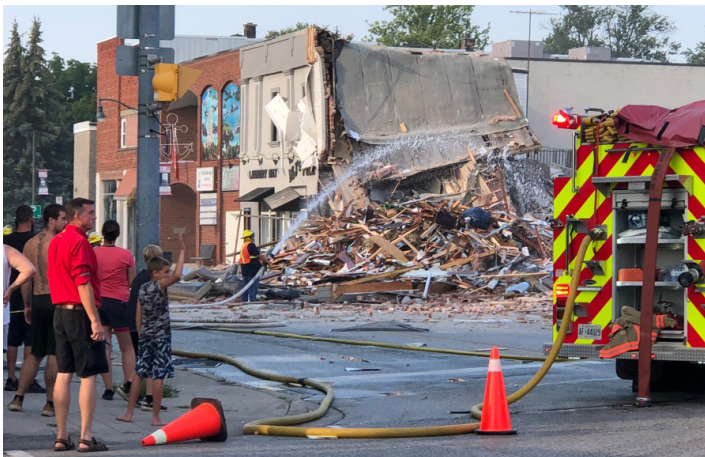
WHAT HAPPENED, THE IMPLICATIONS, AND FUTURE PREVENTION



## Introduction

On August 26, 2021, a hydrogen sulfide gas (H<sub>2</sub>S) explosion occurred in the downtown core of Wheatley, Ontario, resulting in 20 people being injured and causing extensive damage to surrounding buildings. During demolition, the gas was traced to a legacy gas well nearby which had migrated through an underground water reservoir and used an undocumented water well as a conduit to accumulate in the basement of a building that was ultimately destroyed. The force of the explosion necessitated the demolition of several surrounding structures.

Subsequent emergency response and investigation activities uncovered additional undocumented wells, highlighting the need for enhanced monitoring and response protocols to prevent similar incidents. The discovery of these wells also underscored the risks posed by aging and undocumented infrastructure in municipalities with historical oil and gas development.



## What has been done?

Following the incident, several critical actions were taken to address the situation and mitigate further risks:

- A groundwater monitoring well was installed on-site to observe subsurface conditions, and the undocumented water wells were plugged to prevent additional gas migration pathways.
- An Emergency Response Plan (ERP) was developed, which included baseline testing for gas flow rates and H<sub>2</sub>S concentrations, dispersion modeling, and an evacuation plan for Wheatley residents.
- Drone surveys were conducted to establish a baseline of methane emissions from all potential sources within Wheatley.
- An operations program was created to educate crews on safe work procedures and best practices for early gas detection.
- All above-ground buildings adjacent to the explosion site were demolished, and residual concrete foundations and basements were removed in anticipation of discovering more undocumented wells during the excavation process.
- The suspected source gas well is scheduled to be re-abandoned to modern standards, and monitoring will remain in place to ensure that gas concentrations in the groundwater dissipate to safe levels.





## Well Map

The map below illustrates the water (blue) and gas (red) wells in western Chatham-Kent, and neighboring Essex County.





## What Can Other Municipalities Do to Mitigate Risk?

Ontario has more than 30,000 legacy gas wells, many of which pose a risk of causing incidents similar to the Wheatley explosion. Most of these wells were drilled in the early 1900s, before modern cementing practices were in place to protect groundwater from migrating gas. Furthermore, the geospatial data for many of these wells is imprecise, with actual well locations often varying by up to 1 kilometer from public records.

To mitigate risks, municipalities can implement the following measures:

- **Develop a Risk Matrix:** Categorize wells based on proximity to receptors, age, known integrity issues, and potential danger to human health and the environment.
- **Utilize Available Data:** Use existing data to identify potentially at-risk areas that require further investigation.
- **Implement Monitoring Programs:** Establish early detection systems for methane and hydrogen sulfide gas.
- **Engage Stakeholders:** Raise awareness among local stakeholders about the risks and the steps being taken to mitigate them.
- **Lobby for Support:** Advocate for support from the Ontario government and the Ministry of Natural Resources and Forestry to expedite the implementation of the province-wide wellbore identification program.