

# February 2018 Flood Event



April 16, 2018



# Early January Melts Triggered Ice Jams

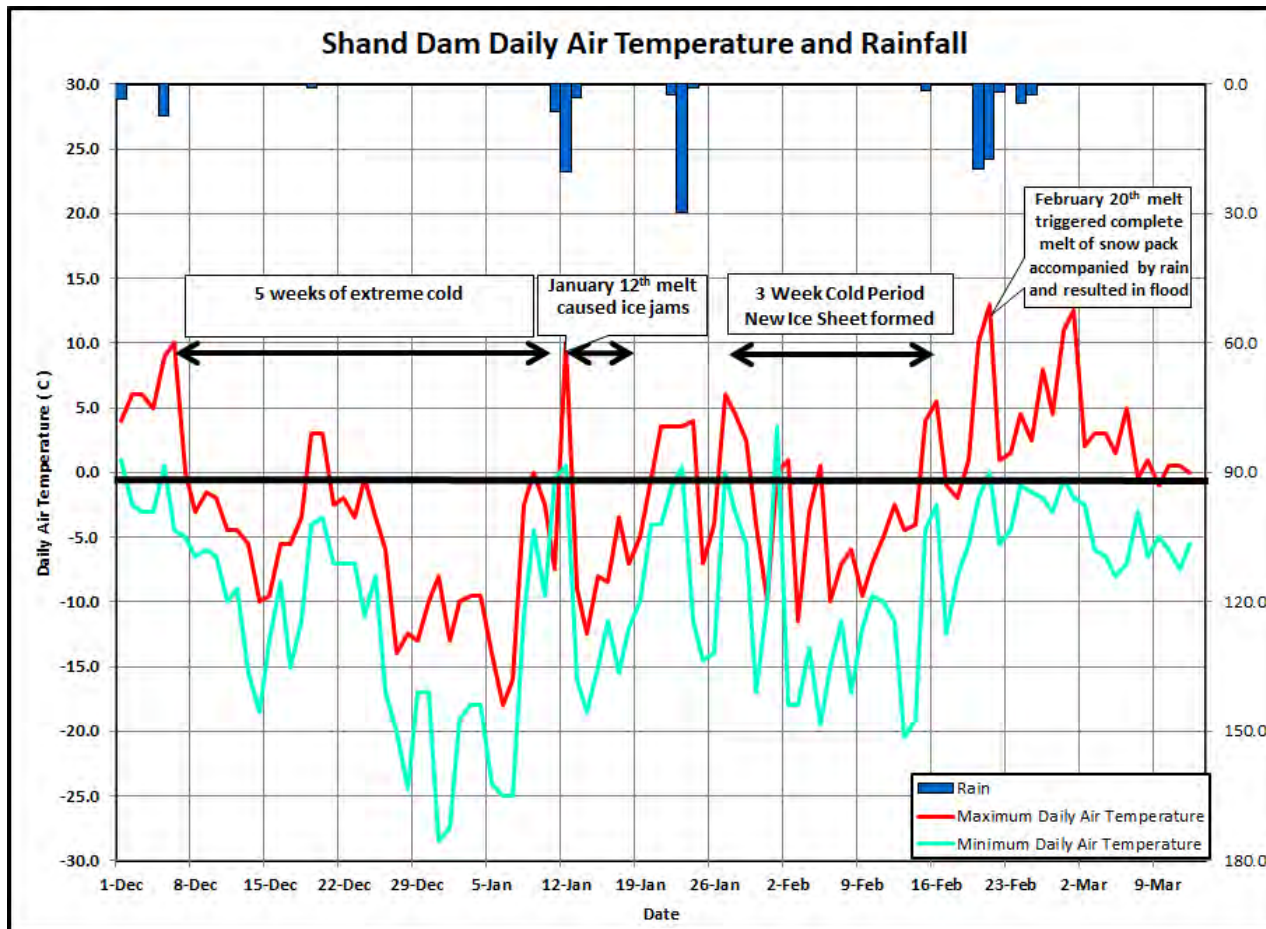
Frazil (slush ice) in the Blair Reach



- Melt event January 11<sup>th</sup> and 12<sup>th</sup> caused upstream ice to flow downstream.
- Intact ice upstream of Parkhill Dam stayed in place and caused an ice jam in the Cambridge area.
- A similar ice jam formed in the Brantford area.
- Following January 12<sup>th</sup> ice jam, cold conditions cause frazil (slush ice ) to further back up water.

Frazil ice (slush ice) formed after the original ice jam this caused unanticipated further backup of water and resultant flooding in the Cambridge area.

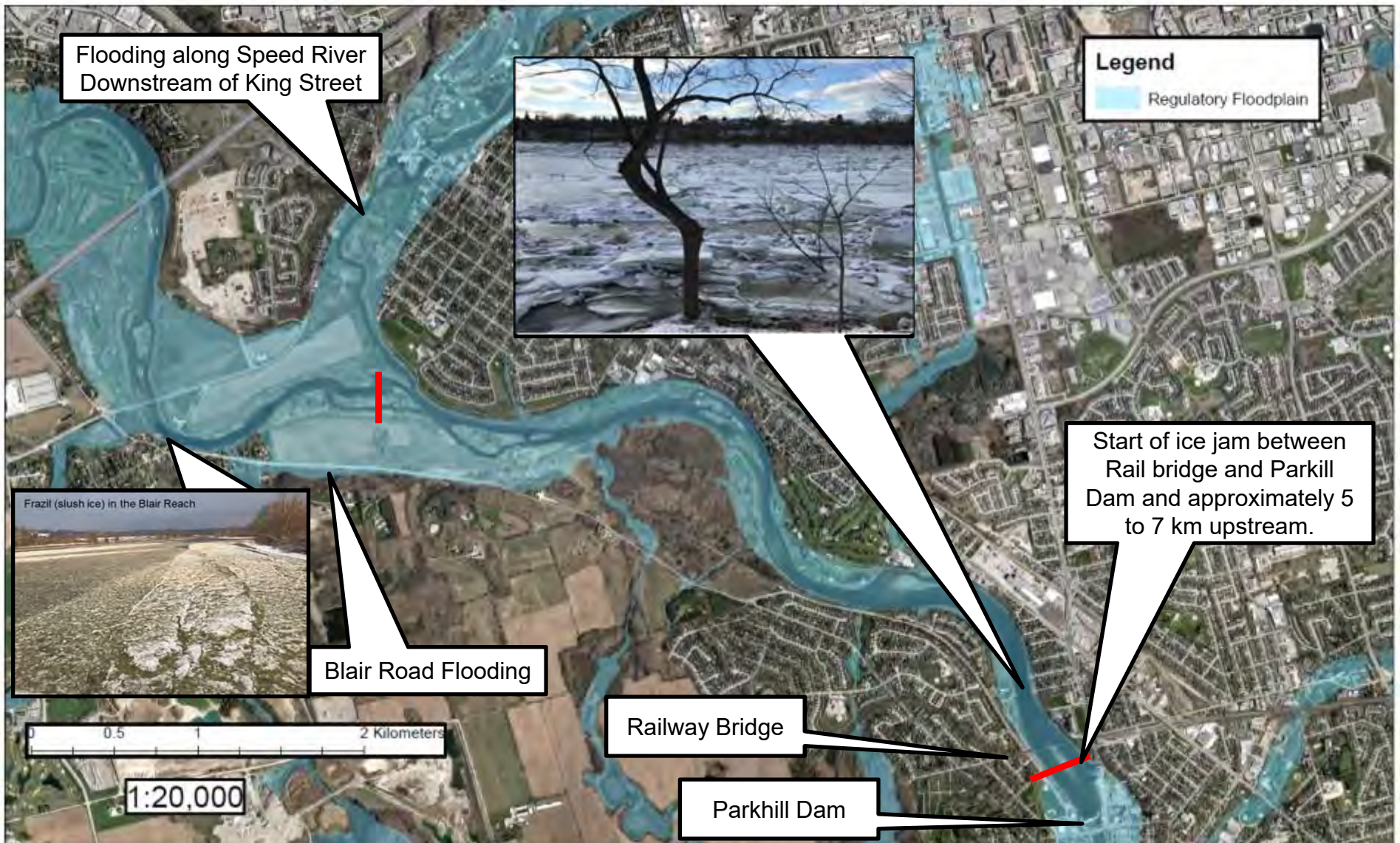
# Continued Melts and Freezes



The snow pack in the north part of the watershed was estimated to contain 75 to 100 mm of water content. This water combined with rainfall provided 125 to 150 mm of runoff water on frozen ground.

- A second winter melt with rain followed by a refreeze occurred in late January.
- Further cold spell in February frozen in ice jams and created new ice sheets.
- Warm front moved in February 19<sup>th</sup> temperatures soared to 13 degrees.
- February rainfall highest 2 day rain on record in Shand Dam's 79 years of record.

# Ice Jam Location Parkhill Blair Reach



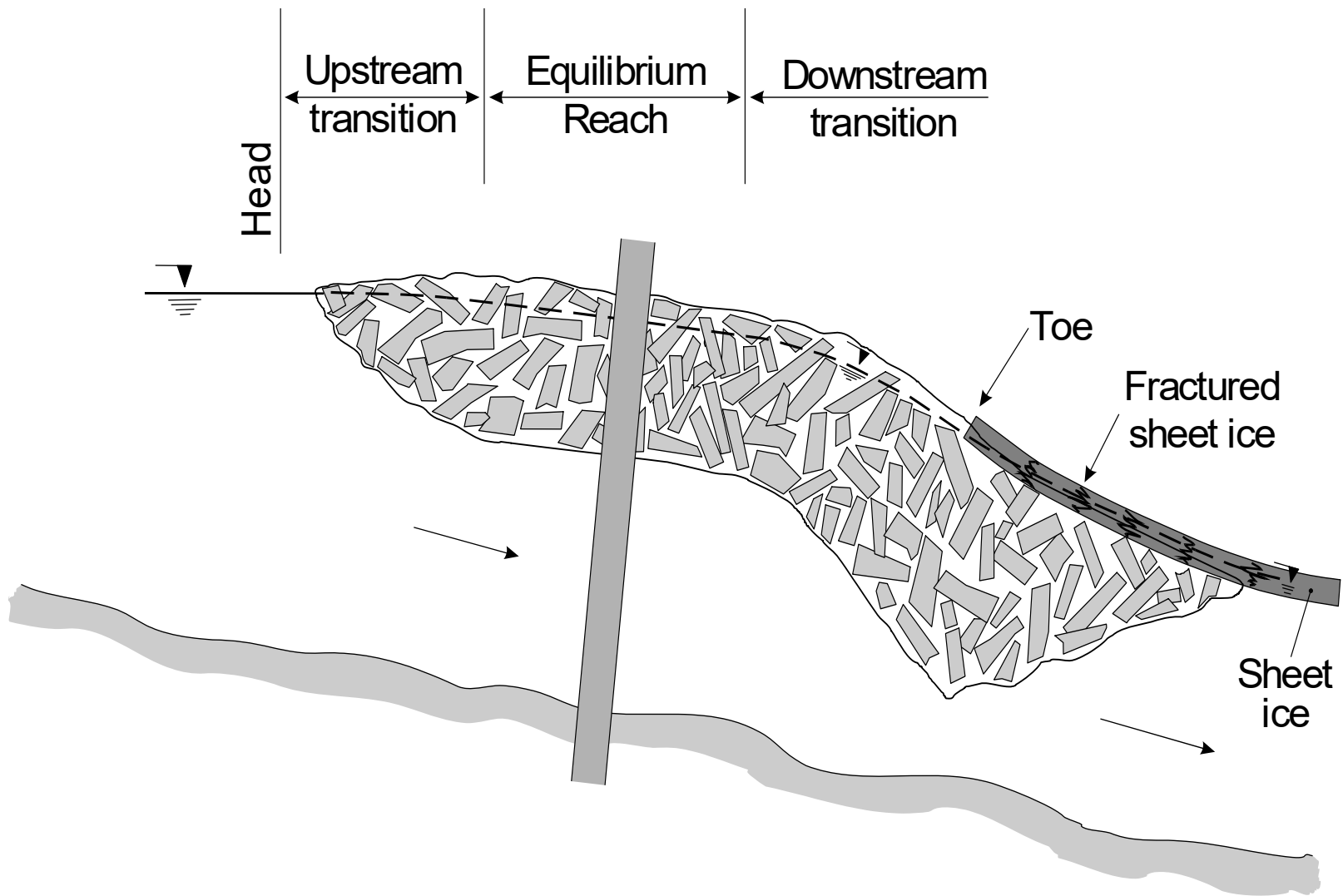
Intact ice upstream of Parkhill Dam stayed in place and resulted in an ice jam.

# February 19<sup>th</sup> – 21<sup>st</sup> Flood Event

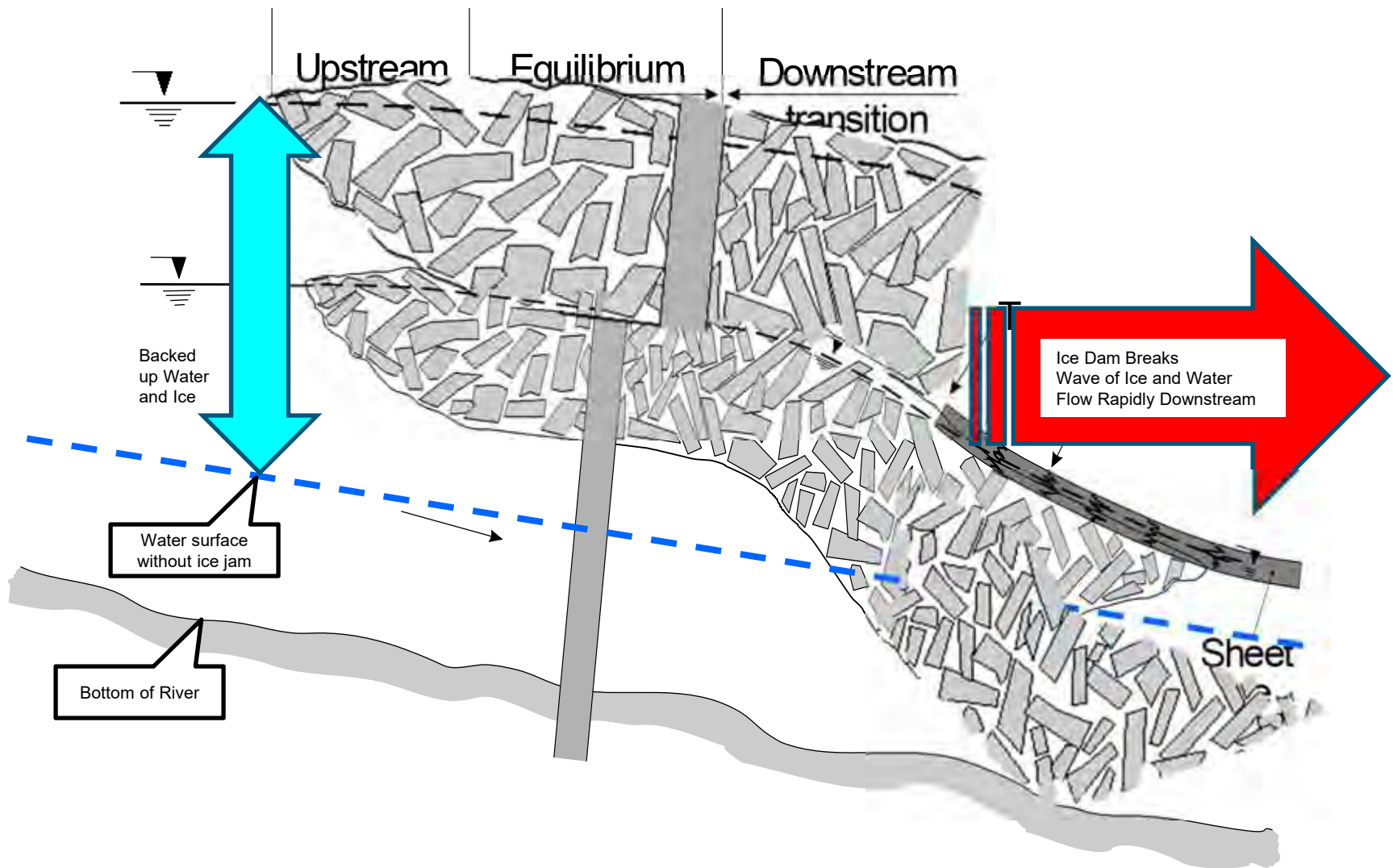
- Combination of warm temperatures, rainfall, and snow melt resulted in heavy runoff and high river flows
- Ice jams, due to their unpredictable response, compounded challenges, but were expected to release with this event. <https://youtu.be/JnfwrJtwN04>



# Characteristics of an Ice Jam/Ice Dam



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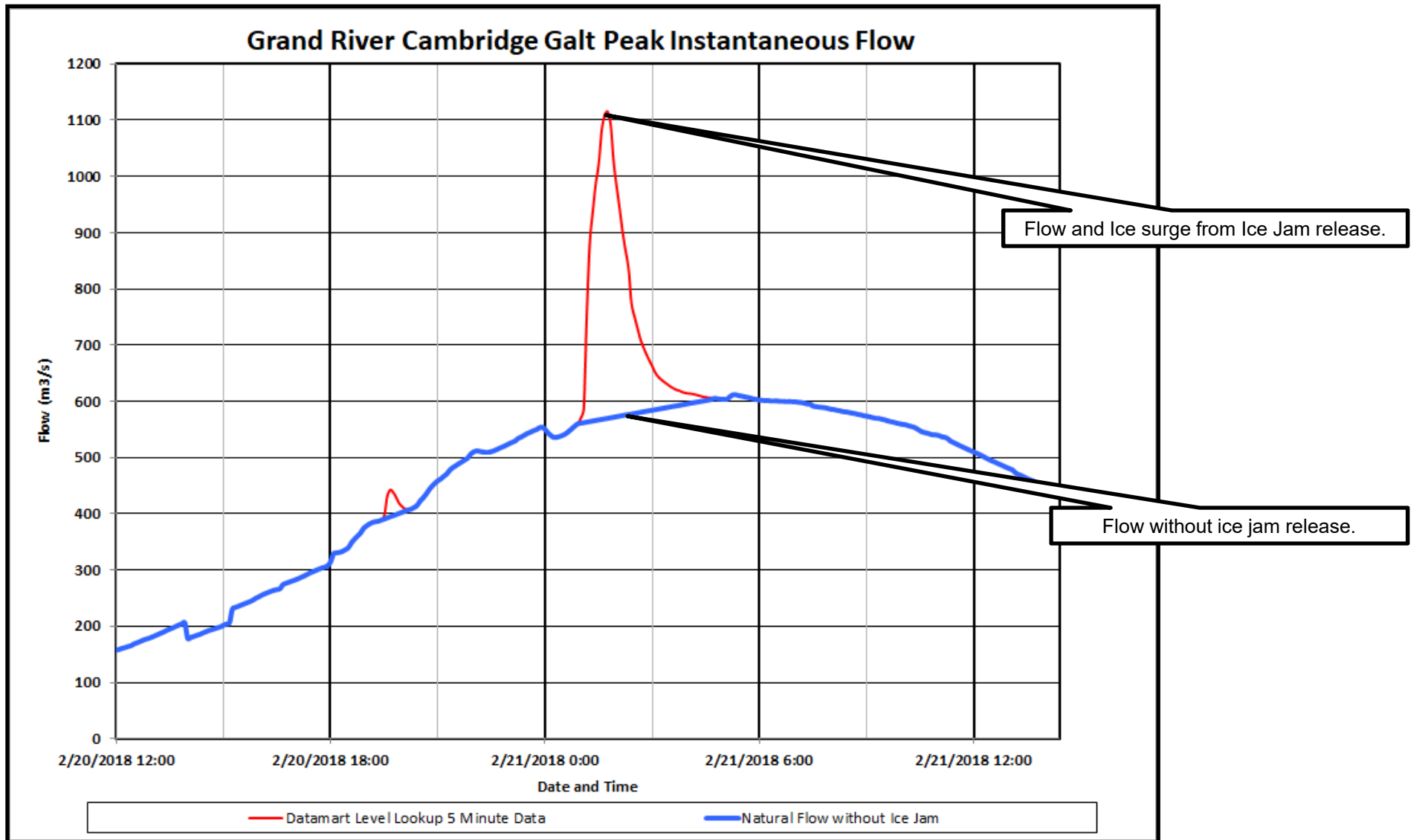


# Impact of the Ice Jam in Cambridge

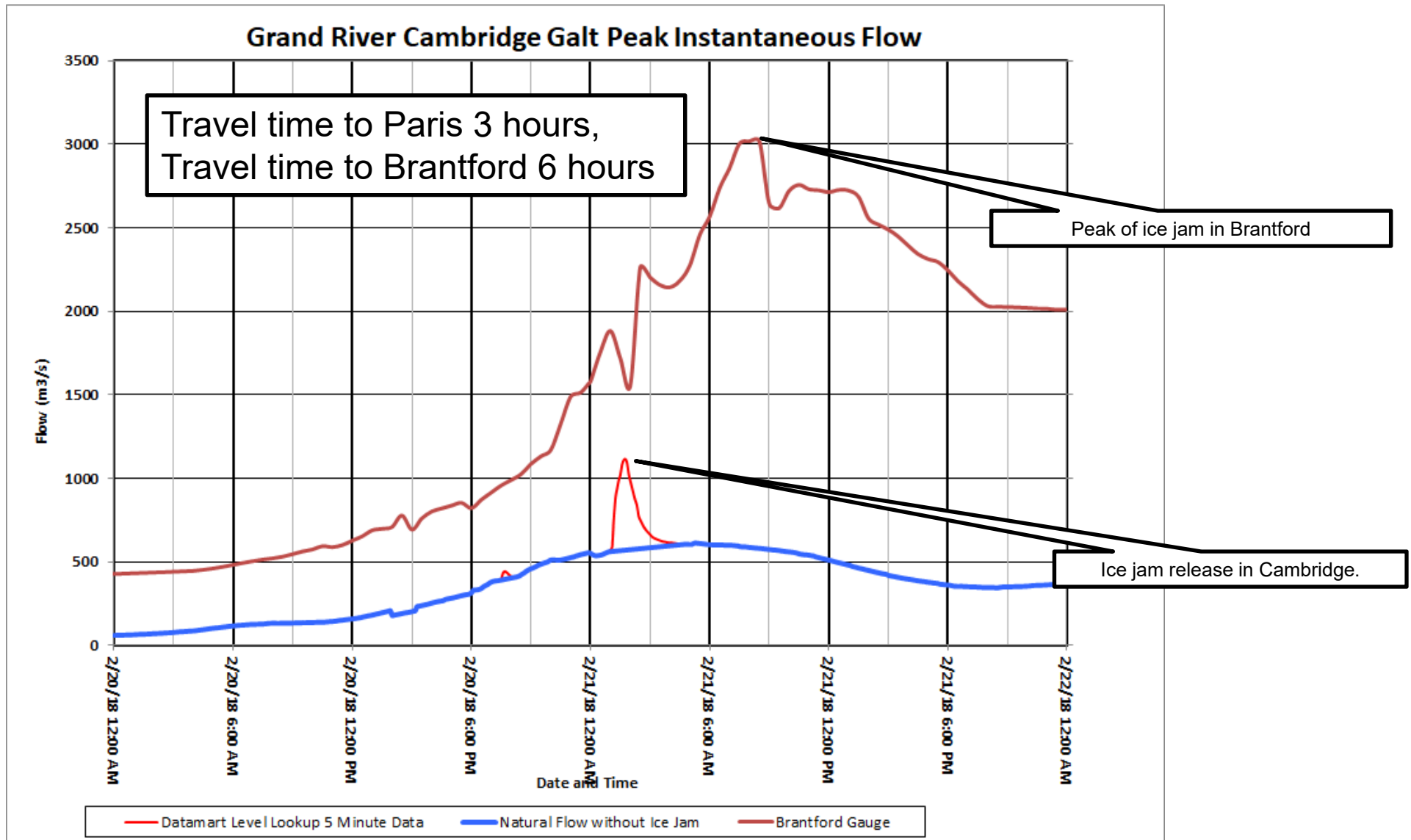




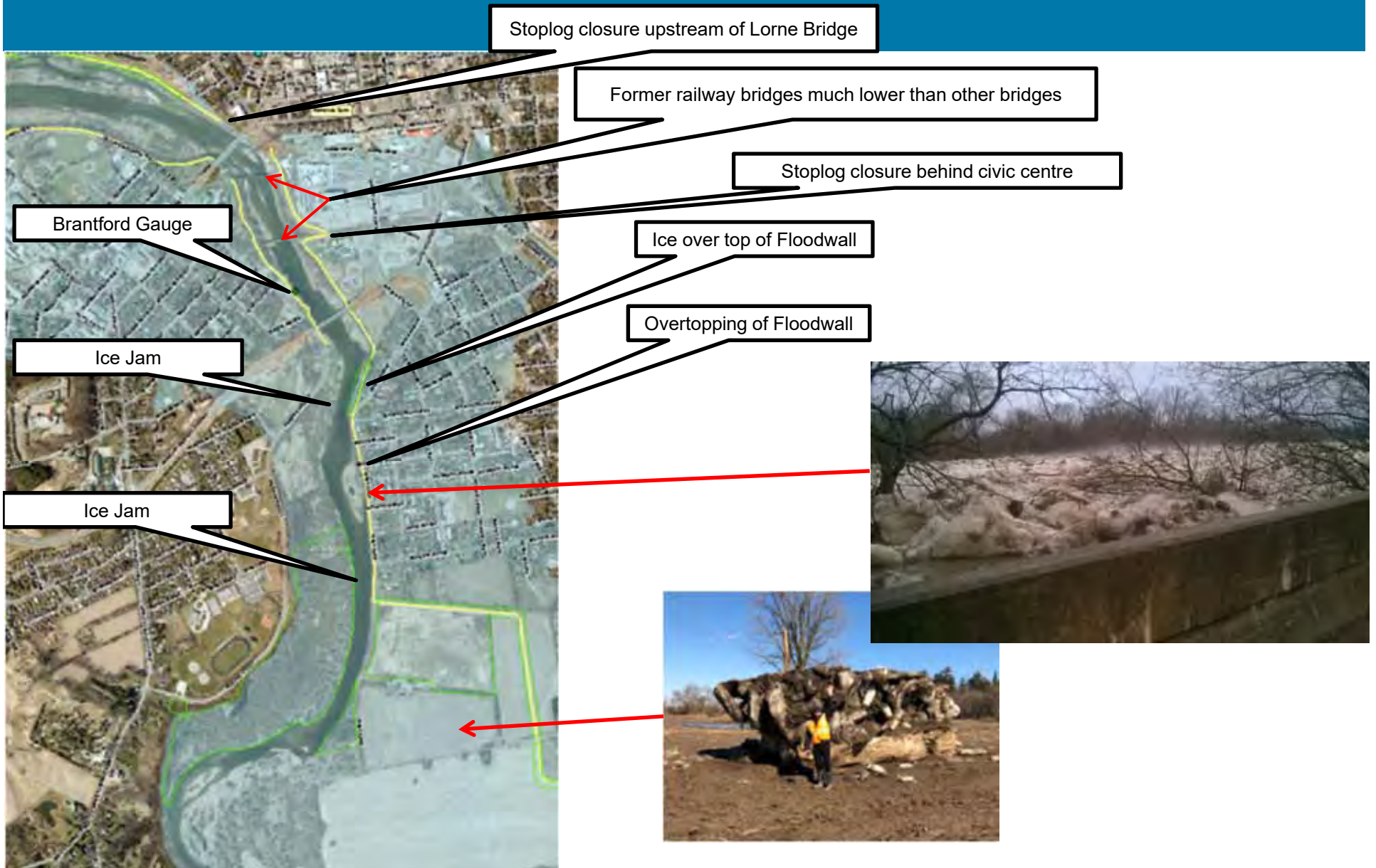
# Sudden Release of Ice Jam in Cambridge



# Sudden Release of Ice Jam in Cambridge Travel Downstream



# Brantford Dike Reach



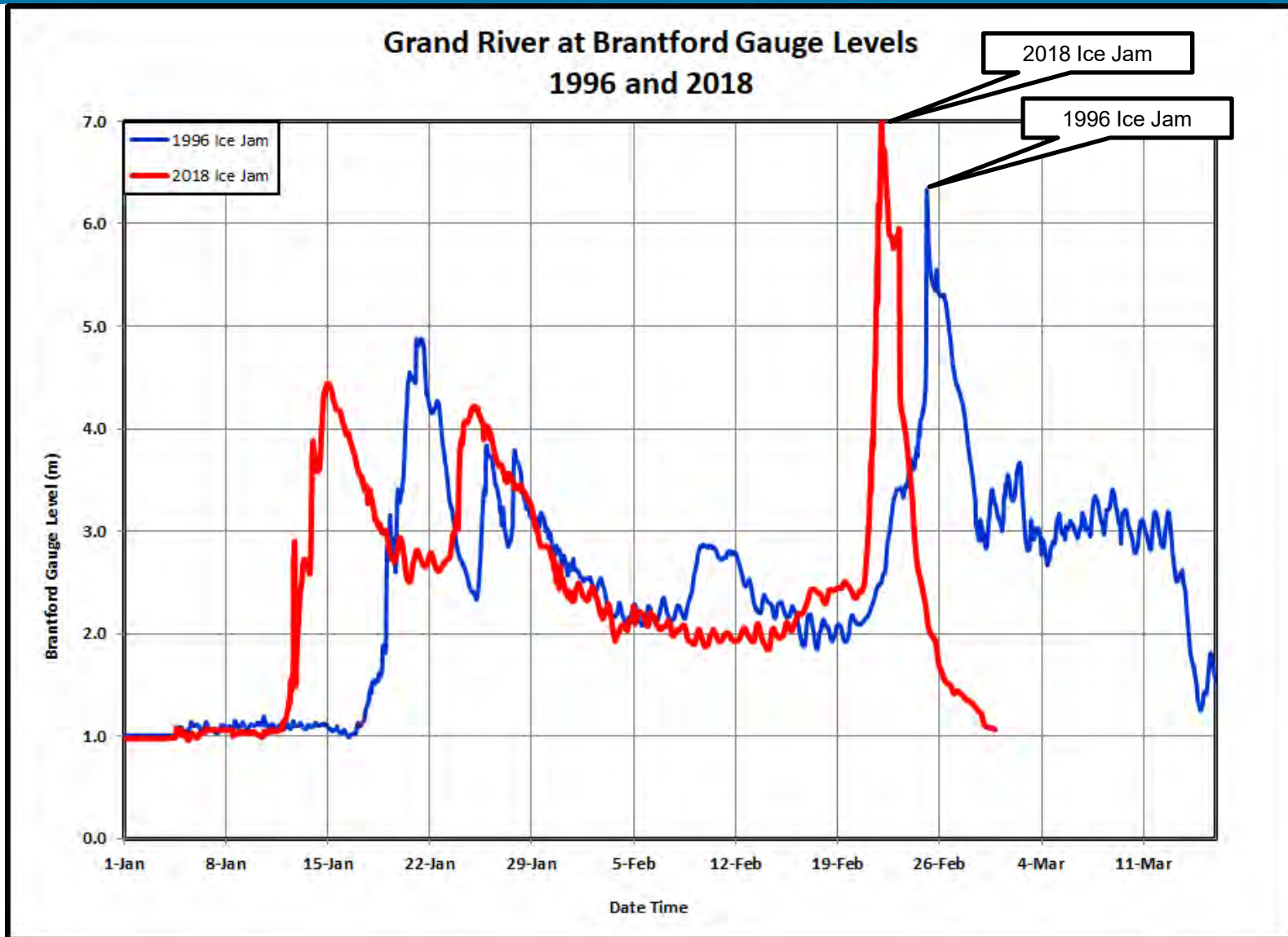
# Ice and water at top of Brantford floodwall



# Brantford Dike Reach Estimated Ice Jam Depth

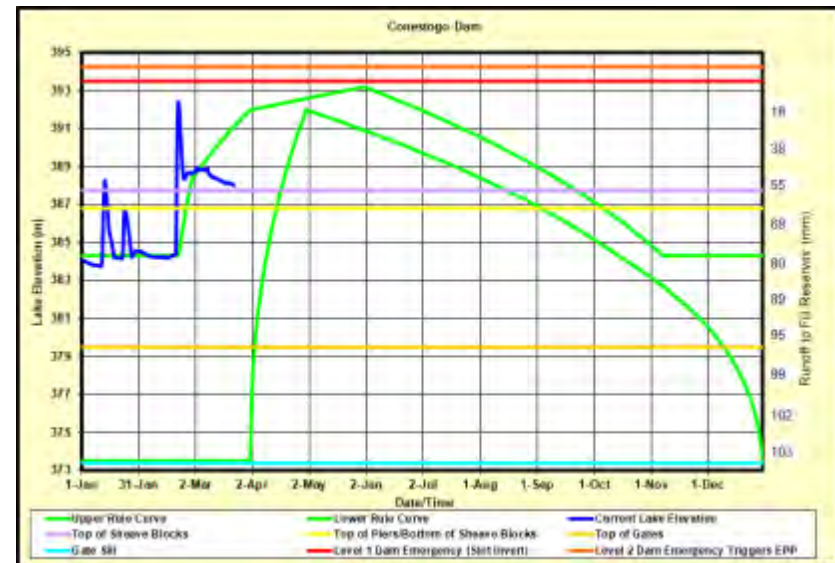
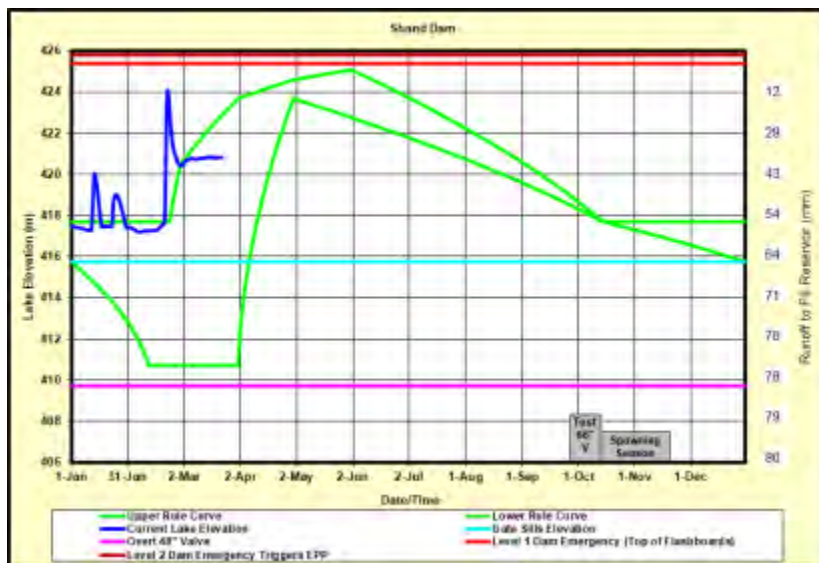


# Brantford Stream Gauge Levels 1996 and 2018 Ice Jams



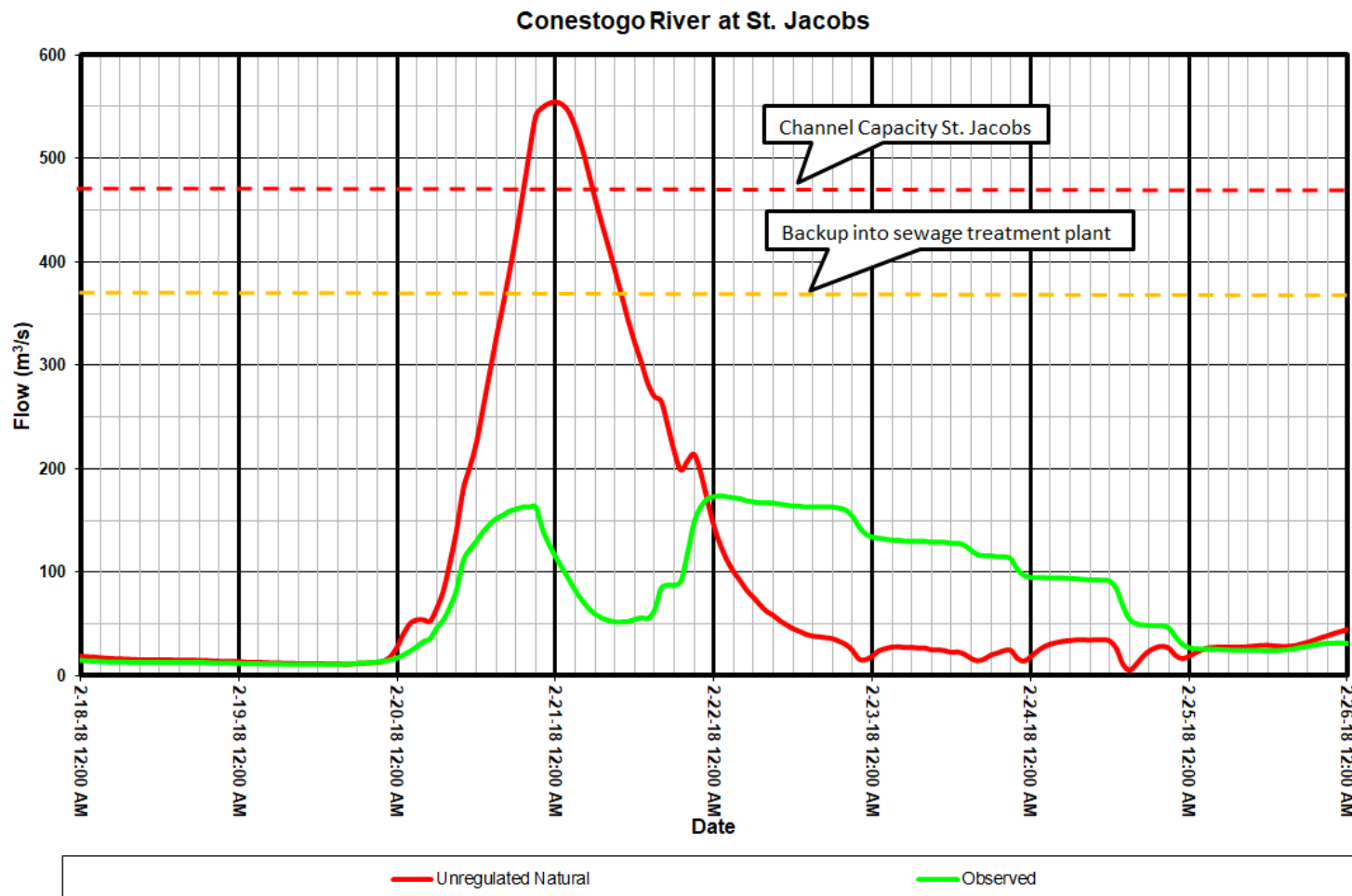
# Reservoir Status

- Following the February event a decision was made to stabilize reservoirs at March 1<sup>st</sup>. Late February was far too early to hold reservoirs at near summer levels.
- Since the February event, abnormally dry conditions have moved into the watershed. The current focus is now on the ability to fill the large reservoirs to normal spring levels.
- Precipitation forecasts are indicating near normal precipitation for April however the landscape is drying out, farmers are starting to work the land and less rain can be expected to runoff once the fields are dry and the land is in agricultural production.
- This highlights the fine balance associated with operating the large dams through the spring filling season. Reservoir operations are dependant on the weather which is fickle and hard to predict.



# Reservoir Flow Regulation

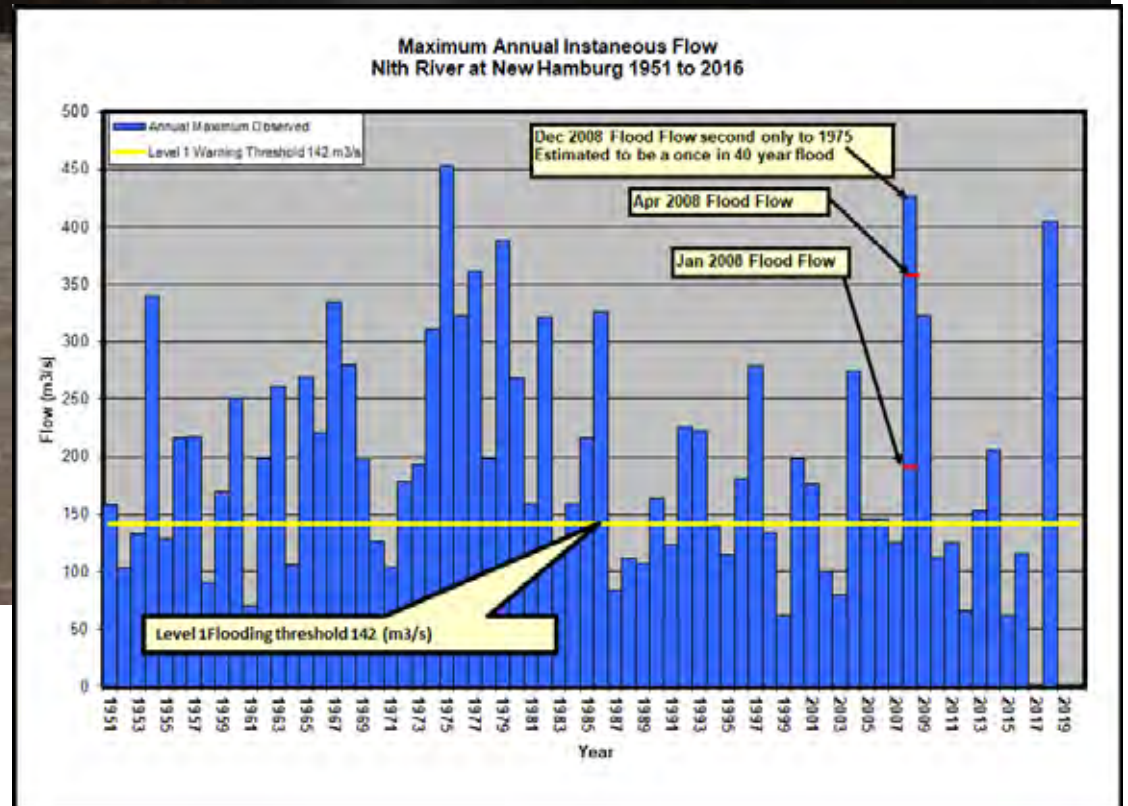
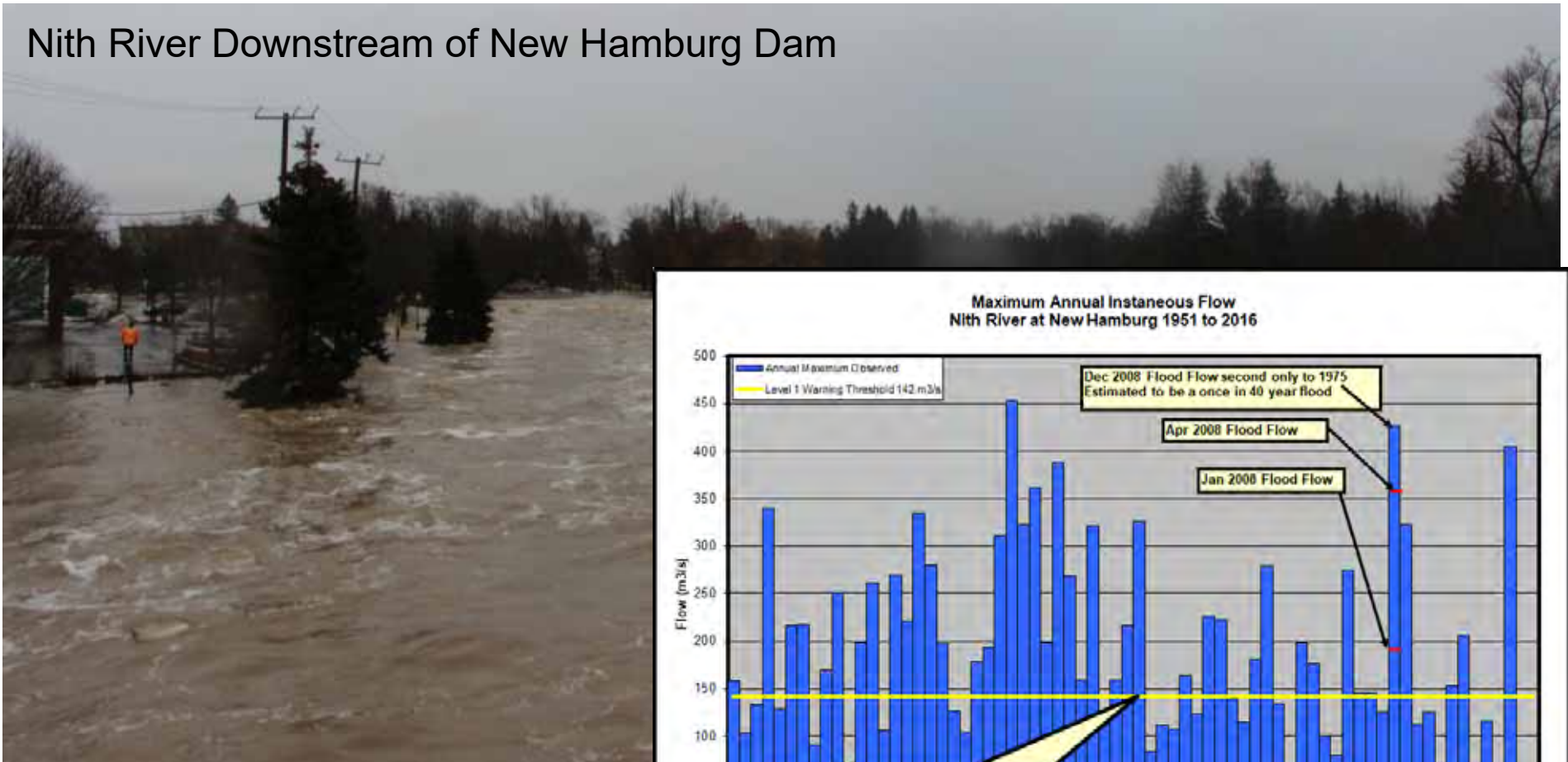
- Without the GRCA reservoirs operating during this event, flows in the river system would have been significantly greater.





# Impact of Nith River flows

Nith River Downstream of New Hamburg Dam



# Impact of Nith River flows



# Impact of Nith River flows



# Town of New Hamburg Public Language Brochure

## Causes of floods

Floods can occur at any time of year and have a variety of causes. The most common reasons for floods are:

- extreme rainfall, which can occur at any time of year
- high temperatures in the winter and spring that cause snow and ice to melt quickly
- ice jams in the winter and spring, when large amounts of ice become lodged in the river channel, causing water to back up and spill over the banks

## Flood forecasting

The GRCA monitors weather information, river flows, snow pack and ice conditions in order to predict when floods will occur and how high the water may rise. Five river gauges and four rain gauges in the Nith River watershed provide information on current conditions.

## Flood messages

When flooding is possible or about to occur, the GRCA issues flood messages to municipal emergency management officials and the media.

There are three types of messages:

### 1. High Water Safety Bulletin:

The GRCA is tracking weather conditions to assess the potential for flooding. Rivers, streams and ponds may be unsafe for recreational and other activity.

**2. Flood Advisory:** Flooding is possible. Municipalities and individuals should prepare.

**3. Flood Warning:** Flooding is occurring or is about to occur. Municipalities and individuals should take action to deal with flood conditions. This may include road closures and evacuations.

## Flood response

When the GRCA issues a flood warning, it is sent to the Waterloo Regional Police and the Wilmet Township Flood Co-ordinator. They implement their flood response plans. In a serious emergency, the township may activate its Emergency Operations Centre to oversee the flood response.

- The township flood co-ordinator will work with township

Turn over for important information  
on dealing with floods ▶

staff to close roads, shut down utilities and take other action to protect lives and property.

- The police will warn households and businesses within the area to be affected, based on the warning levels shown on the map. This will be done through door-to-door visits by police officers.
- Warnings may be issued at different times to different levels, depending on the conditions causing the flood. In most cases, properties will receive only one warning.

## Flood warning levels

Flood emergency officials have developed a warning system that is based on the rate of flow of water in the Nith River during floods. Water flows are measured in "cubic metres per second" (m<sup>3</sup>/s). That is the amount of water flowing past a fixed spot in one second.

Residents should locate their property on the map to see how it is affected at various warning levels.

Normal summer low flow: 1.5 m<sup>3</sup>/s (cubic metres per second)

Warning Level 1: 142 - 175 m<sup>3</sup>/s

## New Hamburg properties warned in the event of Nith River flooding

If flooding is about to occur, the police will warn households and businesses within the area to be affected.



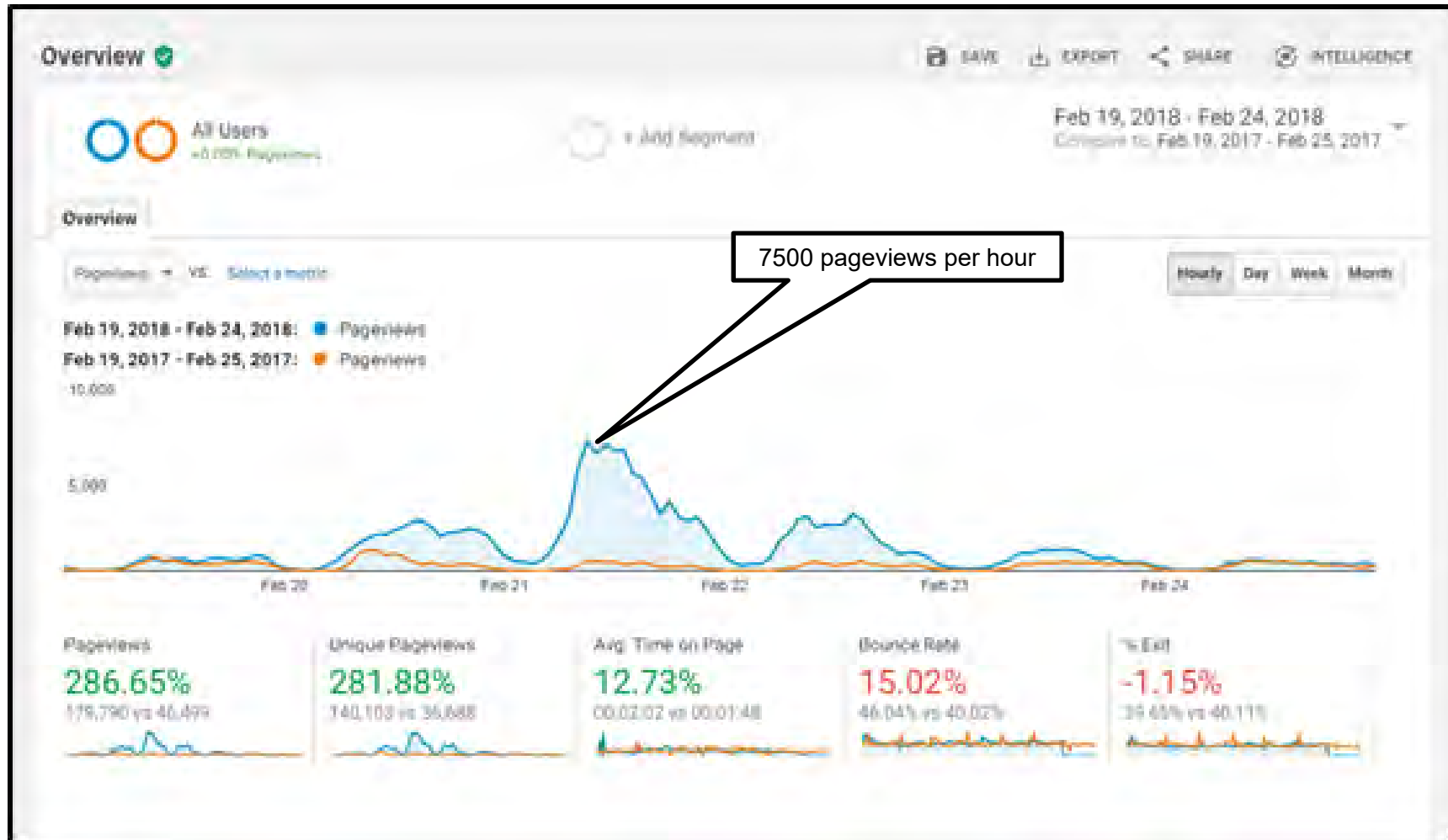
**April 1975: Warning Level 3**  
One of the largest floods in New Hamburg history, with 30 homes and businesses affected. Flows reached

Turning information into consumable understandable terms that connect with the general public requires technical experts to engage and work with communications experts.



**April 2008: Warning Level 3**  
Spring runoff produced a peak flow of 350 m<sup>3</sup>/s resulting in many flooded streets and basements.

# Web Site Traffic February 19-24 2018



During the period February 19th to February 24th, pages were viewed more than 180,000 times. This compares to 46,500 pageviews for the same period in 2017. Statistics indicate that the GRCA website was receiving approximately 7,500 pageviews per hour during the peak of this event.

# UAV Mapping Cambridge Ice Jam

- UAV flights were performed by UKKO Canada one week after the ice jam.
- 5 cm orthoimagery and point clouds were obtained for a 5 km reach upstream of the Parkhill Dam in Cambridge were obtained
- The photography will be used to complete forensic analysis of the ice jam and ice dam that setup upstream of Parkhill Dam.
- Ice experts will be engaged to use this mapping to help explain the breakup event



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# UAV Mapping Cambridge Ice Jam Example of Ice Scrapping Landscape

Before Ice Jam



# UAV Mapping Cambridge Ice Jam Example of Ice Scrapping Landscape

After Ice Jam





# We learn from every flood!

