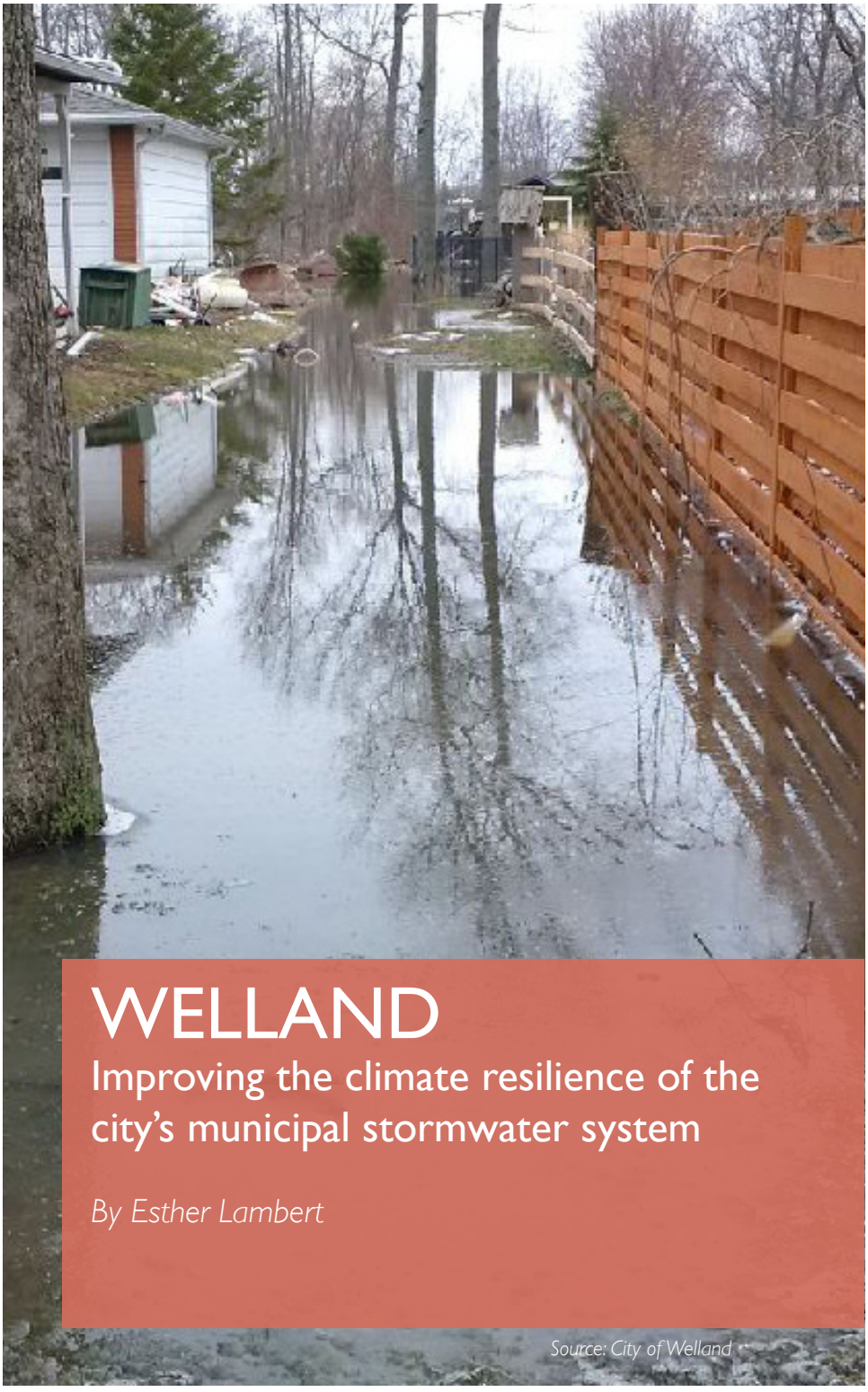

WELLAND

Improving the climate resilience of the city's municipal stormwater system

By Esther Lambert

Source: City of Welland

THE SCIENCE

Projected changes in the frequency and severity of extreme storms in Ontario are expected to harm the province's natural and built infrastructure. These impacts could have significant economic consequences unless the region's infrastructure resilience improves. The City of Welland, 20 km west of Buffalo NY and home to a growing population of more than 50,000 residents, began incorporating climate resilience into municipal infrastructure planning with a 2012 study of the City's storm and wastewater systems. Of special concern was Welland's outdated combined sewer systems that conveyed both storm and wastewater through the same pipe. These systems were built in the early 1900s, with an initial planned lifespan of 50 to 100 years. Separate stormwater and sanitary systems have been municipal best practice for more than 60 years; nevertheless, many communities across Canada continue to operate and maintain old combined systems.

Increasing frequency and severity of extreme rainfall events due to climate change render such systems more vulnerable to combined sewer overflows as the wastewater volumes exceed the capacity of treatment plants. Combined sewer overflows, which often occur during extreme rainfall events, result in the release of partially treated sewage into streams and lakes. Moreover, extreme rainfall can overwhelm these systems resulting in untreated water backing up and flooding basements. This pollution seriously concerns municipalities and provinces. The Region of Niagara, like many other jurisdictions, no longer constructs combined sewers. Cities within the region like Welland have been working on upgrading wastewater treatment facilities, separating combined systems, and upgrading older sewer pipes and pumping stations, but this takes time and funds.

THE TRIGGER

Welland's decision to improve its storm and wastewater infrastructure evolved over time. The City has been increasingly incorporating climate change into infrastructure policy and planning. Two major motivations accelerated its resilience efforts. First, in 2005, the remnants of Hurricane Katrina passed over southern Ontario, dropping 102 mm and 93.4 mm of rainfall at the Port Colborne and Welland weather stations, respectively, causing widespread basement flooding, particularly in areas with combined sewers.

Second, in 2011 and 2012, Welland conducted a Public Infrastructure Engineering Vulnerability Committee (PIEVC) assessment, which confirmed medium risk for infrastructure considering climate projections. The PIEVC analysts recommended updating Welland's Intensity, Duration and Frequency curves (developed from 1963-era Buffalo, NY, weather) so stormwater management efforts reflect current climate for long-term planning. Welland began to work with the region to enhance its infrastructure's climate resilience in several ways.

Figure 17: *Accumulation of water following a rain on snow event in Welland in April 2018 (Source: City of Welland)*

THE APPROACH

Welland considered its storm and wastewater systems in parallel and together. It sought to prioritize projects and initiatives that would enhance system resilience. After receiving the PIEVC report, the City decided to focus on the stormwater system. Looking at all infrastructure at once would have been overwhelming. Having so many neighbourhoods served by combined sewers presented challenges. Because the region is responsible for wastewater treatment and the City manages the collection of treated water, both the municipal and regional levels of government played a crucial role.

Storm design standards and Intensity, Duration and Frequency curves were updated. Developers were encouraged to incorporate a five-year, instead of the previous two-year, design standard by using curves updated to 2050. The likelihood of increased costs with the new design requests provoked developer resistance. Voluntary design standards were deemed unlikely to help. The City also invested in pilot studies such as the Dain City Flood Risk Assessment Study of 400-500 homes. These studies promoted infrastructure planning that considered impacts of future climate and looked beyond specific local areas. They were meant to alert developers to a bigger problem that would require implementing design features to help the broader community. Lastly, educating and engaging asset managers in climate-focused planning proved to be an effective approach that factored in logistical and operational issues crucial to infrastructure planning.

THE OUTCOME

The initial groundwork laid out in the approach set the stage for two major successes. First, Welland was successful in securing $12 million for a sewer separation project, including $8 million from provincial and federal governments. Phase four of that project was scheduled for completion in 2021 to considerably improve the 80-year-old infrastructure in much of the city. Further, every year, the City cost-shares with the Region to undertake sewer separation works.

Second, implementation efforts were scaled up through the development of plans such as the Corporate Climate Change Adaptation Plan and the Asset Management Plan, which provide strategic guidance. These also urge Council and asset managers to consider climate change in their plans. A recent update to Welland's Asset Management Plan includes climate change considerations for inventory of all assets. Work already done on climate change risk will feed into that updated plan.

A WORD FROM WELLAND

The City's success in implementing the PIEVC protocol recommendations, as well as other risk-reduction actions, is partly attributable to its ability to engage a wide cross-section of stakeholders to include consultants, representatives from the Region, academics, asset operators, and other experts to rally around particular policy, plans, and programs in support of more resilient public infrastructure. Marvin Ingebrigtsen, former Infrastructure Asset Manager for the City of Welland, mentioned the importance of Council support, indicating that one way to garner its support is to emphasize that many funding entities like the federal government require the incorporation of climate change considerations as a precondition for funding.

Of particular importance was the presence of a champion who had the passion for understanding the risks posed by climate change. Mr. Ingebrigtsen advocated for changes and initiatives informed by climate science. Also, leveraging the interest created by an extreme weather event to ensure those changes are realized was crucial. As indicated by Mr. Ingebrigtsen, "In 2018, we had a rain-on-snow event that resulted in a 100-year storm runoff event in the Dain City area and 30 basements were flooded. This helped to garner complete support from Council for the Dain City Flood Risk Study."