

Open to Interpretation

Sewer back-up claims following urban flooding, a growing problem across the country, can produce considerable insured damages. However, this high toll can be reduced through provincial building and plumbing code interpretation.

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Urban flood damages are a recurrent and growing issue for municipalities, insurers and homeowners across Canada. The frequency of severe rainfall resulting in urban floods across the country last year — including events in Manitoba, Ontario and Quebec — prompted Environment Canada to label 2012, “The Year of the Urban Flood.”

The year proved expensive in terms of insured damages. For example, the toll for a storm system that affected Thunder Bay, Ontario before moving through to Montreal was \$260 million, while the Insurance Bureau of Canada reports that damages were \$90 million for another event that hit several neighbourhoods in Hamilton and Ottawa.

Many municipalities and local authorities recommend or require backwater valves — frequently using education and subsidy programs to encourage valve retrofits in at-risk homes — as a household-level measure to reduce the risk of sewer back-up in new and existing homes. However, retrofit programs have only been partially effective in encouraging installation after homes have been flooded or when homeowners live in flood-prone neighbourhoods. The retrofits often total in the thousands of dollars, serving as an additional barrier to installation.

CODE INTERPRETATION

Provincial code wordings may hold the key to requiring that backwater valves be installed in new homes. Language in the *National Plumbing Code of Canada 2010* related to backwater valve installation, which is applied in provincial building and plumbing codes across the country, states that when a sewer connection

“... may be subject to backflow, a... backwater valve shall be installed on every fixture drain connected to them when the fixture is located below the level of the adjoining street.”

Discussions with local code officials across Canada suggest the sentence is somewhat vague and subject to interpretation. The lack of clarity revolves around deciding when a new home’s sewer connections “may” be subject to backflow.

The sentence can be interpreted in several ways, including the following:

- Homes may be subject to backflow if they are constructed as infill development in areas with histories of sewer back-up or if they are built in new developments connected to older sewer systems with histories of sewer back-up. Interpreted in this manner, the valves would be installed in new homes only in rare or specific circumstances (such as when connected into

older systems with histories of sewer back-up).

- Any home with sewer connections below the adjoining street may be subject to backflow. When interpreted this way, backwater valves are required in essentially all new homes that are serviced by public, underground sewer systems — even in new, green-field developments where there is no history of sewer back-up.
- The code may be interpreted such that installations are not required in any circumstances, and provides the authority to install backwater valves only when requested by developers or homebuyers.

Given the considerable uncertainties around sewer back-up events — associated with infiltration and inflow into sanitary and storm sewer systems, construction errors, homeowner behaviour and extreme rainfall events — local authorities should consider any home connected to an underground sewer system to be exposed to sewer back-up risk. As such, authorities should require backwater valves in all new homes serviced by public sewer systems.

The impacts of climate change will only serve to increase the unpredictability of widespread sewer back-up events. Experience in Canada has been that regional back-up events can occur in many developments, regardless of their age and how serviced. One need look no further than southern Ontario’s extreme rainfall event in August 2005, when many neighbourhoods that experienced regional sewer back-up events were serviced by modern, separated sewer systems.

Advantages of installing valves in new homes include significantly reduced installation cost and protection of all properties, regardless of the historical occurrence of sewer back-up (see Table 1). The cost of installing a backwater valve in a new home is about \$150 to \$250, while the cost of retrofitting a valve ranges from \$1,000 to \$2,000, if not more.

Several municipalities have implemented programs to help homeowners offset retrofitting costs, sometimes with

programs offering \$500 to \$3,000 to help homeowners install backwater valves and associated risk reduction measures. But Institute for Catastrophic Loss Reduction (ICLR) research, released this year, shows that education and subsidy programs have inspired low uptake rates, ranging from 10% to 50% of eligible households. This indicates retrofit programs alone will not be adequate to address the rising cost of urban flood events.

INTERPRETATION AS INFLUENCER

Over the summer and fall of 2012, ICLR surveyed more than 240 local officials from British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, New Brunswick and Nova Scotia, who represented 160 local authorities and munic-

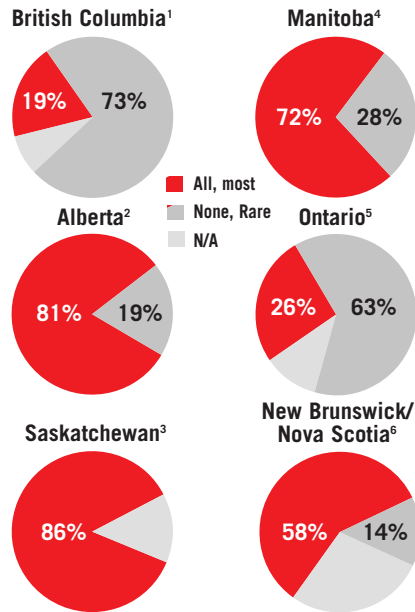
ipalities responsible for building and plumbing code implementation. The idea was to see how officials interpret code wordings related to backwater valves, and how these interpretations affected the frequency of installation in new homes.

Provided with a copy of the *National Plumbing Code* sentence, respondents were asked if it was interpreted in their jurisdictions as requiring backwater valves in all or most circumstances, in rare or specific circumstances, or under no circumstances. The majority of respondents from Alberta, Saskatchewan, Manitoba and New Brunswick and Nova Scotia noted the sentence was interpreted in a way that required backwater valves in all or most new homes, while in British Columbia and Ontario, the

Table 1: Benefits and Drawbacks of Requiring Backwater Valves in New Homes vs. Homes with Histories of Sewer Back-up

Application Type	Benefits	Drawbacks
Retrofit	<ul style="list-style-type: none"> • known risk areas, identified through historical sewer back-up occurrence, can be targeted with retrofit programs 	<ul style="list-style-type: none"> • difficult to encourage homeowners to retrofit valves • valve retrofits are expensive • reactive, post-event approach to risk reduction • valves must be maintained over time to remain functional • possibility for displacement of other methods of reducing sewer back-up risk (i.e., improved infrastructure)
Installation in New Homes	<ul style="list-style-type: none"> • significantly lower installation costs • provides protection to all homes regardless of sewer back-up history • accounts for uncertainties created by climate change and infiltration/inflow • shifts liability of installation costs (e.g., retrofit program cost) away from municipality 	<ul style="list-style-type: none"> • valves must be maintained over time to remain functional • possibility for displacement of other methods of reducing sewer back-up risk (i.e., improved infrastructure, pre-development risk assessments)

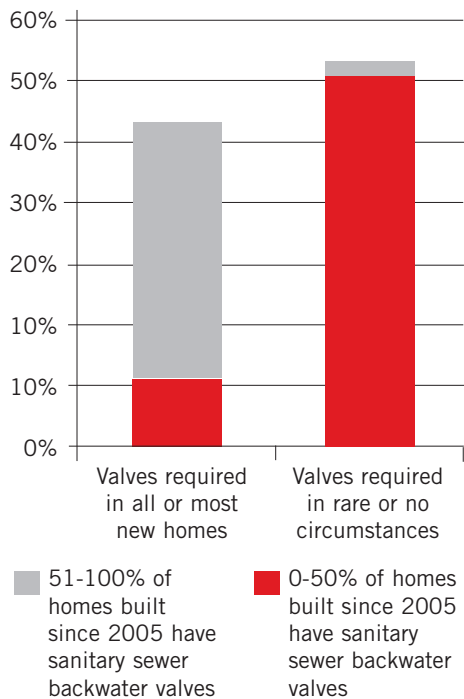
Figure 1: Summary of Results



¹n=41, ²n=21, ³n=7*, ⁴n=25, ⁵n=58, ⁶n=7

* Saskatchewan respondents largely represented Regional Health Authorities, which interpret the provincial plumbing code for a large number of municipalities within their jurisdictions.

Figure 2: Code Interpretation and Installation Frequency*



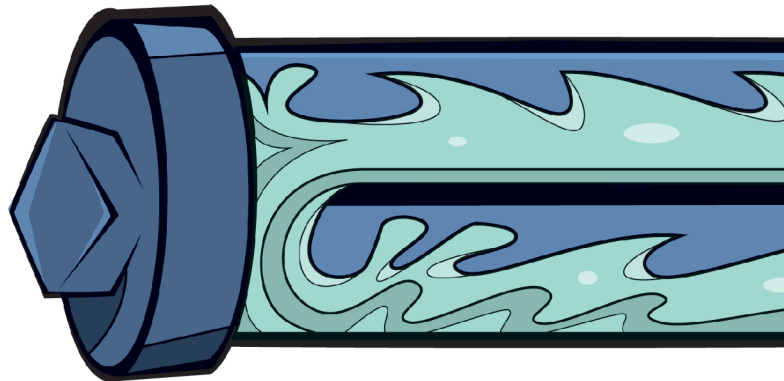
*n=120

majority of local authorities represented in the survey interpreted the section as requiring valves only in rare circumstances (see Figure 1).

When local code enforcement officers are encouraged to consider any drain that is connected to a public sewer system below the level of the adjoining street to be at risk of sewer back-up — as is the case in Alberta — new homes are required to have backwater valves.

The survey also revealed the manner in which code wordings are interpreted had a significant influence on the reported frequency of valve installation in new homes. Municipalities that interpreted the code such that valves are required in all or most new homes were far more likely to report that more than 51% of homes built in their jurisdictions since 2005 had sewer backwater valves (see Figure 2).

In Ontario, several municipalities, including the cities of Toronto and Windsor, now interpret Ontario's *Building Code* as requiring installation of valves in all or most new homes. For example, a City of Windsor report to council in 2011 noted that "... despite all reasonable precautions, the city's sewer system could be overwhelmed, and building drains may be subject to backflow..."



A number of survey respondents commented on the ambiguous nature of the code sentence related to backwater valves, including from Ontario municipalities that expressed a level of frustration with related code wordings. For example, one respondent noted "the code states that a backwater valve shall be installed on drains that 'may' be flooded. Any drain 'may' flood, but there is little political will to force residents to spend money" on backwater valve installations.

Recently, the Town of Collingwood in Ontario adopted a code interpretation to require backwater valves in all new homes. Collingwood's chief building officer pointed out that adopting a code interpretation to require backwater valves was an easier process than developing a by-law to require valves in new homes, and has also quoted as saying developers are now using backwater valves as a selling feature for new homes.

Requiring backwater valves in new homes offers some assurance given the uncertainties associated with infiltration and inflow in separated municipal sewer systems and the occurrence of unpredictable, extreme precipitation events that frequently lead to regional sewer back-up events. ≡