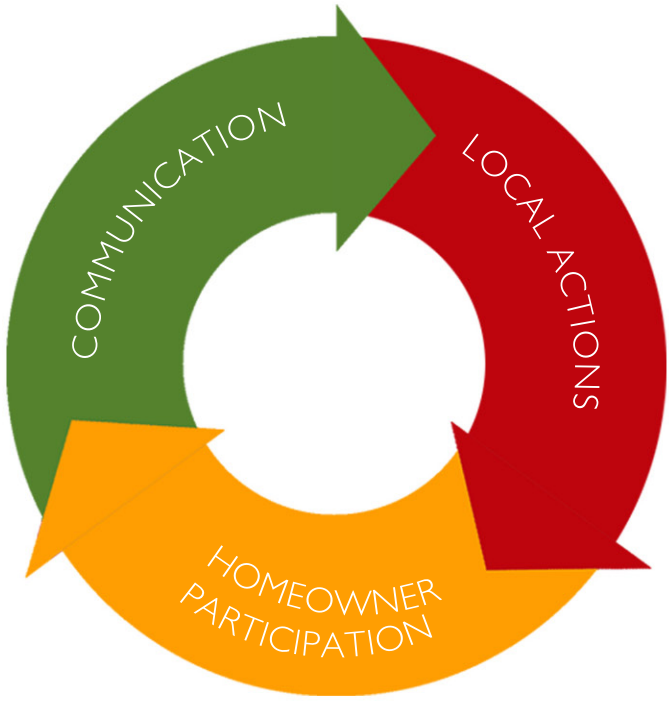

BEST PRACTICES

A comprehensive local plan

Source: ICLR

Local action has the potential to significantly reduce the risk of damage to homes from sewer backup and basement flooding resulting from extreme rainfall. Ideally, local governments should pursue a comprehensive strategy that includes communication, local actions and incentives for action for private property owners. Critical elements of a plan are set out below:

COMMUNICATION

Sewer backup and basement flooding during extreme rainfall events has recently emerged as the leading cause of damage to homes in Canada. Water damage to homes has increased significantly over the past five to 10 years, and a further increase is inevitable over the next few decades unless steps are taken to reduce risk.

Surprisingly, homeowner awareness about the peril is very low. A primary objective of local government communication should involve informing property owners about the risk. All homes connected to the sanitary and stormwater systems are at some risk of damage from backup. Overall damage to homes is presently in excess of $2 billion a year with most of the damage being preventable

The Government of Canada issues more than 13,000 severe weather warnings each year. Most do not result in damage to homes. Most homes in Canada are well built and well maintained. In circumstances when extreme rainfall results in damage to homes property owners typically blame their local government. Local governments are seen to "own" the issue of basement flooding.

Wastewater and stormwater in municipal sewers can back up into homes and cause damage due to decisions made by local governments and also decisions made by private property owners. Communications should identify the need for action by both the government and property owners, while stressing the importance of leadership from the local government.

In some circumstances, like the efforts of the City of London in Sherwood Forest, communication will involve local officials visiting individual property owners in their homes to discuss implementing specific plans to protect their particular home. In other circumstances, like Quebec City's effort in Maizerets, escalating communication was required over a period of almost three years before 100 percent homeowner participation was secured.

The effort in Halifax Region focuses on educating homeowners about the costs and benefits of a broad range of options that could be implemented by property owners. In contrast, communication in Toronto needed to increase awareness that a voluntary program funded by the City had evolved into a mandatory program funded by homeowners.

Some programs, like the one offered by Moncton, targeted homes at high risk of basement flooding, and needed to include information about why these

homes were selected. Other programs, like the incentive program in Winnipeg, is available throughout the City to any household that does not yet have a backwater valve, focusing the program on the benefits of action.

Some programs target new home construction, like those in Markham, Ottawa, Edmonton and Collingwood, so the primary audience includes builders, developers, landscapers and building code enforcement officials. Other programs aim at influencing the behaviour of existing homeowners, so the communication and policy challenges can use a variety of tools including information, financial incentives, regulatory requirements and even fines.

An exciting recent development involves the use of Low Impact Development design in new developments with the object of retaining stormwater in the new development while minimizing the impact on the capacity of the existing stormwater system. Low Impact Development, like that in Calgary, is expected to emerge across the country as an important tool for managing stormwater in new developments and reducing the potential adverse impact of development on existing homes.

Communication needs to be tailored to the specific circumstances of the basement flood reduction program, with considerable scope to learn from the experience of other communities across Canada. Communication will often need to be sustained over several decades, like that in Edmonton and Winnipeg. Communication needs to acknowledge the importance of local leadership while introducing the idea that local governments and private property owners share responsibility for managing the risk.

LOCAL ACTIONS

Local and regional governments are responsible for the systems that treat sanitary wastewater and for stormwater management. Local decisions about the design and management of these systems can increase or reduce the risk that untreated waste and water are driven into homes during extreme rainfall events.

Wastewater from toilets, sinks and other plumbing flow through sanitary sewers to treatment facilities. The risk that sanitary sewers backup and damage homes is associated with the initial construction, and ongoing maintenance of the sewers. Moreover, the risk is significantly affected by inflow and infiltration of excess water into sanitary systems.

Ongoing performance monitoring is an essential element of managing this risk. Victoria seeks to ensure that wet water flows never exceed four times dry water flow through sanitary sewer pipes. Local governments should set a performance target and monitor the system to determine when action is required.

Detailed research is often required to determine the source of problems. The City of London determined that weeping tile connections increase the inflow of rainwater into sanitary sewers.

Surrey determined that inflow and infiltration in their community was the result of private storm lateral failures. Quebec City and Toronto chose to focus on downspout disconnection. Some communities use smoke tests to find illegal cross connections between sanitary and stormwater systems. Local action can be clear when the problem is well understood.

The decision in Metro Vancouver to replace all combined sewers is a bold step to reduce the risk of basement flooding. Moreover, the primary objective of this program is to eliminate the discharge of untreated waste into streams, rivers and the ocean.

Considerable progress has been evident in recent years in the management of stormwater. Many existing systems were put in place decades ago, using historic rainfall intensity, duration and frequency information that no longer reflects current knowledge about risk. Communities should reassess the capacity of their stormwater management systems based upon a current assessment of the risk of extreme rainfall. This assessment should also seek to take into account uncertainties associated with climate change and other risks. For example, London conducted some pioneering research concerning the local impact of climate change and assumes that stormwater flows will increase by 21 percent.

Most communities across Canada design their overland major stormwater management system to cope with the expected intensity of a 100-year rainfall event. Stratford has chosen to focus on the more severe 250-year event, with peak flow rate 15 percent higher than the 100-year storm. Communities choose the degree of safety that will be provided through the design and maintenance of the stormwater management system and we anticipate that progressive communities will seek to provide higher safety margins due to the growing evidence of major losses resulting from current levels of protection.

Best practices for local governments require updating climate information and adding scope to deal with uncertainty associated with risks like climate change. This may involve targeting the 250-year storm, or targeting the 100-year storm with at least 10 to 20 percent adjustment to deal with uncertainty.

Furthermore, the minor stormwater system of sewers and underground infrastructure typically has focused on the five year rainfall event. Increasingly local and regional governments are now designing their buried infrastructure to address the 10-year event, again using more current information about rainfall intensity and perhaps an adjustment for climate change.

Shifting to a higher standard typically results in the installation of somewhat larger diameter sewer pipes. Larger pipes have a higher purchase cost than smaller pipes but may reduce the cost of stormwater management. The cost of the pipes is a very small component of the overall cost of sewer installation

and replacement. Moreover, sewers with larger pipes are less vulnerable to early redundancy with a likely increase in future rainfall intensity.

Local governments have primary responsibility for managing the risk of damage from sanitary and stormwater. Failure to provide adequate protection can result in legal action, as was experienced in Stratford. The significant values at risk suggest that local and regional governments will take action to increase the degree of protection that they provide. This will involve higher capacity in buried infrastructure and change in the ability of overland systems to cope with extreme rainfall. Uncertainty associated with climate change further increases the incentive for local governments to build in conservative assumptions for the design and maintenance of sanitary and stormwater management systems.

HOMEOWNER PARTICIPATION

A particular focus of the Institute for Catastrophic Loss Reduction has been on securing participation of private property owners in the management of the risk of damage from extreme rainfall. Many of the specific actions are well known and enjoy widespread support among local government experts – install a backwater value, install a sump pump, maintain appropriate lot grading, maintain sewer laterals, disconnect downspouts. The challenge is for local governments to get largely uninformed private property owners to participate.

The foundation for involving private property owners begins with understanding property owners motivations and providing outreach to inform homeowners about the importance of working together to confront the risk of damage. This involves a shared understanding about the factors contributing to the risk of damage, and the scope of the problem. Local governments find relatively few partners that can join in the communication of this information. There has been a growing recent interest by academics, local contractors and plumbers, renovation experts and home appraisal professionals. An important new partner in sharing information is found in the insurance industry, a group with a shared interested with homeowners and local governments to aggressively confront sewer backup and basement flooding risk.

Backwater valves represent a critical element of homeowner action to reduce the risk of basement flooding. Some communities, like Edmonton and Winnipeg, have required backwater valves in all new homes for more than three decades. Federal and provincial actions to mandate backwater valves in new homes through the building code continue to result in thousands of new homes built each year in Canada without a backwater valve, a disappointing ambiguity in the code that can be resolved by local action, like that found in Edmonton, Winnipeg, Ottawa, Collingwood and elsewhere.

A greater challenge has been encouraging the installation of backwater valves in existing homes. Every home connected to the sanitary

sewer system is at some risk of damage from backup, while those with a history of flooding are at high risk. Some communities target high risk homes. Saskatoon secured a high participation rate among high risk homes by offering financial incentives immediately following three major basement flooding events.

Some communities require installation of backwater valves in existing homes when homeowners decide to conduct a significant renovation. This may involve a requirement to install backwater valves or may be a general requirement to bring the home up to the standards of the current building code, which may be interpreted to require a backwater valve. Some day communities may mandate installation of a backwater valve in all existing homes, as has been done in Toronto for downspout disconnection.

A comprehensive strategy for local governments to reduce the risk of damage to homes from sewer backup and basement flooding should involve actions to require backwater valves in all new homes, likely through a by-law; and incentives or regulations to encourage homeowners to install valves in existing homes. Manitoba has been willing to share in the funding of the program offered in Winnipeg, so it will be interesting to determine the potential future role of provincial governments. In addition, the experience in Ottawa demonstrates that homeowner knowledge about the maintenance of backwater values is important to effectively reduce this risk so local governments should become involved in education programs.

The experience in Quebec City provides guidance about actions to secure 100 percent homeowner participation in downspout disconnection. The first phase of communication includes information about why compliance is required and informing homeowners that the City is willing to pay all costs. The second phase would clarify that compliance is mandatory and fines are possible. And the final phase would indicate that fines will be issued unless participation is immediately ratified. It would be interesting to see how this approach could be modified for mandating some of the other important actions that would reduce the risk of basement flooding like the installation of backwater valves, sump pumps, storm lateral replacement or lot grading.

Surrey has implemented a strategy for inspecting and replacing sewer laterals when significant renovations are planned for homes. Participation is mandatory, but must be triggered by the choice of homeowners to renovate. This approach is less intrusive than mandating participation for all existing homeowners.

Local governments have adopted a number of approaches in terms of willingness to pay for action by private property owners. In some instances the government will pay the full cost, like downspout disconnection in Quebec City and weeping tile disconnection in London. In some instances the government mandates compliance but makes no financial contribution, like downspout disconnection in Toronto and sewer lateral replacement in

Surrey. Many communities will pay 50 percent or more of the cost of installing backwater valves, although incentives may be restricted to homes at high risk or property owners with lower incomes. There is no consensus about best practices found in the experience of local governments or the academic literature. The most effective programs in terms of high rates of homeowner participation do not necessarily provide the most generous incentives.

Experience does show that local actions generally escalate over time, in part due to poor uptake rates by homeowners. Most local action is triggered by a large loss event. An initial response provides information to homeowners about potential actions, with few homeowners choosing to change their behaviour. A second or third loss event may lead to a local program encouraging voluntary action, perhaps with a financial incentive, but again most homeowners fail to participate. A fourth or fifth loss event may lead to regulations mandating action by homeowners with the local government willing to pay most costs, resulting in higher compliance. Subsequent events ultimately lead to more aggressive regulations mandating action, perhaps introducing fines and often withdrawing local subsidies. Increasingly local governments may move quickly to mandate action by local property owners given the large number of other communities across Canada that have adopted similar action. Practices with respect to the generosity of financial incentives will likely be influenced by local decisions about financial incentives with respect to other issues affecting the community.

CONCLUSION

Damage to homes from sewer backup and basement flooding is largely preventable, yet has been growing at an alarming and unsustainable rate. Local action is essential to address this important issue. Dozens of communities across the country have begun to confront this issue. And there is a strong consensus about the specific actions that would best reduce this risk. The present challenge is to secure greater participation by local governments and private property owners. This book seeks to celebrate the leadership of 20 communities that are taking action now, actions that can be replicated in other communities across Canada. Through local action it is possible to break the alarming and unsustainable trend of rising damage to homes from sewer backup and basement flooding as a result of extreme rainfall.