
Finding the Balance – Defining the Responsibilities of Utility, Insurance, Disaster Recovery Agencies and Property Owners to Address Flooding Challenges

Recommendation:

Utility Committee receives this report as information.

Background:

This report provides additional context to the broader discussion to be held during the Utility Committee meeting on April 23rd with the representatives from the Insurance Bureau of Canada.

As part of the development of the Stormwater Integrated Resource Plan (SIRP), EPCOR has been engaging with both the insurance industry and other water utilities to increase our understanding of each other's roles and expectations and how each group is adapting their processes because of changing stormwater conditions resulting from evolving climate change.

Communities around the world are recognizing that because of the impacts of climate change, traditional engineering approaches to infrastructure development are not able to fully protect the community from the effects of changing weather patterns. More frequent extreme weather events are leading to increased flooding damages on private property. These extreme events are also leading to potential changes in funding that may be available from Federal and Provincial disaster relief agencies.

In April 2017, the Interdisciplinary Centre on Climate Change published the findings from a national survey on the Canadian public perception of changing flooding risks. The full report on the survey is available at the link below.

https://uwaterloo.ca/partners-for-action/sites/ca.partners-for-action/files/uploads/files/canadian_voices_on_changing_flood_risk_fnl.pdf

The key findings from the survey are:

- Due to rising costs the federal and provincial governments are finding ways to reduce flood risks and share responsibility for protection and recovery with Canadian homeowners.
- Canadians are ready to take on a greater role in flood protection – 83% believe that homeowners are responsible for personal protection

- Despite this sense of duty, less than 30% of Canadians are taking actions to protect their property from flooding and show limited interest in flood insurance
- This inaction is a result of a gap in flood risk awareness. Only 6% know they live in a designated flood risk area and only 21% believe that the risk of flooding will increase over the next 25 years.
- Canadians need and want more information to be actively engaged in flood management and protected from flooding risks. There is a major opportunity for transparent information sharing
- Over 90% of homeowners think that flood maps should be made publicly available, sellers of properties should be required to disclose flood risks and property owners should be notified if their home is in a flood risk area.

These Canadian results complement the Edmonton public engagement findings from 2016 and 2017. EPCOR will be conducting additional public engagement later this year during the development of the Stormwater Integrated Resource Plan risk methodology, including testing and validating public preferences for risk allocation. The Stormwater Integrated Resource Plan Stormwater Sub-basin Risk Ranking, which is under development, will also be shared with the community to further inform property owners of their relative level of risk.

The Province of Alberta has also prepared an FAQ on overland flood disaster recovery funding provided through the Alberta Emergency Management Agency. The full FAQs are available at the following link:

<http://www.aema.alberta.ca/overland-flood-insurance-faq>

A key item to note is the initial FAQ statement that:

“Applicants are only eligible for Disaster Recovery Program assistance if insurance is not readily available at a reasonable cost.

As of June 2017, Albertans will still be able to receive Disaster Recovery Program compensation for overland flood damage. However, overland flood insurance is rapidly becoming available to the majority of homeowners. Once overland flood insurance is deemed available at reasonable cost for most Albertans, the Disaster Recovery Program may no longer provide assistance for these damages.

The Disaster Recovery Program continues to monitor rates and the coverage provided by insurance companies to determine when overland flood insurance will be deemed readily and reasonably available”.

It is important that the City of Edmonton, EPCOR, the Province and the Insurance industry increase awareness of this potential change in eligibility for Disaster Recovery financing.

The Insurance Bureau of Canada has recently completed a scan of their members of the current market penetration of overland flood insurance being applied to individual policies. The latest results show that market penetration is just under 40%, up from the 25% reported just over a year ago. Overland flood insurance had been available since 2015.

Insurance Bureau of Canada has also provided a separate report and presentation to accompany this document for the April 23rd Utility Committee meeting.

Related Research:

In addition to the specific discussions on the roles of the Utility, Disaster Recovery Agencies, the insurance industry, and the property owner, EPCOR has also been reviewing the recommendations from the Intact Centre for Climate Adaptation related to increasing flood resiliency.

There are three programs being led by the Intact Centre for Climate Adaptation that are aligned with the goals of the Stormwater Integrated Resource Plan.

The first program is the recently published document, “Preventing Disaster Before it Strikes: Developing a Canadian Standard for New Flood Resilient Communities: 20 Best Practices.” EPCOR has completed an analysis of the greenfield development practices in Edmonton versus this proposed standard. This analysis is provided as a separate attachment to this report.

The second program is a pilot initiative currently underway in Ontario and Saskatchewan on the development of a residential home flood protection program. EPCOR Drainage has had a voluntary Home Flood Check Up program since 2004 that has supported over 10,000 homeowners in the community. A gap analysis has also been completed comparing the Intact Centre for Climate Change audit framework being piloted with the components in the EPCOR program. This report is also attached.

The third program is, “Developing Best Practices for Residential Flood Risk Reduction: existing communities Canada”. This research initiative is in the early stages and EPCOR has signed on to

the working committee to ensure we remain aligned with the national discussion on the recommended best practices to adapt existing communities to changing climate change risks.

Alignment of EPCOR Drainage Existing Practices for Greenfield Development to Proposed Best Practices from Intact Centre on Climate Adaptation and the University of Waterloo

Recommendation:

Utility Committee receives this report as information.

Background:

In 2004 and again in 2012, the City of Edmonton experienced the consequences of severe weather events with the flooding of nearly 5,700 homes. The impacts of flooding are dramatic for residents, the municipality, the province, and businesses and include: financial and mental health stress; insurance risk; mortgage defaults; legal risk; and the municipal credit rating.

To combat the impact of ever-worsening extreme weather, newly built communities must incorporate best flood risk reduction practices into their design.

The Intact Centre on Climate Adaptation in partnership with the University of Waterloo has been leading a national research project to identify best practices for flood-resilient residential community design. In September 2017, they published, "Preventing Disaster Before it Strikes: Developing a Canadian Standard for New Flood Resilient Residential Communities, 20 Best Practices." The full report is available at:

<http://www.intactcentreclimateadaptation.ca/wp-content/uploads/2017/10/Preventing-Disaster-Before-it-Strikes.pdf>

The report will be used as the basis for the development of a national standard for flood-resilient community design for new residential subdivisions in Canada. The standard will be specific to greenfield development of detached homes, semi-detached homes, and row houses.

The types of flooding events considered in development of the 20 best practices include: riverine flooding, overland flooding, storm and sanitary system surcharge, drainage system failures and groundwater seepage.

The 20 best practices have been classified into six categories:

- Category 1 - Design for Resilience (5 Best Practices)
- Category 2 - Storm Sewer Design (3 Best Practices)
- Category 3 - Sanitary Sewer Design (3 Best Practices)
- Category 4 - Street Design (5 Best Practices)
- Category 5 - Wastewater Pumping Station Design (2 Best Practices)
- Category 6 - Preservation of Natural Features (2 Best Practices)

The suggested best practices in this report link to EPCOR’s ongoing development of a Stormwater Integrated Resource Plan (SIRP) “to ensure ongoing effective asset management practices and continued commitment to current Council priorities for flood mitigation”. Assessment of best practices for stormwater management and an awareness of risk for the municipality, the residents, the insurance industry, and other organizations are part of the overall development of SIRP.

The following material provides an assessment of where the existing practices of EPCOR Drainage align, partially align, or do not align with the suggested best practices in the report. EPCOR has included an assessment for partially aligned and non-aligned best practices for information purposes as well as considerations as EPCOR continues with SIRP development.

Note: A second research project will focus on best practices for building flood resiliency in existing communities (residences, facilities, and businesses) beginning in 2018. EPCOR will be a participant in this next phase of research.

Category 1: Design for Resilience (DR)

Overall designing flood resilient residential areas means that the storm and sanitary infrastructures systems in the communities and homes will perform as designed and be capable of minimizing flood damage during extreme events.

Building codes and standards as well as regulations and bylaws need to take into consideration the realities of climate, geography, and topography. High quality construction in all aspects of community and residential building will greatly impact the effects on residents, municipalities, governments, insurers, and lending institutions in Canada.

The suggested best practices in this category follow.

Items/Description	Fully Aligned	Partially Aligned	Not Aligned
DR1. New homes should not be built in the floodway. New homes should also not be built in the flood fringe, unless flood-proofing addresses flood risks in the flood fringe.		√	
DR2. “Safety Factors” should be used in new community design to account for potentially more frequent and severe rainfalls and stormwater system failures. (e.g. locating buildings further distance away from the edge of the floodplain).	√		
DR3. New development should not increase the risk of flooding for existing communities.		√	
DR4. New development should be designed to minimize the risk of basement flooding from groundwater infiltration.	√		

Items/Description	Fully Aligned	Partially Aligned	Not Aligned
DR5. Heating, ventilation and air conditioning (HVAC), fuel and electrical systems should be well-elevated from the basement floor or located above grade.			√

Assessment

(DR1) Only a very small area in the Edmonton river valley is considered part of the floodway or flood fringe and new greenfield residential development opportunities in this area are extremely limited. Most new greenfield developments are being built well away from the river and flood fringe.

(DR3) Due to the configuration of the stormwater network and the location of greenfield development vs. the river valley, there is a requirement to discharge stormwater from greenfield areas through the existing system. The impact of this is limited through the use of ponds within the greenfield area. This impact is being considered as part of the risk assessment being completed through the SIRP.

(DR5) The location of electrical and mechanical systems is defined by the building code which is set out by the province and enforced by the City. EPCOR is not aware of any restrictions being applied in the Edmonton area to force the location of these pieces of equipment above grade.

Considerations

The Stormwater Integrated Resource Plan will continue to analyze storm water flows and determine a variety of potential flood mitigating measures including low impact development. While EPCOR does not set the guidelines for the issuance of development permits, it is recommended that restrictions on residential development in known floodways and flood fringes be continued to limit the risk of flood damages in these areas.

Category 2: Storm Sewer Designs (STO)

The storm sewer system is designed to convey rainfall from average, 5-year, and severe flood events. The installation and maintenance of features to protect the home from flooding are one of the first lines of defense for the homeowner.

The suggested best practices in this category follow.

Items/Description	Fully Aligned	Partially Aligned	Not Aligned
<p>STO1. If the home foundation drainage system connects to a storm sewer:*</p> <ul style="list-style-type: none"> • the water level in the storm sewer should stay at least 30cm lower than the foundation drainage system during a major design flood event (e.g. 1-in-100 year flood event) <li style="text-align: center;">AND • a backwater valve should be installed on the storm sewer lateral to prevent stormwater from backing up into the basement if the storm sewer is overloaded. This backwater valve should be accessible for maintenance. 		√	
<p>STO2. If the home foundation drainage system does not connect to the storm sewer:*</p> <ul style="list-style-type: none"> • sump pumps should be installed and equipped with one or more backup power systems. 	N/A		
<p>STO3. Inlet control devices should be used to restrict the flow of stormwater from the street into storm the sewers.</p>			√

*Alternatively, a separate foundation drain collector system should be provided with no risk of backing up the basement levels during design flood events (e.g. 1-in-100 year flood event).

Assessment

(STO1) New homes in greenfield development are designed with the foundation drain to the storm system; and our current design standards do not require a backwater valve because the foundation drain is outside the home.

(STO2) This is not applicable because our design standards require all new homes in greenfield development to be connected to the storm system.

(STO3) Inlet control devices will be assessed as an alternative to reduce flooding risks as part of the SIRP recommendations.

Category 3: Sanitary Sewer Design (SAN)

The sanitary sewer system can be greatly impacted by the construction of the residence and the installation of sump pumps and backwater valves to protect the home. External factors must be designed and constructed to not affect the sanitary system. This is particularly critical in extreme weather events.

The suggested best practices in this category follow.

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Items/Description	Fully Aligned	Partially Aligned	Not Aligned
SAN1. Basement connected to sanitary sewers should have a backwater valve to mitigate sewage backup into the basement, if the sanitary sewer is overloaded (e.g., during heavy rain).	√		
SAN2. Downspout, foundation drain, and sump pump discharge should not be directed to the sanitary sewers.	√		
SAN3. Design of sanitary sewers should have a factor for “normal” infiltration of rainwater during typical rain events and a higher “Safety Factor.”	√		

Considerations

Continue to educate homeowners on the importance of maintaining the backwater valves in their homes.

Category 4: Street Design (SD)

The street design has a major impact on the storm water system during a severe storm event and potentially on the sanitary system as well. Proper grading and road design along with consideration of potential depth of water from a major storm event are critical considerations in the development of residential areas.

The suggested best practices in this category follow.

Items/Description	Fully Aligned	Partially Aligned	Not Aligned
SD1. Roads and public spaces should be designed to convey excess runoff so that it does not flow through home owners property.	√		
SD2. Road design and lot grading should be such that the water on the road remains at least 30 cm below the lowest building openings (e.g., basement windows) during design flood conditions.	√		
SD3. Roads should be designed so that the maximum depth of water during the extreme design conditions does not exceed 30 cm at the curb.	√		
SD4. Driveways should be built to slope away from homes or garages (i.e. reverse-slope driveway should not be permitted).	√		
SD5. Sanitary sewer manholes should not be located in low-lying areas. Manhole covers should be sealed to minimize inflow of accumulated runoff into the sanitary sewer.			√

Assessment

(SD5) The location of the manholes is determined by the configuration of the sewer network, it is not always possible to avoid them being placed in low-lying areas depending on the road network topography. Additional data on techniques to seal manhole covers in low lying areas in both greenfield and existing areas will be collected and assessed in the development of SIRP.

Category 5: Wastewater Pumping Station Design (WP)

The pumping station must be operational during extreme weather events. The potential for raw sewage to discharge to the river is the result of pumping stations that do not have critical backup power and access.

The suggested best practices in this category follow.

Items/Description	Fully Aligned	Partially Aligned	Not Aligned
WP1. Wastewater pumping station should be operational and fully-accessible during extreme rain events and riverine flood events.	√		
WP2. Wastewater pumping stations should have backup power to allow for a minimum of 48 hours of uninterrupted service and an overflow in case of catastrophic failure.	√		

Category 6: Preservation of Natural Features (PNF)

Design of a new community must ensure the preservation of natural lands to ensure the protection of the environment and the quality of life for residents.

The suggested best practices in this category follow.

Items/Description	Fully Aligned	Partially Aligned	Not Aligned
PNF1. New development should not encroach on riparian buffers (land and natural vegetation adjacent to waterbodies), and sufficient setbacks should be maintained along waterbodies to reduce the risk of flooding due to stream movement.	√		
PNF2. New development should aim to minimize runoff from impervious areas.		√	

Assessment

(PNF2) One of the design techniques that can help to minimize runoff is Low Impact Development (LID). LID is a new design feature in our area; however, not all of these techniques are appropriate for our winter climate. Utilizing these features requires consideration of a variety of issues including designation of maintenance and operation responsibility before selective LID features are considered for new neighbourhoods.

Considerations

Further investigation into options for minimizing runoff from impervious areas will be covered under the SIRP project.

Comparison of EPCOR Drainage Flood Prevention Program to the Intact Centre on Climate Change Adaptation (ICCA) - Home Flood Protection Pilot Program

Recommendation:

Utility Committee receives this report as information.

Background:

When severe flooding occurred in Edmonton in 2004 and 2012, approximately 5,700 homes reported flood damages. City Council directed Drainage Services to implement a program to assist customers at risk to better understand and protect their properties.

The EPCOR Flood Prevention Home Check-Up Program, which has been serving customers since 2004, has inspected over 10,000 homes and 500 multi-family units in Edmonton for flooding risks. Additionally, the program also has offered subsidies to assist homeowners to install a backwater valve. To date over \$4.8 million has been provided to customers to help them protect their basements from sewer back-ups.

EPCOR is continuing to deliver both the Flood Prevention Home Check-Up Program and the Backwater Valve Subsidy. The Check-Up Program is delivered in three ways: a full home inspection (interior and exterior); an interior inspection; or an exterior inspection. Customers also receive an interior home inspection when they request a pre-approval for the backwater valve subsidy. All inspections provide customers with valuable information on how to reduce the risk of flooding in their homes and customers are provided with a detailed report of the actions recommended for their particular home. All of these services are provided to customers free of charge and are scheduled based upon request from a customer. The following links provide more details on the Flood Check-Up program and the Backwater Valve Subsidy program

<https://www.epcor.com/products-services/drainage/flooding-flood-prevention/Pages/flood-prevention-home-check-up.aspx>

<https://www.epcor.com/products-services/drainage/flooding-flood-prevention/Pages/backwater-valve-subsidy-program.aspx>

Through the development of the Stormwater Integrated Resource Plan, EPCOR has also identified that the Intact Centre on Climate Adaptation (ICCA) is in the process of piloting flood proofing programs in Ontario and Saskatchewan. The objective of the pilot program is to develop a recommendation for a national standard that can be applied in all communities and

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assist homeowners when determining the flooding risks for their individual properties. More details are available at the following link:

http://www.intactcentreclimateadaptation.ca/home_flood_protect/

Assessment:

The following table provides comparative information of the EPCOR Home Check-Up Program and the ICCA Home Flood Protection Program pilot.

EPCOR’s inspection is conducted by employees who are technical professionals, experienced in customer services and flood protection assessment. EPCOR’s program provides customized solutions to homeowners, taking into consideration the unique characteristics and issues within each resident’s home. Detailed conversations and information are also provided throughout the inspection process.

The ICCA pilot program is being provided through a certified third party environmental audit company that has been trained on the proposed assessment methodology. There is fee to have the audit completed and the resident is provided with a detailed report of recommended improvements to their property based on a defined audit check list.

Exterior Home Check-up Components		
ICCA Flood Protection Program	EPCOR Includes	EPCOR Program Comments
Nearest stormwater drain to home – check to assess whether clogged with debris, or pooling of water during heavy rains or spring thaws.	√	Includes education on on-going checks and how to keep catch basins clear of debris.
Grading around Foundation – assessment of water pooling near foundations and ice build up in winter.	√	Includes assessment of gaps along concrete walls where they meet concrete pads.
Lot Grading – assessment of water pooling in yard or driveway. Check for water flowing directly onto neighbours property.	√	Additional information provided on any voids under decks or steps. Information provided on managing swales within the homeowner’s property and neighbour’s property.
Driveways and Sidewalks - review of sloping of hard surfaces towards foundations. Identification of pooling of water or ice-build up in winter.	√	Additional information provided specific to paving stones and sidewalk blocks and any exterior floor drains. Also covers patios and walkout basements.
Windows - an assessment for broken seals, broken glass, or damaged frames.	X	
Window Wells – assessment of requirement to add window wells near low elevation windows, debris collection and water pooling assessment.	√	Additional information on proper drainage and maintenance of window wells.
Foundation Walls - check for cracks,	√	Additional information on on-going checks

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Exterior Home Check-up Components		
ICCA Flood Protection Program	EPCOR Includes	EPCOR Program Comments
efflorescence (salt deposits).		recommended and specific high risk areas for water penetration.
<u>Eavestroughs</u> - check for missing sections, leaking joints or overflowing.	√	Additional information on recommended cleaning and repairing of eaves troughs. Includes an assessment of size of eaves troughs for size of building.
<u>Downspouts</u> – proximity check for water discharge location next to foundation.	√	Information provided on downspout extensions and how to drain to interior storm water system.
<u>Rain Barrels</u> – confirmation that they are not overflowing during extreme storm events and that overflow hose is not depositing water at the foundation.	√	Also reviews to confirm overflow is not impacting neighbour’s property.
<u>Winter Tie In</u> - not included in ICCA Flood Proofing check.	√	Additional information provided to reduce risk of ice on driveways and sidewalks from downspouts and sump pump discharges.

Interior Home Check-up Components		
ICCA Flood Protection Program	EPCOR Includes	EPCOR Program Comments
<u>Water Pipes and Appliances</u> – check for leaks and corrosion.	√	Also includes furnace assessment for leaks. Appliances and pipes are examined to ensure none of the appliances are a source of water in the basement.
<u>Sump Pit and Pump(s)</u> – confirmation of frequency of operation. Check to confirm pump is not seized or not functioning. Assessment of sump pit cover.	√	Additional information provided on sump pump maintenance.
<u>Backwater Valve</u> – confirmation of presence of a backwater valve. Review of sewage coming up into fixtures.	√	Inspect backwater valve and advise homeowner to install one if not in the home. Information and approval for the homeowner for the backwater valve subsidy program. Homeowner is made aware of the importance of maintenance and providing access to the backwater valve.
<u>Floor Drain</u> – check for foul odours from drain, sewage backing up into basement, roots visible in drain, drain covered or blocked, no standing water in drain.	√	Plus discussion, information, and inspection of the floor drain and provision of advice about the importance of a flood guard installation. Home owner is informed that the traps must be kept filled with water to eliminate odour.
<u>Foundation Walls</u> – check for cracks, leaks or stains and efflorescence.	√	Additional information on inspection of foundation walls and window sills for potential water leakage.
<u>Basement Floor</u> - check for cracks, leaks or stains and efflorescence.	√	Additional information on inspection of basement floor for potential water leakage.
<u>Weeping Tile and Service Connections</u> – not included.	√	Information and discussion about the weeping tile connection. Inspection of the pipe and information about what should not be put down the drain. Inform about misconnections and pipe damage and

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Interior Home Check-up Components		
ICCA Flood Protection Program	EPCOR Includes	EPCOR Program Comments
		whether or not the backwater valve exists. Education about types of service connections and homeowner responsibilities.
<u>Stored Items</u> – inspection of items touching unfinished walls or floors, damp to the touch, smell of mold or visible mildew.	X	
<u>Indoor Humidity</u> – musty or mildew smell, furnishings damp to the touch.	X	
<u>Furnishing and Electronics</u> – identification of items prone to water damage and/or mold used in basement. Identification of any electronics stored directly on the floor.	X	
<u>Basement Finishes</u> – identification of finishes that are easily damaged by water.	X	

The EPCOR Home Check-Up Program includes many of the components that are in the ICCA proposed program. The method of program delivery is a primary difference (internal vs. external). As well, the ICCA program includes the broader perspective of an assessment of the risks to personal property in addition to the structural components that are covered in both programs.

As significant severe weather events become the new reality for Utilities, customers will experience increased intensity and duration of these weather events which will impact their private property. EPCOR anticipates that there will be increased interest in the Home Check-Up program as more residents become aware of the flooding risks to their property.

EPCOR will continue to monitor the recommendations from the ICCA Home Flood Proofing pilot program as well as consumer interest within the Edmonton area for these services as we proceed with the development of the Stormwater Integrated Resource Plan. If it is determined that the EPCOR Flood Prevention Program should be expanded, EPCOR will work with Utility Committee through the budgeting process to ensure the Program is adequately funded through the utility rates.