

Conservation Halton Spill Flood Hazard Policy Review and Update Discussion Paper

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Glossary

ACCESS AND EGRESS: means conditions, methods or procedures to ensure safe vehicular and pedestrian movement, and access for the maintenance and repair of protection works, during times of *flooding hazards*, erosion hazards and/or other water-related hazards.

EXPOSURE: Population, properties, economic activities, including public services, or any other defined values exposed to hazards in a given area.

FLOOD HAZARD ALTERATION: means activities, such as filling, grading and excavation, that would change the landform and natural vegetative characteristics of a site located within the *flood hazard*.

FLOOD FRINGE: for river, stream and small inland lake systems, means the outer portion of the *floodplain* between the *floodway* and the *flooding hazard* limit. Depths and velocities of flooding are generally less severe in the flood fringe than those experienced in the *floodway*. Flood fringe applies where a *Two Zone* floodplain management approach or *Special Policy Area* is in effect. CH only applies a *One Zone* floodplain management approach in its jurisdiction.

FLOODING HAZARDS: means the inundation, under conditions specified below, of areas adjacent to a shoreline or a river or stream system and not ordinarily covered by water:

- (a) Along the shorelines of the Great Lakes – St. Lawrence River system and large inland lakes, the *flooding hazard* limit is based on the one-hundred-year flood level plus an allowance for wave uprush and other water-related hazards;
- (b) Along river, stream and small inland lake systems, the *flooding hazard* limit is the greater of:
 1. the flood resulting from the rainfall actually experienced during a major storm such as the Hurricane Hazel storm (1954) transposed over a specific watershed and combined with the local conditions, where evidence suggests that the storm event could have potentially occurred over watersheds in the general area;
 2. the one-hundred-year flood; and,
 3. a flood which is greater than 1, or 2, which was actually experienced in a particular watershed or portion thereof as a result of ice jams and which has been approved as the standard for that specific area by the Minister of Northern Development, Mines, Natural Resources and Forestry except where the use of the one-hundred-year flood or the actually experienced event has been approved by the Minister of Northern Development, Mines, Natural Resources and Forestry as the standard for a specific watershed (where the past history of flooding supports the lowering of the standard).

FLOODPLAIN: Area of land that is flooded by a nearby watercourse, such as a creek (*riverine*) during large storm events. When the storm event ends, the floodwater recedes back to the watercourse.

FLOODPROOFING STANDARD: means the combination of measures incorporated into the basic design and/or construction of buildings, structures, or properties to reduce or eliminate *flooding hazards*, wave uprush and other water-related hazards along the shorelines of the Great Lakes – St. Lawrence River system and large inland lakes, and *flooding hazards* along river, stream and small inland lake systems.

FLOODWAY: means the portion of the *floodplain* where development and site alteration would cause a danger to public health and safety or property damage.

Where the *one-zone* concept is applied, the *floodway* is the entire contiguous *floodplain*.

Where the *two zone* concept is applied, the *floodway* is the contiguous inner portion of the *floodplain*, representing that area required for the safe passage of flood flow and/or that area where flood depths and/or velocities are considered to be such that they pose a potential threat to life and/or property damage. Where the *two zone* concept applies, the outer portion of the flood plain is called the flood fringe.

HAZARDS: Potentially damaging physical event that may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation. This event has a probability of occurrence within a specified period of time and within a given area, and has a given intensity.

HAZARDOUS LAND: means land that could be unsafe for development because of naturally occurring processes associated with flooding, erosion, dynamic beaches or unstable soil or bedrock.

ONE HUNDRED YEAR FLOOD: means that flood, based on an analysis of precipitation, snow melt, or a combination thereof, having a return period of 100 years on average, or having a 1% chance of occurring or being exceeded in any given year.

ONE ZONE CONCEPT: means that the *floodplain*, as defined by the appropriate flood standard (i.e. the *regulatory storm*), will consist of one zone. Where the one zone concept is applied, the *floodway* is the entire *floodplain*.

REGIONAL STORM: means the rainfall event and soil conditions existing during Hurricane Hazel that occurred within the Humber River watershed in Toronto in 1954, transposed over a specific watershed and combined with local conditions.

REGULATORY STORM: means the greater of the *Regional Storm* or the *100-year* storm utilized for a particular area.

RIVERINE FLOODING: Riverine flooding occurs when a watercourse's flows overtop its banks and flood adjacent lands and can be caused by heavy rainfall, snow melt, ice and debris jams and/or infrastructure failures. The magnitude of riverine flooding is determined by several factors, including the amount and intensity of precipitation, soil conditions, and topography. Riverine flooding is a natural process; however, it becomes a hazard when it poses a threat to people, and property.

SAFE ACCESS AND EGRESS: means the ability of both pedestrians and vehicles to enter and exit a property safely during flood events. The maximum depth, velocity and depth/velocity product guideline for safe access and egress is based on the information provided for in Appendix 6 of the Ministry of Natural Resources 2002 "Technical Guide – River & Stream Systems: Flooding Hazard Limit"

SHORELINE FLOODING: Caused by high water levels, storm surges/wave uprush or ice-jamming.

SITE ALTERATION: means activities, such as grading, excavation and the placement of fill, that would change the landform and natural vegetative characteristics of a site.

SPECIAL POLICY AREA: means an area within a community that has historically existed in the flood plain and where site-specific policies, approved by both the Ministers of Natural Resources and Municipal Affairs and Housing, are intended to provide for the continued viability of existing uses (which are generally on a small scale) and address the significant social and economic hardships to the community that would result from strict adherence to provincial policies concerning development. The criteria and procedures for approval are established by the Province. A Special Policy Area is not

intended to allow for new or intensified development or site alteration, if a community has feasible opportunities for development outside the flood plain.

SPILL: When water leaves the watercourse, its valley *and* floodplain, and flows into surrounding lands in multiple directions. Flows may move into another watershed, join the same watercourse at a distance downstream, or stay within the spill area.

TWO ZONE CONCEPT: means that the *floodplain*, as defined by the appropriate flood standard (see *floodings hazards*), will consist of two zones – the *floodway* and the *flood fringe*.

URBAN FLOODING: Urban flooding is caused when heavy rainfall/snowmelt causes flooding independent of an overflowing watercourse. Runoff is generated when the ground cannot absorb water as quickly as it falls, especially in urban areas with impervious surfaces such as pavement. The urban drainage system consists of storm sewers, roadways, and overland flow routes. Urban flooding occurs when the storm sewer system is overwhelmed by excessive runoff, causing water to pond in parking lots, submerge streets, seep into nearby homes and structures, and/or back up into basements.

VULNERABILITY: Conditions determined by physical, social, economic and environmental factors or processes, which increase the susceptibility of a community to the impact of hazards. Vulnerability can be subdivided in physical, social, economical, and environmental vulnerability

WATERCOURSE: An identifiable depression in the ground in which a flow of water regularly or continuously occurs.

Executive Summary

Flooding is considered the most significant natural hazard in Ontario with government, private corporations, and individuals having roles in preparing for and managing flooding risk before, during, and after it occurs. In Ontario, proactive approaches direct people and property away from *flood hazards* through regulation and policy. Defining *flood hazard* limits, preparing *flood hazard* mapping, and developing regulations and land use planning policies is one of the most effective approaches to hazard mitigation and management.

Under Section 28 of the *Conservation Authorities Act*, Conservation Authorities (CAs) may develop regulations to prohibit or require permissions for development in hazardous areas. Conservation Halton (CH) administers *Ontario Regulation 162/06*, which regulates development in river and stream valleys, wetlands, the Lake Ontario shoreline, hazardous lands, and adjacent lands within CH's watershed jurisdiction. The purpose of the regulation is to protect life and property from natural hazards such as flooding and erosion, and to protect other features such as wetlands.

To better support the administration of CH's regulation, and to better understand the nature and extent of flood hazards across CH's jurisdiction, CH renewed its Floodplain Mapping Program in 2018. New technologies and tools, along with more available funding, offer opportunities to better understand and depict *flood hazards*. Advancements in technology enable CH to better define *flood hazards*, including areas which were not historically feasible, such as *spill* areas.

Spill flood hazards ("*spills*") occur when floodwaters leave a *watercourse*, its valley and *floodplain*, and continue to flow overland in multiple directions before rejoining the same *watercourse* downstream, spilling into another watershed, or remaining within the *spill* area. *Spills* often move through areas where inundation may not be anticipated. *Spill* mapping is a dynamic process which is still advancing and evolving within CH's jurisdiction.

CH has an interim regulatory policy for development in *spills*, which enables staff to assess development on a case-by-case basis. This interim policy was put in place to allow staff time to develop and publicly engage on more robust policies that will address development within *spills*. While the Province has confirmed that *spills* are regulated *flood hazards*, there is currently no provincial direction on how CAs should deal with *spills*. As such, CAs have developed policies to deal with development in *spills*.

One of the key questions driving CH's *spill* policy review and update is whether *spills* should be treated differently than *floodplains* from a policy perspective. The question raises both technical and policy-based considerations, in terms of whether *spills* and *floodplains* present different risks and whether development proposals in these two *flood hazard* areas should be treated differently.

This discussion paper serves as the initial stage of CH's *spill* policy review and update process. The purpose of this discussion paper is to provide: background information on *flood hazards*, an overview of applicable legislation, regulations and policy, and possible approaches to managing the risk associated with *spills*. A series of discussion questions are also posed at the end of the document.

As part of the *spill* policy review and update process, CH will engage with CAs, municipal partners, residents, and other stakeholders. CH staff will assess public and stakeholder input received throughout the process to inform draft policies and recommend the approval of new *spill* policies to the CH Board of Directors.

Section 1 Introduction

Flooding is considered the most significant natural hazard in Ontario in terms of loss of life and social disruption and is the costliest type of natural disaster in Canada in terms of property damage (Ministry of Natural Resources and Forestry, 2019a).

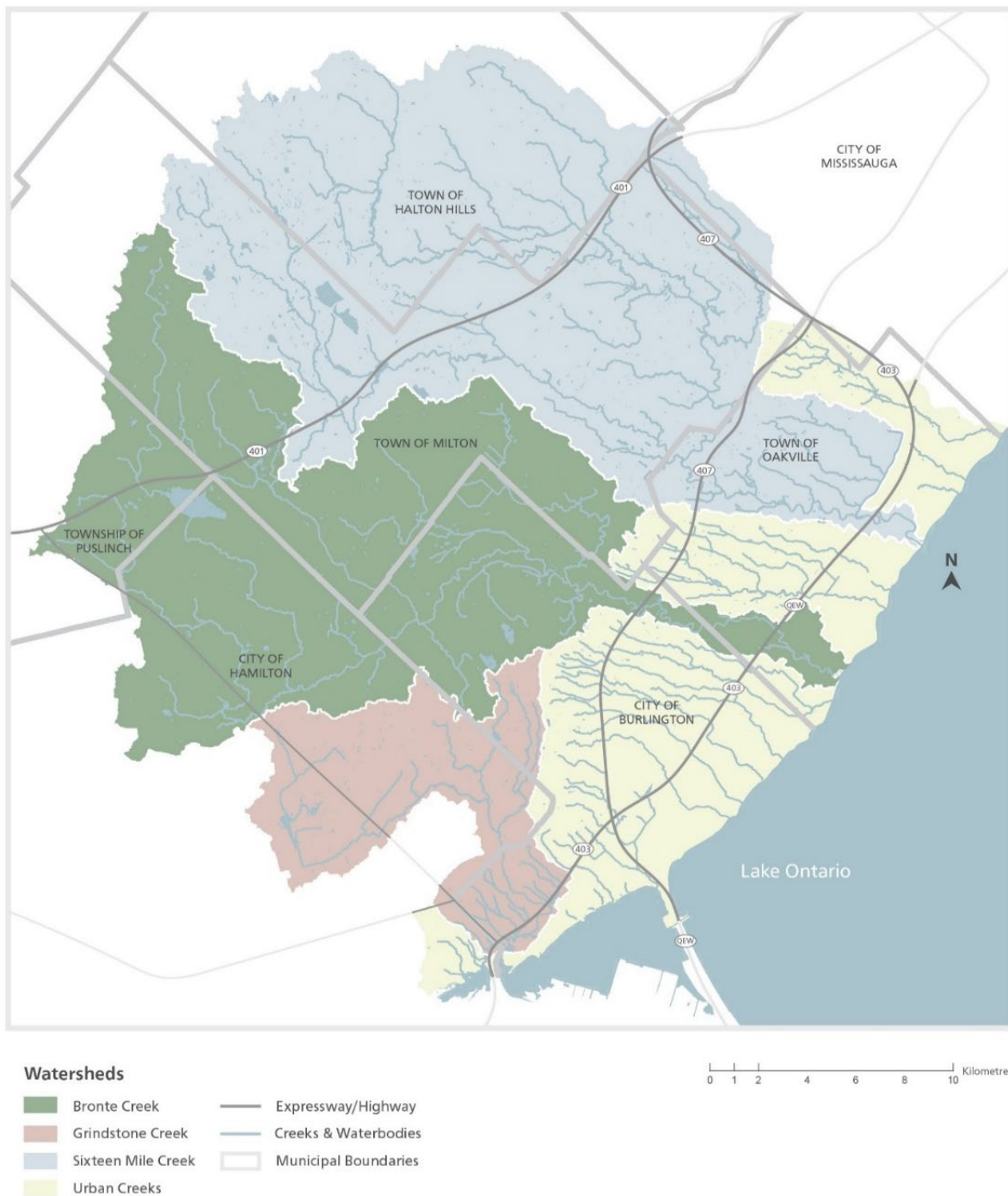
Flooding is a natural phenomenon and, with climate change, more frequent and significant major storm events that contribute to flooding are expected. All levels of government, private corporations, and individuals have a role to play to prepare for and manage the risks associated with flooding before, during, and after it occurs.

The approach to managing and reducing flood risks in Ontario is broad and ranges from flood mitigation infrastructure to land use planning policy. In the past, dams, dikes, and channels were relied on to manage flooding. Today, a more proactive approach is taken to direct people and property away from *flood hazards* through regulation and policy. Defining *flood hazard* limits, preparing *flood hazard* mapping, and developing regulations and land use planning policies to direct development away from hazards is one of the most effective approaches to hazard mitigation and management. This proactive approach saves lives and money, protects property, public health, and the environment, maintains economic stability, helps assure the continuance of critical infrastructure, and reduces social disruption associated with emergencies (Ministry of Natural Resources and Forestry, 2019a).

Unique to Ontario, Conservation Authorities (CAs) are local watershed management agencies that deliver proactive programs and services to protect and manage risks of natural hazards. Thirty-six CAs operate across the Province as local corporate bodies whose governing structure of members (e.g. Board of Directors) are appointed representatives from participating municipalities within the watershed. Flood hazard management activities of CAs include undertaking floodplain mapping and modelling, monitoring streamflow and rainfall, regulating development in flood prone areas in cooperation with municipalities and the Province, providing planning support and advice to municipalities and agencies to minimize flood impacts, issuing warnings, and operating dams, dikes, channels and erosion control structures.

The role of CAs in managing risks associated with natural hazards was recently reinforced on December 8, 2020, when Bill 229, the Protect, Support and Recover from *COVID-19 Act (Budget Measures), 2020*, received Royal Assent making changes to the *CA Act* and the *Planning Act*. To implement these changes, three new regulations were filed under the *CA Act* as part of the first phase regulations, including *Ontario Regulation 686/21: Mandatory Programs and Services*. Each CA in Ontario is required to implement mandatory programs and services related to the risk of natural hazards (i.e. flooding, erosion, dynamic beaches, hazardous sites). The mandatory programs and services related to natural hazards risks that all CAs are required to deliver include programs and services for flood forecasting and warning, drought or low water response, ice management, infrastructure, commenting on planning applications, and administering Section 28 regulations of the *CA Act*.

Under Section 28 of the *Conservation Authorities Act*, Conservation Halton (CH) administers *Ontario Regulation 162/06*, which regulates development in river and stream valleys, wetlands, the Lake Ontario shoreline, *hazardous lands*, and adjacent lands within CH's watershed jurisdiction (Figure 1-1). The purpose of the regulation is to protect life and property from natural hazards such as flooding and erosion, and to protect other features such as wetlands. The recently introduced *Ontario Regulation 686/21: Mandatory Programs and Services*, supports the mapping, policy development, and public engagement work that CH is undertaking on natural hazards.

FIGURE 1-1: CONSERVATION HALTON WATERSHED

In 2018, CH renewed its Floodplain Mapping Program. New technologies and tools, along with more funding, offer opportunities to better understand and depict *flood hazards*. *Floodplain* mapping for many of the creeks within CH's jurisdiction was undertaken in the 1980s and 1990s. Since that time, technology has advanced significantly and become more affordable. For example, LiDAR (Light Detection and Ranging) technology has allowed for the capture of highly detailed and accurate topographic data at the watershed scale, which has vastly improved our understanding of the landscape.

Increased computing power and more sophisticated software such as two-dimensional (2-D) modelling can now apply this detailed topographic data to model complex natural processes and better predict the path and nature of a flood.

Floodplain mapping is an important tool that supports CH's regulatory and planning programs, infrastructure design and management decisions, flood forecasting and warning, as well as emergency planning and response, and prioritization of flood mitigation efforts.

Advancements in technology enable CH to better define *flood hazards*, including areas which were not historically feasible, such as *spill flood hazards* ("*spills*"). A *spill* occurs when floodwaters leave a watercourse, its valley and *floodplain*, and continues to flow overland in multiple directions before rejoining the same watercourse some distance downstream, spilling into another watershed, or remaining within the *spill* area. *Spills* often move through areas where inundation may not be anticipated. *Spill* mapping is a dynamic process which is still advancing and evolving within CH's jurisdiction.

Spills are considered *flood hazards*/hazard lands and are regulated by CH under *Ontario Regulation 162/06*. CH has Board-approved regulatory policies for development in regulated areas, including policies for development in *flood hazards*. Currently, CH has an interim policy for development in *spills*; however, a review and update to this interim *spill* policy is now underway. A high-level work plan was approved by the CH Board of Directors in April 2021 (Report No. CHBD 04 21 07) to develop *spill* policies. New *spill* policies will provide the public with greater certainty and transparency on CH's requirements for developing in *spill* areas especially as more of these areas are mapped in the future.

One of the key questions driving CH's *spill* policy review and update is whether *spills* should be treated differently than *floodplains* from a policy perspective. The question raises both technical and policy-based considerations in terms of whether *spills* and *floodplains* present different risks and whether development proposals in these two *flood hazard* areas should be treated differently. It is important to note that while there are different ways to manage *spills* on the ground (e.g., site grading, culvert replacements), the focus of this discussion paper is on reviewing and updating CH's regulatory policy for addressing development in *spills*.

This discussion paper serves as the initial stage of the *spill* policy review and update. The purpose of the discussion paper is to set the stage for developing a policy approach for *spills* by providing background information on *flood hazards*, an overview of applicable legislation, regulations and policy and possible approaches to managing the risk associated with *spills*. As part of the *spill* policy review and update process, CH will engage with CAs, municipal partners, residents, and other stakeholders. CH staff will assess the input received throughout the process, draft new policies, and recommend to the CH Board of Directors on the approval of any new *spill* policies.

This discussion paper consists of the following:

1. Background information on *spills*, including an overview of relevant legislation and policy
2. Overview of *spill* hazard approaches in other CA jurisdictions
3. *Spill* hazard risk management matrix and policy approaches
4. Details on next steps in the *spill* policy review and update
5. Discussion questions for feedback

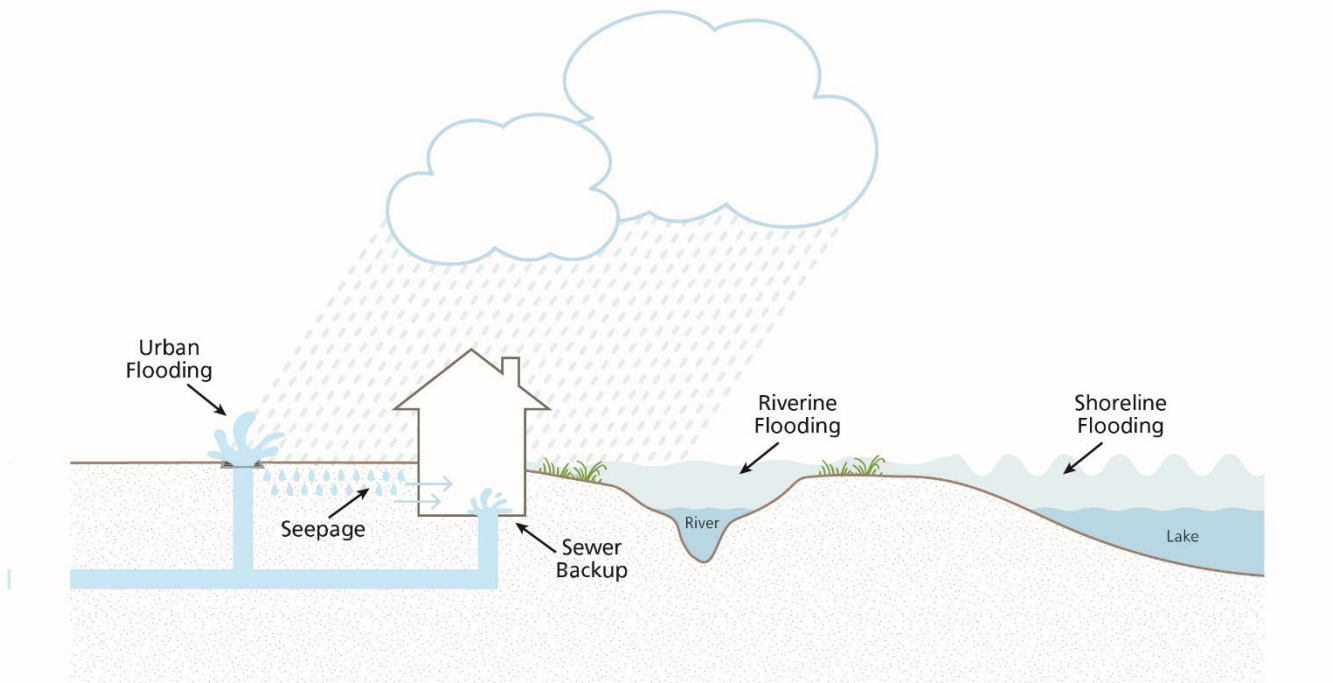
Section 2 Background

This section summarizes the types of flooding in CH's jurisdiction with a focus on *riverine flood hazards*.

2.1 Types of Flood Hazards

In CH's jurisdiction, there are three main types of flooding: *riverine*, *urban*, and *shoreline* shown in Figure 2.1.

FIGURE 2-1: FLOODING TYPES



Riverine flooding is a natural process and occurs when a watercourse's flows overtop its banks and flood adjacent lands. It can be caused by heavy rainfall, snow melt, ice and debris jams and/or infrastructure failures. The magnitude of riverine flooding is determined by several factors, including the amount and intensity of precipitation, soil conditions, and topography.

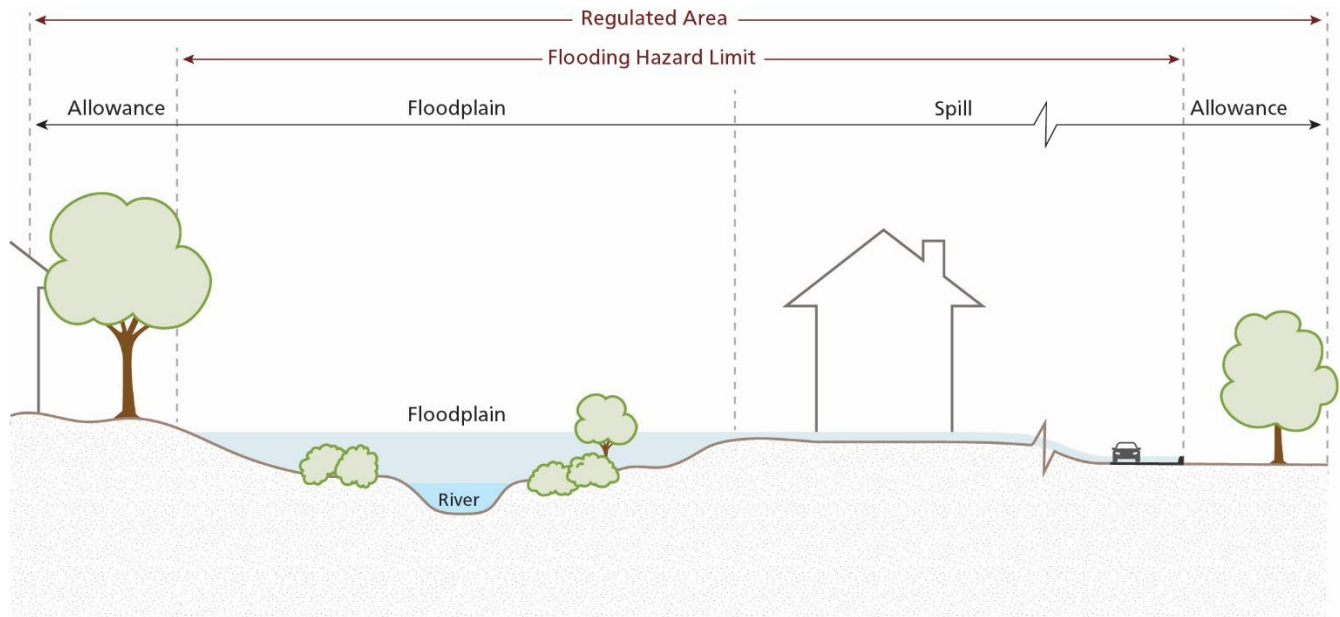
Urban flooding occurs when the urban drainage system is overwhelmed by excessive runoff, causing water to pond in parking lots, submerge streets, seep into nearby homes and structures, and/or back up into basements. It is caused when heavy rainfall and/or snow melt causes flooding independent of an overflowing watercourse. Runoff is generated when the ground cannot absorb water as quickly as it falls, especially in urban areas with impervious surfaces such as pavement. The urban drainage system consists of storm sewers, roadways, and overland flow routes.

Shoreline flooding can be caused by high water levels, storm surges/wave uprush or ice-jamming.

CH regulates *riverine* and *shoreline flooding*. Municipalities are responsible for managing *urban flooding*. Some *watercourses* and *riverine flood hazards* may be conveyed through pipes and along roadways; what distinguishes these hazards from *urban flooding* is that the flow originates from a riverine system (e.g., a watercourse).

Flood hazards include *floodplains* and *spill* areas. Figure 2-2 identifies the *floodplain* and *spill* areas that comprise the *flood hazard* regulated by CH.

FIGURE 2-2: CONSERVATION HALTON FLOOD HAZARD REGULATED AREA



A *floodplain* is an area of land that is flooded by a nearby *watercourse* that exceeds its capacity and overflows its banks during large storm events. When the storm event passes, the flood waters generally recede from the *floodplain* and return to the *watercourse*. Flows within the *floodplain* are generally significant enough to displace and move debris such as tree limbs, accessory structures (e.g. sheds, decks) and in some cases, larger buildings and homes. Most CA's approach to floodplain management is based on a *One Zone Concept*, wherein the entire *floodplain* is considered the *floodway*. The *One Zone Concept* is a hazards-based approach to limit new development in the *floodplain* where there is no distinction between a higher risk *floodway* (where flood depths and velocities are often greater) and a lower risk *flood fringe* (where depths and velocities are often less). The *Two Zone Concept* or *Special Policy Areas* areas are used where there is clear distinction between a *floodway* and a large *flood fringe*.

A *spill* occurs when floodwaters leave the *watercourse*, its valley and the *floodplain* and continue spilling over land in multiple directions before rejoining the same *watercourse* downstream, flowing into another watershed or remaining within the *spill* area. *Spills* often mix with *urban* (pluvial) *flooding* on roadways and other impervious surfaces. A *spill* can occur naturally due to ground elevations that slope away from a *watercourse* and its *floodplain* or because of barriers to the passage of flood flows such as undersized bridges or culverts. Some *spills* have similar characteristics to *floodplains* where the volume, depth and velocity of floodwater is high whereas other *spills* are shallow and spread out at a slower velocity. There are numerous areas within CH's jurisdiction where *spills* occur. It is anticipated that current and future *flood hazard* mapping studies will identify and characterize additional *spill* areas that were difficult to map in the past.

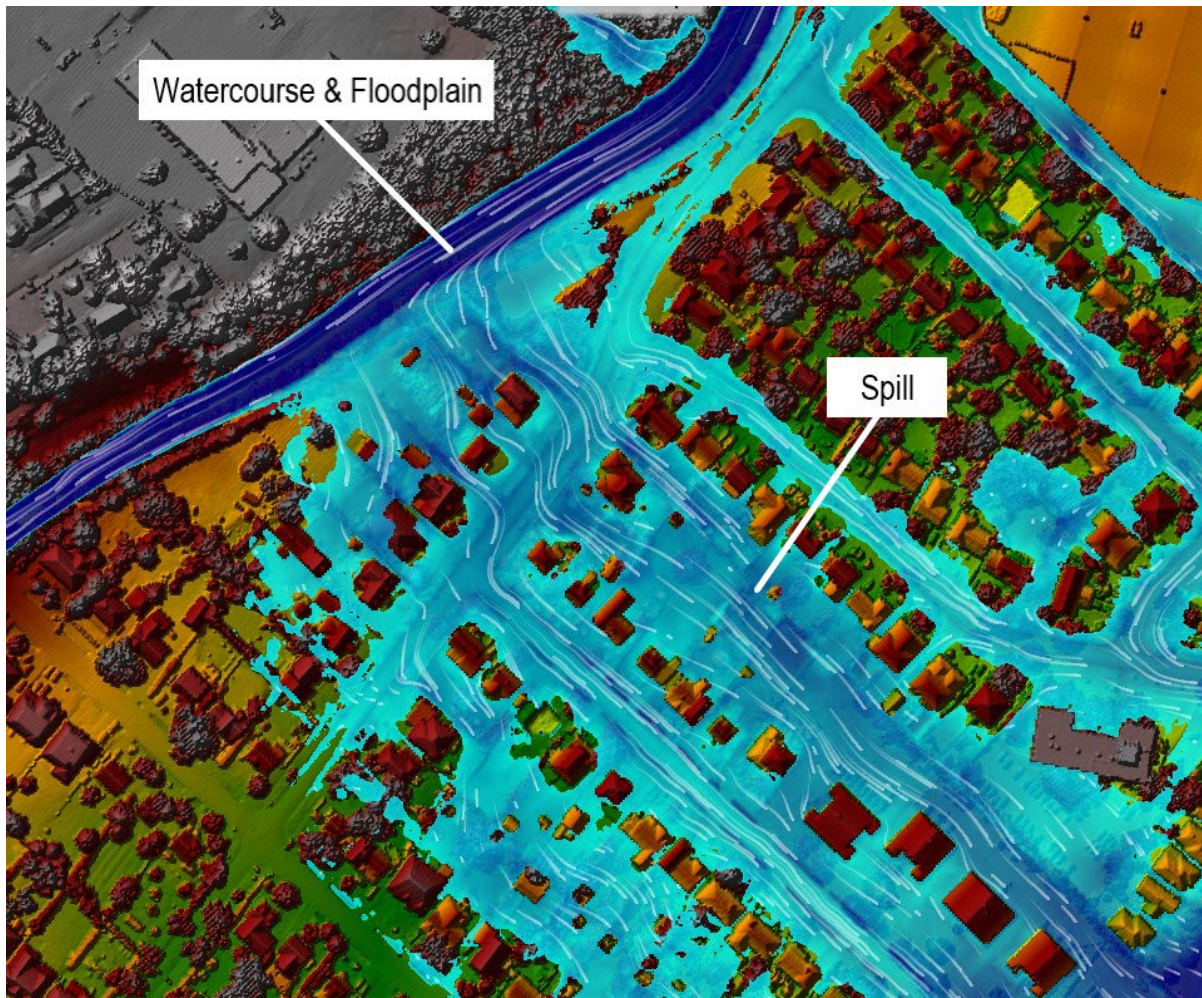
2.2 Flood Hazard Mapping

Flood hazard mapping is based on models that predict flood conditions and delineate the extent of *flood hazards*. With one-dimensional (1-D) modeling, which is commonly used for *floodplain* mapping, and the topographical data previously available to CH, it was not feasible to accurately predict the movement of water moving in multiple directions and to map *spills*.

Through technological advancements and with greater accessibility in flood hazard mapping tools, *flood hazards* can be better defined. This includes the use of LiDAR data to make higher-resolution maps with more detailed topography and more sophisticated software such as two-dimensional (2-D) hydraulic modelling that can better model complex natural processes and predict the path, depth, and velocity of a *spill*.

An example of *spill* mapping is provided in Figure 2-3 below.

FIGURE 2-3: EXAMPLE OF SPILL MAPPING

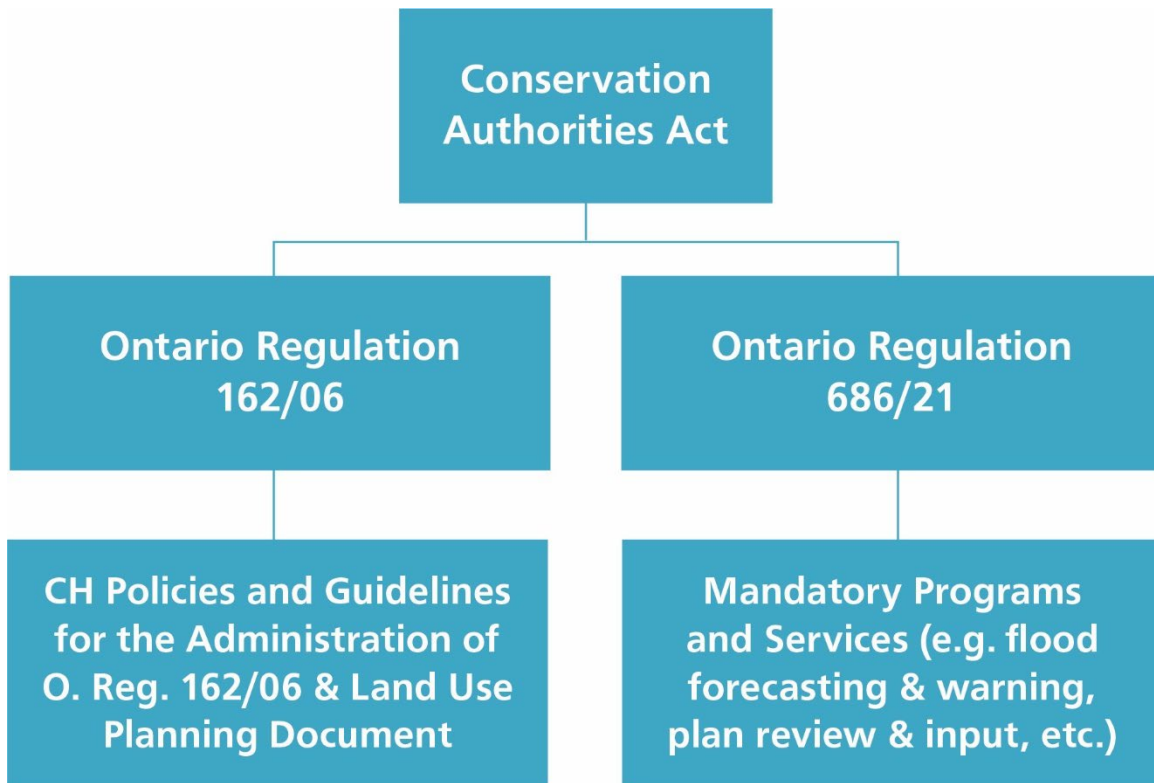


Section 3 Legislative, Regulatory and Policy Context

As an overall principle for flood hazard management, the Province prioritizes the use of non-structural and land use planning measures as its preferred approach to managing flood risks. The main legislative tools used to support this approach include the *Conservation Authorities Act*, and *Planning Act* together with the *Provincial Policy Statement*. Provincial policies have been shown to reduce capital and operating costs associated with managing flooding and other natural hazards, reducing pressure on provincial and municipal infrastructure debts. Existing policies have been estimated to reduce costs associated with ongoing flood and natural hazard management, including costs associated with the operation and maintenance of flood and erosion control infrastructure, by 20 to 80% depending on differences in urban density and property values (Ministry of Natural Resources and Forestry, 2019a).

The following diagram illustrates the foundational legislative, regulatory and policy hierarchy for CH's natural hazard management responsibilities under the *Conservation Authorities Act*.

FIGURE 3-1: LEGISLATIVE, REGULATORY AND POLICY HIERARCHY



3.1 Conservation Authorities Act

The purpose of the *Conservation Authorities Act* (CA Act) is to provide for the organization and delivery of programs and services that further the conservation, restoration, development and management of natural resources through the establishment of conservation authorities (CAs) on a watershed basis. A

CA is a public agency whose governing structure of members are appointed representatives from the participating municipalities. A CA provides programs and services in local resource management within its jurisdiction to the Province, municipalities, and the public.

Section 21.1 of the *CA Act* sets out the objects for CAs to establish and undertake, in the area over which it has jurisdiction mandatory programs and services, municipal programs and services and any other programs or services that may be provided.

Section 28 provides CAs with the ability to administer regulations related to development, interference with wetlands and watercourses, and interference with shorelines within its jurisdiction. The purpose of CA regulations to protect life and property from natural hazards such as flooding and erosion.

3.2 Ontario Regulation 162/06

Under Section 28 of the *CA Act*, CH administers *Ontario Regulation 162/06* which regulates:

- All development in or adjacent to river or stream valleys, wetlands and surrounding lands where development could interfere with the hydrologic function of the wetland, Lake Ontario shorelines, and hazardous lands such as karst and any prescribed allowances
- Alterations to a river, creek, stream or watercourse; and
- Interference with wetlands.

For *riverine flood hazards*, CH regulates development within the *flood hazard* plus a regulatory allowance of 15 metres from the *flood hazard* limit of major watercourse systems (Bronte, Grindstone and Sixteen Mile Creeks and their tributaries), and 7.5 metres from the *flood hazard* limit of minor watercourse systems (i.e., the remainder of watercourse systems, mostly urban systems, in CH's jurisdiction).

Regulatory allowances from flood hazard limits are to 1) ensure *safe access and egress* for people and vehicles during a flooding emergency and regular maintenance or repair to structures within or adjacent to the hazard; 2) provides a buffer from the impacts of unknown events and addresses limitations in accurately predicting extreme events within a naturally variable system, such as debris/ice jams impeding flows, flood waves (should a culvert or embankment wash out), potential for a larger storm event to occur, data limitations, software capabilities to model complex processes; and, 3) allow for consideration of activities directly adjacent to the flood hazard which could aggravate or increase the hazard risk.

Ontario Regulation 162/06 requires that a permission be obtained for development in CH regulated areas (i.e., flood or erosion hazards, wetlands, regulatory allowances adjacent to hazardous lands). Development as defined in Section 28 (25) of the *CA Act* has a broad meaning and includes:

- the construction, reconstruction, erection or placing of a building or structure of any kind;
- any change to a building or structure that would have the effect of altering the use of potential use of the building or structure;
- increasing the size of the building or structure; or increasing the number of dwelling units in the building or structure, site grading, or
- the temporary or permanent placing, dumping or removal of any material, originating on the site or elsewhere.

Section 3 of the Regulation allows CH to grant permission to develop in the areas described above if, in its opinion, the control of flooding, erosion, dynamic beaches, pollution or the conservation of land will not be affected by the development (i.e., the “five tests”).

Ontario Regulation 162/06 is a flexible regulation that is designed to evolve with scientific knowledge and recognizes the evolving and dynamic nature of *flood hazard* mapping. The regulation outlines the flood event standards that must be used to determine the maximum susceptibility to flooding of lands or areas within the watersheds in the area of the CA’s jurisdiction. In CH’s jurisdiction, the regulatory flood event standard for riverine systems as the greater of the 1:100 year flood event or the Hurricane Hazel (Regional storm) flood event. The Regional storm reflects a significant rainfall event, Hurricane Hazel, that occurred in 1954 in the Toronto area.

When hazards are identified and mapped through technical studies, they are incorporated into CH’s Approximate Regulation Limit (ARL) mapping. CH makes the public aware of and applies its regulation to ensure that risk to life or property damage from development is avoided. CH’s ARL mapping is publicly available online as a screening tool to determine if a site may contain natural hazards and/or features such as wetlands and may be regulated by CH. It is important to note that regardless of whether a hazard or wetland is mapped or not, the text providing the legal description of the areas regulated (*Ontario Regulation 162/06*, section 2(3)) prevails over the mapping.

3.3 Ontario Regulation 686/21

The role of CAs in natural hazard management was reinforced on December 8, 2020, when Bill 229, the *Protect, Support and Recover from COVID-19 Act (Budget Measures)*, 2020, received Royal Assent making changes to the *CA Act* and the *Planning Act*. To implement these changes, three new regulations were filed under the *CA Act* as part of the first phase regulations including *Ontario Regulation 686/21: Mandatory Programs and Services*.

Ontario Regulation 686/21 prescribes the mandatory programs and services CAs are required to provide. Each CA in Ontario is required to implement mandatory programs and services related to the risk of natural hazards (i.e., flooding, erosion, dynamic beaches, hazardous sites). The mandatory programs and services related to natural hazards risks that all CAs are required to deliver include flood forecasting and warning, drought or low water response, ice management, infrastructure, commenting on planning applications, and administering Section 28 regulations of the *CA Act*. These changes support the work that CH is undertaking in flood mapping, policy development and public engagement on natural hazards.

3.4 Conservation Halton Regulatory & Land Use Policies

CH has Board of Director-approved regulatory policies used in the administration of *Ontario Regulation 162/06*. These policies govern development in regulated areas such as *flood hazards*, as well as in the regulatory allowance. CH’s *Policies and Guidelines for the Administration of Ontario Regulation 162/06 and Land Use Planning Policy Document* [April 27, 2006 (last amended, November 26, 2020)] provides guiding, general, and specific regulatory policies and technical requirements that must be met before permission to develop in CH regulated areas may be granted. If, after review, it is determined that the Board-approved policies can be met, delegated staff is able to issue a permit. The document also outlines policies that staff use when providing plan input and review comments to municipal partners and provincial agencies.

CH has specific policies that outline the types of development that may be permitted in *floodplains*. In general, CH’s regulatory policies allow for replacements and minor additions to buildings and structures

that already exist in a *floodplain*; however, no new development is permitted in the *floodplain* with the exception of accessory structures, agricultural uses, stormwater management facilities and parking lots that meet certain requirements.

CH's regulatory policies do not generally permit major alterations to *floodplains* including placement of fill to create, or enlarge, a building lot. Such alterations may only be considered on a broad, landscape level where justification is provided through a subwatershed study, an Environmental Assessment or similar comprehensive study. Minor *floodplain* alterations may be permitted subject to confirming that a number of criteria can be met including confirmation that upstream or downstream properties will not be negatively impacted.

The *spill* policy contained in CH's Board-approved policies until April 2020, stated that *spills* are not subject to *Ontario Regulation 162/06*. This *spill* policy reflected the challenges associated with applying a regulation when *spills* could not easily be mapped (i.e., it was difficult to determine the limit of CH's regulated area).

Given that the nature and extent of *spills* are now being characterized through CH's new Floodplain Mapping Program and other technical studies, an interim policy was needed as a short-term measure to correct the statement that CH's regulation does not apply in *spills*, as well as to enable CH's ARL maps to be updated to identify flood risk associated with *spills* for the public. An interim policy acknowledging that *spills* are subject to *Ontario Regulation 162/06* and advising that permission is required for development in these areas was approved by the Board in April 2020 (CHBD 04 20 17). CH's interim *spill* policy states:

Development and redevelopment in spill areas will be considered on a case-by-case basis. Permission may only be granted where the site is subject to low risk and, where appropriate, mitigation measures can be implemented to reduce potential impacts to the satisfaction of Conservation Halton (e.g., flood proofing).

CH's interim *spill* policy enables staff to assess and inform the public of the risk associated with developing in the *spills* on a case-by-case basis while allowing for more time to develop and publicly consult on more robust policies that will address development within *spills*. Under the interim policy, staff works with applicants to assess the scale/scope of development that may be supported on a given site, as well as identify if there are any mitigation measures that can be implemented to reduce risk.

Under the current interim *spill* policy, any development proposed within an identified low-risk *spill* hazard would require technical studies to demonstrate that:

- there is no increased risk to existing development,
- the proposed development is not exposed to greater risk than existing development,
- neighboring properties are not negatively impacted by the proposed development (i.e., flood conveyance is not impacted),
- the building is floodproofed to the extent practical and feasible and there is no risk of structural failure due to potential flood hazards, and
- access and egress within the flooding hazard will be equal or better than existing conditions.

While these principles are not explicitly stated in the policy, they underpin the regulatory test contained in the *CA Act* and *Ontario Regulation 162/06* which directs CAs to ensure that the "control of flooding" is not compromised when making decisions about development in flood hazard areas, which includes areas impacted by *spills*.

3.5 Provincial Policy Statement, 2020

The *Provincial Policy Statement (PPS)* provides policy direction on matters of provincial interest related to land use planning and development, sets the policy foundation for regulating the development and use of land, and guides municipal decision making regarding new development and redevelopment.

The overall direction of the natural hazard policies in Section 3 of the PPS is to direct development to areas outside of hazardous lands including those adjacent to river, stream and small inland lake systems which are impacted by *flood hazards* and/or erosion hazards. Provincial technical guides that support the PPS, including *Technical Guide, River & Stream Systems: Flooding Hazard Limit* (Ministry of Natural Resources, 2002) provides direction on assessing development in *floodplains* and floodplain mapping but minimal direction on *spills*.

Under *Ontario Regulation 686/21*, CAs have the delegated responsibility to review applications or other matters submitted under the *Planning Act* on behalf of the Province to ensure that they are consistent with the natural hazards policies in the PPS. CAs work with municipalities to implement this policy direction in a variety of ways, with the most common approaches being land use designations and associated policy direction in official plans and zoning by-laws which outline the appropriate permitted uses in hazard lands. Municipalities may also work with local CAs to include hazard land mapping and schedules in planning documents.

Section 4 Other Conservation Authority Spill Policies

There is currently no Provincial guidance or policy on how CAs should deal with development proposals within *spills*. A jurisdictional scan was completed to determine how other CAs in Ontario are approaching development proposals in *spills* and review *spill* policies, if any. The table below provides a summary of the *spill* policy approaches of select CAs.

Conservation Authority	Summary of Spill Policy Approach
Toronto and Region Conservation Authority	<p>Development may be permitted in a spill hazard where it can be demonstrated that measures to remediate the spill to the Regulatory Flood can be implemented with no upstream/downstream impacts or impacts to natural features, areas and systems (among other requirements)</p> <p>Alternatives to the above (i.e. floodproofing) may only be permitted where complete remediation is not feasible</p> <p>Specific criteria shall be determined on a site-by-site basis but shall provide Regulatory Flood protection and be in accordance with Valley and Stream Corridor and General Regulation Policies</p>
Credit Valley Conservation Authority	<p>Development may be permitted in a spill hazard provided there are no off-site impacts and the appropriate flood hazard mitigation measures are included such as raising the elevation of proposed buildings or structures above the anticipated floodplain spill level; raising the lands within the spill location to prevent spilling; and/or provisions for safe access during flood events are available</p>
Central Lake Ontario Conservation Authority	<p>Development may be permitted provided flood hazard mitigation can be implemented including raising elevation of proposed buildings or structures above anticipated flood level and/or raising the lands within the spill location</p>
Hamilton Conservation Authority	<p>Development may be permitted in spill areas where flooding depths are less than or equal to 0.3 metres and/or flooding velocities are less than or equal to 0.3 metres/second</p> <p>Supporting calculations to assess onsite and offsite flood elevation impacts may be required and only developments with no net impacts on flood elevations will be considered</p> <p>Dry floodproofing measures with a 0.3 metres freeboard above the Regulatory Flood elevations are required</p>

Through review and discussions with CA staff, there is a range of approaches to managing and regulating development in *spills*. It is generally agreed that unless *spills* are characterized and mapped to understand extent, depth, and velocity, it is challenging to implement specific *spill* policies.

Section 5 Approaches to Spill Hazard Risk Management

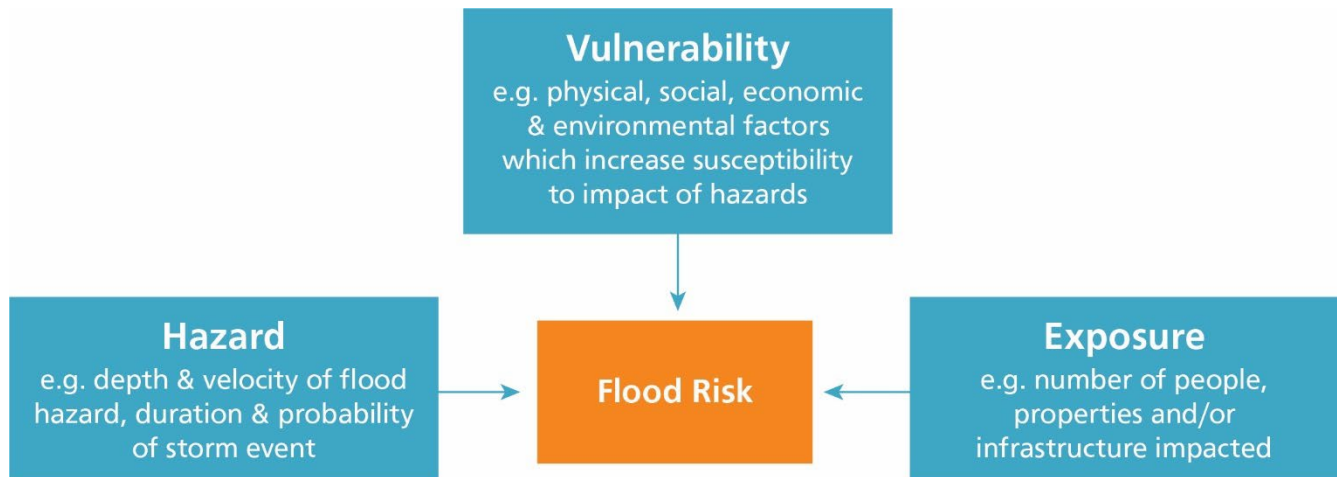
One of the key questions driving CH's *spill* policy review and update is whether *spills* should be treated differently than *floodplains* from a policy perspective. The question raises both technical and policy-based considerations in terms of whether *spills* and *floodplains* present different hazards and risks and whether development proposals in these two *flood hazard* areas should be treated differently.

A range of policy approaches could be considered to address development proposals in *spill* areas differently from *floodplains*. Ontario's *Special Advisor on Flooding Report to Government, An Independent Review of the 2019 Flood Events in Ontario* (Ministry of Natural Resources and Forestry, 2019a) describes two main approaches to managing flooding and other natural hazards: a hazards-based approach and a risk-based approach and recommends that the MNRF consult with CAs on their application to managing flooding.

A hazards-based approach focuses on determining where hazards exist and then taking steps to prevent development from occurring in those areas. In the case of flooding, a hazards-based approach seeks to delineate the *floodplain* and limit development within it. This approach is easier to implement in new, greenfield development situations where new development can be directed away from flood hazards and flood risk can be avoided in the first place. However, in areas of existing development, a rigid application of a hazard-based policy approach would preclude any development within a hazard. In these situations, CH applies a hybrid approach in our *floodplain* policies, whereby new development is limited and some additions and accessory structures to existing development are permitted. This is CH's approach in areas where development predates our current regulations.

A risk-based approach focuses on determining the risks posed by natural hazards and the development proposed, but allowing development where risks are at, or can be reduced to, an acceptable level. This approach seeks to identify the risks associated with development in a *flood hazard* but may allow some development where risk is low, or where risk can be appropriately managed and/or mitigated. Mitigation measures could include enhanced floodproofing, maintaining and/or improving conveyance of flood flows, and other measures. Adopting a risk-based approach allows individuals to proceed with a given activity (e.g., development within a *flood hazard*) provided that sufficient measures can be put in place to keep risks as low as reasonably achievable (Ministry of Natural Resources and Forestry, 2019a).

The schematic below illustrates three concepts that comprise flood risk. Hazards are defined as a potentially damaging physical event that may cause the loss of life or injury, property damage, social and economic disruption, or environmental degradation. Hazardous events have a probability of occurrence within a specified period of time and within a given area, and have a given intensity. Exposure is defined as population, properties, economic activities, including public services, or any other defined values exposed to hazards in a given area. Vulnerability is defined as the conditions determined by physical, social, economic and environmental factors or processes, which increase the susceptibility of a community to the impact of hazards. Vulnerability can be subdivided in physical, social, economical, and environmental vulnerability.

FIGURE 5-1: FLOOD RISK SCHEMATIC

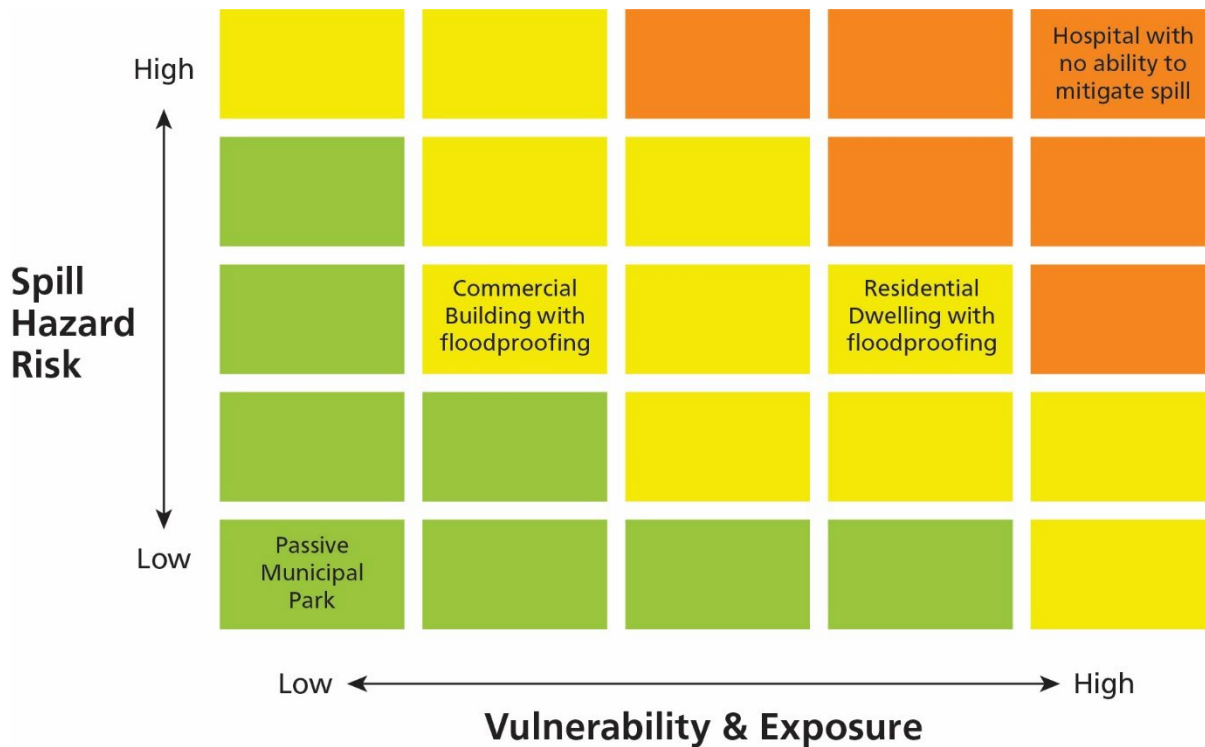
$$\text{Risk} = (\text{Probability} \times \text{Intensity}) \times (\text{Exposure} \times \text{Vulnerability})$$

Hazard related

Sensitivity to hazard

5.1 Spill Risk Management Matrix

Discussing *spills* from a risk management perspective is useful for considering potential policy approaches, particularly in developed areas. The matrix below (Figure 5-2) builds on Figure 5-1 by assigning the *spill* hazard to the y axis and vulnerability and exposure to the x axis. Conceptual development proposals can be plotted on the matrix to reveal a range of potential management approaches. For example, a hospital, which has high vulnerability and exposure due to the nature of its use, proposed in a high-risk *spill* with no ability to mitigate the *spill* is plotted in the red area of the matrix. In this area of the matrix, the level of risk is likely too high and not acceptable. Conversely, a municipal park, which has low vulnerability and exposure as it can flood and not suffer significant damage, proposed in a low-risk *spill* may be supported because the level of risk is acceptable. Information from the matrix can be used to consider the management of development in *spills* based on the level of overall risk. It may also reveal that a range of policies for development in *spills* may be appropriate in addressing the range hazards, vulnerability and exposure from low to high.

FIGURE 5-2: SPILL RISK MANAGEMENT MATRIX

Given that risk may significantly vary from one *spill* to another, as well as within one *spill*, the level of risk based on characteristics of the flood inundation, type of development proposed, and ability to mitigate flood risk could be considered. This is similar to a *Two Zone Concept* for *flood hazard* management, wherein development proposed within the *floodway* is reviewed differently and is subject to more restrictive policies than development proposed within the *flood fringe* where flood depths and velocities are less (i.e., potential lower risk).

Spill risk factors that could be considered include depth of flood water, velocity of flow, combined depth and velocity, frequency of flooding, and the ability of pedestrians and vehicles to safely exit the area during a flood event (i.e. *access and egress*).

Vulnerability and exposure factors could include the location of *spills* as large *spills* over agricultural lands may pose less risk to public safety and property than smaller spills in developed, urban areas where there are greater numbers of residents and potentially vulnerable development types. These may include institutional uses (i.e. hospitals, long-term care homes, day cares and schools), essential emergency services (i.e. fire, police, ambulance), and residential (single or multiple units). Less vulnerable development types where the risk to public health and property is lower may include municipal parks, parking lots, and some types of public infrastructure designed with appropriate mitigation measures such as roads.

5.2 Spill Policy Approaches

Considering the hazard and risk-based approaches and the factors that comprise flood risk, a range of general policy approaches to deal with development in *spills* emerge. The range presented below in Figure 5-3 includes a restrictive application of CH's current *floodplain* policies in spill areas to a more

permissive approach of distinguishing spills from *floodplains* and potentially permitting a broader range of development types in *spills* that have been characterized as low risk.

FIGURE 5-3: RANGE OF SPILL POLICY APPROACHES

Current CH Floodplain Policy	General Jurisdiction Wide CH Spill Policy	Area Specific CH Spill Policy	Case-by-Case CH Spill Policy (General Parameters)
<ul style="list-style-type: none"> Primarily hazard-based approach Views spill same as floodplain Provides clear/consistent direction to limit development in spills May not account for development in low-risk spills 	<ul style="list-style-type: none"> Hazard-and/or risk-based approach Differentiates spill from floodplain Provides clear/consistent direction to permit some development in spills Does not account for differences in local spill conditions Applicant responsible for undertaking technical studies 	<ul style="list-style-type: none"> Risk-based approach Differentiates different spill areas from each other and from floodplain Provides clear/consistent direction to permit some development in spills however, policies would be unique to specific areas Based on technical study for area and accounts for level of risk Potentially reduces technical study requirements for applicant 	<ul style="list-style-type: none"> Risk-based approach Differentiates spill from floodplain on case-by-case basis Potentially unclear/inconsistent direction to permit some development in spills on case-by-case basis Applicant responsible for technical studies

The figure above highlights some of the key considerations for a range of policy approaches to address development *spills*. Within the range there are also potential approaches of applying general *spill* policies across CH's watershed, area-specific *spill* policies based on CH or municipally-led technical studies that have characterized the *spill*, or an approach of assessing each development application within a *spill* area on a case by case basis with or without the general parameters described in Section 3.4.

Other factors to consider include the balance between consistency and flexibility from a policy implementation perspective, the level of certainty each policy approach would provide to the public and stakeholders, and how effectively the policy approach accounts for managing *spill* risk. The amount of risk that is considered "acceptable" in any risk-based approach is subjective. While CH staff with professional expertise (i.e., professional water resources engineers, registered professional planners, regulations officers) play a key role in determining acceptable levels of risk, consideration must also be given to the risk tolerance of the community (municipalities, residents, etc.) from a *spill* policy perspective. Through this discussion paper, CH is seeking feedback on the merits of the above approaches and which approach may be most appropriate for CH's jurisdiction.

Section 6 Conclusion

Spills are considered *flood hazards*/hazard lands and are regulated by CH under *Ontario Regulation 162/06*. Currently, CH has an interim policy for development in *spills*; however, a review and update to this interim *spill* policy is now underway. New *spill* policies will provide the public with greater certainty and transparency on CH's requirements for developing in *spills* especially as more of these areas are mapped in the future.

This discussion paper serves as the initial stage of the *spill* policy review and update. The purpose of the discussion paper is to provide an overview of *flood hazards*, the legislative, regulatory and policy context and possible approaches to managing the risk associated with *spills* through a new updated regulatory policy.

As part of the policy review and update process, CH will engage with CAs, municipal partners, residents and other stakeholders. CH staff will assess the input received throughout the process, draft new policies, and recommend to the CH Board of Directors on the approval of any new *spill* policies.

Following this initial public engagement and a review of feedback received, draft *spill* policies will be shared for further public engagement in Spring 2022. Responses will inform final policy recommendations to CH's Board of Directors on the approval of new *spill* policies in Fall 2022. All input received will be documented.

Section 7 Discussion Questions

The following discussion questions are provided to facilitate feedback from the reader. This feedback will directly inform the draft *spill* policies that will also undergo a public review.

1. Should CH have different regulatory policies for *spills* than *floodplains*? Why or why not?
2. If CH were to have *spill* specific policies, should they follow a hazard-based, risk-based, or hybrid approach? Why?
3. If CH's *spill* policies followed a risk-based or hybrid approach should different policies be established for developing in low versus high flood hazard/risk *spill* areas? What criteria should be used to distinguish between areas of low *flood hazards* and high *flood hazards*?
4. Do the policy approaches presented in Section 5/Figure 5-3 cover the full range of policy approaches that could be taken to address development in *spills*? What other policy approaches could be considered? What policy approach is preferred and why?
5. Should CH have different policies for different types of land uses in *spills*?
6. Are there any other things CH should consider when developing new *spill* policies?

Please submit responses to the discussion questions and any additional comments via email to policy@hrca.on.ca.

You may also provide feedback and/or register to receive email updates on the Spill Flood Hazard Policy Review & Update by visiting CH's website and completing a response/registration form (conservationhalton.ca/public-consultations).

Section 8 References

Caribbean Disaster Emergency Management Agency, *Caribbean Handbook for Risk Information Management – Use Case Book*, 2022.

Central Lake Ontario Conservation, *Policy and Procedural Document for Regulation and Plan Review*, 2014.

Conservation Halton, *Policies and Guidelines for the Administration of Ontario Regulation 162/06 and Land Use Planning Policy Document*, amended November 26, 2020.

Credit Valley Conservation Authority, *Watershed Planning and Regulation Policies.*, 2010.

Hamilton Conservation Authority, *Planning & Regulation Policies and Guidelines*, 2011.

Ministry of Natural Resources, *Policies and Procedures for Conservation Authority Plan Review and Permitting*, 2010.

Ministry of Natural Resources, *Understanding Natural Hazards*, 2001.

Ministry of Natural Resources, *Technical Guide, River & Stream Systems: Flooding Hazard Limit*, 2002.

Ministry of Natural Resources and Forestry, *Ontario's Special Advisor on Flooding Report to Government, An Independent Review of the 2019 Flood Events in Ontario*, 2019a.

Ministry of Natural Resources and Forestry, *Protecting people and property: Ontario's flooding strategy*, 2019b.

Toronto and Region Conservation Authority, *The Living City Policies*, 2014.

Appendix A

Legislative, Regulatory and Policy Links

Central Lake Ontario Conservation Authority

https://www.cloca.com/files/ugd/b3995f_a7bfa9064ccc40df9573ee2e4ed43652.pdf

Conservation Authorities Act <https://www.ontario.ca/laws/statute/90c27>

Conservation Halton Policies and Guidelines for the Administration of Ontario Regulation 162/06 and Land Use Planning <https://www.conservationhalton.ca/policies-and-guidelines>

Credit Valley Conservation Authority https://cvc.ca/wp-content/uploads//2021/06/004-CVC-WPR-Policies_APR-2010.pdf

Hamilton Conservation Authority

<https://conservationhamilton.ca/images/PDFs/Planning/PlanRegPolicyGuidewAppendices.pdf>

Ontario Regulation 162/06 <https://www.ontario.ca/laws/regulation/060162>

Ontario Regulation 686/21 <https://www.ontario.ca/laws/regulation/210686>

Provincial Policy Statement <https://www.ontario.ca/page/provincial-policy-statement-2020>

Toronto and Region Conservation Authority <https://trca.ca/planning-permits/living-city-policies/>