



Mr. Doug McNeil, Special Advisor on Flooding
c/o Mike Passey, Senior Policy Advisor, Ministry of Natural Resources and Forestry (MNRF)
(mike.passey@ontario.ca)

September 18, 2019

Dear Mr. McNeil,

Thank you for meeting with Conservation Ontario's Chair Wayne Emmerson and I to discuss the critical flood management role of conservation authorities (CAs) in Ontario. Additional information was provided to you on floodplain mapping and modelling in a letter dated August 9, 2019. This letter is being provided in follow-up to our meeting on August 1, 2019 where you encouraged us to provide advice with regard to policy/regulatory improvements to the flood management system in Ontario.

This letter highlights some suggestions that we have for legislative and public policy initiatives that are currently underway in Ontario which include: i) regulations to enable new Sections of the *Conservation Authorities Act* which received Royal Assent in June 2019; ii) the Provincial Policy Statement Review, and iii) review of the Section 28 Regulations under the *Conservation Authorities Act*.

The following policy/regulatory improvements would maintain and improve the flood management system in Ontario:

- i) Supporting the creation of a robust natural hazard (management) mandatory programs and services regulation under the *Conservation Authorities Act* that recognizes the value of the comprehensive approach to watershed management to reduce risks associated with floods (see Attachment 1).
- ii) Retaining critical policies of the Provincial Policy Statement (PPS), clarifying some of those policies, and amending policies in section 3.1 of the PPS. The improvements to the policies and updates to the technical guides supporting these policies suggested in Attachment 2 will ensure more consistency in interpretation and implementation across CAs and municipalities.
- iii) Updating, as necessary, the *flooding hazards* found within the PPS and the Flood Event Standards found within the existing Section 28 regulations made under the *Conservation Authorities Act* based on the best available science and including a factor of safety for extreme weather (see Attachment 3).

Thank you once again for the opportunity to meet with you and for your invitation to provide advice with regard to policy/regulatory improvements to the flood management system in Ontario. Please do not hesitate to contact myself at ext.223 or Leslie Rich at ext.226, if you have any questions regarding the information provided.

Sincerely,

A handwritten signature in black ink, appearing to read "Bonnie Fox". The signature is fluid and cursive, with the first name "Bonnie" written in a larger, more prominent script than the last name "Fox".

Bonnie Fox
Manager, Policy and Planning

Enclosed in email: 4 additional resources related to the flood event standard

c.c. All Conservation Authority GMs/CAOs

Attachment 1: Creating a Robust Natural Hazard (Management) Mandatory Program and Service Regulation

Background

The Made-in-Ontario Environment Plan recognizes that “effective watershed management is important to people in communities, especially at times when watersheds are facing stresses such as increased development and flooding caused by severe weather events”(p.14). The Plan recommends a “comprehensive approach to watershed management, which can inform current actions and future development”(p.14). This is strongly supported by the conservation authorities where the watershed approach has been very effective in reducing flood risk within their watersheds. Support for the comprehensive approach to watershed management as it relates to CA delivery of their natural hazard ‘mandatory programs and services’ is critical for ongoing effective flood management in Ontario.

Currently it is our assumption that the mandatory programs and services referenced in Section 21.1 (to be enacted once regulations are in place) are not limited to provincial transfer payment eligible items as there is no provincial funding provided for example for “the conservation and management of lands owned or controlled by the authority”. The mandatory programs and services referenced in Section 21.1 are supported in some cases by self-generated revenues as well as municipal levy, including components of the natural hazard program.

The proposed draft text for the regulation encompasses our delivery of programs and services on a watershed basis as per the Purpose of the Act¹, and the objects² and powers of authorities³ identified in the Act. There are watershed management actions that are foundational to effective delivery of the Natural Hazard mandatory program including for example, monitoring, mapping, stewardship actions, and education.

Conservation Ontario Proposed Draft Text for Mandatory Programs and Services Regulation

Natural Hazard (Management)

The **purpose** of the natural hazard (management) mandatory program and service is to advance and contribute to the:

- Assessment and reduction of risk and protection of life and property from natural hazards in a changing climate;
- Successful implementation of the five pillars of Emergency Planning and Management in Ontario for natural hazards: Prevention, Mitigation, Preparedness, Response, and Recovery; and,
- Delivery of plan review and permitting in support of achieving safe and sustainable communities.

The **standards and requirements** that advance the purpose include:

- a) Administration of the Section 28 Regulation under the *Conservation Authorities Act*;

¹ Purpose (Section 0.1) “to provide for the organization and delivery of programs and services that further the conservation, restoration, development and management of natural resources in watersheds in Ontario.”

² Objects (Section 20) “to undertake a program designed to further the conservation, restoration, development and management of natural resources...”

³ Powers (Section 21a) to q)) outlines broad operational powers including: to study and investigate the watershed, to undertake research, to plant and produce trees...for any purpose

- b) Delivery of Plan Review on matters of provincial interest relating to Natural Hazards (Section 3.1 under Public Health and Safety under the Provincial Policy Statement – excluding forest fire);
- c) Forecasting of flood events and the issuance of flood and erosion warnings, alerts and advisories to prepare those who must plan for, respond to and recover from the flood or erosion event;
- d) Activities undertaken to inform and coordinate those who must respond to a low water event;
- e) Operation and maintenance of infrastructure for the purposes of flood and/or erosion control to mitigate risk to life and property damage from flooding and/or erosion;
- f) Operation and maintenance of infrastructure for the purposes of low flow augmentation which assist in managing the impacts of low water events;
- g) Watershed scale data collection, monitoring, data management and modelling;
- h) Watershed scale studies, plans, assessments and/or strategies, that inform/identify actions to reduce natural hazard risk and protect life and property from natural hazards, including flood and/or erosion risk mapping and climate vulnerability risk assessment;
- i) Provision of water and land management and stewardship activities to minimize flooding and erosion and to reduce risks;
- j) Activities undertaken to minimize flooding and erosion from ice build-up and jamming; and,
- k) Communication, outreach and education activities to ensure broader appreciation of the importance of managing natural hazards and their associated risks for the protection of life and property

Attachment 2: Early Comments on S. 3.1 of the Provincial Policy Statement (Table 1) and Recommended Updates to the Technical Guides and Special Policy Area Guidelines (Table 2)

These comments (Table 1) represent early thinking from Conservation Ontario (CO) on section 3.0 Protecting Public Health and Safety found within the Provincial Policy Statement and does not represent CO’s final submission on this consultation. These comments are not intended to limit consideration of comments shared individually by conservation authorities (CAs). Additional comments on updates to the Technical Guides and Special Policy Area Guidelines are provided in Table 2.

Table 1. Early Comments on S.3.1 of the Provincial Policy Statement

Excerpts from Provincial Discussion Document: Proposed Provincial Policy Statement 3.0 Protecting Public Health and Safety	Conservation Ontario’s Comments
<p>(Note: policies in this section related to natural hazards are subject to ongoing review by the Province’s Special Advisor on flooding. Further changes may be considered as a result of this review)</p>	<p>Conservation Ontario is appreciative of the expertise that the Province’s Special Advisor on flooding brings to this review.</p> <p>It is difficult for conservation authorities to fully comment on this section without having the benefit of reviewing proposed changes. The Province is encouraged to take advantage of the significant expertise available through the CAs prior to enacting any changes to the natural hazards section.</p>
<p>Ontario's long-term prosperity, environmental health and social well-being depend on reducing the potential for public cost or risk to Ontario’s residents from natural or human-made hazards.</p> <p>Development, redevelopment and intensification (CO recommended addition) shall be directed away from areas of natural or human-made hazards where there is an unacceptable risk to public health or safety or of property damage, and not create new or aggravate existing hazards.</p>	<p>The current preamble is designed to address new development whereas many of the risks associated with the management of natural hazards are a result of historic development. Conservation Ontario suggests the edits to the preamble (see bolded text) to address existing development. The PPS and Ontario’s planning system should also broaden the use of Special Policy Areas (SPAs) to address existing development in high risk areas, including areas subject to erosion.</p> <p>The term “unacceptable risk to public health or safety” requires further direction in an update to the Provincial Technical Guides. As a result of the Court of Appeal decision in <u>Gilmor v. Nottawasaga Valley Conservation Authority</u> many municipalities and CAs have been hesitant to issue approvals for development in areas where safe access has not been established. In southwestern Ontario, this renders large portions of the watersheds undevelopable. The Province is urged to update the Technical Guides with greater clarity around</p>

<p>Excerpts from Provincial Discussion Document: Proposed Provincial Policy Statement 3.0 Protecting Public Health and Safety</p>	<p>Conservation Ontario's Comments</p>
	<p>safe access requirements.</p> <p>Given that the Province is proposing to strengthen the wording with regard to a changing climate (see 3.1.3) it is recommended that consideration of climate change be mentioned in the preamble to this section as well.</p>
<p>3.1.1 Development shall generally be directed to areas outside of:</p> <ul style="list-style-type: none"> a. <i>hazardous lands</i> adjacent to the shorelines of the <i>Great Lakes - St. Lawrence River System</i> and <i>large inland lakes</i> which are impacted by <i>flooding hazards, erosion hazards</i> and/or <i>dynamic beach hazards</i>; b. <i>hazardous lands</i> adjacent to <i>river, stream and small inland lake systems</i> which are impacted by <i>flooding hazards</i> and/or <i>erosion hazards</i>; and c. <i>hazardous sites</i>. 	<p>Conservation Ontario is supportive of this section.</p>
<p>3.1.2 <i>Development and site alteration</i> shall not be permitted within:</p> <ul style="list-style-type: none"> a. the <i>dynamic beach hazard</i>; b. <i>defined portions of the flooding hazard along connecting channels</i> (the St. Marys, St. Clair, Detroit, Niagara and St. Lawrence Rivers); c. areas that would be rendered inaccessible to people and vehicles during times of <i>flooding hazards, erosion hazards</i> and/or <i>dynamic beach hazards</i>, unless it has been demonstrated that the site has safe access appropriate for the nature of the <i>development</i> and the natural hazard; and d. a <i>floodway</i> regardless of whether the area of inundation contains high points of land not subject to flooding. 	<p>As previously described, the term “rendered inaccessible” should be addressed in updated technical guidance.</p> <p>It is recommended that this section explicitly include, “plus an allowance for <i>wave uprush</i> and <i>other water-related hazards</i>” in b for clarity purposes. It is acknowledged that it is currently included in the definition of “flooding hazard”.</p>
<p>3.1.3 Planning authorities shall consider prepare for the potential impacts of a changing climate change that may increase the risk associated with natural hazards (amendment proposed by Province).</p>	<p>Conservation Ontario is supportive of the proposed amendment as it strengthens the requirement. Provincial guidance on how to prepare is required.</p>

Excerpts from Provincial Discussion Document: Proposed Provincial Policy Statement 3.0 Protecting Public Health and Safety	Conservation Ontario's Comments
<p>3.1.4 Despite policy 3.1.2, <i>development and site alteration</i> may be permitted in certain areas associated with the <i>flooding hazard along river, stream and small inland lake systems</i>:</p> <ul style="list-style-type: none"> a. in those exceptional situations where a <i>Special Policy Area</i> has been approved. The designation of a <i>Special Policy Area</i>, and any change or modification to the official plan policies, land use designations or boundaries applying to <i>Special Policy Area</i> lands, must be approved by the Ministers of Municipal Affairs and Housing and Natural Resources prior to the approval authority approving such changes or modifications; or b. where the <i>development</i> is limited to uses which by their nature must locate within the <i>floodway</i>, including flood and/or erosion control works or minor additions (CO recommended deletion) or passive non-structural uses which do not affect flood flows. 	<ul style="list-style-type: none"> a. Conservation authority staff have experienced difficulty in getting the Province to engage in discussions regarding new or updates to existing SPAs, making it difficult to address existing development located in the hazard. At the same time there is increasing pressure to increase density in downtown cores, especially with regard to major transit station areas. The SPA guidelines were created 10 years ago and require update based on lessons learned and ideally to reflect updated natural hazard technical guides. b. It is recommended that the term “minor additions” either be deleted (see bolded text) or that clarification about what constitutes a minor addition be provided. Minor additions do not seem to fit with the rest of this paragraph as the presumption is that these are habitable uses, whereas the rest are uses that must by their nature locate within a floodway. Should the Province decide to provide a definition of minor additions, it is recommended that there be a cap on the size of the development permitted.
<p>3.1.5 <i>Development, redevelopment and intensification</i> (CO recommended addition) shall not be permitted to locate in <i>hazardous lands</i> and <i>hazardous sites</i> where the use is:</p> <ul style="list-style-type: none"> a. an <i>institutional use</i> including hospitals, long-term care homes, retirement homes, pre-schools, school nurseries, day cares and schools; b. an <i>essential emergency service</i> such as that provided by fire, police and ambulance stations and electrical substations; or c. uses associated with the disposal, manufacture, treatment or storage of <i>hazardous substances</i>. 	<p>It is recommended that this section also speak to redevelopment and intensification (see bolded text) as these are particularly sensitive land uses.</p>
<p>3.1.6 Where the <i>two zone concept for flood plains</i> is applied, <i>development and site alteration</i> may be permitted in the <i>flood fringe</i>,</p>	<p>It is recommended that the Province provide guidance on how to address spill areas in the Technical guides, particularly with the increased</p>

Excerpts from Provincial Discussion Document: Proposed Provincial Policy Statement 3.0 Protecting Public Health and Safety	Conservation Ontario's Comments
subject to appropriate floodproofing to the <i>flooding hazard</i> elevation or another <i>flooding hazard</i> standard approved by the Minister of Natural Resources.	use of 2 D modelling. Spill areas have the capacity to represent a significant hazard in some areas.
<p>3.1.7 Further to policy 3.1.6, and except as prohibited in policies 3.1.2 and 3.1.5, <i>development</i> and <i>site alteration</i> may be permitted in those portions of <i>hazardous lands</i> and <i>hazardous sites</i> where the effects and risk to public safety are minor, could be mitigated in accordance with provincial standards, and where all of the following are demonstrated and achieved:</p> <ul style="list-style-type: none"> a. <i>development</i> and <i>site alteration</i> is carried out in accordance with <i>floodproofing standards</i>, <i>protection works standards</i>, and <i>access standards</i>; b. vehicles and people have a way of safely entering and exiting the area during times of flooding, erosion and other emergencies; c. new hazards are not created and existing hazards are not aggravated; and d. no adverse environmental impacts will result. 	This subsection is overly complex with its cross-references to other sections. It is recommended that this section be simplified to provide clarity.
<p>3.1.8 <i>Development</i> shall generally be directed to areas outside of lands that are unsafe for <i>development</i> due to the presence of <i>hazardous forest types for wildland fire</i>.</p> <p><i>Development</i> may however be permitted in lands with <i>hazardous forest types for wildland fire</i> where the risk is mitigated in accordance with <i>wildland fire assessment and mitigation standards</i>.</p>	When updating the MOU between the Province and Conservation Ontario on plan review (or through regulation), it should be clarified that CAs are not responsible for this part of S. 3.1 of the PPS.
<p>See 6.0 Definitions flooding hazard “means the inundation, under the conditions specified below, of areas adjacent to a shoreline or a river or stream system and not ordinarily covered by water:</p> <ul style="list-style-type: none"> a. along the shorelines of the <i>Great Lakes - St. Lawrence River System</i> and <i>large inland lakes</i>, the <i>flooding hazard</i> limit is based on 	It is recommended that the current definition of flooding hazard be amended to allow for an increased requirement where the past history of flooding supports the raising of the standard.

Excerpts from Provincial Discussion Document: Proposed Provincial Policy Statement 3.0 Protecting Public Health and Safety	Conservation Ontario's Comments
<p>the <i>one hundred year flood level</i> plus an allowance for <i>wave uprush</i> and <i>other water-related hazards</i>;</p> <p>b. along <i>river, stream and small inland lake systems</i>, the <i>flooding hazard</i> limit is the greater of:</p> <ol style="list-style-type: none"> 1. the flood resulting from the rainfall actually experienced during a major storm such as the <i>Hurricane Hazel</i> storm (1954) or the <i>Timmins storm</i> (1961), 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 <i>one hundred year flood</i>; 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 Natural Resources; <p>except where the use of the <i>one hundred year flood</i> or the actually experienced event has been approved by the Minister of Natural Resources as the standard for a specific watershed (where the past history of flooding supports the raising or lowering of the standard)". (CO recommended addition).</p>	

Table 2. Recommended Updates to the Technical Guides and Special Policy Area Guidelines

Guideline	Conservation Ontario's Comments
<p>Procedures for Approval of New Special Policy Areas (SPAs) and Modifications to Existing SPAs Under the Provincial Policy Statement, 2005 (PPS, 2005)</p> <p>Policy 3.1.3 – Natural Hazards- Special Policy Area, dated January 2009</p>	<p>The 2009 document should be updated based on lessons learned, to reflect the current PPS and to incorporate new direction from updated Technical Guides. Consideration should be given to expanding the use of SPAs to include other hazards, such as erosion hazards.</p>

Guideline	Conservation Ontario's Comments
	SPAs may be an important tool in addressing spill areas within areas of existing development.
<p>Technical Guides for Implementation of section 3.1 of the PPS</p> <ul style="list-style-type: none"> - River & Stream Systems: Erosion Hazard Limit - River & Stream System; Flooding Hazard Limit - Great Lakes – St. Lawrence River System and Large Inland Lakes 	<p>The current Technical Guides were created to support the implementation of the PPS. Conservation authorities use the Technical Guides in support of the regulations program under S. 28 due to a lack of technical guidance issued by the Province for that purpose. Some planning approaches and the delineation of hazards differ between the Technical Guides and the S. 28 regulation. It is recommended that these differences should be reconciled to avoid conflicts and to increase public safety.</p> <p>In addition, the following updates are recommended:</p> <ul style="list-style-type: none"> • incorporate Provincial direction on considering climate change in natural hazard programs • update safe access requirements to appropriately address the ability of first responders to attend sites and the outcomes of the Gilmore v. Nottawasaga Valley Conservation Authority case • incorporate new modeling approaches, including 2D • provide direction on the consideration of spill areas and storm water as a flooding hazard <p>Conservation Ontario is prepared to assist with all aspects of the updates.</p>
New – Guidelines to help planning authorities prepare for the impacts of a changing climate	Conservation Ontario would strongly support additional guidance material provided by the Province to assist planning authorities with climate change adaptation.

Attachment 3: Updating as Necessary, the flooding hazards founding within the PPS and the Flood Event Standards found within the existing Section 28 Regulations made under the CAA

Under the Provincial Policy Statement, 2014 the flooding hazard “means the inundation, under the 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) or the **Timmins storm** (1961), 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 Natural Resources;

except where the use of the *one hundred year flood* or the actually experienced event has been approved by the Minister of Natural Resources as the standard for a specific watershed (where the past history of flooding supports the lowering of the standard)”.

The PPS mimics what is found within Ontario Regulation 97/04 the “Content of Conservation Authority Regulations under Subsection 28 (1) of the Act: Development, Interference with Wetlands and Alterations to Shorelines and Watercourses”. It allows for regulating the 100 year flood level along the Great Lakes- St. Lawrence River System, and one of the following flood event standards for riverine and lake systems: Hurricane Hazel, 100 Year, Timmins Flood, Historic Flood or 100 year flood level and an allowance for wave uprush and other water-related hazards.

a. Concerns Related to the One Hundred Year Flood Event Standard

In recent years, a number of watersheds under CA jurisdiction have experienced significant flooding, particularly in southwestern and eastern Ontario, as well as along the Great Lakes shoreline. In these communities, it is the 100 Year flood event that is utilized as the regulatory standard.

In May, 2019, in response to the Ministry of Natural Resources and Forestry’s consultation on the S. 28 Regulation, Conservation Ontario Council endorsed a letter, where concerns with the existing flood event standards were outlined. It included a recommendation that the Province undertake a review of the current flood event standards and update them based on the best available science, including observed flooding. Furthermore, it was recommended that the update to the standards should include provisions to consider climate change from a regulatory perspective.

Two examples of recent flood events are highlighted below.

- Great Lakes Flooding - One Hundred Year Event

A 100 year event has a 64% likelihood of occurring over the next 100-year period, without considering any change to land use or climate. Flooding is now the most costly natural disaster in Canada.ⁱ Currently, the water levels in the Great Lakes remain near or above all time high valuesⁱⁱ threatening people and properties, particularly in low lying areas.

- The attached memo from Essex Region and Lower Thames Valley Conservation Authorities (July, 2019) outlines concerns regarding flooding in Lake Erie and Lake St. Clair. It is noted that a state of emergency was recently declared in the Lower Thames' watershed.

As per the attached memo, key findings of the "Adapting to the Future Storm and Ice Regime in the Great Lakes" study have found that Lake Erie water levels are predicted to rise 0.75 metres higher than current record levels, coupled with increased wave energy and year-round erosion and flooding from storms due to a lack of ice cover. This demonstrates the peril of relying on the one hundred year event as a regulatory standard.

- Riverine Flooding – One Hundred Year Event

In 2017 and 2019 the Ottawa River experienced significant flood events, particularly in the area of Constance Bay. Constance Bay experienced a slightly less than a 1:50 year flood event in May, 2017; an approximately 1:100 year flood in April, 2019 and a 1:50 year flood in May, 2019. The results of the review of the flooding information, in comparison to the existing Regulatory floodplain maps, demonstrate that the floodplain maps are providing the necessary level of accuracy. Since 1988 the Mississippi Valley Conservation Authority has been administering the regulation under Section 28 of the CAA. The development that occurred after the CA permitting process was in place generally fared much better than those who developed without the assistance of the CA.

- The attached memos from Mississippi Valley Conservation Authority dated June 28, 2017 and August 12, 2019 describe the review of the Ottawa River Floods in 2017 and 2019

- b. Difficult to adjust the flood event standard based on an actual event

Many CAs have expressed concerns with the difficulty of increasing the regulatory flood event standard in their regulations based on an actual event. The process to do so via the Ministry is unclear. Moreover, a change to the flood event standard will likely add additional properties to the floodplain, potentially impacting perceived risk and future development potential. This can be a major disincentive for local decision-makers. The PPS definition of flooding hazard mentions an increased standard (see #3 of the definition) based on ice jams, rather than a strictly water event whereas the final paragraph appears to only allow for a *lower* standard based on an actual event where no ice jamming is involved. The current definition of flooding hazard found within the PPS appears to further limit the Province's ability to adjust to increased flooding in Ontario.

When utilizing a 100 year return period, technically the standard may change every time a watershed experiences a significant flood event. If a CA were to continuously recalculate the 100 year return period, this may move historic development into the regulatory floodplain. Again, this can be a major disincentive for local decision-makers.

- c. Revisions to the Flooding Hazards and Flood Event Standards

Conservation Ontario Council previously endorsed a request that the Province update, as necessary, the Flood Event Standards found within the existing S. 28 regulations based on the best available science

and including a factor of safety for climate change. Conservation Ontario Council took no position at that time on what new flood event standard may be appropriate, however, in speaking to a number of CA experts, they offered the following observations:

- Communicating with the public why different watersheds have different flood event standards can be difficult;
 - There are issues associated with the assumptions made in calculating the Hurricane Hazel event, particularly as they pertain to heavily developed watersheds;
 - Design storm standards should include a factor of safety for climate change; and
 - Some watersheds are more susceptible to flooding based on their topography and regardless of what flood event standard is used. In these locations there should be an increased emphasis on floodproofing where possible.
- The attached memo from Credit Valley Conservation dated August 27, 2019 provides one expert opinion on the Floodplain Management Standards and includes an illustration of the difficulties in adjusting the flood event standard based on an actual event (see section b.).

Additional Resources (attached separately in email):

- 3a) Lake Levels and Flood Management – Essex Region and Lower Thames Valley conservation authorities, July 2019
- 3b) Ottawa River Flood Plain Mapping Review – Mississippi Valley Conservation Authority, dated June 28, 2017
- 3c) 2019 Ottawa River Flood Review – Mississippi Valley Conservation Authority, dated August 12, 2019
- 3d) Floodplain Management Standards – Design Storm Review, Credit Valley Conservation, dated August 27, 2019

ⁱ Weathering The Storm: Developing a Canadian Standard for Flood-Resilient Existing Communities, Natalia Moudrak and Dr. Blair Feltmate, Intact Centre on Climate Adaptation, January, 2019

ⁱⁱ Provincial Flood Forecasting and Warning Program website, retrieved September 9, 2019