



September 5, 2023

Ministry of Natural Resources and Forestry

*Submitted via the Environmental Registry of Ontario (ERO#019-4706)*

**Re: Conservation Ontario's Comments on the "Technical Bulletin - Flooding Hazards: Data Survey and Mapping Specifications" (ERO# 019-4706)**

Thank you for the opportunity to provide comments on the "Technical Bulletin - Flooding Hazards: Data Survey and Mapping Specifications". Conservation Ontario is the network for Ontario's 36 Conservation Authorities (CAs). These comments are not intended to limit the comments submitted by individual CAs.

As part of their mandatory programs related to the risk of natural hazards (O. Reg. 686/21) all Conservation Authorities may collect and manage information enabling the Authority to delineate and map areas of natural hazards (including flooding hazards). The provision of these maps assists CAs with administration and enforcement of their Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulations ("Section 28 Regulations") under the CA Act, as well as manage the risks related to natural hazards within their watershed jurisdiction). In addition, CA flood plain mapping supports emergency management, watershed planning, flood risk reduction and remediation.

Since 2020, Conservation Ontario and several Conservation Authorities have participated in the Ministry of Natural Resources and Forestry (MNRF) Multi-Partner Flood Mapping Technical Team which was established to support implementation of Ontario's Flooding Strategy, specifically to:

- Develop a multi-year approach to updating flood mapping;
- Identify flood-related foundational geospatial data;
- Establish a provincial elevation mapping program; and,
- Update provincial standards for flood mapping.

Conservation Ontario has appreciated the opportunity to be involved in this important initiative and contribute to the work completed to date.

Conservation Ontario applauds the Province's commitment to updating existing technical guidance used to support implementation of the natural hazard policies outlined in the Provincial Planning Statement, 2023. As noted by the Province in the Environmental Registry posting, existing technical guidance was created between 1996 and 2002, and updates are required to ensure guidance continues to reflect advancements in science, technology and mitigative measures. The proposed "Technical Bulletin – Flooding Hazards: Data Survey and Mapping Specifications" (the "Technical Bulletin") would replace Appendix J of the existing "River & Stream Systems: Flooding Hazard Limit" technical guidelines, which have not been updated in over 20 years.

Conservation Ontario is supportive of the proposed Technical Bulletin as useful guidance which clarifies the necessary data considerations and mapping specifications, the importance of various data sets, and how data collected is used when preparing flood plain modeling and mapping products. The guidance and resulting data will be particularly useful for Conservation Authorities as they undertake work to delineate flood hazards through the creation of new, or updates to existing, flood plain maps.

As the Province works to finalize the Technical Bulletin, Conservation Authorities have identified the following additional topics for consideration:

- **Capacity** – The jurisdictional size and staff capacity of Conservation Authorities and their partner Municipalities varies widely across Ontario and their ability to implement the recommendations in this Technical Bulletin will vary accordingly. It is important to emphasize that the scope of this document is derived from commonly accepted and recommended best practices and presents guidance rather than mandatory instructions or methodologies to be rigidly applied in all circumstances. Conservation Authorities will meet and exceed these recommendations where resources permit. While Conservation Ontario is grateful for this updated technical guidance, resources from the Province to support and ensure consistency in the implementation of all best practices will be needed.
- **Climate Change** – It is recommended that guidance be provided in the Technical Bulletin as it relates to climate change and mapping of climate change events. Consideration of climate change is identified as a priority in Ontario's Flooding Strategy, the Provincial Planning Statement, and O.R. 686/21 Mandatory Programs and Services (Section 1(2) and (3)). Many Conservation Authorities are recipients of funding for flood plain mapping through the federal Flood Hazard Identification and Mapping Program (FHIMP) which requires identification of additional significant flood events such as climate change considerations, as well as mapping for flood lines in climate change scenarios.
- **Technical Specifications for Drone Surveys** – As an increasing number of Drone surveys are submitted across the province, it is recommended that this Technical Bulletin provide guidance on technical specifications to provide consistency for

proponents. It is recommended that technical specifications be included in Section 3.4.3.4 (Unmanned Aerial Vehicles (UAV)) of the proposed Technical Bulletin.

- **Requirements for 2D Modelling** – As written, the proposed Technical Bulletin lacks information related to mapping requirements for 2D modelling. There has been a proliferation of 2D modelling across the Province given the advantages over 1D models for complex flow areas, including spill areas. Additional details and direction on how flood elevation data should be displayed on a flood plain map where flood lines are derived through 2D modeling exercises is necessary.
- **Application** - It is recommended that the Province clarify the intent and application of the Technical Bulletin for different forms of flood mapping (e.g., pluvial (urban) flood mapping vs riverine flood plain mapping). It is recommended that the document clarify that the data requirements and mapping specifications have been developed to support riverine flood plain mapping, as modelling and mapping of pluvial flooding would require consideration of various other datasets related to defining the urban drainage network, which is beyond the scope of this document.

In addition to these general comments, Attachment 1 provides detailed comments on the individual sections of the proposed Technical Guide.

Once again, thank you for the opportunity to provide comments on “Technical Bulletin - Flooding Hazards: Data Survey and Mapping Specifications” (ERO #019-4706). Conservation Ontario appreciates collaborating with the Province, Municipalities and the Federal government through the multi-partner flood mapping technical team. Both Conservation Ontario and Conservation Authorities would appreciate the opportunity to continue working with the MNRF through this multi-staged approach to updating existing technical guidance. Please contact the undersigned should you have any questions regarding these comments.

Sincerely,

*Rick Wilson*

Rick Wilson  
Data and Analytics Manager

c.c.: All CA CAOs/GMs

Attachment 1: Conservation Ontario’s Detailed Feedback on the proposed Technical Bulletin – Flooding Hazards: Data Survey and Mapping Specifications

Technical Bulletin Section / Subsection	Detailed Comments
(1) Introduction	<ul style="list-style-type: none"> <li>• <b>Section 1</b> – Text in paragraph 2 states that “additional information can be found in other available MNRF Natural Hazard Technical Bulletins”. It is recommended that the MNRF be more specific on what information is available and identify where to access these additional Technical Bulletins.</li> <li>• <b>Section 1.2</b> – It is recommended that language from paragraph 2 in this section be inserted into paragraph 1 to clarify that the proposed Technical Bulletin presents <i>“commonly accepted and recommended best practices”</i>. Consider amending paragraph 1 to read, “It is not intended to be a list of mandatory instructions or methodologies to be rigidly applied in all circumstances, <i>but commonly accepted and recommended best practices.</i>”</li> </ul> <p><b>Recommended Edits (Grammar, Terminology, Formatting, etc.)</b></p> <ul style="list-style-type: none"> <li>• Page 2 – Text should read “water resources” rather than “waters resources” in paragraph 1.</li> <li>• Page 3 – No acronym provided for MMAH (Ministry of Municipal Affairs) within the List of Acronyms;</li> <li>• Page 4 – Reference in the final paragraph is lost;</li> <li>• Page 5 – Within Figure 1.1: <ul style="list-style-type: none"> <li>○ Text should read “High Resolution DEM” rather than “Hi Resolution DEM”.</li> <li>○ Text should read “Initial Hydraulic Model” rather than “Initial Hydraulics Model”</li> <li>○ The proposed Technical Bulletin does not cover the approval process for flood plain mapping and use of mapping for regulation. It is therefore recommended the stage “Land Use Planning (and Regulation)” be removed.</li> </ul> </li> </ul>
(2) Flood Hazard Mapping Framework	<b>Recommended Edits (Grammar, Terminology, Formatting, etc.)</b>

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	<ul style="list-style-type: none"> <li>• Page 7 – Within paragraph 3, it is recommended that each of the five steps outlined in the first sentence be appropriately numbered to help clarify the numbering used later in the paragraph (e.g., Data Collection (Step 1), Data Processing (Step 2), etc.).</li> <li>• Page 8 – Within Figure 2-1: <ul style="list-style-type: none"> <li>○ To assist with clarity, and to distinguish key actions/processes from sub-tier processes, it is recommended that sub-tier processes be organized with the same symbols or with the same-coloured outline.</li> <li>○ It is recommended that “Building Footprints” be added to the list under “Project Deliverable Recommendations”.</li> </ul> </li> </ul>
<b>(3) Data Acquisition, Processing, Deliverables and Associated Recommendations</b>	
<b>(3.1) Scope</b>	No comments.
<b>(3.2) Georeferencing and Metadata</b>	<ul style="list-style-type: none"> <li>• <b>Section 3.2.1</b> – Text states that the current horizontal datum is NAD83 CSRS <b>Version 6</b> Epoch 2010.0, and that the Office of the Surveyor General is reviewing the appropriateness of NAD83 CSRS Ver. 7 Epoch 2010.0. However, Section 3.2.3 makes reference that the six-degree Universal Transverse Mercator (UTM) is projected from NAD83 CSRS, <b>Version 7</b> Epoch 2010.0. It is recommended that MNRF review these sections for consistency and clarity on which version is currently appropriate.</li> <li>• <b>Section 3.2.2</b> –The document states that datasets related to the CGVD28-78 vertical datum should be converted to the new CGVD2013 vertical datum. Clarification is requested on whether it is necessary for older Flood Hazard mapping that used the CGVD28-78 vertical datum to be converted to the CGVD2013 vertical datum.</li> </ul>
<b>(3.3) Data Quality and Accuracy Recommendations</b>	No comments.
<b>(3.4) Data Acquisition and</b>	<ul style="list-style-type: none"> <li>• <b>Section 3.4.1</b> - Professional judgement should be applied whether additional information is required for bathymetry. Bathymetry should be required where beaver dams are</li> </ul>

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<p><b>Collection Recommendations</b></p>	<p>present, flow depths are significant, or the watercourse is wide or cloudy. Small creeks may not require additional bathymetry if an adequate Digital Elevation Model (DEM) is available.</p> <ul style="list-style-type: none"> <li>• <b>Section 3.4.1.1</b> – Clarification on the representative location and the amount of surveyed cross sections is recommended. For example, details regarding whether surveyed sections need to extend the full extent of the flood plain when an adequate DEM is available would be useful. In many or most cases, the DEM can be better than survey in overbank areas. It is further noted that the guidance provided in this section is specific to 1D modelling. Coupled models (1D and 2D) have specific cross-section orientation and spacing requirements. It is recommended this section be revised to include cross section guidance for coupled models.</li> <li>• <b>Section 3.4.1.2</b> – The bulleted list outlines that all cross sections must include <i>“bank elevations to the channel bed and the deepest part of the stream must be measured”</i>. While this is certainly a best practice given the importance of representation for the stream channel, it may not be practical or feasible to survey the stream bed at every cross section.</li> </ul> <p><b>Recommended Edits (Grammar, Terminology, Formatting, etc.)</b></p> <ul style="list-style-type: none"> <li>• Page 30 – Insert a comma to separate section numbering at the end of the paragraph in section 3.4.3.4.</li> </ul>
<p><b>(3.5) Data Processing and Derivative Products</b></p>	<ul style="list-style-type: none"> <li>• <b>Section 3.5.1</b> - Hydraulic models such as HEC-RAS do not require flow paths through structures to be enforced.</li> <li>• <b>Section 3.5.1</b> - A hydroenforced DEM is not necessary for a hydraulic HEC-RAS model (e.g., flow paths through structures) and may cause problems when plotting flood lines and flood depths and is not necessary for 1D or 2D models. It is recommended that the modeler have discretion as to whether a bridge deck should be removed.</li> </ul>

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	<ul style="list-style-type: none"> <li>• <b>Section 3.5.4</b> - Clarification is appreciated as to whether smoothed contours from a DEM are acceptable when stated in the map that the contour data is for reference only? Contours output from full resolution LiDAR can be a problem cartographically as there is more 'noise'. Using 'smoothing' on the source DEM can create a more cartographically pleasing product.</li> <li>• <b>Section 3.5.4</b> – The bulleted text appears to indicate that contours must be derived from a TIN. Where current LiDAR is readily available, it is recommended the bulletin include language permitting that contours be extracted from LiDAR DTM.</li> </ul>
<b>(3.6) Accuracy Assessment, Validation and Checking Recommendations</b>	No comments.
<b>(3.7) Accuracy Accounting, Quantification and Reporting Recommendations</b>	<ul style="list-style-type: none"> <li>• Text in the document appears to alternate between "Flooding hazard limit (line)," and "Flood hazard limit (line)". It is recommended that only one term be used.</li> </ul>
<b>(3.8) Project Deliverables, Metadata and Data Storage</b>	<ul style="list-style-type: none"> <li>• <b>Section 3.8.1</b> – Text in (b) notes that a digital stamp from the responsible surveyor on the completion of the survey portion must be included with the final product. Clarification is requested as to whether a digital seal/stamp from an Ontario Land Surveyor is required for elevation data acquired from aerial LiDAR where data checks and validations have been reported.</li> </ul>
<b>(4) Data Update Recommendations</b>	
<b>(4.1) Scope</b>	No comments.
<b>(4.2) Update Schedule</b>	<ul style="list-style-type: none"> <li>• Table 4-1 outlines recommended review and update schedules for mapping of 5-10 years in urban areas and 10-15 years in rural areas. These recommended schedules will require substantial and sustained funding for organizations such as Conservation Authorities to complete these updates.</li> </ul>

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	It is recommended that that Province consider providing resources to support this work to ensure mapping remains current, particularly in rapidly developing areas.
<b>(4.3) Update Process</b>	<ul style="list-style-type: none"> <li>Greater clarity is required on how to document revisions if only a small portion of an area in a previously mapped and stamped area is updated. For example, would revision text be added in the original map sheet documenting what has been done and who has completed update work? Alternatively, would a revision block circle be added outlining where revisions occurred on the map, coupled with text in a revision block documenting what has been done and who has completed update work? Recommended direction would be appreciated in this section.</li> </ul>
<b>(5) Mapping Products: Flood Hazard Map Dissemination and Sharing</b>	
<b>(5.1) Scope</b>	<ul style="list-style-type: none"> <li>As previously stated, additional guidance is necessary for flood plain maps generated using the 2D modelling approach. Generally, what is displayed on the map sheets should be consistent, however, clarification on matters such as how flood elevation data is to be displayed in an area where no cross sections exist would be useful.</li> </ul> <p><b>Recommended Edits (Grammar, Terminology, Formatting, etc.)</b></p> <ul style="list-style-type: none"> <li><b>Page 50</b> – Consider replacing “...communication products...” with “...public facing products or documents...”</li> </ul>
<b>(5.2) Digital Maps</b>	<ul style="list-style-type: none"> <li>Clarity is requested as to whether it is acceptable to have the engineer seal/stamp only on the original map document and not on the product which is consumed by the public/external agents (e.g., online/digital maps).</li> </ul>
<b>(5.3) Paper Maps</b>	No comments.
<b>(5.4) Web Mapping and other Online Formats</b>	<ul style="list-style-type: none"> <li>Guidance would be appreciated regarding content for web maps vs. digital and paper mapping products. For example is it acceptable for web maps to display a subset of the information that is shown on the official flood plain map (i.e., just the flood line and cross sections)?</li> </ul>
<b>(5.5) Map Content</b>	<ul style="list-style-type: none"> <li><b>Section 5.5.2</b> – As a point of clarification, the Ministry should consider adding text in this section to note that features to be shown on the maps such as communities, streets, parks,</li> </ul>



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	<p>etc. should conform to the names used by local administrative authorities/municipalities.</p> <ul style="list-style-type: none"> <li>• <b>Section 5.5.3</b> – Text in the bulleted list under (a) states that <i>“upstream and downstream study limits and mapping limits”</i> are map elements which should be included on flood hazard maps. Recommendations for study limits, such as the general guideline of extending flood plain mapping to a minimum of a 125ha drainage area, would be appreciated in the final guidance.</li> <li>• <b>Section 5.5.3</b> – Under (i) (<i>Title</i>) it is recommended that the content also include the project title and the watershed name.</li> <li>• <b>Section 5.5.4</b> – Text in the bulleted list under (a) states that all cross sections used in the hydraulic model <i>“will be shown with jurisdictional regulatory flood, water surface elevations in the label, as well as the 100-year flood (if the 100-year flood is not the regulatory flood)”</i>. Historically, the 100-year flood elevation has been included in the cross section “bubble” with the regional flood elevation. Clarification is requested that, per this proposed Bulletin, it will be the expectation that flood plain maps display two flood lines in areas where the 100-year flood is not the regulatory flood.</li> <li>• <b>Section 5.5.4</b> – Text in the bulleted list under (a) states that for all cross sections used in the hydraulic model reads <i>“All circular labels will be placed on one side of the map in ascending order”</i>. Achieving this is often difficult, time consuming and inefficient. Instead, it is recommended that this text be modified to read <i>“Care should be taken to place section labels in an organized way which provides all necessary information”</i>.</li> <li>• <b>Section 5.5.4</b> – The final sentence under item (e) appears to be out of place in relation to flood plain spills. It is recommended that the sentence starting with <i>“In maps showing contour data, spot elevations...”</i> form a new item (f) for this section.</li> </ul>

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<b>(6) Glossary of Terms</b>	<ul style="list-style-type: none"> <li>• Definitions for the following terms used within the proposed Technical Guide are requested:               <ul style="list-style-type: none"> <li>○ “Hydroenforcement” (appears in section 3.5.1);</li> <li>○ “Hydro-flattening” (appears in section 3.5.3); and,</li> <li>○ “Hydro-conditioning” (appears in section 3.8);=.</li> </ul> </li> </ul>
<b>(7) References</b>	No comments.
<b>APPENDIX 1</b>	<ul style="list-style-type: none"> <li>• Within Figure A1-1, it is recommended that the term “storm sewer” be removed and replaced with “sewer shed mapping”.</li> <li>• Using the term “storm sewers” implies these systems will be integrated into the hydrologic model which would require additional data input requirements and specifications from the Province. If it is the Province’s intent to include these systems into flood plain mapping studies there needs to be further direction on modelling requirements and policy direction.</li> <li>• To support previous comments related to requests for guidance for 2D modelling, it is recommended that a figure similar to A1-1 and A1-2 be developed specific to 2D modelling.</li> </ul> <p><b>Recommended Edits (Grammar, Terminology, Formatting, etc.)</b></p> <ul style="list-style-type: none"> <li>• Page 66 – Correct spelling errors in the title of Figure A1-1 (“hydrological” and “workflow”).</li> </ul>
<b>APPENDIX 2</b>	No comments.
<b>APPENDIX 3</b>	No comments.