

### Section I – Items for Board of Directors Action

**TO:** Chair and Members of the Board of Directors  
Friday, September 24, 2021 Meeting

**FROM:** Sameer Dhalla, Director, Development and Engineering Services

**RE:** **TRCA WETLAND WATER BALANCE MODELLING GUIDANCE DOCUMENT**

---

#### KEY ISSUE

Board approval of Toronto and Region Conservation Authority's (TRCA) Wetland Water Balance Modelling Guidance Document, a decision support tool developed to support the *Water Balance for Protection of Natural Features* of TRCA's Stormwater Management Criteria, and The Living City Policies for Planning and Development in the watersheds of TRCA.

#### RECOMMENDATION

**WHEREAS** wetlands play a crucial role as part of the “green infrastructure” of the Greater Toronto Area region by providing stormwater retention, flood attenuation, filtering of air and water pollutants, wildlife habitat and greenspace for communities to enjoy;

**AND WHEREAS** Toronto and Region Conservation Authority (TRCA) regulates wetlands and the interference with wetlands under Ontario Regulation 166/06;

**AND WHEREAS** TRCA staff review and assess submissions for development, infrastructure and site alteration affecting the hydrology of wetlands as part of planning, environmental assessment and permitting applications;

**AND WHEREAS** the development industry requested a technical guideline to provide guidance to proponents on how to model the hydrology of a wetland when impacts from a proposed development are anticipated to inform mitigation measures. The guidance document provides direction that helps to streamline the application review process by explicitly outlining the procedure for conducting a feature-based water balance modelling exercise for the protection of a wetland's hydrology;

**AND WHEREAS** in July of 2018, TRCA staff sought input into the development of the draft Modelling Guidance Document from partner municipalities, provincial agencies, the Building Industry and Land Development Association (BILD), consulting firms and neighbouring conservation authorities, and have now finalized the Modelling Guidance Document based on the input received;

**THEREFORE, LET IT BE RESOLVED THAT** the TRCA Wetland Water Balance Modelling Guidance be approved for use by proponents of development and infrastructure, consultants, and TRCA staff in the planning and development submission, review and approval process;

**AND FURTHER THAT** the Ministry of Northern Development, Mines, Natural Resources and Forestry, the Ministry of Transportation, the Ministry of Municipal Affairs, the Ministry of Environment, Conservation and Parks, the Ministry of the Environment and Climate Change, TRCA's member municipalities, Conservation Ontario and neighbouring conservation authorities be so advised.

### **BACKGROUND**

At Authority Meeting #7/12, held on September 28, 2012, Resolution #A173/12 was approved, endorsing the TRCA Stormwater Management Criteria document (hereafter referred to as the SWM Criteria document). In accordance with provincial guidance and TRCA's The Living City Policies, applications under TRCA review are required to meet TRCA's criteria for water quantity, water quality, erosion and water balance. For proposals that impact a wetland's hydrology that has been designated for protection through the planning process, a wetland water balance analysis must be undertaken by the proponent. The water balance analysis helps to ensure the protection of wetlands and their ecological functions following development, and to increase the resilience of wetlands to other stressors, such as climate change. Wetland water balance analysis may also reduce municipal risks and liabilities associated with flooding of private property and municipal infrastructure, which are issues that may arise when wetland water balance is not properly considered. A water balance will not generally be required for linear infrastructure, such as roads and railways, where TRCA's regular permitting process would generally be sufficient to address potential impacts to natural features and associated mitigation options.

To help achieve the wetland water balance objectives, TRCA developed a series of technical guidance tools including TRCA's Wetland Water Balance Monitoring Protocol. The protocol was endorsed by Resolution #A143/16 at Authority Meeting #6/16, held on July 22, 2016, TRCA's Wetland Water Balance Risk Evaluation that was endorsed by Resolution #A210/17 at Authority Meeting #9/17, held on November 17, 2017, and TRCA's Wetland Water Balance Modelling Guidance Document (hereafter the Modelling Guidance Document) have been updated as presented in the attached documents.

### **Wetland Water Balance Modelling Guidance**

The Modelling Guidance Document is a technical guideline that was requested by the development industry to outline the approach and procedure for conducting a feature-based water balance modelling exercise for the protection of wetland hydrology, as outlined in the Stormwater Management Criteria Document (SWM Document; TRCA, 2012). The purpose of the modelling exercise is to inform the need for, and the design of, mitigation measures to ensure a minimal difference between the post-development and pre-development water balance of a wetland. This Modelling Guidance Document provides an overview of wetland hydrology modelling, the strengths and weaknesses of various hydrological models, and the information that needs to be included in a feature-based water balance analysis report.

The Modelling Guidance Document is accompanied by a companion document, entitled Wetland Water Balance Modelling Case Studies (hereafter the Modelling Case Studies), that outlines set-up, calibration, and validation of wetland water balance models within five commonly used continuous hydrology models (HEC-HMS, HSPF, SWMM, MIKE-SHE, and VO5). This collection of modelling case studies is not intended to be a definitive guide to application of these models, but rather illustrates potential approaches within each model, and the advantages or drawbacks to application of the models to specific scenarios. The Modelling Guidance Document is intended to be a living document that TRCA staff will update periodically as new information and/or modelling approaches become available.

The Modelling Guidance Document benefits proponents by:

- Providing an overview of wetland hydrology modelling including the strengths and weaknesses of various hydrological models
- Clarifying the information that needs to be included in a feature-based water balance analysis report along with recommended report template and main section headings

## Item 7.1

- Providing consistency and transparency in decision-making along with a statistical tool that allows selection of acceptable mitigation measures;
- Efficiently using information as it largely requires the use of data and modeling approaches that is already being used as part of the planning process;
- Simplifying the review process by providing step-by-step guidance on risk determination.

### RATIONALE

Conservation authorities (CAs) regulate wetlands under section 28 of the *Conservation Authorities Act* due to their importance for the hydrology and the ecology of watersheds. CAs also advocate for the protection of wetlands in their commenting roles under the planning and environmental assessment review processes. Protection of wetlands and their associated hydrological and ecological services is a key objective under provincial policy including the Provincial Policy Statement, the Oak Ridges Moraine Conservation Plan and the Greenbelt Plan.

The protection of wetlands on the landscape helps to fulfill TRCA's key objectives, and those of the Province and municipalities, for watershed resilience to climate change and land use change. Wetlands cover less than five percent of TRCA's jurisdiction yet provide a disproportionately large number of ecosystem services, including water storage, reduction of downstream flooding and erosion, provision of baseflow in streams, and provision of habitat for plants and animals (some of which only occur in wetlands).

The water balance of a wetland is an accounting of the various pathways by which water enters or leaves a wetland, such as rainfall, overland runoff or groundwater seepage. Land use change within the surface water catchment of a wetland may alter the water balance by changing the ratio of surface runoff (water output) to infiltration (water input) within the catchment, the proportion of water lost to evapotranspiration, or the area draining to a wetland through grading and stormwater management activities. Many of the ecosystem services provided by wetlands are dependent on the water balance and altering the water balance can result in loss of ecosystem services.

TRCA has documented several instances in which insufficient consideration of water balance for natural features has resulted in loss of ecosystem services and created nuisance flooding and erosion issues on private lots and back-up of water into municipal stormwater infrastructure. These are issues that are difficult and expensive to mitigate after development has occurred and/or infrastructure has been installed. Proactive mitigation during the planning phase is much more cost-effective but requires that the need for a water balance analysis be identified as early as possible in the planning and development process so that proponents and reviewers can scope the analysis into the application.

The determination of which wetlands will be protected on the landscape is external to any application of this Modelling Guidance Document and will be made as part of a planning or infrastructure review and approval process. The Wetland Water Balance Risk Evaluation (Risk Evaluation; TRCA, 2017) should be completed in advance of any application of this Modeling Document to determine the appropriate scope of analysis and type of model to be used. The Risk Evaluation identifies if a water balance analysis is necessary and, if so, the scope of study (monitoring and modeling) that is appropriate given the features of the application in question. If modelling is determined to be in scope, the Modeling Document and its companion document, the Modelling Case Studies, provides further guidance on suitable approaches and methods in modelling wetland hydrology, the strengths and weaknesses of commonly utilized continuous hydrology models, and the critical information that needs to be included in a feature-based water balance analysis report to identify the need for, and the design of, mitigation measures to

## Item 7.1

ensure a minimal difference between the post-development and pre-development water balance of a wetland.

### **Stakeholder Consultation**

TRCA staff established an External Stakeholder Committee (ESC) with representatives from municipalities, BILD, the consulting industry, Credit Valley Conservation, and other conservation authorities to collaborate on the development of the Modelling Guidance Document. The Modelling Guidance concept and intent to develop the guidance was presented to BILD in September 2016, then the draft document was presented to the ESC in February 2018. Then, drafts of the document were circulated twice for comment (summer 2018 and fall 2019) and revised based on feedback from internal staff, the ESC, and more broadly from external partners, which included all TRCA's partner municipalities, BILD, the consulting industry, relevant provincial agencies, and neighbouring conservation authorities.

External commentators were generally supportive of the intent, structure, and content of the draft version, and some had seen the draft previously through its use by TRCA Engineering staff; preliminary reports from staff are that the draft is helpful as a tool for consultants and staff in scoping water balance modelling exercises.

Furthermore, the Ministry of Northern Development, Mines, Natural Resources and Forestry recently released "Wetland Conservation Strategy for Ontario (2017-2030)" outlines the Province of Ontario's objective of ensuring no net loss of wetlands in southern Ontario by 2025, while the Ontario Flooding Strategy (2020) cites the development of policy tools and approaches to prevent new wetland loss. The Modelling Guidance Document can help achieve the above objectives.

### **Relationship to Building the Living City, the TRCA 2013-2022 Strategic Plan**

This report supports the following strategies set forth in the TRCA 2013-2022 Strategic Plan:

**Strategy 2 – Manage our regional water resources for current and future generations**

**Strategy 4 – Create complete communities that integrate nature and the built environment**

**Strategy 9 – Measure performance**

### **FINANCIAL DETAILS**

The development of the Modelling Guidance Document was supported by capital funding from the regional municipalities of York and Peel. TRCA staff secured external funding in the form of grants from the Great Lakes Protection Initiative (formerly the Great Lakes Sustainability Fund) and the Toronto and Region Remedial Action Plan. These grants, together with funding from the regions of York and Peel, also support continued wetland water balance monitoring in the jurisdiction being led by TRCA and Credit Valley Conservation.

### **DETAILS OF WORK TO BE DONE**

The Modelling Guidance Document will be implemented through the Development and Engineering Services division in review of Planning Act applications, environmental assessments and master planning, and through TRCA's permitting process. TRCA planners, engineers, ecologists and hydrogeologists reviewing applications will continue to work with development proponents and consultants to streamline the review process while striving for the best possible outcome for environmental and growth management objectives. TRCA's Planning and Development Procedural Manual, Environmental Impact Study Guidelines, and Stormwater Management Criteria document will all be updated to reference the Modelling Guidance Document.

## Item 7.1

The Modelling Guidance Document will be posted on TRCA's website and will be reviewed biennially in conjunction with the Wetland Water Balance Monitoring document and Wetland Water Balance Risk Evaluation to reflect new science and understanding, and any minor updates to the SWM Criteria document. TRCA will communicate the approval of the Modelling Guidance Document to our municipal and conservation authority partners as well as other stakeholders.

**Report prepared by:**

**Namrata Shrestha, Senior Manager, Watershed Planning and Reporting, ext. 5782;**

**Dilnesaw Chekol, Senior Engineer, Water Resources Engineering Services, ext. 5746**

**Emails: [namrata.shrestha@trca.ca](mailto:namrata.shrestha@trca.ca); [dilnesaw.chekol@trca.ca](mailto:dilnesaw.chekol@trca.ca)**

**For Information contact: Dilnesaw Chekol, ext. 5746**

**Emails: [dilnesaw.chekol@trca.ca](mailto:dilnesaw.chekol@trca.ca)**

**Date: August 11, 2021**

**Attachments: 2**

Attachment 1: Wetland Water Balance Modelling Guidance Document

Attachment 2: Wetland Water Balance Modelling Case Studies