

Ausable Bayfield Conservation Authority  
ABCA Watershed Hydrology Model Update:  
HEC-HMS Based Flood Forecasting Model  
Development for the Ausable River

Request for Proposals

Issue date: Wednesday, October 30th, 2024

Closing date and Closing Time: Wednesday, November 13th, 2024 at noon local time

ABCA Contact:

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Water Resources Engineer

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## 1.0 Preamble

This request for proposals (RFP), as cancelled, amended or clarified from time to time, is a request for proposals for an update to the ABCA Watershed Hydrology Model.

### 1.1 Background

The ABCA has set aside funding to update the existing DOS-based GASWER model to a more stable and modern software package. Based on a review of the options, and state of the art, staff have selected the US Army Corps of Engineers HEC-HMS model as it is open source and expected to be updated and maintained for the foreseeable future.

The funding for this update has been divided into two phases, to take place in each of the ABCA's next fiscal years. The division is as follows:

Phase 1: Ausable River Basin, Parkhill Creek and Mud Creek

Phase 2: Bayfield River Basin and Lake Huron Gullies

See attached subwatershed map in Appendix A for these areas.

The ABCA is requesting proposals from qualified consultants to assist ABCA staff with the development of a flood forecasting model, and staff training. The following sections outline the elements requested for Phase 1 of this project.

## 2.0 Model Development

The proponent will develop a hydrologic basin model for the Ausable River using the US Army Corps of Engineers HEC-HMS model. The model will follow the same setup as the Conservation Authority's GASWER model. A successful proposal will outline how the proponent proposes to change the Hydraulic Response Units (HRU) of the GASWER model into the basins used by HMS models. The proponent will be responsible for delineating and modeling the following for the Ausable River within the HEC-HMS modelling environment:

- i) subbasins,
- ii) reaches,
- iii) junctions, and
- iv) reservoirs.

Attached as Appendix A to this application is a map of the Flood Damage Centres within the ABCA watershed. It is expected that there be junctions in the model at every Flood Damage Centre.

Also, the proponent will be responsible for coordinating with ABCA Staff's input on selecting the necessary processes for the HEC-HMS model:

- v) canopy storage,
- vi) surface storage,
- vii) loss method,
- viii) hydrograph transformation,
- ix) baseflow routing,
- x) snowmelt,
- xi) reservoir routing, and
- xii) channel routing for the HEC-HMS model.

Furthermore, the proponent will be responsible for selecting and deriving parameters for each modeling process. In their proposal, the proponent will describe their modeling methodology, their selection and justification of model processes, and their method for selecting and deriving model parameters. Attached as Appendix B to this RFP is a map with the recorded parameters, and a table with the period of record for each parameter. All precipitation gauges are tipping buckets except a weighing gauge located at the Parkhill Climate Station (RAC) on McGuffin Hills Dr.

## 2.1 Model Testing and Evaluation

The proponent will be responsible for calibration and validation of the HEC-HMS model for the Ausable Bayfield Conservation Authority watersheds. In their proposal, the proponent will describe the methodology they will use to test and evaluate the HEC-HMS model. This should include, at a minimum the use of graphical plots, statistical tests, sensitivity analyses, and uncertainty analyses. In their proposal, the proponent must justify their methodology including their selection of graphical plots and statistical tests for evaluating the basin model. In addition to recorded stream-flow data, the proponent should expect to compare results to the existing GAWSER model. The HEC-HMS model should perform the same, or better in terms of hydrograph volume, hydrograph peak, and hydrograph timing. At least one calibration and one validation event should be done for the following:

- i) mid-winter rain-on-snow event
- ii) typical spring melt
- iii) June convective storm event

Events used will be selected with input from ABCA Staff.

## 2.2 Model Simulation

The proponent will be responsible for undertaking both continuous and event simulations using the HEC-HMS model for the Ausable River to determine the 2-through 500-year flood flows, and the Hurricane Hazel event at flood damage centres and all model junctions along the Ausable River. In their proposal, the proponent will describe their methodology for estimating flood frequency flows at damage centres along the Ausable River.

Phases 1 and 2, as described previously in Section 1.1, would be scheduled to occur in the following fiscal years:

Phase 1: Ausable River Basin, Parkhill Creek and Mud Creek in 2024(Q4) and 2025 (Q1 and Q2).

Phase 2: Bayfield River Basin and Lake Huron Gullies in 2025 (Q3 and Q4) and 2026 (Q1).

### 2.3 Model Setup for Operational Flood Forecasting

The proponent will be responsible for setting up the hydrology basin model of the Ausable River into a Flood Forecasting Model including ensemble forecasting. In their proposal, the proponent is to describe how they plan to convert the hydrology basin model for the Ausable River into a flood forecasting model. The flood forecasting model is to be used for single-event forecasting and ensemble forecasting. Timeseries inputs are to come from WISKI and must allow a method for editing/overwriting suspect recorded data. This should include a tool for meshing recorded and forecast data. A method for the user to easily enter a variety of storms at a minimum of 1-hour intervals should be developed. The successful model will include a tool for meshing recorded and forecast data within the model. Total runtime by a trained user to model a flood event must be less than 45 minutes.

### 2.4 Training Course for Authority Staff

The proponent will be responsible for developing a multi-phase training course for Conservation Authority Staff on the operational use of the flood forecasting model. The training course in each phase should be a minimum of one day held either virtually or in person, with a separate follow-up Q&A session held virtually on MS Teams or Zoom approximately two weeks after the initial training. As part of the training course, the proponent will be responsible for developing a manual with tutorial examples on operational flood forecasting including ensemble forecasting.

### 2.5 Retainer Period

To support the ABCA's transition from the existing "GAWSER" based model, the successful proponent will enter into an agreement for a two year retainer period following Phase 2 of this project. This retainer is to provide technical support and supplemental calibration. This retainer should be budgeted separately from the initial project.

## 3.0 Proposal Requirements

Proposals should be submitted to,

Ausable Bayfield Conservation Authority  
c/o Davin Heinbuck, General Manager,  
RR #3, 71108 Morrison Line  
Exeter, ON NOM 1S6  
or via email to [dheinbuck@abca.ca](mailto:dheinbuck@abca.ca)

Email subject line must include "ABCA Hydrology Model Proposal." File formats accepted are PDF and docx.

The deadline to submit a proposal is Wednesday, November 13<sup>th</sup>, 2024 by no later than noon, (12 p.m.), local time. One PDF copy by email is required by the deadline. Additional hard copies may be accepted up to 72 hours after the proposal deadline.

The ABCA may accept a proposal, in whole or in part, whether the submitted price is the lowest or not, and may reject any or all proposals. There will be no requirement of the RFP, implied or otherwise, that the proposal representing the lowest submitted price, or any proposal, would be selected or preferred. The RFP process is used as a means of evaluating a number of criteria (one of which is submitted price) That are not necessarily equally weighted, including, but not limited to:

- experience of the Modeller converting GAWSER based models to HMS, and experience with HMS models
- experience of the Modeller developed real-time flood forecasting tools with HEC-HMS
- proposed approach to convert GAWSER model to HMS
- proposed approach to incorporate feedback from ABCA staff throughout the process
- proposed approach to clean existing time-series data before using for calibration and validation
- proposed approach to undertake calibration and validation
- proposed approach to operationalize HMS model for real-time flood forecasting, including methodology and tools to mesh recorded and forecast data
- proposed approach to winter modelling of snowmelt runoff based on current types of rain gauges owned and operated by ABCA

In the event that a favourable proposal does not exactly meet with the ABCA's requirements, ABCA reserves the right to enter into negotiations with Proponents to arrive at a mutually satisfactory arrangement with respect to any modifications to the proposal.

This RFP is not a tender and does not commit the ABCA in any way to select a Preferred Proponent, or to proceed to negotiations for a Contract, or to award any Contract, and the ABCA reserves the complete right to at any time reject all Proposals, and to terminate this RFP process for any reason without liability.

Questions regarding submission requirements, scope of work and the content of this request for proposals should be directed to:

Daniel King P.Eng., MEPP  
Water Resources Engineer  
Ausable Bayfield Conservation Authority  
RR #3, 71108 Morrison Line  
Exeter, ON N0M 1S6 Phone: 519-235-2610  
or via email to [dking@abca.ca](mailto:dking@abca.ca)


## 4.0 Agreement

The successful consultant will be expected to enter into an agreement with the ABCA for the provision of services as outlined in this Request for Proposals and the consultant's proposal. The agreement may utilize the consultant's estimate as the upset limit for this project.

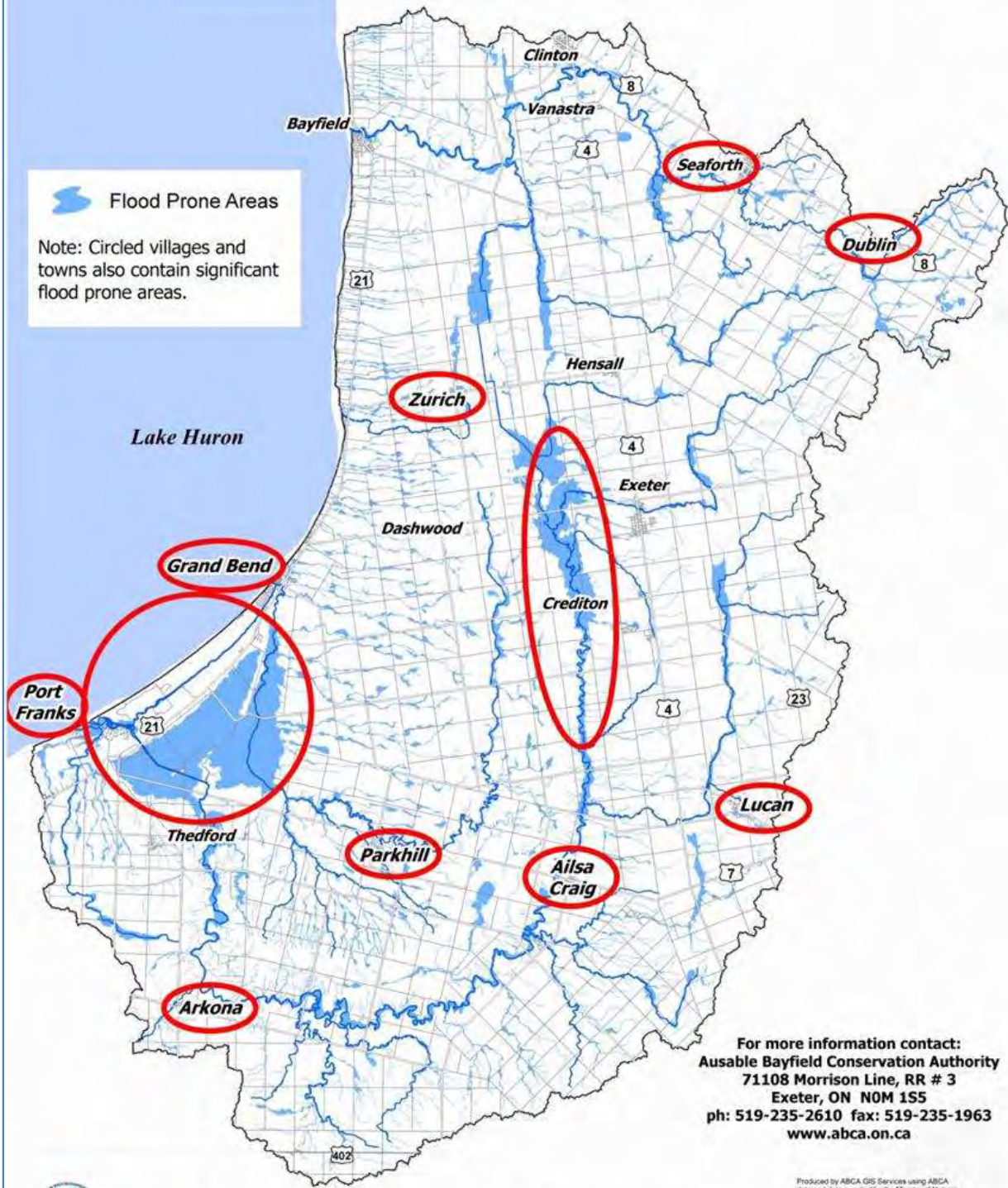
# Appendix A – Watershed Maps

# Ausable Bayfield Conservation Authority Significant Flood Prone Areas



 Flood Prone Areas

Note: Circled villages and towns also contain significant flood prone areas.



For more information contact:  
**Ausable Bayfield Conservation Authority**  
 71108 Morrison Line, RR # 3  
 Exeter, ON N0M 1S5  
 ph: 519-235-2610 fax: 519-235-1963  
[www.abca.on.ca](http://www.abca.on.ca)

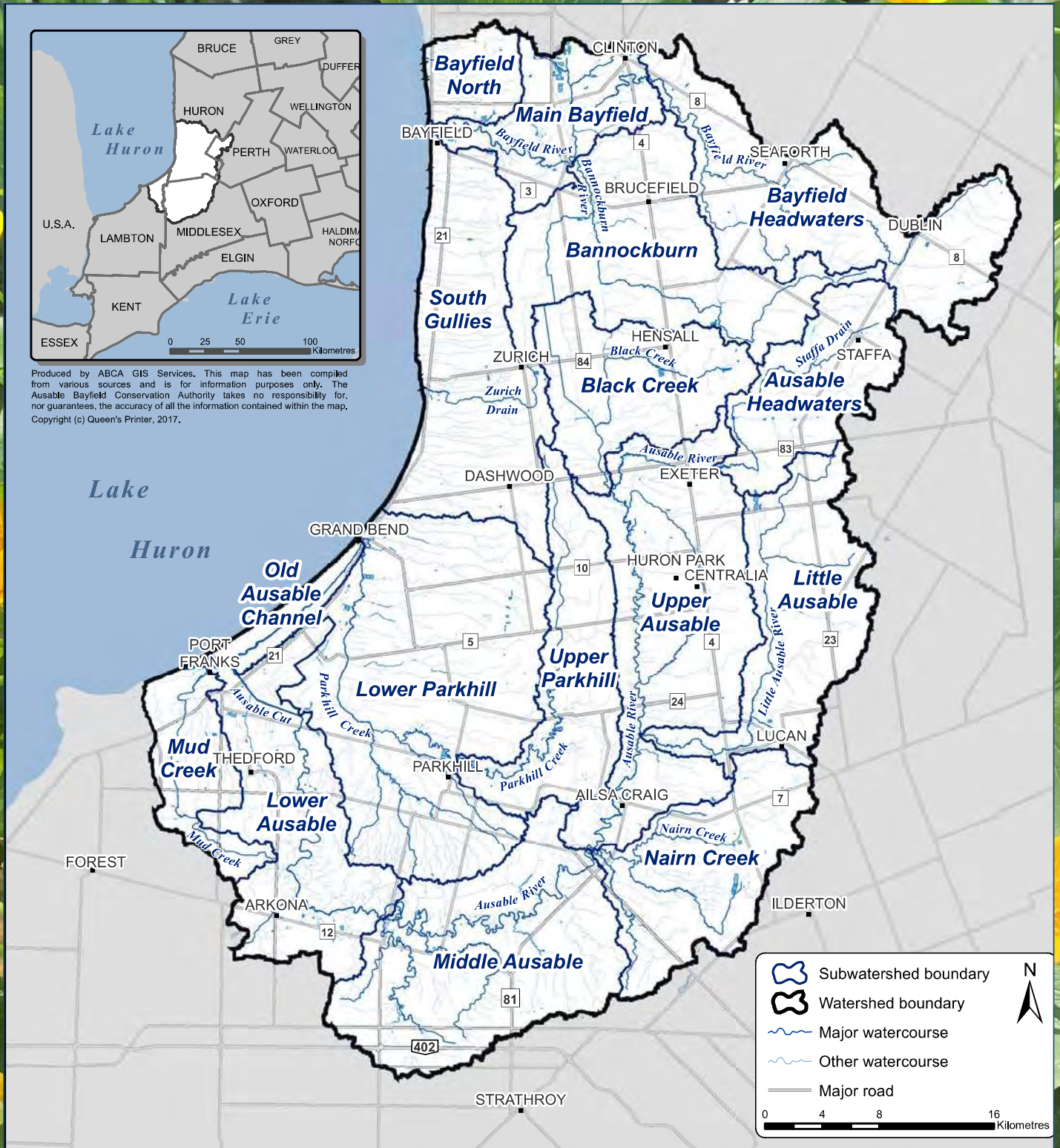


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# Appendix B – Watershed Stations and period of record

**Appendix B**

Stations and Period of Record (to date)

	<b>Flow (Q)</b>	<b>Water Level (HG)</b>	<b>Precipitation (PP)</b>	<b>Air Temperature (TA)</b>	<b>EC-Code</b>	<b>911 Address</b>
<b>Springbank</b>	1986-03-06	1986-03-06	1986-03-12	2000-01-01	02FF002	31060 Springbank Road
<b>Exeter</b>	1986-03-06	1986-03-06	1986-03-12	2016-07-31	02FF009	71247 Airport Line
<b>Varna</b>	1989-04-06	1989-04-06	1989-04-06	2000-11-01	02FF007	76453 Parr Line
<b>Parkhill Inlet</b>	1989-03-23	1989-03-23	1989-03-23	2010-10-22	02FF008	3003 McGuffin Hills Road
<b>Parkhill Dam</b>	1992-12-24	1992-12-24			02FC003	33060 Grand Bend Road
<b>Ausable Cut</b>		1997-01-27	1997-01-27		02FF010	8659 Bog Line
<b>Port Franks</b>		1992-02-24			02FC002	7574 Biddulph Street
<b>Black Creek</b>	2005-12-16	2005-12-16	2005-12-16	2005-12-16	02FF014	72431 London Road
<b>Seaforth</b>	2002-09-12	2002-09-12	2002-09-12	2010-01-01	02FF011	44 Birch Street
<b>South Parkhill</b>	2000-01-01	2000-01-01		2016-08-31	02FF004	1456 Elliot Drive
<b>Mitchell</b>	2016-09-04	2016-09-04	2000-01-01	2016-09-07	02GD014	
<b>Little Ausable</b>	2005-11-24	2005-11-24	2005-11-24	2005-11-24	02FF013	33957 Denfield Road
<b>Tricks Creek</b>	2005-11-24	2005-11-24	2014-08-01	2005-11-24	02FF015	37688 Bayfield Road
<b>Gully Creek</b>		2011-04-15	2013-01-11		02FFC11	Porters Hill Line
<b>Parkhill Climate Station (RAC)</b>			2012-06-26	2012-06-26	02FFC10	McGuffin Hills Dr