

Waterlines Flume - News from DNR Division of Water

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Thank you for subscribing to the Indiana DNR Division of Water's (DOW) monthly newsletter for engineers – *Flume*, and your interest in the division's mission to protect, enhance, preserve, and wisely use water resources for the benefit of Indiana's citizens through professional leadership, management, and education.

Modeling Guidance for Division of Water Permit Applications

The Division of Water has detailed guidelines for hydraulic modeling submissions on our [website](#). We want to ensure you have the information needed to develop acceptable models for permit applications.

Modeling Software and Approach

In general, you should use Hydraulic Engineering Center-Riverine Analysis System (HEC-RAS) software to create a steady flow, subcritical, One-Dimensional (1D) model. Other modeling software and methods may be accepted in rare cases, but you should discuss these with our engineering staff prior to submittal.

Discharge Determinations

Determine the appropriate discharge according to our September Flume newsletter guidance on discharge determinations. If the stream is a coordinated reach, you must use the Coordinated Discharge. Alternatively, you may submit your own hydrologic study for review, use a discharge from a previous permit, or request a discharge determination through this [online tool](#).

Required HEC-RAS Plans

Each modeling submittal should contain these four HEC-RAS plans:

1. Duplicate Effective - The effective model downloaded from our [Hydraulic Model Library](#) and rerun on your machine.
2. Corrective Effective - The Duplicate Effective model updated with any newer survey and LiDAR data. You may add new cross sections or redraw existing ones to better reflect prior projects and the proposed work.
3. Existing - The Corrective Effective model updated to reflect any changes since that model was developed.
4. Proposed - The Existing model with your proposed project added.

Cross sections should be identical between the Corrective Effective, Existing, and Proposed models.

Accounting for Prior Projects

Use our Hydraulic Model Library to identify and incorporate any relevant prior project models into your Existing conditions. For recently approved or active permits, contact us directly. Our Division of Water Online Research Center ([DoWORC](#)) can also help identify previous permits in the area.

Submittal Requirements:

- Project/Modeling Narrative: This will describe the source of the information used to develop the model and how it was developed. It should describe any changes made between the four submitted plans.
- Electronic HEC-RAS model files for the four required plans
- Cross Section Location Map: Full extent of each cross section should be shown with labels.
- Hydraulic Modeling Checklist (State Form – 52882)
- cHECK-RAS Report with notes and/or comments on the messages ([gov/flood-maps/tutorials/check-ras](#))
- Construction Plans/Survey Data
- Project Evaluation Table comparing water surface elevations (WSEL) across the four plans, with additional columns showing the difference in WSEL between them. Example shown below.

**PROJECT EVALUATION TABLE
HYDRAULIC MODELING RESULTS**

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
LOCATION DESCRIPTION		PUBLISHED OR EFFECTIVE DATA (Ft., NGVD) (Based on FBI Table or Profile)	MODELING RESULTS				COMPARISONS			NOTES
Model Cross Section Station	Location Description		Duplicate Effective Model (Ft., NGVD)	Corrected Effective Model (Ft., NGVD)	Existing- Conditions Model (Ft., NGVD)	Proposed- Conditions Model (Ft., NGVD)	Cumulative Impacts w/o Project (ft)	Cumulative Impacts with Project (ft)	Project Impacts (ft)	
				(model name)	(model name)	(model name)	(8) - (5)	(7) - (5)	(7) - (6)	
	D/S end of study reach						+	+	+	
							+	+	+	
							+	+	+	
							+	+	+	
							+	+	+	
	property limit						+	+	+	
							+	+	+	
							+	+	+	
	example bridge						+	+	+	
							+	+	+	
							+	+	+	
							+	+	+	
							+	+	+	
	property limit						+	+	+	
							+	+	+	
							+	+	+	
							+	+	+	
							+	+	+	
							+	+	+	
							+	+	+	
							+	+	+	
	U/S end of study reach						+	+	+	

NOTES:
 * Project increases water surface 0.14-ft above Corrected Effective Model; project may be permissible only if there is zero rise over the Existing Condition Model.
 X Project increases water surface 0.14-ft above Corrected Effective Model AND does not have zero rise over the Existing Condition Model; project is not permissible.

We won't initiate a review if the narrative, checklist, or evaluation table are missing.

Common Issues to Avoid

- Critical depth results, indicating the model failed to solve the steady flow equation or there has been a hydraulic jump (an invalid subcritical solution). More information can be found [here](#).
- Failure to properly account for prior projects
- Inconsistencies between the four model plans (cross sections, flow rates, boundary conditions, Manning's n)

Please refer to the website for additional technical guidance. Don't hesitate to email our team at water_inquiry@dnr.IN.gov if you have any questions as you develop your models.

FEMA No-rise Resources:

You can view a recording of the August webinar *FEMA No-rise Requirements*, hosted by ACEC Indiana [here](#).

DNR Engineering Services Center manager Adam Bales will discuss Construction in a Floodway permits and FEMA No-rise requirements at the Civil Engineering Professional Development Seminar at Purdue University on Nov. 21. View more information about the event on the [Local Technical Assistance Program \(LTAP\) website](#).

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