

CHAPTER 2.5

Non-modeling Assessment Approaches Used by the IDNR

2.5 Overview

Construction projects located in a floodway can result in varying degrees of loss in the effective cross sectional flow area at a project site. For many projects that result in a negligible cumulative loss of the effective cross sectional flow area, the Division of Water has developed non-modeling hydraulic assessment worksheets that document and compute the effect the project will have on the effective cross sectional flow area without requiring extensive hydrologic and hydraulic computer modeling for the permit application.

Based on specific project types, the four non-modeling hydraulic assessment worksheets provide a listing of the plan details and computations that are needed to meet the minimum requirements for a Construction in a Floodway permit application review. The worksheets are listed below with a brief description of the projects to which they may apply.

- No Change in Effective Cross Sectional Flow Area: to assess projects that will result in no discernable loss of the effective cross sectional flow area.
- Change in Effective Cross Sectional Flow Area: to assess most projects with a negligible loss to the effective cross sectional flow area that can be shown to produce a minimal surcharge without modeling.
 - a) Companion Worksheet A: a comparison of existing and proposed conditions at the most restrictive segment of the project reach.
- Ineffective Area of the Contraction or Expansion Reach of a Stream Crossing: to assess projects that are located entirely within the ineffective area of the contraction or expansion reach of a bridge structure which is not overtopped and has no road overflow during the base flood event.
- Bridge Replacement in Kind and associated Companion worksheets: to assess bridge replacements which meet the criteria for the waterway opening and bridge low chord.
 - a) Bridge Replacement-in-Kind Companion Worksheet B, or
 - b) INDOT Bridge Replacement in Kind Assessment Worksheet ()

These worksheets serve to communicate the framework used to evaluate a project's cumulative impacts to the effective cross sectional flow area and to fish, wildlife, and botanical resources in the floodway. These worksheets are meant to relay the information needed to evaluate the vast majority of projects but cannot describe the information needed for all scenarios and all potential projects. The

purpose of the worksheet is to balance the need for transparency of the evaluation methods and information needed for a particular project; the preparer's discernment is still needed when preparing an application and supporting documents for review to meet the statutory requirements.

Projects which may cause an increase to the base flood elevation of more than 0.14', such as new bridges, bridge replacement-in-kind with a change in flow regime, fill, levees, dams, and new developments, are not eligible for a non-modeling assessment approach.

Floodway Habitat Mitigation is based on the floodway delineation. For sources of delineated floodways, refer to the INdiana Floodplain Information Portal or FEMA Map Service Center.

Non-Modeling Hydraulic Assessment Worksheets, Companion Worksheets, Construction in a Floodway Assessment User Guide, Worksheet Examples, and training videos are available on the Division of Water webpage.

2.5.1 No Change in Effective Cross Sectional Flow Area

An assessment using the No Change in Effective Cross Sectional Flow Area Non-Modeling Worksheet is appropriate to use to assess projects that will result in no discernable loss of the effective cross sectional flow area. Project examples include bank stabilization, restoration projects, excavation, or fill of 6" or less when comparing pre-construction to post-construction conditions for such projects as a trail, parking lot, access drive, sidewalk, or scour countermeasures (below ground line).

The determination regarding the work being proposed above the top of bank is a requirement. This can be defined as where banks stations might be applied using Hec-RAS cross sections, or as shown in the example figure 2-2.

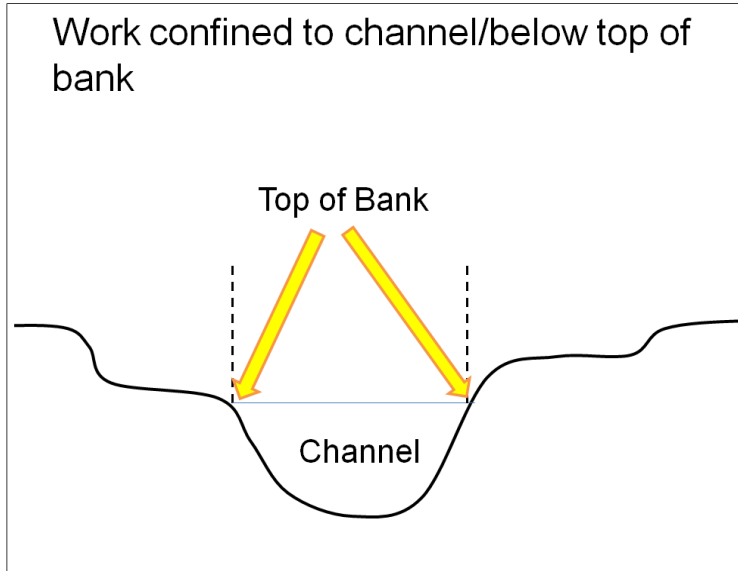


Figure 2-2

The worksheet requests the applicant determine *the most restrictive segment of the project reach*. When the post-construction cross sectional area condition is smaller than the pre-construction cross section area condition, the restriction to the cross sectional area at the site could result in an increase to the upstream or downstream base flood elevation. Therefore, cross sections upstream and downstream of the project location may be required to establish a “base” condition of comparison when no survey or plans are available, as is typically the case in restoration projects. See an example of an eroded stream bank in figure 2-3 and figure 2-4.

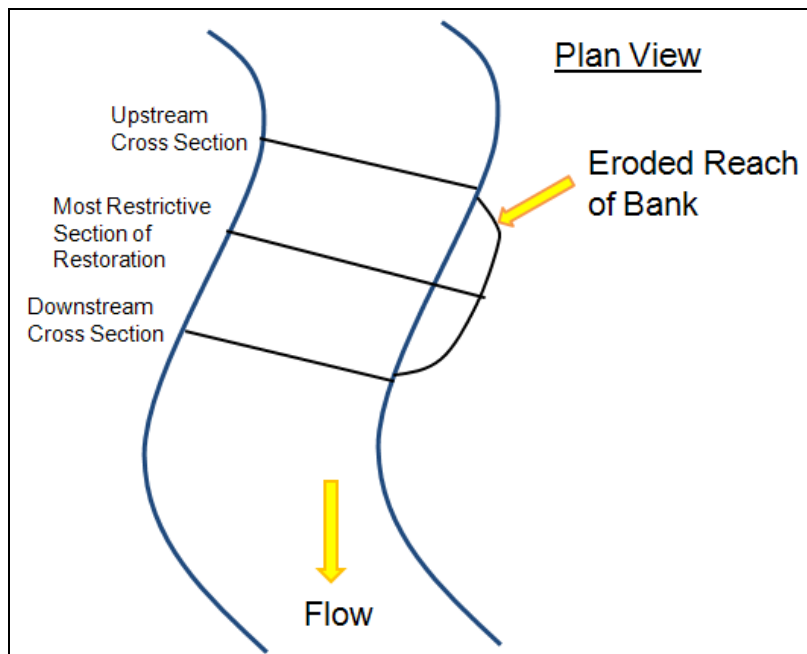


Figure 2-3

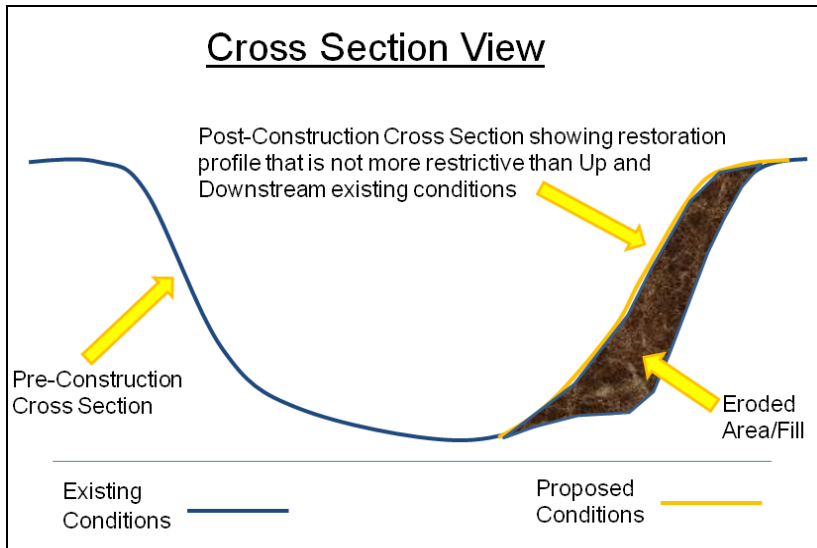


Figure 2-4

2.5.2 Change in Effective Cross Sectional Flow Area

An assessment using the Change in Effective Cross Sectional Flow Area Non-Modeling Worksheet is appropriate to use to assess most projects with a negligible loss to the effective cross sectional flow area that can be shown to produce a minimal surcharge. Typical projects include stream bank armoring, scour counter measures (below ground line), minor fill, berms, and projecting outfall structures.

It is not to be used for new and replacement-in-kind bridge projects, projects that are located within the ineffective area of the expansion or contraction zone of a bridge (see Ineffective Area of the Contraction or Expansion Reach of Stream Crossing Worksheet), a dam construction project or the reconstruction of a building.

Cumulative impacts are evaluated based on previously permitted construction in the floodway. It is therefore required that you check your project reach for previous permits in the DNR files. A previous project which resulted in significant surcharge in the reach may make the Worksheet approach inappropriate for your case. Figure 2-5 gives an example assessment of fill with previously permitted construction.

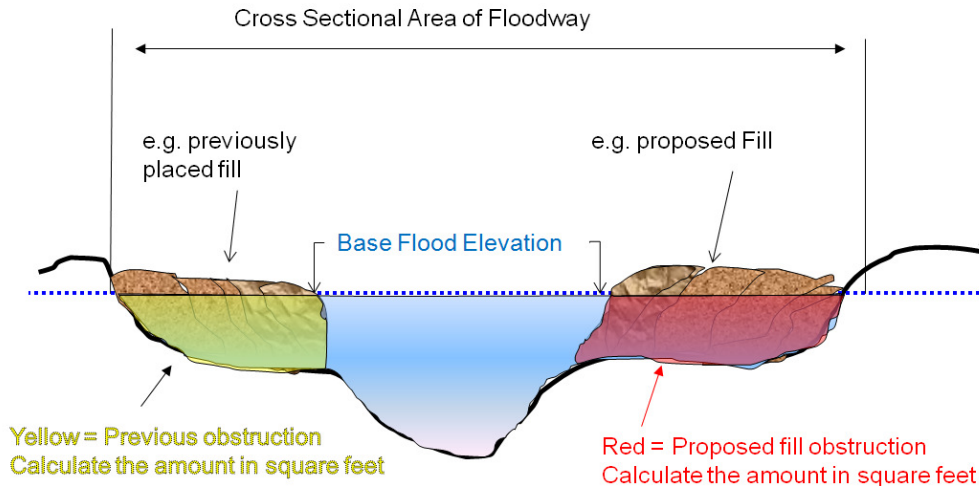


Figure 2-5

The *Base Flood Elevation* sources include a Flood Insurance Study or DNR files of previous studies to determine the BFE. If there is no existing flood zone or base flood elevation (BFE) information at the project site, the applicant may:

- a. perform the modeling themselves and submit to DNR for review. This flood elevation then may be referenced in the worksheet.
- b. develop modeling with the proposed project for the permit application.

Companion Worksheet A is a comparison of the post-construction cross sections with the most restrictive segment of the project reach. This is a similar computation as referenced in Section 2.5.1, see figures 2-3 and 2-4.

2.5.3 Ineffective Area of Contraction or Expansion Reach of a Crossing

An assessment using the Ineffective Area of the Contraction or Expansion Reach of a Stream Crossing Non-Modeling Worksheet is appropriate for a project that is located entirely within the ineffective area of the contraction or expansion reach of a bridge AND the base flood event is conveyed solely through the bridge opening (no road overflow). Project examples appropriate for this worksheet would include a pedestrian bridge, fill, a non-residential building, etc. (Constructing residential buildings or abodes in the floodway is prohibited in Indiana.)

This assessment requires all flow is conveyed through the bridge opening at the base flood elevation. If there is no existing flood zone or base flood elevation (BFE) information at the project site, the applicant may:

- a. perform the modeling themselves and submit to DNR for review. This flood elevation then may be referenced in the worksheet.

- b. develop modeling with the proposed project for the permit application.

A plan view of the site in relation to ineffective areas of expansion and contraction is also necessary. Figure 2-6 is an example plan view of a qualifying project site within the ineffective area of the expansion. The site box represents the entire footprint of the fill and/or structure.

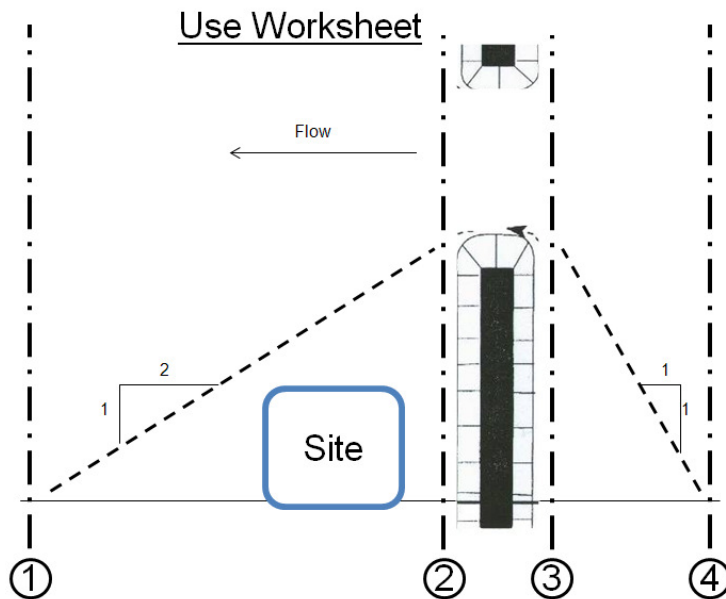


Figure 2-6

If a project is partially in the contraction or expansion reach, as shown in Figure 2-7, a non-modeling assessment approach cannot be used; computer modeling in accordance to the General Guidelines for the Hydrologic-Hydraulic Assessment of Floodplains in Indiana will be required with the permit application submittal.

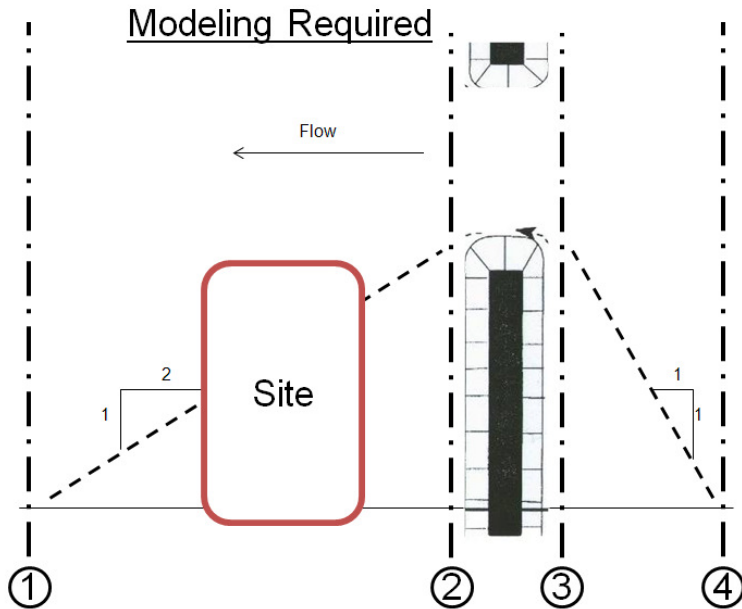


Figure 2-7

2.5.4 Bridge Replacement in Kind

An assessment using the Bridge Replacement-in-Kind Non-Modeling Worksheet is appropriate to use for a bridge replacement or bridge widening project for roadway, railroad, pedestrian, golf cart, or private access structures. This non-modeling approach may be applicable to assess a bridge replacement project where the modeling approach is not changing to a less efficient flow (the bridge modeling approach changing from Energy method to Pressure and/or Weir) for:

- a bridge or culvert structure that is being replaced with a bridge structure of equal or greater flow area, or
- a culvert structure that is being replaced with a culvert structure if:
 - the length of the proposed culvert is essentially the same as the existing culvert, **AND**
 - the proposed culvert is made of like-material with roughness coefficient equal to or smaller than that of the existing culvert.

To determine if a project will qualify for the non-modeling hydraulic assessment approach, a Companion Worksheet is required to be completed and submitted with the permit application. :

- a. Bridge Replacement-in-Kind Companion Worksheet B
- b. or if the bridge will be reviewed by INDOT as a State Highways or local Federal aid bridge which is externally designed, use DNR/INDOT MOU Bridge Replacement-in-Kind Assessment Worksheet

The Companion Worksheet B initially requests the area of waterway opening beneath the structure. This is gross waterway opening below the low chord. Later, the Worksheet may request the area of waterway opening under the bridge low chord below the base flood elevation. This is similar to the INDOT MOU definition of the gross waterway opening as below the base flood elevation at the downstream face of the bridge.

Engineering staff of INDOT review stream modeling completed by outside consultants submitted to prove compliance with local Federal Aid design standards. INDOT administers the use of Federal transportation money for many State and County bridge projects. INDOT does not review projects constructed solely with local funds. Therefore, locally funded projects, which require an IDNR permit, are not covered under the INDOT-DNR MOU.

DNR delegates to INDOT staff the hydraulic reviews for the following transportation projects subject to the Flood Control Act: State highway and local Federal aid replacement-in-kind bridges without road overflow which are externally designed.

Otherwise refer to the Bridge Replacement-in-Kind Companion Worksheet B.

FEMA Map Service Center:

<http://www.msc.fema.gov/>

INdiana Floodplain Information Portal:

<http://www.INFIP.dnr.in.gov>

Division of Water Regulatory Permit Programs and Related Information

Non-Modeling Hydraulic Assessment Worksheets & Companion Worksheets:
(under “[Technical Requirements: Minimal Application Submittal for Construction in a Floodway](#)”)

<http://www.in.gov/dnr/water/2455.htm>

Construction in a Floodway Assessment User Guide, Worksheet Examples, & training videos:

<http://www.in.gov/dnr/water/2455.htm>

Permit Application Database:

<http://www.in.gov/dnr/water/2455.htm>

Floodway Habitat Mitigation Guidelines:

<http://www.in.gov/dnr/water/2455.htm>