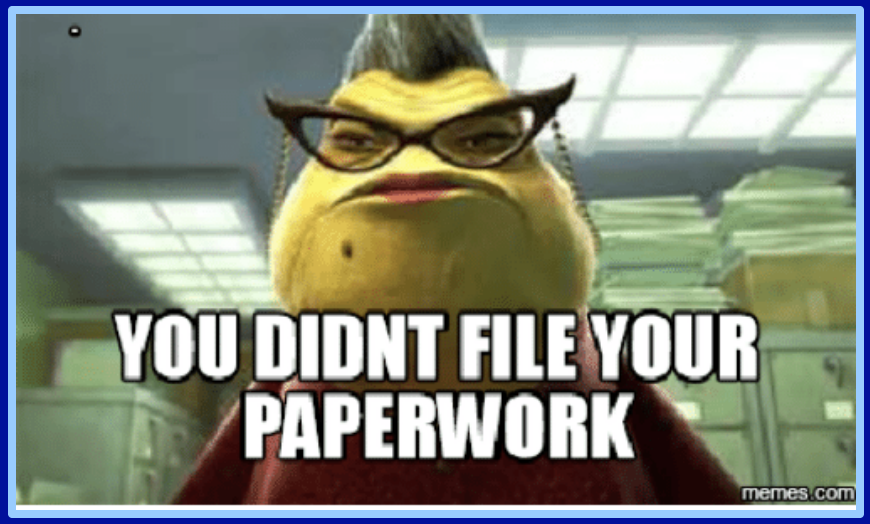
Navigating the floodplain study approval process with WI DNR

November 8, 2018



Chris Olds

Floodplain Engineer

Wisconsin Department of Natural Resources

When is a study required?

- Is the development in a mapped floodplain?
  - Is it below the BFE even though it is not in an adjacent floodplain?
- Is the development in the floodway?
  - Zone AE floodway ‘OR’ Zone A
- Does the development change the floodway/floodplain boundary?
  - LOMR or LOMR-F

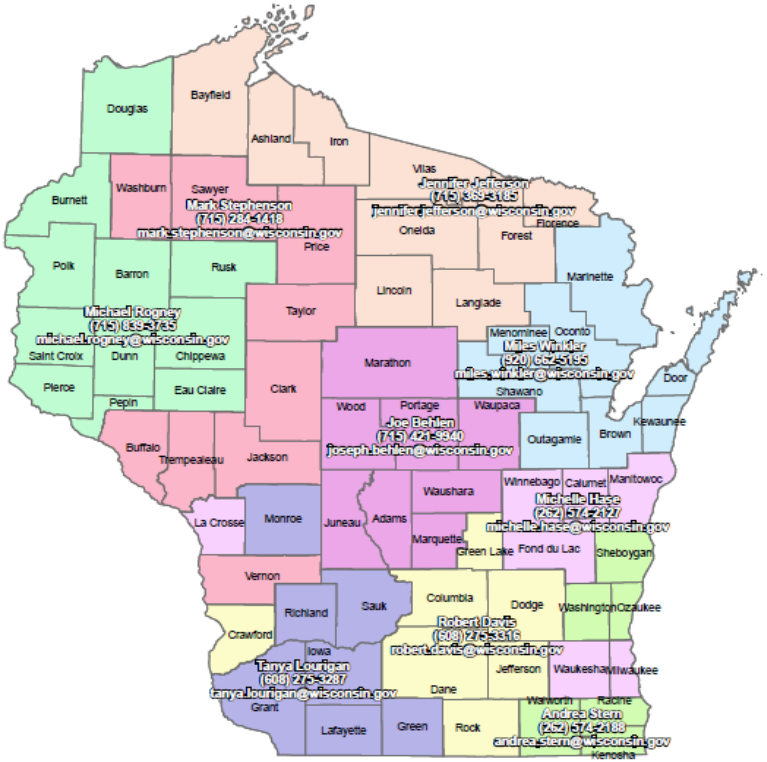
Who to contact

- **Local ZA**
- **https://www.wccadm.com/wcca-contacts**

Who to contact

WISCONSIN DEPARTMENT OF NATURAL RESOURCES

DAM SAFETY / FLOODPLAIN CONTACTS



CENTRAL OFFICE

Meg Galloway, Dams and Floodplain Section Chief, (608) 266-7014, meg.galloway@wisconsin.gov

Christopher Olds, Floodplain Engineer, (608) 266-5606, christopher.olds@wisconsin.gov

Konny Margovsky, Dam Safety / Floodplain Engineer, (608) 266-1925, konstantin.margovsky@wisconsin.gov

Chad Heimerl, Floodplain Engineer, (608) 267-7571, chad.heimerl@wisconsin.gov

Michelle Staff, State NFIP Coordinator, (608) 266-3093, michelle.staff@wisconsin.gov

DNR WME

engineer contact information

County	Name of WME	DNR Office
Adams	Joe Behlen	Wisconsin Rapids
Ashland	Jennifer Jefferson	Rhinelander
Barron	Mike Rogney	Eau Claire
Bayfield	Jennifer Jefferson	Rhinelander
Brown	Miles Winkler	Green Bay
Buffalo	Mark Stephenson	Black River Falls
Burnett	Mike Rogney	Eau Claire
Calumet	Michelle Hase	Waukesha
Chippewa	Mike Rogney	Eau Claire
Clark	Mark Stephenson	Black River Falls
Columbia	Rob Davis	Fitchburg
Crawford	Rob Davis	Fitchburg
Dane	Rob Davis	Fitchburg
Dodge	Rob Davis	Fitchburg
Door	Miles Winkler	Green Bay
Douglas	Mike Rogney	Eau Claire
Dunn	Mike Rogney	Eau Claire
Eau Claire	Mike Rogney	Eau Claire
Florence	Jennifer Jefferson	Rhinelander
Fond du lac	Michelle Hase	Waukesha
Forest	Jennifer Jefferson	Rhinelander
Grant	Tanya Lourigan	Fitchburg
Green	Tanya Lourigan	Fitchburg
[illegible]	Rob Davis	Fitchburg
Iowa	Tanya Lourigan	Fitchburg

Floodplain Ordinance

WISCONSIN DEPT. OF NATURAL RESOURCES

(c) HYDRAULIC AND HYDROLOGIC STUDIES TO ANALYZE DEVELOPMENT
All hydraulic and hydrologic studies shall be completed under the direct supervision of a professional engineer registered in the State. The study contractor shall be responsible for the technical adequacy of the study. All studies shall be reviewed and approved by the Department.

1. Zone A floodplains:
   a. Hydrology
      i. The appropriate method shall be based on the standards in ch. NR 116.07(3), Wis. Admin. Code, *Hydrologic Analysis: Determination of Regional Flood Discharge.*

   b. Hydraulic modeling
      The regional flood elevation shall be based on the standards in ch. NR 116.07(4), Wis. Admin. Code, *Hydraulic Analysis: Determination of Regional Flood Elevation* and the following:

      i. determination of the required limits of the hydraulic model shall be based on detailed study information for downstream structures (dam, bridge, culvert) to determine adequate starting WSEL for the study.

      ii. channel sections must be surveyed.

      iii. minimum four foot contour data in the overbanks shall be used for the development of cross section overbank and floodplain mapping.

      iv. a maximum distance of 500 feet between cross sections is allowed in developed areas with additional intermediate cross sections required at transitions in channel bottom slope including a survey of the channel at each location.

      v. the most current version of HEC_RAS shall be used.

      vi. a survey of bridge and culvert openings and the top of road is required at each structure.

      vii. additional cross sections are required at the downstream and upstream limits of the proposed development and any necessary intermediate locations based on the length of the reach if greater than 500 feet.

      viii. standard accepted engineering practices shall be used when assigning parameters for the base model such as flow, Manning's N values, expansion and contraction coefficients or effective flow limits. The base model shall be calibrated to past flooding data such as high water marks to determine the reasonableness of the model results. If no historical data is available, adequate justification shall be provided for any parameters outside standard accepted engineering practices.

      ix. the model must extend past the upstream limit of the difference in the existing and proposed flood profiles in order to provide a tie-in to existing

studies. The height difference between the proposed flood profile and the existing study profiles shall be no more than 0.00 feet.

   c. Mapping
      A work map of the reach studied shall be provided, showing all cross section locations, floodway/floodplain limits based on best available topographic data, geographic limits of the proposed development and whether the proposed development is located in the floodway.

      i. If the proposed development is located outside of the floodway, then it is determined to have no impact on the regional flood elevation.

      ii. If any part of the proposed development is in the floodway, it must be added to the base model to show the difference between existing and proposed conditions. The study must ensure that all coefficients remain the same as in the existing model, unless adequate justification based on standard accepted engineering practices is provided.

2. Zone AE Floodplains
   a. Hydrology
      If the proposed hydrology will change the existing study, the appropriate method to be used shall be based on ch. NR 116.07(3), Wis. Admin. Code, *Hydrologic Analysis: Determination of Regional Flood Discharge.*

   b. Hydraulic model
      The regional flood elevation shall be based on the standards in ch. NR 116.07(4), Wis. Admin. Code, *Hydraulic Analysis: Determination of Regional Flood Elevation* and the following:

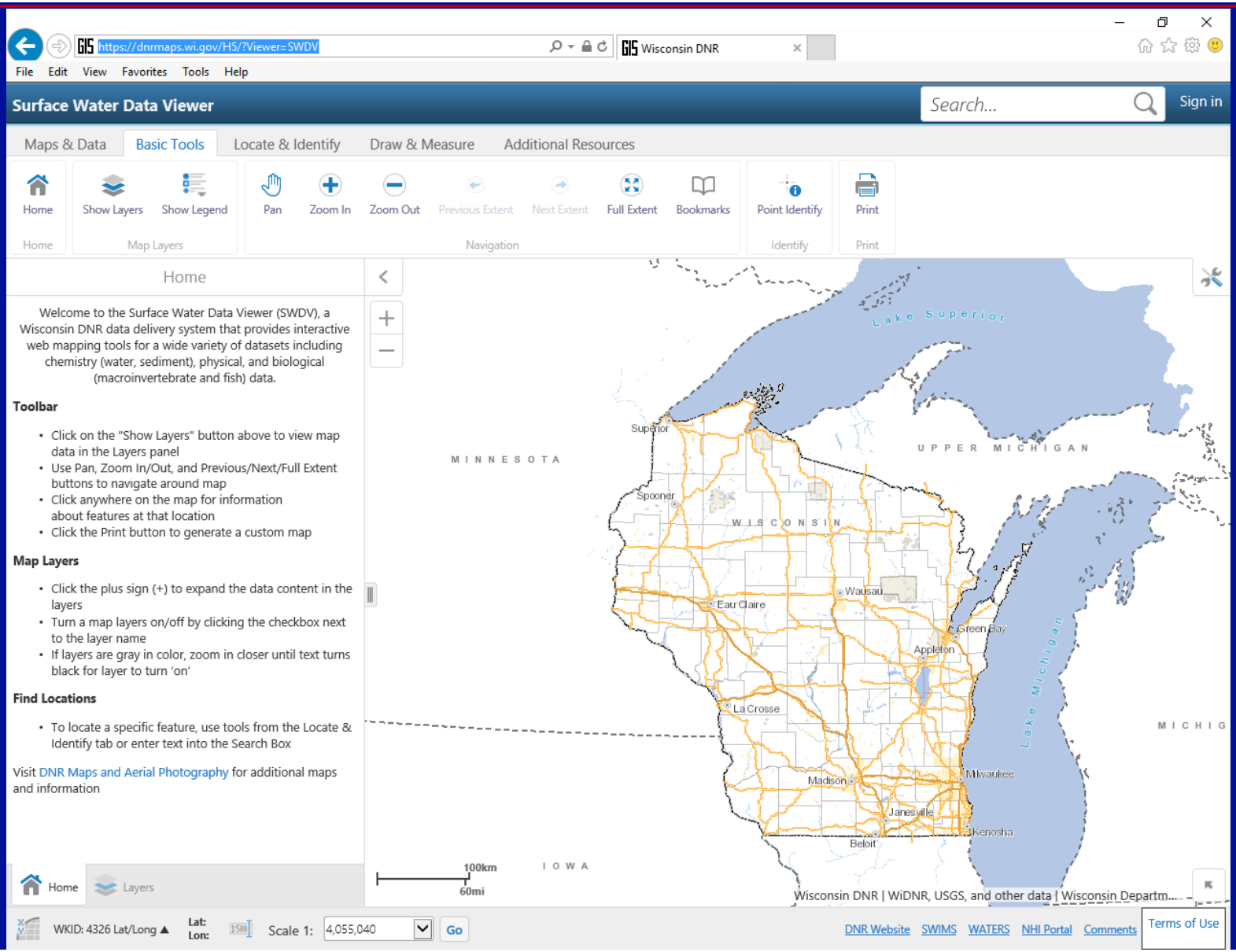
      i. Duplicate Effective Model
      The effective model shall be reproduced to ensure correct transference of the model data and to allow integration of the revised data to provide a continuous FIS model upstream and downstream of the revised reach. If data from the effective model is available, models shall be generated that duplicate the FIS profiles and the elevations shown in the Floodway Data Table in the FIS report to within 0.1 foot.

      ii. Corrected Effective Model.
      The Corrected Effective Model shall not include any man-made physical changes since the effective model date, but shall import the model into the most current version of HEC-RAS for Department review.

      iii. Existing (Pre-Project Conditions) Model.
      The Existing Model shall be required to support conclusions about the actual impacts of the project associated with the Revised (Post-Project) Model or to establish more up-to-date models on which to base the Revised (Post-Project) Model.

      iv. Revised (Post-Project Conditions) Model.
      The Revised (Post-Project Conditions) Model shall incorporate the Existing Model and any proposed changes to the topography caused by the proposed development. This model shall reflect proposed conditions.

WI DNR SWDV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Wisconsin DNR
File Edit View Favorites Tools Help
Surface Water Data Viewer
Search...
Sign in
Maps & Data
Basic Tools
Locate & Identify
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Pan
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Home
Welcome to the Surface Water Data Viewer (SWDV), a Wisconsin DNR data delivery system that provides interactive web mapping tools for a wide variety of datasets including chemistry (water, sediment), physical, and biological (macroinvertebrate and fish) data.
Toolbar
Click on the "Show Layers" button above to view map data in the Layers panel
Use Pan, Zoom In/Out, and Previous/Next/Full Extent buttons to navigate around map
Click anywhere on the map for information about features at that location
Click the Print button to generate a custom map
Map Layers
Click the plus sign (+) to expand the data content in the layers
Turn a map layers on/off by clicking the checkbox next to the layer name
If layers are gray in color, zoom in closer until text turns black for layer to turn 'on'
Find Locations
To locate a specific feature, use tools from the Locate & Identify tab or enter text into the Search Box
Visit DNR Maps and Aerial Photography for additional maps and information
Lake Superior
MINNESOTA
UPPER MICHIGAN
WISCONSIN
Superior
Spooner
Wausau
Eau Claire
Green Bay
Appleton
La Crosse
Lake Michigan
MICHIG
Madison
Milwaukee
Janesville
Kenosha
Beloit
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Wisconsin DNR | WiDNR, USGS, and other data | Wisconsin Departm...
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DNR Website
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WATERS
NHI Portal
Comments
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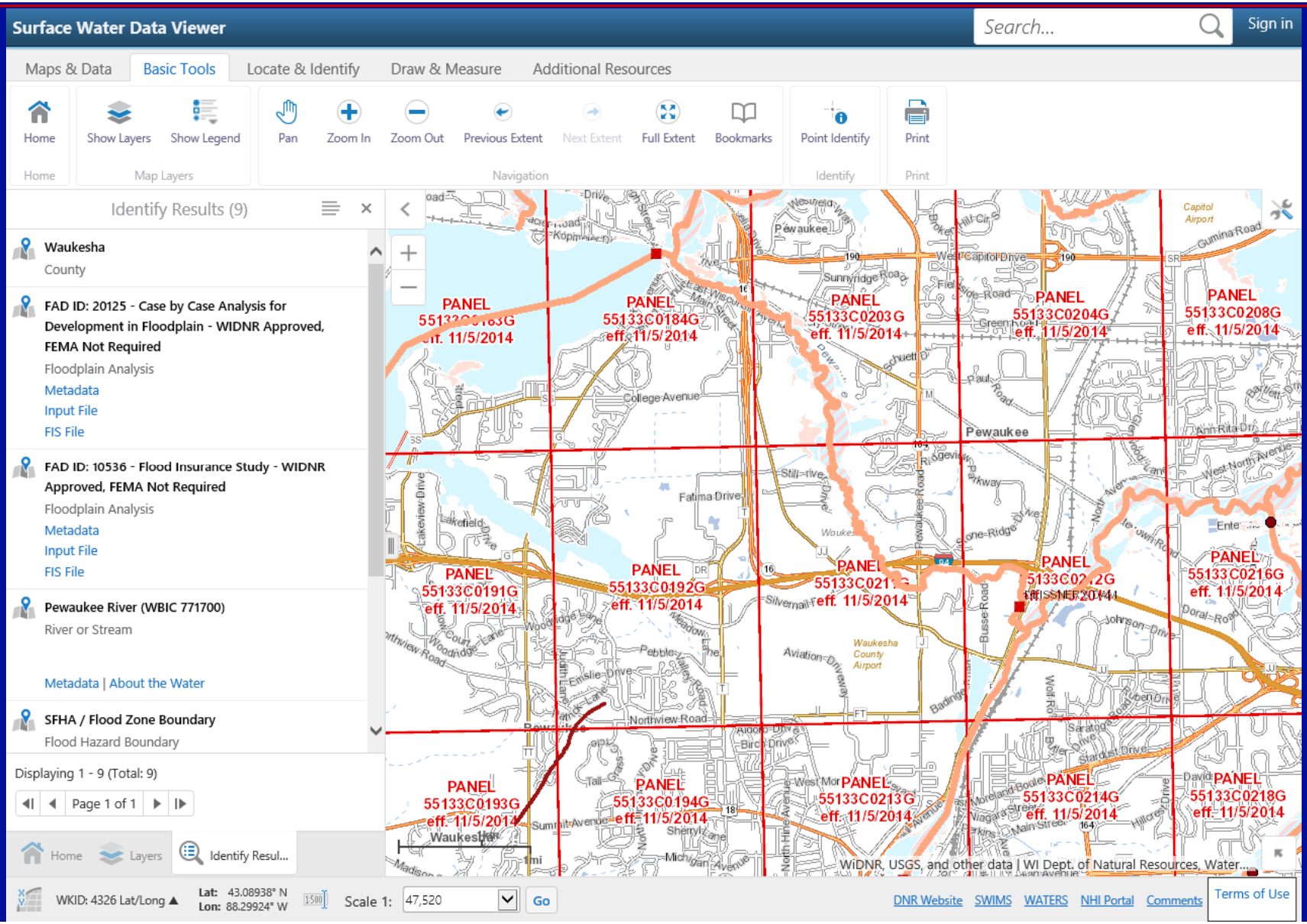
WI DNR SWDV


Surface Water Data Viewer
Search...
Sign in
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Basic Tools
Locate & Identify
Draw & Measure
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Zoom In
Zoom Out
Previous Extent
Next Extent
Full Extent
Bookmarks
Point Identify
Print
Map Layers
Navigation
Identify
Identify Results (9)
Waukesha
County
FAD ID: 20125 - Case by Case Analysis for Development in Floodplain - WIDNR Approved, FEMA Not Required
Floodplain Analysis
Metadata
Input File
FIS File
FAD ID: 10536 - Flood Insurance Study - WIDNR Approved, FEMA Not Required
Floodplain Analysis
Metadata
Input File
FIS File
Pewaukee River (WBIC 771700)
River or Stream
Metadata | About the Water
SFHA / Flood Zone Boundary
Flood Hazard Boundary
Displaying 1 - 9 (Total: 9)
Page 1 of 1
Home
Layers
Identify Resul...
PANEL 55133C0184G eff. 11/5/2014
PANEL 55133C0203G eff. 11/5/2014
PANEL 55133C0204G eff. 11/5/2014
PANEL 55133C0208G eff. 11/5/2014
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Capitol Airport
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Fatima Drive
Silvernail Road
Northview Road
Aviation Driveway
Busse Road
Sunnyridge Road
West Capitol Drive
Paul Road
Pebble Valley Road
Summit Avenue
Sherryl Lane
Michigan Avenue
WiDNR, USGS, and other data | WI Dept. of Natural Resources, Water...
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DNR Website
SWIMS
WATERS
NHI Portal
Comments
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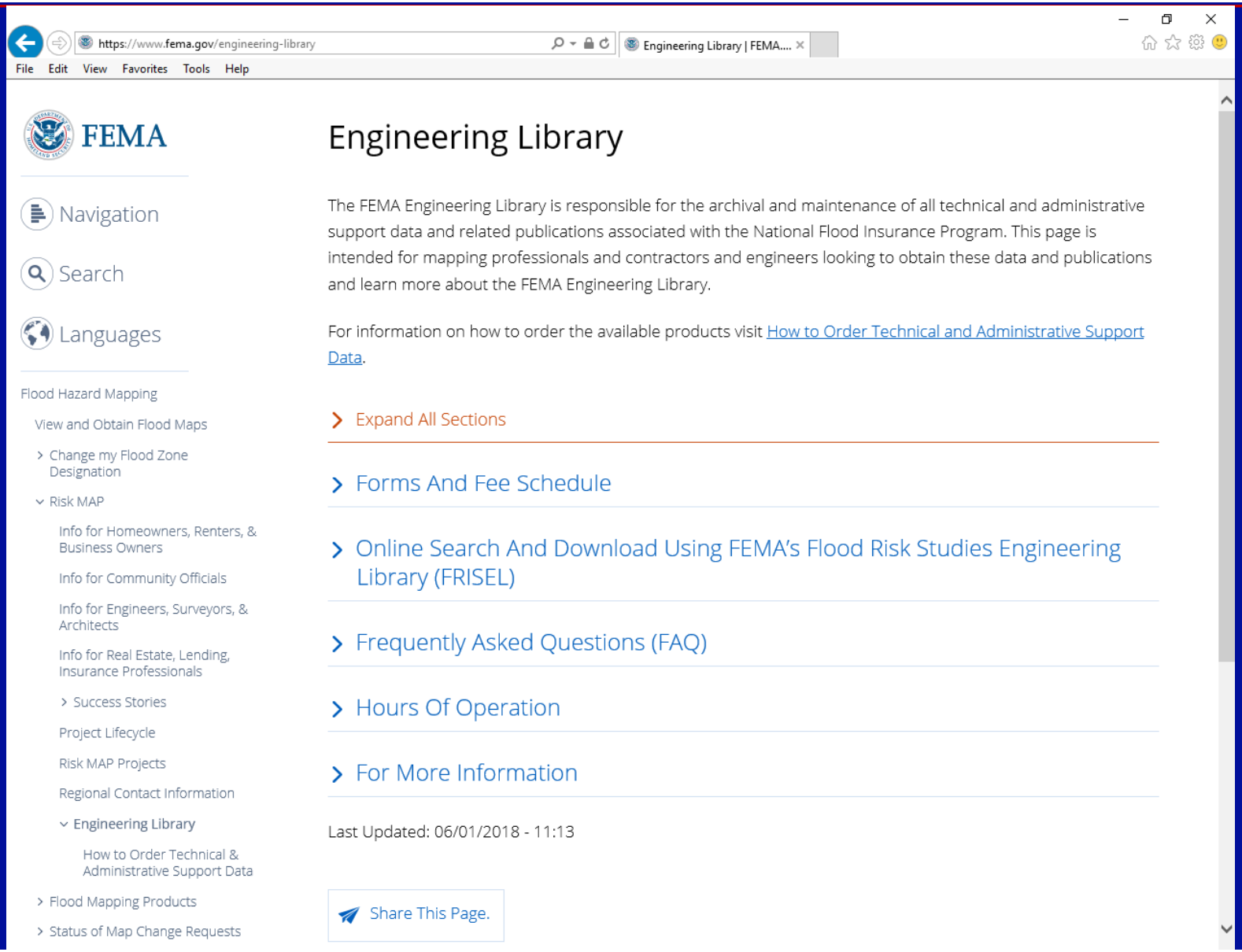
Who to contact



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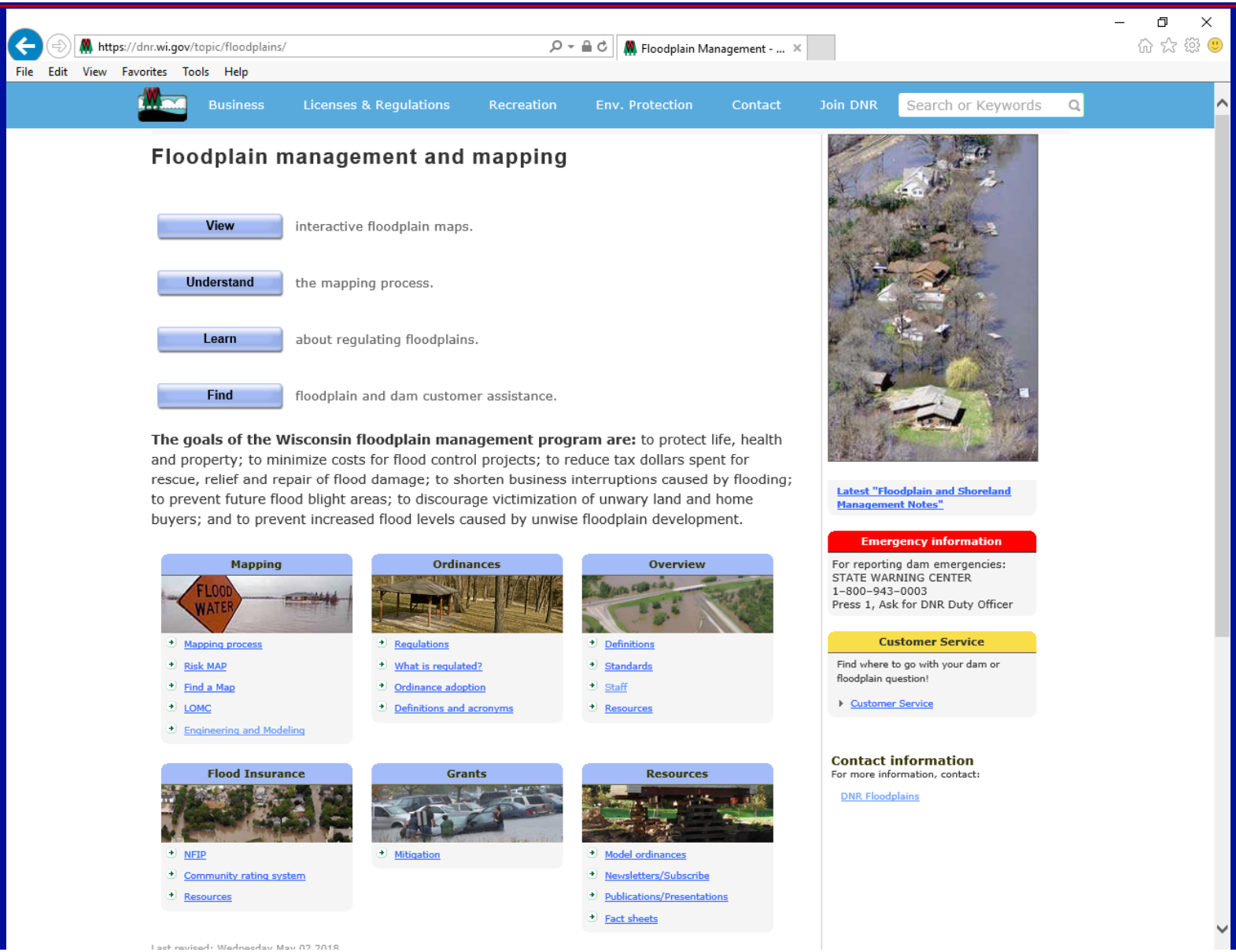
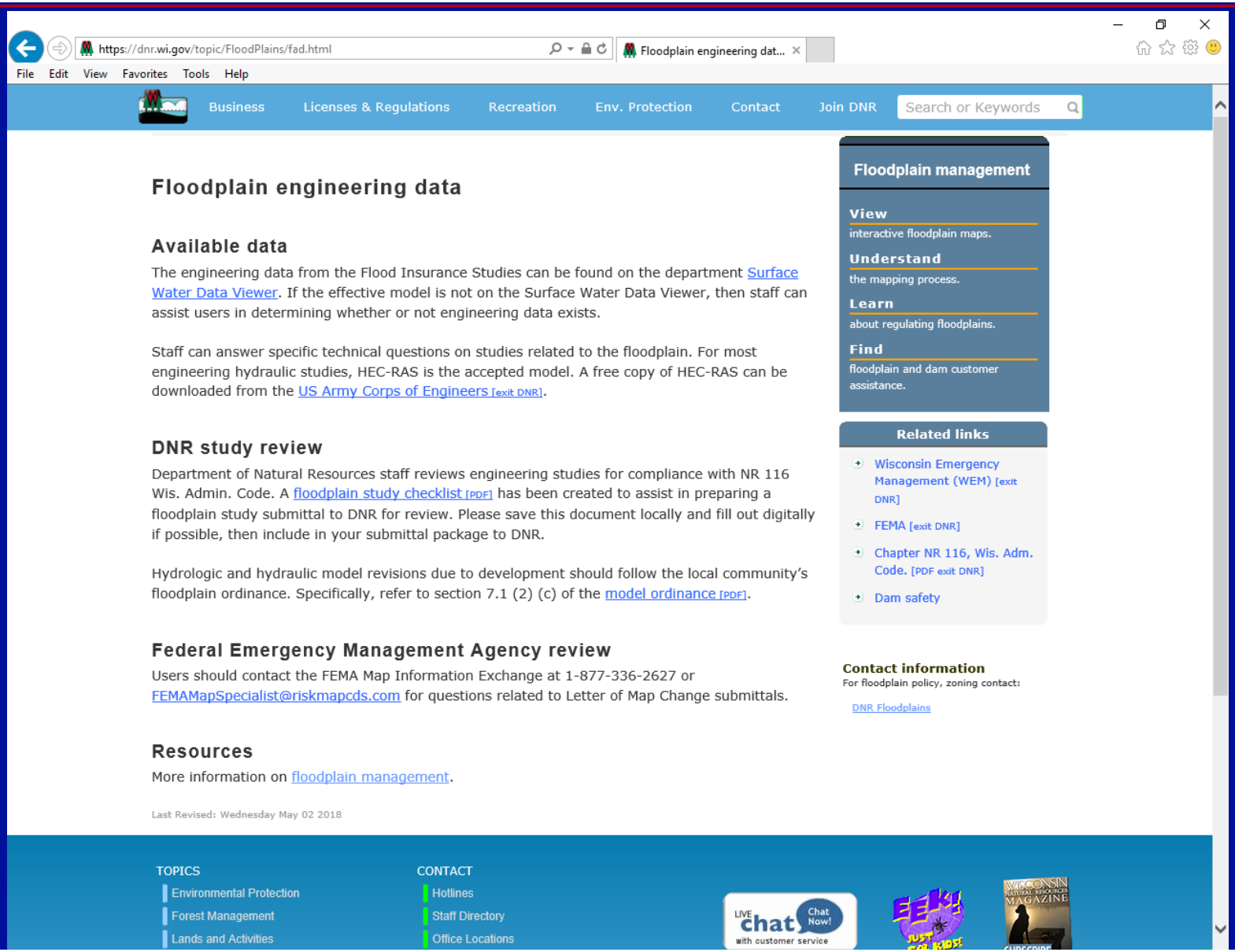


Who to contact



Floodplain Checklist

Checklist for Submitting a Floodplain Study

Wisconsin Department of Natural Resources

This outline for department review of floodplain studies may not contain all of the requirements of the administrative code. It is a general outline and detailed examination of the codes should be done to be assured that a submittal may meet department approval. Appropriate areas should be filled in by the engineer submitting the study for WDNR review.

Community/Zoning Authority:_____

Official Stream Name:_____

County:_____

Study Author:_____

Submission Date:_____

Submitted to:_____

Legal Description:

Upstream Limit____1/4(QQ), ____1/4(Q), Section(s)_____, Township_____, Range_____

Downstream Limit ____1/4(QQ), ____1/4(Q), Section(s)_____, Township____, Range____

Study Type (circle): Bridge/Culvert Channel Realignment Enclosure Filling/Grading BFE determination

Other _____

I) General Documentation

_____ Contact (Telephone Conservation) Reports

_____ Meeting Minutes/Reports

_____ General Correspondence

_____ Submittal letter or e-mail from zoning authority requesting review

II) Narrative Report

_____ Purpose of the study

_____ Geographic location of the study

_____ Detailed description of the methodology used for hydrology, hydraulics and any special applications used in the study

_____ Description of the project location related to model river stations

_____ Documentation of the changes made between each model run

_____ Floodway Data Table
Note: Include at least one table with the following output variables:
'River Sta' 'Q Total' 'W.S. Elev' 'Top Wdth Act' 'Flow Area' 'Vel Total'

_____ Previous studies on the same watercourse – date/author/source of study

_____ Data collection methods

_____ Past flooding

_____ Benchmark identification and location

_____ Coordination with other agencies

_____ Other supporting documentation provided

(circle) Soils Maps Watershed Maps Photographs Stream Flow Records

Other: _____

Floodplain Checklist

WISCONSIN DEPT. OF NATURAL RESOURCES

III) Engineering Analyses

1) Hydrologic Analysis (electronic input/output files)

_____ Is there an existing model?

Existing model input file name: _____

The *two* techniques used to determine the regional flood flow discharges:

_____Log-Pearson Type III, described in Technical Bulletin #17B

_____Regional Regression Equations (i.e. Congers)

_____Synthetic hydrographs (i.e. HEC-HMS)

_____Was floodplain storage explicitly taken into account to attenuate flood peak flow?

_____If yes, have flood storage district maps been created for the community to adopt?

_____Which rainfall distribution was used?

_____If a distribution other than NRCS's MSE3/MSE4 was used, what duration was the critical duration when the critical duration analysis was performed to identify the peak storm duration?

_____Technical Release No. 55 (TR-55)

_____Comparison of similar drainage basins at gaged sites

_____Historic flood data

_____Other methods with department approval (comment on what method)

Input file name: _____

_____ New peak flows tie in with upstream and downstream published flows

2) Hydraulic Analyses (electronic input/output files)

Note: The same model must be used for both existing and proposed conditions for relative consistency

_____ Is there an existing model?

Existing model input file name: _____

_____ Existing model was not truncated from its original study reach

New hydraulic model type (i.e. HEC-RAS) _____

New input file name (project model name that has one or multiple runs):

_____

Model plan descriptions: _____

_____

(ex. p.01 = effective, p.02 = corrected effective, p.03 = pre-project, p.04 = post-project…)

What is the vertical datum of the survey/geometric data (NAVD88, NGVD29...) _____

_____Is there a dam with operable gates in the study reach?

_____If yes, does the modeled operation represent the DNR approved Inspection, Operations, and Maintenance Plan (IOM)? The dam operator then assumes liability that the gates will be operated as outlined in the IOM.

If not, explain_____

_____ Is there a detailed study upstream of the submitted reach? (Y/N)

_____If yes, do the profiles match within 0.5' at the boundary? (Y/N)

_____ Is there a detailed study downstream of the submitted reach? (Y/N)

_____If yes, do the profiles match exactly at the boundary? (Y/N)

_____ Model shows increases due to development (proper legal arrangements required)

Floodplain Checklist

3) Miscellaneous

_____ Supporting hand calculations, sketches and figures used in analyses

_____ Key to Cross-Section Labeling

_____ Key to Transect Labeling (coastal study only)

IV) Mapping information

_____ Workmaps including floodway, floodfringe, cross sections, and stream centerlines
_____ Floodway Data Table
Note: Include at least one table with the following output variables:
'River Sta' 'Q Total' 'W.S. Elev' 'Top Wdth Act' 'Flow Area' 'Vel Total'

Digital mapping data provided: _____
(Circle) ESRI shapefile(s)/database CAD data Other

Horizontal coordinate system used: _____

V) Certification

_____ Signed, stamped, and submitted by a Professional Engineer registered in Wisconsin

Name_____Registration #_____

Model requirements AE zone

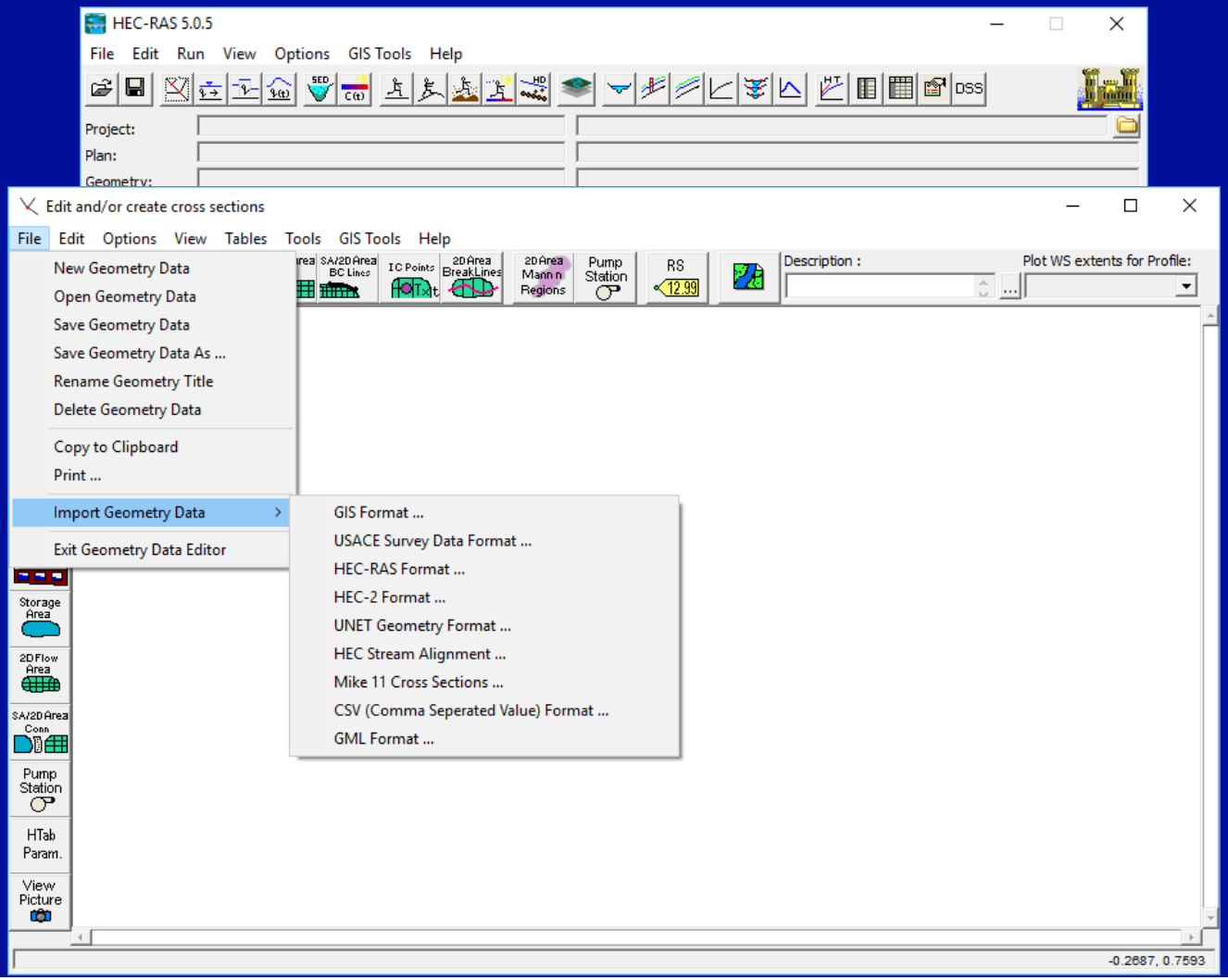
- Hydraulics
  - Existing/Duplicate effective (FIS model)
  - Corrected effective
  - Pre-project
  - Post-project
  - Encroachment (floodway run…necessary?)
  - Elevation to 2 decimals

Model requirements A zone

- Hydrology – 2 methods
- Hydraulics – HEC-RAS preferred
- Engineered A zones – there are many model backed A zones in WI, check with the regional engineer

HEC-RAS 101

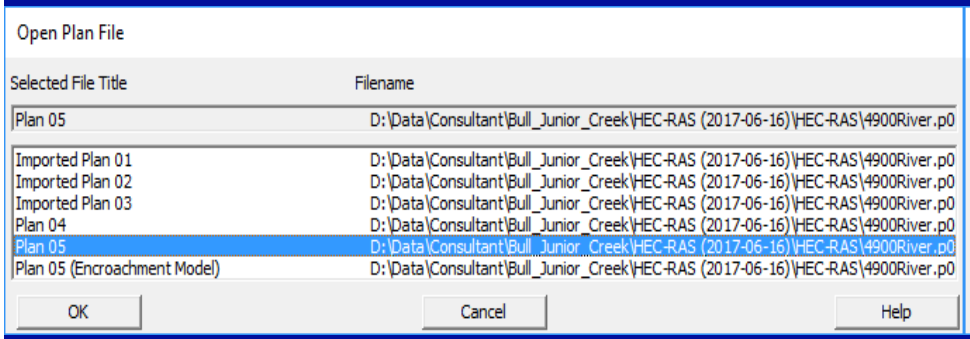
- Importing a HEC-2 into HEC-RAS

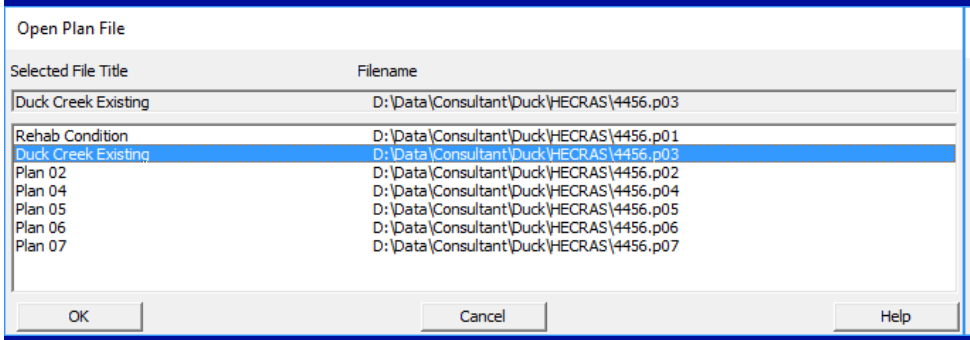


HEC-RAS 101

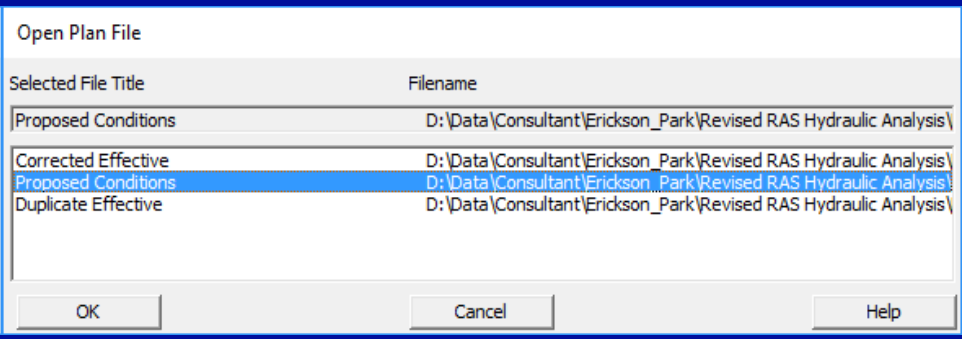
- All plans in one project
- Clearly label plans

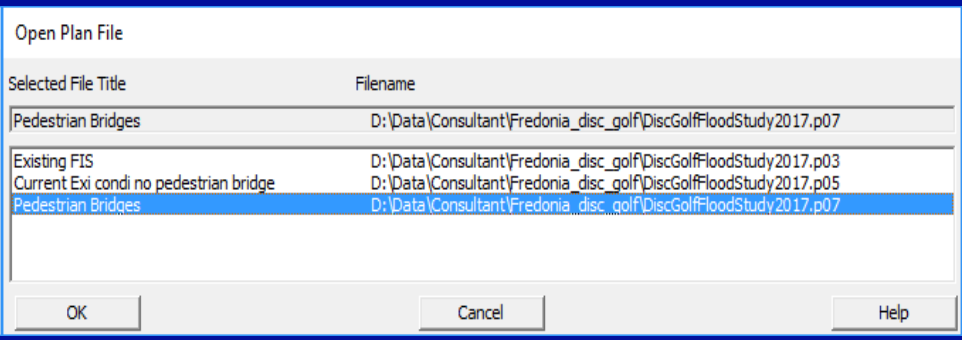
NO





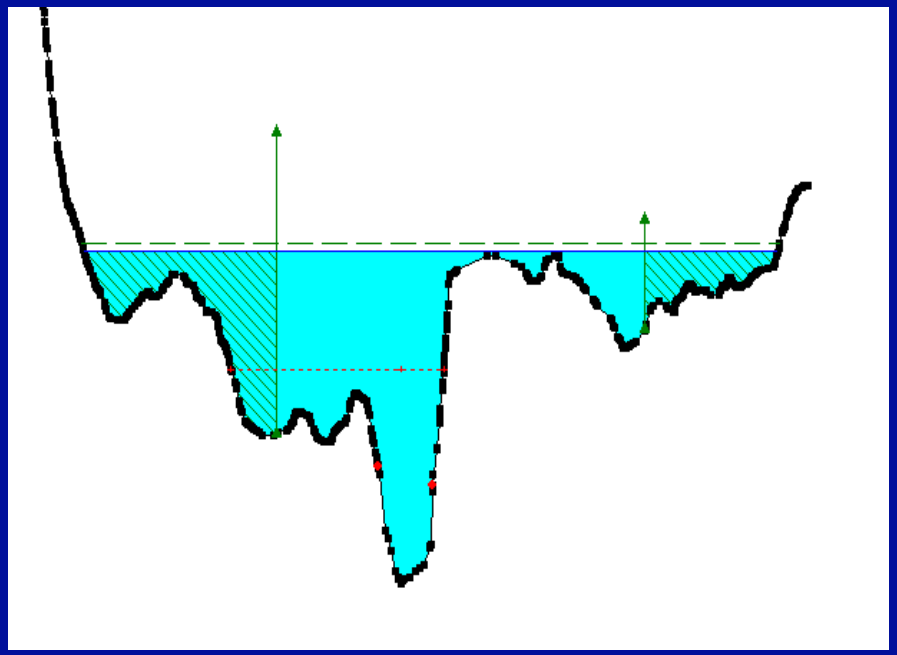
YES

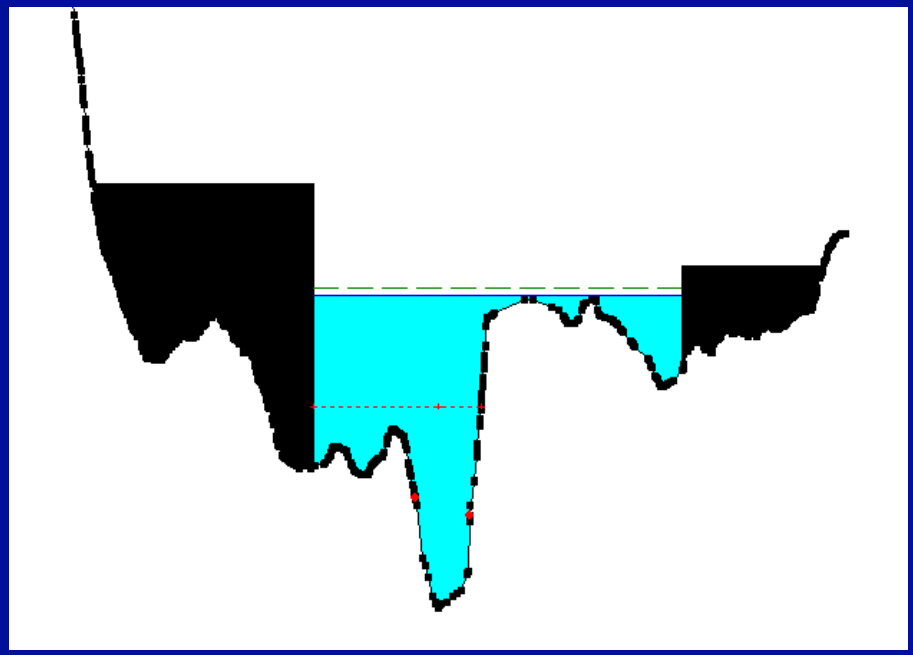




HEC-RAS 101

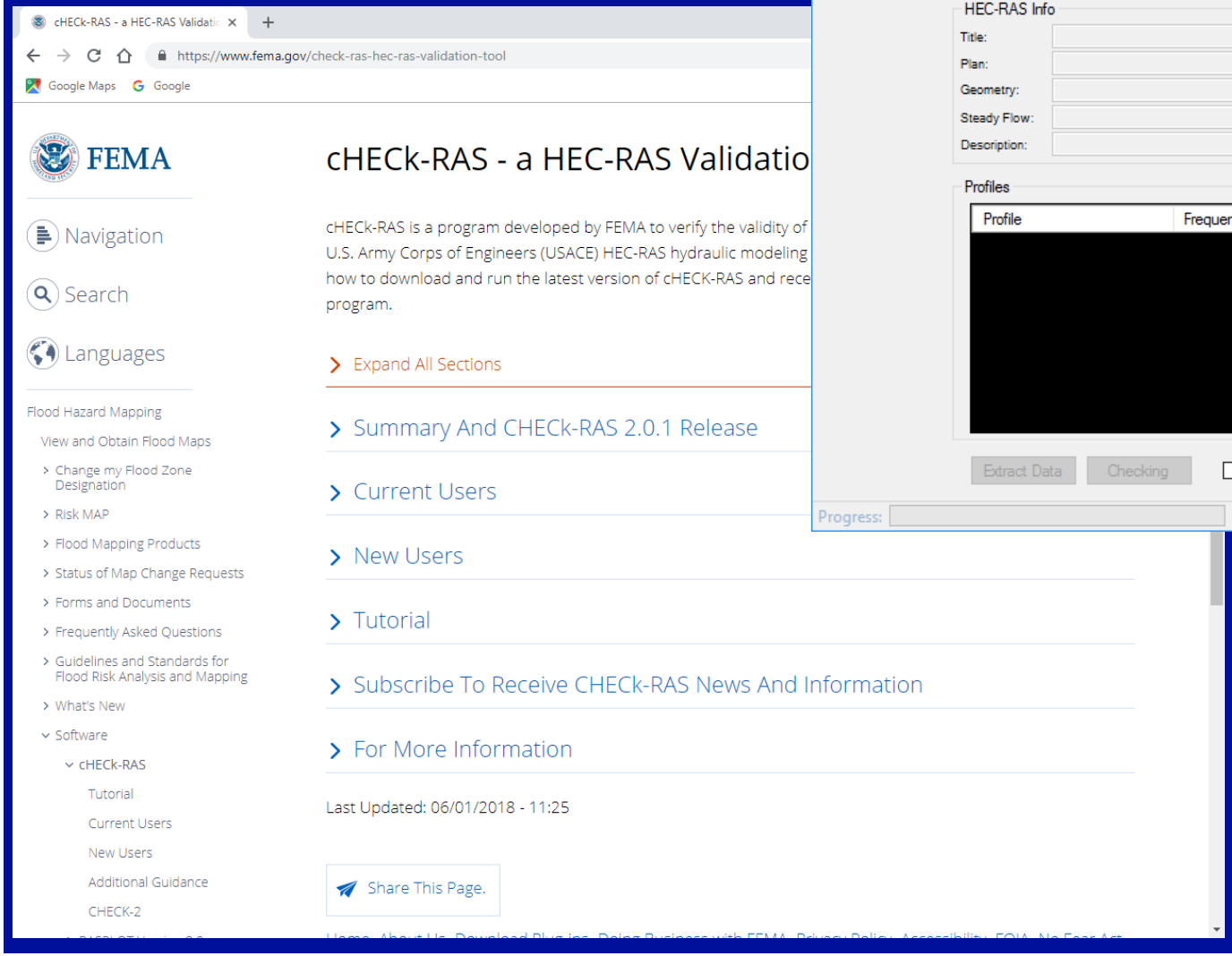
- **Floodway limits**
  - **Blocked obstruction vs. ineffective flow (sensitivity analysis)**

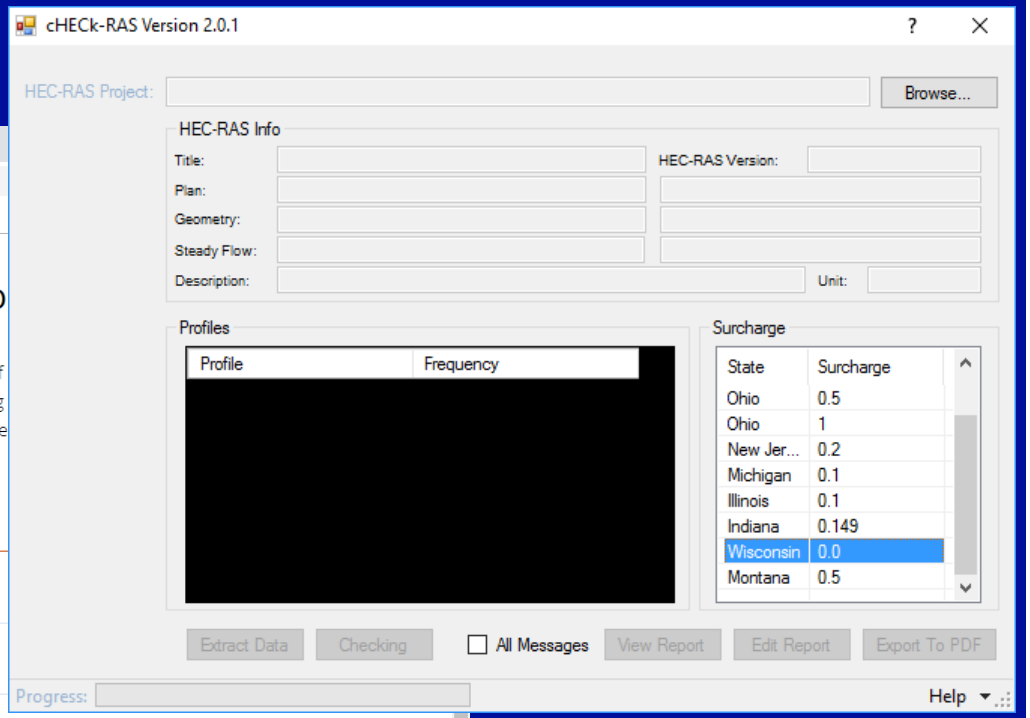




HEC-RAS 101

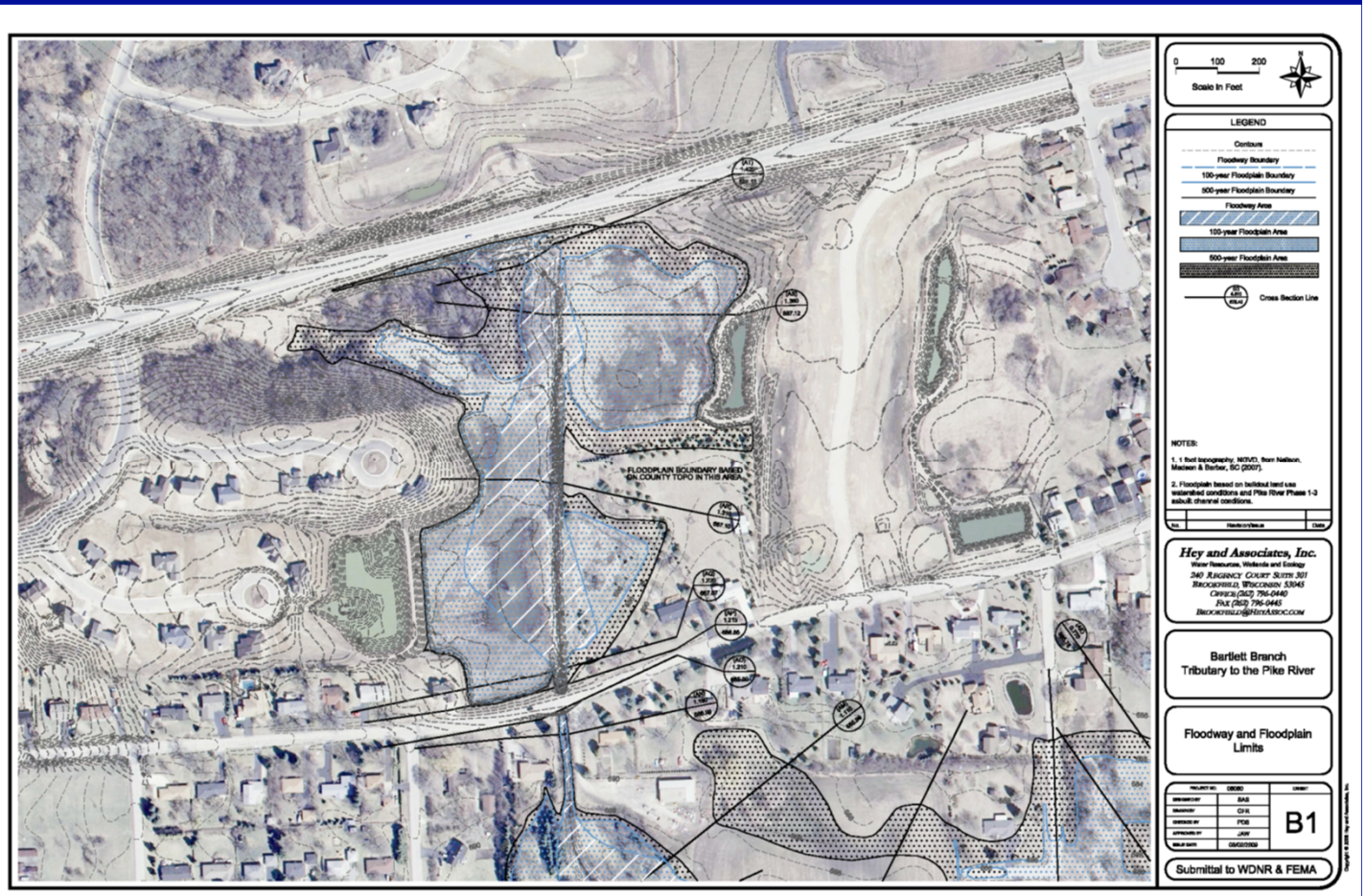
- Check-RAS





Mapping

- Include map (electronic) to scale with current & proposed floodplain/floodway, topo, and cross sections



Mapping

- Tie-in (hydrology, hydraulics, and floodplain) upstream and downstream
- Mapped floodway topwidths match model
- ESRI products (shapefiles) preferred

When is a CLOMR/LOMR required?

- CLOMR when risk (BFE/FW/fp) increases
- LOMR within 6 months of project completion
- Revisions based on FEMA comments require another WDNR review

Questions?