



Floodplain 101

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&

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Objectives

- ⌘ Federal, State and Local Roles
- ⌘ Basic Floodplain Regulation in relation to Wisconsin Administrative Code NR 116
- ⌘ Dam Failure Analyses
- ⌘ H & H Analyses
- ⌘ Legal Nonconforming Uses & Structures
- ⌘ Permit Scenario



Federal Role

- ⌘ Risk Identification (Map Production)
- ⌘ Review/approval of Letter of Map Change (LOMC)
- ⌘ Establish Minimum development/building protection standards (NFIP)
- ⌘ Provide affordable flood insurance rates using actuarial methods
- ⌘ Lending regulations/enforcement
- ⌘ Inform and educate the public
- ⌘ Provide technical assistance to local partners
- ⌘ Respond to congressional inquiries



State Role

- ⌘ Establish development/building protection standards and promulgate state regulations
- ⌘ Provide technical assistance including training to local community/agency partners
- ⌘ Under contract with FEMA, evaluate and document community/agency floodplain management activities
- ⌘ Inform and educate the public
- ⌘ Under FEMA contracts, provide mapping, engineering and contract management services for RiskMAP
- ⌘ Review/approve engineering studies for map revision projects
- ⌘ Respond to legislative inquiries



Local Role

- ⌘ Adopt local floodplain management regulations in compliance with appropriate Federal/State laws
- ⌘ Regulate development/building protection standards through permitting and inspection of construction activities to ensure compliance with adopted floodplain regulations
- ⌘ Maintain information records of floodplain development and mapping
- ⌘ Inform and educate the public



Basic NFIP Regulations

- ⌘ Ensure that all proposed development is reasonable safe from flooding
- ⌘ Ensure that the lowest floor of any new or substantially damaged or improved structure within the SFHA is elevated to or above the base flood elevation.
- ⌘ Ensure that development within the Floodway does not increase flood heights.

Eau
Claire
Co
2016



Jefferson
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2008

Definition of Lowest Floor

“...means the lowest floor of the lowest enclosed area, including basement.”

Basement is defined by the NFIP as any area subgrade on all sides.



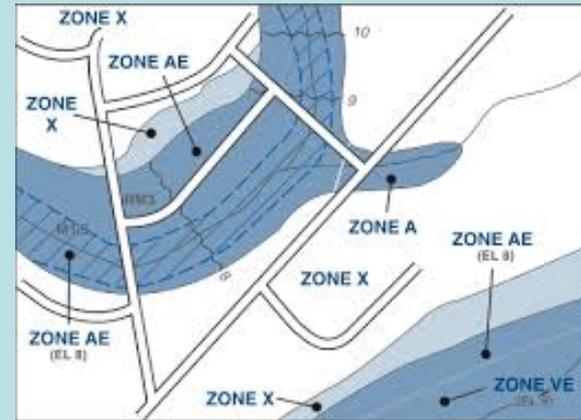
Mapping Flood Hazards

FIRM = Flood Insurance Rate Maps

The DFIRMs show areas at risk to flooding overlain on aerial photos.



WDNR Surface Water Data Viewer



Paper FIRMs

FEMA's National Flood Hazard Layer



Risk MAP

The Risk Mapping Assessment and Planning (MAP) program provides flood maps and resources to homeowners and communities

Business Licenses & Regulations Recreation Education Contact Join DNR Search or Keywords Q

Surface Water Data Viewer

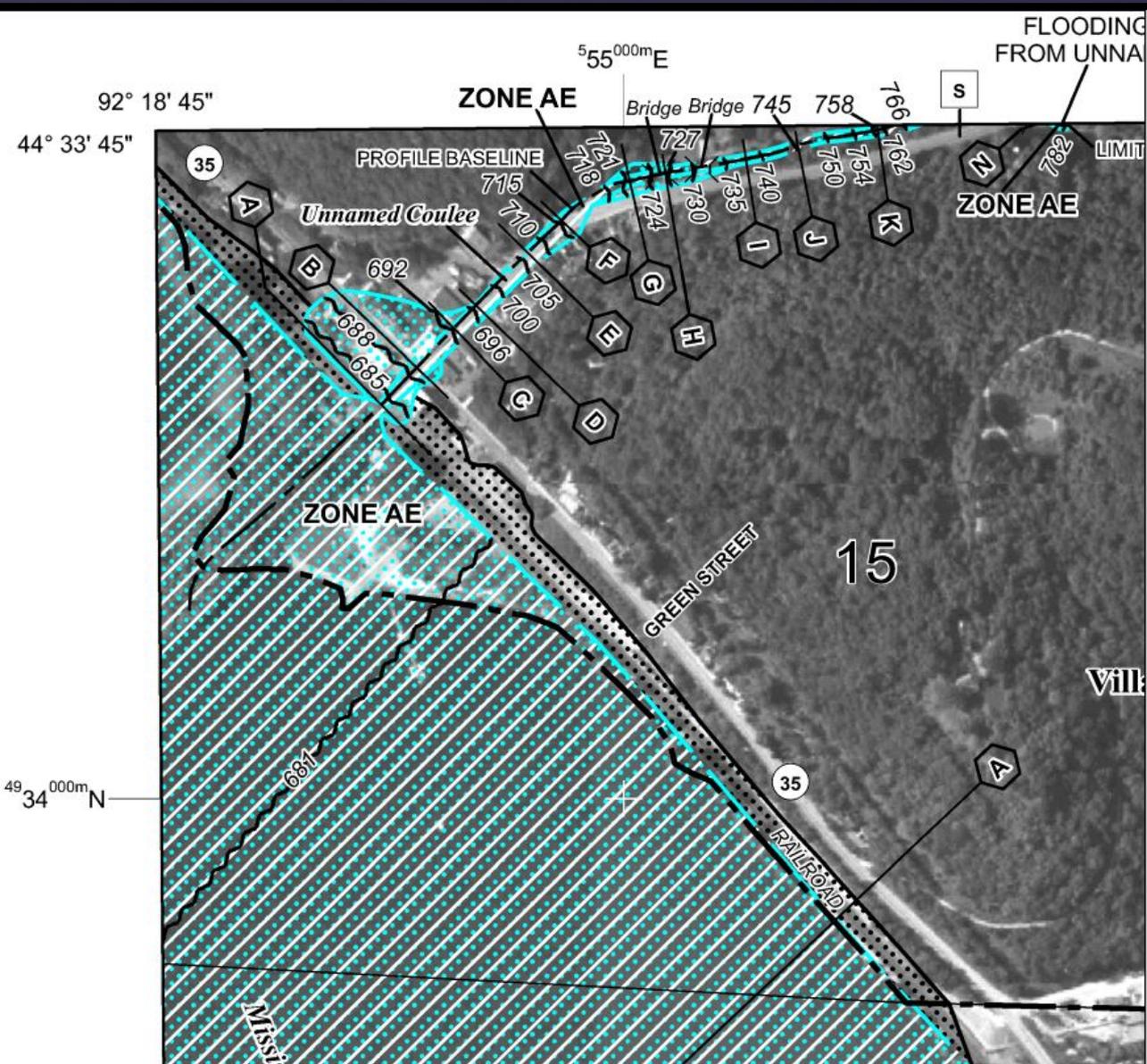
The Surface Water Data Viewer (SWDV) is a Wisconsin DNR data delivery system that provides interactive webmapping tools for a wide variety of datasets including chemistry (water, sediment), physical, and biological (macroinvertebrate, aquatic invasives) data.



The new interactive web mapping application for surface water resources has nearly all the capabilities as the old version as well as a number of new features. One major difference between the old and new versions is that the new interface has tabs which group similar sets of tools (similar to MS Word or Excel). Turning on layers, panning and zooming are more seamless; with much shorter page loading times. Other new features include more drawing tools, the ability to add a CSV or Shapefile, and the ability to change coordinate systems.

- Surface water**
- SWIMS help guides**
About the SWIMS database.
- SWIMS data model**
Projects, monitoring stations, fieldwork events, finding data.
- Surface water viewer**
Launch Application: [SWIMS](#)
- Great Lakes data**
Beach stations, projects, grants, and data.
- River & stream data**
Stations, projects, results.
- Wetlands data**

Flood Insurance Rate Map



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A No Base Flood Elevations determined.

ZONE AE Base Flood Elevations determined.

ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.

ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE AR Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.

ZONE A99 Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.

ZONE V Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.

ZONE VE Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- Base Flood Elevation line and value; elevation in feet*
(EL 987)
- Base Flood Elevation value where uniform within zone; elevation in feet*

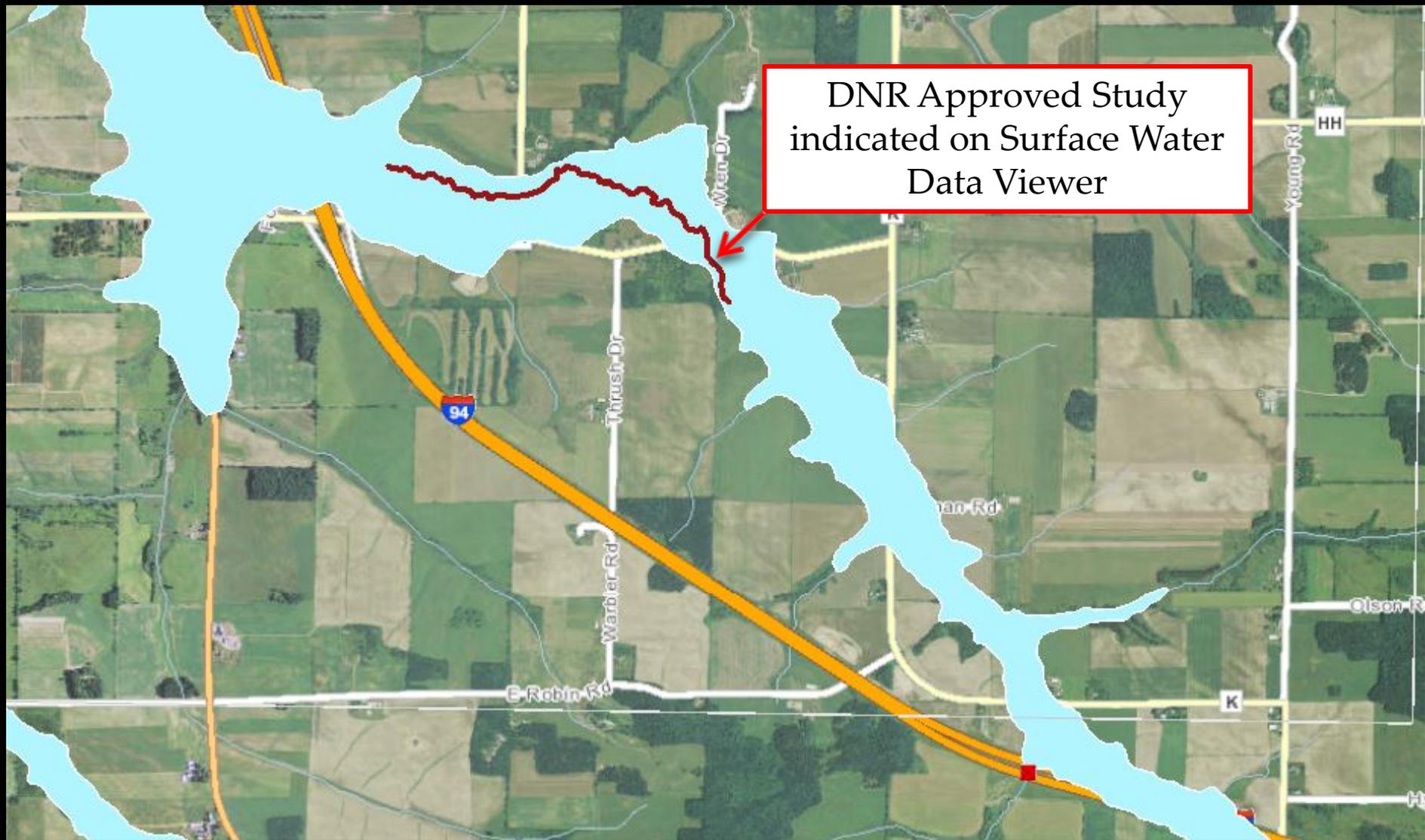
* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

- A-A Cross section line
- 23-23 Transect line
- 97° 07' 30", 32° 22' 30" Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
- 4275000mN 1000-meter Universal Transverse Mercator grid ticks, zone 15
- 6000000 FT 5000-foot grid ticks: Wisconsin State Plane coordinate system, central zone (FIPSZONE 4802), Lambert Conformal Conic

Key Definitions

- ‡ Floodway → The channel portion of a river or stream, and those portions of the floodplain adjoining the channel required to carry the regional flood discharge
- ‡ Floodfringe → That portion of the floodplain outside of the floodway, which is covered by flood water during the regional flood. The term, “floodfringe” is generally associated with standing water rather than flowing water
- ‡ Zone AE → The base floodplain where RFEs are provided
- ‡ Zone A → The base floodplains mapped by approximate methods, i.e., RFEs are not determined. Often called unnumbered A Zone or approximate A zone.

Zone A



Additional Notes: Zone A

- ⌘ Zone A floodplains are considered floodway until proven otherwise by a H&H
- ⌘ The project can cause an increase up to 1 foot in a Zone A, ONLY if the increase is either contained on the applicants property or proper legal arrangements are obtained.
 - ⌘ If increase is greater than 1 foot, a CLOMR needs to be obtained prior to permitting
- ⌘ If the proposed structure or other prohibited use is located in the floodway, a LOMR-F needs to be obtained prior to permitting
 - ⌘ NR 116.18 – Must be on FILL to the flood protection elevation (RFE + 2 ft.) and is contiguous to other lands lying outside the floodplain.

Flood Insurance Study

- ⌘ Developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates.
- ⌘ Detailed studied areas (Zone AE) and approximate (Zone A)
- ⌘ Contain principal flooding problems, regional flood discharges, regional flood elevations, and regional flood profiles

FLOOD INSURANCE STUDY



EAU CLAIRE COUNTY, WISCONSIN, AND INCORPORATED AREAS

Community Name	Community Number
Altoona, City of	550126
Augusta, City of	550127
Eau Claire County, Unincorporated Areas	555552
Eau Claire, City of	550128
Faichid, Village of	550129
Fall Creek, Village of	550130



REVISED:
APRIL 16, 2014

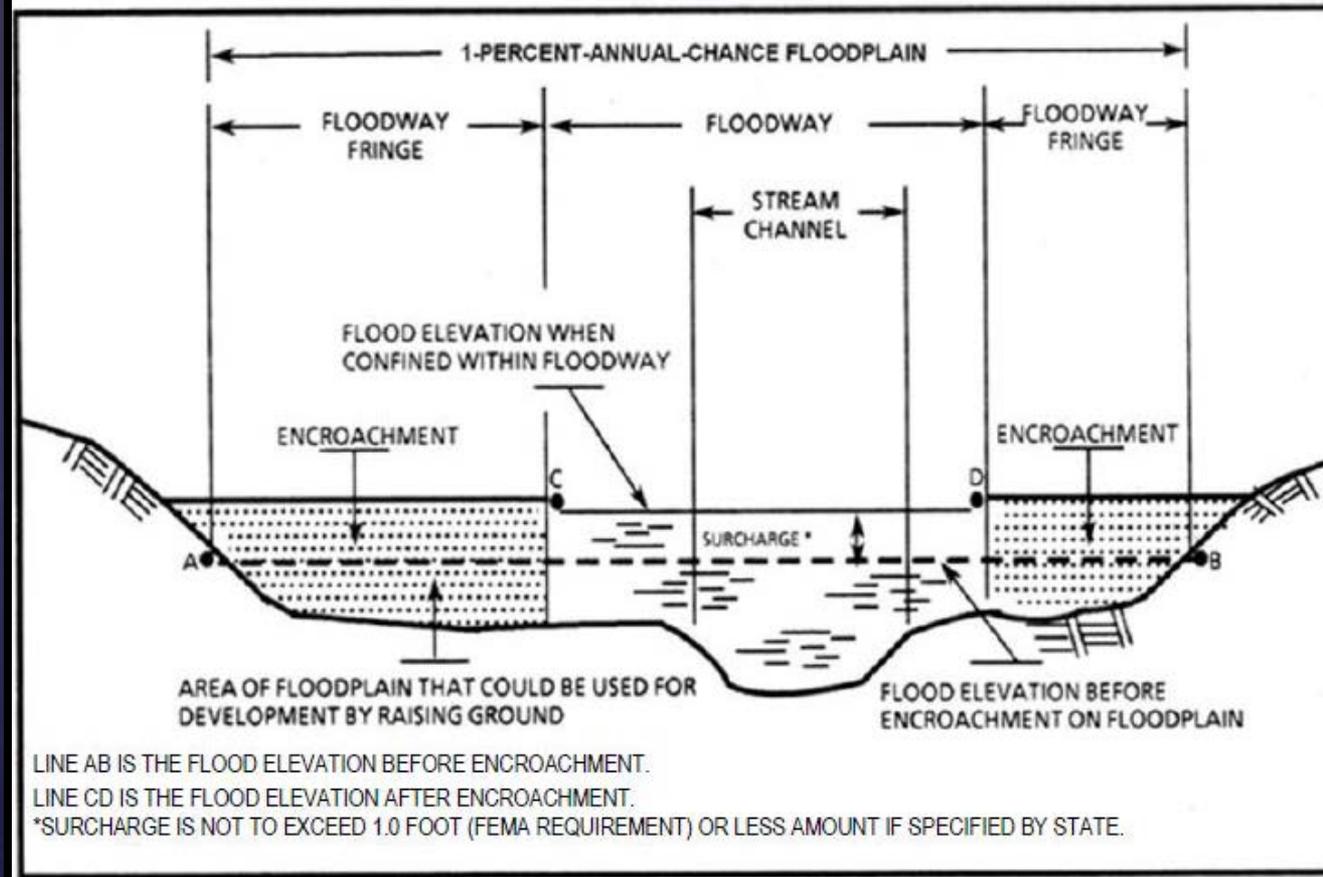


Federal Emergency Management Agency
FLOOD INSURANCE STUDY NUMBER
55036CV000B

Regional Flood Elevation

- ⌘ The elevation determined to be representative of large floods known to have occurred in Wisconsin or which may be expected to occur on a particular lake, river, or stream at a frequency of 1 percent during any given year

Figure 4: Floodway Schematic



Wisconsin Minimum Standards

Chapter NR 116, Wisconsin Administrative Code Basic Overview

- ∅ 2 feet of freeboard (Flood Protection Elevation = RFE + 2 feet)
- ∅ Dry land access for new development
- ∅ Prohibits most floodway development
- ∅ Cumulative improvement standards (50% provision for legal non-conforming structures)
- ∅ Zero rise mapping standard (i.e. project cannot cause an increase in the RFE)

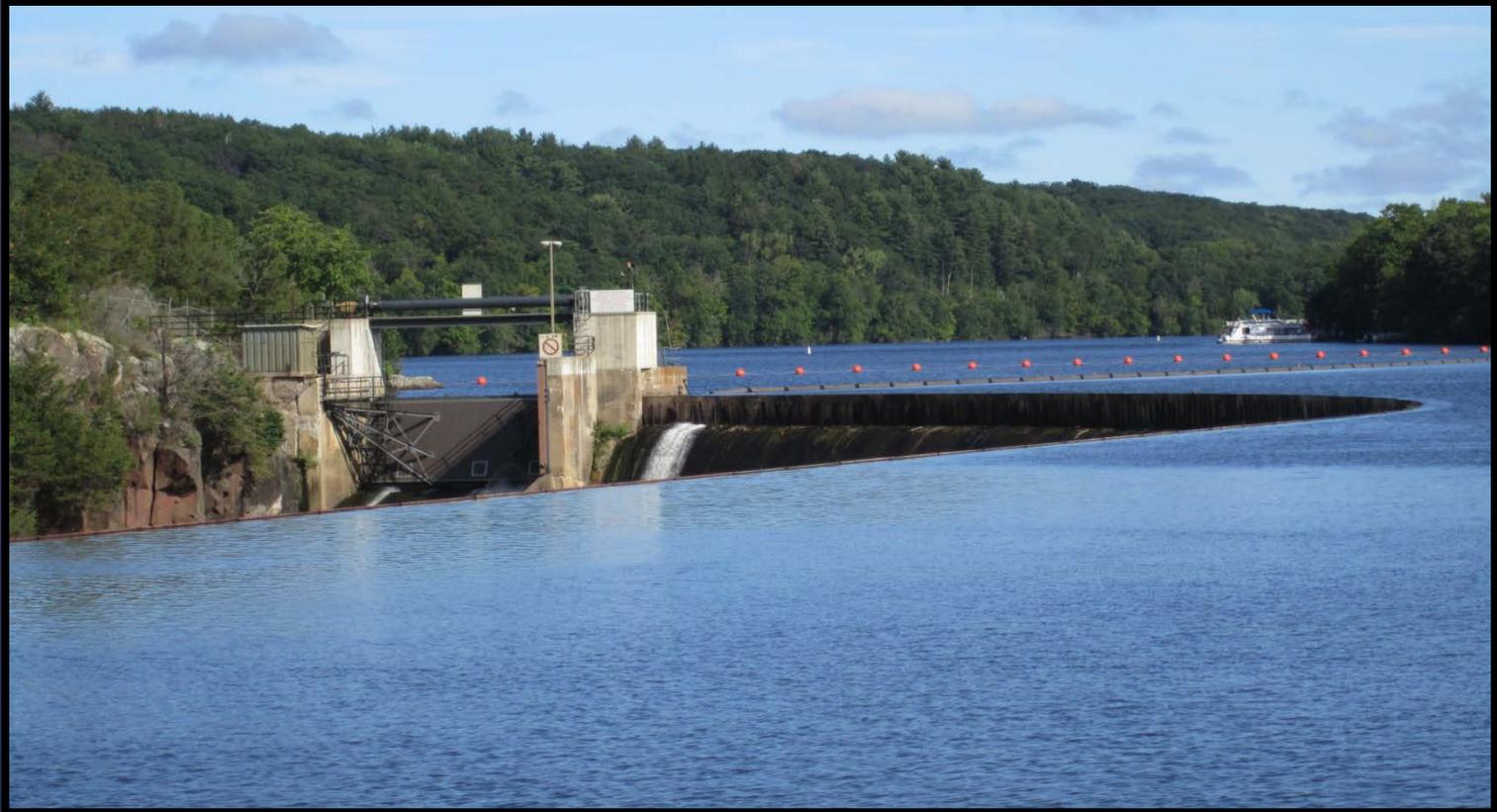
Wisconsin Minimum Standards

- ⌘ For new development in the floodfringe, the following are the minimum standards according to NR 116:
 - ⌘ Fill shall be not less than one foot above the regional flood elevation;
 - ⌘ Fill shall extend at such elevation at least 15 feet beyond the limits of any structure or building erected thereon; and
 - ⌘ Dryland access shall be provided
- ⌘ If existing streets or sewer lines are at elevations which make dryland access impractical, the municipality may permit new development and substantial improvement where access roads are at an elevation lower than the RFE provided:
 - ⌘ The municipality has a DNR-approved emergency evacuation plan or
 - ⌘ The municipality has written assurance from the appropriate units of police, fire, and emergency services that rescue and relief can be provided by wheeled vehicles.

Emergency Access Examples



Dam Failure Analyses



DFA Adoption

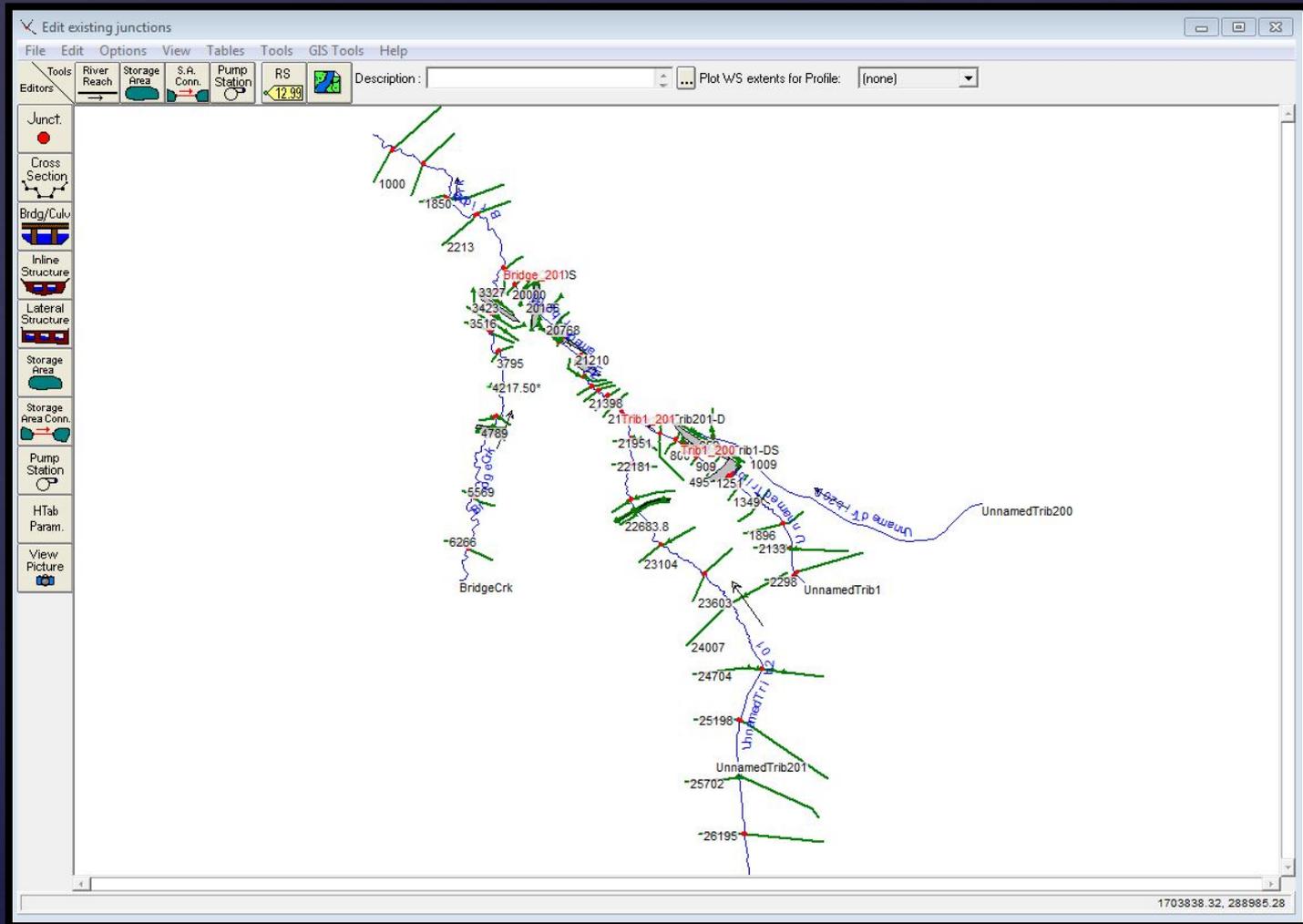
- ⌘ All large dams in the State of Wisconsin require Dam Failure Analyses (DFA).
- ⌘ NR 116.08(3)(6)(b) – Developed areas downstream of compliant dams shall be zoned and regulated as follows:
 - ⌘ For high hazard dams, assuming that the dam is nonexistent during the regional flood.
 - ⌘ For significant or low hazard dams, assuming the dam fails during the regional flood.
 - ⌘ NR 116.08(3)(6)(c) – Undeveloped areas downstream of a compliant dam shall be zoned and regulated assuming that the dam fails during the regional flood.

DFA Adoption

- ⌘ Once a DFA is approved, the Regional WME will send the local community an adoption notice as well as the appropriate profiles, maps, and data to adopt into the ordinance.
 - ⌘ The DFA must be adopted in the ordinance within 6 months of receiving the notice from the Department.
- ⌘ The same standards for adopting LOMCs apply for DFAs.
- ⌘ A floodplain appendix works great for communities with a number of dams.

****Wisconsin is one, if not the only, state in the U.S. that implements land use controls downstream of dams.****

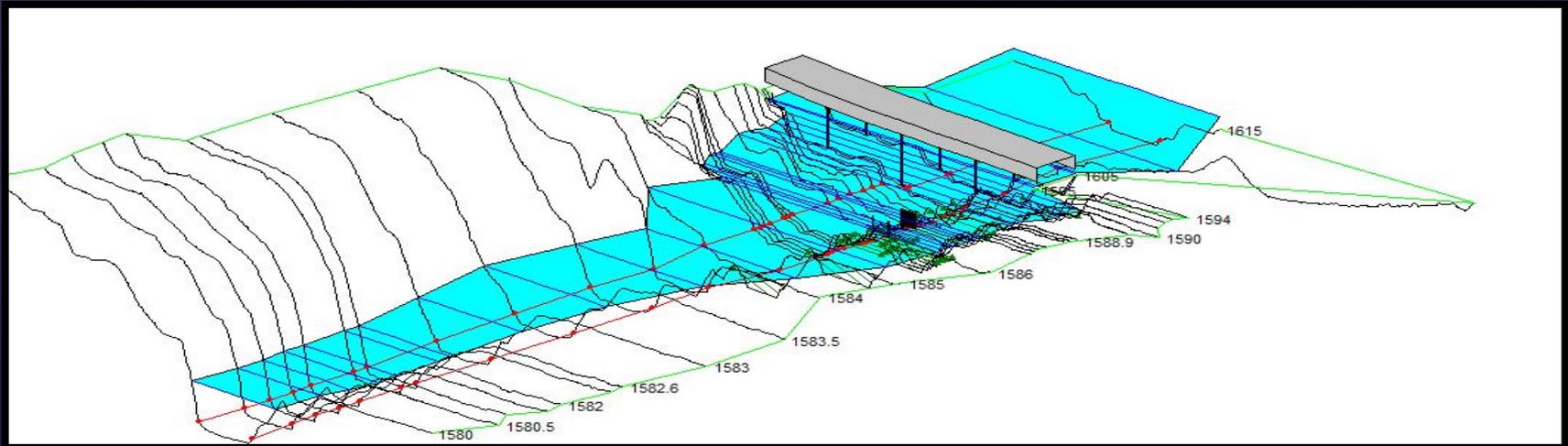
Hydrologic & Hydraulic Analyses



Hydrologic & Hydraulic Analyses

What exactly is an H&H?

- ⌘ When requested, the property owner will need to hire a P.E., to submit an H&H completed using the Army Corps of Engineer Hydrologic Engineering Centers River Analysis System (HEC-RAS)
- ⌘ The software is a step-backwater program that calculates RFE's based on approved regional flood discharges and elevation data.
- ⌘ Can also delineate between floodway and flood fringe.



FAQ for H&H's

Who requests a H&H?

- ⌘ This is the ultimate responsibility of the local zoning official, since permitting is completed under the local ordinance. Do not be afraid to consult with your Regional Water Management Engineer (WME).

When is an H&H required?

- ⌘ Any encroachment, obstruction, or fill placed in the floodway of a mapped floodplain requires an analysis, completed by a professional engineer, to investigate impacts on the RFE.

Who reviews an H&H?

- ⌘ Once an H&H is submitted, either from the consultant or applicant, the local municipality must request a review from the WME if associated with a LOMC. If the municipality has qualified staff to review the model, then they may do so.

How long is the review period by the DNR?

- ⌘ It varies, depending on the submittal. Additional materials, engineering components, etc... may need to be submitted. Typically the WME will include the local zoning official on any request to the consultant/applicant.

How much does an H&H cost?

- ⌘ It varies, depending on the data available, consulting firm, and scope of the project.

Who puts this all
together in the
Community?

Floodplain Administrators



WHAT PEOPLE THINK WE DO



WHAT CITIZENS
THINK WE DO



WHAT OTHER
DEPARTMENTS
THINK WE DO



WHAT CO-WORKERS
THINK WE DO



WHAT WE THINK WE DO



WHAT IT IS REALLY LIKE!

Like

Tag Photo

Used by author's permission: Mr. Duane Demeritt

Photos of Association of State Floodplain Managers

ORD FEBRUARY 2012

Authority To Regulate Floodplains

- You are enforcing the local jurisdiction's regulations—not FEMA's or DNR's.
- Local regulations for reducing flood loss receive authority granted to municipalities by the States.
- Inherent in the right to enact regulations is the duty and authority to administer and enforce them.



FEMA

Job Aid Components: Resources and Procedures

1. Provide educational and outreach materials.
2. Establish an interoffice review process.
3. Develop an adequate permit application form.
4. Offer “over-the-counter” consultation.
5. Check application for completeness.
6. Check application for technical compliance.
7. Get necessary interoffice reviews / signoffs.
8. Approve or deny the application.



FEMA

Job Aid Components: Construction

9. Perform field inspections.

10. Issue certificate of occupancy / completion.



FEMA



Check Application for Completeness

- All forms provided.
- All required information provided.
- Signatures provided. Topography (existing / proposed)
- Floodplain and floodway boundaries
- BFEs
- Plans / elevations of existing / proposed structures
- Existing / proposed infrastructure
- Utilities



FEMA

(2) LAND USE PERMIT

A land use permit shall be obtained before any new development; repair, modification or addition to an existing structure; or change in the use of a building or structure, including sewer and water facilities, may be initiated. Application to the zoning administrator shall include:

(a) GENERAL INFORMATION

1. Name and address of the applicant, property owner and contractor;
2. Legal description, proposed use, and whether it is new construction or a modification;

(b) SITE DEVELOPMENT PLAN

A site plan drawn to scale shall be submitted with the permit application form and shall contain:

1. Location, dimensions, area and elevation of the lot;
2. Location of the ordinary highwater mark of any abutting navigable waterways;
3. Location of any structures with distances measured from the lot lines and street center lines;
4. Location of any existing or proposed on-site sewage systems or private water supply systems;
5. Location and elevation of existing or future access roads;
6. Location of floodplain and floodway limits as determined from the official floodplain zoning maps;
7. The elevation of the lowest floor of proposed buildings and any fill using the vertical datum from the adopted study – either National Geodetic Vertical Datum (NGVD) or North American Vertical Datum (NAVD);
8. Data sufficient to determine the regional flood elevation in NGVD or NAVD at the location of the development and to determine whether or not the requirements of s. 3.0 or 4.0 are met; and
9. Data to determine if the proposed development will cause an obstruction to flow or an increase in regional flood height or discharge according to s. 2.1. This may include any of the information noted in s. 3.3(1).

Legal Nonconforming Uses & Structures





Legal Nonconforming Structures & Substantial Improvement

& What is a legal nonconforming structure?

- ∅ A lawful structure that was in place prior to the passage of the ordinance.
- ∅ Any structure built in the floodplain after the effective passage of the ordinance are not legal and may be in violation of the local floodplain ordinance.

Applicability and General Provisions

- ⌘ NR 116.15(1) – “These standards apply to the modification of, or addition to, any building to the use of any building or premises which was lawful before the passage of the ordinance.”
- ⌘ NR 116.15(1)(c) – “No modification or addition to any nonconforming building or any building with a nonconforming use, which over the life of the building would exceed 50% of its present equalized assessed value, may be allowed unless the entire building is permanently changed to a conforming building with a conforming use in compliance with the applicable requirements of this chapter.”
- ⌘ No maintenance to any non-conforming building or any building with a nonconforming use, which would exceed 50% of its present equalized assessed value, may be allowed unless the entire building is permanently changed to a conforming building.
- ⌘ No maintenance or modification/addition to any non-conforming building or any building with a nonconforming use, which would exceed 50% of its present equalized assessed value, may be allowed unless the entire building is permanently changed to a conforming building.

Equalized Assessed Value & Improvements

- ⌘ The Equalized Assessed Value (EAV) is the product of the assessed value of the property (improvements) and the State Equalization Factor.
- ⌘ Prior to applying for a permit, the applicant must present the EAV of the structure and the costs associated with the proposed improvements to the nonconforming structure.
 - ⌘ If the costs of the improvements exceed 50% of the EAV, then structure must become conforming with the ordinance.
 - ⌘ The application should include a set of detailed plans with the cost estimate including labor and materials.
- ⌘ The costs of improvements to a nonconforming structure are cumulative through the life of the structure.
 - ⌘ The local community must keep record of the improvements.
- ⌘ The cost to elevate or flood proof a structure does not count towards the 50% limit.

Maintenance vs. Alteration

- ⌘ Alteration – An enhancement, upgrading or substantial change or modifications other than an addition or repair to a dwelling or to electrical, plumbing, heating, ventilating, air conditioning and other systems within a structure
- ⌘ Maintenance – The act or process of restoring original soundness, including redecorating, refinishing non-structural repairs, or the replacement of existing fixtures, systems or equipment with equivalent fixtures, systems or structures.
- ⌘ General Rule of Thumb
 - ⌘ If the proposed project is an alteration which if damaged would cost significantly more to replace than what was originally there, it is fair to assume that particular proposal should be considered a substantial improvement and count towards the 50% limit.

Substantial Improvement/Substantial Damage: Items Included/Excluded



Items To Be Included

All Structural Elements, including	All Interior Finish Elements, including	All Utility and Service Equipment, including	Other
<ul style="list-style-type: none"> ▪ Spread or continuous foundation footings and pilings ▪ Monolithic or other types of concrete slabs ▪ All walls, tie beams, and trusses ▪ Wood or reinforced concrete decking or roofing ▪ Floors and ceilings ▪ Attached decks and porches ▪ Interior partition walls ▪ Exterior wall finishes (e.g., brick, stucco, or siding) including painting and decorative moldings ▪ Windows and doors ▪ Re-shingling or reroofing a roof ▪ Hardware 	<ul style="list-style-type: none"> ▪ Tiling, linoleum, stone, or carpet over subflooring ▪ Bathroom tiling and fixtures ▪ Wall finishes, including dry wall, painting, stucco, plaster, paneling, marble, or other decorative finishes ▪ Kitchen, utility, and bathroom cabinets ▪ Built-in bookcases, cabinets, and furniture ▪ Hardware ▪ Ornamental work 	<ul style="list-style-type: none"> ▪ HVAC equipment ▪ Repair or reconstruction of plumbing and electrical services ▪ Light fixtures and ceiling fans ▪ Security systems ▪ Built-in kitchen appliances ▪ Built-in washer/dryer ▪ Central vacuum systems ▪ Water filtration, conditioning, or recirculation systems 	<ul style="list-style-type: none"> ▪ Labor and other costs associated with demolishing, removing, or altering building components ▪ Construction management/supervision ▪ Overhead and profit ▪ Equivalent costs for: <ul style="list-style-type: none"> ▪ Donated materials ▪ Volunteered labor (including owners') ▪ Any improvements beyond pre-damaged condition

Items To Be Excluded

<ul style="list-style-type: none"> ▪ Plans and specifications ▪ Survey costs ▪ Permit fees ▪ Debris removal (e.g., removal of debris from building or lot, dumpster rental, transport fees to landfill, and landfill tipping fees), and cleanup (e.g. dirt and mud removal, building dry-out, etc.) 	<ul style="list-style-type: none"> ▪ Items not considered real property, such as throw rugs, furniture not built-in, appliances ▪ Outside improvements, including: <ul style="list-style-type: none"> ▪ Landscaping ▪ Sidewalks ▪ Fences ▪ Yard lights ▪ Swimming pools ▪ Screened pool enclosures ▪ Sheds ▪ Gazebos ▪ Detached structures (including garages) ▪ Landscape irrigation system
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Note: This list is intended for guidance only, and may not be all-inclusive.



Substantial Improvement vs. Substantial Damage

- **Substantial improvement:** Cost to rebuild / improve a structure in the floodplain, whether damaged or not = More than 50% of market value prior to work start.
- **Substantial damage:** Cost of post-damage repair = More than 50% of pre-damage market value.



Included in Substantial Improvement

- Reconstruction
- Rehabilitation
- Addition
- Other Improvements



Substantial improvement of any structure in the floodplain, whether damaged or not, is considered new construction under the local flood damage prevention ordinance.



FEMA

Community Responsibility

Community:

- Only entity that can make a substantial improvement/substantial damage determination.
- Must assure:
 - Accuracy of improvement cost and actual repair / damage value.
 - Consistent market value estimates.



FEMA

Example Improvement Scenario



Review of Permit

- ⌘ What type of permit is this?
- ⌘ What's the BFE/RFE?
- ⌘ Calculate EAV
- ⌘ Cost of Changes (\$130,000)
- ⌘ In the permit, they have a list of improvements. Is this correct list?
- ⌘ Would you ask for more info?
- ⌘ FW (H & H for floodway development)



In-class activity

Questions and Answers

