Pursuant to ch. 227, Wis. Stats., the Wisconsin Department of Natural Resources has finalized and hereby certifies the following guidance document.

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<td>DOCUMENT TITLE</td>
<td>Floodplain Management in Wisconsin Quick Guide</td>
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<td>PROGRAM/BUREAU</td>
<td>WATERWAYS PROGRAM</td>
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<td>STATUTORY AUTHORITY OR LEGAL CITATION</td>
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<td>DATE SENT TO LEGISLATIVE REFERENCE BUREAU (FOR PUBLIC COMMENTS)</td>
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DNR CERTIFICATION

I have reviewed this guidance document or proposed guidance document and I certify that it complies with sections 227.10 and 227.11 of the Wisconsin Statutes. I further certify that the guidance document or proposed guidance document contains no standard, requirement, or threshold that is not explicitly required or explicitly permitted by a statute or a rule that has been lawfully promulgated. I further certify that the guidance document or proposed guidance document contains no standard, requirement, or threshold that is more restrictive than a standard, requirement, or threshold contained in the Wisconsin Statutes.

[Signature]

12/16/19
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This **Quick Guide** helps local officials and citizens understand why and how Wisconsin communities must manage development in floodplains to protect people and property. Flood-prone communities adopt codes and ordinances that detail the rules and requirements. In cases of conflict, those codes and ordinances, not the guidance provided in this publication, must be followed.

This **Quick Guide** was developed and funded jointly by the Wisconsin Department of Natural Resources (DNR) and the Federal Emergency Management Agency (FEMA).

Questions, comments and requests for additional copies should be directed to the State NFIP Coordinator at dnrfloodplain@wisconsin.gov.

For more detail on all aspects of floodplain management, please refer to FEMA 480, **National Flood Insurance Program, Floodplain Management Requirements: A Study Guide and Desk Reference for Local Officials.**
Why Do We Regulate the Floodplain?

To protect people and property. Implementing floodplain management regulations reduces vulnerability to future flood risk. If we know low lying land will flood from time to time, we should make reasonable decisions to help protect our families, homes, and businesses.

To make sure National Flood Insurance Program (NFIP) flood insurance is available. Communities must join the NFIP and administer floodplain management requirements before residents and businesses can purchase NFIP flood insurance and be eligible for some types of Federal assistance, including flood mitigation grants.

To save tax dollars. Every time communities experience flood disasters local budgets are impacted. If we build smart, we’ll have fewer problems the next time the water rises. Remember, Federal disaster assistance is not available for all floods. Even when the President declares a disaster, communities still must pay a portion of repair and clean-up costs, temporary housing assistance, and evacuation expenses.

To avoid liability and lawsuits. If we know an area is mapped as a flood hazard area, and if we know people could be in danger and buildings could be damaged, doesn’t it make sense to take reasonable protective steps as our communities develop and redevelop?

Since 1978, NFIP flood insurance policy holders in Wisconsin have received over $103 million in claim payments. Even though that represents many payments, most of the State’s flood-prone property owners do not have flood insurance.
Wisconsin Floods and Floodplain Facts

- More than half of Wisconsin’s declared disasters involved flooding. Winter storms and tornadoes account for the rest.
- Most counties, cities and villages in Wisconsin have identified floodprone areas shown on Flood Insurance Rate Maps (FIRMs).
- Thousands of buildings and other structures are located in identified floodprone areas, called Special Flood Hazard Areas (SFHAs).
- Flood maps have not been prepared for many waterways.
- One county and 60 municipalities are floodprone but elect to not participate in the National Flood Insurance Program (as of April 2019).

Many flood events are not declared major disasters. Many floods are local, affecting only small areas such as several homes, a limited number of communities, or a few watersheds.
The National Flood Insurance Program (NFIP) was created by Congress in 1968 to protect lives and property and to reduce the financial burden of providing disaster assistance. The NFIP is administered by the Federal Emergency Management Agency (FEMA). Nationwide, over 22,300 communities participate in the NFIP. In Wisconsin, more than 563 counties, cities and villages participate.

The NFIP is based on a mutual agreement between the Federal Government and communities. Communities that participate agree to regulate development in mapped flood hazard areas according to certain criteria and standards. The partnership involves:

- **Flood hazard maps.** In partnership with water management districts, communities and the State, FEMA produces flood maps in accordance with FEMA standards. The maps are used by communities, insurance agents, real estate professionals, and others.

- **Flood insurance.** Property owners and renters in participating communities are eligible to purchase NFIP flood insurance for buildings and contents.

- **Regulations.** Communities must adopt and enforce minimum floodplain management regulations so that development, including buildings, is undertaken in ways that reduce exposure to flooding.

To learn more about the NFIP, including your potential flood risk and the approximate cost of a flood insurance policy, go to FEMA’s FloodSmart website [www.floodsmart.gov](http://www.floodsmart.gov).
Community Responsibilities

To participate in the National Flood Insurance Program, Wisconsin communities agree to:

- **Recognize** flood hazards in community planning (see page 6)
- **Adopt and enforce** flood maps and a flood damage prevention ordinance
- **Require** permits for all types of development in the floodplain (see page 22)
- **Assure** that building sites are reasonably safe from flooding
- **Require** new and substantially improved homes and manufactured homes to be elevated at or above the Flood Protection Elevation (FPE = BFE + 2 ft., see page 27)
- **Require** non-residential buildings to be elevated at or above the FPE; industrial structures may be dry floodproofed
- **Determine** if damaged buildings are substantially damaged
- **Conduct** field inspections; cite and remedy violations
- **Require and maintain** surveyed elevation information to document compliance (see pages 34, 35, and 38)
- **Carefully consider** requests for variances
- **Resolve** non-compliance and violations of floodplain management requirements
- **Advise and work** with FEMA and the DNR when updates to flood maps are needed
- **Maintain** records for review and respond to periodic requests for reports from DNR and FEMA
Wisconsin communities should consider incorporating planning considerations into comprehensive plans, land development codes, floodplain management regulations, and multi-hazard mitigation plans to reflect the long-term goal of increasing resiliency to future flooding. NFIP regulations (44 CFR Section 60.22(c)) outline 19 factors for consideration, including:

- **Divert** development to areas outside the SFHA to reduce flood damage
- **Full public disclosure** to potential buyers of properties in the SFHA
- **Acknowledge** that SFHA development may increase flood risk of existing development
- **Improve** local drainage to control increased runoff that increases the probability of flooding on other properties
- **Require** additional elevation above the minimum (e.g., above the State minimum FPE, which is BFE + 2 ft.)
- **Require** consistency between State, regional and local comprehensive plans and floodplain management programs
- **Require** evacuation plans for manufactured home parks and subdivisions
Who needs flood insurance? Flood insurance is required for all buildings in mapped flood zones shown on FEMA’s maps if they are financed by Federally-backed loans or mortgages. All homeowners, business owners, and renters in communities that participate in the NFIP may purchase NFIP flood insurance on any building and its contents, even if outside of the mapped flood zone. Homes in mapped flood zones are five times more likely to be damaged by flooding than by major fires.

Not in a mapped flood zone? Unfortunately, it’s often after a flood that many people discover that their home or business property insurance does NOT cover flood damage. Approximately 25% of all flood damage occurs in low risk zones, commonly described as being “outside the mapped floodplain.”

Protected by a levee or dam? Even areas protected by levees or other flood control structures have some risk of flooding if the structures are overtopped or fail. Even when levees provide “100-year” flood protection, there is still a chance that a higher flood will occur.

What about disaster grants and loans? Federal disaster grants do not cover most losses and repayment of a disaster loan can cost many times more than the cost of a flood insurance policy.

Want to know more? Learn more at www.floodsmart.gov. To purchase a policy, call your insurance agent.
The NFIP’s Community Rating System (CRS)

The NFIP recognizes communities that achieve better flood resiliency by providing policy holders with reduced flood insurance premiums. Communities must apply to participate in CRS and commit to implement and certify activities that contribute to reduced flood risk. Examples of actions communities can take to reduce the cost of flood insurance premiums include:

- Preserve open space in the floodplain
- Enforce higher standards for safer development through zoning, stormwater, subdivision, and flood damage protection ordinances
- Obtain grants to buy out or elevate houses, or to floodproof manufacturing/industrial structures
- Develop hazard mitigation plans and watershed and storm management plans
- Undertake engineering studies and prepare flood maps
- Maintain drainage systems
- Monitor flood conditions and issue warnings
- Inform people about flood hazards, flood insurance, and how to reduce flood damage

Property owners in 17 Wisconsin communities that participate in the CRS receive premium discounts ranging from 5% to 25% (as of April 2019).

Community officials can request assistance from CRS specialists to help with the application process and prerequisites. Check the online CRS Resource Center (see page 67).
Flood Insurance Studies (FISs) are compilations of flood risk information used for community planning and development.

Flood Insurance Rate Maps (FIRMs) show flood zones subject to regulations and where flood insurance is required.

Access FIRMs at the FEMA Flood Map Service Center at https://msc.fema.gov, where current and historical flood maps may be viewed and downloaded.

Many cities and counties also make digital flood maps available online, sometimes with property parcel data.

Looking for FEMA Flood Map Information?

Need a fast answer? Community planning, zoning, engineering, or permit offices may also have paper flood maps available for viewing by the public.
Portions of flood maps can be produced, saved, and printed by making a “FIRMette.” FIRMettes are full-scale sections of FIRMs.

- The tutorial “How to Print a FIRMette and Download a FIRM Panel” is available at [www.fema.gov/media-library/assets/documents/34930](http://www.fema.gov/media-library/assets/documents/34930).

- Making a FIRMette is easy after a property is located. Use the <Search by Address> link or <Search All Products> to find the community and map panel of interest.

- Earlier versions of FIRMs are available for many communities, so current flood hazard information can be compared to historic data.

Go to [https://msc.fema.gov](https://msc.fema.gov) and check out the “MSC Frequently Asked Questions.” For step-by-step instructions on how to read flood maps and view the How to Read a Flood Insurance Rate Map Tutorial.
For riverine floodplains with Base Flood Elevations (BFEs) determined by detailed flood studies, the Flood Profile in the Flood Insurance Study shows water surface elevations for different frequency floods (see page 15).

The **Special Flood Hazard Area (SFHA)** is that portion of the floodplain subject to inundation by the base flood (1% annual chance). Riverine SFHAs are shown on FIRMs as Zones A, AE, AH, AO, AR, and A99. Older FIRMs may have Zones A1-A30.

See page 12 to learn about the floodway, the area of the SFHA where flood waters usually are deeper and flow faster.

See page 17 to learn about coastal floodplains in the Great Lakes counties.
For any proposed floodway development, before a local floodplain permit can be issued, the applicant must provide evidence from an experienced professional engineer that “no-rise” will occur (see page 32). If ANY increase (more than 0.00 ft.) will occur, a Conditional Letter of Map Revision (CLOMR) must be obtained from FEMA (see page 19). Proposed projects that have cumulative water surface increases may be permitted if the increases do not cause “increased flood damage potential” (including no impacts on existing buildings).
Flood Insurance Rate Map (Riverine)

1. **Unshaded Zone X** is all other areas considered low risk.

2. **Base Flood Elevation (BFE)** is the water surface elevation of the base flood rounded to the nearest whole foot (consult FIS profiles and tables for more accurate elevations).

3. The **Floodway** is the cross-hatched area (see page 12).

4. **Zone AE** is the 1% annual chance (100-year) floodplain with BFEs.

5. **Cross Section** location (see page 15).

6. **Shaded Zone X** is the 0.2% annual chance (500-year) floodplain.

7. **Zone A** (approximate) is the 1% annual chance floodplain.
Approximate Flood Zones

Approximate Zone A designations are based on minimum criteria established FEMA, using very little field work and limited data. Newer FIRMs have better elevation data based on high resolution topography (LiDAR) which results in more accurate boundaries.

Before permits are issued, Regional Flood Elevations (RPEs) must be determined when development is proposed in an Approximate Zone A. Additional engineering information may be needed to establish the RFE and/or the location of floodway and flood fringe boundaries.

Check with community permitting offices for the best available data. Local officials may request assistance by contacting DNR floodplain staff at dnrfloodplain@wisconsin.gov.

An Approximate Zone A is a special flood hazard area where BFE information is not provided.

Everyone lives in an area with some flood risk – it’s just a question of whether it is a low, moderate, or high-risk flood hazard area.
Using the Riverine Flood Profile to Determine Riverine BFEs

Flood Profiles from Flood Insurance Study reports can be used to determine the BFE at a specific site. Profiles also show estimated water surface elevations for floods other than the 1% annual chance flood (100-year).

1. On the effective flood map, locate the site by measuring the distance, along the profile baseline of the stream channel, from a known point such as a road or cross section, for example, JM or JN.

2. Scale that distance on the Flood Profile and read up to the profile of interest, then across to determine the BFE, to the nearest 1/10 of a foot. (Answer: 853.0 feet).
Flood Insurance Studies have Floodway Data Tables for every waterway that was studied by detailed methods for which floodways were delineated.

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<th>CROSS SECTION</th>
<th>DISTANCE¹</th>
<th>WIDTH (FEET)</th>
<th>SECTION AREA (SQUARE FEET)</th>
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¹Feet above confluence with Rock River
²Elevations without considering backwater effect from Rock River

1. Velocity estimates based on the mean velocity for the cross sections.
2. Computed BFEs.
3. Elevations may not consider backwater effect from downstream river.
4. Amount of increase between without and with floodway is not more than 0.00 ft at any location.
1. **Zone AE** is subject to flooding by the base or 1% annual chance (100-year) flood, and waves less than 3 feet high.

2. **Zone VE** is where wave heights are expected to be 3 feet or more.

3. **Base Flood Elevation (BFE)** is the water surface elevation (in feet above the vertical datum shown on the map).

4. **Shaded Zone X** is the 0.2% annual chance (500-year) floodplain.

5. **Unshaded Zone X** is the area of minimal flood risk outside the 0.2% annual chance (500-year) floodplain.
The most accurate information available is used to make flood maps, including topographic base maps and detailed engineering methods or methods of approximation. FEMA issues map revisions if technical data are submitted to support the changes.

**Letter of Map Amendment (LOMA)** is an official amendment to an effective FIRM that may be issued when a property owner provides additional technical information from a professional land surveyor, such as ground elevation relative to the BFE. Lenders may waive the flood insurance requirement if the LOMA removes a building site from the SFHA because natural ground at the site is at or above the BFE.

**Letter of Map Revision Based on Fill (LOMR-F)** is an official revision to an effective FIRM that is issued to document FEMA’s determination that a structure or parcel of land has been elevated by fill above the BFE, and therefore is no longer in the SFHA. Lenders may waive the insurance requirement if the LOMR-F removes a building site from the SFHA.

Conditional Letter of Map Revision (CLOMR) comments on whether a proposed project, if built as shown on the submitted documentation, would meet the standards for a map revision. Communities should require this evidence prior to issuing permits for fill or alteration of a watercourse. Certificates of Occupancy/Compliance should be withheld until receipt of the final LOMR based on “as-built” documentation and certification.

Letter of Map Revision (LOMR) is an official revision to an effective FIRM that may be issued to change flood insurance risk zones, special flood hazard areas and floodway boundary delineations, BFEs and/or other map features. Lenders may waive the insurance requirement if the approved map revision shows buildings to be outside of the SFHA.

To learn more and download forms, find links by searching key words “MT-EZ,” “MT-1,” and “MT-2.”
Many levees are designed to protect land against flooding from the Base Flood. In order for FEMA to show those areas as outside of the Special Flood Hazard Area, communities and levee owners must certify that levees meet certain design criteria. Certification will present significant challenges during the map revision process.

Communities that have levees should determine as soon as possible whether certification will be required. Pursuant to FEMA’s Procedural Memoranda 34 and 43, and as outlined in Federal regulations at 44 CFR Section 65.10, the documentation requirements address:

- Freeboard
- Closures
- Embankment protection for erosion
- Embankment and foundation stability
- Settlement
- Interior drainage and seepage
- Operation and maintenance plans
- Other site-specific criteria and state requirements

* Freeboard is the distance between the BFE and the top of the levee; for FEMA accreditation freeboard is usually 3 feet
If land is shown on the map as “in” the SFHA, but the building site is higher than the Base Flood Elevation (BFE), owners should get a professional land surveyor to complete a FEMA Elevation Certificate (EC). Submit a request for a Letter of Map Amendment (LOMA) to FEMA along with the EC to verify that the structure is above the BFE (see page 18). If FEMA approves the request, lenders are not required to have property owners get flood insurance policies, although some may still require policies. FEMA and DNR encourage owners with LOMAs to get flood insurance at reduced rates.

Owners should keep certificates and LOMAs with deeds— the documentation will help future buyers.
Activities in SFHAs that Require Local Permits and Approvals

Regulated activities include but are not limited to:
- Construction of new buildings
- Additions to buildings
- Improvements to buildings
- Renovation of building interiors
- Repair of damaged buildings
- Placement of manufactured (mobile) homes
- Subdivision of land
- Construction or placement of temporary buildings and accessory structures
- Construction of agricultural buildings and cranberry reservoirs
- Construction of roads, bridges, and culverts
- Placement of fill, grading, excavation, mining, and dredging

Floodplain development or building permits must be obtained before these activities and ANY land-disturbing activities occur in flood zones. Contact community permitting offices for specific requirements.
Avoid SFHAs When Possible

All land subdivided into lots, some lots partially in the floodplain, setbacks modified to keep homesites on high ground.

**RECOMMENDED**

Floodplain land put into public/common open space, net density remains, lot sizes reduced and setbacks modified to keep homesites on high ground.

**RECOMMENDED**

Let the floodplain perform its natural function – if possible, keep it as open space. Other compatible uses: Recreational areas, playgrounds, reforestation, unpaved parking, gardens, pasture, and created wetlands.
Fill Can Adversely Affect Floodplain Functions

Floodplains are supposed to store and convey floodwater. If storage space is blocked by fill material, future flooding may be worsened. Fill may change drainage and adversely affect adjacent properties. Fill can alter valuable floodplain functions, including wildlife habitat, wetlands, and groundwater infiltration. Communities may apply the floodway restrictions on fill to the entire floodplain.

State statute Chapter 30 permits may be required for placement of fill below the Ordinary High Water Mark (OHWM) determined by DNR.
DNR, in partnership with FEMA and the Wisconsin State Cranberry Growers Association, developed a floodplain district for Flooded Agricultural-Cranberry Farms. When existing cranberry farm operations are located in floodplains:

- Landowners establish boundaries of existing activities and communities certify the boundaries to allow normal farming practices and maintenance activities.
- Landowners establish the height of existing perimeter dikes (surveyed or using 2-ft contour maps). Maintenance activities are permitted within the certified boundaries and below the top of existing perimeter dikes.
- Permits are required for improvements, such as raising existing perimeter dikes.
- Permits are required for new activities, including building new cranberry beds and new dikes.

Compliance with all requirements of local floodplain ordinances is required for:

- Construction, maintenance, repair, and improvement of buildings in Flooded Agricultural-Cranberry Farm districts
- New cranberry farm operations or expansion of existing farms outside of certified existing boundaries
Major storms and flash floods can cause flooding that rises higher than the Base Flood Elevation (BFE). Be safer – protect your home or business by avoiding flood zones or building higher. See page 28 to see how this will save you money on flood insurance.
In Wisconsin, floodplain management requirements for buildings are measured relative to the Flood Protection Elevation. The FPE is determined as follows:

**Regional Flood Elevation (RFE)**
+ **2 feet minimum freeboard** (some communities adopt more freeboard)

= **Flood Protection Elevation (FPE)**

**Terms and Definitions**

**Regional Flood** – A flood determined to be representative of large floods known to have occurred in Wisconsin. The regional flood has a one percent chance of being equaled or exceeded in any given year, and if depicted on the FIRM, the Regional Flood Elevation is equivalent to the BFE.

**Flood Protection Elevation (FPE)** – An elevation of two feet of freeboard above the water surface profile elevation designated for the regional flood.
Freeboard is additional height – a factor of safety. Buildings that are higher than the BFE experience less damage. Owners of buildings elevated above the BFE also save on NFIP flood insurance.

**NOTE!** Flood insurance rates and various fees change from time to time. Rather than specific costs for insurance, these figures give a feel for how much difference just a foot or two can make.

**Remember!** Builders must submit floor elevations as part of foundation inspections. An error of just 6 or 12 inches could more than double the cost of NFIP flood insurance. Imagine trying to sell a house if the bank requires insurance that costs nearly $10,000 a year!

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**Freeboard: Build Higher, Reduce Damage, Save on Insurance**

- Unofficial estimates using 2019 rates; use only for comparison purposes
- **Savings over at-BFE premium**
Variances From Elevation Requirements

Very specific criteria related to the property (not the owner’s actions or preferences) must be satisfied to justify a variance. In addition to the variance criteria in Wisconsin Statutes, NFIP requirements include:

- Compliance would result in exceptional noneconomic hardship due to the unique conditions not common with adjacent properties
- Variance is consistent with purposes of floodplain management regulations and not contrary to the public interest
- No increase in the BFE would result
- Applicant has shown good and sufficient cause
- Variance is the minimum necessary to provide relief
- Variance is for lot size less than ½ acre and contiguous to lots with existing structures below the BFE, unless technical justification is presented

Property owners and communities must carefully consider the impacts of variances to allow buildings below the FPE. Not only will buildings be more likely to sustain flood damage, but NFIP flood insurance will be very costly (see page 28). Communities with a pattern of granting variances may be subject to NFIP sanctions, costing all insurance policyholders even more.
Two objectives of the NFIP are to reduce flood damage and guide development to less hazard prone areas. When buildings are built in special flood hazard areas, increased resistance to flooding is achieved by the following fundamentals:

- **Foundations** capable of resisting flood loads
- **Lowest floors elevated** high enough to prevent floodwater from entering during the design event
- **Equipment and utilities** elevated or designed to remain intact and be restored easily
- **Enclosures below elevated floors** limited to parking, limited storage, and building access and designed to minimize damage
- **Flood damage-resistant materials** used below elevated lowest floors

Critical facilities such as hospitals, fire stations, police stations, and buildings where hazardous materials or critical records are stored should be located outside of the floodplain. But when they must be located in the floodplain, they should be protected to a higher level than other buildings to allow continued functioning even after extreme flooding. Facility owners should develop emergency plans for actions to take before the onset of flooding, during floods, and after floodwater recedes.

In short ... flood resistant buildings!
Some Key Floodplain Development Permit Review Steps

The permit reviewer must check many things. Some of the key questions are:

- Is the site in the mapped flood zone or floodway?
- Is the natural ground elevation below the BFE?
- Are applicants advised that other State and Federal permits must be obtained before work starts?
- Does the site plan show the flood zone, Base Flood Elevation and building location?
- Is substantial improvement or repair of substantial damage proposed?
- Is an addition proposed?
- Will new buildings and utilities be elevated properly?
- Do the plans show an appropriate and safe foundation?
- Are all required design certifications submitted?
- Will the owner/builder have to submit an as-built Elevation Certificate?
The Floodway “No-Rise” Certification

- Floodways convey a large volume of water and may have high velocities.
- State law restricts development in floodways.
- Engineers must prepare floodway encroachment analyses to evaluate the hydraulic impact of proposed development, including but not limited to grading/filling, new/replacement culverts and bridges, and bank stabilization.
- Development is allowed if certified to cause “no-rise” (0.00 ft. increase) in BFEs or if legal arrangements are made.
- Fencing in floodways should be “open” to allow floodwater to flow through; solid and chain link fencing are floodway encroachments.
- “No-rise” certifications must be signed by a Professional Engineer licensed in Wisconsin and qualified to conduct hydraulic analyses.
- Request a “No-Rise” Certification form from dnrfloodplain@wisconsin.gov.

The floodway encroachment analysis must be based on technical data obtained from FEMA.

Reduce flood risk – don’t build in the Floodway!
Good information will lead to better construction and less exposure to future flood damage.

Contact the local floodplain administrator or building, planning, zoning, or engineering department for application forms and guidance.
Communities that participate in the NFIP agree to maintain certain documentation for all development in flood zones, including but not limited to:

- Permits issued and variances granted
- Letters of Map Change revising FIRMS (see pages 18 and 19)
- Floodway encroachment and watercourse alteration
- Design certifications for dry floodproofed buildings
- Design certifications for engineered flood openings
- Determinations of whether alterations, improvements or additions to existing buildings are substantial improvements
- Determinations of whether damaged buildings are substantially damaged
- Certificates of Compliance with surveyed “as-built” building elevations (Elevation Certificates)

Maintaining permanent records allows communities to respond to citizen inquiries and to provide documentation to FEMA and DNR as part of Community Assistance Visits (CAV).
The Elevation Certificate (EC) is a FEMA form. Go to www.fema.gov and search for “Elevation Certificate.”

The EC must be completed and sealed by a California professional land surveyor or civil engineer.

Community officials may complete the EC for sites in Approximate Zone A and Zone AO (see Section G of the EC).

It can be used to show lowest grades adjacent to planned or existing building sites are above the Base Flood Elevation (see page 21).

It is used to verify building and equipment elevations.

Insurance agents use the EC to write and rate NFIP flood insurance policies.

See page 68 for online Elevation Certificate training information.

By itself, the EC cannot be used to waive the mortgage lender requirements to obtain flood insurance. See page 19 to learn about FEMA’s Letter of Map Amendment process.
Completing the Elevation Certificate

In this example, the BFE is 762.0 and the FPE is 764.0.

A professional land surveyor must fill out and seal the EC form. The EC includes diagrams for different building types. Several points must be surveyed. Although an EC is required only for finished construction ("as-built"), it’s a good practice to complete the EC when the lowest floor is set and prior to further vertical construction.
Certificates of Compliance are evidence that permitted development, including buildings that are built, replaced, altered, added to, modified, or repaired, conforms to floodplain management requirements. These certificates must be issued before the development can be used or occupied.

- Permittees notify communities when construction is complete.

- Permittees must submit certifications signed by a registered professional engineer, architect or land surveyor, as appropriate, that the fill, lowest floor, or dry floodproofing elevations comply with issued permits. As-built Elevation Certificates are part of this documentation.

- Prior to occupancy or use, communities must issue Certificates of Compliance documenting compliance with the floodplain management requirements. DNR’s model certificate is online at https://dnr.wi.gov/topic/floodplains/.

- Communities must keep Certificates of Compliance on file.

Many communities use a form to be submitted by applicants and accompanied with statements or certifications signed and sealed by professional land surveyors (elevation) or licensed professional engineer or architect (design). Some communities require Elevation Certificates when foundations are complete and prior to further vertical construction.
Owners should keep Elevation Certificates in a safe place. They can be used to demonstrate that buildings were compliant at the time of construction. Also, Elevation Certificates are required to obtain NFIP flood insurance policies.

“As-built” Elevation Certificates should be submitted before the final inspection. Surveyors collect information helpful to verify compliance, including flood openings and elevation of equipment.
CAUTION! Enclosures (including crawlspaces) have some specific requirements. Note: When the walking surface of the lowest floor is at the FPE, under-floor utilities are not allowed. Fill used to elevate buildings must be placed properly (see page 40).
Earthen fill used to raise the ground above the flood elevation must be placed properly so that it does not erode or slump when water rises. For safety and to meet requirements, fill should:

- Not be placed in areas with poor drainage or where the fill may divert water onto adjacent properties.
- Be good clean soil, free of large rocks, construction debris, and woody material (stumps, roots)
- Be machine compacted to 95 percent of the maximum density (determined by a design professional)
- Have graded side slopes that are not steeper than 2:1 (one foot vertical rise for every 2 feet horizontal extent); 3:1 flatter slopes are recommended
- Have slopes protected against erosion (vegetation for “low” velocities, durable materials for “high” velocities – determined by a design professional)
- Avoid the floodway (see page 32)

State requirements specify that fill used to elevate buildings must extend at least 15 feet from the building. Engineers can find more information in FEMA’s instructions for Letters of Map Revision based on Fill (FEMA Form MT-1) and NFIP Technical Bulletin #10.
New buildings are not allowed to have basement floors below the BFE and NFIP flood insurance coverage is very limited in existing basements for a very good reason. It only takes an inch of water over a door threshold or window sill and the entire basement fills up! Excavating a basement into fill doesn’t always make it safe because saturated groundwater can damage the walls.

**Definitions**

A **basement** is any portion of a building that has its floor sub-grade (below ground level) on all sides.
Crawlspace Details (Zone A/AE)

- The Lowest Floor must be at or above the Flood Protection Elevation (BFE + 2 ft).
- The crawlway (crawlspace) interior grade or floor must be at or above the BFE.
- If the crawlway interior grade or floor is below the FPE, the walls must be dry floodproofed.
- Designs for dry floodproofed crawlways must be certified by a registered professional engineer or architect.
- Utility service and equipment may be located in the crawlway (see page 43).
Utilities and mechanical equipment must be either:

- Elevated to or above the FPE (see page 44)
- Designed to prevent water from entering or accumulating within the equipment
- Installed in a dry floodproofed crawlway
Fuel and propane tanks can pose serious threats to people, property and the environment during flood conditions. Search online for FEMA videos on “Fuel Tank Flood Hazards” and “How to Anchor Home Fuel Tanks”. “How-To Guides” on anchoring fuel tanks and other flood damage reduction techniques are available at: http://www.fema.gov/library/viewRecord.do?id=3262.
In floodplains, accessory structures must:

- Not be habitable
- Be elevated on fill, which is not required to extend 15 ft. from the building
- Have the structure floor be at or above the BFE
- Have utilities that are at or above the FPE (BFE + 2 ft.)
- Materials that are buoyant, flammable, explosive, or injurious to property, water quality or human, animal, plant, fish or aquatic life must be stored at or above the FPE
- Meet the floodway limitations, if applicable
- Not be modified for different use in the future

Even small accessory buildings are “development” and permits with the noted conditions are required. Examples of accessory structures include garages, storage sheds, boathouses, gazebos, picnic shelters, and pole barns.
Mobile Recreational Vehicles

In flood zones, mobile RVs must:

- Be licensed and titled as an RV (not as a permanent residence)
- Be built on a single chassis
- Must measure 400 sq.ft. or less (measured at largest horizontal projection)
- Be road-ready, with inflated tires and be self-propelled or towable by a light-duty truck
- Have no attached deck, porch, shed, or utilities
- Be used for temporary recreational, camping, travel or seasonal use (no more than 180 consecutive days)
- Have quick-disconnect sewage, water and electrical connectors

Mobile RVs that do not meet these conditions must be installed and elevated like residential structures, including permanent foundations and tie-downs.

Camping near the water? Ask the campground or RV park operator about flood warnings and plans for safe evacuations.
General Requirements in Coastal High Hazard Areas (Zone V)

Revisions to Flood Insurance Rate Maps for the Lake Michigan and Lake Superior shorelines may show coastal high hazard areas (Zone V).

The fundamental requirements for flood resistant construction (see page 30) apply in Zone V and:

- Buildings must be elevated on “open” foundations (piers, pilings, columns) to allow waves and water to pass under without imposing significant wave forces (see page 48).

- The lowest horizontal structural member of the lowest floor must be elevated at or above the FPE (BFE + 2 ft.), see page 48.

- Foundation designs must be prepared and certified by registered design professionals (see page 49).

- Walls of enclosures below elevated buildings must be designed to break away (see page 50).

Some Zone AE areas inland of Zone V may be subject to damaging waves and erosion. DNR recommends buildings in these areas be designed and constructed according to the Zone V requirements.
In Zone V, the design specifics will be determined and certified by an architect or engineer based on the site, including how the building will be elevated and how deep the foundation elements will be in the ground (see page 49). For more information, see FEMA P-762, Local Officials Guide to Coastal Construction and FEMA P-55, Coastal Construction Manual.
The Zone V Design Certificate

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<table>
<thead>
<tr>
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<tbody>
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<td>Datum</td>
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<td>NAVD</td>
</tr>
<tr>
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<td></td>
</tr>
<tr>
<td>Base Flood Elevation (BFE)</td>
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</tr>
<tr>
<td>Elevation of Lowest Adjacent Grade</td>
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<td></td>
</tr>
<tr>
<td>Approximate Depth of Anticipated Scour/Erosion used for Foundation Design</td>
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<td></td>
</tr>
<tr>
<td>Embedment Depth of Pilings or Foundation Below Lowest Adjacent Grade</td>
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<td></td>
</tr>
</tbody>
</table>

A Wisconsin licensed engineer or architect must review and/or prepare the building design and complete a Zone V Design Certificate for any new construction, substantial improvement, or the repair of a substantially damaged structure. This form is on the DNR Floodplain Management webpage (see page 67).
Enclosures under elevated buildings should be avoided. If small areas are enclosed:

- Walls must be designed to collapse or “break away” under flood conditions
- Enclosures must be unfinished and made of flood resistant materials
- Utility wires and pipes must not go through or be attached to breakaway walls
- Enclosures must be used only for parking, limited storage, and building access (no bathrooms, recreation, or utility rooms)
- Minimal electric service for safety (light switch) is permitted

It is a violation if enclosures below elevated buildings are modified or used for purposes other than parking, storage, and access. Not only will damage be increased during floods, but flood insurance policies will be more expensive.

Enclosures larger than 299 sq. ft. may have higher insurance premiums.
Improvements and Repairs of Buildings in Floodplains

Permits to improve and repair buildings are required. Local officials must:

- Review costs estimated in construction contracts (see page 54).
- Use Equalized Assessed Value (building only) in the property assessment records. Permittees who do not agree with EAVs may appeal to their local assessors.
- Compare the costs to the Equalized Assessed Value.
- Require buildings to be brought into full compliance if the costs equal or exceed 50% of the Equalized Assessed Value, called Substantial Improvement (or repair of Substantial Damage).
- Keep track of improvement and repair percentages over the life of each building.
- Encourage owners to consider other ways to reduce future damage if the comparison is less than 50% (see page 62).

By Wisconsin statute, nonconforming buildings that are damaged or destroyed by a nonflood disaster may be repaired or reconstructed to the same size and use, provided they meet certain requirements, including elevation to at least the BFE (fill, pilings, columns, posts, and perimeter walls are permitted).
What is Meant by Pre-FIRM and Post-FIRM?

**Pre-FIRM** and **Post-FIRM** are NFIP insurance terms tied to a community’s initial FIRM. The terms are used to determine flood insurance rates. Although common, the terms should not be used to distinguish between buildings constructed before a community joined the NFIP and those built after, especially in communities where the FIRMs have been revised.

Buildings must be brought into compliance when work is determined to be substantial improvement or repair of substantial damage (see pages 53 through 58).
FEMA’s SI/SD Desk Reference (FEMA P-758) provides guidance and suggested procedures for:

- Estimating costs of improvements and costs of repairs (see page 54)
- Estimating market values
- Community and property owner responsibilities
- Administrative requirements
- Key aspects of bringing buildings into compliance
- Suggestions for preparing for disasters

**Terms and Definitions**

**Substantial Improvement** means any reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds 50% of the present equalized assessed value of the structure before the "start of construction" of the improvement. The term includes structures that have incurred "substantial damage" from any cause, regardless of the actual repair work performed. The term does not include improvements of structures to correct existing violations of state or local health, sanitary, or safety code requirements. Wisconsin communities track improvements over a period of time, triggering compliance for repetitive flood damage, when the cumulative improvement value equals or exceeds 50%, or when a structure has been previously altered.

https://www.fema.gov/media-library/assets/documents/18562

Substantial Improvement/Substantial Damage Desk Reference

Wisconsin Quick Guide

Wisconsin Quick Guide

53
The costs of improvements (or the costs to repair damaged buildings to pre-damage condition) must be estimated before determining whether proposed work constitutes Substantial Improvement or repair of Substantial Damage.

- **Include** costs of all structural elements, all interior and exterior finishes, built-in appliances, all utility and service equipment
- **Include** site preparation related to the improvement or repair (e.g., foundation excavation or filling in basements)
- **Include** costs of demolition, construction management, contractor overhead and profit
- **Include** costs associated with elevating a structure when the proposed elevation is lower than the FPE
- **Exclude** costs of plans and specifications, land survey, permit and inspection fees, and debris removal
- **Exclude** costs of outside improvements (landscaping, irrigation, sidewalks, driveways, fences, yard lights, pools, detached accessory structures, etc.)

For more details on cost items that must be included and those that are excluded, see the SI/SD Desk Reference (page 53).
Because use of fill is limited in floodways, this method of elevating existing buildings cannot be used. Instead, when an existing building is proposed to be substantially improved, the owner must either reduce the amount of work or relocated the building out of the floodway.

This illustrates one way existing buildings on crawlspaces can be elevated. The primary steps in the process include:

- Determine if the existing building is sound enough to lift
- Determine if the existing foundation can be extended; if not, then a new foundation is required
- Detach the building and lift it on cribbing
- Build the extended or new foundation
- Lower and attach the building to the taller foundation
- Fill in below-grade spaces and place compacted fill under and around the building
Community permit offices can help determine the requirements that apply when buildings must be brought into compliance. A preliminary review of proposed improvements is recommended before projects are designed and before permit applications are submitted.
Non-Substantial Improvement: Lateral Addition Only

Permits are required to build additions to buildings in SFHAs.

- If an addition is not a substantial improvement, then only the addition must be elevated.
- If an addition is a substantial improvement, the addition and the existing building must be elevated (see page 56).

In floodways, non-substantial improvement additions must be elevated on piers or columns (fill is not permitted).
Permits are required to repair damaged buildings, regardless of the cause – fire, flood, wind, or even vehicle impact. Detailed estimates of the cost to repair a building to pre-damage condition are required (see page 54). If the costs are 50% or more of the pre-damage equalized assessed value of the building, then it is “substantially damaged” and must be brought into compliance, which may involve raising the building and other measures. Consult with local permit offices before repairs are started.

See page 55 for an example of elevating an existing building.
Paying for Post-Flood Compliance

Owners may be eligible for up to $30,000 to help pay to bring buildings into compliance with building code and community requirements – if all of the following apply:

- Buildings are located in a mapped flood zone
- Buildings are covered by NFIP flood insurance, which includes Increased Cost of Compliance coverage
- Buildings have lowest floors below the BFE
- Buildings are substantially damaged by flooding
- Substantial damage may be one-time 50% or by repetitive flood damage in communities that enforce repetitive loss provisions
- Owners act quickly with their claims adjusters and community officials to process all required paperwork

Learn more at www.fema.gov/increased-cost-compliance-coverage.

Owners whose buildings are substantially damaged are required to “bring the buildings into compliance” with flood zone requirements.
FEMA’s SDE tool was developed to help State and local officials in collecting uniform information needed to make substantial damage determinations for residential and non-residential structures in accordance with local floodplain management requirements. The SDE tool:

- Can be used to assess flood, wind, wildfire, seismic, and other forms of damage
- Helps provide timely substantial damage determinations so that reconstruction can begin following events that damage buildings
- Is used in conjunction with industry-accepted construction cost-estimating guides

Non-Substantial Improvements Other than Additions

Proposed improvements are “non-substantial” if the costs are less than 50% of the equalized assessed value of the building. In these cases, buildings are not required to be brought into compliance. However, there are many things owners can do to reduce exposure to future flooding. Owners should consider the following:

- Use flood damage-resistant materials, for example tile, closed-cell wall insulation, and polyvinyl wall coverings
- Raise air conditioning equipment, heat pumps, furnaces, water heaters, and other appliances on platforms
- Move electric outlets higher above the floor
- Add flood openings to crawlspace foundations
- Move ductwork out of crawlspaces
- Fill in below-grade crawlspaces

Note! ALL proposed work must be included in permit applications. If more work is proposed or undertaken after a permit is issued, community officials must determine whether the additional work changes the substantial improvement determination.
Some Flood Protection for Older Homes is Easy and Low Cost

Move fuse boxes, water heaters, furnaces, and ductwork out of crawlspaces and basements. Anchor heating oil and propane gas tanks to prevent flotation and lateral movement. **Do not** store valuables or hazardous materials in a flood-prone crawlspace or basement. Use flood-resistant materials when repairs are made.
Small Berms or Floodwalls May Protect Older Buildings

In areas where floodwater isn’t expected to be deep, sometimes individual buildings can be protected by earthen berms or concrete floodwalls. Permits are required for these protection measures and extra care must be taken if sites are in floodways (see page 32). Small berms or floodwalls cannot be used to achieve compliance for new construction, substantially improved buildings, or substantially damaged buildings.

**Important!** These protective measures will not reduce your NFIP flood insurance premium or remove the property from the floodplain.
Following floods, some communities purchase and remove damaged homes. The acquired land is dedicated to public open space or stormwater storage and can be used for recreation or to help restore wildlife habitat and wetlands. Some homes have been elevated on new, higher foundations, and others have been moved to safer high ground outside of high risk flood hazard areas. Studies indicate these types of projects have a 7:1 return on investment.

Wisconsin Emergency Management administers FEMA mitigation grant programs:
https://dma.wi.gov/DMA/about/wem

DNR administers the Municipal Flood Control Grant Program:
https://dnr.wi.gov/aid/munfloodcontrol.html
Be Prepared for Flood Emergencies

Everyone should be prepared for floods and other emergencies. Preparation begins at home, at work places, at schools, and in communities.

Sometimes floods and other disasters can strike quickly and without warning and evacuation may be required. Basic services (water, gas, electricity and telephones) may be interrupted, perhaps for several days. Local officials and emergency relief workers will be on the scene after disasters, but they cannot reach everyone right away. Communities, families, and businesses should prepare before disasters occur by:

- Learning about natural hazards (Wisconsin communities participate in developing Hazard Mitigation Plans)
- Learning about community level flood preparation and the Community Resources Toolbox developed by the St. Paul District U.S. Army Corps of Engineers, including Emergency Action Plan Guidance and Flood Fight Handbook
- Making family and workplace emergency plans and knowing where to go if evacuations are required
- Putting together disaster kits with supplies to last a few days

Learn more about ReadyWisconsin at https://readywisconsin.wi.gov/ and about preparing for emergencies at the American Red Cross (www.redcross.org). Also check with local emergency management agencies.
Turn Around Don't Drown®

Learn about flood risks and follow these safety rules:

- When flooding is expected, stay away from creeks, streams, and rivers.
- NEVER drive through flooded roads – they may be washed out.
- Passenger cars may float in only 12-24 inches of water.
- Be especially cautious at night when it is harder to recognize dangers.
- Just 6 inches of fast-moving water can knock you off your feet.
Useful Resources and Common Acronyms

- Wisconsin information about floodplain management, mapping and interactive floodplain maps, definitions and standards, local regulations, NFIP flood insurance, publications, fact sheets, grant opportunities, and community officials and homeowners and related links: https://dnr.wi.gov/topic/Floodplains/

- NFIP regulations, Title 44 CFR: www.fema.gov/national-flood-insurance-program/laws-and-regulations

- NFIP Technical Bulletins: www.fema.gov/media-library/resources-documents/collections/4

- CRS Resources: www.fema.gov/national-flood-insurance-program-community-rating-system

Common Acronyms

- BFE = Base Flood Elevation
- EC = Elevation Certificate
- FIRM = Flood Insurance Rate Map
- FPE = Flood Protection Elevation
- ICC = Increased Cost of Compliance
- NFIP = National Flood Insurance Program
- RFE = Regional Flood Elevation
- SFHA = Special Flood Hazard Area (100-year floodplain)
Want to Learn More?

- For information and advice on permits, contact local building or planning departments.
- FEMA’s on-line publications can be found in the FEMA Library ([www.fema.gov/library/](http://www.fema.gov/library/)) or by using an Internet search engine to search on the publication number or title.
- To learn about NFIP flood insurance, call an insurance agent. Most insurance companies write NFIP policies.
- To learn the importance of taking steps to financially protect homes and businesses from flood damage go to [www.floodsmart.gov](http://www.floodsmart.gov).
- Find out about Elevation Certificates and training for professional land surveyors by searching for Elevation Certificate at [www.fema.gov](http://www.fema.gov).
- To join the Wisconsin Association for Floodplain, Stormwater, and Coastal Management and see workshop, course, and conference opportunities, go to [https://wafscm.org](https://wafscm.org).
- See upcoming trainings, subscribe to the Floodplain & Shoreland Management Notes newsletter, and view past newsletters at [https://dnr.wi.gov/topic/floodplains/](https://dnr.wi.gov/topic/floodplains/)
This **Quick Guide** may be downloaded from

Wisconsin Department of Natural Resources
dnr.wi.gov/topic/floodplains

Wisconsin Association for Floodplain, Stormwater and Coastal Management
https://wafscm.org (see <Training and Education>