2020

FLOODPLAIN MANAGEMENT IN MINNESOTA

Quick Guide

DEPARTMENT OF NATURAL RESOURCES

Division of Ecological and Water Resources

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https://mndnr.gov/floodplain

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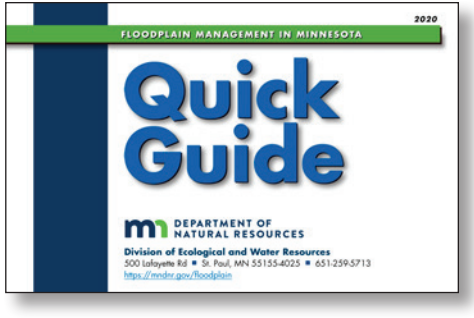
About This Guide

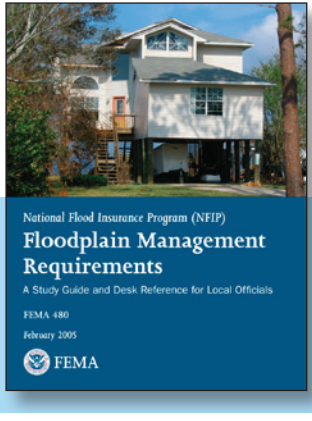
This **Quick Guide** helps local officials and citizens understand why and how Minnesota communities must manage development in floodplains to protect people and property. Flood-prone communities adopt codes and ordinances that detail the rules and requirements. In cases of conflict, those codes and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



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

Questions, comments and requests for additional copies should be directed to the MNDNR Division of Ecological and Water Resources at floodplain.dnr@state.mn.us.

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.*



Prepared by:

RCQUINN CONSULTING, INC.

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 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.

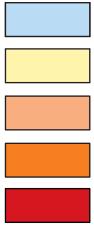
To avoid liability and lawsuits. If we know an area is mapped as a flood hazard area, and if we know people could be in danger and buildings could be damaged, doesn't it make sense to take reasonable protective steps as our communities develop and redevelop?

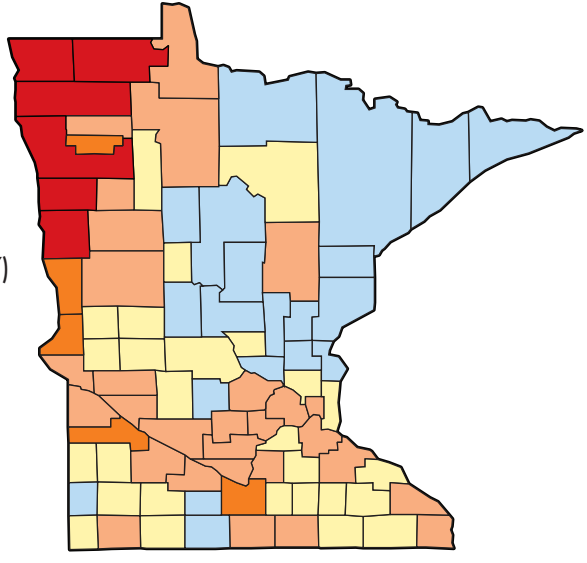
Since 1978, NFIP flood insurance policy holders in Minnesota have received over $148 million in claim payments. Most of the State's flood-prone property owners do not have flood insurance.

Minnesota Disaster and Floodplain Facts

Federal Disaster Declarations

Number of Declarations by County (1965 to mid-2017)





Most 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.

- More than 80% of Minnesota's declared disasters involved flooding. Winter storms, winds, and tornadoes account for the rest.
- Most counties, cities and towns in Minnesota have identified floodprone areas shown on Flood Insurance Rate Maps.
- 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.
- Eighty-four municipalities are floodprone but elect to not participate in the National Flood Insurance Program and do not enforce floodplain management regulations (as of March 2020).

What is the National Flood Insurance Program?

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 Minnesota, more than 620 counties, cities, towns, and tribes 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.

Local, State, Regional, and Federal Roles and Responsibilities

- **Communities (city, county, township):**
  - ❑ Exercise zoning authority to adopt floodplain management ordinances
  - ❑ Enroll in the National Flood Insurance Program (NFIP)
  - ❑ Administer and enforce ordinances, maintain records (see page 6)
- **Minnesota Department of Natural Resources:**
  - ❑ Oversight of community floodplain management programs and approval of ordinances
  - ❑ Technical assistance and training
  - ❑ Assist with some flood study data and mapping
  - ❑ Coordinate between FEMA and communities

- **Watershed Districts:** May have overlapping floodplain management regulations and may be sources of floodplain data
- **FEMA:** Oversees NFIP (enrolls communities; can act to suspend or put communities on probation); and produces and approves flood studies and flood maps and changes to flood maps

Community Responsibilities

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

- **Recognize** flood hazards in community planning (see page 7)
- **Adopt and enforce** flood maps and floodpain management ordinance
- **Require** permits for all types of development in the floodplain (see page 34)
- **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 Regulatory Flood Protection Elevation (RFPE) (BFE + 1 to 1.5 ft.)
- **Require** non-residential buildings to be elevated at or above the RFPE (BFE + 1 to 1.5 ft.), or 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 44, 45, and 47)
- **Carefully consider** requests for variances
- **Resolve** non-compliance and violations of floodplain management requirements
- **Advise and work** with FEMA and the MNDNR Floodplain Program when updates to flood maps are needed
- **Maintain** records for review and respond to periodic requests for reports to FEMA

NFIP Recommended Planning Considerations

Minnesota 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 State minimum (e.g., BFE + 2 or 3 ft.)
- Require elevation methods such as pilings or columns rather than fill to maintain the storage capacity of the floodplain and to minimize environmental impacts
- Require evacuation plans for manufactured home parks, subdivisions, and campgrounds (including recreational vehicle parks)

Flood Insurance: Property Owner's Financial Protection

Who must purchase flood insurance? Flood insurance is required for all buildings in mapped high risk flood zones shown on FEMA's maps when financed by Federally-backed loans or mortgages.

Who can purchase flood insurance? All homeowners, business owners, and renters in communities that participate in the NFIP (over 96% of Minnesotans) may purchase NFIP flood insurance on any building and its contents, even if outside of the mapped flood zone. Discounted Preferred Risk Policies are usually available outside of the mapped high risk flood zone. Owners are encouraged to buy flood insurance even if not required by mortgage lenders because buildings 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 when many people discover their home or business property insurance does NOT cover flood damage. Approximately 50% of all flood damage occurs in low risk zones, commonly described as being "outside the mapped flood zone."

What about disaster grants and loans? Federal disaster grants are only available after the largest floods, 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:

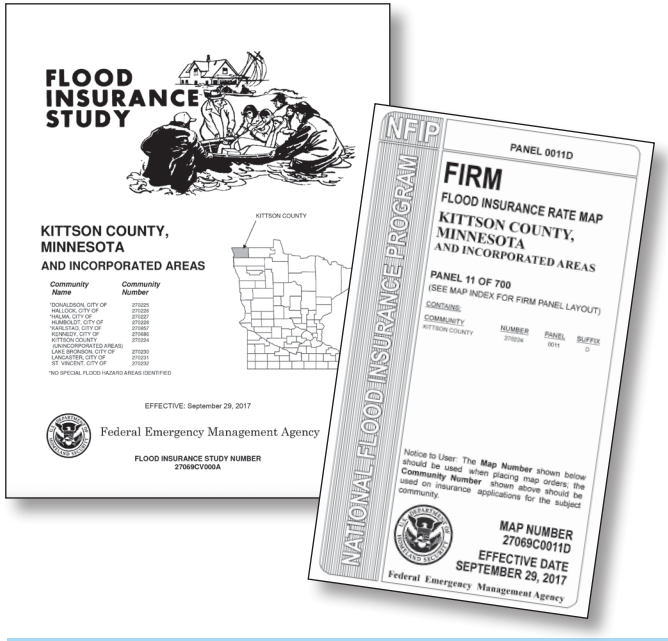
- Preserve open space in the floodplain
- Enforce higher standards for safer development through zoning, stormwater, subdivision, and floodplain management ordinances
- Develop hazard mitigation plans and watershed and storm management plans
- Undertake engineering studies and prepare flood maps
- Obtain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

Important Information

Community officials can request assistance from CRS specialists to help with the application process and prerequisites. Check the online CRS Resource Center (see page 78).

Property owners in 10 Minnesota communities that participate in the CRS receive premium discounts ranging from 5% to 25% (as of October 2019).

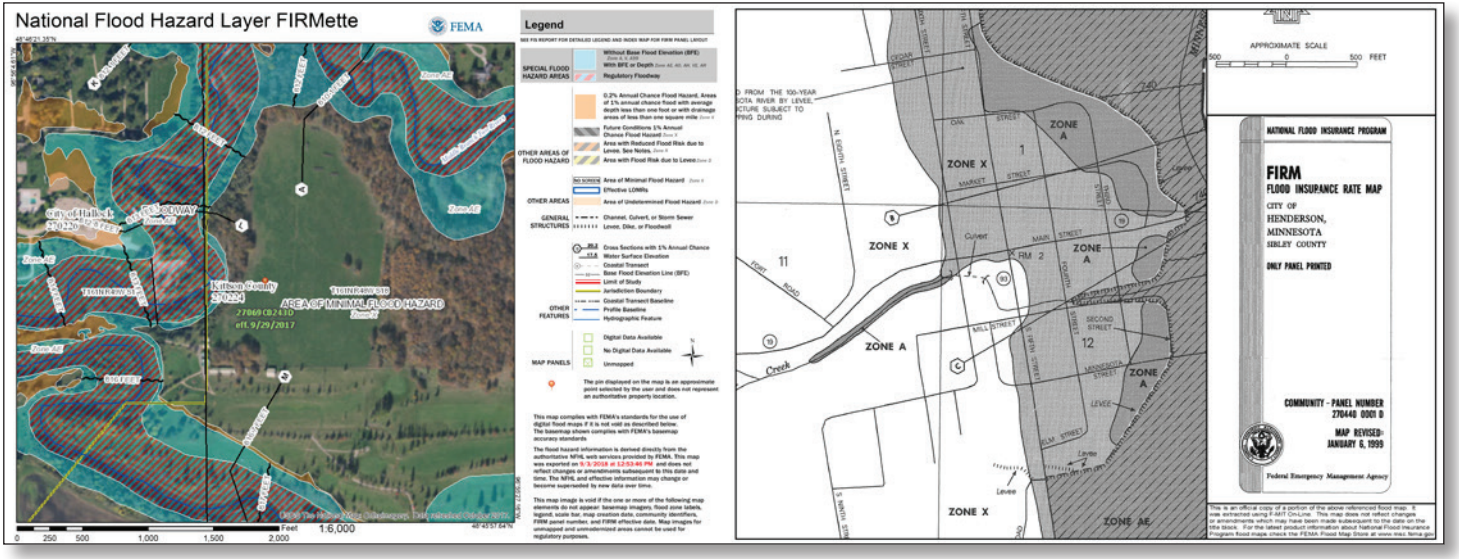
Looking for FEMA Flood Map Information?



- 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 Map Service Center, https://msc.fema.gov. Enter an address or use the <Search All Products> to see and download current, preliminary, pending, and historical flood maps and other products.
- See which counties have current and preliminary FEMA FISs and maps, and related links, at MNDNR Flood Maps site (see page 11).
- Many cities and counties also make digital flood maps available online, often with other data layers.

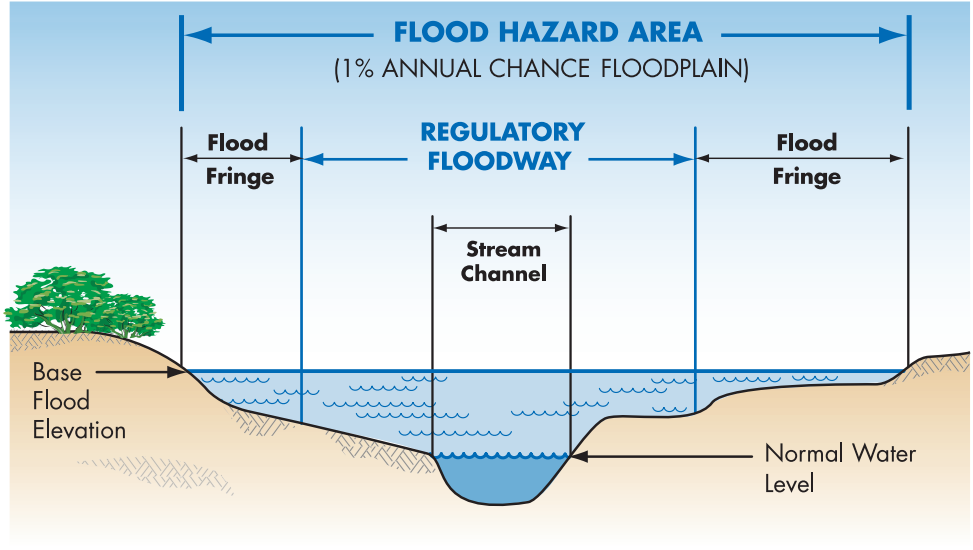
Need a fast answer? Community planning, engineering, or permit offices may also have paper flood maps available for viewing by the public.

FIRMette: FEMA Flood Maps Online



Portions of FEMA flood maps can be produced, saved, and printed by making "FIRMettes." FIRMettes are full-scale sections for FIRMs. Check out "How to Download" instructions at MNDNR https://www.dnr.state.mn.us/waters/watermgmt_section/floodplain/access-flood-maps.html. Go to https://msc.fema.gov and check out the MSC Frequently Asked Questions.

Understanding the Riverine Floodplain



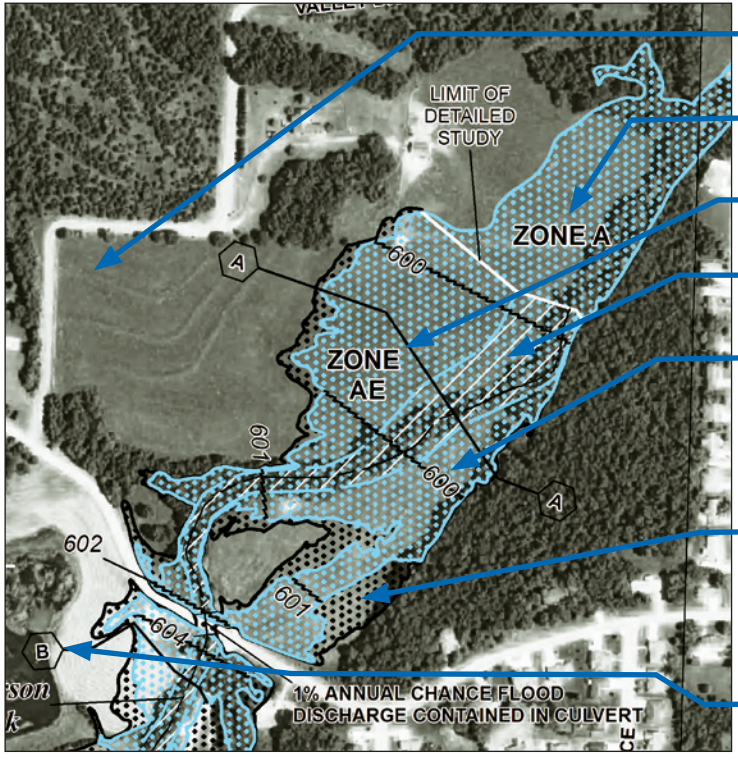
For riverine floodplains with Base Flood Elevations (BFEs) determined by detailed flood studies, the Flood Profile in the Flood Insurance Study shows water surface elevations for different frequency floods (see page 16).

Terms and Definitions

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

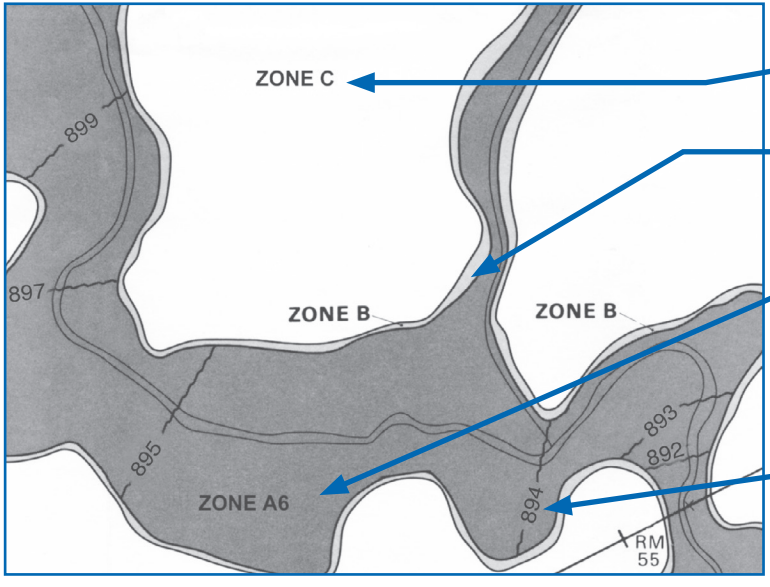
See page 17 to learn about the regulatory floodway, the area of the SFHA where flood waters usually are deeper and flow faster.

New Format Flood Insurance Rate Maps



1. **Unshaded Zone X** is all other areas considered low risk (formerly Zone C).
2. **Zone A** (approximate) is the flood hazard area without BFEs.
3. **Zone AE** is the 1% annual chance (100-year) floodplain with BFEs (formerly Zones A1- A30).
4. The **Floodway** is the cross-hatched area (see page 17).
5. **Base Flood Elevation (BFE)** is the water surface elevation of the base flood rounded to the nearest whole foot above the vertical datum shown on the map (consult FIS profiles and tables for more accurate elevations).
6. **Shaded Zone X** is the 0.2% annual chance (500-year) floodplain, SFHAs with average flood depths less than 1 foot or with drainage areas less than 1 square mile, and areas behind accredited levees (formerly Zone B).
7. **Cross Section** location, see flood profile (page 16) and Floodway Data Table (page 18).

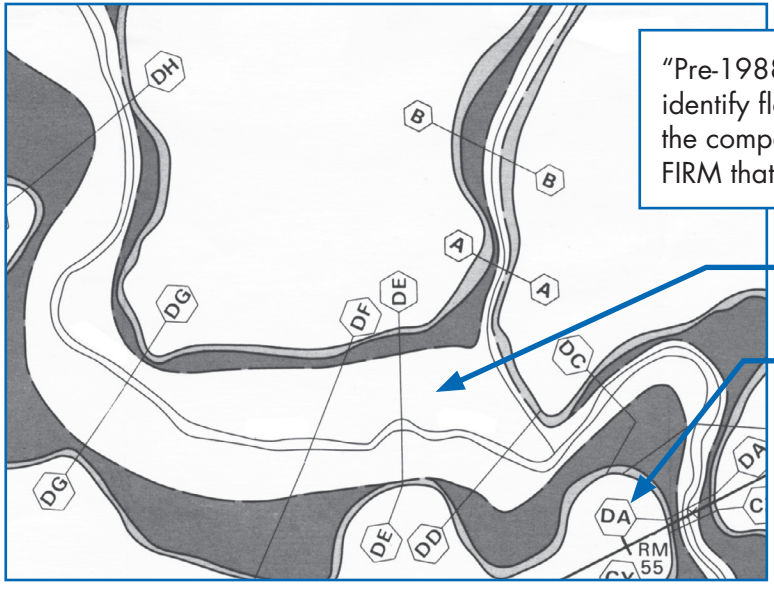
"Pre-1988" Flood Insurance Rate Maps



1. **Zone C** (or Zone X) is all areas considered to be low risk.
2. **Zone B** (or shaded Zone X) is moderate risk areas subject to flooding by the 0.2% annual chance flood (500-year).
3. **Zone A, Zones A1-A30, Zone AH, Zone AO** or **Zone AE** are subject to flooding by the base or 1% annual chance flood (100-year), and are considered high risk areas.
4. **Base Flood Elevation (BFE)** is the water surface elevation of the base flood, rounded to the nearest whole foot above the vertical datum shown on the map.

FEMA prepares Flood Insurance Rate Maps (FIRMs) to show areas that are at high risk of flooding. These "pre-1988" FIRMs, and companion Flood Boundary and Floodway Maps, are being replaced as part of the FEMA's Risk Map Program.

"Pre-1988" Flood Boundary and Floodway Map



Important Information

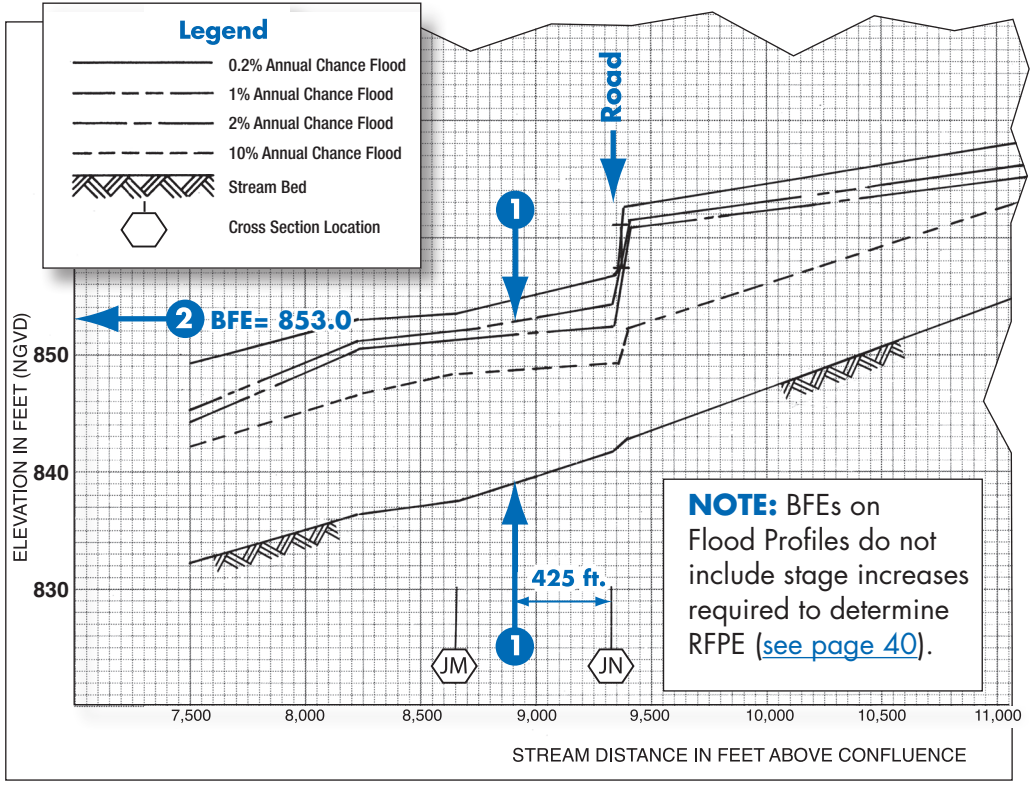
"Pre-1988" floodway maps do not identify flood zones or BFEs. Check the companion FIRM for that information. Page 14 shows the FIRM that matches the map clip to the left.

1. **The Floodway** is the unshaded area around the waterway profile baseline.

2. **Cross Section** location, where ground surveys determined the shape of the land and how constrictions such as bridges and culverts affect the flow of floodwater. See Flood Profile (page 16) and Floodway Data Table (page 18) in the Flood Insurance Study to determine BFEs at cross sections.

FEMA prepared floodway maps as companions to many "pre-1988" FIRMs. You should check to see if your project will be in the floodway because additional engineering will be required (see page 38).

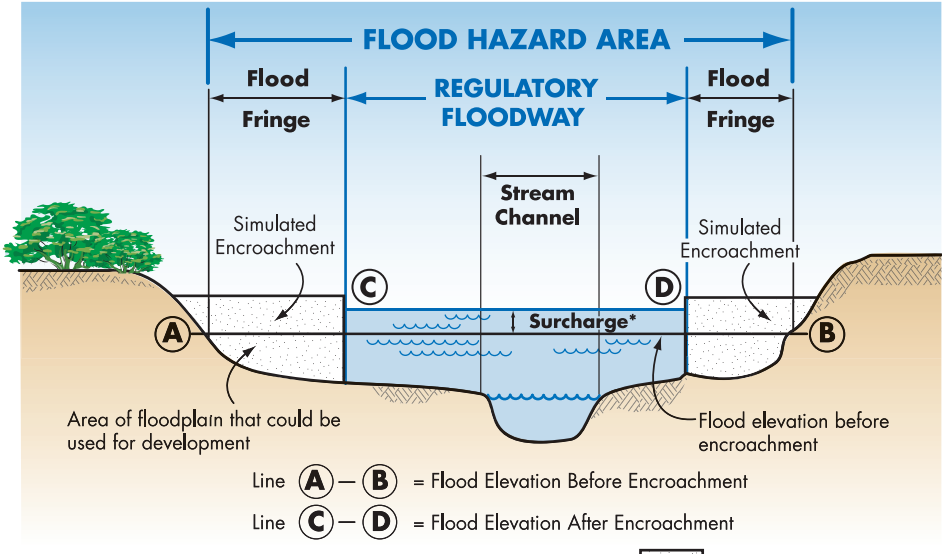
Using the Riverine Flood Profile to Determine Riverine BFEs



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).

Understanding the Regulatory Floodway



Terms and Definitions

The **Regulatory Floodway** is the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to pass the base flood discharge without cumulatively increasing flood elevations.

Computer models are used to simulate "encroachment" or development in the flood fringe in order to predict where and how much the Base Flood Elevation would increase if the flood fringe is allowed to be developed.

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 38). If ANY increase (more than 0.00 ft.) will occur, a Conditional Letter of Map Revision (CLOMR) must be obtained from FEMA (see page 29). MNDNR approval is required to obtain a CLOMR, and cumulative water surface increases of up to 0.50 ft. (with the proposed project) may be permitted if the increases do not cause "increased flood damage potential" (including no impacts on existing buildings).

Floodway Data Table

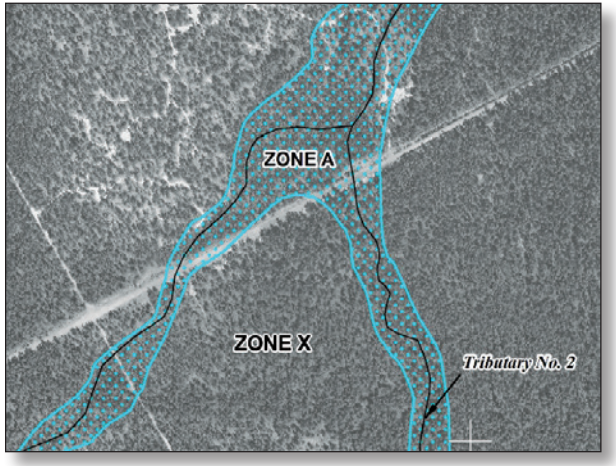
Flood Insurance Studies have Floodway Data Tables for every waterway that was studied by detailed methods for which floodways were delineated.

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE-FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
MIDDLE BRANCH OF LITTLE CEDAR RIVER								
A	1,860	220	820	2.3	1,277.1	1,277.1	1,277.1	0.0
B	3,100	200	644	2.8	1,279.1	1,279.1	1,279.2	0.1
C	4,330	210	630	2.9	1,281.2	1,281.2	1,281.4	0.2
D	6,590	520	1,620	1.1	1,283.4	1,283.4	1,283.4	0.0
E	7,670	210	410	3.3	1,285.0	1,285.0	1,285.0	0.0
F	9,210	220	670	2.1	1,287.4	1,287.4	1,287.4	0.0
G	11,570	180	450	3.0 (1)	1,289.8 (2)	1,289.8 (3)	1,289.8	0.0 (4)

[1]Feet above confluence with Little Cedar River

1. Velocity estimates based on the mean velocity data may be used to compute hydrodynamic loads.
2. Compute BFE (rounded values are shown on FIRMs).
3. Elevations may not consider backwater effect from downstream river.
4. Amount of allowed increase – not more than 0.5 foot at any location.

Approximate Zone A



Approximate Zone A refers to SFHAs without BFEs. Older FEMA maps show Approximate Zone A boundaries determined based on very little field work. Methods have changed a lot since the early years. Data may be available at different quality levels.

Level A

- No supporting data
- Paper maps or "digital capture" from paper maps

Level B*

- Modeling without bridges and culverts
- Boundaries based on 10 ft. elevation contours or high resolution data (e.g., LiDAR)

Level C*

- Modeling with bridges and culverts
- High resolution data (e.g., LiDAR) used for modeling and boundaries

Level D*

- Modeling with bridges and culverts
- High resolution data (e.g., LiDAR) used for modeling and boundaries
- Includes 10-yr, 25-yr, 50-yr, 100-yr, and 500-yr

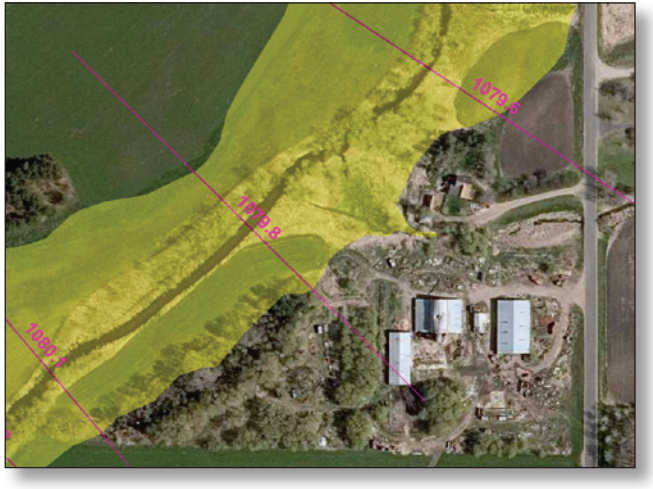
Check with community permitting offices for the best available data. BFEs must be determined in Approximate Zone A before local permits are issued. Local officials may contact MNDNR floodplain staff at floodplain.dnr@state.mn.us to request assistance with determining BFEs.

** Quality levels B, C, and D show cross section locations and approximate BFEs. MNDNR refers to those maps as "pink line" maps (see page 20).*

Sources for BFEs in Approximate Zone A Without BFEs

When FIRMs show Zone A without BFEs (called Approximate Zone A), local officials and others must look for floodplain information from other sources to determine BFEs. Potential sources include:

- FEMA detailed studies for preliminary or pending maps
- Lake Flood Elevations Online (LFEO) viewer, for basins and lakes (see page 21)
- For streams, Level B, C, or D quality data, also known as "pink lines" (see page 19)
- Studies prepared by communities and watershed districts



Sample showing "pink lines," which are estimated 1% Water Surface Elevations that can be used as best available data BFEs.

Find BFEs and other flood elevations at https://www.dnr.state.mn.us/waters/watermgmt_section/floodplain/bfe.html. Community officials, surveyors, and others can check with MNDNR Area Hydrologists or floodplain staff (floodplain.dnr@state.mn.us) for other sources.

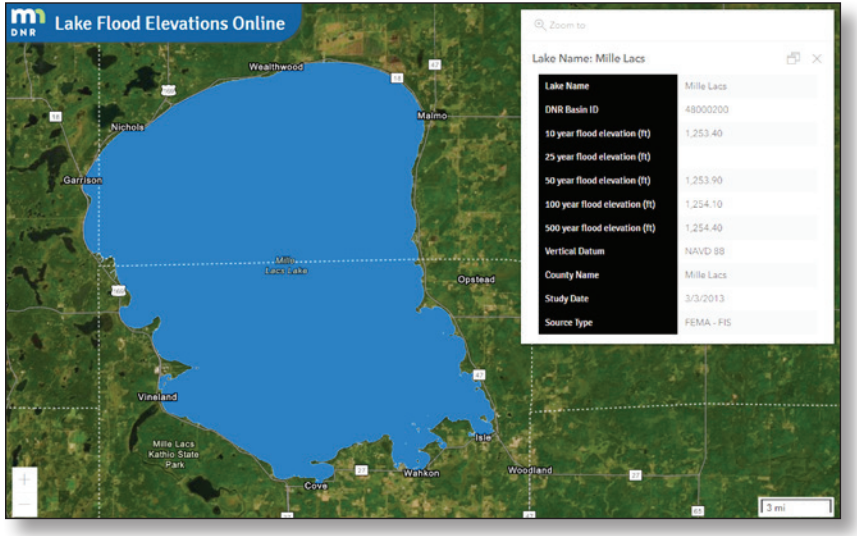
Minnesota's Lake Flood Elevations Online (LFEO) Application

Use the **Lake Flood Elevations Online (LFEO)** application to view and download detailed flood elevations for:

- Lakes and basins shown on FIRMs with BFEs (BFEs on maps are rounded to the nearest foot)
- Lakes and basins with flood elevation data from other sources when MNDNR determines the data meet minimum quality standards

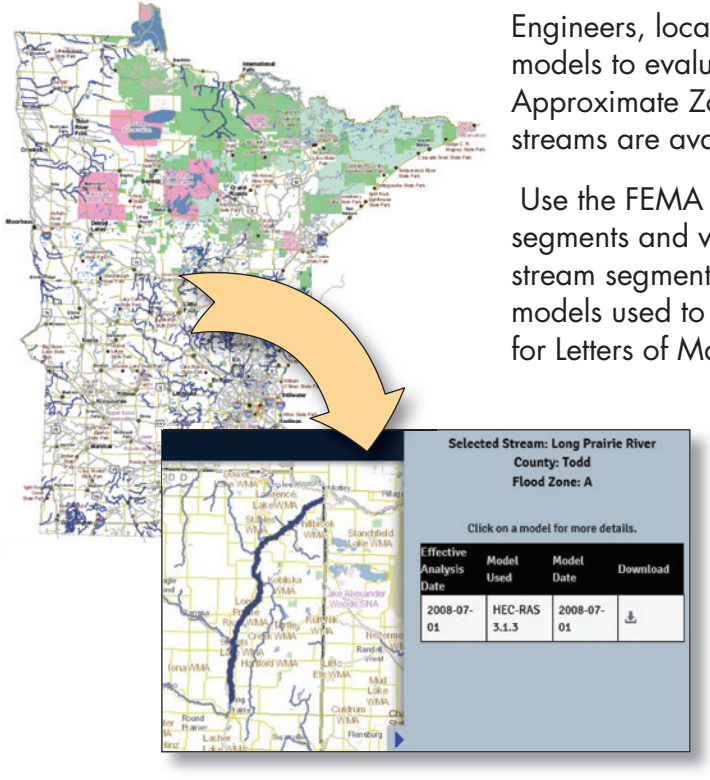
Available data include:

- MNDNR basin name and number
- Study date and source
- Datum
- Flood elevations, if available, for:
  - 10-year (10% annual chance)
  - 25-year (4% annual chance)
  - 50-year (2% annual chance)
  - 100-year (1% annual chance)
  - 500-year (0.2% annual chance)



Access the Lake Flood Elevations Online (LFEO) online at:
https://arcgis.dnr.state.mn.us/ewr/lake_floodplain/

Minnesota's FEMA Hydraulic Model Download Site



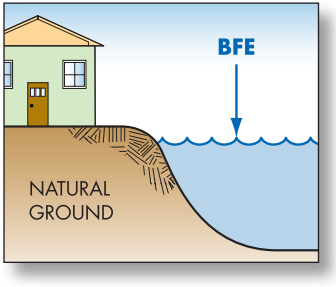
Engineers, local officials and others sometimes need to use hydraulic models to evaluate proposed projects or determine flood elevations in Approximate Zone A. Hydraulic models prepared by FEMA for many streams are available online.

Use the FEMA **Hydraulic Model Download Site** to select stream segments and view and download hydraulic model information. Some stream segments may have multiple models, including the original models used to produce FIRMs, updated models, and models developed for Letters of Map Revision.

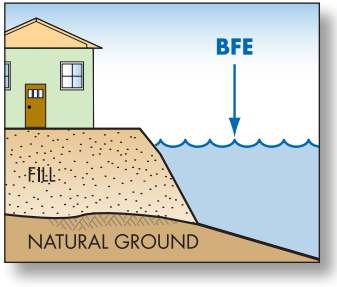
Access the FEMA Hydraulic Model Download Site online at: https://arcgis.dnr.state.mn.us/ewr/hydra_model_download/index.html. MNDNR may have models that are not yet available on this site. Contact MNDNR floodplain staff (floodplain.dnr@state.mn.us).

FIRM Revisions: LOMAs and LOMR-Fs

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.



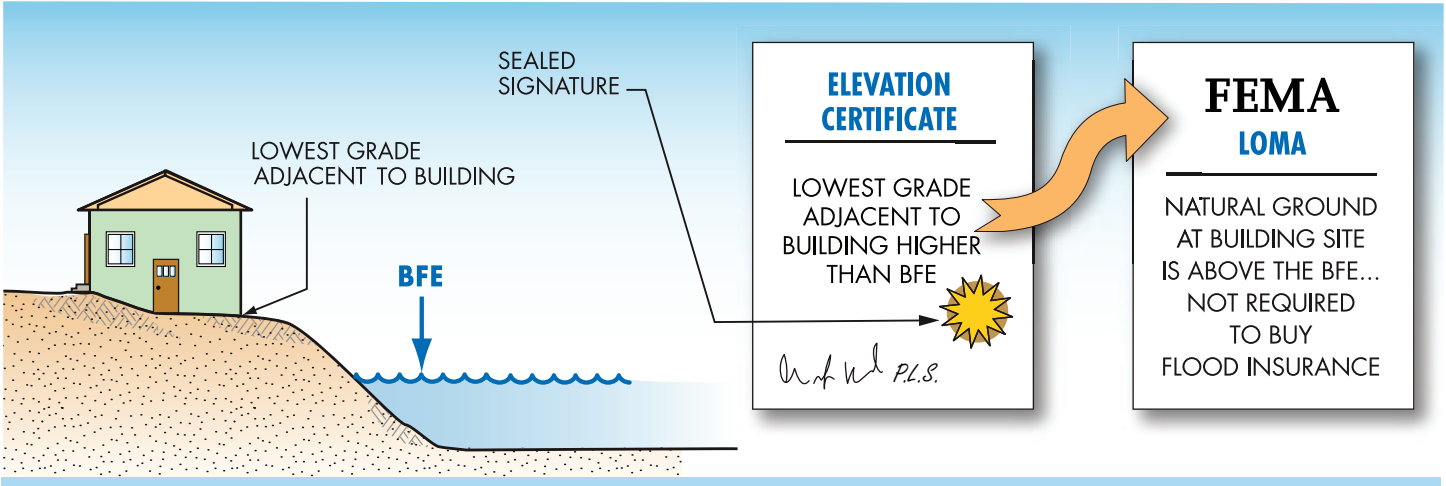
Letter of Map Amendment (LOMA) is an official amendment to an effective FIRM that may be issued when a property owner provides additional technical information from a professional land surveyor, such as ground elevation relative to the BFE. Lenders may waive the flood insurance requirement if the LOMA 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 FEMA determination that a structure or parcel of land has been elevated by fill above the BFE, and therefore is no longer in the SFHA for federal mandatory flood insurance purposes. Minnesota law requires additional steps to remove a structure or parcel of land from the SFHA for regulatory purposes.

Check www.fema.gov/letter-map-amendment-letter-map-revision-based-fill-process for guidance on map revisions. Access to FEMA's web-based application for professional land surveyors to submit eLOMAs is https://hazards.fema.gov/femaportal/resources/whatiseloma.htm.

Are Building Sites Higher than the BFE?



If land is shown on the map as "in" the SFHA, but the building site is higher than the Base Flood Elevation (BFE)… 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 23). If FEMA approves the request, lenders are not required to have property owners get flood insurance policies, although some may still require them.

Owners should keep certificates and LOMAs with deeds— the documentation will help future buyers.

LOMAs: "Out as Shown"

- Mortgage lenders that are regulated or insured by the Federal Government are mandated to require flood insurance when structures are in, or touch, the SFHA.
- Lenders sometimes perform automated determinations, where computers compare parcel locations to the SFHA map.
- Owners can ask lenders to reconsider determinations. Documentation may be required to clearly show a structure is outside of the SFHA. Lenders may require FEMA LOMAs, especially if it is a close call.
- Lenders have discretion to require flood insurance even when structures are not in the SFHA (usually occurs when a portion of the lot is in the SFHA).

See page 26 for documentation required for lenders or that is required to seek Letters of Map Amendment from FEMA to show structures are not in SFHAs, sometimes called "out as shown."

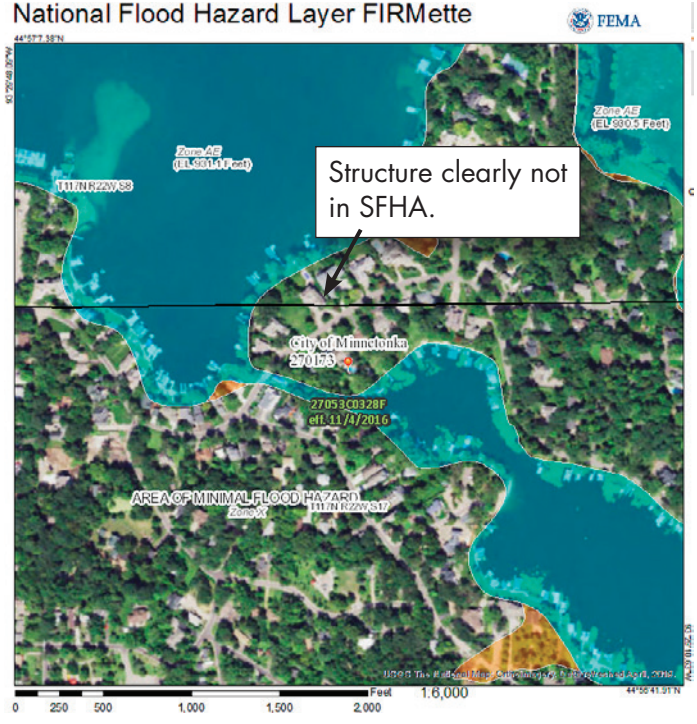
Red Circle: A corner of the structure is in the SFHA. Lenders must require flood insurance unless the owner obtains a Letter of Map Amendment from FEMA.

Yellow Circles: Structures clearly not in the SFHA, but parts of the lots may be in. (Flood insurance is not mandatory, but is encouraged.)

Options to Document Structures are Not in SFHAs

Sometimes property owners are asked to provide evidence their buildings and structures are not in SFHAs.

- Most mortgage lenders will accept FIRMettes (see page 11) as evidence that structures are not in SFHAs.
- Lenders may require maps provided by a community, surveyor, or engineer that clearly show structures are not in SFHAs.
- Owners can ask lenders to reconsider determinations. Documentation may be required to clearly show a structure is outside of the SFHA. Lenders may require FEMA LOMAs, especially if it is a close call



More on LOMAs: Using LiDAR Topography

Owners can obtain LOMAs to show buildings are not in SFHAs if 2-foot contour topographic mapping developed using LiDAR technology clearly shows an entire structure is on land that is at least 1 foot (half a contour interval) above the BFE and the site was not filled to make it higher than the BFE. A field survey may not be required.

- Acceptable maps are prepared by community officials, licensed surveyors, or professional engineers.
- Maps must include:
  - ❑ Aerial photo, with building identified
  - ❑ 2-foot contours (including date and source) – available in all Minnesota
  - ❑ Contour below, but not touching, structure identified
  - ❑ BFE elevation
  - ❑ Address (or legal description) & parcel boundary
  - ❑ Scale and north arrow

This example based on county GIS shows the building is entirely above the contour shown in blue, which is more than 1 foot above the BFE.

Access MNDNR Letter of Map Amendments Using Lidar Elevation Data instructions at https://www.dnr.state.mn.us/waters/watermgmt_section/floodplain/loma-lidar.html

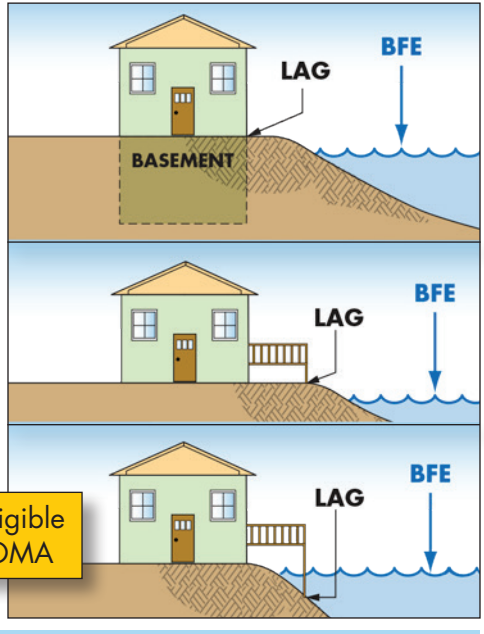
More on LOMAs: Basements and Decks

Owners can obtain LOMAs to show buildings are not in SFHAs even when buildings have basements, provided:

- Earthen fill has not been placed since date of the first FEMA map showing the site in the SFHA.
- The Lowest Adjacent Grade (LAG) is at or above the BFE.

Owners can obtain LOMAs to show buildings are not in SFHAs when buildings have decks or stairs, provided:

- The Lowest Adjacent Grade (LAG) at the lowest deck or stair support is at or above the BFE
- Documentation that the deck or stairs are detached (not structurally connected), as long as the LAG next to the building is at or above the BFE.



For new buildings, communities may still require minimum floor elevations if sites are not in SFHAs, but are in Shoreland Districts (see page 37), or if the community has other local requirements.

FIRM Revisions: CLOMRs and LOMRs

- **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.

CLOMRs are required if a proposed project causes a rise in water surface elevation (see pages 38 and 39).

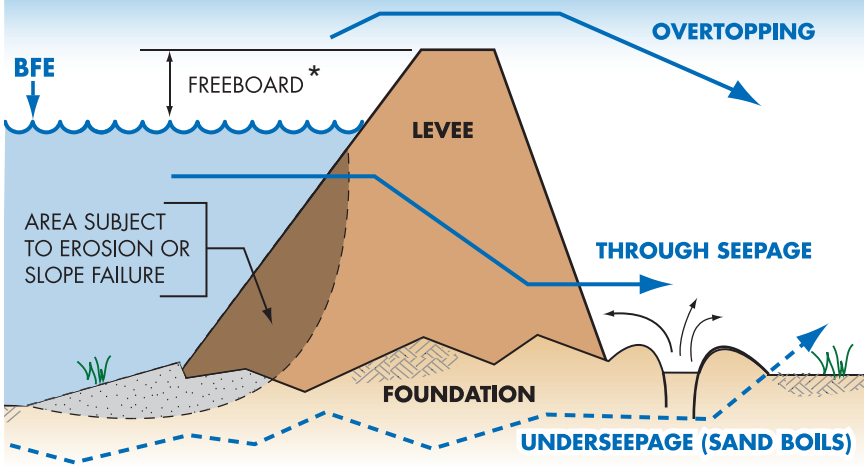
Learn more about Map and Technical Resources and download the LOMR/CLOMR Guide for State-specific information at www.dnr.state.mn.us/waters/watermgmt_section/floodplain/tech_resources.html

Levee Certification for FIRMs

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.

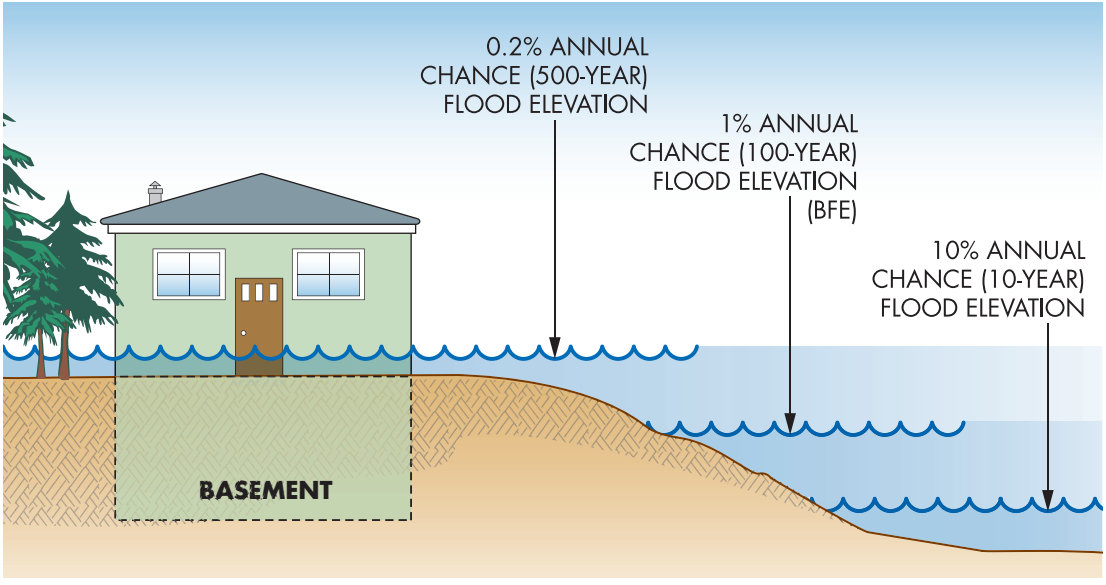
Communities that have levees should determine as soon as possible whether certification will be required. Pursuant to FEMA's Procedural Memoranda 34 and 43, and as outlined in Federal regulations at 44 CFR Section 65.10, the documentation requirements address:

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



* Freeboard is the distance between the BFE and the top of the levee; for FEMA accreditation freeboard is usually 3 feet

Floods Don't Always Stop at the BFE



Important Information

Many people don't understand just how risky building in flood zones can be. There is a greater than 26% chance that a non-elevated home in the SFHA will be flooded during a 30-year mortgage period. The chance that a major fire will occur during the same period is less than 5%!

CAUTION! 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 41 to see how this will save you money on flood insurance.

Avoid SFHAs When Possible

All land subdivided into lots, some homesites and lots partially or entirely in the floodplain.

NOT RECOMMENDED

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

RECOMMENDED

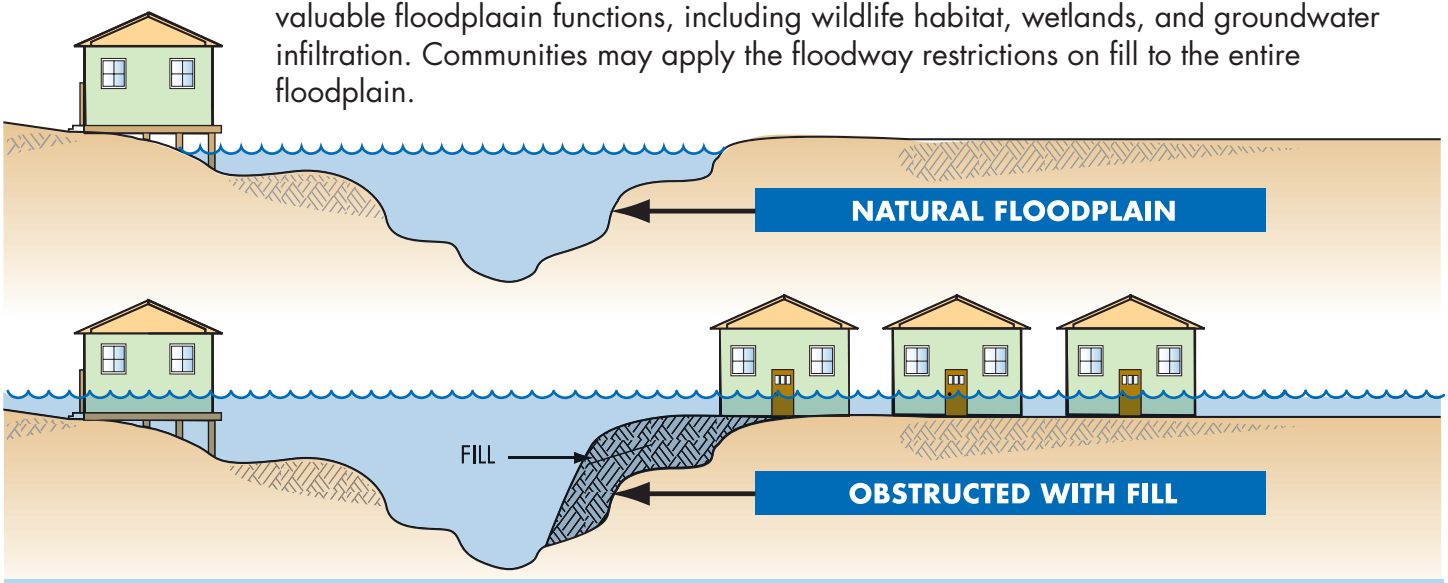
Floodplain land put into public/ common open space, net density remains, lot sizes reduced and setbacks modified to keep homesites on high ground.

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 floodplaain functions, including wildlife habitat, wetlands, and groundwater infiltration. Communities may apply the floodway restrictions on fill to the entire floodplain.



Public waters work permits from MNDNR may be required for alterations below the Ordinary High Water Line. Buildings and fill to support buildings and other development are not permitted below the OHWL.

Development in SFHAs Requires Local Permits and Approvals

- 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
- Construction of roads, bridges, and culverts
- Placement of fill, grading, excavation, mining, and dredging
- Alteration of stream channels

Terms and Definitions

Development is any man-made change to improved or unimproved real estate, including but not limited to, buildings or other structures, tanks, temporary structures, temporary or permanent storage of equipment or materials, mining, dredging, filling, grading, paving, excavations, drilling operations or any other land disturbing activities.

Floodplain development or building permits must be obtained before these activities and **ANY** land-disturbing activities occur in flood zones.

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?
- Is the site in the Shoreland District?
- Is work proposed below Ordinary High Water? Is MNDNR permit required?
- Are applicants advised that other State or 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?
- Is a Conditional Use Permit (CUP) required?
- Will manufactured homes be properly elevated and anchored?
- 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?

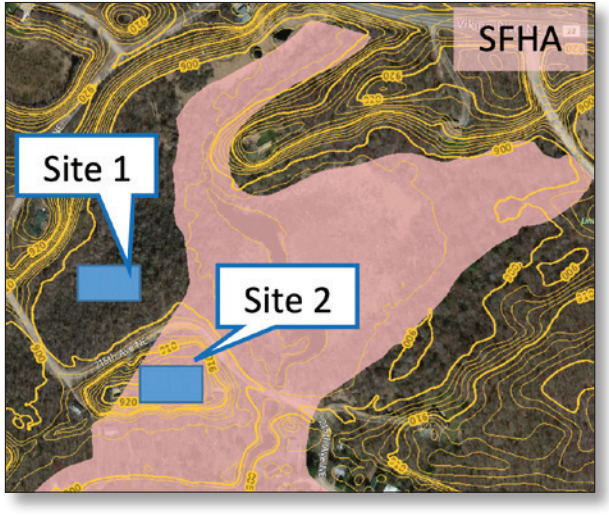
Review Checklist

- ❑ Floodplain
- ❑ Floodway
- ❑ RFPE
- ❑ MNDNR Permit
- ❑ Shoreland District
- ❑ New Construction
- ❑ Improved Existing Bldg.
- ❑ Elevated
- ❑ CUP
- ❑ Elevation Certificate
- ❑ Issue Permit

Minimum Requirements Based on Actual Ground Elevations

Older FIRMs sometimes were drawn with SFHAs boundaries that are not consistent with the actual ground elevations. More recent FEMA studies and maps are based on improved supporting data when BFEs are determined. Revised maps delineate SFHA boundaries on updated topographic mapping.

- In Minnesota, development on land that is below the BFE must meet floodplain requirements, even if not in the FEMA-mapped SFHA (see Site 1).
- Owners with land that is actually above the BFE (see Site 2) may be able to build basement or crawlspace foundations and still meet the RFPE, and they can apply to FEMA for a Letter of Map Amendment (see page 23).



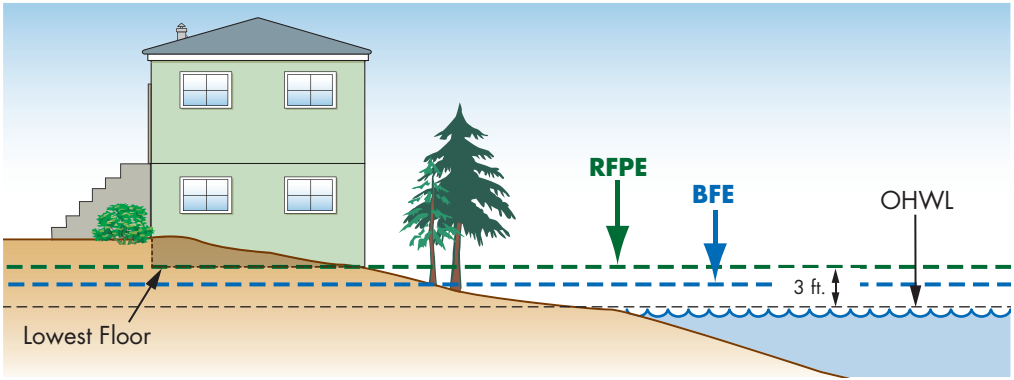
Important Information

MN Rule 6120.5700, subp.3, D: "Where a conflict exists between the floodplain limits illustrated on the official zoning map and actual field conditions, the flood elevations shall be the governing factor in locating the regulatory floodplain limits."

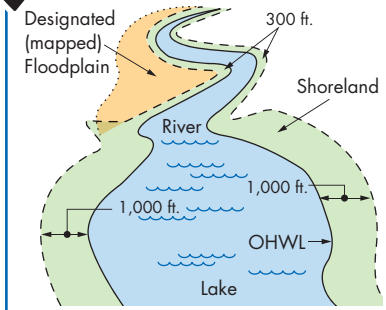
Minimum Elevation Requirements in Shoreland Districts

In Minnesota, buildings that are outside of FEMA mapped high risk flood zones (SFHAs) but in Shoreland Districts must have lowest floors at or above minimum elevations when communities adopt Shoreland Management ordinances.

- If a flood study is available, lowest floors must be at or above the RFPE (see page 40).
- If a flood study is not available, lowest floors must be at least 3 feet above the Ordinary High Water Level (OHWL) or highest known water level, whichever is higher



Terms and Definitions



State law defines Shoreland as the land located:

(1) within 1,000 feet of OHWL of lake, pond, or flowage; and

(2) within 300 feet of river or stream, or the landward edge of mapped floodplain, whichever is greater

The Regulatory Floodway "No-Rise" Certification

- Floodways convey the largest volume of water and may have high velocities.
- State law restricts development in regulatory floodways.
- Engineers must prepare floodway encroachment analyses to evaluate the hydraulic impact of proposed development (includes grading/filling, new/replacement culverts and bridges, and bank stabilization).
- Development is not allowed unless certified to cause "no-rise" (0.00 ft. increase) in BFEs.
- 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 Minnesota and qualified to conduct hydraulic analyses.
- Download the "No-Rise" Certification form from Floodplain Administration Resources on MNDNR's Floodplain Regulations web page (see page 78).

ENGINEERING "NO-RISE" CERTIFICATION

Community: Anytown, MN
Applicant: ABC Developers, Inc.
Address: 210 River Road

This is to certify that I am a duly qualified professional engineer licensed to practice in the State of Minnesota. It is further to certify that the attached technical data supports the fact that the described project will not impact the floodway width or 1% elevation (will not raise or lower by more than 0.00 ft.) of said flooding source in the Flood Insurance Study for the above community dated [date of FIS] and will not impact the 1% elevation at unpublished cross-sections in the vicinity of the proposed development.

P.E.

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

Reduce flood risk – don't build in the Floodway!

Limiting Rises Where Floodways Not Delineated

Buildings and Structures. New buildings and structures, substantial improvements, and additions are not permitted in Zone A or Zone AE where floodways have not been delineated, unless applicants provide certification prepared by experienced Professional Engineers that show sites are flood fringes, without causing flood level increases more than Allowable Increases (below).

Other Development. When development such as filling, grading, alteration of a watercourse, and culverts and bridges are proposed where floodways have not been delineated, communities must determine proposed projects will not cause more than Allowable Increases (below).

Allowable Increases (Rises). In Zone A and Zone AE where floodways have not been delineated, allowable cumulative increase (rise) in flood level is:

- Up to 0.5 feet, as long as there is no increased flood damage potential (i.e., no existing buildings are in or touching the floodplain).
- No more than 0.00 feet, if existing buildings are impacted.

Flood studies and floodway/flood fringe determinations for development and subdivisions of 50 lots or 5 acres (whichever is lesser) must be certified by experienced Professional Engineers.

Regulatory Flood Protection Elevation (RFPE)

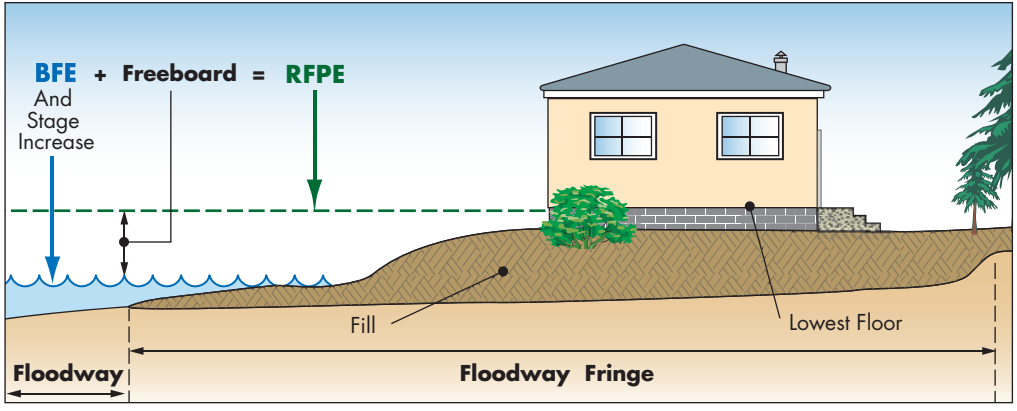
In Minnesota, floodplain management requirements for buildings and road surfaces are measured relative to the Regulatory Flood Protection Elevation. The RFPE is determined as follows:

Base Flood Elevation

\+ **Stage increase** up to 0.5 ft. due to floodway designation (0.0 ft. on lakes)

\+ **1 foot (minimum) freeboard** (some communities have higher freeboard)

= **RFPE**



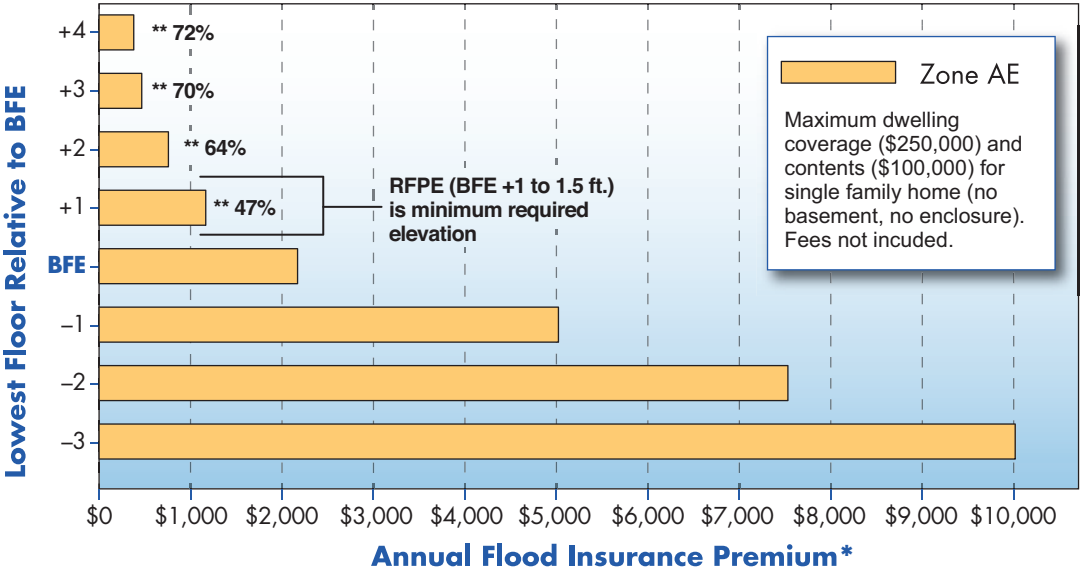
Terms and Definitions

Regulatory Flood Protection Elevation (RFPE) is an elevation not less than one foot above the elevation of the regional flood plus any increases in flood elevation caused by floodplain encroachments (stage increase) that result from designation of a floodway.

Regional Flood is also known as "base flood," "one-percent (1%) annual chance flood," and the "100-year flood."

Freeboard: Build Higher, Reduce Damage, Save on Insurance

Freeboard is additional height – a factor of safety – above the BFE. Buildings that are higher than the BFE experience less damage. Owners of buildings elevated above the BFE also save on NFIP flood insurance.



* Unofficial estimates using 2019 rates; use only for comparison purposes

** Savings over at-BFE premium

Important Information

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.

A community may be able to grant a variance, but the owner will probably be required to buy insurance. Imagine trying to sell a house if the bank requires insurance that costs nearly $10,000 a year!

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. NFIP requirements in addition to the variance criteria in Minnesota Statutes include:

- A showing of good and sufficient cause
- Potential to result in exceptional hardship

Limitations on variances:

- Shall not allow a lower degree of flood protection than the RFPE
- Shall not cause increases in flood levels
- Shall not obstruct flood flows

A variance that allows construction or substantial improvement below the BFE does not waive the lender's flood insurance requirement. Buildings with lowest floors below the BFE will have more expensive flood insurance premium – perhaps nearly $10,000 per year (see page 41)!

State Specific Guidance

Although the "hardship" standard was replaced with "practical difficulties" in State zoning enabling Statutes, hardship remains a Federal standard for variances. NFIP regulations for variances are in 44 CFR § 60.6 and guidance is in FEMA P-993, *Variances and the National Flood Insurance Program*.

Property owners and communities must carefully consider the impacts of variances to allow buildings below the RFPE. Not only will buildings be more likely to sustain flood damage, but NFIP flood insurance will be very costly. Communities with a pattern of granting variances may be subject to NFIP sanctions, costing all insurance policyholders even more.

Carefully Complete the Permit Application

Part of Floodplain Development Permit Application (only key parts shown)

Floodplain District

- ❑ Floodway
- ☑ Flood Fringe
- ❑ General Floodplain

Type of Structure

- ☑ Residence
- ❑ Accessory Structure
- ❑ Commercial/Office
- ❑ Warehouse/Industrial
- ❑ Shed / Storage
- ❑ Other

RFPE Calculation

a. BFE* = 759.1 ft.

b. Floodway stage inc. = 0.2 ft.

c. Freeboard = 1.0 ft.

RFPE (add a, b & c) = 760.3 ft.

Datum:

- ❑ NGVD, 1929
- ☑ NAVD, 1988

100-yr source:

- ☑ Flood Insurance Study
- ❑ Other

Type of Project

- ☑ New Construction
- ❑ Addition
- ❑ Repair/Maintenance
- ❑ Fence
- ❑ Fill/Grading
- ❑ Culvert/Crossing
- ❑ Other

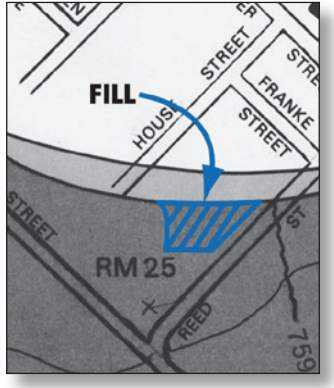
Zoning

- ☑ Permitted

- ❑ CUP
- ❑ Variance

Important Information

You must get all permits **before** you work in a flood zone.



Download sample permit application from MNDNR's Floodplain Regulations webpage (see page 78). Contact the local floodplain administrator or building, planning or engineering department for application forms and guidance.

Communities Must Retain Flood Records Permanently

Communities that participate in the NFIP agree to maintain certain documentation for all development in flood zones, including:

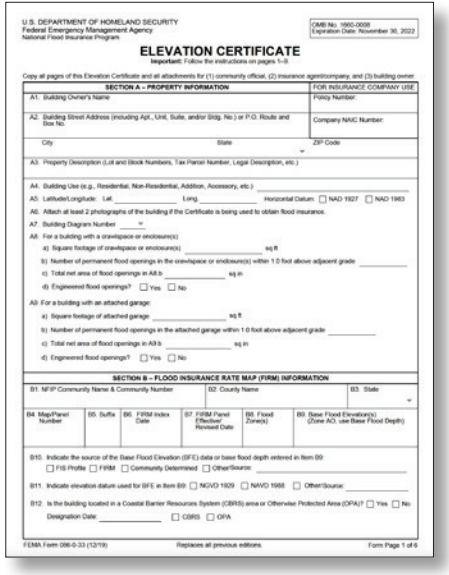
- Permits and Conditional Use Premits (CUPs) issued and variances granted
- Floodway encroachment and watercourse alteration "no-rise" certification or Zone A hydraulic analysis
- Design certifications for dry floodproofed nonresidential buildings
- Design certifications for engineered flood openings
- Determinations of whether work on existing buildings is substantial improvement or repair of substantial damage
- Surveyed "as-built" building elevations (Elevation Certificates)

Important Information

Maintaining permanent records allows communities to respond to citizen inquiries and to provide documentation to FEMA and MNDNR as part of Community Assistance Visits.

What is the Elevation Certificate and How is it Used?

- The Elevation Certificate (EC) is a FEMA form. Go to www.fema.gov and search for "Elevation Certificate."
- The EC must be completed and signed by a professional land surveyor or qualified professional engineer licensed in Minnesota.
- Community officials may complete the EC for sites in Zone AO (see Section G of the EC).
- It can be used to show that lowest grades adjacent to planned or existing building sites are above the Base Flood Elevation (see page 24).
- It is used to verify building and equipment elevations.
- Insurance agents use the EC to write and rate flood insurance policies.
- See page 79 for online Elevation Certificate training information.



U.S. DEPARTMENT OF HOMELAND SECURITY
Federal Emergency Management Agency
National Flood Insurance Program

OMB No. 1660-0008
Expiration Date: November 30, 2022

ELEVATION CERTIFICATE

Important: Follow the instructions on pages 1–9.

Copy all pages of this Elevation Certificate and all attachments for (1) community official, (2) insurance agent/company, and (3) building owner.

SECTION A – PROPERTY INFORMATION | FOR INSURANCE COMPANY USE

A1. Building Owner's Name | Policy Number:

A2. Building Street Address (including Apt., Unit, Suite, and/or Bldg. No.) or P.O. Route and Box No. | Company NAIC Number:

City | State | ZIP Code

A3. Property Description (Lot and Block Numbers, Tax Parcel Number, Legal Description, etc.)

A4. Building Use (e.g., Residential, Non-Residential, Addition, Accessory, etc.)

A5. Latitude/Longitude: Lat. ____ Long. ____ Horizontal Datum: ☐ NAD 1927 ☐ NAD 1983

A6. Attach at least 2 photographs of the building if the Certificate is being used to obtain flood insurance.

A7. Building Diagram Number ____

A8. For a building with a crawlspace or enclosure(s):

a) Square footage of crawlspace or enclosure(s): ____ sq ft

b) Number of permanent flood openings in the crawlspace or enclosure(s) within 1.0 foot above adjacent grade: ____

c) Total net area of flood openings in A8.b: ____ sq in

d) Engineered flood openings? ☐ Yes ☐ No

A9. For a building with an attached garage:

a) Square footage of attached garage: ____ sq ft

b) Number of permanent flood openings in the attached garage within 1.0 foot above adjacent grade: ____

c) Total net area of flood openings in A9.b: ____ sq in

d) Engineered flood openings? ☐ Yes ☐ No

SECTION B – FLOOD INSURANCE RATE MAP (FIRM) INFORMATION

B1. NFIP Community Name & Community Number | B2. County Name | B3. State

B4. Map/Panel Number	B5. Suffix	B6. FIRM Index Date	B7. FIRM Panel Effective/ Revised Date	B8. Flood Zone(s)	B9. Base Flood Elevation(s) (Zone AO, use Base Flood Depth)

B10. Indicate the source of the Base Flood Elevation (BFE) data or base flood depth entered in Item B9:
☐ FIS Profile ☐ FIRM ☐ Community Determined ☐ Other/Source: ____

B11. Indicate elevation datum used for BFE in Item B9: ☐ NGVD 1929 ☐ NAVD 1988 ☐ Other/Source: ____

B12. Is the building located in a Coastal Barrier Resources System (CBRS) area or Otherwise Protected Area (OPA)? ☐ Yes ☐ No
Designation Date: ____ ☐ CBRS ☐ OPA

FEMA Form 086-0-33 (12/19) Replaces all previous editions. Form Page 1 of 6

By itself, the EC cannot be used to waive the requirement to obtain flood insurance. See page 23 to learn about FEMA's Letter of Map Amendment process.

Completing the Elevation Certificate

SECTION C – BUILDING ELEVATION INFORMATION (SURVEY REQUIRED)

C1. Building elevations are based on: ☐ Construction Drawings* ☐ Building Under Construction* ☒ Finished Construction
*A new Elevation Certificate will be required when construction of the building is complete.

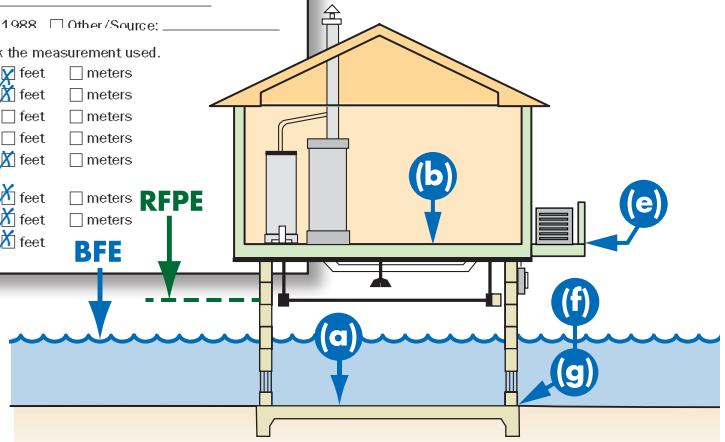
C2. Elevations – Zones A1–A30, AE, AH, A (with BFE), VE, V1–V30, V (with BFE), AR, AR/A, AR/AE, AR/A1–A30, AR/AH, AR/AO. Complete Items C2.a–h below according to the building diagram specified in Item A7. In Puerto Rico only, enter meters.

Benchmark Utilized: _____ Vertical Datum: _____

Indicate elevation datum used for the elevations in items a) through h) below. ☐ NGVD 1929 ☒ NAVD 1988 ☐ Other/Source: _____
Datum used for building elevations must be the same as that used for the BFE.

		Check the measurement used.	
a) Top of bottom floor (including basement, crawlspace, or enclosure floor)	629.8	☒ feet	☐ meters
b) Top of the next higher floor	639.0	☒ feet	☐ meters
c) Bottom of the lowest horizontal structural member (V Zones only)	N/A	☐ feet	☐ meters
d) Attached garage (top of slab)	N/A	☐ feet	☐ meters
e) Lowest elevation of machinery or equipment servicing the building (Describe type of equipment and location in Comments)	638.0	☒ feet	☐ meters
f) Lowest adjacent (finished) grade next to building (LAG)	623.4	☒ feet	☐ meters
g) Highest adjacent (finished) grade next to building (HAG)	623.4	☒ feet	☐ meters
h) Lowest adjacent grade at lowest elevation of deck or stairs, including structural support	623.4	☒ feet	

ELEVATION CERTIFICATE
(partial)



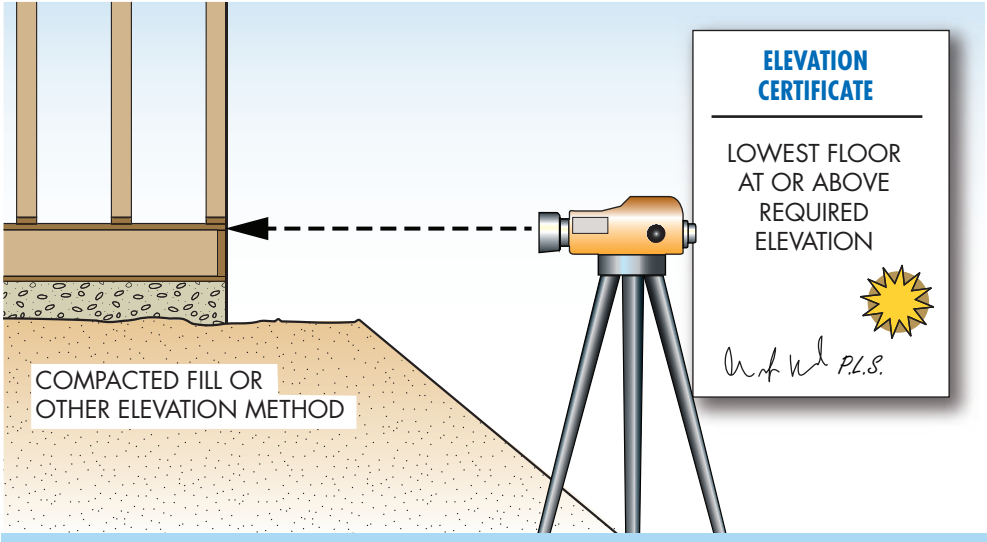
*CUP required for elevation method other than fill

In this example, the BFE is 625.0 and the RFPE is 626.5.

The house is elevated on a perimeter wall foundation,* with flood openings. The lowest floor is high enough to use the enclosed area for parking and building access.

A professional land surveyor or qualified professional engineer must fill out and sign 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.

Paperwork is Important for Owners



Important Information

Lowest Floor means the lowest floor of the lowest enclosed area (including basement). An unfinished or flood-resistant enclosure (that is not a basement) is not the lowest floor if the enclosure is limited to parking, limited storage, and building access (see page 50) and it is built as required by local floodplain management ordinances and a CUP is obtained.

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 (see page 45).

Fundamentals of Flood Resistant Construction

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:

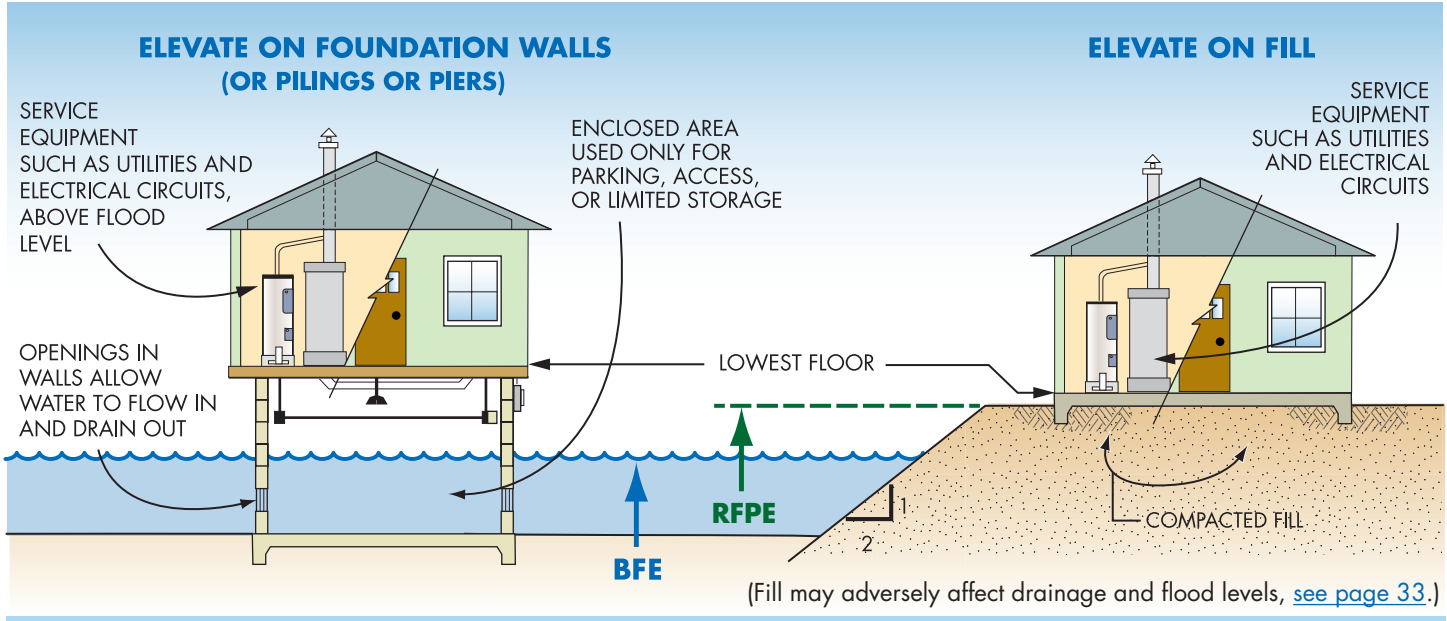
- **Foundations** capable of resisting flood loads (including dry floodproofed nonresidential buildings)
- **Lowest floors elevated** high enough to prevent floodwater from entering during the design event
- **Equipment and utilities** elevated or designed to remain intact and be restored easily
- **Enclosures 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

Important Information

Many Minnesota communities require critical facilities to be located outside of SFHAs. When alternative sites are not available, critical facilities should be elevated higher than the RFPE or above the 0.2% annual chance floodplain (500-year).

In short … flood resistant buildings!

How to Elevate Buildings in Flood Zone A/AE



(Fill may adversely affect drainage and flood levels, see page 33.)

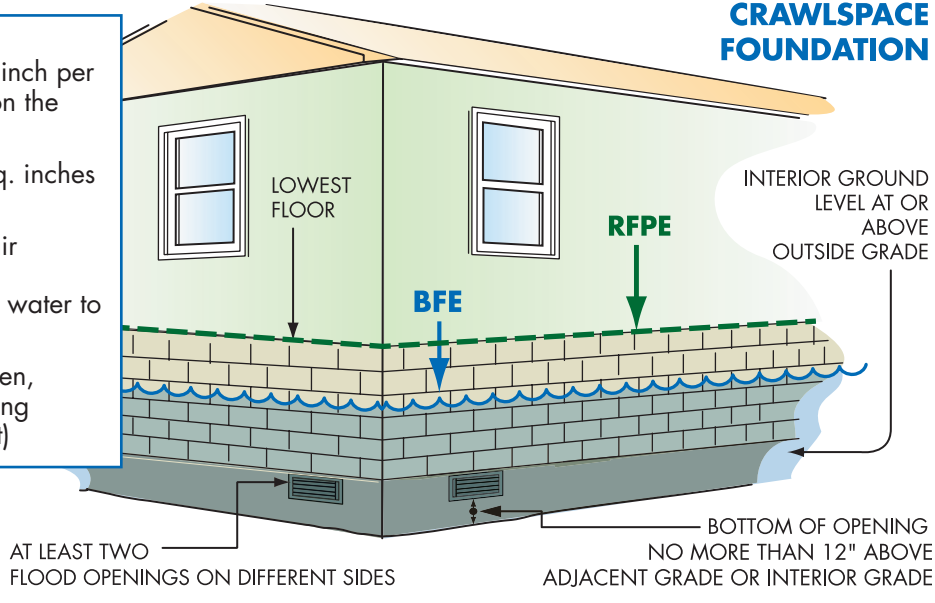
Caution! Enclosures (including crawlspaces) have some specific requirements (see page 50) and require a CUP. Note: When the walking surface of the lowest floor is at the RFPE, under-floor utilities are not allowed. Fill used to elevate buildings must be sized and placed properly (see page 52).

Enclosures Below the Lowest Floor (Zone A/AE)

NOTE:

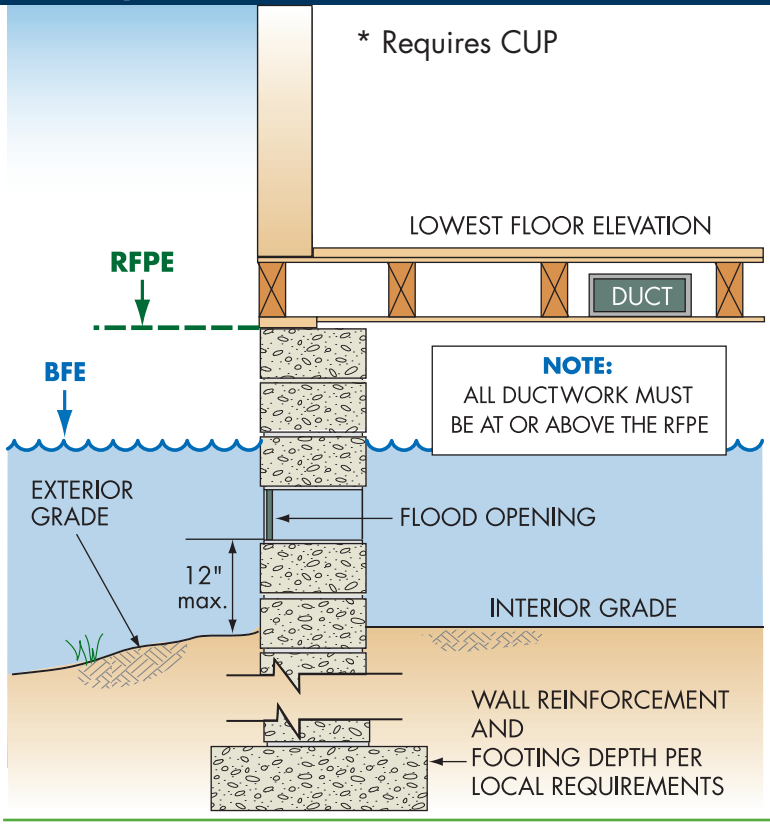
- Total net area of all openings is 1 sq. inch per sq. foot of enclosed area (measured on the outside)
- A 30' x 40' enclosure needs 1,200 sq. inches of openings
- If inserted in flood openings, typical air ventilation units must be permanently disabled in the open position to allow water to flow in and out
- A typical air ventilation unit, with screen, provides 42 to 65 sq. inches of opening (look for "net free area" stamp on unit)

ALTERNATIVE: Engineered openings are acceptable **if certified** to allow adequate automatic inflow and outflow of floodwater.



A CUP is required for solid perimeter wall foundations that enclose flood-prone space. The following are required: Flood openings, elevated utilities, flood damage-resistant materials, and limitations on use. See NFIP Technical Bulletin #1 *Requirements for Flood Openings in Foundation Walls and Walls of Enclosures* and Technical Bulletin #2 *Flood Damage-Resistant Materials Requirements.*

Crawlspace* Details (Zone A/AE)

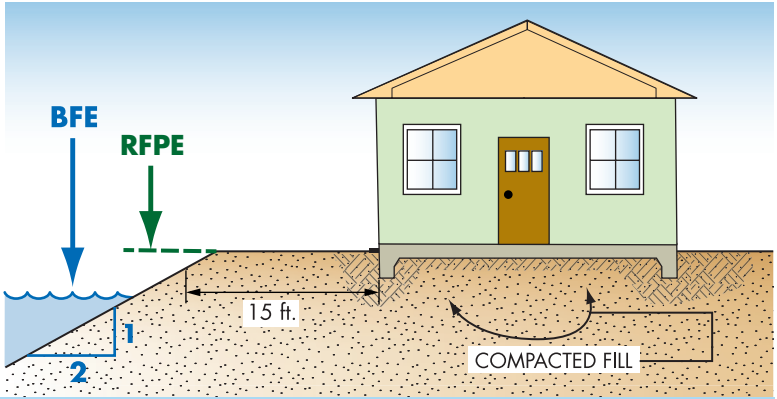


- The Lowest Floor must be at or above the RFPE (BFE + 1 to 1.5 ft.).
- All materials below the lowest floor must be flood resistant.
- Flood openings must provide 1 sq. in. of net open area for every sq. ft. of area enclosed by the perimeter walls – or certified engineered openings may be used.
- A 30' x 40' building needs 1,200 sq. in. of net opening (non-engineered).
- The bottom of flood openings must be no more than 12 inches above the higher of the interior and exterior grades.
- Standard air ventilation units must be permanently disabled in the "open" position to allow water to flow in and out.
- Interior grade must be equal to or higher than exterior grade on at least one side.

Placement and Compaction of Fill in Zone A/AE

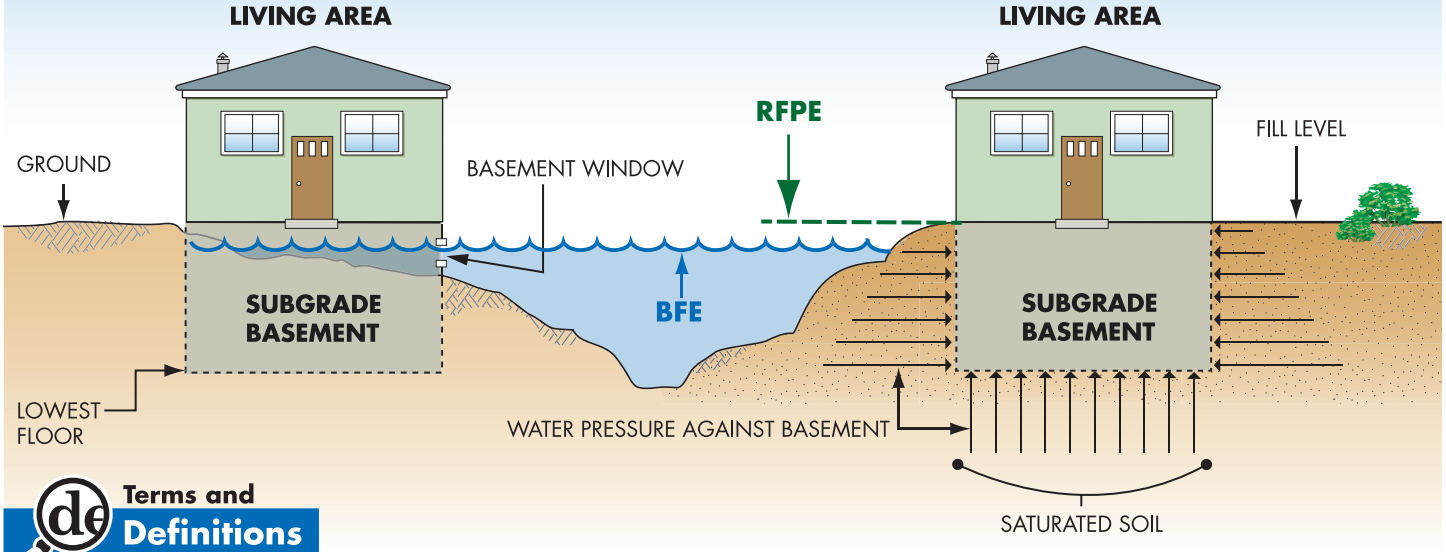
Earthen fill used to raise the ground above the flood elevation must be placed properly so that it does not erode or slump when water rises. For safety and to meet requirements, fill should:

- Not be placed in areas with poor drainage or where the fill may divert water onto adjacent properties. Instead, use perimeter walls, piers, columns, or pilings to minimize drainage problems
- Be good clean soil, free of large rocks, construction debris, and woody material (stumps, roots)
- Be machine-compacted to 95 percent of the maximumdensity (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)



State requirements specify that fill used to elevate residential buildings must extend at least 15 feet from the building to the point where the slope drops below the RFPE minus one foot.

Basements in Flood Zones Are Unsafe

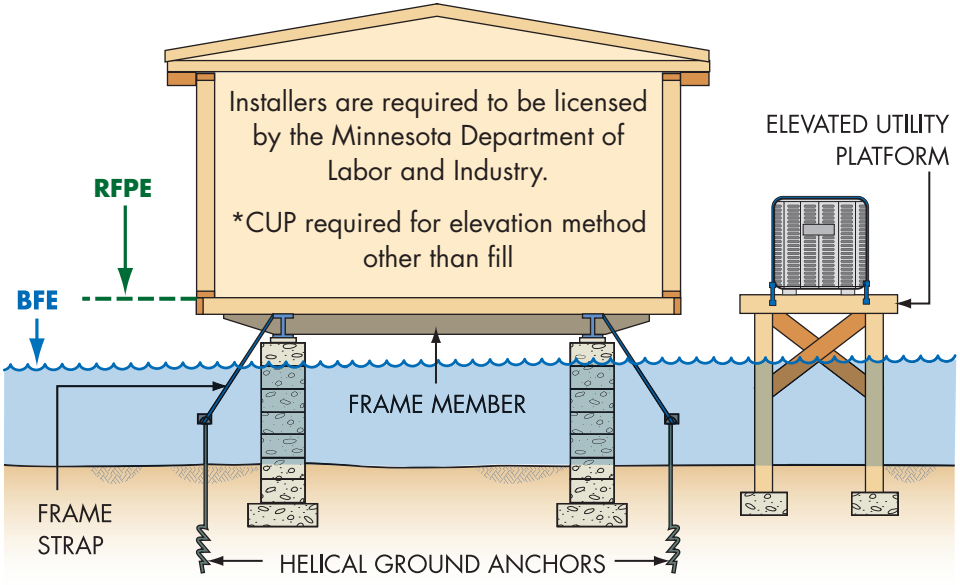


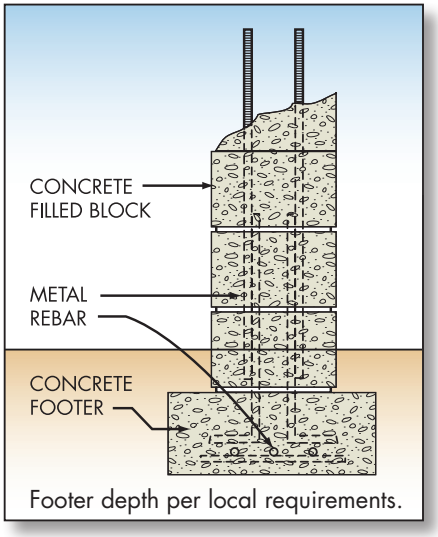
Terms and Definitions

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

New buildings are not allowed to have basement floors below the RFPE 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.

Manufactured Homes Require Special Attention

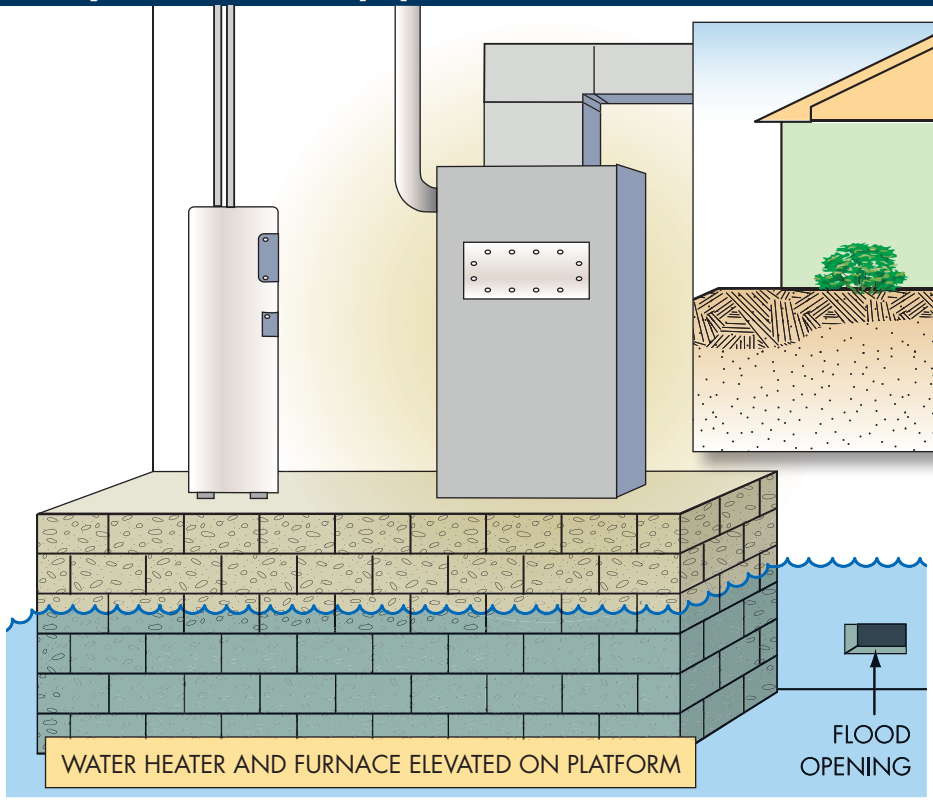


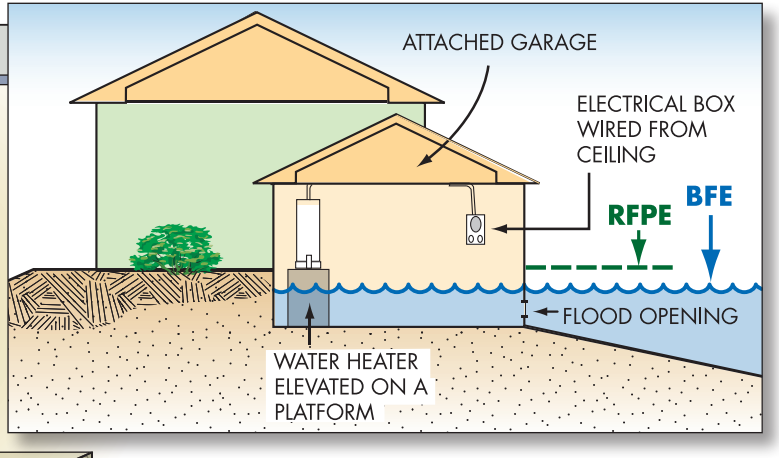


Experience shows that manufactured homes are easily damaged. Just a few inches of water above the floor can cause substantial damage.

Homes must be anchored to reinforced foundations to resist flotation, collapse, and lateral movement and must be tied down in accordance with community ordinances or the manufacturers' installation specifications for SFHAs. See guidance and some pre-engineered designs in FEMA P-85, *Protecting Manufactured Homes from Floods and Other Hazards*.

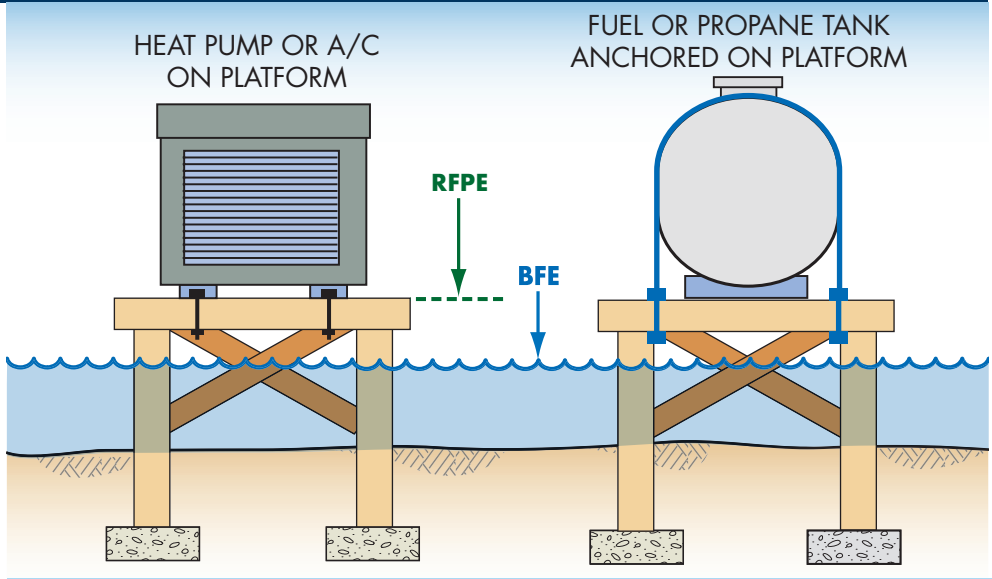
Utility Service and Equipment Inside Enclosures





Equipment (including ductwork) must be elevated to or above the RFPE. Utilities (plumbing, electrical, gas lines, heating, ventilating and air conditioning) must be elevated or designed and installed to prevent intrusion of floodwater into their components.

Utility Service, Equipment, and Tanks



Important Information

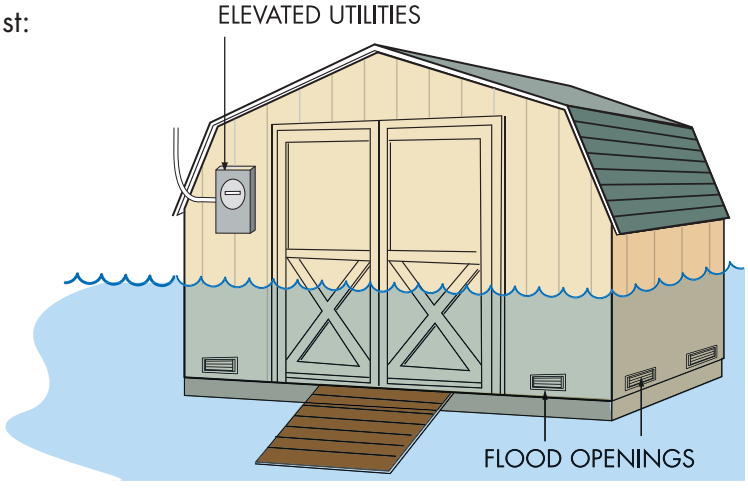
Fuel and propane tanks may explode or release contents during flooding. Even shallow water can create large buoyant forces on tanks. Tanks may be underground, elevated on platforms or columns, or at-grade and anchored to resist flood loads.

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.

Accessory Structures

If not elevated, accessory structures in flood zones must:

- Not be in the floodway
- Be less than 576 sq. ft. in floor area
- Not be habitable
- Be used only for parking or storage (not pollutants or hazardous materials)
- Be anchored to resist floating
- Have flood openings
- Be built of flood damage-resistant materials
- Have elevated utilities
- Not be modified for different use in the future



Examples of accessory structures are detached garages, carports, storage sheds, pole barns, and hay sheds.

Even small buildings are "development" and permits or variances with noted conditions are required. They must be elevated or anchored and built to resist flood damage.
Caution! Remember, everything inside will get wet when flooding occurs.

Agricultural Structures

Communities may adopt regulations to grant variances to allow certain agricultural structures to be "wet floodproofed" rather than elevated or dry floodproofed. FEMA specifies:

- Variances must be granted for individual agricultural structures
- Applicants must justify variances, including low damage potential and the anticipated hardship if variances are not granted
- Except for size limits, the accessory the accessory structure requirements also apply to agricultural structures (see page 57)

As an alternative to handling individual agricultural structures by variance, communities may seek a "community-wide exception" from FEMA. If approved, the exception allows communities to issue permits under specified conditions.

FEMA issued a policy on agricultural structures and accessory structures in early 2020. The policy, a floodplain management bulletin, and fact sheets are available on FEMA's web site. Contact floodplain.dnr@state.mn.us with questions.

Important Information

Agricultural Structure is defined by FEMA policy as a structure that is used exclusively in connection with the production, harvesting, storage, raising, or drying of agricultural commodities and livestock. Aquaculture is farming conducted in or over water. Structures used for human habitation are not agricultural structures, even when located on agricultural land.

Recreational Vehicles

In flood zones, 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)
- Have 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

Important Information

Camping near the water?
Ask the campground or RV park operator about flood warnings and plans for safe evacuations.

RVs that do not meet these conditions must be installed and elevated like manufactured homes, including permanent foundations and tie-downs (see page 54).

Pools in Flood Hazard Areas

Pools in flood hazard areas should be designed and constructed to be stable during flooding. Empty pools may be dislodged if the surrounding soil becomes saturated. Where a pool is located and whether it is in-ground, above-ground, or a combination (perhaps with associated grading and fill) determine requirements:

- **Floodway (see page 38):** Pools may be allowed in floodways with Conditional Use Permit (CUP), provided the no-rise requirements are satisfied.
- **Flood Fringe:** Pools may be permitted in flood fringe areas without encroachment analyses.

In addition:

- **Pool fencing** should be made of flood damage-resistant materials
- **Pool houses** used to store hazardous chemicals and/or those with floor area larger than 576 sq. ft. must be elevated at or above the RFPE.
- **Pool controls and equipment** must meet the requirements for utility service (see page 56).

Improvements and Repairs of Buildings in Flood Zones

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

- Review costs estimated in construction contracts or other cost estimates (including estimated market value of owner labor and donated labor and materials).
- Many communities use costs of maintenance and repairs within the past 365 days, plus proposed the costs of proposed improvements. Some accumulate improvement costs since they adopted floodplain management regulations.
- Estimate the market value using property assessment records or use an independent assessment of market value performed by a licensed appraiser.
- Compare the costs of improvements and costs of repairs to the building market value.
- Require buildings to be brought into full compliance if the costs equal or exceed 50% of the market value, called Substantial Improvement (or repair of Substantial Damage).
- Encourage owners to consider other ways to reduce future damage if the comparison is less than 50% (see page 73).

Important Information

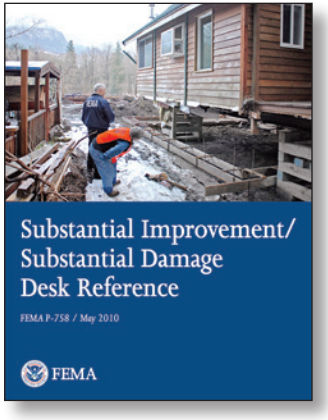
- Lateral addition only that is not substantial improvement (see page 66)
- Lateral additions (see page 67)
- Renovation/ rehabilitation of the interior of the existing building (see page 68)
- Non-substantial improvements (see page 65)

By Minnesota statute, destroyed nonconforming structures may be reconstructed if permit applications are submitted within 180 days of the destruction. However, destroyed nonconforming structures in SFHAs must be brought into compliance with the requirements for new construction in SFHAs.

Substantial Improvement/Substantial Damage Desk Reference

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 63)
- Estimating market values
- Community and property owner responsibilities
- Administrative requirements
- Key aspects of bringing buildings into compliance
- Suggestions for preparing for disasters



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

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 market 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. Some Minnesota communities have a threshold lower than 50% and most 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.

Estimating Costs of Improvements and Repairs

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 BFE + 1 foot
- **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.)

Important Information

Written estimates prepared by contractors provide the best cost information.

Owners performing work must include estimates of the value of their own labor.

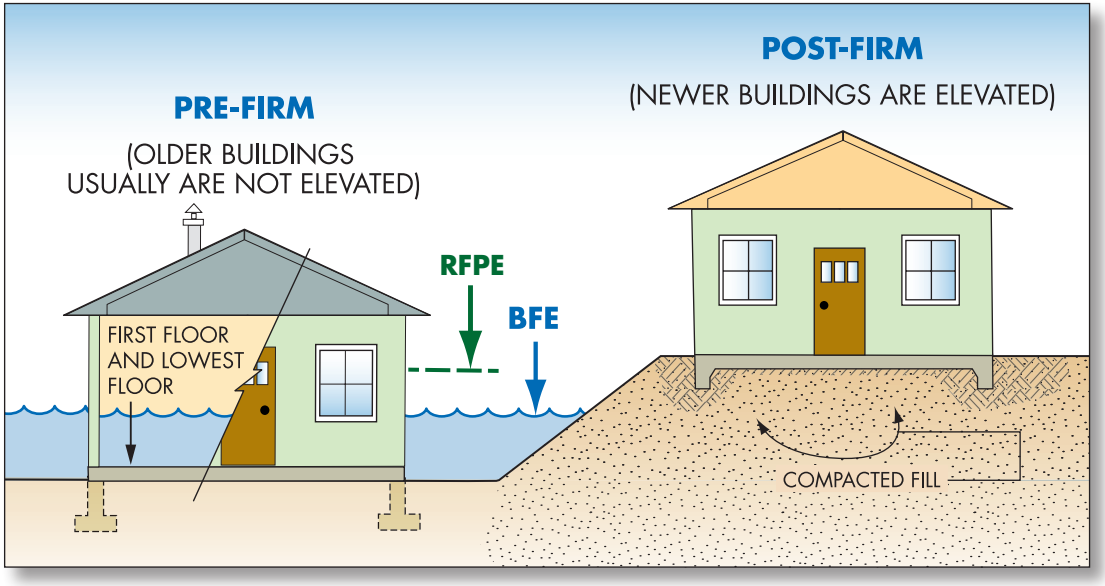
Equivalent costs must be estimated when materials are donated or volunteers help with construction.

For more details on cost items that must be included and those that are excluded, see the SI/SD Desk Reference (see page 62).

What is Meant by Pre-FIRM and Post-FIRM?

Pre-FIRM and **Post-FIRM** are NFIP insurance terms tied to the date of a community's initial Flood Insurance Rate Map (FIRM). The terms are used to determine flood insurance rates. Although common, the terms should not be used to distinguish between new construction built before a community joined the NFIP and those built after, especially in communities where the FIRMs have been revised.

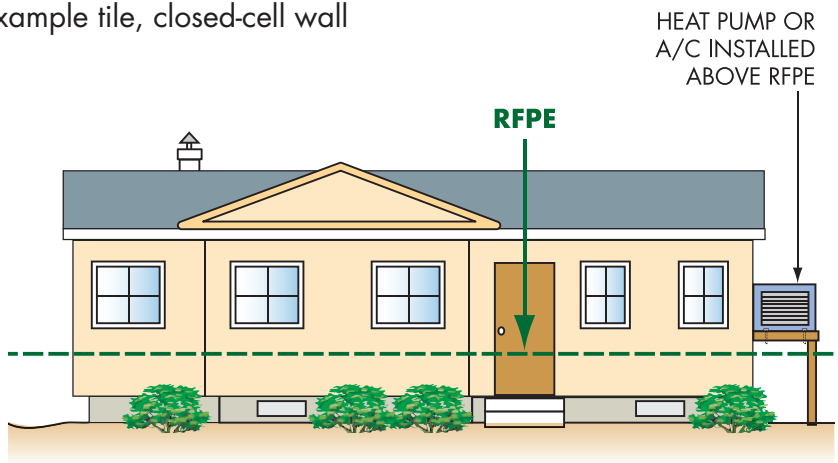
Buildings in SFHAs must be brought into compliance when work is determined to be substantial improvement or repair of substantial damage.



Non-Substantial Improvements

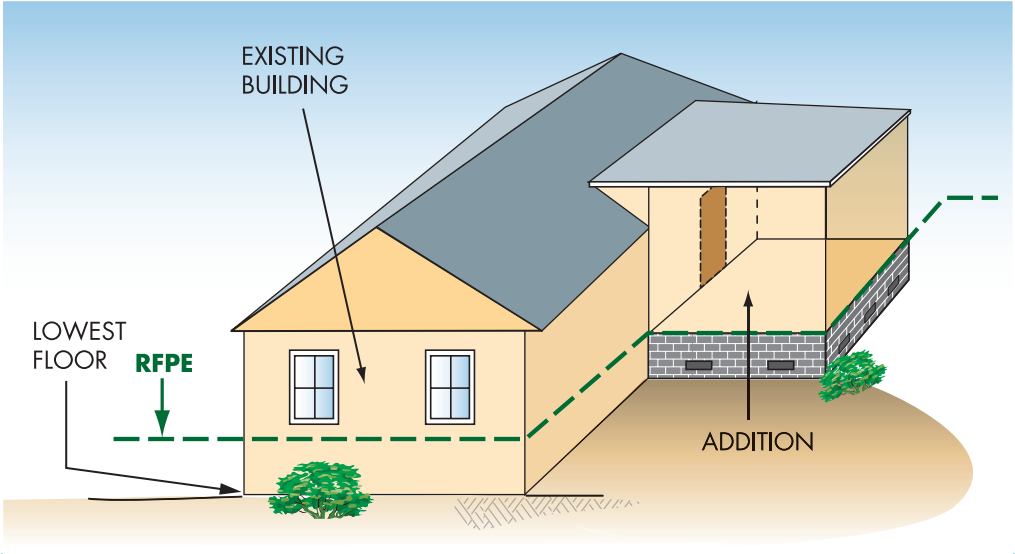
Proposed improvements are "non-substantial" if the costs are less than 50% of the market value of the building. In these cases, buildings are not required to be brought into compliance. However, there are many things owners can do to reduce exposure to future flooding. Owners should consider the following:

- 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 crawlspace



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.

Non-Substantial Improvement: Lateral Addition



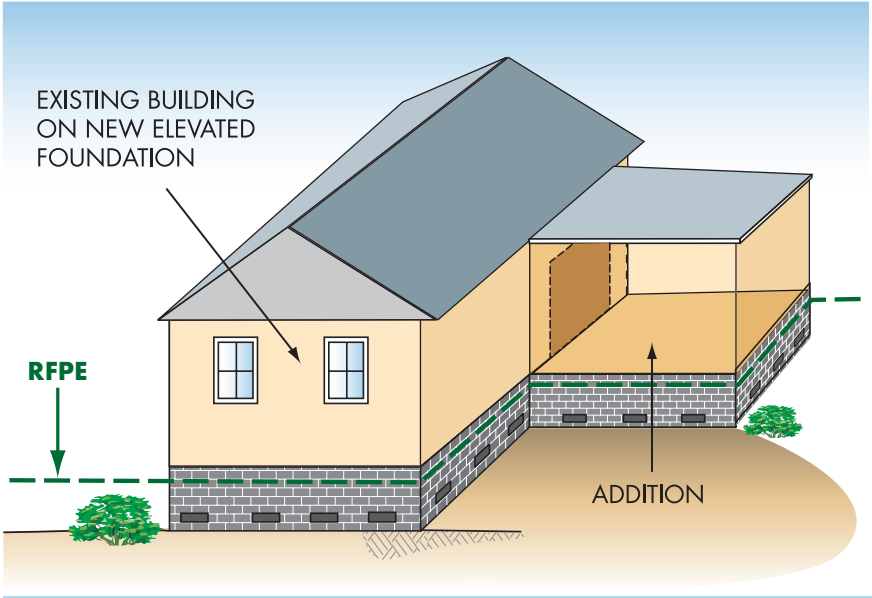
Important Information

Permits are required to build additions to buildings in SFHAs. Communities must determine whether proposed work will trigger the substantial improvement requirement.

See page 67 for projects to add lateral additions that are substantial improvements.

If an addition is not substantial improvement (cost less than 50% of market value), only the addition must be elevated and comply with requirements. Some communities accumulate costs of maintenance, repairs, and improvement over the past 365 days, and some accumulate costs since they adopted floodplain management regulations.

Substantial Improvement: Additions



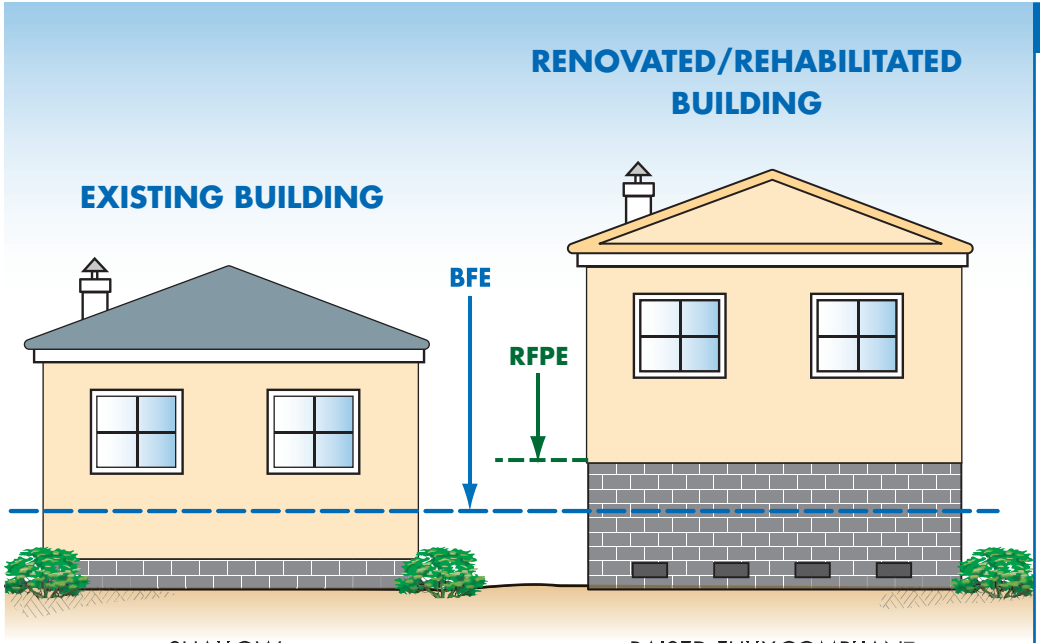
Important

Information

When communities determine an addition is substantial improvement, or an addition plus other improvements to an existing building are substantial improvements, the addition and the existing building must be elevated in compliance with the requirements for SFHAs.

Community permit offices can help determine which requirements 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.

Substantial Improvement: Renovation Only



SHALLOW CRAWLSPACE FOUNDATION

RAISED FULLY-COMPLIANT CRAWLSPACE FOUNDATION

(See page 69)

Important Information

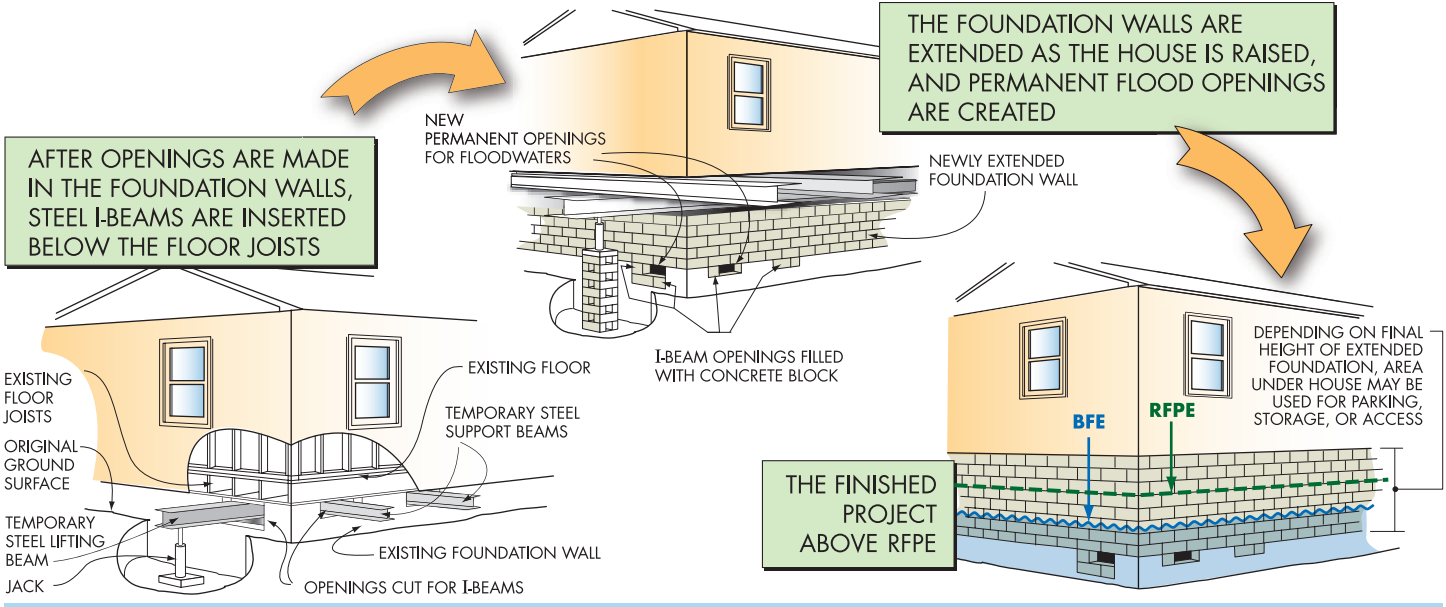
Buildings in SFHAs can be improved, renovated, rehabilitated or altered, but special rules apply.

Consult local permit offices before beginning work. Provide complete information about all proposed work.

If local code officials have cited violations of State or local health, sanitary, or safety codes, minimum costs to correct violations to provide safe living conditions can be excluded from the cost of renovations.

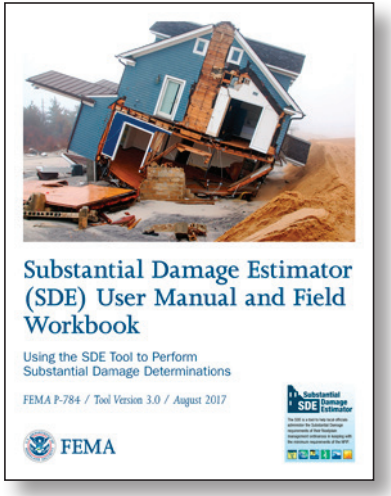
Alteration of registered historic structures are allowed, by variance, as long as the structures continue to meet the criteria for listing as historic structures.

Elevating an Existing Building



This is one way to elevate an existing building to comply with building code and floodplain regulations (also see FEMA P-312, *Homeowner's Guide to Retrofitting*). If an NFIP-insured building is damaged by flood and the community determines it is substantially damaged, the owner may be eligible for an **Increased Cost of Compliance** payment (see page 72).

Estimating Substantial Damage

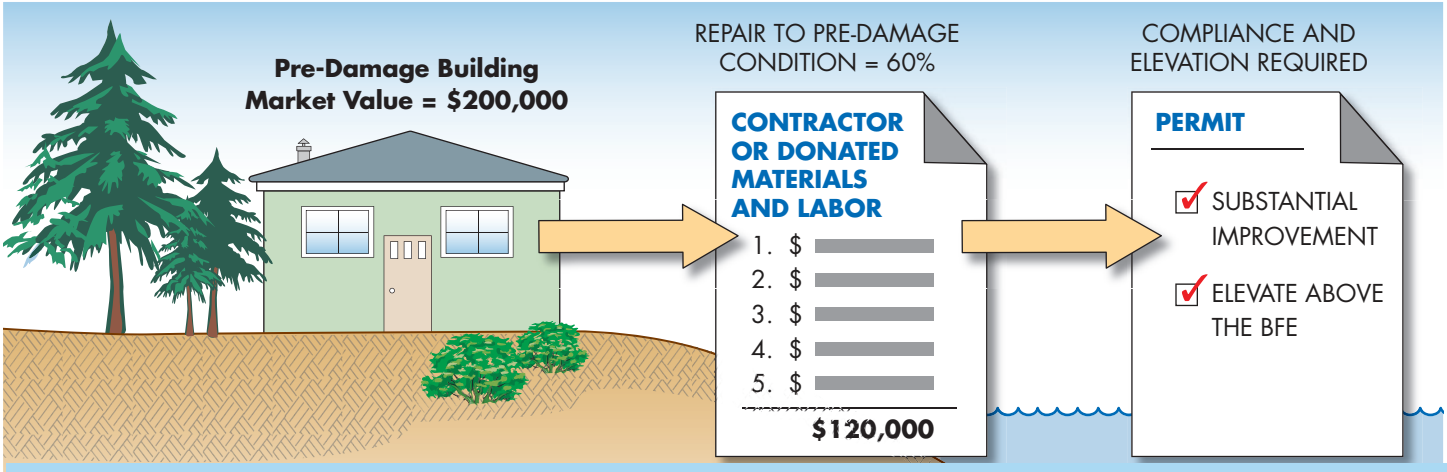


FEMA's Substantial Damage Estimator tool (SDE) was developed to help state and local officials in collecting uniform information needed to make substantial damage determinations for residential and non-residential structures in accordance with local floodplain management requirements.
The SDE tool:

- 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

Download the SDE software installation package, *User Manual and Field Workbook*, forms, worksheets and other materials at https://www.fema.gov/media-library/assets/documents/18692.

Repair of Damaged Buildings



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. If the costs are 50% or more of the pre-damage market value of the building, then it is "substantially damaged" and must be brought into compliance, which may involve raising the foundation and other measures. Consult with local permit offices before repairs are started.

Even if applications are submitted within 180 days, destroyed nonconforming structures in SFHAs must be brought into compliance with the requirements for new construction in SFHAs.

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
- The community made an official determination that buildings were 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.

USE THE ICC CLAIM TO:

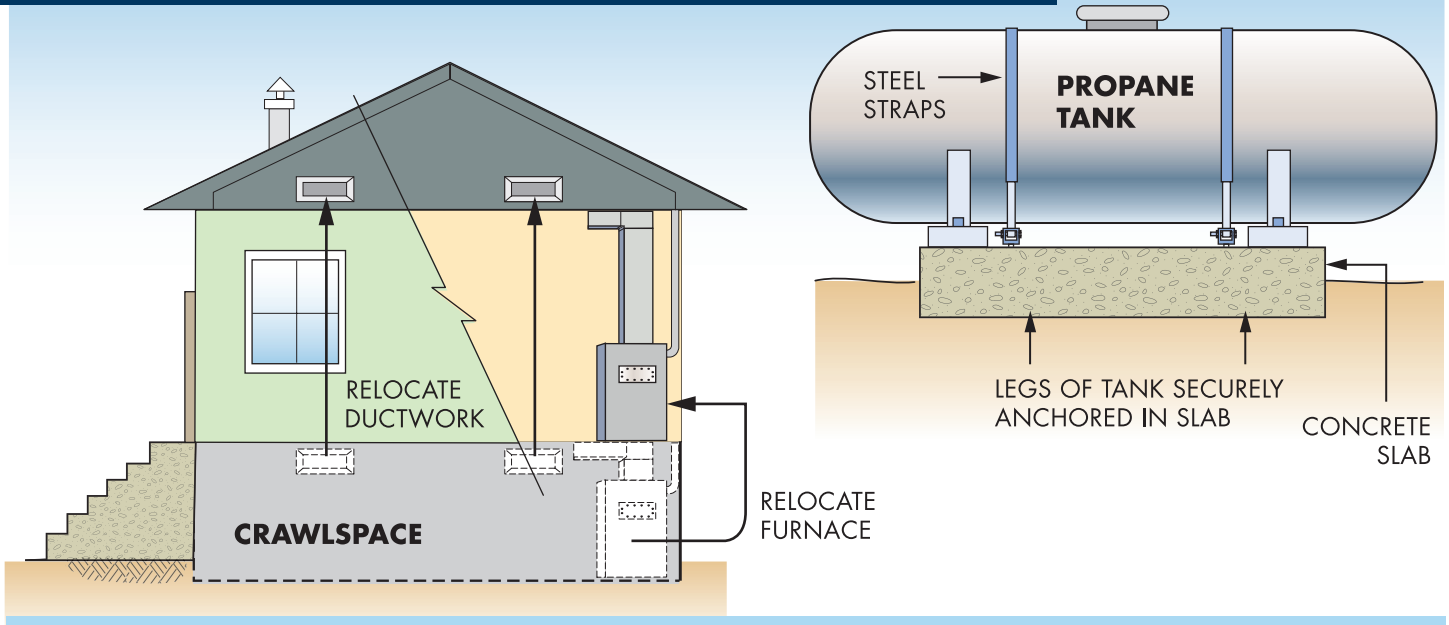
ELEVATE-IN-PLACE

RELOCATE TO HIGH GROUND

DEMOLISH

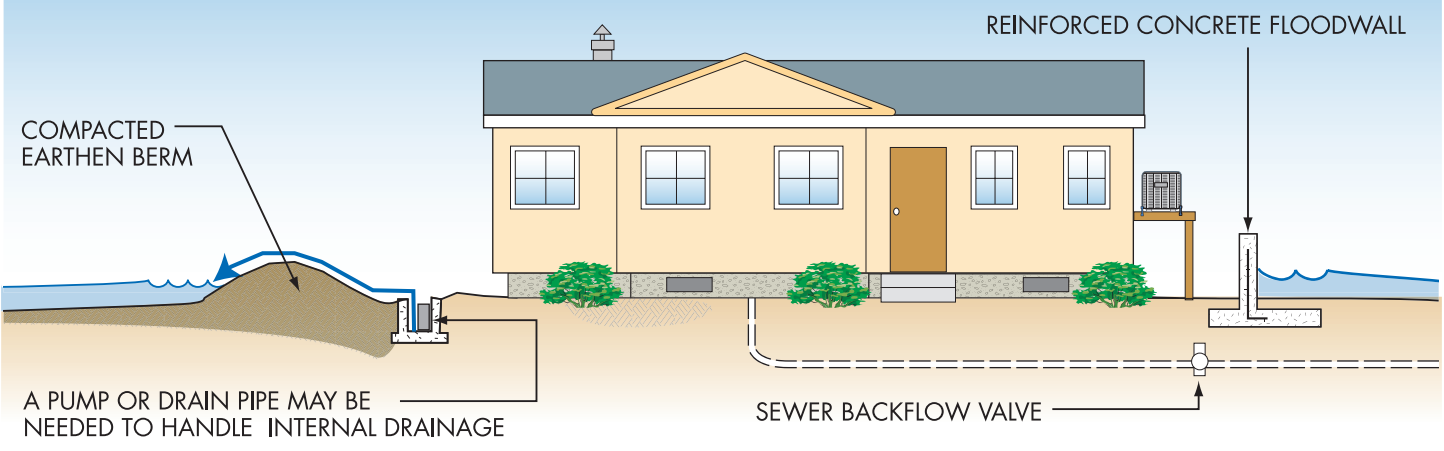
FLOODPROOF (NON-RESIDENTIAL ONLY)

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



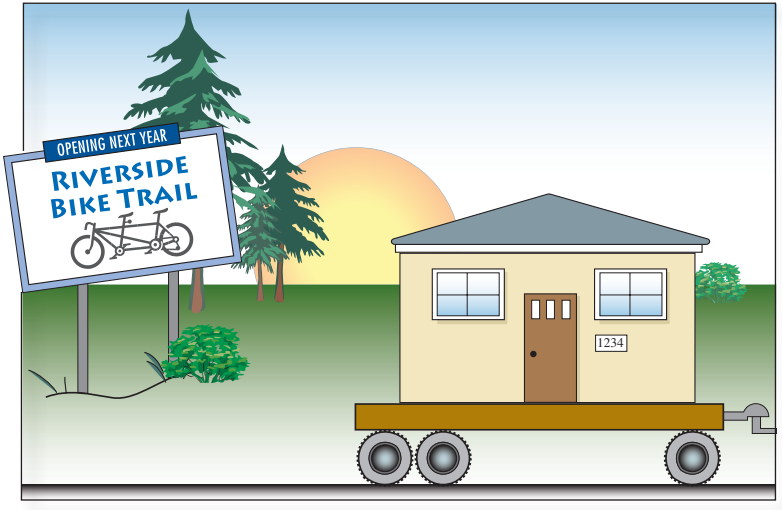
In areas where floodwater isn't expected to be deep, sometimes individual buildings can be protected by earthen berms or concrete floodwalls. Permits are required for these protection measures and extra care must be taken if sites are in floodways (see page 17). Small berms or floodwalls cannot be used 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!

Some Flood Mitigation Projects are More Costly Up Front

But Give More Protection and a Positive Return on Investment

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.



The Minnesota Division of Homeland Security and Emergency Management (HSEM) administers FEMA mitigation grant programs: https://dps.mn.gov/divisions/HSEM.

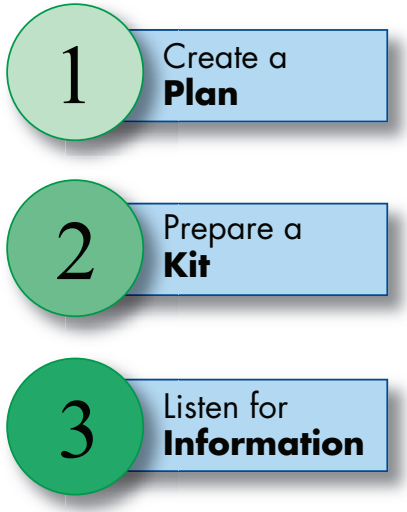
The MNDNR administers the State Flood Hazard Mitigation grant program: https://www.dnr.state.mn.us/waters/watermgmt_section/flood_damage/index.html.

StormAware: 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.
- https://www.weather.gov/safety/flood-turn-around-dont-drown.

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 (Minnesota 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 online at www.ready.gov, the American Red Cross (www.redcross.org), and the Minnesota HSEM (https://dps.mn.gov/divisions/hsem). Also check with local emergency management agencies.

Useful Resources and Common Acronyms

- MNDNR Floodplain Management, information for community officials and homeowners and related links: https://mndnr.gov/floodplain/ and https://www.dnr.state.mn.us/waters/watermgmt_section/floodplain/access-flood-maps.html
- MNDNR Shoreland Management: www.dnr.state.mn.us/waters/watermgmt_section/shoreland/
- MNTOPO, 2-foot elevation contours and other topographic and floodplain data: https://www.dnr.state.mn.us/maps/mntopo/index.html
- 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
- CUP = Conditional Use Permit
- EC = Elevation Certificate
- FIRM = Flood Insurance Rate Map
- NFIP = National Flood Insurance Program
- RFPE = Regulatory Flood Protection 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.
- To learn about FEMA maps, go to www.fema.gov/national-flood-insurance-program-flood-hazard-mapping.
- FEMA's on-line publications can be found in the FEMA Library (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.
- Find out about Elevation Certificates and training for professional land surveyors by searching for Elevation Certificate at www.fema.gov.
- To join the Minnesota Association of Floodplain Managers and see conference opportunities, go to www.mnafpm.org.
- See upcoming trainings, subscribe to the Water Talk newsletter, and view past newsletters at https://mndnr.gov/floodplain (under Training and Education).

This **Quick Guide** may be downloaded from

Minnesota Department of Natural Resources, Floodplain Program

https://mndnr.gov/floodplain/

Minnesota Association of Floodplain Managers

www.mnafpm.org (see <Resources>)