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OFFICE OF
CHEHALIS BASIN

Be Aware, Be Prepared

Protect Yourself from Flooding in the Chehalis Basin

Prepared by
Office of Chehalis Basin
Washington State Department of Ecology

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ACRONYMS AND ABBREVIATIONS

BFE	Base Flood Elevation
CFAR	Community Flood Assistance and Resilience program
CRS	Community Rating System
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
NAVD	North American Vertical Datum of 1988
NFIP	National Flood Insurance Program
NGVD	National Geodetic Vertical Datum of 1929
SFHA	Special Flood Hazard Area

FEMA maintains a searchable list of terms on their website, at <https://www.fema.gov/flood-insurance/terminology-index>.

1 INTRODUCTION

The three most important things you can do about flooding are:

1. Know when a flood is coming
2. Protect your property
3. Carry flood insurance

The Office of Chehalis Basin recommends that you do all three in order to reduce damage from flooding. All three are introduced and summarized in this guide. There are links to websites that can help you and a list of more detailed references on the last pages. You can also get help through the Community Flood Assistance and Resilience program, or CFAR.

1.1 Community Flood Assistance and Resilience Program

The Community Flood Assistance and Resilience program (CFAR) is a program managed by the Washington State Department of Ecology, Office of Chehalis Basin. CFAR provides both technical assistance and funding to help Chehalis Basin tribes, local governments, residents, and businesses take actions that will reduce the threat to life and property damage from flooding and erosion.

If you would like to request technical assistance, need help developing a project, or have general questions about flood issues, please contact the Office of Chehalis Basin at (360) 791-4388 or OCB@ecy.wa.gov.

It is up to you, the reader, to decide what is best for your situation. But, CFAR can help you learn about and weigh your options.

In addition to technical assistance, CFAR can provide funding support for some building protection measures. The first step in seeking financial help is to have a CFAR advisor review your situation with you, discuss options, and explain the financial assistance application procedures.

More information on CFAR can be found at <https://chehalisbasinstrategy.com/cfar/>.

1.2 Technical Terms

Several sections of this guide use terms that should be defined. They are from the **National Flood Insurance Program (NFIP)**, which provides government-backed insurance for flood damage in cities and counties that agree to regulate new development in the floodplain. The agreement is that the federal government will make flood insurance available if the local government makes sure that new buildings and other development meet certain minimum flood protection standards. All of the cities and the three primary counties in the Chehalis Basin (Grays Harbor, Lewis and Thurston counties) are in the NFIP.

You can find the Flood Insurance Rate Map and information from it at your local building department or at the Federal Emergency Management Agency (FEMA) Map Service Center <https://msc.fema.gov/portal/home>. Just enter an address.

The NFIP publishes **Flood Insurance Rate Maps** or **FIRMs**. They delineate the **Special Flood Hazard Area (SFHA)** where local governments must regulate and they provide flood insurance rate setting information. The SFHA is the area where the ground is lower than the **base flood elevation**.

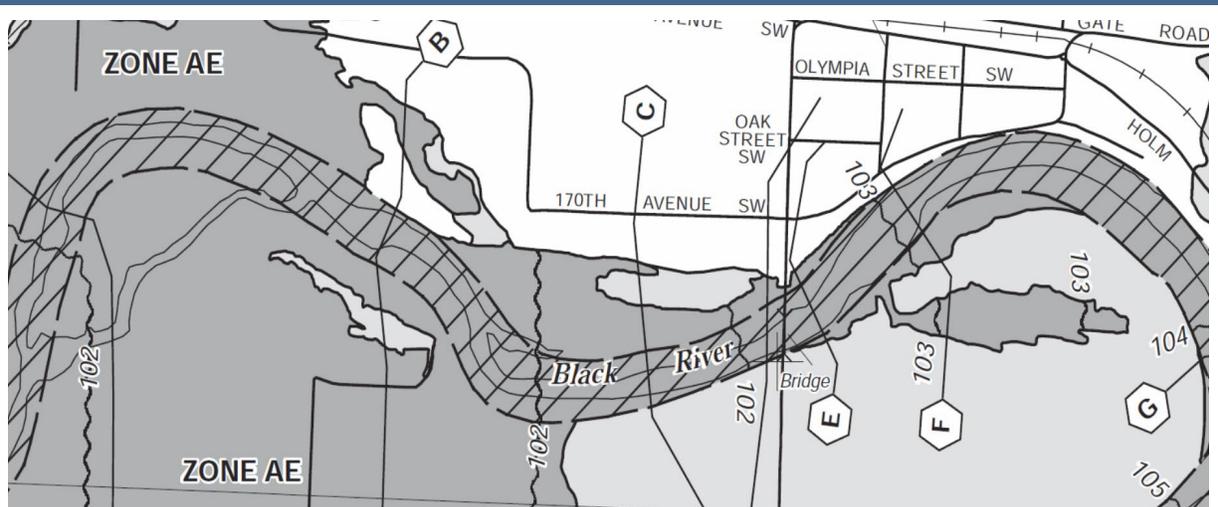
The **base flood elevation** or **BFE** is the elevation above sea level of the base flood. The base flood is the flood that has a 1% or 1 out of 100 chance of occurring in any year. It is also called the 100-year flood, but that term is not used much anymore because people thought that meant it only happens once every hundred years. In fact, at the Grand Mound gage on the Chehalis River, the floods of 1990, 1996, and 2007 were as high or higher than the BFE shown on the FIRM for Thurston County.

The **flood protection level** is the level you want to protect your property to. For flood insurance purposes, the living area within your home should be at least as high as the BFE. Most local codes require new buildings and substantial improvements to at least the BFE + 1 foot (see 3.A, page 13).

The flood protection level may also be the level of the highest flood recorded at the site, especially if that is higher than the BFE. This flood is known as the “**flood of record**.” CFAR recommends and funds projects to protect properties to a flood protection level of the BFE plus three feet or the flood of record plus three feet, whichever is higher.

Another feature shown on the FIRM is the **floodway**. This is the central part of the SFHA, closest to the channel. It is usually the most dangerous part of the floodplain because the water is deeper and moves faster. There are special federal and state regulatory requirements in the floodway (see 3.B on page 13).

Excerpt from a Flood Insurance Rate Map



This excerpt from the Thurston County Flood Insurance Rate Map shows the Special Flood Hazard Area (the dark shaded “Zone AE”), the floodway (the “/////” area along the channel), and base flood elevations (102 – 105 feet above sea level (NAVD; see page 7 for more information on “NAVD”).

2 FLOOD WARNING

Knowing that a flood is coming can be very valuable to protect your family and your property. Knowing how high the water could get can be even more useful. Over the last 10 years, the Chehalis River Basin Flood Authority has added rain and river gages and taken other steps to improve the quality and utility of flood warning information throughout the Basin.

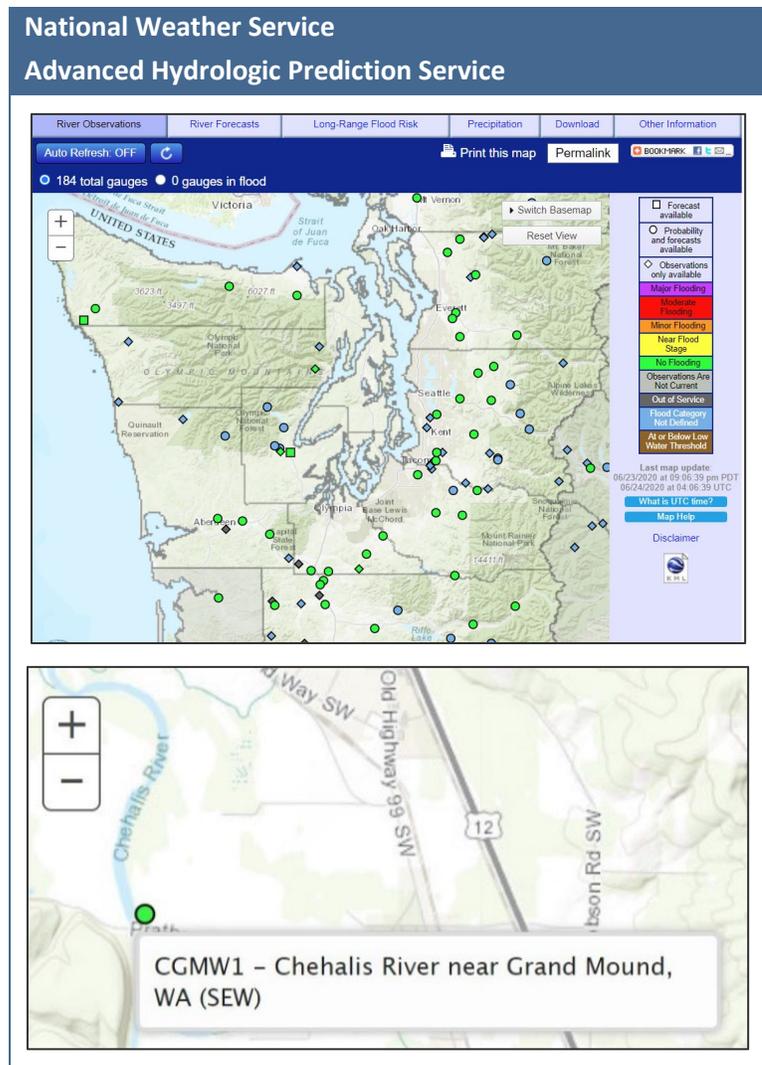
2.1 Find your gage

You can access information on gages by going on the National Weather Service’s Advanced Hydrologic Prediction Service website, <https://water.weather.gov/ahps/>.

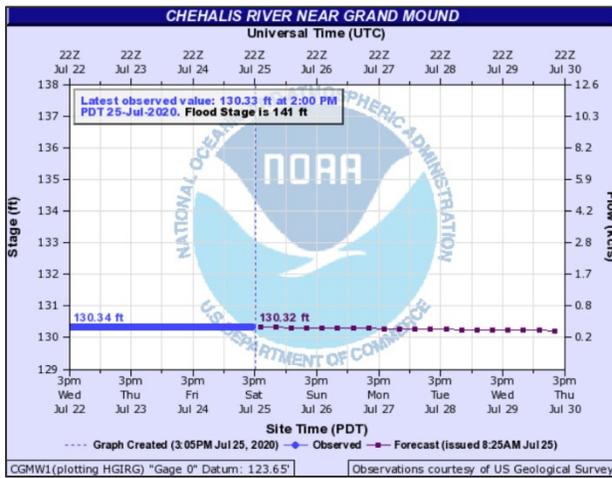
Use the  tool in the top left corner to zoom in on your area of interest. A green dot is a gage that reports both current water level and predicted future levels. Pick one or more gages closest to your location by clicking on the green dot(s). You will get a graph like the ones on the top of the next page that shows recent gage readings in blue and the predicted gage readings in red.

2.2 Reading River Gages

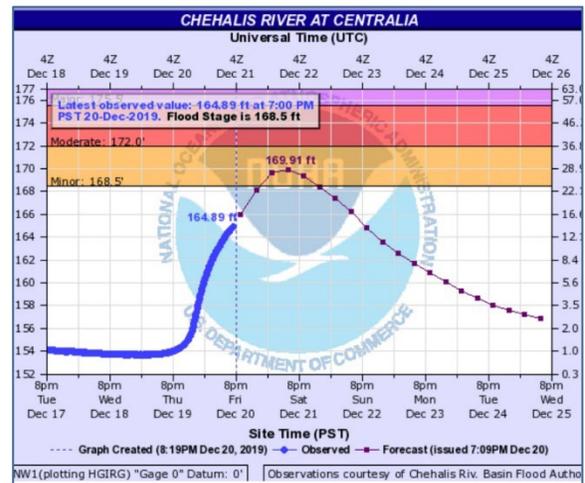
River gages report heights in “stage,” as noted on the left side of the graphs on the next page. In the example on the left, the Chehalis River at Grand Mound is at a stage of 130.34 and is predicted to stay at that level for the next few days. This is well below the “Flood Stage” at this gage. Generally, “flood stage” is the level where water starts causing damage to human development like roads and buildings.



Chehalis River Gage Hydrographs at Grand Mound and Centralia



This is the hydrograph for the Grand Mound gage reading on July 25, 2020. The river level was predicted to stay steady. This gage is discussed more on the next page.



This is the Chehalis River gage at Centralia on December 20, 2019, when a flood was predicted to reach an elevation of 169.91 feet, above this gage's "Flood Stage" of 168.5.

Historically, "stage" for most gages was a level above an arbitrary starting point. The Flood Categories information to the right was taken from the Grand Mound gage. Note that in 1996, the flood crested at 19.98 and in 2007 it crested at 147.26. The 2007 flood wasn't 127 feet deeper. The newer records are recorded in relation to mean sea level. There are two different "sea levels." The older system is used in the Lewis County FIRM, known as National Geodetic Vertical Datum (NGVD). The newer system, the North American Vertical Datum (NAVD), is used in the FIRMs for Grays Harbor and Thurston counties and most of the river gages' more recent readings.

The Grand Mound gage's Historic Crests includes the 12/04/2007 flood in both the old stage (20.23) and NAVD (147.26). The difference is 147.26 - 20.23 = 127.03. You can add this difference to the stage values to convert the older readings to NAVD.

For example, the 02/09/1996 flood crest was at a stage of 19.98, which is 19.98 + 127.03 = 147.01 feet above sea level (NAVD). In other words, the 1996 flood was only 0.25 feet below the crest of the 2007 flood at Grand Mound. This approach is the only way to compare stage readings to the flood elevations on the FIRM. See also www.chehalisriverflood.com and the Gage Height Conversion Project (found at https://www.ezview.wa.gov/site/alias_1492/37257/Chehalis-Basin-Gage-Height-Conversion-Project.aspx).

Flood Categories (in feet)	
Major Flood Stage:	144
Moderate Flood Stage:	142.5
Flood Stage:	141

Historic Crests

- (1) 147.26 ft on 12/04/2007
- (2) 142.68 ft on 12/22/2019 (P)
- (3) 142.41 ft on 01/08/2020 (P)
- (4) 20.23 ft on 12/04/2007
- (5) 19.98 ft on 02/09/1996

[Show More Historic Crests](#)

(P): Preliminary values subject to further review.

Recent Crests

- (1) 142.41 ft on 01/08/2020 (P)
- (2) 142.68 ft on 12/22/2019 (P)
- (3) 15.77 ft on 02/10/2017 (P)
- (4) 14.47 ft on 11/26/2016 (P)
- (5) 16.84 ft on 12/10/2015 (P)

[Show More Recent Crests](#)

(P): Preliminary values subject to further review.

Screenshot of Gage-Related Data from Grand Mound Gage

Most gage websites have additional information on what happens at and above flood stage. Here's an excerpt from the National Weather Service website for the Chehalis River at Grand Mound, where flood stage is 141 feet:

- 146 the Chehalis River in Thurston County will cause severe near record flooding, with deep and swift flood waters inundating the Independence Valley. Flooding will occur all along the river including headwaters, tributaries, and other streams within and near the Chehalis River Basin.
- 144.5 the Chehalis River in Thurston County will cause major flooding, inundating roads and farm lands in Independence Valley. Deep and swift flood waters will cover SR-12 and James, Independence and Moon Roads. Flooding will occur all along the river including headwaters, tributaries, and other streams within and near the Chehalis River Basin.
- 142.5 the Chehalis River in Thurston County will flood several roads in Independence Valley with swiftly moving water including SR-12 and James, Independence, Moon and Anderson Roads. Flood waters will cut off access to and from Chehalis Reservation and inundate nearby farm lands. Some residential structures may be threatened.
- 141 the Chehalis River in Thurston County will flood several roads in Independence Valley including James Road, Independence Road, and Moon road. Flood waters will also cover nearby farm lands. –

<https://water.weather.gov/ahps2/hydrograph.php?wfo=sew&gage=cgmw1>

2.3 Relate flood stages to your situation

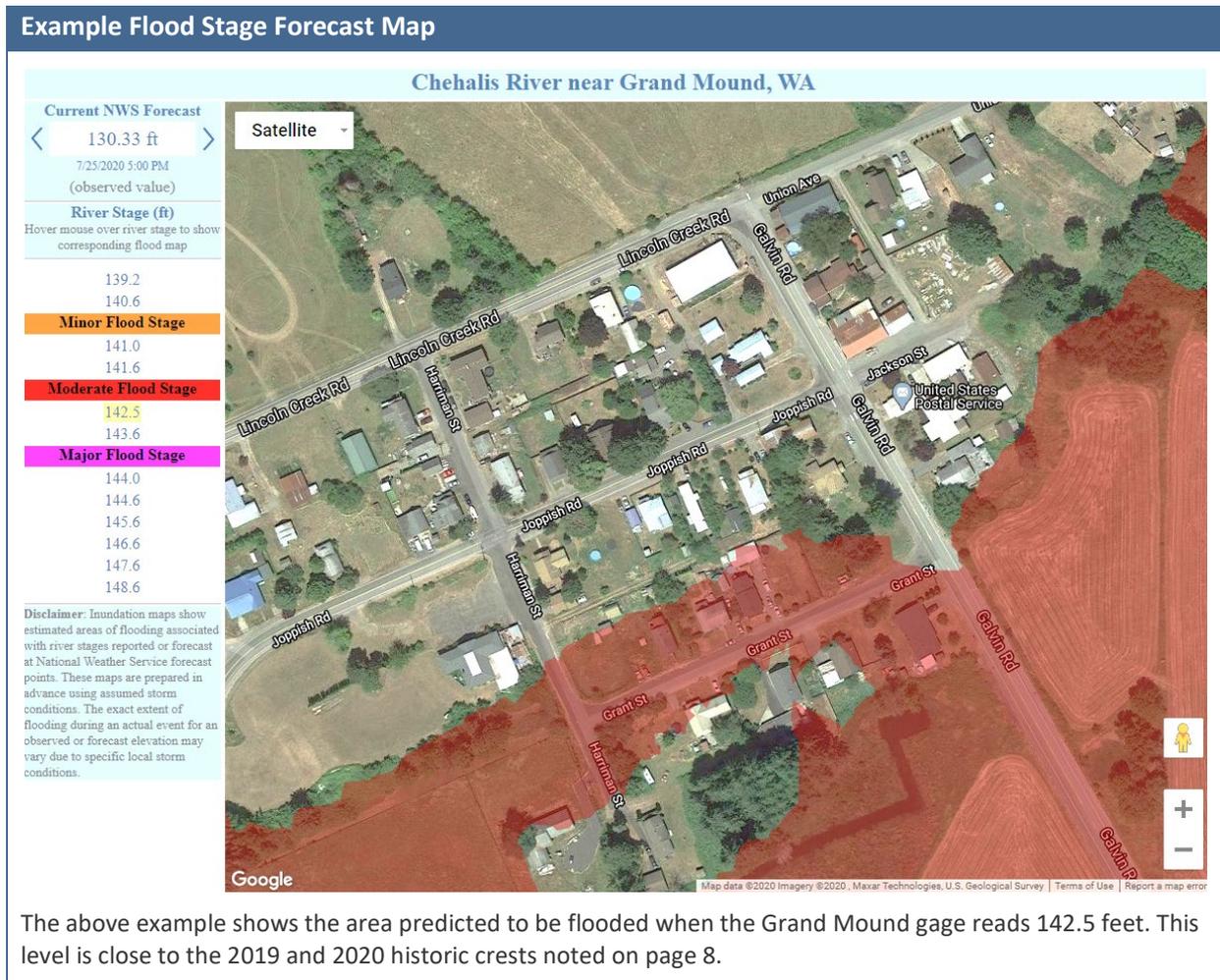
To put the gage data in context, it's helpful to track levels of past floods at your property. For example, at the Grand Mound gage the January 8, 2020, and December 22, 2019, river crests were about a foot and a half above the flood stage of 141 feet. A good way to remember how high those floods were on your property is to mark them. By doing so, you can relate the gage data to your situation. In this example, if the January 2020 flood at 142.41 was a foot below your garage floor, you know that a prediction of a river level of 143.4 feet or higher at the same gage means water will probably get into your garage. The closer your property is to the gage, the more accurate this comparison.



The Weather Service gage data and a helpful additional tool can be found on the Chehalis River Basin Flood Authority's Flood Warning System website, www.chehalisriverflood.com. Scroll down and click on "Flood Maps." Pick a gage on the river that floods your area that is near your location (example to the right). You will get a map like the one shown on the next page.



Find your location on the map. The unincorporated community of Galvin in Lewis County is shown in the example below, about 2 miles upstream of the Chehalis River gage at Grand Mound. You can pick any of the stages river shown on the left side of the screen, e.g., a recent flood level or a predicted flood level.



When there is a flood warning, you can also click on the “angle brackets” surrounding the “Current National Weather Service Forecast” (“<” and “>” right or left of “130.33 ft” in the example above). This allows you to scroll through the entire Weather Service forecast and see the inundated area expand and contract as the flood passes through the site. Times for each level of flooding are noted as well.

Please note the following:

1. Consider how these maps match your experience of a recent flood. If you remember the flood covering a larger area, keep that in mind when you look at a map of a predicted flood level.
2. You may be subject to flooding from more than one source. The flood shown on the image above is backwater from the Chehalis River, but this area could also be flooded by Lincoln Creek or by both sources. This could result in a flood higher than predicted on the Chehalis River gage.

3. No prediction is 100% accurate and no map is perfect. If you get a warning for one level, you may want to map the next higher level to provide a margin of safety.
4. Check when your property and your building would be flooded, but also be aware of other impacts in your area, especially when roads and bridges will go under water. It would not be unusual for your evacuation route to be blocked before the water reaches your house. In the example on the previous page, most of the buildings are still dry at 142.5 feet, but a map of a larger area (right) shows that all roads going in or out of Galvin (yellow square) will be under water.



Screenshot of Flood Authority website illustrating approximate areas inundated at flood stage 142.5. The yellow box shows the area covered by the map on the previous page.

2.4 Get a warning

You can sign up for a notice from your county emergency management office. Getting a notice is particularly helpful because you'll be advised of potential flooding, even if you're asleep or out of town. The notices may come by email or to your smartphone. Here are the counties' sites, where you can go to sign up for alerts and notices:

- Grays Harbor County: http://www.co.grays-harbor.wa.us/departments/emergency_management/preparedness.php
- Lewis County: <https://flood.lewiscountywa.gov/during-flood/monitor-situation/>
- Thurston County: <https://www.thurstoncountywa.gov/em/Pages/ei-alert.aspx>

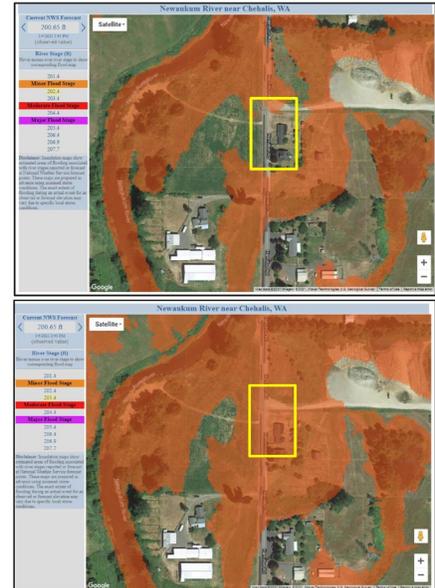
Once you know your gage, understand the readings, and can relate the readings to your situation, you can convert a general flood warning to something much more specific for your property. You can check the gage and map whenever you want, when it's raining, or when you get an alert. You can also see live webcam views of current river levels at several locations at <https://chehalis.onerain.com/dashboard/list/>.

2.5 Have a response plan

Responding to a flood can be intense. It's a good idea to decide with your family or housemates who is doing what, and write it down so nothing is forgotten. Such a plan can be used for other hazards, like a fire. It should include turning off utilities, packing important papers (especially your insurance policies), caring for your pets, and moving valuables upstairs or to high ground. Check the county websites for links to emergency preparedness and emergency grab and go kits.

Note: Even if your building won't be damaged, you should still evacuate a floodprone area before the flood. You may need to be able to get to a hospital or help family when the water is up.

CFAR has worked with a Basin resident to prepare a flood response plan for his property¹. It is included in a guide for residents who wish to develop their own response plans. The flood response plan recommends actions to take at different stage levels for the Newaukum River gage near Chehalis. Flood stage forecast maps from that gage (right) were used to determine the actions to take before access will be blocked by water, before the water is predicted to reach a building, and before water gets into a building.



Screenshots of Flood Authority website illustrating approximate areas inundated by water under different flood stage levels. The yellow box shows the property.

You can download the guide, "Preparing a Household Flood Response Plan" at <https://apps.ecology.wa.gov/publications/SummaryPages/2113002.html>.

3 PROPERTY PROTECTION MEASURES

This section reviews what you can do to your property or building to reduce the likelihood of damage by a flood. Six different measures are introduced. Each works better in different situations. This section starts with a review of the factors that determine which measure works best for your situation.

3.1 Factors that Affect the Choice of a Measure

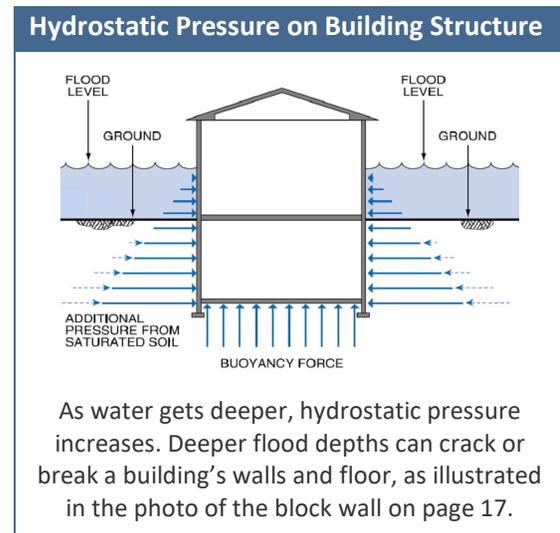
Before you can decide how to protect your property, you need information on four factors.

1. The flood hazard. You have more options if the floodwaters are shallow and slow moving. Here is some flood information you need:

A. **Flood velocity:** Faster moving water is more dangerous and puts more pressure on a structure. What was the experience during past floods? You can get the average calculated velocities from the Flood Insurance Study for your county, which can be found on FEMA's Map Service Center (<https://msc.fema.gov/portal/home>). This information is only available where a floodway was mapped, which is usually only for larger rivers. A velocity greater than 3 feet per second is considered too dangerous to walk or drive in.

B. **Flood depth:** You can use the gage stage information explained in Section 2 of this guide and recent flood depths to determine how deep the water will be, and how that might affect the level at which you want to protect your property.

C. **Warning time:** You need time to evacuate and you may need some time to install part of your protection measure, such as closing an opening in a floodwall. You can have more lead time if you receive alerts and check your gage predictions, as explained in the Flood Warning section. Or, you may want to design your measure so it does not require any last-minute installations.



2. The building. Is the building in good condition? If there are structural problems, it may be cheaper to demolish the building and rebuild it to code rather than repair and retrofit it. Another factor is the type of construction. It is very difficult to keep water out of a basement or area below ground level (see graphic above). A building on a crawlspace is easiest to elevate while one on a slab is easier to dry floodproof. In either case, it makes a difference if the structure is masonry, brick faced, or has wooden or vinyl siding. These factors are further explained for each measure.

3. Construction requirements. Every community in the Basin has regulations on buildings and development. There are two special requirements for buildings in the SFHA.

A. If an existing building in the SFHA is “substantially improved,” the NFIP regulations require that it be treated as a new building. The NFIP minimum regulations define “substantial improvement” as “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.” This requirement also applies to buildings that are substantially damaged (where “substantially damaged” means that the cost to repair, or return the building to its pre-damage condition, exceeds 50% of the market value).

A substantially improved or substantially damaged residence in the SFHA must be elevated above the base flood elevation. Most communities in the Basin require elevating to one or more feet above the base flood elevation. A non-residential building must be elevated or dry floodproofed. The building could be demolished or replaced with a new code-compliant structure, but the other measures described in this section are not permitted.

B. If a substantially improved or substantially damaged residence is in the mapped floodway, state law may not allow it to stay or be replaced in the floodway. There are some very specific exceptions to this, so be sure to check with the building official in your community to see what the minimum requirements are for your situation.

4. Cost. The fourth factor is the price. The perfect measure may not be affordable or may not be worth the cost. There may be federal and/or state funding available for more expensive measures such as acquisition and elevation. They usually require the benefiting property owner to pay a share of the cost.

CFAR may fund some of the measures described in this section including elevations and acquisitions; however, if there are more applications than funding available, it may take a year or more to get the funds. It will also take some paperwork and a review of the project to ensure it meets funding criteria. For some of the least expensive measures, such as protecting utilities or regrading a yard, it may be more efficient for the owner to pay the full cost rather than wait for financial assistance.

3.2 Acquisition

A property with structures subject to flooding may be purchased by a government agency, land trust, or similar organization, and cleared. The land may be kept by the purchasing entity, usually for recreation or open space use. While this is usually considered the ultimate solution for a floodprone building, there can be some downsides to property acquisition:

- The local government loses part of its tax base.

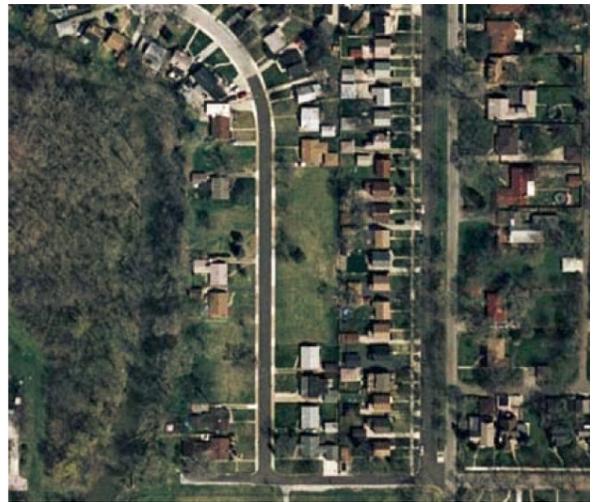
- The government may not have lower public costs for the area. If some properties remain, the local government still has to maintain streets and utilities in the area (see photo below).
- Neighborhoods may be broken up and residents may leave the area, especially if there is no affordable replacement housing nearby.

Where acquisition works best: All floodprone areas. Other measures often are not as effective in areas subject to deep, fast-moving, or repetitive flooding where risk to people and properties may be greatest.

Appropriate building types: While all types of buildings can be acquired and cleared, the following buildings are most appropriate to clear:

- Buildings in a floodway or shoreline buffer area, where new buildings and major improvements over time may be restricted by floodway and shoreline management program rules.
- Vacant buildings and/or buildings in poor condition that may cost more to fix than they are worth.
- Where the owner is interested in selling for whatever reason.

Area of a Volunteer Acquisition Project



The vacant lots along a river in this aerial photo were acquired as part of a flood mitigation project. Those who did not volunteer to sell remain, leaving the “checkerboard” pattern.

Google Earth

Flood insurance premium reduction: N/A. There is no building left to insure.

Experience in the Basin: Several cities and counties have acquired and cleared floodprone properties, primarily with FEMA funding assistance.

If a building is still in good condition, an option that can be considered is to sell the building back to the owner at a very small cost. The owner would have to move the structure to a location that does not flood. This saves the government agency the cost of demolition and allows the owner to keep his or her home.

3.3 Elevation

When elevating a structure, all damage-prone parts of the building are raised above the flood protection level on a foundation intended to resist flood damage. Elevation is typically less expensive and less disruptive than acquisition, but the residents are still exposed to the flood hazard.

The elevation process requires adequate clearance around the building to insert beams under it. This is relatively simple for a building with the lowest floor already partially elevated, such as with a crawlspace foundation. It can be much more expensive for a slab-on-grade foundation and for a building with several wings or masonry walls.

Once the beams are in place, the structure is slowly jacked up. Sometimes utility lines are extended during the process in order to allow the owner to stay in the building. When the lowest floor is above the desired height, a new foundation is built and the structure is lowered down onto it.

The lower areas must be open or wet floodproofed. Only parking, access, and limited storage is allowed. If the project is funded by a grant, a non-conversion agreement is required in order to dissuade future owners from improving or modifying the lower area in a way that makes it susceptible to flood damage.

Where elevation works best: Areas with lower velocity flooding and depths less than 8 feet.

Appropriate building types:

- Structures in sound condition.
- Buildings on crawlspaces and other elevated foundations are the easiest to elevate.

Flood insurance premium reduction: Flood insurance premiums are usually lowered if the building is elevated to the base flood elevation. Premiums can be lowered more if the building is raised even higher.



Examples of Elevated Buildings



Buildings can be elevated to the flood protection level (left) or to a higher level to give the owner a full story for parking or storage (right). The lower area cannot be improved in a way that is susceptible to water damage. Both of these buildings are on the Chehalis River in Thurston County. The one on the left was elevated with government funding support. The one on the right was funded by the owner.

Experience in the Basin: Numerous homes have been elevated, most with FEMA mitigation grants. Examples are above and on the next page.

In 2008, FEMA published *Evaluating Losses Avoided Through Hazard Mitigation, City of Centralia, Washington*. This special FEMA study looked at 35 homes that had been elevated after the 1996 flood. The report concluded:

Had these 35 homes not been elevated, the December 2007 flood would have caused between \$6,574 and \$186,122 in flood losses for each home. For just these 35 elevated homes, the total losses avoided from the December 2007 flood are estimated to be \$1,905,760.

The cost-effectiveness of these Centralia elevation projects was clearly established for a single flood event. It can be expected that the payoff from mitigation expenditures will continue to increase over the effective life of the structures, as cumulative losses avoided grow with subsequent flood events.

Flood openings: One problem with several elevated homes in the Basin has been inadequate flood openings in the foundation walls, as illustrated on the next page. In 2016, the Chehalis River Basin Flood Authority initiated a special program in the Town of Bucoda to fund retrofitting homes on elevated foundations to provide the proper flood openings.

The Need for Proper Flood Openings



This is an example of an improperly elevated building. The openings are too high to relieve hydrostatic pressure.



This is an example of a properly elevated house. Note the location of the openings, near the ground.



This is what happens to a block wall when the openings do not meet code and hydrostatic pressure is not equalized.



This building in Bucoda was retrofitted with insulated flood vents near the ground that automatically open to let water in.

3.4 Barriers

Barriers divert shallow floodwaters away from a structure. Typical barriers are walls, berms, and regrading a yard. If flood warning time allows (which is possible because of the Basin's flood warning program on the larger rivers, like the Chehalis and Skookumchuck), sandbagging or emergency walls could be erected. Barriers have the advantage of being less expensive and less disruptive than acquisition and elevation.

Where barriers work best:

- Relatively shallow flooding, e.g., less than 2 feet deep. Deeper flooding requires an engineered floodwall that can be expensive to build and maintain.

Examples of Successful Floodwalls



The owner of this house in Centralia (above) built the floodwall around his house after his first flood. It has worked during subsequent floods (the home is slated for clearance by the Port Authority). The commercial building (right), also in Centralia, but outside the Special Flood Hazard Area, combined the concrete barrier with landscaping to reduce its visual impact.



- Most barriers have openings, such as driveways and doors. There must be enough flood warning time to allow someone to close these. On the main stems of the larger rivers, the Chehalis River Basin Flood Warning System should provide adequate lead time, provided a responsible person is close enough to respond.

Appropriate building types:

- Barriers make more economic sense for buildings that are on slab foundations where it is more expensive to elevate them.
- Larger parcels that have enough room for a barrier without affecting drainage on neighboring properties (right).
- Areas where the soils are relatively impervious. Otherwise, if floodwaters stay up for several hours, water seeps under or through the barrier.

Example of Engineered Barrier



This engineered barrier protects Pe Ell's wastewater treatment plant. It was built with funding support from the Chehalis River Basin Flood Authority.

Flood insurance premium reduction: No

Experience in the Basin: See the examples above.

3.5 Dry Floodproofing

Dry floodproofing means making the walls of a building watertight and closing all openings, so water that gets to the building does not get inside. The building itself becomes the barrier to the passage of floodwaters. Dry floodproofing can be done anywhere except for new, substantially improved, or substantially damaged residential buildings in the SFHA.

Where dry floodproofing works best:

- Shallow flooding, less than 2 feet deep. Most buildings were not designed to withstand the hydrostatic pressure that deeper floodwaters put on walls.
- Most dry floodproofing projects have openings, such as doors. Unless they are shut all the time, there must be enough flood warning time to allow someone to close these. On the larger rivers, the Chehalis River Basin Flood Warning System should provide adequate lead time, provided a responsible person is close enough to respond.

Example of Dry Floodproofing



This house was dry floodproofed by the owner with a concrete apron around the slab, a low wall at the doorway, and a removable closure that requires an hour of warning time. The measure has worked for local drainage flooding since it was built in the 1960s. It was overtopped when a nearby levee failed during a higher flood.

Appropriate building types: Buildings on a slab-on-grade foundation with masonry or brick facing. These buildings are easier to make watertight and they are expensive to elevate. Buildings on crawlspaces should not be dry floodproofed because seepage under the walls can come up through the floor.

It should be noted that a number of dry floodproofed commercial buildings failed during Hurricane Sandy in New Jersey in 2012. It was found that parts were missing or had not been maintained and that building owners were not familiar with how the measure operated. Long-term maintenance and practice drills are vital for dry floodproofing to be effective.

Flood insurance premium reduction: Only for non-residential buildings that are floodproofed to 1 foot above the base flood elevation.

3.6 Wet Floodproofing

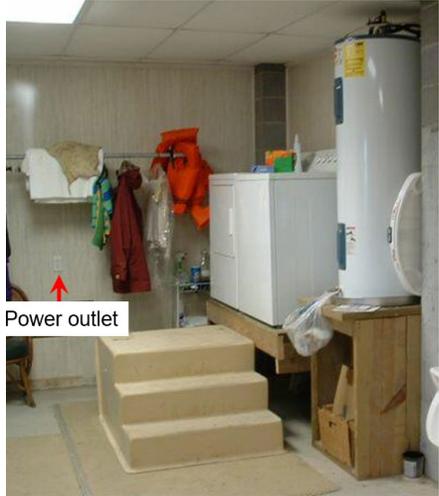
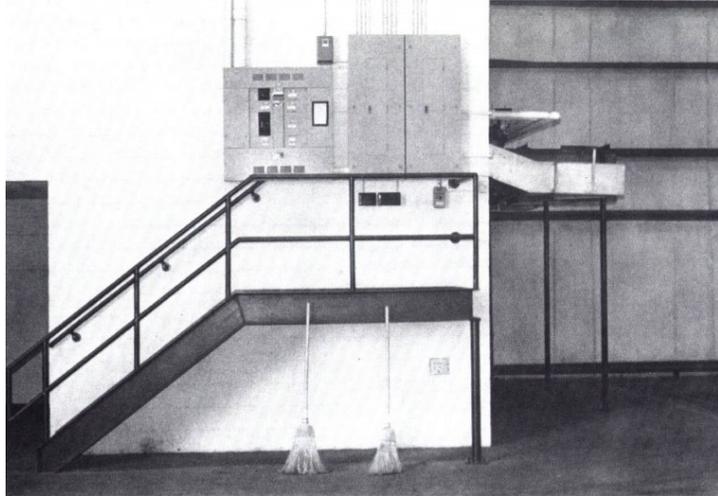
Wet floodproofing allows water to enter a floodable area, such as a crawlspace, but damageable items are removed or elevated and the finishings, contents, and use of the interior are modified so damage is prevented or minimized. Materials in the lower area are waterproofed or elevated above the flood protection level.

Wet floodproofing projects are generally inexpensive and many can be undertaken by the owner. Most wet floodproofing projects do not affect the exterior appearance of the building.

Where wet floodproofing works best: Slow-moving floodwaters.

Appropriate building types: Crawlspaces, garages, or other parts of a structurally sound building below the first floor.

Examples of Wet Floodproofing

 <p>Power outlet</p>	
<p>The washer, dryer, and water heater were elevated in this wet floodproofed garage.</p>	<p>Large commercial, industrial, and storage buildings are easier to adapt to wet floodproofing than small or residential buildings.</p>

Flood insurance premium reduction: Premiums may be reduced where a lower area, such as a crawlspace, is wet floodproofed. This may make a higher floor level become the lowest floor for insurance rating purposes.

Experience in the Basin: Other than the buildings retrofitted with Flood Authority funds in the Town of Bucoda, there is no documentation of such projects elsewhere in the Basin. This is because the measure is not visible from the outside.

3.7 Utility Protection

If utilities are protected, not only is flood damage reduced, but the time it takes to clean and reoccupy a flooded building is also reduced. All or parts of a building's utility systems can be protected, even if the rest of the building cannot. This is usually done by elevating the furnace, air conditioner, appliances, and/or the electrical and plumbing systems above the flood level. This is similar to wet floodproofing but does not address other items in the flooded area, such as insulation and drywall.

Electrical systems below the flood protection level should be on separate ground fault interruption circuits. Plumbing systems are generally watertight unless there is a fixture below the flood protection level.

These projects are usually affordable and are often funded by the owner. One of the best times to elevate above flood levels is when an appliance is being replaced (see example, next page).

Where utility protection works best: Slow-moving floodwaters.

Appropriate building types: Some utility protection can be provided in all types of buildings.

Flood insurance premium reduction: The NFIP offers a mitigation discount if certain covered machinery and equipment and appliances servicing the building, inside or outside the building, are elevated to at least the elevation of the floor above the building's first floor.

Experience in the Basin: There are outdoor air conditioning units that have been elevated, as in the examples to the right and on the next page (photos not from the Chehalis Basin). It is possible that more projects have been implemented, but they are not visible from outside.

Examples of Utility Protection



This house has an elevated air conditioning compressor and electric meter.



The owner replaced a flood damaged water heater with a shorter one and elevated it.

Example of HVAC Protection



After a flood destroyed the HVAC utilities in this house's crawlspace, the owner elevated the air conditioning compressor and relocated the furnace and ductwork into the attic. This project also resulted in a wet floodproofed crawlspace.



4 FLOOD INSURANCE

Flood insurance is highly recommended, especially if you don't construct a property protection measure. If you do build or install a protection measure, insurance is still recommended in case the flood exceeds your project's flood protection level.

An advantage of insurance is that your property is covered as long as the policy is in force, even when you're not home to implement your flood response plan. Most standard homeowner's insurance policies do not cover a property for flood damage.

Mandatory purchase: If you are located in an SFHA, you must buy flood insurance coverage as a condition of having a federally backed mortgage, home improvement loan, or disaster assistance. In other words, if the federal government is insuring a bank and that bank makes loans secured by a floodprone building, federal law requires a flood insurance policy on the building (but usually not on the contents). A NFIP policy and some private policies meet this federal requirement.

For flood coverage, you will need either a policy under the National Flood Insurance Program or one underwritten by a private company. Both types of policies are sold by local licensed insurance agents.

4.1 NFIP Flood Insurance

Many of the flood insurance policies in the Chehalis Basin are NFIP policies. The criteria are consistent, so this section only discusses National Flood insurance. All the cities and counties in the Chehalis Basin participate in the NFIP, so any building in the Basin (whether it is in or outside of the SFHA) can be covered by an NFIP flood insurance policy.

Any property insurance agent can sell an NFIP policy and all agents must charge the same rates. Your rates will not change just because you file a claim for damage; they are set on a national basis. If your agent does not know about flood insurance or you don't have an agent, see "Buying a Policy" in FEMA's FloodSmart website menu – <https://www.floodsmart.gov>.

Risk Rating 2.0: Beginning October 1, 2021, FEMA moved all new flood insurance policies to a new rating system called Risk Rating 2.0. On April 1st 2022, FEMA began issuing all renewals under Risk Rating 2.0. The new rates better reflect the flood hazard by basing premiums on many different variables instead of just the FIRM zone and base flood elevation. An Elevation Certificate is no longer required.

The new system has many more rating factors than its predecessor, making it hard to calculate the premium. It is very difficult to show a specific dollar savings for a particular building protection measure because some of the factors, and the way they are used, are proprietary and not available to the public. A licensed insurance agent can submit information, such as the address and level of coverage desired, and FEMA will provide the premium without all the details of what it was based on.

4.2 NFIP Coverage

Any walled and roofed structure can be covered by an NFIP policy. Detached garages and accessory buildings are covered under the policy for the lot's main building. There are two types of coverage: structure and contents.

- A structural policy generally covers everything that stays with a house when it is sold, including the furnace, cabinets, built-in appliances, and wall-to-wall carpeting.
- Contents move with the owner when the building is sold, but do not include certain items like money and valuable papers. Contents coverage can be purchased with a structural policy or separately. Renters may purchase contents coverage, even if the owner does not have structural coverage.

There is no coverage for things outside the building, like a driveway or landscaping, certain items located below the first floor, automobiles and motorcycles, and other items specifically excluded in the policy. There is coverage for moving and storing contents at another location before a flood to protect it from damage.

Basements: The NFIP considers any floor below ground level (“grade”) as a basement. For example, the lower level of a split level house and a crawlspace with its floor more than two feet below ground level are considered basements. A NFIP policy has limited coverage for damage to contents in a basement. Structural coverage only covers the structural parts of a basement’s walls and floor (not finishings like wallpaper or paneling) and selected items such as the furnace, water heater, washer, and sump pump. The NFIP does not insure buildings for subsurface flooding, including seepage and sewer backup.

Waiting period: There is a 30-day waiting period before NFIP flood coverage takes effect. Don’t wait for the next flood to buy insurance protection. There are shorter waiting periods for special situations, such as when the policy is purchased to secure a mortgage or loan and after a wildfire in the watershed.

Cost of an NFIP policy: NFIP policies are rated based on information FEMA has collected on the building and its claims history. If an owner has information on the building that FEMA may not have, such as the building being elevated in the last few years, it can be provided through the insurance agent to see if it impacts the premium.

How can I pay less for flood insurance?
For answers to this question, visit
www.floodsmart.gov/flood-insurance-cost/savings

New policies are charged the “full risk rate” premium. When an existing policy is converted to a Risk Rating 2.0 policy, and the full risk rate premium is projected to be higher than the current premium, the premium increases are capped by Federal law at a maximum of 18% per year. You should ask your insurance agent what the full risk rate premium will eventually be for your policy.

4.3 Community Rating System

NFIP rates are the same everywhere with one exception: rates are lower in the communities that participate in the NFIP's Community Rating System (CRS). In the four communities within the Chehalis Basin that participate in CRS, the premiums for properties in the SFHA are reduced by the following percentages: City of Centralia (20%), City of Chehalis (15%), unincorporated areas of Lewis County (25%) and unincorporated areas of Thurston County (40%).

Under the new Risk Rating 2.0 system, the full CRS discount is provided for all properties in the community, not just those in the Special Flood Hazard Area. All properties in a community, including those outside the Special Flood Hazard Area, will receive the discount based on the community's CRS class. However, the full CRS discount is only realized when the policy reaches its "full risk rate."

4.4 Private flood insurance

A private flood insurance policy may be a less expensive alternative to a National Flood Insurance Program policy. While they generally do not include a CRS discount, they may have coverage not provided by the NFIP, such as paying for additional living expenses after a flood.

But remember, often "you get what you pay for." Check the details with your insurance agent. For example, find out if your policy will be cancelled after you submit a claim.

We hope this guide has been helpful at equipping you to protect your residence or business from damage from flooding. You can be more prepared for the next major flooding event by taking practical steps to:

- Know when a flood is coming and how to respond;
- Protect your property through flood protection measures; and
- Carry adequate flood insurance.

If you'd like to learn more or to request additional assistance from the CFAR program, please visit our website at <https://chehalisbasinstrategy.com/cfar/>. You can learn more by reading the references on the next page.

5 REFERENCES

The following references provide more detailed information on the six property protection measures. Most of these are available through FEMA’s searchable Building Science Resource Library (<https://www.fema.gov/emergency-managers/risk-management/building-science/publications>), and some of these are also available in the Timberland Regional Library.

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Protecting Manufactured Homes from Floods and Other Hazards, A Multi-Hazard Foundation and Installation Guide, FEMA P-85, November 2009, https://www.fema.gov/sites/default/files/2020-08/fema_p85.pdf

Protecting Your Home And Property From Flood Damage – Mitigation Ideas For Reducing Flood Loss, FEMA P-805, 2010.
<https://www.palmspringsca.gov/home/showpublisheddocument/68896/637043386125300000>

Wet Floodproofing Requirements and Limitations, FEMA TB 7, May 2022,

https://www.fema.gov/sites/default/files/documents/fema_nfip-technical-bulletin-7-wet-floodproofing-guidance.pdf

PROPERTY PROTECTION MEASURES REFERENCES						
Reference	Acquisition	Elevation	Barriers	Dry Floodproofing	Wet Floodproofing	Utility Protection
<i>Above the Flood</i>		✓				
<i>Engineering Principles and Practices</i>		✓	✓	✓	✓	✓
<i>Floodproofing Non-Residential Buildings</i>				✓	✓	✓
<i>Homeowner's Guide to Retrofitting</i>		✓	✓	✓	✓	✓
<i>Openings in Foundation Walls</i>		✓			✓	
<i>Protecting Building Utility Systems</i>		✓			✓	✓
<i>Protecting Manufactured Homes</i>		✓				
<i>Protecting Your Home and Property</i>		✓	✓		✓	✓
<i>Wet Floodproofing Requirements and Limitations</i>				✓	✓	✓

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