

Preparing a Household Flood 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. ("Be Aware, Be Prepared – Protect Yourself from Flooding in the Chehalis Basin," page 10)

This is the essence of a household flood response plan – a list of things to protect your family and your property that should be done at different times when a flood is predicted or is happening. This guide provides step-by-step instructions on how to prepare such a plan. It references the "Protect Yourself" publication quoted above. "Protect Yourself" can be downloaded at no cost from the Community Flood Assistance and Resilience (CFAR) program [website](#).

This guide includes examples from a flood response plan followed by Mike Smell, a resident of the Chehalis Basin. Mike's property is located south of Chehalis near the Newaukum River. The property has been flooded several times since he moved there in 1989. Mike has learned flood response lessons and has adjusted the actions he takes based on his experiences. Below is an aerial view of the property and the buildings that are discussed later in this guide.



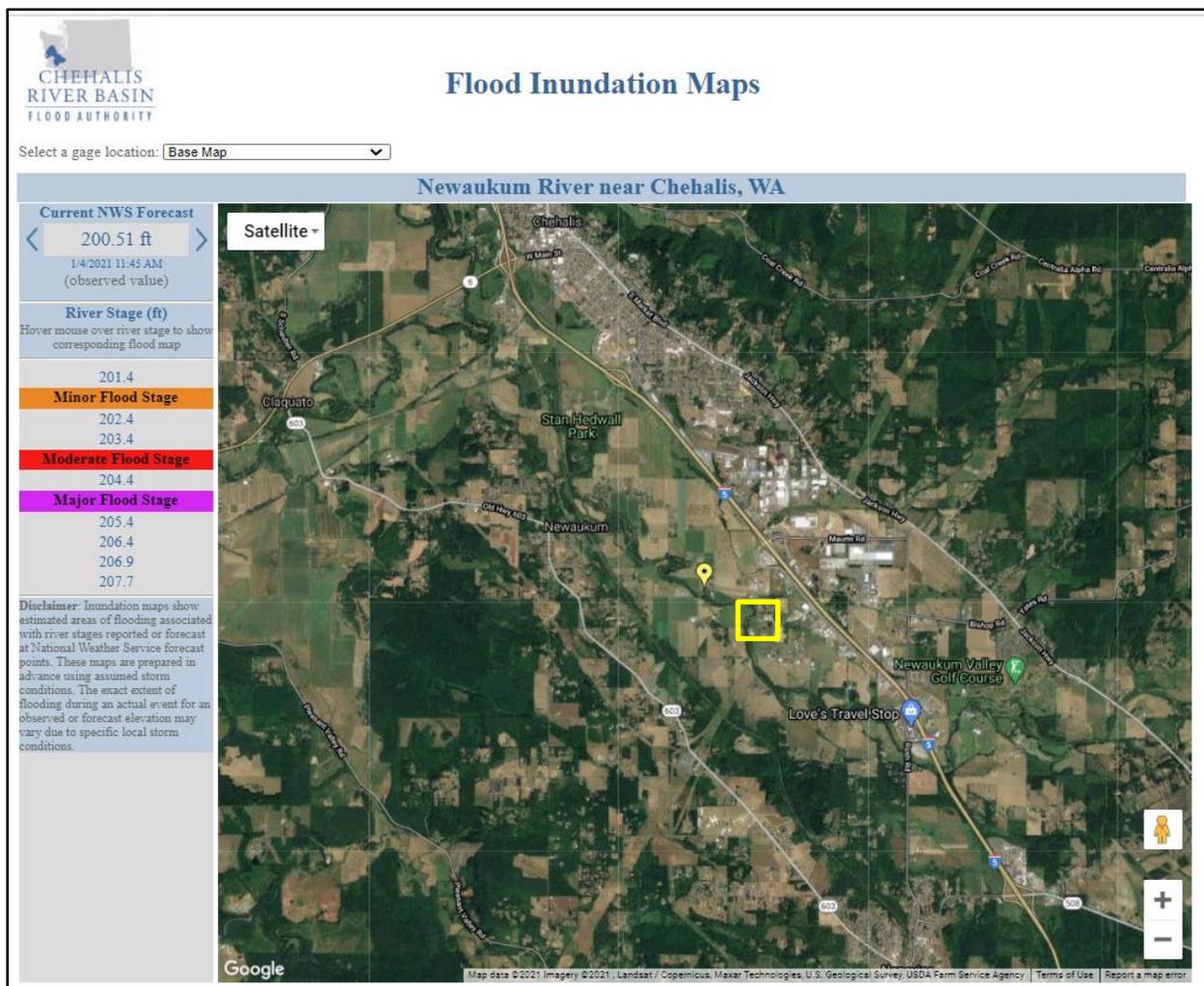
Step 1. Find your gage

Your plan and the things you do when a flood is predicted or happening should be based on one or more local river gage readings, especially a gage where the National Weather Service provides flood level predictions. Instructions on how to find a gage near your property can be found on pages 6 – 8 in the “Protect Yourself” publication.

Mike’s example:

Mike has relied on the Newaukum River near Chehalis gage for current stream water levels and flood predictions. The gage is located by the yellow pointer in the map below. It is 2/3 of a mile downstream from Mike’s property, which is in the yellow box. River gages report water heights in “stage,” as explained on pages 6 – 7 in the “Protect Yourself” publication.

Mike has “bookmarked” the gage’s website link, so he can quickly access the gage data at any time of day or night from his computer or his cell phone.



Step 2. Relate flood stages to your situation

River stages are discussed on page 7 of the “Protect Yourself” publication. River stages may be reported in feet above a local starting point or as the elevation above sea level at the gage. For your flood response plan, you want to relate what different stages reported at your gage look like or mean in terms of flood levels on your property. There are two ways you can do this:

1. Review gage records to find the stages of historical floods and relate them to what you remember about those floods. For example, you may have marked the high water line of the December 2007 flood on a building or tree on your property. The river gage websites include the elevation or stage of the crest of the December 2007 flood. If a flood is predicted to reach two feet below the stage of the crest of the 2007 flood, you know how high water will likely go on your property.
2. Using the Flood Inundation Map tool on the Chehalis River Basin Flood Authority's Flood Warning System website, review how different flood levels are predicted to cover your property and the surrounding areas. This tool is described on pages 8 – 10 in the “Protect Yourself” publication.

We recommend you do both of these things to gather all of the information you can about what happens on your property and surrounding areas at different river levels. First, you may have to convert some of the historic crest stages to feet above sea level, as explained below.

Converting Gage Stage to Elevation above Sea Level

To the right is the Newaukum River gage website’s record of the highest recent floods. Note that some flood crests are listed in feet above sea level (NAVD 1988) while the flood of 01/07/2009, is listed in gage stage (13.48). Current gage levels and flood predictions are reported in NAVD, so a factor needs to be added to convert older gage readings and flood records to today’s NAVD Datum.

Converting old gage stage readings to NAVD is discussed on page 7 of the “Protect Yourself” publication. There are seven gages in the Basin with inundation maps. Their conversion factors are listed below.

River Gage Stage Conversion Factors

Gage	Factor
Chehalis River at Porter	27.11
Chehalis River near Grand Mound	127.03
Chehalis River at Centralia	103.32
Chehalis River near Doty	304.90
Skookumchuck River near Bucoda	198.15
Skookumchuck River at Centralia	103.76
Newaukum River near Chehalis	191.94

The conversion factor is added to the stage readings before May 2018 that appear to be much lower than elevations above sea level. At the Newaukum gage, the 2009 stage of 13.49 is converted to NAVD: $13.49 + 191.94 = 205.43$, roughly the same level as the 1996 flood (205.48).

Flood Categories (in feet)

Major Flood Stage: 205.5

Moderate Flood Stage: 204.5

Flood Stage: 202.5

Action Stage: 200.5

Low Stage (in feet): 0

Historic Crests

(1) 205.48 ft on 02/08/1996

(2) 204.52 ft on 12/21/2019

(P)

(3) 204.14 ft on 01/07/2020

(P)

(4) 203.19 ft on 02/07/2020

(P)

(5) 13.49 ft on 01/07/2009

[Show More Historic Crests](#)

(P): Preliminary values subject to further review.

By clicking on “Show More Historic Crests,” you can see more gage records. The December 2007 reading was 13.45 or 205.39 NAVD. Mike was there for the 1996, 2007, and 2009 floods and they all crested at roughly the same level.

Mike's example for the first approach:

Using the first approach, Mike looked at the Newaukum River gage website. It has some general information on what happens at different flood elevations, like:

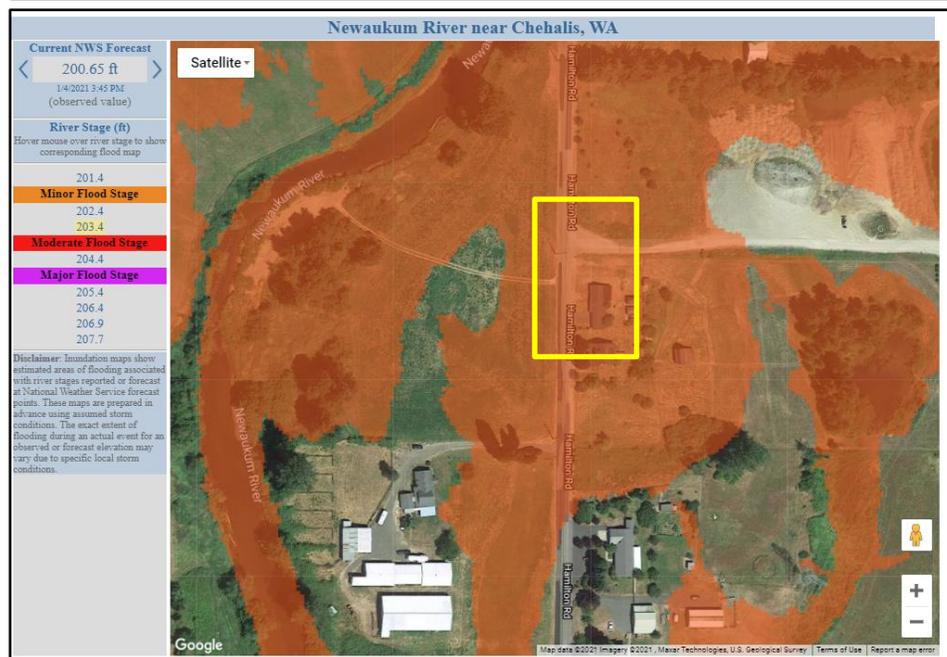
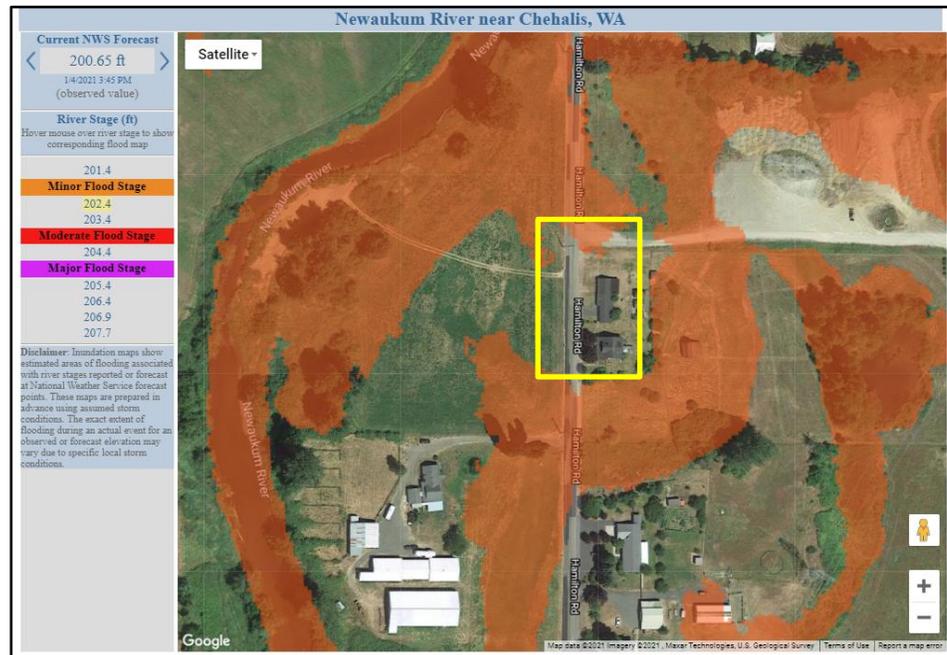
202.5 – flood waters will inundate many roads and residential and commercial areas along the Newaukum River and its forks....

204.5 – deep and hazardous flood waters will inundate many roads and residential and commercial areas...

Mike's example for the second approach:

Using the second approach, Mike chose different river stage levels on the legend on the left side of the inundation map tool website. His house and outbuildings are in the middle of the screen, in the yellow box to the right. At river stage 202.4, his property is surrounded by floodwater.

At the next higher level, 203.4, floodwaters will reach his buildings (right). A flood to the next level on the map, 204.4, would get into his outbuildings. His deck is higher than the outbuildings and the house is three feet higher than the deck, so it did not get flooded in recent floods. The floods of 1996, 2007, and 2009 (approximately 205.4) did flood the outbuildings and came close to covering his deck (see photo, page 11).



Step 3. Select your flood response stages

Page 7 in the “Protect Yourself” publication has two hydrographs. These are charts that show the past and current river levels and the National Weather Service’s predictions of future gage stages. The hydrographs and the inundation maps for each gage have three water levels highlighted in different colors: Minor Flood Stage (orange), Moderate Flood Stage (red), and Major Flood Stage (purple).

These water level designations are based on what happens in the area during a flood. The river may be coming out of its banks at lower levels, but the water is usually not high enough to damage property. In most cases, Minor Flood Stage means the water is high enough to affect buildings or close roads.

You may want to use the same water levels and designations when you take different actions to protect your property, but it’s not likely that these water levels correspond directly to when impacts to your property may occur. For example, it may take a moderate flood stage of water to reach your garage and a major flood for water to get into your house.

After completing Step 2, you should have a good idea of what might happen on and around your property as a result of different predicted flood levels. Select stages or water levels for your response plan based on the potential impacts to your property from those water levels.

Mike’s example:

Mike chose to use round numbers to identify what happens when the water is at each level. His stages are lower than the minor, moderate and major stages ones discussed above. This gives him a little extra protection by triggering protection measures before they are absolutely needed.

- 202.0 – Access in and out of the property will be blocked.
- 203.0 – Flood water will be at the outbuildings
- 204.0 – Flood water will be in the outbuildings
- 206.0 – Flood water will be near the top of the deck



Flood stage 202.0 at Mike’s road



Flood stage 204.0 at Mike’s outbuildings

Step 4. Get a warning

Page 10 in the “Protect Yourself” publication describes how to sign up for flood warnings in the Chehalis Basin.

Step 5. Identify steps to take when the gage prediction means access in or out of your property will be blocked

Here’s a checklist of things to consider:

- ___ Get all vehicles to high ground
- ___ Call neighbors who may not be monitoring gage readings
- ___ Consider leaving rather than riding out the flood. This is particularly important for properties on the mainstem Chehalis River and other large rivers where water levels may stay up for a day or more. You don’t want to be isolated if you have an emergency.
- ___ Double check your “Go Kit,” a bag or case with all the things you need to take with you, like your medications, insurance policies, and food for your pets. These are called Survival Kits by the Red Cross (www.redcross.org/get-help/how-to-prepare-for-emergencies/survival-kit-supplies.html) and Ready Kits by FEMA (<https://www.ready.gov/kit>).
- ___ Check that items needed for your flood response, like sand bags, are still available and ready for use.

Mike’s example:

Mike has a NOAA Weather Radio that alerts him to possible high water. He checks the Newaukum gage and takes these steps when the gage shows a predicted crest at 202 or higher:

- ___ Call the neighbors who depend on him to give them a warning (although more and more neighbors have the Weather Service links on their own computers or tablets).
- ___ Check the Newaukum gage readings and predictions every hour.

Mike has found that at stage 201, he has five hours to take steps to protect his property before water gets in his outbuildings at stage 204. He starts work on those items that will get wet first.

If the prediction is 202 or higher, when the road will be underwater, his plan is to:

- ___ Move the car and truck down the road to the neighbor’s higher property.

Mike knows that the first flood crest predictions are not always 100% accurate. In January 2021, the water went 1.5 feet higher than the first predicted crest. To be safe, he will usually implement most of his response measures, including those for crest stages higher than predicted.



Mike stores filled sand bags on shelves and in nooks in his carport. Note the elevated electrical outlet above the sign.

Step 6. Identify steps to take if the flood will reach your building(s)

Walk around your property and identify things that will be damaged or float away if they get wet. Make a list so you won't forget something during the excitement of an impending flood.

Here's a checklist of things to consider:

- ___ Identify items like the barbecue grill that could get damaged or float away
- ___ Move damageable items that can be moved to a higher location
- ___ Tie down or otherwise secure damageable items that cannot readily be moved
- ___ Sandbag low points where water could enter a building, such as a window well

Mike's examples:

Here are some things Mike does when the gage predicts a crest of 203:

- ___ Move lighter, portable, items to higher locations. To the right, wheel barrows of hay and the trash bin have been moved to the front porch, which is several feet above grade.
- ___ Secure the stack of firewood with pallets.
- ___ Get the boat out and tie it to the deck. This is a safety precaution should Mike have to leave his property when the water is high. It also allows Mike to monitor conditions on his property while the water is up (assuming no fast water).



___ Connect planks to the deck (below).

___ Drive the yard tractor up the planks and onto the deck.

To protect his riding mower, Mike built a ramp out of two planks that attach to his deck. He drives the mower up on the deck (below) and then picks up the planks and stores them there (right).

The deck would not be overtopped until a flood reached elevation 206.



Step 7. Identify steps to take if the flood will get into your building(s)

The best way to protect your buildings before a flood is to move them to a higher location, elevate them, or implement one of the other property protection measures discussed in Chapter 3 of the “Protect Yourself” publication.

Unless your building has been structurally floodproofed, you have to assume that water will get in. Therefore, Step 7 looks at protecting what’s in the building from water damage. If you have a basement, don’t try to keep the water out, as it will put so much pressure on the walls and floor that they may crack or break (see pages 11 and 16 in the “Protect Yourself” publication).

Here’s a checklist of things to consider:

- ___ Identify damageable items that can readily be moved, such as smaller carpets and furniture.
- ___ Determine where the items can go, such as upstairs or on top of a table or counter.
- ___ Elevate damageable items, such as the washer and dryer. See the example on page 20 of the “Protect Yourself” publication.
- ___ Elevate damageable utilities, such as the furnace and water heater. See the examples on pages 21 – 22 of the “Protect Yourself” publication.
- ___ Consider renovating floodprone areas to minimize damage. This would involve wet floodproofing approaches discussed on pages 19 – 22 of “Protect Yourself.”
- ___ Consider renovating floodprone areas to make clean up easier. For example, replace a wooden floor with a concrete floor. Use batt insulation and don’t tape or paint the lower levels of wallboard – put the wallboard in with screws so you can readily open the walls and throw out the insulation, before water wicks to a higher level.

More ideas on preventing flood damage and emergency flood protection measures can be found at the Louisiana State University AgCenter [website](#).

Mike's examples:

When the flood crest prediction is 204 or higher, Mike's outbuildings are the first to get wet and the easiest to retrofit for water. Here are some things he's done to his workshop.



The workshop and other outbuildings sit on a concrete pad. The floor is made of easily removable plywood sheets resting on the concrete pad. They are taken up after the flood and hosed off. The interior walls are left open, which facilitates hosing them off.



Almost all tools are stored at least three feet above the floor. The workshop has a loft over the workbench where lighter items that aren't used regularly are stored.

Mike's basement

The first floor of Mike's house is more than five feet above ground level. It has not flooded, but the basement has. Having bare concrete walls and floors, the basement is easy to wet floodproof. The challenge is to ensure that utilities and items stored in the basement are elevated above flood levels.



Items are stored and appliances are elevated above past flood water levels



Electrical outlets are well above floor level. The freezer is turned off during a flood, but power can quickly be restored to the area after the flood.

The permanent sump pump (middle photo) keeps seepage out. Mike also has two portable submersible pumps that help keep the water level down during a flood and drain the basement after the flood recedes. He doesn't try to keep the basement dry because interior water counteracts the water pressure on the outside of the walls. He has a generator because the power always goes out when you need it the most (next page).

Shop vacs help during clean up.

Other outbuildings



The chicken coop and the greenhouse have no electricity and are floodable. The shelf in the chicken coop extends to the front and is large enough to store water and feed for the chickens during the flood. Before the flood, Mike does a run-through and moves damageable things (like bulk feed and the white bag of fertilizer) to a higher level.

Mike's barn (right) has no utilities and no longer houses any animals. When the flood comes, he does nothing – the water flows through the open doors and causes no damage.

The photo to the right was taken during the 2009 flood. Note the deck in the foreground, just above water level.

Mike has a generator available if there is a loss of power to the area

