



**CITY OF VIRGINIA BEACH
OFFICE OF EMERGENCY MANAGEMENT
FAQs STORM SURGE**

Q: What is a storm surge?

A: Storm surge is simply a high dome of water caused by high winds and low pressure, which is pushed toward the shore, most commonly associated with hurricanes. This rise in water level can cause severe flooding in coastal areas, particularly when the storm tide coincides with the normal high tides.

Storm surge has historically brought 90% of the death and destruction during hurricanes, and is the primary reason that coastal areas are evacuated as storms approach.

It is important to note that storm surge maps reflect the worst case hurricane storm surge inundation (including astronomical high tide), regardless of the point of where the center of the hurricane (or tropical storm) makes landfall. No single hurricane will necessarily cause all of the flooding represented on the maps. It should also be noted that the data reflect only still-water saltwater flooding and do not take into account the effects of pounding waves that ride on top of the storm surge in locations exposed to wave action. Also, these maps do not show areas that may be flooded by excessive rainfall –they only depict flooding that would occur as a result of the ocean level rising (as well as estuaries and rivers that can be affected by hurricane storm surge) and inundating the color-coded areas.

Q: What are storm surge maps used for?

A: Storm surge maps are designed for the purpose of enhancing the local government's ability to do effective hazard mitigation planning and to assist state and local governments in the development and/or enhancement of hurricane planning by providing the best technical information available. When used in conjunction with model data, these maps will allow communities to best assess their vulnerability to storms.

Q: What are the major difference between the old surge map and the new one?

A:

- Different tidal levels (high tide vs. mean tide) and datum were used along with new elevation data.
- The new maps also have 4 categories of storm.

Q: Where does the evacuation zone data come from and what does it mean?

A: Hurricane evacuation zones are usually determined as part of a national [Hurricane Evacuation Study](#) (HES) effort. While some states use **storm surge zones** as a guide, others use easily recognizable roadways such as interstates and highways to determine evacuation zones. The HES is conducted jointly by the [Federal Emergency Management Agency](#) (FEMA), the [U.S. Army Corps of Engineers](#) (USACE), the [National Oceanic and Atmospheric Administration](#) (NOAA), and state emergency management agencies. Close coordination between these (and other) agencies facilitates more effective responses at the local level to hurricane emergencies. Depending on your proximity to the coast, you may or may not be located in an evacuation zone. The closer you are to the coast, the more likely it is that you will be located in an evacuation zone. If you are located in an evacuation zone, it is important to note that the particular zone you are in will not necessarily match the particular storm surge zone you are in. For safety reasons, officials typically issue evacuations for one category storm higher than what they are expecting. For example, if there is a Category 1 hurricane approaching but you live in a Category 3 evacuation zone, you may still be asked to leave, simply due to uncertainties associated with the storm's track and intensity. Always follow the instructions of local officials before, during and after an emergency.

Q: What are Hurricane Evacuation Studies?

A: [Hurricane Evacuation Studies](#) are designed to assist state and local governments in the development and/or enhancement of hurricane planning by providing the best technical information available. Typically, a study includes five related analyses that develop data concerning hurricane hazards, vulnerability of the population, assumptions about public response to evacuation advisories, evacuation network clearance times, and sheltering needs for various hurricane threat situations. The results from these studies include [storm surge](#) analyses and evacuation requirements for hurricanes of different intensities and that come from different directions. Emergency planners use the information in the HES to devise checklists of steps to take during a hurricane. Following these checklists, decision makers can determine what to do when certain meteorological conditions are met or forecasted, based mostly on information from the [National Hurricane Center](#) and local [National Weather Service](#) weather forecast offices. The overall objective of an HES is to provide emergency management officials with state-of-the-art information on the major factors affecting hurricane evacuation planning and decision making, and the skills and training aids necessary to educate the public. Visit the [USACE National Hurricane Study Program](#) Web site for more information.

Q: What do the different storm surge zones mean for me?

A: Hurricanes are classified by categories according to the *[Saffir-Simpson Hurricane Scale](#). The scale ranges from 1 to 5, with the "weakest" storms classified as Category 1 (74 to 95 miles per hour sustained winds) and the strongest storms as Category 5 (sustained winds greater than 155 miles per hour). The different storm surge zone categories imply that flooding is possible for your area for a storm of that category OR HIGHER. For example, a Category 3 storm surge zone would be most vulnerable to storms of Category 3 and higher. Similarly, those people that live in Category 1 storm surge zones are vulnerable to all categories of storm, from 1 up to 5. Be sure to listen to and follow local official advice if a storm is threatening your area. Although local officials make decisions about who should stay and who should go, it is ultimately your responsibility to take action early for you and your family to stay safe.

The [Saffir-Simpson Hurricane Scale](#) provides general estimates of potential storm surge heights relative to the five different categories of hurricanes. However, the level of surge in a particular area, when all other factors are held constant, is in large part determined by the slope of the continental shelf. For instance, a shallow continental shelf off the coast will allow a greater surge to inundate coastal communities. Communities with a steeper continental shelf will not see as much surge inundation, although large breaking waves can still present major problems. Storm tides, waves and currents in confined harbors can severely damage ships, marinas and pleasure boats.

Q: What is the difference between an evacuation zone and a storm surge zone?

A: Storm surge zones indicate areas subject to flooding from different categories of hurricane. Evacuation zones are areas typically located within or in close proximity to storm surge zones. Emergency management officials use evacuation zone information to determine who needs to evacuate before a hurricane makes landfall. By becoming familiar with what zone you are located in, you can be better prepared to execute your plan when or if an evacuation order is issued for the zone in which you live.

Q: Does global warming have any impact on storm surge map?

A: No. It is the result of better technology, along with more liberal parameters (i.e., using high tide vs. mean tide).

Q: Where can I get more information about hurricane shelters in my area?

A: Contact the Virginia Beach Office of Emergency Management at 385-8466 or visit the city's Web site, www.VBgov.com/hurricane, and download a customized hurricane report.

Q: Where can I find information about what roads to take during an evacuation?

A: This information is available through the Virginia Department of Transportation Web site.

Q: What do I do if there is an evacuation order issued for my area?

A: Evacuations are necessary to protect people from the potential life-threatening effects of hazards. Hurricane evacuations are typically focused on individuals living in "low-lying" areas. Typically, these are areas located immediately adjacent to or within close proximity to the coast or a major coastal waterway. Evacuations are focused in these areas because the greatest risk to life from a hurricane comes from water – both storm surge and breaking waves along the immediate coast and flooding caused by heavy rains away from the coast. Anyone living in a manufactured home will be asked to evacuate, as these structures are not designed to withstand the very strong winds that accompany a hurricane. If you do not live in a manufactured home and live away from the coast and/or a major coastal waterway, you may be urged to "Hide from the Wind" or, essentially, stay put. If this is the case and you feel that your residence is "wind-worthy," the best place to be is in a walk-in closet, bathroom or inner hallway away from windows and doors.

If you must evacuate, seek shelter in a sturdy building located inland from the coast, such as a masonry or wood-frame building or hotel, or an officially designated American Red Cross shelter. If you plan to evacuate, particularly if you are not ordered to do so, leave early so that you don't impede carefully planned evacuation procedures that plan for a certain number of cars occupying crowded roadways before a storm. Evacuations are planned well in advance and include "clearance time," which is the time it takes for all evacuees to reach a safe destination and to clear the roadways in advance of a storm. The bottom line is to make sure you have a plan – know what you're going to do and where you're going to go if an evacuation order is issued.

In the event that an evacuation order is issued for your area, consider the following:

- Stay alert to storm advisories; know the difference between a [hurricane watch and warning](#).
- Enact your [family disaster plan](#).

- Map out your evacuation route – use travel routes specified by local authorities. *DO NOT* get on the road without a place to go.
- Fill your car with gasoline.
- Evacuate if told to do so or EVACUATE EARLY. If possible, evacuate to the home of either friends or family in a non-vulnerable area. Next, try a motel or hotel and, as a last resort, go to a public shelter. Remember, shelters are not designed for comfort and do not usually accept pets.
- Enact your pet plan. Before a storm threatens, contact your veterinarian or local humane society for information on [preparing your pets for an emergency](#).
- Bring your [disaster supply kit](#), including important documents.
- Secure your home before leaving. Board up windows and glass doors, anchor loose yard objects or bring them inside and lock your doors.
- Get cash. Following a hurricane, banks and ATMs may be temporarily closed.
- Notify family and friends of your plans.
- People who require special assistance in evacuating should register with their local emergency management office.

Q: What effect does the surge map have on citizens and flood insurance.

A: None. The map is designed for the purpose of enhancing the local government's ability to do effective hazard mitigation planning. When used in conjunction with model data, it will allow communities to best assess their vulnerability to storms.

Q: What is the difference between evacuation zones and flood zones?

A: *Evacuation zones* are determined by surge maps. These maps delineate zones based on the estimated inland extent of the hurricane surge by category of hurricane, and a definable geographic or physical feature such as a river or road. This makes it easier for officials to communicate who must evacuate. Based on the severity of the storm, State or local officials may call for a mandatory evacuation by zone. Evacuation zone maps are purposefully conservative in their estimates of surge inundation areas because they are used for evacuation and life safety purposes.

Flood zones are determined by the National Flood Insurance Program (NFIP) flood hazard maps, known as Flood Insurance Rate Maps (FIRMs). These maps delineate the one percent chance flood (100-year flood) for all riverine and coastal areas. This is based on a statistical analysis of all of the probable storms impacting a coastal area. FIRMs are used for insurance and floodplain management purposes.

Homeowners should have a good understanding of each of the maps discussed above and the location of their property on each map in order to understand the risk.

* **Saffir-Simpson Hurricane Scale**

- **Tropical Storm**
Winds 39-73 mph
- **Category 1 Hurricane** — winds 74-95 mph (64-82 kt)
No real damage to buildings. Damage to unanchored mobile homes. Some damage to poorly constructed signs. Also, some coastal flooding and minor pier damage.
- Examples: Irene 1999 and Allison 1995
- **Category 2 Hurricane** — winds 96-110 mph (83-95 kt)
Some damage to building roofs, doors and windows. Considerable damage to mobile homes. Flooding damages piers and small craft in unprotected moorings may break their moorings. Some trees blown down.
- Examples: Bonnie 1998, Georges (FL & LA) 1998 and Gloria 1985
- **Category 3 Hurricane** — winds 111-130 mph (96-113 kt)
Some structural damage to small residences and utility buildings. Large trees blown down. Mobile homes and poorly built signs destroyed. Flooding near the coast destroys smaller structures with larger structures damaged by floating debris. Terrain may be flooded well inland.
- Examples: Keith 2000, Fran 1996, Opal 1995, Alicia 1983 and Betsy 1965
- **Category 4 Hurricane** — winds 131-155 mph (114-135 kt)
More extensive curtain wall failures with some complete roof structure failure on small residences. Major erosion of beach areas. Terrain may be flooded well inland.
- Examples: Hugo 1989 and Donna 1960
- **Category 5 Hurricane** — winds 156 mph and up (135+ kt)
Complete roof failure on many residences and industrial buildings. Some complete building failures with small utility buildings blown over or away. Flooding causes major damage to lower floors of all structures near the shoreline. Massive evacuation of residential areas may be required.

Q: What actions can citizens take to help ensure their safety and the safety of their homes and family.

A: STORM SURGE SAFETY ACTIONS

- Minimize the distance you must travel to reach a safe location; the further you drive the higher the likelihood of encountering traffic congestion and other problems on the roadways.
- Select the nearest possible evacuation destination, preferably within your local area, and map out your route. Do not get on the road without a planned route or a place to go.

- Choose the home of the closest friend or relative outside a designated evacuation zone and discuss your plan with them before hurricane season.
- You may also choose a hotel/motel outside of the vulnerable area.
- If neither of these options is available, consider the closest possible public shelter, preferably within your local area.
- Use the evacuation routes designated by authorities and, if possible, become familiar with your route by driving it before an evacuation order is issued.
- Contact your local emergency management office to register or get information regarding anyone in your household who may require special assistance in order to evacuate.
- Prepare a separate [pet plan](#), as most public shelters do not accept pets.
- Prepare your home prior to leaving by boarding up doors and windows, securing or moving indoors all yard objects, and turning off all utilities.
- Before leaving, fill your car with gas and withdraw extra money from the ATM.
- Take all prescription medicines and special medical items, such as glasses and diapers.
- If your family evacuation plan includes an RV, boat or trailer, leave early. Do not wait until the evacuation order or exodus is well underway to start your trip.
- If you live in an evacuation zone and are ordered to evacuate by state or local officials, do so as quickly as possible. Do not wait or delay your departure. To do so will only increase your chances of being stuck in traffic, or even worse, not being able to get out at all.
- Expect traffic congestion and delays during evacuations. Expect and plan for significantly longer travel times than normal to reach your family's intended destination.
- Stay tuned to a local radio or television station and listen carefully for any advisories or specific instructions from local officials. Monitor your [NOAA Weather Radio](#).

Q: Who do I contact regarding flood insurance?

A: National Flood Insurance Program:
 Customer Service: (888) 379-9531
 TTY – (800) 427-5593
 Fax: (202) 646-2818
www.floodsmart.gov

Q: Who can citizens call for more information?

A: Contact the City of Virginia Beach Office of Emergency Management at 385-8466.

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