

Comprehensive Emergency Management Plan



Section 6-Riverine & Coastal Flood Annex

June 2016

Blank Intentionally

Annex 6 – 3 Riverine & Coastal Flood Annex

I. PURPOSE

The purpose of this annex is to supplement the Horry County Emergency Operations Plan by establishing procedures specific to response operations during riverine and coastal flooding events. Special emphasis is placed on the use of the flood stages and evacuation to increase the safety of the citizens of Horry County.

A flood is a natural event for rivers, streams and coastal areas. Excess water from rainfall or storm surge accumulates and overflows onto the banks and adjacent floodplains. Floodplains are lowlands, adjacent to rivers, lakes and oceans that are subject to recurring floods. Flooding is the most common hazard in South Carolina, and thousands of households are located within floodplains.

Floods can occur at any time of the year and at any time day or night. Most injuries and deaths occur when people are swept away by flood currents, often when attempting to traverse floodwaters in a vehicle.

Coastal flooding is typically a result of storm surge, wind-driven waves, and heavy rainfall. These conditions are produced by hurricanes during the summer and fall, and nor'easters or other large coastal storms during the winter and spring. Storm surges may overrun barrier islands and push seawater up coastal rivers and inlets, blocking the downstream flow of inland runoff. The surge associated with tropical storms and hurricanes propagates the rivers and may cause overbank flooding.

Urban flooding occurs when there has been development within stream floodplains. Urbanization increases the magnitude and frequency of floods by increasing impermeable surfaces, increasing the speed of drainage collection, reducing the carrying capacity of the land, and occasionally, overwhelming sanitary sewer systems.

The following conditions may exacerbate the effects of floods and are considered high risk factors: impermeable surfaces, steeply sloped watersheds constrictions, obstructions, debris, contamination, soil saturation, and velocity.

- A. Impermeable surfaces: Excessive amounts of paved areas or other surfaces upstream or in the community can increase the amount and rate of water runoff. Development affects the runoff of storm water when buildings and parking lots replace the natural vegetation, which normally would absorb water. When rain falls in an undeveloped area, as much as 90 percent of it will infiltrate the ground; in a highly developed area, as much as 90 percent of rainfall will run off.
- B. Constrictions: Re-grading or filling within or on the edge of floodplains obstructs flood flows, backing up floodwaters onto upstream and adjacent properties. It also reduces the floodplain's ability to store excess water, sending more water downstream and causing floods to rise to higher levels. This also increases floodwater's velocity downstream of the constriction.
- C. Obstructions: Bridges, culverts and other obstructions can block flood flow and trap debris, causing increased flooding upstream and increased velocity downstream.
- D. Debris: Debris from the watershed, such as trees, rocks, and parts of damaged buildings, increases the hazard posed by moving water. Moving water will float, drag or roll objects, which then act as battering rams that can knock holes in walls and further exacerbate the effects of debris.

- E. Contamination: Few floods have clear floodwater, and the water will pick up whatever was on the ground within the floodplain, such as soil, road oil, farm and lawn chemicals, and animal waste. In addition, if a wastewater treatment plant was inundated, the floodwaters will likely include untreated sewage. Contamination is also caused by the presence of hazardous material storage in the floodplain and in the community, as well as upstream from the community.
- F. Velocity: Flood velocity is the speed of moving water, measured in feet per second. Velocity is determined by slope, waves, and several other factors. The damage potential of flood waters increases dramatically, sometimes exponentially, with velocity. High velocities (greater than 5 feet per second) can erode stream banks, lift buildings off their foundations, and scour away soils around bridge supports and buildings. Water velocity is a major cause of damage in coastal areas, rivers, coastal inlets and over wash areas.

Floodplain managers use the term —100-year flood to describe a flood that has a one-percent chance of occurring in any given year. Many people find it helpful to think of the 100-year flood risk as a bag of 100 marbles: 99 clear marbles and one black marble. Depending on weather conditions, a community may draw one or more marbles, or floods, from the bag. Most of these—the clear marbles—will be minor floods. It is possible, however, to draw the black marble, representing the 100-year flood, at any time. Because the marbles must be returned to the bag after they are drawn, it is even possible to draw the black marble several times in a row. Just because a community has suffered a 100-year flood does not mean that it won't face a flood of similar magnitude for another 99 years.

The location of the 100-year floodplain is often indicated on maps, such as the National Flood Insurance Program's Flood Insurance Rate Maps (FIRMs). In practice, the location of the 100-year flood should be judged in part by community experience as well. Where the water goes in a flood depends on many changing variables, including land use that may not be accurately reflected by a map in every instance.

Flood waters and standing waters pose various risks, including infectious diseases, chemical hazards, and injuries. Below is a list of infectious diseases that may be encountered during a flood response.

- A. Cryptosporidiosis
- B. Enteroviruses
- C. Escherichia coli (E. coli)
- D. Giardiasis
- E. Hepatitis B, Hepatitis C, HIV/AIDS
- F. Leptospirosis
- G. Legionnaires' disease
- H. Methicillin-Resistant Staphylococcus aureus (MRSA) Infection
- I. Norovirus
- J. Rotavirus
- K. Shigellosis
- L. Skin Infections
- M. Tetanus
- N. Toxoplasmosis
- O. Trench Foot or Immersion Foot
- P. Tuberculosis (TB)
- Q. Varicella Disease (Chickenpox)
- R. Vibrio cholerae (Non-O1 & Non-O139)

- S. Vibrio parahaemolyticus
- T. Vibrio vulnificus

U. West Nile Virus

There are many precautions that can be taken during a flood incident to lessen the chance of contracting infectious diseases and generally lessening your risk to harm. Listed below are some ways to avoid injury and diseases development.

Diarrheal Diseases: Eating or drinking anything contaminated by flood water can cause diarrheal disease.

- A. Practice good hygiene (hand washing) after contact with flood waters.
- B. Do not allow children to play in flood water areas.
- C. Wash hands frequently (always before meals).
- D. Wear all proper PPE at all times with operating in flooded areas.

Wound Infections: Open wounds and rashes exposed to flood waters can become infected.

- A. Avoid exposure to flood waters if you have an open wound.
- B. Cover open wounds with a waterproof bandage.
- C. Keep open wounds as clean as possible by washing well with soap and clean water.
- D. If a wound develops redness, swelling, or drainage, seek immediate medical attention.

Other Health Effects: While responding or working during a flooding emergency, be aware that flood water may contain sewage.

- A. Trench foot, also known as immersion foot, occurs when the feet are wet for long periods of time. It can be quite painful, but it can be prevented and treated.

Chemical Hazards: Be aware of potential chemical hazards during floods. Flood waters may have moved hazardous chemical containers of solvents or other industrial chemicals from their normal storage places.

- A. Protect Yourself from Chemicals Released During a Natural Disaster
- B. Chemical Emergencies

Animal and Insect Bites: Flood waters can displace animals, insects, and reptiles. To protect yourself and be alert and avoid contact.

- A. Protect yourself from animal and insect related hazards

Electrical Hazards: Avoid downed power lines.

- A. Protect yourself and others from electrical hazards after a disaster
- B. If down power lines are located during a flood incident the EOC will be notified and proper precautions will be taken to ensure members of the public are not at risk of being electrocuted.

Wounds: Flood waters may contain sharp objects, such as glass or metal fragments, that can cause injury and lead to infection.

Drowning: Flood water poses drowning risks for everyone, regardless of their ability to swim. Swiftly moving shallow water can be deadly, and even shallow standing water can be dangerous for responders. Vehicles do not provide adequate protection from flood waters. They can be swept away or may stall in moving water.

II. SITUATION

Floods are one of the greatest natural disasters known to mankind. Flooding occurs when water accumulates faster than soil can absorb it or rivers can carry it away. Floods are a temporary overflow of water onto lands not normally covered by water and that are used or usable by man, producing measurable property damage/destruction or forcing evacuation of people and vital resources.

The Atlantic hurricane season runs from June 1st through November 30th, and significant rain events can happen any time during the year. On a day-to-day basis the Horry County Emergency Management Department continually monitors the current weather affecting the county as well as weather conditions and systems that may impact the county in the foreseeable future. There are a number of weather related resources that assist in the identification of weather related conditions, such as: The National Weather Service; The National Hurricane Center; and a suite of tools and predictive models.

The department transitions from normal, day-to-day operations to a state of heightened situational awareness (OPCON 4) when models indicate that an approaching weather system; whether an actual or anticipated tropical depression, tropical storm or hurricane or significant rain could impact county. Should such threat present itself then the Emergency Operations Plan, in conjunction with this Riverine and Coastal Flood Annex is implemented.

Hazard and threat analysis information is maintained as part of the Horry County All Hazards Mitigation plan. Identified in the threat analysis are high-risk areas (i.e., population, infrastructure and environmental). Impacts and response actions for Tropical Systems are covered the Hurricane Annex of the Horry County Comprehensive Emergency Management Plan.

III. ASSUMPTIONS

- A. Horry County will generally receive several days of early warning of an impending significant rain event or coastal flooding event due to high tides through the National Oceanic Atmospheric Administration (NOAA) and the National Weather Service (NWS).
- B. Horry County will use this warning time to prepare using plans, protocols and procedures predefined and coordinated in this and other plans.
- C. Mutual Aid Compacts and agreements will enable assistance in shortfall areas of personnel, equipment and logistics; state-to-county, county-to-county, and county-to-municipality.
- D. The citizens of Horry County will prepare themselves for the approaching event.
- E. Significant flooding may trigger only a state and local response without a Federal response.
- F. Flooding may result in displaced people that may overwhelm local and State capabilities.
- G. There will be increased security in evacuated areas to prevent looting.
- H. Both response and recovery operations may be hampered by blocked roads, damaged bridges or roads, and downed trees and utility poles.

IV. AREAS OF FLOOD CONCERN

Horry County is bound on two sides by water and a river that runs through the county as well. These are the Great Pee Dee River along the border and the Waccamaw River running through the county. To the East is the Atlantic Ocean. The flood potential from these are noted on the attached storm surge map. This map depicts the inundation of the coastal areas from storm surge as well as the areas along the rivers which depict the areas also found in the FIRM maps. The FIRM maps for Horry County can be viewed at www.horrycounty.org.

HISTORY OF FLOODING

According to the NCDC, Horry County and the participating jurisdictions have experienced 34 flood events since 1950. One of the most diverse was Hurricane Floyd, which brought three different floods to Horry County. During the storm, the intense rainfall could not drain away faster than it collected, flooding yards, parks, intersections, parking lots, building entrances and low lying areas. This water drained away as the rainfall intensity decreased.

The second flooding event occurred mostly in the City of Conway on the following day as the Crabtree Swamp watershed responded to the large rainfall. Because this is a relatively small watershed, the runoff from Floyd's rain caused water to rise quickly. Since the Waccamaw River was still low, Crabtree Swamp drained quickly. Homes along the Swamp in the north part of the City were only flooded for a few hours. (Conway, FHMP-1999). The third flooding event started a few days after the storm when the runoff from the Waccamaw River watershed caused the river to rise.

Because the Waccamaw's watershed is so large and flat, it took days for the storm water runoff to collect and flow into the river. This flood had the added hazard of water that had been polluted by farm runoff that included livestock waste. The water was much dirtier and more noxious than the water in the other two floods. And it stayed in or under buildings for up to 45 days. It also flooded several sewer pump stations, including those that serve the Horry County Emergency Operations Center and the County Dispatch Center.

Hurricane Floyd brushed the eastern South Carolina coast and made landfall near Cape Fear, North Carolina on September 16, 1999. Up to 18-inches of rainfall was recorded in parts of Horry County. Record flooding was documented at gauging station 02110500 located at the Waccamaw River near Longs, S.C. The peak discharge was about 1.6 times higher than the 100-year flood recurrence interval discharge.

Hurricane Joaquin passed well off-shore on October 1, 2015 yet produced 17-20 inches of rain over most of the state including Horry County. Horry County experienced significant flash flooding impacting 410 homes in the unincorporated areas of the county. Flash flooding was also a concern in several of the local municipal jurisdictions. Flash flooding covered many of the roads and bridges. The county EOC facility was impacted by the flash flooding and was also isolated from all directions until the water receded. The Waccamaw River crested 8 days later at 16.20 feet resulting in the third highest historical crest. Estimated damages exceeded \$9M in residential losses and \$5 M in public infrastructure losses. Impact to the area beaches was estimated at \$50M in emergency re-nourishment and the local economic impact exceeded \$50M. FEMA Individual Assistance exceeded \$3M to over 4000 applicants in Horry County.

Flood losses: The full extent of the impact of Hurricane Floyd and Hurricane Joaquin can never be completely measured due to secondary impacts that may never be recorded, but following is an overview of the impact this storm had in Horry County.

Hurricane Floyd

- More than 1,700 homes were damaged. Of those over 200 homes were substantially damaged which qualified them for assistance under the Hazard Mitigation Grant Program.
- An estimated 300 more homes had water in or near the crawlspaces but did not suffer any structural damage. However, many received damage to their outside air conditioning units, garages, and/or landscaping.
- Several sewer lift stations were damaged by flooding, in spite of a major sandbagging effort.
- Over 25 streets and bridges were closed. Backups of several miles were common on the state highways during the flood.
- An untold number of families and businesses were disrupted due to direct flood damage or closing of the streets.
- There were very few reports of health problems, in spite of the heavily polluted water.
- An estimated \$45 million in adverse economic impact to Horry County in tourism and business dollars. (Myrtle Beach Chamber of Commerce)

Hurricane Joaquin

- More than 400 homes were damaged with 5 being substantially damaged.
- Over county 200 roads and bridges were damaged and closed.
- Estimated \$9 million in residential losses.
- Estimated \$5 million in public infrastructure losses.
- Over 4000 FEMA Individual and Household Assistance applicants received more than \$3 million in direct assistance.
- Flash flooding was the major cause of the flooding impacts. These areas had not been developed during the Hurricane Floyd event.
- Estimated \$50 million adverse economic impact.

The main potential causes for flooding in the our area and jurisdictions and agreed most of the flooding would be a result of a slow moving tropical system which could potentially dump large amount of rainfall in a specific location inundating that area and the obvious storm surge inundation of the waterways and rivers. The other potential is due to a rise in a watershed which could cause fresh water flooding along the banks of the Waccamaw, Little Pee Dee River and their tributaries. Natural floodplain functions are important and there is a need to preserve these areas and prevent additional structures from being built in these areas. The limitations on this type of mitigation are controlled by building codes and the local ordinances. The County provides educational and outreach materials for those individuals who inquire about Special Flood Hazard Areas and flooding. The Horry County Flood Zone map and the Horry County Storm Surge map can be found as Attachment C & D to this annex.

V. BASIC FLOOD PROTECTION ACTIVITIES

Basic flood protection activities can be taken by the public to help mitigate the potential damages from floods. Many of the actions can be routine such as keeping storm drains clear of debris and reporting retention pond issues to the Horry County Storm Water Department which oversees and provides maintenance for the county drainage system. Horry County has a dedicated Road and Drainage Hotline 843-381-8000 for the public to report drainage issues.

Other mitigation efforts include: sandbagging of homes and businesses prior to the arrival of flood water, property elevations to move property above the highest expected flood; Acquisitions can be undertaken by property owners to remove the property from the threat of flooding.

An ongoing concern for the Horry County are its residents during and after a flood. The biggest fear is for personal safety and ensuring residents understand safety and mitigation techniques. As a way to help with any lack of information or communication Horry County has drafted Flood Response Preparation document (FRP) in the form of a double sided door hanger. This door hanger will be distributed in the flood affected communities by Public Safety Personnel during the early stages of the operation. The FRP addresses health and safety issues for residents during the flood and permitting and mitigation tips and information for after the flood. A copy of this FRP can be found as Attachment B in this document.

VI. CONCEPT OF OPERATIONS

A. General

1. This plan is used in conjunction with the responsibilities outlined in the Emergency Operations Plan and its annexes/appendices.
2. Groups and individuals responding to flooding events will do so generally using procedures parallel to their normal day-to-day operations.

B. Riverine and Coastal Flood Stages

Horry County shall use flood stages for riverine and coastal flood planning and the Operational Condition levels in the Emergency Operations Plan for response, thus facilitating the action of both emergency management and emergency response personnel.

1. *Minor Flood Stage Rivers:* (Waccamaw River 11 feet; Little Pee Dee River 9 feet) Minor flooding is expected at this level, slightly above flood stage. Few, if any, buildings are expected to be inundated, however, roads may be covered with water, parklands and lawns may be inundated and water may go under buildings on stilts or higher elevations.
2. *Minor Flood Coastline:* (1-2 foot above normal high tide) Water will usually run all the way up to the dune in waves during a minor flood. Over wash may occur on shoreline roads. Lifeguard structures and beach concession stands will usually be flooded, and may be damaged by surf.
3. *Moderate Flood Stage Rivers:* (Waccamaw River 12 Feet; Little Pee Dee River 11 feet) Inundation of buildings usually begins at this stage. Roads are likely to be closed and some areas cut off. Some evacuations may be necessary.
4. *Moderate Flood Coastline:* (2-4 Feet above normal high tide) At moderate flood stage, usually water overtops the natural dune and begins flooding coastal areas. Shoreline roadways and beaches will often be completely flooded out. High surf usually associated with this level of flooding may pound

some ocean side structures like piers, boardwalks, docks, and lifeguard stations apart. Beach houses may be damaged by water and surf, especially if lacking stilts.

5. *Major Flood Rivers:* (Waccamaw River 14-16 feet; Little Pee Dee River 12 feet) Significant to catastrophic, life-threatening flooding is usually expected at this stage. Extensive flooding with some low-lying areas completely inundated is likely. Structures may be completely submerged. Large-scale evacuations may be necessary.
6. *Major Flood Coastline:* (4-9 feet above normal high tide) Water surges over not only the dune, but also man-made walls and roads. Large and destructive waves pound weak structures to bits and severely damage well-built homes and businesses. Over wash occurs on high-level seawalls. If major flooding occurs at high tide, impacts may be felt well inland.
7. *Record Flood Rivers:* Waccamaw River above 17 feet; Little Pee Dee above 16 feet. These are the highest that has been recorded on these rivers since the gauges have been in place.
8. *Coastlines:* (Greater than 9 feet above normal high tide) record flooding at the coast is associated with Tropical cyclones, but it may be associated with coastal storms, or tsunamis. Destruction is often extensive and may extend a far distance inland.

C. Warnings

The Horry County E911 Emergency Communications center has the ability to monitor and receive any weather or flood related event of notifications on a 24 hour basis. Once the E911 center receives a flood notification they will contact the Horry County Emergency Management officer on-call and make them aware of the situation. From that point, the Horry County Emergency Management Director or his designee has the authority to request that the National Weather Service office in Wilmington, NC to issue a Civil Emergency Message through activation of the Emergency Alert System, with the request for people in the impacted areas to relocate to high ground or above the estimated flood level. Once an evacuation order had been issued, Emergency Management will coordinate the evacuation effort and activate the emergency operations center. Evacuation response teams will be organized for warning, traffic control, and security of the evacuated areas, when necessary. The Horry County Evacuation Plan will be implemented. Warning and evacuation instructions will be disseminated via various alerting systems, radio, TV and social media. Horry County's commercial emergency notification system will be used to issue the evacuation alert to all businesses and residences in the evacuation area. The Public Information Officer will develop and provide information announcements and publications regarding evacuation procedures, to include recommended primary and alternate evacuation routes, designated assembly points for those without transportation, rest areas and services along evacuation routes.

D. Warning Methods:

Several methods are used to warn the public in Horry County. These methods can be used separately or together, depending upon the specific situation.

1. Local radio and TV stations.
2. Social Media
3. Commercial Emergency Notification System (CodeRED)
4. NOAA Weather Alert Radios
5. Public Safety vehicles patrol the streets with sirens and emergency lights, announcing the emergency message over their PA system.

Social Media:

Horry county Emergency Management utilizes several social media accounts to educate, inform and warn the public. The accounts allow the public to follow news feeds, status updates and information posts made by emergency management. The accounts are public and available for both residents and non-residents of Horry County.

CodeRED Emergency Notification System:

Horry County Emergency Management offers the CodeRED Emergency Notification System to all property owners in the county regardless of registering. However, the public may also register with CodeRED to receive information in other formats like text and email. The system allows the property owner to enter as many phone numbers as you need for other family members or employees at your business by re-entering your information. The system also allows you to enter email addresses as the emergency notification can be broadcasted by phone, text or email. This service is available for both residential and non-residential properties.

Other CodeRED features:

TTY/TDD Functions – The CodeRED system allows those hearing impaired to also sign up to receive emergency notifications. Text Telephones (TTY), also known as Telecommunications Device for the Deaf (TDD), are used by the deaf, hard-of-hearing, and individuals with speech impairments to communicate

Message Playback – You may hear the last message to your phone through the CodeRED system by simply dialing back the number on your Caller ID. Community members can easily identify calls coming from the CodeRED system as the recipient’s Caller ID will read Emergency Communications Network or 866-419-5000.

CodeRED Mobile Alert App – The app is geo-aware so no matter where you are when an alert is issued, you will receive notifications that affect you – right on your mobile device. The app delivers information from community officials in areas that are subscribed to the CodeRED Emergency Notification System. The free app is available on Horry County’s website at www.horrycounty.org.

CodeRED Weather Warning – This is an opt-in only weather warning product that taps into the National Weather Service’s Storm Based Warnings. This geographical targeted weather warning product is built into the CodeRED system and will alert citizen’s moments after a severe thunderstorm, flash flood, or tornado warning has been issued. Community members can easily identify calls coming from the CodeRED Weather Warning as the recipient’s Caller ID will read Emergency Communications Network or 800-566-9780. The CodeRED Weather Warning also provides a CodeRED Weather.

E. Operational Conditions Levels

Horry County’s response and recovery actions for disasters is outlined in the Comprehensive Emergency Management Plan. The trigger points for implementing actions is associated with Operational Condition levels or OPCONs. OPCONs outlined in the Emergency Operations Plan (CEMP Section 2) provides an explanation of each OPCON and how they are associated with Horry County’s state of readiness. OPCONs for specific annexes or appendices are found within those documents. Below are the OPCONs and associated actions for riverine and coastal flooding.

OPCON 5

Horry County will remain at OPCON 5, day-to-day operations, until the National Weather Service identifies that riverine or coastal flood threat greater than minor flooding for Horry County. Tropical systems responses are found in the Hurricane Annex of the Emergency Operations Plan.

Emergency Management Department

- a. Daily monitor the National Weather Service forecast.
- b. Monitor gauges for river levels.

OPCON 4

Once the National Weather Service identifies that minor flooding may increase to moderate flooding, the operating condition will move to OPCON 4. The primary events that will take place at this level are the notification of key personnel of the possible threat and initiation of preparatory activities. The EOC will not be activated at this stage. Tropical systems responses are found in the Hurricane Annex of the Emergency Operations Plan. Required response actions should be completed in less than 12 hours.

County Administrator

- a. Update Horry County Council on the actions being performed by county agencies and departments.
- b. Activate the EOP and Riverine and Coastal Flooding Annex as recommended by the EMD Director.

Public Information

- a. Update the Horry County Government website with press releases and local advisories.
- b. Issue a press release of OPCON 4 status.
- c. Utilize pre-scripted messages for flood preparation activities.

Emergency Management Department

- a. Review the advisory package forecast data. Determine projected evacuation timelines.
- b. HCEMD led conference calls with National Weather Service.
- c. Discuss and coordinate current situation and future actions with the following agencies:
 1. SCEMD
 2. NWS, Wilmington
 3. Georgetown County Emergency Management
 4. Marion County Emergency Management
- d. Discuss, coordinate and update on current situation and future actions with local municipalities:
 1. Town of Atlantic Beach
 2. Town of Aynor
 5. Town of Briarcliffe Acres
 6. City of Conway
 7. City of Loris
 8. City of Myrtle Beach
 9. City of North Myrtle Beach
 10. Town of Surfside Beach

- e. Establish an event in iRISS.
- f. Check scheduling and determine who is scheduled to use the EOC. Notify them that they are subject to be rescheduled.
- g. Consider notification through EOC alert roster.
- h. Update county departments that may be most affected by the flooding hazards as appropriate.
- i. Advise EMD staff to prepare for possible OPCON 3.

Maintenance

- a. Check county facilities that may be in the potential flood hazard area. (4 Staff Members)
 1. Technology Center
 2. M. L. Brown Jr Public Safety Facility
 3. Government and Justice Center
 4. Olin Blanton Government Facility
 5. South Strand Recreation Center
 6. Little River Fire Station
 7. Lake Arrowhead Fire Station
 8. Holmestown Fire Station
- b. Actions should take about 5 hours

Law Enforcement

- a. Advise the road patrols of flood hazard and possible impacted roads.
- b. Prepare for possible evacuations and identify possible traffic control locations.

Fire/Rescue

- a. Advise personnel on road impacts
- b. Ready equipment and notify department personnel to prepare for potential water-rescue activities.
- c. Equipment:
 1. Rescue Boat
 2. Jet Skis
 3. 4x4 trucks
- d. Supplies:
 1. Extra fuel
 2. Medical treatment supplies
 3. Life safety gear
- e. Actions should take about 8 hours

Public Works

- a. Prepare equipment for staging closer to impacted areas, if applicable
- b. Prepare to implement barricades along county own roads.
- c. Coordinate with SCDOT as needed regarding possible impacts along state own roads.
- d. Prepare staff and equipment to work with law enforcement and fire/rescue to assist with evacuations and rescues.
- e. Equipment:
 1. Track Hoes
 2. Truck/trailers
 3. Medium and large dump trucks
 4. Message boards

5. Barricades
6. Temporary signs
- f. Actions should take about 12 hours

Storm Water

- a. Prepare equipment for staging closer to impacted area if applicable.
- b. Equipment
 1. Small Track Hoes
 2. Trucks/trailers
 3. John boats
 4. Small dump trucks
 5. Hand Tools
 6. Barricades
 7. Temporary signs
- c. Clear drainage tiles and ditches in identified areas that may flood as much as possible to maintain drainage flow.
- d. Identify other areas that may already be impacted by recent events.
- e. Provide an estimation of which areas that may be impacted the most.
- f. Actions should take about 12 hours

Public Information Office

- a. Monitor weather related information from the Emergency Management Department and other sources.
- b. Prepare to utilize pre-scripted releases by including pertinent information.
- c. Reach out to other local government agencies to begin coordinating flood related information.

OPCON 3

When the National Weather Service forecasts a Major Flood Stage, Horry County will move to OPCON 3. The EOC will be activated at this level, either at a partial or full status. The primary events that will occur will include evacuation discussions, conducting pre-evacuation conferences, intelligence and information gathering, resource management and other preparatory activities. Once the EOC activates county departments are incorporated into the appropriate Emergency Support Function (ESF). Required response actions should be completed in less than 12 hour.

Executive Group

- a) Discuss possible evacuation options and if appropriate activate the Evacuation Plan Appendix 6-6 of the Emergency Operations Plan.
- b) County Administrator to coordinate with County Council to prepare a draft “State of Emergency”.
- c) Preliminary discussion and evaluation of emergency ordinances.
- d) Coordinate with the Human Resources Director regarding canceling leave for all essential personnel.
- e) Consider activation of resource and recovery contract based on recommendation by EOC Manager.

Emergency Management/EOC Manager

- a) Recommend implementation of the EOP and appropriate annexes/appendices.
- b) Recommend the activation of the EOC, based on the situation; determine if partial or full activation is required.
- c) Review the advisory package forecast data. Determine projected evacuation options and timelines.
- d) Discuss and coordinate current situation, future actions and potential evacuation with the following agencies:
 1. SCEMD
 2. NWS, Wilmington
 3. Georgetown County Emergency Management
 4. Marion County Emergency Management
- e) Discuss, coordinate and update on current situation and future actions with local municipalities. Be prepared to discuss local issues that might impact the evacuation, such as road construction or special events if located in the evacuation areas.
 1. Town of Atlantic Beach
 2. Town of Aynor
 3. Town of Briarcliffe Acres
 4. City of Conway
 5. Town of Loris
 6. City of Myrtle Beach
 7. City of North Myrtle Beach
 8. Town of Surfside Beach
- f) Recommend activation of resource and recovery contract to Executive Group, as appropriate
- g) Encourage departments/agencies to begin documenting hours and activities in each department.
- h) Activate the EOC phone bank in the Joint Information Center and develop a “Talking Point Sheet”. Ensure each operator has accurate information on the situation. Continue to update as the situation develops.

ESF 1 – Transportation

- a) Coordination with CoastRTA regarding evacuation pick-up points.

ESF 2 – IT/Communications

- a) Establish the Amateur Radio Net, primarily with EOCs and hurricane evacuation shelters in the county.
- b) Actions should take about 8 hours

ESF 3 – Public Works/Engineering

- a) Check the evacuation routes and verify that they are prepared for maximum traffic volume. Report any problems that could affect the evacuation.
- b) Ensure all critical vehicles and equipment are at a ready state.
- c) Maintenance prepare for closure and securing of government buildings.
- d) Actions should take about 6 hours

ESF 5 – Information and Planning

- a) Utilize IRISS to develop and provide timely and accurate actionable intelligence.

ESF 6 – Mass Care

- a) Coordinate the possible opening of evacuation shelters and special medical needs shelters. Verify that shelters are capable of sustaining operations and needed personnel required.
- b) Discuss with school district officials regarding schedule modifications and possible closings.

ESF 7 – Resource Support

- a) Consider opening the County EOC shelter at the Academy for Technology.
- b) Review food operations for ATA and consider activation of the caterer contract.
- c) Initiate resource requests approved by the EOC manager

ESF 8 – Public Health

- a) Notify hospitals of the situation.
- b) Determine status of critical care patients at hospitals in evacuation zones.
- c) Contact nursing homes in evacuation zones and report operational status to EOC Manager.

ESF 13 – Law Enforcement

- a) Discuss security measures pre and post event.
- d) Develop a security plan for evacuation zones.
- e) Develop listing of potential access control point locations along flooded neighbor hoods.

ESF 16 – Emergency Evacuation (tropical systems)

- a) Prepare to implement the traffic evacuation procedures.
- b) Coordinate the additional resources for evacuation traffic control points.
- c) Actions make take about 4 hours

ESF 19 – Military Support

- a) SCANG begin to mobilize units to support the TCP and evacuation efforts if needed.
- b) Coast Guard monitor Intracoastal Waterway traffic.

ESF 22 – Air Operations

- a) If the evacuation area is substantial, then coordinate for flights to monitor traffic along the evacuation routes. Coordinate with ESF 13 on reporting and monitoring the evacuation of traffic.

ESF 24 – Business and Industry

- a) Coordinate with local businesses regarding the situation.

- b) Identify major events and special activities that could impact the evacuation.
- c) Consider coordinating with directors of special public activities and events.

OPCON 2

Once the determination is made that evacuations must take place, the OPCON level will automatically move to OPCON 2. At this level evacuation shelters will be prepared for opening and local resources deployed to support the evacuation. Public notifications and press conferences will be coordinated. Required response actions should be completed in less than 6 hours.

Executive Group

- a) Prepare and issue “State of Emergency”.
- b) Finalize decision on any potential closure of government functions and facilities.
- c) Discuss current and future EOC operations with municipal leaders and state and federal delegations.
- d) Discuss with Solid Waste Authority, (SWA) implementation of debris management contract.

EOC Manager

- a) Discuss and coordinate current situation and future actions with the following agencies:
 - 1. SCEMD
 - 2. NWS, Wilmington
 - 3. Georgetown County Emergency Management
 - 4. Marion County Emergency Management
- b) Discuss, coordinate and update on current situation and future actions with local municipalities, if appropriate.
 - 1. Town of Atlantic Beach
 - 2. Town of Aynor
 - 3. Town of Briarcliffe Acres
 - 4. City of Conway
 - 5. Town of Loris
 - 6. City of Myrtle Beach
 - 7. City of North Myrtle Beach
 - 8. Town of Surfside Beach
- c) Update Brunswick County and Columbus County, North Carolina on the current status of Horry County OPCON level.

ESF 1 – Transportation

- a) CoastRTA implement evacuation pick up points.

ESF 3 – Public Works/Engineering

- a) In coordination with ESF 16, position equipment to support evacuation.
- b) Take appropriate actions to protect critical Horry County facilities and infrastructure.

ESF 4 – Fire/Rescue

- a) Coordinate the movement and use of fire equipment for flood operations.

ESF 6 – Mass Care

- a) Coordinate the opening of the evacuation shelters.
- b) Coordinate with the PIO for a press release once the evacuation decision is announced.

ESF 7 – Resource Management

- a) Monitor the status of the County EOC Shelter at the Academy for Technology and Arts.
- b) Continue to submit and track resource requests.

ESF – 8 – Public Health

- a) Monitor medical facilities.
- b) Prepare statements and guidelines for the prevention and management of flood borne illnesses.
- c) Prepare to monitor for the outbreak of flood borne illnesses and report them to DHEC

ESF 16 – Emergency Evacuation (tropical systems)

- a) Position resources to manage the evacuation traffic. Resources must be in place prior to the start of the evacuation.
- b) Begin monitoring traffic patterns and prepare to adjust traffic signals, as appropriate

ESF 19 – Military Support

- a) Assist Law Enforcement with staffing of the TCP and evacuation needs.
- b) Identify potential capabilities and tasks to assist the county and municipalities.

OPCON 1

Once an evacuation is ordered, the OPCON automatically moves to OPCON 1. At this level, the primary activity will be the evacuation of the vulnerable populations and evacuation shelter management. The EOC will remain at full activation throughout the evacuation and flood response. Required response actions should be completed in less than 6 hours.

Executive Group

- a) Implement closure of county facilities, as appropriate.
- b) Monitor situational awareness and provide guidance for flood response and recovery operations.

EOC Manager

- d) Discuss and coordinate current situation and future actions with the following agencies:
 - 1. SCEMD

2. NWS, Wilmington
 3. Georgetown County Emergency Management
 4. Marion County Emergency Management
- e) Discuss, coordinate and update on current situation and future actions with local municipalities, if appropriate.
1. Town of Atlantic Beach
 2. Town of Aynor
 3. Town of Briarcliffe Acres
 4. City of Conway
 5. Town of Loris
 6. City of Myrtle Beach
 7. City of North Myrtle Beach
 8. Town of Surfside Beach

ESF 2 – IT/Communications

- a) Monitor the status of all communication systems.

ESF 3 – Public Works/Engineering

- a) Complete actions to protect critical county facilities and infrastructure.
- b) Move and disperse equipment to safe areas, as required.
- c) Begin planning for debris management following impact, if applicable.
- d) Monitor the evacuation and ensure traffic moves as rapidly as possible.
- e) Begin preparations for an immediate assessment for the road network following the flood's impact.
- f) Review the priority for assessing and clearing the roads.

ESF 4 – Fire/Rescue

- a) Move equipment to safe areas, as required.
- b) Develop a plan for post impact search and rescue of the impacted areas.

ESF 6 - Mass Care

- a) Monitor the status of the evacuation shelters. Determine if supplemental evacuation shelters are necessary. Coordinate closely with other agencies.
- b) Document shelter occupancy levels for evacuation shelters and special medical needs shelters.
- c) Begin planning for the transition from general evacuation shelters to post-impact shelters closer to impacted areas.

ESF 7 – Resource Support

- a) Identify possible staging areas.
- b) Identify POD resource needs.

ESF 8 – Public Health

- a) Monitor medical facilities.
- b) Prepare statements and guidelines for the prevention and management of flood borne illnesses.
- c) Prepared to monitor for the outbreak of flood borne illnesses and report them to DHEC

ESF 13 – Law Enforcement

- a) Monitor the evacuation routes and maintain maximum traffic flow.
- b) Review and plan to implement re-entry.
- c) Plan for post-impact security requirements.

ESF 16 – Emergency Evacuations (tropical systems)

- a) Conduct evacuations.

VII. ANNEX MAINTENANCE

Horry County Emergency Management has the responsibility of coordinating, developing and maintaining the Riverine & Coastal Flood Annex and is the designated Lead Agency. The Riverine & Coastal Flood Annex will be updated in conjunction with the CEMP as stated in Section VII, Plan Development and Maintenance.

ATTACHEMENTS

- A. Critical Facilities Letter
- B. Flood Response Preparation Outreach
- C. Horry County Flood Zone Map
- D. Horry County Storm Surge Map

Attachment A



Emergency Management Department

RANDALL S. WEBSTER

The following Horry County facilities are considered as critical facilities which must remain operational during flooding response and recovery operations. These facilities receive advanced warnings and special notifications of impending flood events so they can be ready to support response and recovery activities.

Horry County E-911 Communications Facility

Ms. Toni Bessent, Director
Phone 843-915-5100
Email Bessentt@horrycounty.org

Horry County Emergency Operations Center

Mr. Randall S. Webster
Phone 843-915-5150
Email Websterrr@horrycounty.org

Attachment B

Flood Response Preparations Outreach

In effort to increase compliance with the NFIP building standards, enforce local building codes and ordinances and to promote public health and safety Horry County has decided to implement Flood Response Outreach projects during and immediately following a flood occurrence in the county. These outreach projects would be in addition to the outreach projects that are implemented on an annual basis. These projects are drafted and made ready for reproduction and dissemination after a major flood warning or post flood event. Drafts of these projects can be found at the end of this document along with an outreach worksheet.

Flood Response Preparations Documents

- a) FRP#1 During/After the Flood Door Hanger

Flood Response Preparation Procedure

- a) Monitor river gauges and weather conditions in effort to determine affected areas.
- b) Provide the FRP Documents to Supervisory Personnel within the Public Safety Division (Fire & Police).
- c) Public Safety Personnel will distribute material in a door to door process as they perform safety check in those areas affected by the flood.

Annual Evaluation

An evaluation of the Flood Response Outreach projects will be conducted annually prior to the start of the hurricane season by Horry County staff. The evaluation will cover:

- a) A review of the projects that were completed (if applicable)
- b) Relevancy of materials
- c) Updates to regulations or ordinances
- d) Changes in the target audiences



During the Flood

During the Flood

Below are some important tips that Horry County Government wants you to remember during a flood event.

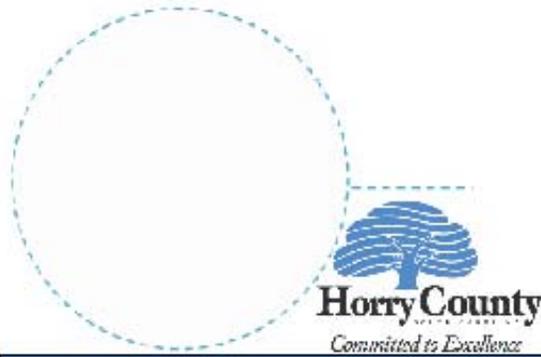
- If possible evacuate your home before conditions get bad or worsen this will help protect your personal safety and that of the first responders.
- Before you leave make sure to inventory your possessions and take all pertinent documents with you when evacuate. (insurance information, passports, birth certificates etc.)
- Do not drive around any barricaded roads or streets. The barricades have been put there to protect you.
- If you decide not evacuate your residence issues like electricity and water outages are extremely possible and can impede your ability to conduct daily activities.
- Be aware if you decide to stay it possible you will not be able to get in and out of your residence and you may be stranded in the case of emergencies
- If you are deciding to stay for the duration of the event please make contact with Horry County Emergency Management and give them the following information:
 - Your Name & the name of the additional occupants of the residence
 - Residence address
 - Contact phone number
- Please call in and give us the requested information at 843-915-5150

Below are some important tips that Horry County Government wants you to remember during a flood event.

- If possible evacuate your home before conditions get bad or worsen this will help protect your personal safety and that of the first responders.
- Before you leave make sure to inventory your possessions and take all pertinent documents with you when evacuate. (insurance information, passports, birth certificates etc.)
- Do not drive around any barricaded roads or streets. The barricades have been put there to protect you.
- If you decide not evacuate your residence issues like electricity and water outages are extremely possible and can impede your ability to conduct daily activities.
- Be aware if you decide to stay it possible you will not be able to get in and out of your residence and you may be stranded in the case of emergencies
- If you are deciding to stay for the duration of the event please make contact with Horry County Emergency Management and give them the following information:
 - Your Name & the name of the additional occupants of the residence
 - Residence address
 - Contact phone number
- Please call in and give us the requested information at 843-915-5150

For Additional Information Call Horry County Emergency Management 843-915-5150 or www.horrycounty.org

For Additional Information Call Horry County Emergency Management 843-915-5150 or www.horrycounty.org



After the Flood

The information below is something Horry County wants you to consider after the flood.

- Do you know if your property is located in a Special Flood Hazard Area?
 - Consider finding out what flood zone your property is in so you will know your risk before next time.
- If your building has been flooded do not enter the building until it has been cleared by an inspector.
 - Entering a flooded building is a safety and health risk for you. There may be electrical, structural or hazardous materials that could cause you injury.
- If your building has suffered damage due to the flood consider mitigating against those future risk when you repair.
 - Think about the possibility of both structural and nonstructural efforts to help prevent future losses.
- Remember before you start repair on your building make sure a permit is not required.
 - Contact Horry County Code Enforcement before you begin the repair. Remember completing the repair without a permit when one is need will cause the permit fees to be doubled in cost.
- Flood Insurance is a good way to help protect your property.
 - Contact your insurance provider to determine if flood insurance is an option for your property.

The information below is something Horry County wants you to consider after the flood.

- Do you know if your property is located in a Special Flood Hazard Area?
 - Consider finding out what flood zone your property is in so you will know your risk before next time.
- If your building has been flooded do not enter the building until it has been cleared by an inspector.
 - Entering a flooded building is a safety and health risk for you. There may be electrical, structural or hazardous materials that could cause you injury.
- If your building has suffered damage due to the flood consider mitigating against those future risk when you repair.
 - Think about the possibility of both structural and nonstructural efforts to help prevent future losses.
- Remember before you start repair on your building make sure a permit is not required.
 - Contact Horry County Code Enforcement before you begin the repair. Remember completing the repair without a permit when one is need will cause the permit fees to be doubled in cost.
- Flood Insurance is a good way to help protect your property.
 - Contact your insurance provider to determine if flood insurance is an option for your property.

For Additional Information Call Horry County Code Enforcement 843-915-5090 or www.horrycounty.org

For Additional Information Call Horry County Code Enforcement 843-915-5090 or www.horrycounty.org

Flood Reponse Outreach Projects

Target Audience	Message	Outcome	Projects Proposed to support messages	Assignment
Flooded Property Owners & Residents	<p>Topic #1: Know Your Flood Hazard Message: Find out your flood zone & risk before next time</p>	Increases awareness of SFHA and inherent risk	<p>FRP #1: Informational Door Hangers placed on doors in flooded neighborhoods. To be done during damage assessments post storm</p>	County CRS Coordinator/Emergency Mgmt; distribution thru damage assessment teams
	<p>Topic #3: Protect people from the hazard Message: Entering a building that has been flooded is a health & safety risk</p>	Bring awareness to public health risk and structural risk post flood	<p>FRP #1: Informational Door Hangers placed on doors in flooded neighborhoods. To be done during damage assessments post storm</p>	County CRS Coordinator/Emergency Mgmt; distribution thru damage assessment teams
	<p>Topic #4: Protect your property from the hazard Message: Consider implementing mitigation actions to protect against future losses</p>	Make people aware and increase interest in mitigation actions	<p>FRP #1: Informational Door Hangers placed on doors in flooded neighborhoods. To be done during damage assessments post storm</p>	County CRS Coordinator/Emergency Mgmt; distribution thru damage assessment teams
	<p>Topic #5: Build Responsibly Message: Make sure you get a permit if necessary before you repair</p>	Insure compliance with NFIP & County Ordinances	<p>FRP #1: Informational Door Hangers placed on doors in flooded neighborhoods. To be done during damage assessments post storm</p>	County CRS Coordinator/Emergency Mgmt; distribution thru damage assessment teams
	<p>Topic #2: Insure your property for your hazard Message: Contact your insurance provider to get information about flood insurance</p>	Promote the purchase of Flood Insurance	<p>FRP #1: Informational Door Hangers placed on doors in flooded neighborhoods. To be done during damage assessments post storm</p>	County CRS Coordinator/Emergency Mgmt; distribution thru damage assessment teams

Attachment C

Horry County, South Carolina Existing Flood Hazard

