Comprehensive Emergency Management Plan

Horry County
SOUTH CAROLINA
Committed to Excellence

Section 6-Riverine & Coastal Flood Annex

January 2025

Annex 6 – 3 Riverine & Coastal Flood Annex

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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 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. However, 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. Hurricanes produce these conditions 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 impervious surfaces, increasing the speed of drainage collection, reducing the land's carrying capacity, 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 stormwater 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; approximately 90 percent of rainfall will run in a highly developed area.

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. Constrictions also increase floodwater's velocity downstream.

C. Obstructions: Bridges, culverts, and other obstructions can block floodwater 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 is inundated, the floodwaters will likely include untreated sewage. Contamination can also be caused by hazardous material storage in the floodplain, the community, and upstream from other communities.

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 floodwaters 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 structures. Water velocity is a significant cause of damage in coastal areas, rivers, coastal inlets, and overwash 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. However, it is possible to draw the black marble, representing the 100-year flood, at any time. Because the marbles must be returned to the bag after being 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 a map in every instance may not accurately reflect.

Floodwaters and standing waters pose various risks, including infectious diseases, chemical hazards, and injuries. Below is a list of potential infectious diseases 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

During a flood incident, many precautions can be taken to lessen the chance of contracting infections or diseases and generally lessen your risk of harm. Listed below are some ways to avoid injury and disease development.

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

A. Practice good hygiene (handwashing) after contact with floodwaters.
B. Do not allow children to play in floodwater areas.
C. Wash your hands frequently (always before meals).
D. Wear all proper PPE at all times when operating in flooded areas.

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

A. Avoid exposure to floodwaters 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 floodwater may contain sewage.

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

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

A. Protect Yourself from chemicals released during a natural disaster
B. chemical emergencies

Animal and Insect Bites: Floodwaters can displace animals, insects, and reptiles. To protect yourself, 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 downed power lines are located during a flood incident, the EOC will be notified, and proper precautions will be taken to remove the risk of being electrocuted.

Drowning: Flood water poses drowning risks for everyone, regardless of their swimming ability. Swiftly moving shallow water can be deadly, and even shallow standing water can be dangerous for responders. In addition, vehicles do not provide adequate protection from floodwaters. They can be swept away or may stall in moving water.

II. SITUATION

Floods are one of the greatest natural disasters known to humanity. Flooding occurs when water accumulates faster than the soil can absorb it or rivers can carry it away. Floods are a temporary overflow of water onto lands not usually covered by water used or usable by man, producing measurable property damage/destruction or forcing the 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. Several weather-related resources assist in identifying 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 when models indicate that an approaching weather system, whether an actual or anticipated tropical depression, tropical storm, hurricane, or significant rain, could impact the county. Should such a threat present itself, the Emergency Operations Plan is implemented with this Riverine and Coastal Flood Annex.

Hazard and threat analysis information is maintained as part of the Horry County All Hazards Mitigation plan. The threat analysis identifies high-risk areas (i.e., population, infrastructure, and environmental). In addition, impacts and response actions for Tropical Systems are covered in 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 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 forthcoming 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. The Great Pee Dee River along the border and the Waccamaw River run through the county. To the East is the Atlantic Ocean. The flood potential from these rivers is noted on the attached storm surge map. This map depicts the inundation of the coastal areas from storm surges and the rivers, which show the areas also found in the FIRM maps. The FIRM maps for Horry County are viewable at https://www.horrycountysc.gov/online-services/fema-flood-maps/.

HISTORY OF FLOODING

According to the National Climatic Data Center (NCDC), Horry County and the participating jurisdictions have experienced 36 flood events since 1950. Hurricane Floyd was one of the most diverse, bringing three

different floods to Horry County. First, the intense rainfall could not drain away faster than it collected during the storm, flooding yards, parks, intersections, parking lots, building entrances, and low-lying areas. Fortunately, water drained away as the rainfall intensity decreased. The second flooding event occurred mainly in the City of Conway on the following day as the Crabtree Swamp watershed responded to the significant 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. As a result, homes along the swamp in the northern part of the City 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 stormwater runoff to collect and flow into the river. This flood had the added hazard of water polluted by farm runoff, including livestock waste. As a result, the water was much dirtier and more noxious than the water in the other two floods. The floodwater 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 16th, 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 1st, 2015, yet produced 17-20 inches of rain over most of the state, including Horry County. As a result, Horry County experienced significant flash flooding that impacted 410 homes in the county's unincorporated areas. Flash flooding was also a concern in several of the local municipal jurisdictions. Flash flooding covered many roads and bridges; the county EOC facility was impacted by the flash flooding and was isolated from all directions until the water receded. The Waccamaw River crested eight 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. The impact on 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.

Horry County was hit again almost a year to the date, after the 2015 flood. First, Hurricane Matthew made landfall in Hatti and eastern Cuba as a category-four storm on October 4th, 2016. Then Hurricane Matthew skirted along the southeast coast of the United States, where it eventually impacted Horry County on October 8th, 2016, as a category one hurricane. Hurricane Matthew brought significant amounts of rain again to coastal South Carolina. Horry County received between 12-14 inches of rain in a little over a 24-hour period, which caused significant river rise and inland flooding in low-lying areas. Hurricane Matthew also impacted the watershed and tributaries to the Little Pee Dee River in North Carolina, causing more significant flooding. Due to the impacts of Hurricane Matthew, Horry County experienced historic flood levels in all three waterways, The Little Pee Dee, the Intracoastal Waterway, and the Waccamaw, all broke previous floods on record. Due to this event, residents and businesses along these waterways experienced weeks of damage and dislocation. Damage assessment numbers for residents impacted in the unincorporated area of Horry County are over 1100 homes and over 5000 applicants for FEMA Individual Assistance.

In 2018, Hurricane Florence made landfall north of Horry County and produced record-breaking rainfall totals. Horry County saw 23 inches of rain, and rainfall in the Waccamaw and Pee Dee river basins in NC were near 34 inches. The rainfall resulted in a new record flood with the Waccamaw River creating in Conway at 21.16 feet, nearly 3.5 feet above the previous record of 17.37 set in 2016. The flooding resulted in 260+ impassable roads, threatened to isolate Horry County from the rest of the region, and cut the county in two for an estimated 7-10 days due to flooding on major highways leading in and out of the county. Unprecedented steps had to be taken to ensure a lifeline was maintained into and through Horry County and ensure a supply of commodities

available for over 320,000 people. There were 1941 homes impacted, and the reported cost of damage from Hurricane Florence flooding was $41.5 million in Horry County.

Flood losses: The full extent of the impact of Hurricane Floyd, Hurricane Joaquin, Hurricane Matthew, and Hurricane Florence can never be wholly measured due to secondary effects that may never be recorded, but the following is an overview of the impact these storms had on Horry County.

Hurricane Floyd 1999:

- 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 structural damage. However, many received damage to their outside air conditioning units, garages, and landscaping.
- Several sewer lift stations were damaged by flooding despite a significant 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 the closing of the streets.
- There were very few reports of health problems despite 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 2015:

- More than 400 homes were damaged, with five being substantially damaged.
- Over 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 primary cause of the flooding impacts. These areas had not been developed during the Hurricane Floyd event.
- Estimated $50 million adverse economic impacts.

Hurricane Matthew 2016:

- Over 1100 homes were impacted with damage.

- Estimated $33 million in residential losses.
- Estimated $13 million in public infrastructure losses.
- Over 5000 FEMA Individual Assistance applicants.
- Broke all previous historical flood data records on all three waterways.

Hurricane Florence 2018:

- 1591 homes damaged.
- Estimated $41.5 million in residential losses.
- Estimated $13.1 million in public assistance claims.
- Over 6500 FEMA Individual Assistance applicants.
- New flood record exceeding the old record by 3.5 feet at the Waccamaw River gauge
- Over 260 roads closed due to flooding, including three major highways (Hwy 9, Hwy 917, Hwy 22)

Hurricane Dorian 2019:

- Storm surge flooding affected Garden City during the afternoon of September 5. Video shared by local media showed six inches of water covering Atlantic Avenue at least two blocks inland from the beach.
- Flash flooding affected a few Horry County neighborhoods including Grier Crossing and Jordan Estates near the city of Conway.
- Inlet Square Mall in Garden City had up to two feet of flood water standing in the parking lot. Flash flooding also affected the Surfside Beach Club community.
- In Cherry Grove, flood water was knee deep on 49th Avenue. North of Conway, Long Avenue Extension was closed as water from Grier Swamp covered hundreds of feet of the highway.
- Three tornadoes touched down in Horry County during Hurricane Dorian's passage: an EF1 tornado struck Little River at 4:37 a.m., an EF0 tornado developed near Socastee at 5:45 a.m., and another EF0 tornado touched down in North Myrtle Beach at 6:37 a.m.

Hurricane Ian 2022:

- In Garden City Beach, storm surge breached the dunes and flooded parking lots and streets. Debris lines after the storm were noted approximately four feet above ground level in the first floor of some beachfront homes. Upwards of three feet of sand was deposited onto South Waccamaw Drive in Garden City, entombing parked vehicles.
- Severe erosion was also noted in Myrtle Beach where six foot tall cliffs were eroded into the beach. Storm surge flooding entered a large amusement park in Myrtle Beach. Apache Pier and Second Avenue Pier were both damaged. Upwards of three feet of sand was deposited onto South Waccamaw Drive in Garden City.

- North Myrtle Beach, portions of Main Street, North Ocean Boulevard, and Sea Mountain Highway were closed due to flooding.

- In Cherry Grove Beach a NWS storm survey found water depth reached 1 to 2 feet above ground level on Lake Drive just inland from Ocean Blvd. Homes along the water on the north end of Ocean Blvd suffered more significant storm surge flooding, with mud lines observed 2 to 4 feet above ground level along 48th Ave, 53rd Ave, and Channel Street.

The leading potential causes for flooding in the area would be a slow-moving tropical system that could dump large amounts of rainfall in a specific location, inundating that area and the obvious storm surge inundation of the waterways and rivers. The other potential is a rise in a watershed that could cause freshwater flooding along the banks of the Waccamaw and Little Pee Dee Rivers and their tributaries. Natural floodplain functions are essential, and there is a need to preserve these areas and prevent additional structures from being built in these areas. Building codes and local ordinances control the limitations on this type of mitigation. 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 in Attachment C & D to this annex.

V. BASIC FLOOD PROTECTION ACTIVITIES

The public can take basic flood protection activities to help mitigate the potential damages from floods. Many 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 maintains the county drainage system. In addition, Horry County has a dedicated Road and Drainage Hotline 843-381-8000 for the public to report drainage issues.

Other mitigation efforts that can be taken before the arrival of floodwaters include sandbagging homes and businesses, property elevations to move property above the highest expected flood, acquisitions that property owners can undertake to remove the property from the threat of flooding.

The main concern for Horry County is its residents during and after a flood. The biggest fear is personal safety and ensuring residents understand safety and mitigation techniques. To help with any lack of information or communication, Horry County has drafted a 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, permitting and mitigation tips, and information for after the flood. A copy of this FRP can be found in 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 generally use 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 to respond, thus facilitating 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 saturated, and water may go under buildings on stilts or higher elevations.

2. *Minor Flood Coastline*: (1-2 feet above normal high tide) Water will usually run-up to the dune in waves during a minor flood. Overwash may occur on shoreline roads. Lifeguard structures and beach concession stands will usually be flooded and possibly damaged by the 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 the 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 traditionally associated with this level of flooding may significantly impact some ocean-side structures like piers, boardwalks, docks, and lifeguard stations. In addition, 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 the dunes, man-made walls, and roads. Large and destructive waves pound weak structures to bits and severely damage well-built homes and businesses. Overwash 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 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 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 the National Weather Service office in Wilmington, NC, issue a Civil Emergency Message by activating the Emergency Alert System (EAS). By requesting people in impacted areas to relocate to high ground or above the estimated flood level. Once an evacuation order has 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, and 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, including 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 available to warn the public in Horry County. Depending on the specific situation, these methods can be used separately or together.

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. These 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 broadcast 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 with hearing impairment also to 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 quickly 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 in 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 geographically targeted weather warning product is built into the CodeRED system and will alert citizens moments after a severe thunderstorm, flash flood, or tornado warning has been issued. Community members can quickly 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 are outlined in the Comprehensive Emergency Management Plan. The trigger points for implementing actions are associated with Operational Condition levels or OPCONs. OPCONs outlined in the Emergency Operations Plan (CEMP Section 2) explain each OPCON and how they are associated with Horry County's state of readiness. In addition, OPCONs for specific annexes or appendices are found within those documents. Below are the OPCONs and associated actions for riverine and coastal flooding.

OPCON 3

Horry County will remain at OPCON 3, day-to-day operations until the National Weather Service identifies that riverine or coastal flood threats are greater than minor flooding. 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.

Initial Notification and Increased Awareness

Once the National Weather Service identifies that minor flooding may increase to moderate flooding, the operating condition remains the same, but situational awareness increases. The primary events that will occur at this level are the notification of key personnel of the possible threat and the 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 3 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 the 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 the current situation and future actions with local municipalities:
    1. Town of Atlantic Beach
    2. Town of Aynor
    3. Town of Briarcliffe Acres
    4. City of Conway
    5. City of Loris
    6. City of Myrtle Beach

7. City of North Myrtle Beach
8. Town of Surfside Beach

e. Establish an event in iRISS and Palmetto as appropriate.
f. Check the scheduling and determine who is scheduled to use the EOC. Notify them that they are subject to be rescheduled.
g. Consider notification through the 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 2.

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 hazards 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-owned roads.
c. Coordinate with SCDOT as needed regarding possible impacts along state-owned roads.
d. Prepare staff and equipment to work with law enforcement and fire/rescue to assist in 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 the 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 recent events may already impact.
e. Provide an estimation of which areas are 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 2

When the National Weather Service forecasts a Major Flood Stage, Horry County may move to OPCON 2. The EOC may be activated at this level, either partial or full status. The primary events will include evacuation discussions, 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 hours.

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 contracts based on the recommendation by the 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 the 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

a. Discuss, coordinate, and update the 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 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

a. Recommend activation of resource and recovery contract to Executive Group, as appropriate.
b. Encourage departments/agencies to begin documenting hours and activities in each department.

c. 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 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 in a ready state.
c. Maintenance prepares 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 the needed personnel required.
b. Discuss with school district officials regarding schedule modifications and possible closings.

ESF 7 – Resource Support

a. Initiate resource requests approved by the EOC manager.
b. Consider activating the food service contract for the EOC.
c. Consider implementing the emergency procurement policy.

ESF 8 – Public Health

a. Notify hospitals of the situation.
b. Determine the 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.
b. Develop a security plan for evacuation zones.
c. Develop a listing of potential access control point locations around the flooded neighborhoods.

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 may take about 4 hours

ESF 19 – Military Support

a. SCNG prepares to mobilize units to support the TCP and evacuation efforts.
b. Coast Guard monitors Intracoastal Waterway traffic.

ESF 22 – Air Operations

a. If the evacuation area is substantial, 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 significant events and special activities that could impact the evacuation.
c. Consider coordinating with directors of special public activities and events.

OPCON 1

Once an evacuation is ordered, the OPCON automatically moves to OPCON 1. The primary activity will be evacuating vulnerable populations and evacuation shelter management at this level. 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 for situational awareness and guide flood response and recovery operations.

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. If appropriate, update, discuss, and coordinate the current situation and future actions with local municipalities.
    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 of 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. Prepare 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 is responsible for coordinating, developing, and maintaining the Riverine & Coastal Flood Annex and is the designated Lead Agency. The Riverine & Coastal Flood Annex will be updated with the CEMP as stated in Section VII, Plan Development and Maintenance.

ATTACHMENTS

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

SAMUEL HODGE,
DIRECTOR

The following Horry County departments are considered critical which must remain operational during flooding response and recovery operations. These departments receive advanced warnings and special notifications of impending flood events to be ready to support response and recovery activities from the National Weather Service, Horry County Engineering Department and Horry County Stormwater Department. Both departments receive advanced and specific notifications.

Horry County E-911 Communications Facility
1976 Industrial Park Road, Conway, SC 29526
Ms. Renee Hardwick, Director
Phone 843-915-5100
Email rhardwick@horrycountysc.gov

Horry County Emergency Operations Center
1976 Industrial Park Road, Conway, SC 29526
Mr. Samuel Hodge, Director
Phone 843-915-5150
Email hodge.samuel@horrycountysc.gov

Attachment B

Flood Response Preparations Outreach

In an effort to increase compliance with the NFIP building standards, enforce local building codes and ordinances, and 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 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, outreach project messages, and outreach project desired outcomes.

Flood Response Preparations Documents

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

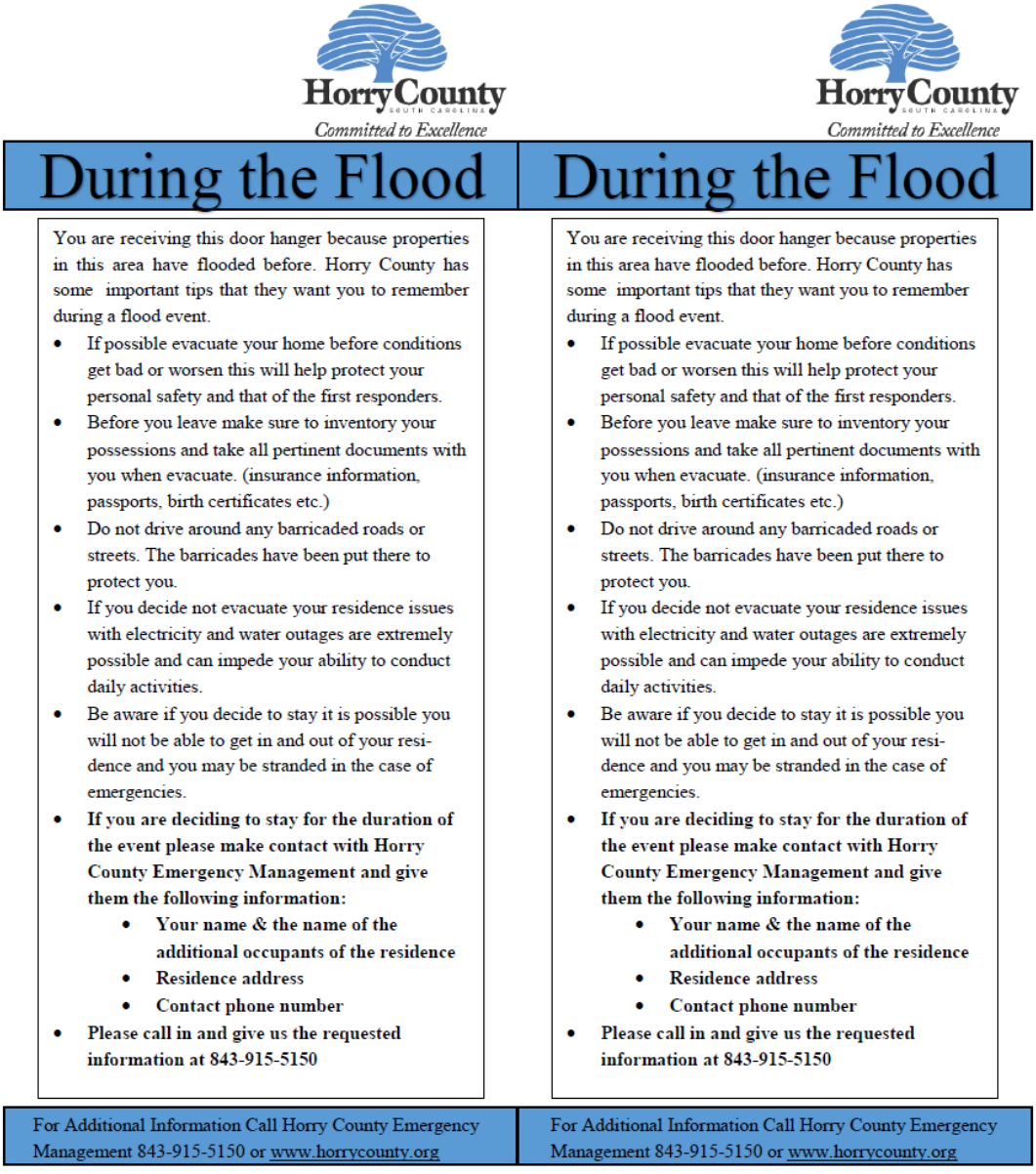
Flood Response Preparation Procedure

a) Monitor river gauges and weather conditions 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 a safety check in those areas affected by the flood.

Annual Evaluation

An evaluation of the Flood Response Outreach projects will be conducted annually before the start of the hurricane season by Horry County staff. The assessment 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



Horry County
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During the Flood

You are receiving this door hanger because properties in this area have flooded before. Horry County has some important tips that they want 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 with electricity and water outages are extremely possible and can impede your ability to conduct daily activities.
- Be aware if you decide to stay it is 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

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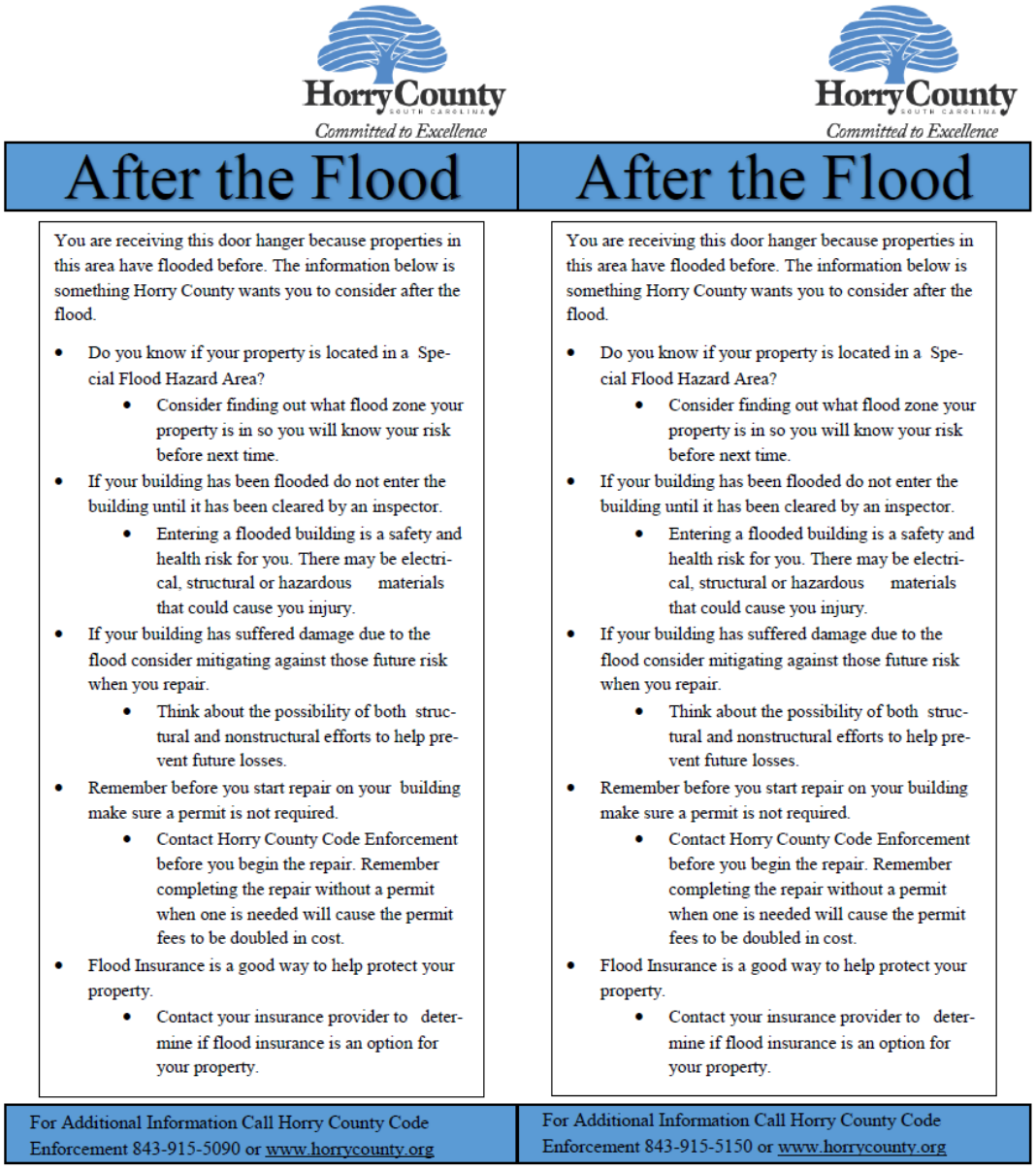

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After the Flood

You are receiving this door hanger because properties in this area have flooded before. 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 needed 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

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After the Flood

You are receiving this door hanger because properties in this area have flooded before. 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 needed 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 843-915-5150 or www.horrycounty.org

Flood Reponse Outreach Projects

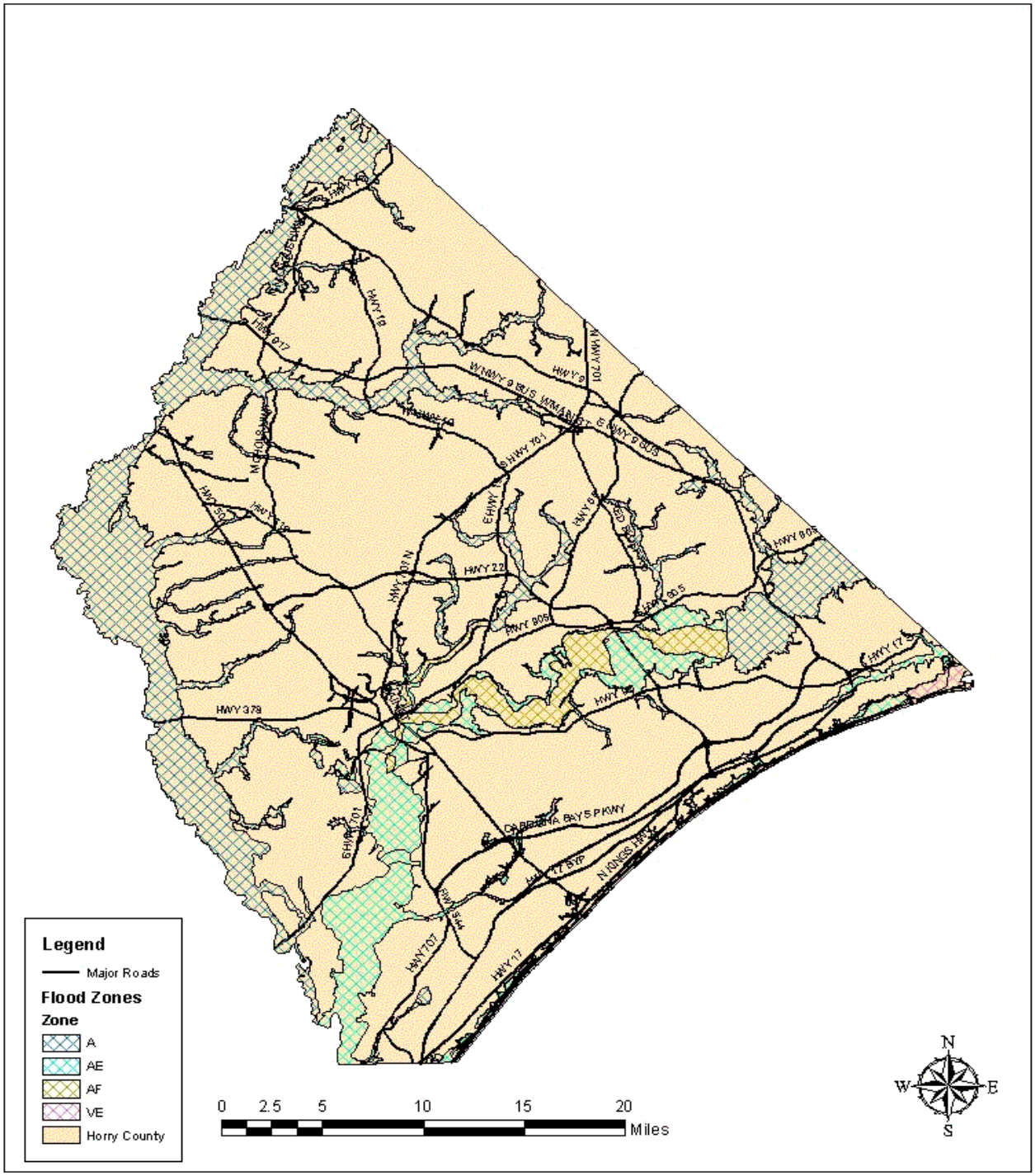
Target Audience	Message	Outcome	Projects Proposed to support messages	Assignment
Flooded Property Owners & Residents	**Topic #1**: Know Your Flood Hazard **Message:** Find out your flood zone & risk before next time	Increases awareness of SFHA and inherent risk	**FRP #1:** Informational Door Hangers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

PRIORITY TOPICS	OUTREACH PROJECT MESSAGES
1. Know your flood hazard	A. Know your risk of flooding B. Understand your flood risk C. Find out your flood zone & risk before next time
2. Insure your property for your flood hazard	D. Everyone can get flood insurance E. Talk to your insurance agent about getting flood insurance F. Contact your insurance provider to get information about flood insurance
3. Protect people from the flood hazard	G. Turn around, don't drown H. Stay out of floodwaters; they hide other hazards I. Do not drive around any barricaded roads or streets
4. Protect your property from the hazard	J. Keep storm drains clean K. Only rain goes down the drain L. Consider implementing mitigation actions to protect against future losses
5. Build responsibly	M. Check building code requirements and flood zone regulations before your build or remodel N. Don't build on or block easements O. Get a permit, if required, before you repair
6. Protect natural floodplain functions	P. Don't trash the river/Don't trash our rivers Q. Keep the waterways clean
ADDITIONAL TOPICS	
7. Have a family disaster plan for flooding	R. Have an evacuation plan established for your family
8. Know where to obtain flood warning information	S. Know how you will receive emergency information when potential flooding may occur T. Have multiple ways of receiving emergency alerts
9. Understand flood insurance eligibility	U. Know that you do not have to be in SFHA to purchase flood insurance
10. Obtain accurate disaster insurance knowledge	V. Know that standard homeowner's insurance does not cover flood damage or content damage caused by flooding W. Understand that how the water gets into your home determines what insurance will cover

MESSAGE	DESIRED OUTCOME (*change behavior*)
1. Know Your Flood Hazard	More people/residents reach out to Code Enforcement for flood zone information or; inquire at the purchase from real estate; use an online tool (IT could track)
2. Insurance property for your flood hazard	More people purchase flood insurance
3. Protect people from flood hazards	Messages such as don't drive around barricades; no incidents where anyone was rescued or injured from driving through flooded roads or around barricades
4. Protect your property from the hazard	Homeowners gain mitigation (keep storm drains clear, lift HVAC off the ground, clean out gutters, etc.)
5. Build responsibility	Encourage building permits, licensed contractors, fewer code violations; more people seek flood zone information prior to purchasing (Coastal Carolinas Association of Realtors data)
6. Protect Natural Floodplain Functions	Only rain goes down the drain; reduced number of citations for individuals dumping or littering in the rivers, and fewer citations to restaurants for improper disposal of waste
7. Family Disaster Plan for flooding	More non-English speaking families receive and adhere to messaging; more residents receive educational materials for hurricane and inland flooding evacuations
8. Flood Warning Information	More families, including the hearing impaired, have multiple ways to receive flood warning information
9. Flood Insurance Eligibility	More residents outside of SFHA purchase flood insurance; more renters purchase content flood insurance
10. Disaster insurance knowledge	Residents have an increased understanding of what their current policies protect against; residents understand the difference between a standard homeowners policy and flood policy and purchase additional insurance accordingly; residents protect their insurance information through tools such as emergency binders, waterproof storage, and other means of safeguarding documents

Attachment C

Horry County, South Carolina
Existing Flood Hazard



Attachment D