



ADVISORY Base Flood Elevations for Plaquemines Parish, Louisiana

Hurricanes Katrina and Rita were both strong Category 5 hurricanes for several days in the Caribbean and Gulf of Mexico before pushing waters toward the Louisiana coast. Katrina made landfall on August 29, 2005, near the Mississippi-Louisiana border, and Rita made landfall on September 23, 2005, at the Texas-Louisiana border. These hurricanes caused extensive damage in the Louisiana parishes along the Gulf Coast and Lake Pontchartrain.

To minimize the flood impacts of future events, the U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA) is attempting to provide consistent advisory information concerning coastal flood elevations and interior levee ponding elevations that can be used to guide recovery efforts. This guidance is necessary because Hurricanes Katrina and Rita, along with other storms, have created concerns about the accuracy of the flood risk information for Plaquemines Parish (including incorporated areas) and whether the risk may be understated.

Assessing flood hazards in Plaquemines Parish is challenging due to the existence of numerous flood control facilities. These facilities experienced damage of varying degrees throughout southeastern Louisiana as a result of Hurricanes Rita and Katrina, and the U.S. Army Corps of Engineers (USACE) is on an aggressive path to repair and improve the flood control system. The USACE is on schedule to have repairs to damaged areas completed by June 2006, to have all Federal levees constructed to authorized heights by September 2007, and to have fully authorized levels of protection and improvements to the system completed by 2010.

Although USACE improvements to the flood control system will make Plaquemines Parish safer than it was before the storms, they will not eliminate the potential for flooding. **In fact, based on analyses recently completed by the USACE,**

the flood control system will not meet the standards necessary for providing protection against the 1-percent-annual-chance (100-year) flood, which is also referred to as the base flood. The National Flood Insurance Program (NFIP) uses the base flood as the standard for floodplain management.

FEMA and the USACE are working together to develop flood hazard data and formulate recommendations to be considered by State and local governments as they begin to make recovery decisions. While certain work tasks are not completed, the information presented in this document is both reliable and current, and is aimed at assisting in the recovery process as it moves forward. Owing to the differences in flood risk information for areas inside and outside of levees, this Flood Recovery Guidance has been organized below to treat these two physical settings separately with the best available data.

Inside of Levee-Protected Areas

For the Belle Chasse area west of the Mississippi River bank within the Parish and located within existing levees, it has been determined that eventual levee certification is likely. In the Belle Chasse area of Sub-Basin "a" located in the northern part of the Parish (also known as USACE levee polder Belle Chasse; see Table 1 and Figure 1 on the following page), FEMA recommends the following: new construction and substantially damaged homes and businesses within a designated FEMA floodplain should be elevated to either the Base Flood Elevation (BFE) shown on the current effective Flood Insurance Rate Map (FIRM) **or** at least 3 feet above the highest adjacent existing ground elevation at the building site, whichever is higher; and new construction and substantially damaged homes and businesses not located in a designated FEMA floodplain should be elevated at least 3 feet above the highest adjacent existing ground elevation at the building site.

For the Parish Advisory BFE (ABFE) Levee Sub-Basin “a” in Belle Chasse (Table 1 and Figure 1), this Guidance is similar to NFIP rules for areas protected by levees being restored to provide 1-percent-annual-chance base flood protection. Should the requirements necessary for application of these rules fail to materialize, flood elevations in this area would be based on a “without levee” scenario and could exceed an elevation of 8 feet referenced to the National Geodetic Vertical Datum of 1929 (NGVD29).

For the remaining Parish ABFE Levee Sub-Basins “b” through “i” (see Table 1 and/or Figure 1 for levee polder name, location, and ABFE), additional time is needed to study these areas.

In addition to the recent USACE storm surge modeling, FEMA has also developed these recommendations based on the height and integrity of the levee system expected to be in place by September 2007. Although FEMA is confident in the results from this current assessment, the agency will continue to monitor progress made with regard to levee improvements, findings from other ongoing studies, and enhancements to the agency’s understanding of the probability of flooding in this area. FEMA will adjust the recommended flood elevations as necessary as the agency prepares updated FIRMs for Plaquemines Parish and its incorporated areas.

Outside of Levee-Protected Areas

USACE, in close coordination with FEMA, has completed a preliminary analysis of the 1-percent-annual-chance flood elevations for all areas in the Parish outside of levees along the Gulf of Mexico shoreline. This analysis considered storm data from the past 155 years (including Hurricanes Katrina and Rita), new and existing long-term tidal gage records, and other existing engineering studies. The results of the USACE storm data analysis indicate that the new 1-percent-annual-chance flood elevations in areas impacted by coastal

Parish ABFE Levee Sub-Basin Identification Code	USACE Levee Polder Name	FEMA ABFE Based on USACE SWELs (in feet, NGVD29)
a	Belle Chasse	N/A – See guidance above
b	Plaquemines, Non-Federal, Area 6 West	To Be Determined (TBD)
c	Plaquemines, Non-Federal, Area 5 West	TBD
d	Plaquemines, Non-Federal, Area 4 West	TBD
e	Plaquemines West Bank, Reach A	TBD
f	Plaquemines West Bank, Reach B-1	TBD
g	Plaquemines West Bank, Reach B-2	TBD
h	Plaquemines East Bank, Reach C	TBD
i	N/A (non-USACE levee polder on east bank)	TBD

Table 1. Parish ABFE Levee Sub-Basin information with USACE levee polder names for inside levee-protected areas.

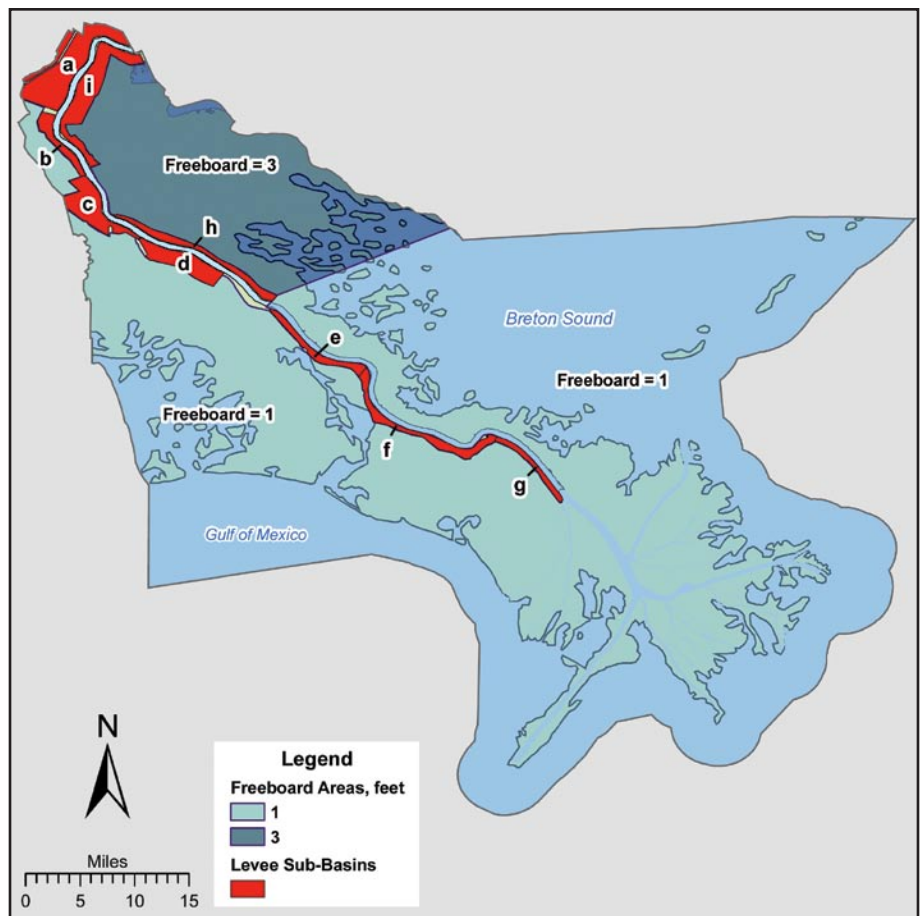


Figure 1. ABFE guidance and levee sub-basin locations for Plaquemines Parish.

storm surge are higher than those shown on the current, effective FIRMs for Plaquemines Parish.

As a result of the storm data analysis, FEMA has developed ABFEs that incorporate freeboard above the current BFEs shown on the effective FIRMs. “Freeboard” is defined as follows (from 44 CFR 59.1):

Freeboard means a factor of safety usually expressed in feet above a flood level for purposes of floodplain management. “Freeboard” tends to compensate for the many unknown factors that could contribute to flood heights greater than the height calculated for a selected size flood and floodway conditions, such as wave action, bridge openings, and the hydrological effect of urbanization of the watershed.

FEMA has two recommendations for outside-levee areas in Plaquemines Parish (see Figure 1): (1) for areas located west of the Mississippi River and areas east of the River from the Gulf of Mexico up to Parish ABFE Levee Sub-Basin “h”, a freeboard of 1 foot should be applied; that is, structures should be elevated at least 1 foot above the current BFE shown on the effective FIRM for the building site; and (2) for outside-levee areas located east of the Mississippi River adjacent to and north of Parish ABFE Levee Sub-Basin “h”, FEMA recommends a freeboard of at least 3 feet above the current BFE should be used when elevating structures; that is, structures should be elevated at least 3 feet above the current BFE shown on the effective FIRM for the building site.

Community Adoption

FEMA is encouraging local officials and citizens to adopt the elevation and freeboard recommendations for inside and outside of levee-protection provided in this Guidance Document and to elevate structures accordingly. These added precautions will take into account increased flood risk due to subsidence, provide extra flood protection to the structure, reduce nuisance flooding, and may result in lower flood insurance premiums. Using elevation and freeboard are prudent measures for ensuring structures are rebuilt using the best available information to protect lives and property, and is also a sound floodplain management practice that communities are encouraged to adopt and enforce.

Updated Flood Risk Information for Plaquemines Parish

A FEMA coastal model study of hurricane storm surge flooding and levee flood protection is already underway at USACE, and FEMA intends to have an updated preliminary Flood Insurance Study (FIS) and updated FIRMs for coastal areas of Plaquemines Parish as soon as possible. The updated

FIS and FIRMs may show an increase of the SWELs, Special Flood Hazard Areas (SFHAs), and BFEs over existing flood data (including the storm data analysis and engineering studies used for this Flood Recovery Guidance), and may result in the coastal high hazard area (V Zone) moving further landward.

Until the restudy is completed, FEMA is encouraging communities within Plaquemines Parish to use the Flood Recovery Guidance described herein. This Guidance method can be used during the recovery and reconstruction of the Louisiana coastal and levee-protected areas by determining the site-specific ABFEs.

Flood Recovery Guidance Method

Inside of Levee-Protected Areas

To apply the Flood Recovery Guidance provided above to determine an ABFE for inside of levee-protected areas, individuals must review the current, effective FIRM and detailed topographic data (ground elevations) for the building site. In the Parish ABFE Levee Sub-Basin “a” in Belle Chasse, the first floor of new construction is recommended to be elevated to the BFE shown on the FIRM or at least 3 feet above the highest adjacent existing ground elevation at the building site, whichever is higher. (A professional surveyor may need to be consulted to accurately determine the highest adjacent existing grade for the proposed site.) For the remaining Parish ABFE Levee Sub-Basins “b” to “i”, the ABFEs

1. Method for Calculating ABFE Inside of Levee-Protected Areas for Belle Chasse Sub-Basin “a” *:

ABFE = The greater of either the FIRM BFE or the highest existing adjacent grade (HEAG) at the building site + 3 feet

2. Example:

Consider a Belle Chasse site where:

Plaquemines Parish FIRM BFE = Zone AE (EL 5 feet)
(relative to NGVD29)

Site HEAG = 4 feet (NGVD29)

Compare FIRM BFE to site HEAG + 3 feet:

FIRM BFE of 5 feet < 7 feet (site HEAG of 4 feet + 3 feet)

ABFE at this site is 7 feet (NGVD29). Therefore, the structure’s first floor (including basement) is recommended to be elevated to 7 feet (NGVD29) or higher.

*All other Sub-Basins will use ABFEs to be determined at a later date for inclusion in Table 1.

for the first floor of the structures are yet to be determined.

Outside of Levee-Protected Areas

To apply the Flood Recovery Guidance provided above to determine an ABFE in areas outside of levees, the first step is to determine the SFHAs and BFEs from the effective FIRM that applies to the structure on the building site.

Once the BFE applicable to the building has been determined, the ABFE can be calculated (see Figure 2) using the appropriate freeboard amount specified above based on location within the Parish. Specifically, for areas located west of the Mississippi River and areas east of the River from the Gulf of Mexico up to Parish ABFE Levee Sub-Basin “h”, the ABFE is the current BFE plus a freeboard of 1 foot. For areas located east of the Mississippi River adjacent to and north of Parish ABFE Levee Sub-Basin “h”, the ABFE is

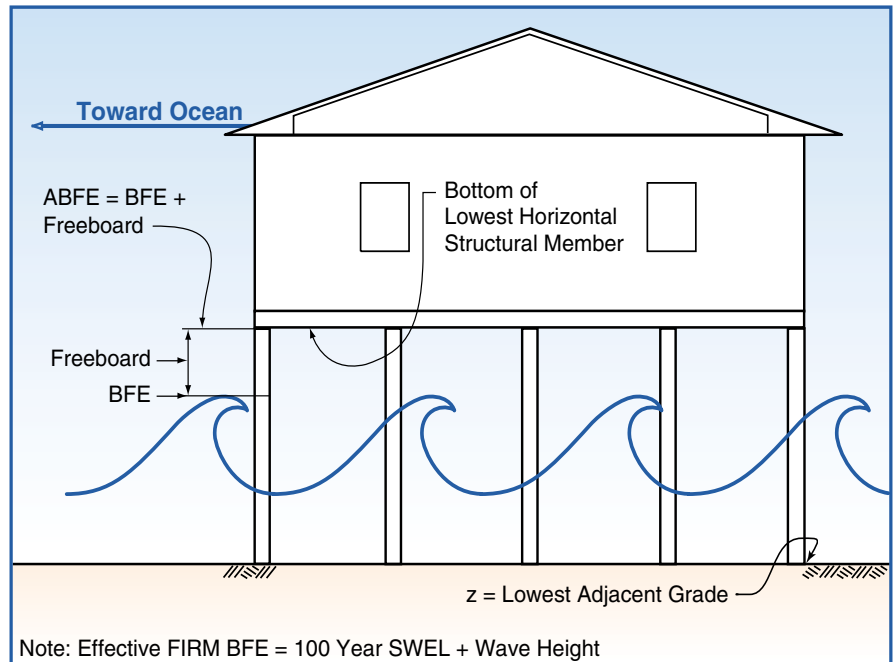


Figure 2. How to determine the ABFE based on the site's effective BFE and recommended freeboard.

1. Method for Calculating ABFE for Outside of Levee-Protected Areas:

$ABFE = FIRM\ BFE + Freeboard$

$FIRM\ BFE = 100\text{-year}\ SWEL + wave\ height$

Freeboard = 1 foot for areas west of the Mississippi River and areas east of the River from the Gulf to Parish ABFE Levee Sub-Basin “h” (Region 1) **or**

3 feet for areas east of the Mississippi River adjacent to and north of Parish ABFE Levee Sub-Basin “h” (Region 2)

2. Example:

For Region 1 with a Plaquemines Parish FIRM BFE = Zone VE (EL 12 feet) and

Freeboard = 1 foot: $ABFE\ for\ Region\ 1 = 12 + 1 = 13\ feet\ NGVD29$
or

For Region 2 with a Plaquemines Parish FIRM BFE = Zone VE (EL 12 feet) and

Freeboard = 3 feet: $ABFE\ for\ Region\ 2 = 12 + 3 = 15\ feet\ NGVD29$

In either location, compare ABFE to the lowest adjacent grade (LAG) elevation

Region 1: With $ABFE = 13\ feet$ and Building LAG (z) = 4 feet; the building is recommended to be elevated 9 feet above ground surface

Region 2: With $ABFE = 15\ feet$ and Building LAG (z) = 4 feet; the building is recommended to be elevated 11 feet above ground surface

the current BFE plus a freeboard of 3 feet. For structures located in Zone VE on the effective FIRMs, the bottom of the lowest horizontal structural member is recommended to be at the ABFE.

Other Pertinent ABFE Information

Although the information provided herein is advisory, communities should consider its use for rebuilding in a safer manner. For additional information, community officials, residents, and other interested parties can access the FEMA website for these flood recovery advisories at <http://www.fema.gov/hazard/flood/recoverydata/index.shtm>.

In addition to determining site-specific ABFEs, community officials should consider additional protective measures to reduce future flood risks. These measures could include using additional freeboard and using the FEMA Coastal Construction Manual (CCM) (FEMA Publication 55). The CCM recommends the use of V Zone building standards in all areas subject to waves and velocity floodwaters caused by hurricane storm surges. For additional information on

recommended practices, see the *Coastal Construction Fact Sheet Series* available at <http://www.fema.gov/fima/mat/fema499.shtm>.

Ultimately it will be local officials, working with property owners, who will make final decisions regarding construction type and elevations that will apply during the recovery and rebuilding process. The ABFEs will be a valuable tool until new model studies can be developed and incorporated into the FIS and FIRMs. Within the next one to two months, FEMA will also publish a set of maps that will show detailed event information for Hurricanes Katrina and Rita, including flood inundation boundaries and high-water elevations.

Datum Conversion Considerations

Conversion of orthometric height measurements (elevations) from the NGVD29 to North American Vertical Datum of 1988

(NAVD88) is important to surveyors and building officials using this Guidance. Studies show significant variability of the conversion factor between NGVD29 and NAVD88 over the geographic extents of Plaquemines Parish, and it would appear that a Parish average conversion factor of -0.26 foot would be appropriate for application. For site-specific determinations, a tool such as CORPSCON, developed by the USACE (<http://crunch.tec.army.mil/software/corpscon/corpscon.html>) can be used. The latest information on NAVD88 elevations in Louisiana can be found on the National Oceanic and Atmospheric Administration's (NOAAs) National Geodetic Survey (NGS) website at <http://www.ngs.noaa.gov/heightmod/LouisianaControl.shtml>. Future updates to the FIS and FIRM by FEMA will include a conversion of all flood data and BFEs within the Parish from NGVD29 to NAVD88.