

Hurricane Ida 2021: Jefferson Parish Louisiana

Three separate hurricanes affected the same area of Jefferson Parish between 2005-2021. After Hurricane Katrina in 2005, FEMA mitigation funds for \$2.3 million were used to elevate 23 individual homes. After Hurricane Isaac in 2012, FEMA published a loss avoidance study. This [original loss avoidance study](#) has been updated after Hurricane Ida in 2021.

Purpose of the Updated Study

FEMA makes significant natural hazard mitigation investments to strengthen the nation’s resilience. This study demonstrates the importance of hazard mitigation investments in breaking the cycle of disaster damage while decreasing the financial burden on individuals and communities.

This study highlights the effectiveness of projects funded under FEMA's Hazard Mitigation Assistance (HMA) grant programs by quantifying the losses avoided due to hazard mitigation investments. The projects evaluated by this loss avoidance study update are residential elevation projects.

In the aftermath of Hurricane Katrina, the community of Jefferson Parish, Louisiana spent a total of \$2.36 million to elevate 23 individual homes. FEMA provided \$1.5 million in grants to support the Parish’s resilience efforts. These efforts avoided at least \$2.24 million of damage and other losses in 2012 during Hurricane Isaac and another \$3 million in 2021 during Hurricane Ida. For this study’s 23 elevated individual homes – total, cumulative losses avoided so far are estimated to be 2.23 times the total mitigation costs.

Table 1. Cost-effectiveness of Elevation Project in Jefferson Parish, Louisiana

Hurricane Katrina Mitigation Project Costs \$2,361,247	Losses Avoided	Loss Avoidance Ratio
Hurricane Isaac	\$2,241,140	0.95
Hurricane Ida	\$3,017,842	1.28
Combined Cumulative Total	\$5,258,983	2.23



Hurricane Katrina was one of the costliest disasters in the nation’s history, with total estimated economic damage of more than \$160 billion. FEMA, the state and local governments invested millions of dollars in hazard mitigation measures to help protect individuals and property from future damage. This included elevating 23 individual homes in Jefferson Parish that suffered severe flood damage. These homes were in high-risk flood areas and each home was elevated above FEMA's base flood elevation.

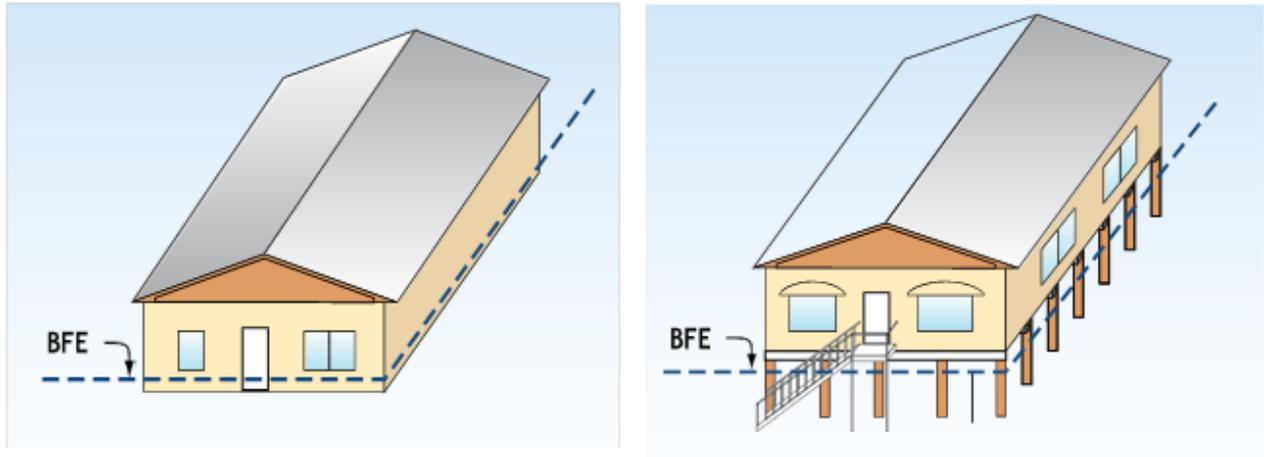


Figure 1: Elevating a house above the Base Flood Elevation can mitigate future flood damage

Hurricane Isaac struck Jefferson Parish in 2012. Due to the storm’s slow movement and high winds, the hurricane had unusually high storm surge levels for a Category 1 hurricane. Flood damage was severe in the western part of the parish, with flood depths of four feet or higher above ground elevation, resulting in over \$437 million in FEMA Public Assistance and Individual Assistance obligations in Louisiana alone.

Shortly after the hurricane, FEMA’s Hazard and Performance Analysis group undertook a loss avoidance study in 2012 to evaluate the effectiveness of the project as seen on Figure 2. The 2012 study found that none of the elevated properties sustained flood damage above the finished elevated floor and the losses avoided equaled 95% of the elevation costs.

Another storm, Hurricane Ida, struck Jefferson Parish in 2021. FEMA followed-up with a loss avoidance study to update the 2012 Isaac study and assess cumulative losses avoided.

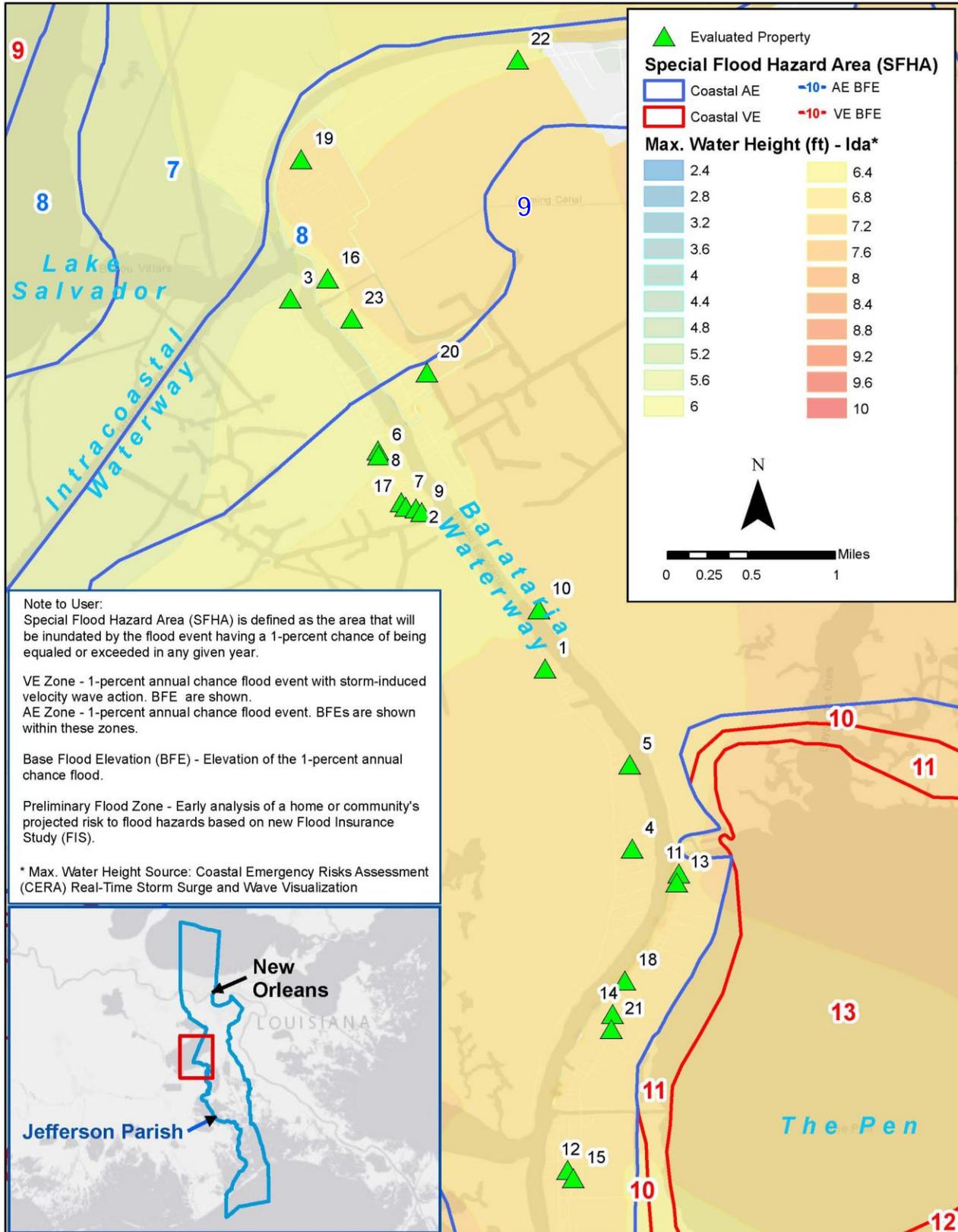


Figure 2: Map of Properties Evaluated for Elevation Above the Base Flood Elevation

Storm Description

Hurricane Ida made landfall near Port Fourchon, Louisiana, as a Category 4 Hurricane on Aug. 29, 2021. As New Orleans residents dealt with a parish-wide power outage, small communities just outside the city and its levee protection system were being pummeled by the storm. Hundreds of people were asking for help, but they could not be reached due to catastrophic flooding from several feet of stormwater.

As New Orleans residents dealt with a parish-wide power outage, small communities just outside the city and its levee protection system were being pummeled by several feet of stormwater. Among the places impacted were the towns of Jean Lafitte, Crown Point, lower Lafitte Barataria and all of southern Jefferson Parish. The parish sustained winds reached up to 70 mph and floodwater was reportedly between 10-12 feet.

Within 24 hours, the hurricane weakened to a tropical depression as it tracked northeast across Mississippi. By Sept. 1, the remnants of the storm had passed across several states into the northeast where it caused heavy rainfall and associated flooding as shown in Figure 3.

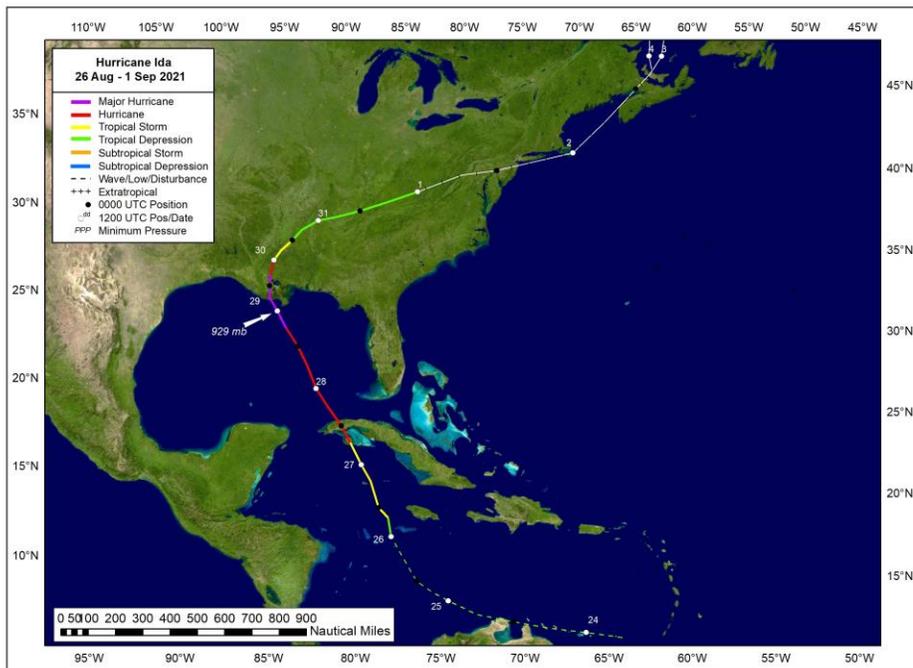


Figure 3: Preliminary Ida Track Image Source: NOAA – National Hurricane Center Loss Estimation Analysis

The 2012 Hurricane Isaac Loss Avoidance Study identified the basic information needed to determine Hurricane Ida losses avoided at each building, including grade elevation of the ground at the base of the property, pre-mitigation first-floor-elevation, post-mitigation first-floor-elevation and mitigation costs.

While the study uses an approach similar to the 2012 Isaac study, FEMA updated several key variables to adjust for inflation and reflect current conditions, such as: Hurricane Ida flood heights, current building replacement costs, daily lodging and meals costs and persons per household.

Flood Surge Elevation Data

As of October 2021, the [U.S. Geological Survey's](#) high water mark data for Jefferson Parish's areas of interest was not available. Instead, FEMA used modeled surge elevations to estimate flood depths.

The model used was the Coastal Emergency Risk Assessment's (CERA) hurricane surge estimates which are developed from Ida's recorded measurements of storm surge history. This data is a "hindcast" that models storms using technology like the ADCIRC (Advanced Circulation) storm surge model and the SWAN (Simulating Waves Nearshore) wave model.

In the study area along the Barataria and Intracoastal Waterways, there was enough data in the hindcast to identify a surge elevation at each of the 23 elevated houses. Using available data, the hindcast model estimated surge elevations between 5.63 feet and 6.93 feet, with an average of 6.44 feet.

A nearby U.S. Army Corps of Engineers stream gauge located at the on the Gulf Intracoastal Waterway validated the hindcast with a peak of 6.88 feet.

Louisiana Average Household Size

According to the U.S. Census Bureau (2015-2019), Louisiana's average household size is 2.61, remaining unchanged since the 2012 Isaac Study.

Displacement Costs

Displacement cost estimates are based on the Government Services Administration (GSA) per diem rates for Orleans and Jefferson Parishes in Louisiana. This includes both lodging and meals.

The 2021 lodging rate was \$158 for the high season and \$136 for the low season, with an average lodging rate of \$147.

The 2021 rate for meals was \$71. This rate is unchanged from the original 2012 study. Following the 2012 methodology, \$7 was subtracted to reflect more accuracy in this rate, which results in an average rate for meals of \$64. Multiplied by the average number of people living in a household, 2.61, the total meal cost per day per household is \$167.

The sum of the total for daily meals per household (\$167) and the total daily lodging rate (\$147) is the total daily displacement cost, \$314. The number of days displaced is based on the flood depth caused by the flood event.

Building and Content Replacement Cost

The costs from the original 2012 Loss Avoidance Study were updated to current 2021 costs using the Engineering News Record (ENR) inflation index. Unlike the Consumer Price Index (CPI), which measures inflation across the entire economy, the ENR inflation index measures increases in construction costs that can be more directly connected to repairs and reconstruction of disaster-related building damage.

ENR inflation index values for the past 100 years through 2021 are embedded in the current FEMA Benefit-Cost Analysis (BCA) Toolkit Software Version 6.0 for historic damages. Based on inputting 2012 historic costs into the FEMA BCA Toolkit and updating them to 2021, the cost adjustment factor was determined to be 1.26594. The 2012 base cost-per-square-foot estimate was multiplied by this adjustment for a value of \$144.57 per square-foot, and both building and contents costs were re-calculated.

Losses Avoided

After Hurricane Ida, all 23 studied structures avoided flood-related losses. These homes would have incurred significant building repair costs, contents losses, and displacement costs had they not been elevated. Generally, elevating structures does not require regular maintenance and maintenance costs are negligible. The 2021 Hurricane Ida total losses avoided are more than \$3 million, compared to more than \$2.2 million identified in the 2012 Hurricane Isaac Loss Avoidance Study.

Again, while evaluating losses avoided on a storm-by-storm basis is informative, overall losses avoided are a cumulative benefit since mitigation efforts can protect against multiple storm events.

Conclusion

Based on these two studies alone, the more than \$2.3 million spent on mitigation measures have avoided \$5.26 million in damages and other losses, approximately \$2.23 for each \$1 spent over the past 10 years since the projects were completed. With effectiveness typically lasting 30 years, we can expect to see continued benefits over the next 20 years from these projects.

This Loss Avoidance Study demonstrates that federal, state and local funds used to elevate properties provide a cost-effective, long-term mitigation solutions that reduce and prevent future damage from natural hazard events. While losses avoided from a single storm event can be significant, cumulative benefits over a mitigation project's lifetime can be substantial.

Sources

FEMA. [2012. Loss Avoidance Study](#), Jefferson Parish, Louisiana, Hurricane Isaac, Report DR-4080-LA.

Government Services Administration (GSA) [2021 Per Diem Rates](#).

US Army Corps of Engineers [GIWW at West Closure Complex Flood Side \(76265\)](#).

[Engineering News Record \(ENR\)](#)

U.S. Census Bureau [American Factfinder](#). Louisiana, Selected Social Characteristics, Average Household Size.

NOAA – National Hurricane Center 2021. Preliminary Ida Track Aug. 26-Sept. 1, 2021