Bayou Cane – Terrebonne Parish
Repetitive Loss Area Analysis

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The University of New Orleans
Center for Hazards Assessment, Response and Technology
(UNO-CHART)

floodhelp.uno.edu

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CENTER FOR HAZARDS ASSESSMENT RESPONSE AND TECHNOLOGY
University of New Orleans

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Terminology

Area Analysis: An approach to identify repeatedly flooded areas, evaluate mitigation approaches, and determine the most appropriate alternatives to reduce future repeated flood losses.

1% chance flood: The flood having a one percent (1%) chance of being equaled or exceeded in any given year, is known as the "100-year" or "1% chance" flood.

100-year flood: The flood that has one percent (1%) chance of being equaled or exceeded each year. The effective risk for the 100-year flood is 26% over a 30 year mortgage.

Base Flood: The base flood is a statistical concept used to ensure that all properties subject to the National Flood Insurance Program are protected to the same degree ("1% chance" or "100-year") against flooding. The National Flood Insurance Program (NFIP) and other agencies use the base flood to require flood insurance and regulate development.

Base Flood Elevation (BFE): The elevation of the crest of the base flood or 100-year flood.

Digital Flood Insurance Rate Map (DFIRM): All new FIRMs are prepared as a GIS based map of a community's flood hazards. All new maps are based upon this digital platform and communities may use these maps instead of paper maps for regulatory purposes.

FEMA: Federal Emergency Management Agency

FIRM: The Flood Insurance Rate Map is the official map which identifies hazard areas and flood risk zones in the community.

Freeboard: A factor of safety usually expressed in feet above the Base Flood Elevation (BFE) for purposes of floodplain management.

Geographic Information Systems (GIS): integrates hardware, software, and data for capturing, managing, analyzing, and displaying all forms of geographically referenced information in the form of maps, globes, reports, and charts.

Hazard Mitigation: Any sustained action taken to reduce or eliminate long-term risk to life and property from a hazard event (floods, fires, earthquakes, etc.), such as elevation or floodproofing.

ICC: Increased Cost of Compliance, a $30,000 rider on flood insurance policies for policy holders located in the special flood hazard area that can be used to bring the structure into compliance in the event that it is substantially damaged by a flood.

NFIP: The National Flood Insurance Program is FEMA's flood insurance coverage and floodplain management program.

Repetitive Loss Area Analysis (RLAA): An approach that identifies repetitive loss areas, evaluates mitigation approaches, and determines the most appropriate alternatives to reduce future losses.

Repetitive loss property (RL)[1]: An NFIP-insured property where two or more claim payments of more than $1,000 each have been paid within a ten year period since 1978.

Severe repetitive loss property (SRL)[2]: A residential repetitive loss property that within a ten year period has had either four or more NFIP claim payments, more than ten days apart, of more than $5,000 each and the cumulative amount of claims exceeds $20,000, or within a ten year period two separate claims (building payments only) more than ten days apart, that cumulatively exceed the building's market value.

Special Flood Hazard Area (SFHA): The base floodplain delineated on a Flood Insurance Rate Map that a community must regulate under the requirements of the National Flood Insurance Program. The SFHA is mapped as a Zone A or AE (see definition). In coastal situations, Zone V (see definition) is also a part of the SFHA. The SFHA is included in a community's regulatory floodplain.

Substantial Improvement: The repair, reconstruction, or improvement of a structure, the cost of which equals or exceeds 50% of the market value of the structure before the improvement or repair is started**.**

UNO-CHART: The University of New Orleans' Center for Hazards Assessment, Response and Technology, an applied social science research center with an expertise in repetitive loss area analyses.

Zone A: The Special Flood Hazard Area (except coastal V Zones) shown on a community's Flood Insurance Rate Map. There are seven types of Zone As:

A: SFHA where no base flood elevation is provided.

A#: Numbered A Zones (e.g., A7 or A14), SFHA where an older FIRM shows a base flood elevation in relation to a national datum.

AE: SFHA where base flood elevations are provided. AE-Zone delineations are used on newer FIRMs instead of A# Zones.

AO: SFHA with sheet flow, ponding, or shallow flooding. Base flood depths (feet above grade) are provided.

AH: Shallow flooding SFHA. Base flood elevations in relation to a national datum are provided.

AR: A temporary designation for an area where a flood control system that no longer provides protection from the base flood is expected to be improved, so it will provide protection to the base flood again in the future. This zone is considered part of the Special Flood Hazard Area or "regulatory floodplain," but properties in this zone do not receive the "in SFHA" CRS premium discount (see Table 110-1).

A99: A mapped floodplain that will be protected by a federal flood protection system where construction has reached specified statutory milestones. This zone is considered part of the Special

[1] NFIP/FEMA website 3/26/14
[2] NFIP/FEMA website 3/26/14

Flood Hazard Area or “regulatory floodplain,” but properties in this zone do not receive the “in SFHA” CRS premium discount (see Table 110-1).

Zone B: Area of moderate flood hazard, usually depicted on older Flood Insurance Rate Maps as between the limits of the base and 500-year floods of the primary source of flooding. B Zones may have local, shallow flooding problems. B Zones are also used to designate areas protected by levees and base floodplains of little hazard, such as those with average depths of less than 1 foot.

Zone C: Area of minimal flood hazard, usually depicted on older Flood Insurance Rate Maps as above the 500-year flood level of the primary source of flooding. C Zones may have local, shallow flooding problems that do not meet the criteria to be mapped as a Special Flood Hazard Area, especially ponding and local drainage problems.

Zone D: Area of undetermined but possible flood hazard.

Zone V: The Special Flood Hazard Area subject to coastal high hazard flooding. There are three types of V Zones: V, V#, and VE, and they correspond to the A-Zone designations.

Zone X: Newer Flood Insurance Rate Maps show Zones B and C (see above) as Zone X. The shaded Zone X corresponds to a Zone B and the unshaded Zone X corresponds to a Zone C.

Acknowledgements

The compilation of this report was managed by Monica Farris, PhD, CFM, Director of UNO-CHART and Tara Lambeth, Assistant Director of UNO-CHART. Contributing to this report were French & Associates; FEMA Region VI; Solutient; UNO-CHART research assistants Aspen Nero and Hannah Galloway; Terrebonne Parish Consolidated Government; and residents of Bayou Cane.

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Bayou Cane Repetitive Loss Area Analysis Executive Summary

Background

The National Flood Insurance Program (NFIP) is administered by the Federal Emergency Management Agency (FEMA) and is continually faced with the task of paying claims while trying to keep the price of flood insurance at an affordable level. It has a particular problem with repetitive and severe repetitive flood loss properties, which are estimated to have cost $13 billion nationwide and $3 billion in Louisiana alone[3] since 1978. Repetitive flood loss properties represent only 1.3% of all flood insurance policies, yet historically they have accounted for nearly one-fourth of the claim payments. Mitigating these repeatedly flooded properties reduces the overall costs to the NFIP, the communities in which they are located, and the individual homeowners. Ultimately, mitigating repeatedly flooded properties benefits everyone.

Study Area

The study area is comprised of one neighborhood, Bayou Cane, which has been separated into two study areas: the Westview Drive area, and the Jean Street area. Both study areas are located in unincorporated Terrebonne Parish. The study areas are located at low elevation on flat land, and bordered by canals and bayous. The Westview Drive area includes houses from Harding Street, Louis Drive, and Westview Drive, with Verna Street and Jana Street acting as the western and eastern boundaries. There are 92 buildings located in the Westview Drive area. Of the 92 buildings, 19 (20.7%) are on FEMA's repetitive loss list, and 8 (42.1%) of those are considered to be a severe repetitive loss properties. The Jean Street area includes Grace Street, Duet Street, Jean Street, and Ann Carol Street. The four streets are bounded by Caddo Street to the east and Daigle Street to the west. There were no properties recorded on Daigle Street, but properties were recorded on Caddo Street. Of the 168 buildings, 15 (8.9%) are on FEMA's repetitive loss list, and 2 (13.2%) of those are considered to be severe repetitive loss properties. The parish has already mitigated 11 repetitive loss properties in the study area, through elevation or acquisition.

Problem Statement

The Westview Drive and Jean Street areas are topographically flat and located at a low elevation. In addition, many of the homes have slab foundations that are built low to the ground. The following bullets summarize the repetitive flooding problems in the areas:

- There are 260 homes in the study area. As of June 2015, ninety-one of these properties carry flood insurance, and 63 total homes in both study areas have made insurance claims. A total of 34 of these homes that made claims have flooded to the extent that they qualify as repetitive loss structures under the NFIP; 10 of which are severe repetitive loss properties. The parish has already mitigated 11 repetitive loss properties in the study area, through elevation or acquisition.
- The 24 repetitive loss properties have made 105 flood insurance claims for a total of **$2,077,100.00** since 1978, and the 10 severe repetitive loss properties have made claims totaling **$1,302,829.06**.

[3] As of December 2012; FEMA, since 1978 when records began.

- For all homes in both areas, repetitive loss and non-repetitive loss, the total claims combined amount to over $2.4 million dollars in flood claims from multiple flooding incidents. There have been a total of 141 claims averaging $15,927.31.
- On the current Flood Insurance Rate Map (FIRM) for Terrebonne Parish, most structures in the Jean Street study area are located in Zone C, with a few in Zone AH, while the structures in the Westview Drive study area are located in Zones C, B and A2. On the DFIRM, all of the Westview study area is located in Zone A, and all of the Jean Street study area is outside of the Special Flood Hazard Area.
- Only about half of the claims in each area reported flood depths. The average depth of flooding for the 31 homes that reported depths in the Jean Street study area is 2.9 feet. The 45 claims that reported depths in the Westview Drive study area had an average flood depth of 2.3 feet. Some structures have since been removed, replaced or elevated in both study areas.
- A majority of the homes in the study areas are slab on grade.
- The causes of flooding in the areas include hurricanes, heavy rainfall, inadequate drainage, and subsidence.

Recommendations

For Terrebonne Parish

Implemented by: Terrebonne Parish.
Potential Funding sources: FEMA, Flood Insurance and Small Business Administration Loans, Parish Funds, and Staff Time

- Adopt this Area Analysis according to the process detailed in the CRS Coordinator's Manual, 2013.
- Encourage the owners of repetitive flood loss structures to pursue one or more mitigation measures.
- Continue to assist interested property owners in applying for mitigation grants.
- Continue to improve the drainage.
- Continue to work on activities related to the Community Rating System (CRS).
- Continue public information activities, such as outreach projects, websites, and flood protection assistance that help residents learn about and implement mitigation measures.

For the residents of Westview Drive and Jean Street Study Areas

Implemented by: Residents of Westview Drive and Jean Street study areas
Potential Funding sources: FEMA grants (HMGP, PDM, FMA), Flood Insurance, Rebates, Small Business Administration Mitigation Loans

- Review the mitigation measures listed in this report and implement those that are appropriate: elevation, barriers to floodwaters, dry floodproofing, elevating utilities, and obtaining flood insurance.
- Stay up to date with what Terrebonne Parish is doing in regards to flood protection: www.tpcg.org.
- Purchase or maintain flood insurance policies on the home (if a homeowner) and/or on the contents (homeowners and renters). More information can be found at www.floodsmart.gov .

- Stay informed of the changes being made to the NFIP by the implementation of the Biggert-Waters Flood Insurance Reform and Modernization Act of 2012: www.fema.gov/flood-insurance-reform or www.floodsmart.gov.
- Read through the LSU Homeowner's Handbook to Prepare for Natural Hazards for more information on appropriate mitigation measures, available online at: www.lsu.edu/sglegal/pubs/handbook.htm.

Introduction

Flooding is a problem for many people across the United States. Enduring the consequences of flooding over and over again can be quite frustrating. When the water rises, communities have to deal with the disruption of life, ruined belongings, and the cost of rebuilding.

This report was created in collaboration with the Terrebonne Parish Consolidated Government and the residents in the Bayou Cane area, many of whom continually suffer the personal losses and stresses associated with living in a flood-prone house.

The goal of this Repetitive Loss Area Analysis (RLAA) is to help homeowners reduce their flood risk by providing a broader understanding of the flooding problems in their neighborhood, and the potential solutions to the continual distress related to repetitive flooding. This report also discusses the availability of possible funding sources for certain mitigation options.

This analysis discusses flooding issues and potential mitigation measures for homes and apartments located in the Bayou Cane area. While the homes and apartments in this study are representative of other homes throughout Terrebonne Parish, not all the mitigation measures reviewed in this report are appropriate for all homes.

There are many stresses associated with repetitive flooding, including worry about how high the water may rise, loss of life, loss of personal belongings, possibility of mold, and uncertainty of return. Adding to this worry are the decisions related to the potential solutions:

- Should I elevate and, if so, how high?
- How much will a mitigation project cost?

Repetitive Loss Area Analysis (RLAA): An approach that identifies repetitive loss areas, evaluates mitigation approaches, and determines the most appropriate alternatives to reduce future losses.

Mitigation: Any sustained action taken to reduce or eliminate long-term risk to life and property from a hazard event (floods, fires, earthquakes, etc.) such as elevation or floodproofing.

Repetitive Loss property (RL): An NFIP-insured property where two or more claim payments of more than $1,000 each have been paid within a ten year period since 1978.

Severe Repetitive Loss Property (SRL): A residential repetitive loss property that within a ten year period has had either four or more NFIP claim payments, more than ten days apart, of more than $5,000 each and the cumulative amount of claims exceeds $20,000, or within a ten year period two separate claims (building payments only) more than ten days apart, that cumulatively exceed the building's market value.

- What will my neighborhood look like if I am the only one to mitigate, or the only one *not* to mitigate?
- Is there a solution that might work for the entire neighborhood?

These questions are common, and this report attempts to answer them according to the specific situation faced by residents in the Bayou Cane. Overall, by gaining a better understanding of the flooding issues, neighborhoods can become more resilient, and homeowners will be better able to confront the hazard of flooding.

Background

The National Flood Insurance Program (NFIP) is administered by the Federal Emergency Management Agency (FEMA) and is continually faced with the task of paying claims while trying to keep the price of flood insurance at an affordable level. The NFIP has a particular problem with repetitive and severe repetitive flood loss properties, which are estimated to have cost $13 billion nationwide and $3 billion in Louisiana alone[4] since 1978.

Repetitive flood loss properties represent only 1.3% of all flood insurance policies, yet historically they account for nearly one-fourth of the claim payments. Mitigating these repeatedly flooded properties will reduce the overall costs to the NFIP, the communities in which they are located, and the individual homeowners. Ultimately, mitigating repeatedly flooded properties benefits everyone.

The University of New Orleans' Center for Hazards Assessment, Response and Technology (UNO-CHART) receives funding from FEMA to gather data and analyze the repetitive flood loss areas in Louisiana in partnership with local governments, residents, and neighborhood associations. Using a Geographic Information System (GIS) and geo-coded flood insurance claims data, UNO-CHART prioritizes repeatedly flooded areas and properties for attention and analysis. In selected locations, UNO-CHART works with local officials and residents to conduct in-depth analyses of the causes and possible solutions to the flooding problem. These efforts are called "Repetitive Loss Area Analyses" (RLAA).

UNO-CHART conducted a RLAA in the Bayou Cane neighborhood of Terrebonne Parish Louisiana. This area analysis follows FEMA guidelines to determine why an area has repeated flood losses, and what alternative flood protection measures would help break the cycle of repetitive flooding[5]. The parish as a whole has 1,368 mitigated repetitive loss (RL) properties and 633 unmitigated repetitive loss properties. Of those RL properties, 34 (approximately .05%) are located in the two study areas. Of those 34 RL properties, 11 have been acquired or elevated (mitigated) in the study area.

[4] Numbers provided by FEMA Region VI as of December 2012.
[5] http://crsresources.org/files/2013-manual/crs_manual_508_ok_5_10_13_bookmarked.pdf

Figure 1 - Map of Louisiana; Source: commons.wikipedia.org

Repetitive Loss Area Analyses are encouraged by and credited under the Community Rating System (CRS), as explained in more detail on page 14. Terrebonne Parish participates in the CRS program and is rated as a class 6.

The Area

The study area is comprised of a portion of the Bayou Cane neighborhood in Terrebonne Parish, which has been divided into two smaller areas for this report, the Westview Drive study area, and the Jean Street study area. Developed in the 1960s and 1970s, the Westview Drive study area consists of 92 properties. The area is low lying and predominantly residential. Of the 92 properties, 19 (20.7%) are on FEMA's repetitive loss list, and 8 (42.1%) of those are considered to be a severe repetitive loss properties.

Developed in 1956, the Jean Street area includes Grace Street, Duet Street, Jean Street, and Ann Carol Street. The four streets are bounded by Caddo Street to the east and Daigle Street to the west. There were no properties recorded on Daigle Street, but properties were recorded on Caddo Street. Of the 168 buildings, 15 (8.9%) are on FEMA's repetitive loss list, and 2 (13.3%) of those are considered to be severe repetitive loss properties.

See Figures 2 and 3 for the locations of the two study areas.

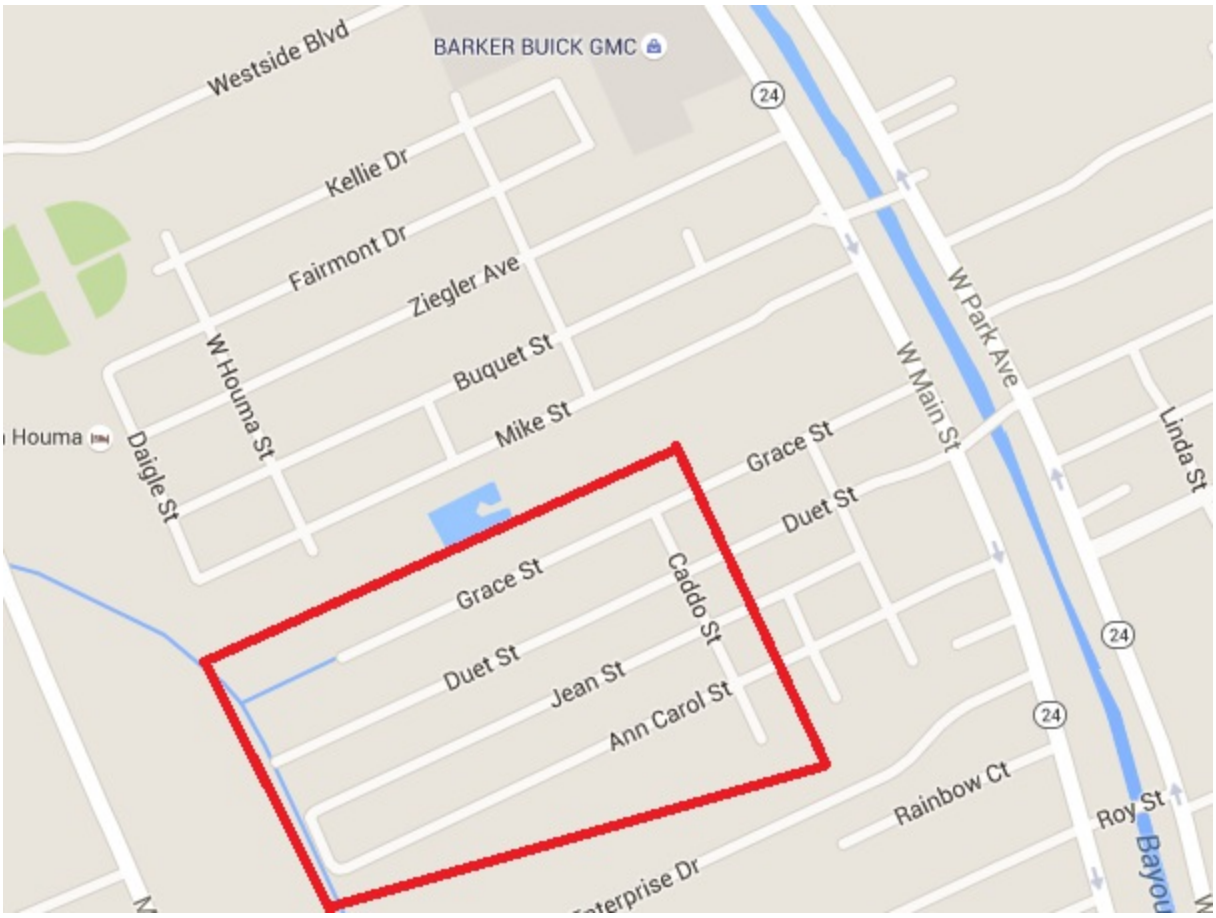


Figure 2 - Jean Street Study Area

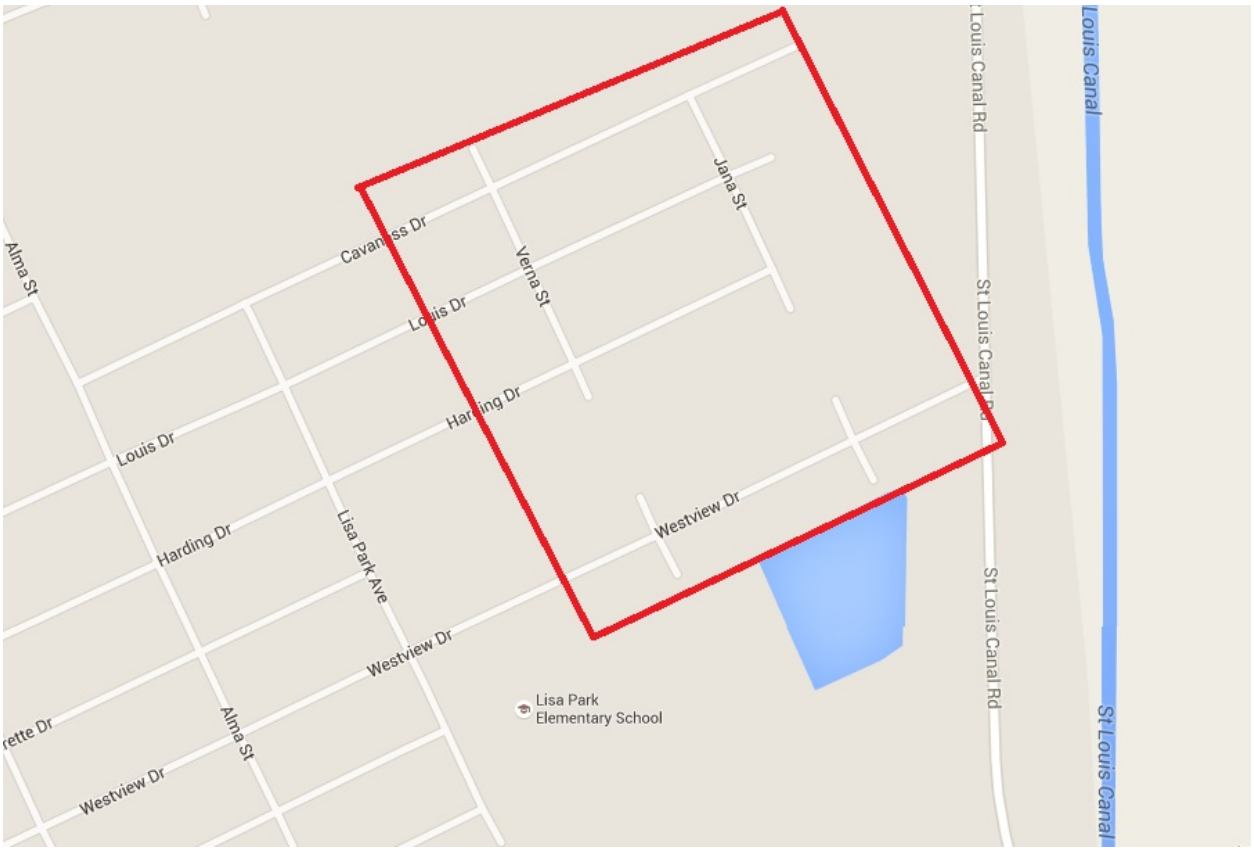


Figure 3 - Westview Drive Study Area

The areas were selected for this analysis due to the clustering of repetitive loss properties in these neighborhoods, which indicates a recurring flooding problem. The parish has targeted the area for buyouts and elevations, resulting in the acquisition of 6 repetitive loss properties and the elevation of 5 repetitive loss properties. Local officials also expressed their interest in further addressing the repetitive flooding issues in the area, making these two neighborhoods ideal for a repetitive loss area analysis.

The Process

In May 2015, after a careful review of repetitive flood loss properties throughout the State of Louisiana and discussions with FEMA Region VI, the UNO-CHART team and Terrebonne Parish officials began the repetitive loss area analysis (RLAA). Terrebonne Parish is a Community Rating System (CRS) community and currently is rated a class 6 in the program. As such, residents receive a discount of over 1 million dollars on NFIP policies throughout the parish.

After meeting with the parish's Permits Specialist, Community Rating System Coordinator, Recovery Planner, Assistant Director of Planning and Zoning, and Director of Planning and Zoning, the final study area was selected. The study area consists of two sections of the Bayou Cane area.

This project follows a five step FEMA process. UNO-CHART has always taken a social science perspective during the process, and FEMA recently offered a new approach to emergency management that merges the two methods: The Whole Community Approach.

The Whole Community Approach: FEMA champions a new approach to emergency management, The Whole Community Approach. This philosophical approach to emergency management seeks to leverage the social and cultural resources of a community, along with that of its private and non-profit resources. In essence, this approach brings together the *whole* community in order to generate a comprehensive view of the hazards to which that community is vulnerable, as well as to cooperatively develop solutions to mitigate those risks.[6] Applying the Whole Community Approach to RLAAs allows the local officials and residents living in repetitively flooded communities to see the problem as a *shared* issue, and not just one for the local government or residents to handle on their own.

The five step process in the 2013 *CRS Coordinator's manual* for conducting a RLAA is as follows[7]:

Step 1: Advise all of the property owners in the repetitive flood loss areas that the analysis will be conducted, and request their input on the hazard and recommended action through informational meeting.

Step 2: Contact agencies or organizations that may have plans or studies that could affect the cause or impacts of the flooding.

Step 3: Collect data on the analysis areas and each building in the identified study areas within the neighborhood to determine the cause(s) of the repetitive damage.

Step 4: Review alternative mitigation approaches and determine whether any property protection measures or drainage improvements are feasible.

Step 5: Document the process and findings.

Steps 1-5 are described in pages 15 through 55 of the report.

Step 1: Neighborhood Notification

The first step in the five-step RLAA process is to notify the property owners in the area of the project. On July 15, 2015 UNO-CHART sent a letter to the homeowners, on Terrebonne Parish letterhead and signed by the Terrebonne Parish planning department, introducing the community to UNO-CHART and the project. Accompanying the letter was a data sheet that asked residents basic questions about their building and their flooding history. A copy of this letter, data sheet and summary statistics are found in Appendices A, B and C.

Figure 4 - Neighborhood Meeting held on July 29, 2015

On July 29, 2015, UNO-CHART held an informational meeting introducing the community to the project. The informational meeting was attended by 13 members of the community, 4 members of the Terrebonne Parish Planning Department, and 2

[6] FEMA *A Whole Community Approach to Emergency Management: Principles , Themes, and Pathways for Action*; FDOC104-008-1, 12/2011
[7] FEMA, *National Flood Insurance Program Community Rating System Coordinator's Manual*, FIA-15/2013, p. 510-30-510-33.

members of UNO-CHART. At the meeting, UNO-CHART explained the Repetitive Loss Area Analysis process.

Step 2: Review Plans and Flood Insurance Rate Maps (FIRMs)

The second step in the RLAA process is a review of the plans and Flood Insurance Rate Maps (FIRMs) that pertain to the study areas. The plans, FIRMs and drainage information were collected from several agencies and departments. The following agencies and organizations were contacted by the UNO-CHART team in order to complete this analysis:

- FEMA Region VI, Mitigation Division
- FEMA Insurance Data from Web Data Exchange
- Terrebonne Parish Consolidated Government Planning & Zoning Department
- Terrebonne Parish Consolidated Government Floodplain Management
- Terrebonne Parish Consolidated Government Permits
- Terrebonne Parish Consolidated Government Planning Commission
- Terrebonne Parish Consolidated Government Recovery Assistance & Mitigation Planning
- Terrebonne Parish Consolidated Government Zoning
- Terrebonne Parish Consolidated Government Public Works Department
- Terrebonne Parish Consolidated Government Engineering
- Terrebonne Parish Consolidated Government Gravity Drainage
- Terrebonne Parish Consolidated Government Forced Drainage
- Terrebonne Levee and Conservation District
- The Army Corps of Engineers

This step helps to open lines of communication among those interested in flood protection in Bayou Cane, and to examine what other groups are doing to address the flood problems.

The UNO-CHART team collected and reviewed the following reports/data:

A. Terrebonne Parish Code of Ordinances
B. Terrebonne Parish 2014 Hazard Mitigation Plan Update
C. Terrebonne Parish Comprehensive Master Plan Vision 2030 (2013)
D. Terrebonne Levee and Conservation District and Army Corps of Engineers Projects
E. Flood Insurance Rate Maps
F. Field Data
G. Resident Data Sheets

Terrebonne Parish, Flood Damage Related Ordinances:

Chapter 9 of the Terrebonne Parish Code of Ordinances details flood prevention measures. The purpose of the ordinances are to protect life and property in the parish from flood conditions, reduce flood losses, reduce the cost of flooding, appoint a floodplain manager, inform potential homeowners if their property is in the flood area, and require compliance with floodplain regulations for new construction and substantial improvement of buildings.[8]

Other sections of the chapter include details on reducing flood losses:

[8] www.municode.com/library/la/terrebonne_parish/codes/code_of_ordinances?nodeId=PTIIPACO_CH9FLDAPR_ARTIIIFLHARE_S9-56GEST

> Sec. 9-6. - Methods of reducing flood losses.[9]
> In order to accomplish its purpose, this chapter uses the following methods:
> (1) Restricts or prohibits uses that are dangerous to health, safety, or property in times of flood, or cause excessive increases in flood heights or velocities;
> (2) Requires that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction;
> (3) Controls the alteration of natural floodplains, stream channels, and natural protective barriers, which are involved in the accommodation of floodwaters;
> (4) Controls filling, grading, dredging, and other development which may increase flood damage;
> (5) Prevents or regulates the construction of flood barriers which will unnaturally divert floodwaters or which may increase flood hazards to other lands. (Parish Code 1979, § 7-review, 34)

The parish also appointed a floodplain manager, whose duties include permit application review, analysis of flood maps and the special flood hazard area, and analysis of base flood elevation data, in order to ensure proper floodplain management (Sec. 9-31).[10]

Additionally, the parish requires compliance with floodplain regulations for new construction as well as substantial improvement:

> Sec. 9-56. - General standards. [11]
> In all areas of special flood hazard, the following provisions are required for all new construction and substantial improvements:
> (1) All new construction and substantial improvements shall be designed (or modified) and adequately anchored to prevent flotation, collapse, or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy;
> (2) All new construction or substantial improvements shall be constructed by methods and practices that minimize flood damage;
> (3) All new construction or substantial improvements shall be constructed with materials resistant to flood damage;
> (4) All new construction or substantial improvements shall be constructed with electrical, heating, ventilation, plumbing, and air conditioning equipment and other service facilities that are designed and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding;
> (5) All new and replacement water supply systems shall be designed to minimize or eliminate infiltration of floodwaters into the system;
> (6) New and replacement sanitary sewage systems shall be designed to minimize or eliminate infiltration of floodwaters into the systems and discharge from the systems into floodwaters;
> (7) On-site waste disposal systems shall be located to avoid impairment to them or contamination from them during flooding;

[9] www.municode.com/library/la/terrebonne_parish/codes/code_of_ordinances?nodeId=PTIIPACO_CH9FLDAPR_ARTIIIFLHARE_S9-56GEST
[10] www.municode.com/library/la/terrebonne_parish/codes/code_of_ordinances?nodeId=PTIIPACO_CH9FLDAPR_ARTIIIFLHARE_S9-56GEST
[11] www.municode.com/library/la/terrebonne_parish/codes/code_of_ordinances?nodeId=PTIIPACO_CH9FLDAPR_ARTIIIFLHARE_S9-56GEST

(8) No new sanitary landfills will be permitted; and
(9) No new or expanded hazardous waste sites including saltwater injection wells will be permitted, nor the temporary storage of hazardous waste materials.

The parish further requires all residential construction to be built at or above base flood elevation, and at least 18 inches above the centerline of the street or nearest manhole cover if no elevation data is available[12]. The parish also requires adequate drainage in AH and AO zones. In addition, backflow prevention devices are required to be installed in each individual unit of new construction.

Since local ordinances determine the threshold at which substantial damage and /or repetitive claims are reached, adopting language that would lower these thresholds would benefit the homeowners of repetitive loss properties. Currently, per Section 9-56 of the Code of Ordinances, substantial damage/improvement refers to restoration/reconstruction that equals or exceeds 50 percent of the market value of the structure. Additionally, the parish has a cumulative substantial damage requirement, wherein any repairs or changes made over a 10 year period cannot equal or exceed 50% of the market value of the structure.

Residents interested in flood loss related ordinances should contact the Terrebonne Parish floodplain manager. The information can be found at http://www.tpcg.org/index.php?f=flood_plain.

Terrebonne Parish Hazard Mitigation Plan Update 2014:

The hazard mitigation plan was completed last year and the plan was approved and adopted by the City Council and FEMA in April 2015. Of the 1,326,748 acres of land in the parish, 5.6% of the parish is urbanized and the other 94.6% of the parish contains forest, wetlands, or water. An estimated 90% of the parish is located in the Special Flood Hazard Area.[13]

The Parish recognizes the following hazards as threats to the community in the 2014 Hazard Mitigation Plan[14]:

1. Coastal Erosion
2. Coastal (Tropical) Storm
3. Levee (Dam) Failure
4. Drought
5. Flood
6. Hurricane
7. Land Subsidence
8. Saltwater Intrusion
9. Tornado
10. Thunderstorms/Lightning/High Winds

Of the ten hazards listed, the parish found the following seven hazards to pose the most threat:[15]

1. Levee failure
2. Flooding
3. Hurricane and Coastal/Tropical Storms

[12] Terrebonne Parish Code of Ordinances Chapter 23 – Sewers and Sewage Disposal
[13] http://www.tpcg.org/files/flooding/HMPU_Approved_2014.pdf
[14] http://www.tpcg.org/files/flooding/HMPU_Approved_2014.pdf p. 28
[15] http://www.tpcg.org/files/flooding/HMPU_Approved_2014.pdf p. 29

4. Saltwater Intrusion
5. Tornadoes
6. Subsidence
7. Coastal Erosion

The study areas are vulnerable to all of the hazards listed in the hazard mitigation plan, and flooding in particular is an issue. The parish identifies flooding as the "most prevalent and the most frequent hazard to the parish."[16] The flooding that takes place in the parish occurs from multiples sources and can be divided into four categories, to include riverine, backwater, storm water, and storm surge. The parish chose to categorize the flooding issues in order to pin point which areas of the parish are prone to each hazard. Riverine flooding refers to primarily high water related to rivers and bayous, stormwater refers to rainfall, storm surge occurs during tropical storms and hurricanes and includes coastal flooding, and back water flooding results from riverine flooding and surge.

The hazard mitigation plan specifically addresses flooding in Bayou Cane, mentioning that "Bayou Cane experiences flooding from rains more often than hurricanes" (HMP, p. 38). On several occasions Bayou Cane has seen flooding severe enough to block off major thoroughfares and intersections. The plan mentions an area close to the Westview Drive study area as well, explaining that "the intersection of Alma and Westside Boulevard has been closed to traffic between 2013 and 2014 due to high waters from flooding caused by rain events" (HMP, p. 38). Referring to the Jean Street area, the plan points out that "closer to Martin Luther King Boulevard, but still in Bayou Cane, Jean Street, Mike Street, and sometimes all the way to Duet Street residents experience flooding in rains" (HMP, p. 38). This flooding due to rainfall has caused the parish to target Westview Drive and Louis Drive for buyouts, "due to the consistent flooding regardless of improvements" (p. 38). The parish has acquired properties on Harding Drive as well.

The Plan has a detailed "Mitigation Strategy" section that outlines the goals and related actions the Parish will pursue to protect its citizens and resources from the various hazards to which the region is prone. There are four goals and several action Items that are relevant to this project. They are as follows:

Goal 1: Identify and pursue preventative measures that will reduce future damages from hazards

Actions include:

- Building and infrastructure updates
- Hazards warning and response
- Community preparedness outreach
- Subsidence reduction and coastal restoration
- Land use controls
- Historic preservation

Goal 2: Enhance public awareness and understanding of disaster preparedness

Actions include:

- Educating the public through distribution of materials and more community meetings.

[16] http://www.tpcg.org/files/flooding/HMPU_Approved_2014.pdf p. 30

Goal 3: Reduce repetitive flood losses in the parish

Actions include:

- Drainage improvements
- Constructing new flood control structures
- Elevation or acquisition of repetitive loss and severe repetitive loss properties
- Elevating equipment in the parish
- Flood proofing of public buildings
- Increased levee and hurricane protection

Goal 4: Facilitate sound development in the parish to reduce or eliminate potential impacts of hazards

Actions include:

- Land use and building codes to restrict development that increase hazards
- Floodplain management
- Preservation and conservation efforts
- NFIP participation
- Homeowner outreach
- Flood risk reduction

All of the above goals could aid the reduction of flood losses in the study areas through mitigation projects, public education, drainage improvements, and NFIP participation.

Terrebonne Parish Comprehensive Master Plan Vision 2030 (2013)

The issue of flooding is addressed throughout the current draft of Terrebonne Parish's Comprehensive Master Plan Vision 2030 plan[17]. The plan was completed in 2012 and adopted in 2013. The purpose of the plan is to address the storms and flooding in the parish in 2005 and 2008, and the subsequent land loss and relocation that occurred in much of the parish. The goal of the plan is to help the parish have a more sustainable future in light of the hazards it faces. Chapter 7 of the plan addresses environmental issues and hazard mitigation that pertain to flooding. In Chapter 1 of the Master Plan, the parish emphasizes that one document alone cannot address community resiliency, and therefore the parish includes hazard mitigation strategies in the Master Plan, the Code of Ordinances, and the Hazard Mitigation Plan.

The strategies for a more sustainable and resilient community from Chapter 7 include:

- Integrate coastal restoration and protection projects, land development, and states and regional infrastructure investments.
- Invest and develop smarter. This list includes numerous strategies such as risk management, levee and storm protection, enforcement of building codes, and restoring wetlands.
- Focus new developments in low-risk areas.
- Educate homeowners living in high-risk areas.
- Manage our watersheds.
- Purchase high-risk and environmentally sensitive land through such methods as conservation easements, etc.

[17] http://www.tpcg.org/index.php?f=vision2030&p=plan2030

To coincide with the resilience strategies of the master plan, this RLAA will help educate homeowners in the Bayou Cane area about their risks, as well as aid them in managing those risks.

The Parish addresses eight major sustainability topics that need to be considered when implementing drainage. These topics are addressed in Chapter 11: Capital Improvement Priorities in the Master Plan. Drainage updates that the parish would like to take on are summarized as follows:

1. Find funding and complete the Morganza hurricane protection levee system.[18]
2. Most of the 2012 capital budget was spent on drainage and levee projects, and changes in sea level rise will also affect drainage and worsen issues, so the parish may need to complete a new drainage study to address future issues.
3. Acquire land throughout the parish to help with storm water retention that will create greenways to reduce flooding. This land must work with the overall drainage patterns in the area and studies will need to be done to find these areas.
4. Control where new sewer lines go to influence new development and control raw sewage and untreated sewage entering waterways.
5. Remove all septic tanks and help residents connect to sewer systems.
6. Improve the Public Safety Complex that supports law enforcement and helps control flooding and fire damage.
7. Improve Downtown Houma.
8. Improve roads and thoroughfares.

Drainage studies and improvements, storm water retention, sewer system improvements, and public safety and road improvements could all help to reduce flooding in Bayou Cane.

Terrebonne Levee and Conservation District and Army Corps of Engineers Projects

In addition to the numerous levees constructed and maintained by the parish, the Army Corps of Engineers, in partnership with the Louisiana Department of Transportation and Development and the Terrebonne Levee and Conservation District, will implement the Morganza to the Gulf project[19]. The Morganza to the Gulf project includes levees, floodgates, water control structures, and a large lock complex[20]. This project will help to protect Terrebonne and Lafourche parishes from storm surge. The project does not have federal funding as of this report, but the Corps and levee district have begun construction of pieces of the system using state and local funds.

Plan Review Conclusion

Terrebonne Parish works to combat its hazards, particularly issues with flooding, through the Code of Ordinances, the Hazard Mitigation Plan, the Master Plan, and Terrebonne Levee and Conservation District and Army Corps of Engineers Projects. These plans serve to protect the parish from flooding at the regional, parish, local and neighborhood level.

[18] http://www.tpcg.org/files/vision2030/final/Chapter%2011%20-%20Capital%20Improvement%20Priorities.pdf
[19] http://www.tlcd.org/morganza.aspx
[20] http://www.mvn.usace.army.mil/Portals/56/docs/PD/Projects/MTG/117.pdf

Flood Insurance Rate Maps (FIRMs)

The team reviewed two FIRMs for the study area. These included:

- Flood Insurance Rate Map (FIRM)
- Preliminary Digital Flood Insurance Rate Map (DFIRM)

A FIRM is the official map which identifies hazard areas and flood risk zones in the community, while a DFIRM is the new GIS based map of the community's flood hazards that the community can use for regulatory purposes. Both maps detail approximate risk, as flooding can occur outside of the Special Flood Hazard Area. Therefore, it is helpful to have flood insurance, even if the home is outside of the Special Flood Hazard Area.

Terrebonne Parish Flood Insurance Rate Map, 1985[21]

A Flood Insurance Rate Map (FIRM), published by FEMA, shows identified flood risk according to zones of severity, and is used in setting flood insurance rates. The regulatory floodplain used by FEMA for the floodplain management and insurance aspects of the NFIP is based on the elevation of the 1% chance flood, or base flood. The base flood is a statistical concept used to ensure that all properties subject to the National Flood Insurance Program are protected to the same degree against flooding. For another frame of reference, the 100-year flood has a 26% chance of occurring over the life of a 30-year mortgage. It is becoming more common to refer to the 100-year storm as the 1% annual chance flood. It is important to note that more frequent flooding does occur in the 100-year floodplain, as witnessed by the number of repetitive loss properties. Please refer to the sidebar located on the right for flood zone information.

Zone A: The Special Flood Hazard Area (SFHA) (except coastal V Zones) shown on a community's FIRM. Types of A zones found in the study areas include:

A: SFHA where base flood elevation is not provided

A#: Numbered A Zones; used in older FIRMs to designate that there are base flood elevations for the area

AE: found on newer FIRMs; SFHA where base flood elevations are provided

AH: Shallow flooding SFHA. Base flood elevations in relation to a national datum are provided.

Zone B: Area of moderate flood hazard (between the base and 500-year flood, found on older FIRMs; may have local, shallow flooding problems

Zone C: Area of minimal flood hazard (above the 500-year flood level), usually found on older FIRMs; may have local, shallow flooding problems

Zone X: Found on newer FIRMs, corresponds to Zones B (when shaded) and C (when unshaded)

On Terrebonne Parish's FIRM, the Jean Street area is in Zones AH and C, and the Westview Drive area is in Zones B, C and A2, elevation 4. Zone A is in the Special Flood Hazard Area and Numbered A Zones designate elevations for the area, while AH Zones are a shallow flooding area in the SFHA that also designate elevations for the area. In this case, the designated elevation in the Westview Drive area is 4, while the designated elevation in the Jean Street area is 3. Zone B is an area of moderate flood hazard between the base and 500-year flood, which may have local, shallow flooding problems. Zone C is an area of minimal flood hazard, usually depicted on older Flood Insurance Rate Maps as above the 500-year flood level of the primary source of flooding. C Zones may have local, shallow flooding problems

[21] For more information on your flood zone, contacts Terrebonne's Floodplain Manager and/or refer to http://maps.lsuagcenter.com/floodmaps/.

that do not meet the criteria to be mapped as a Special Flood Hazard Area, especially ponding and local drainage problems.

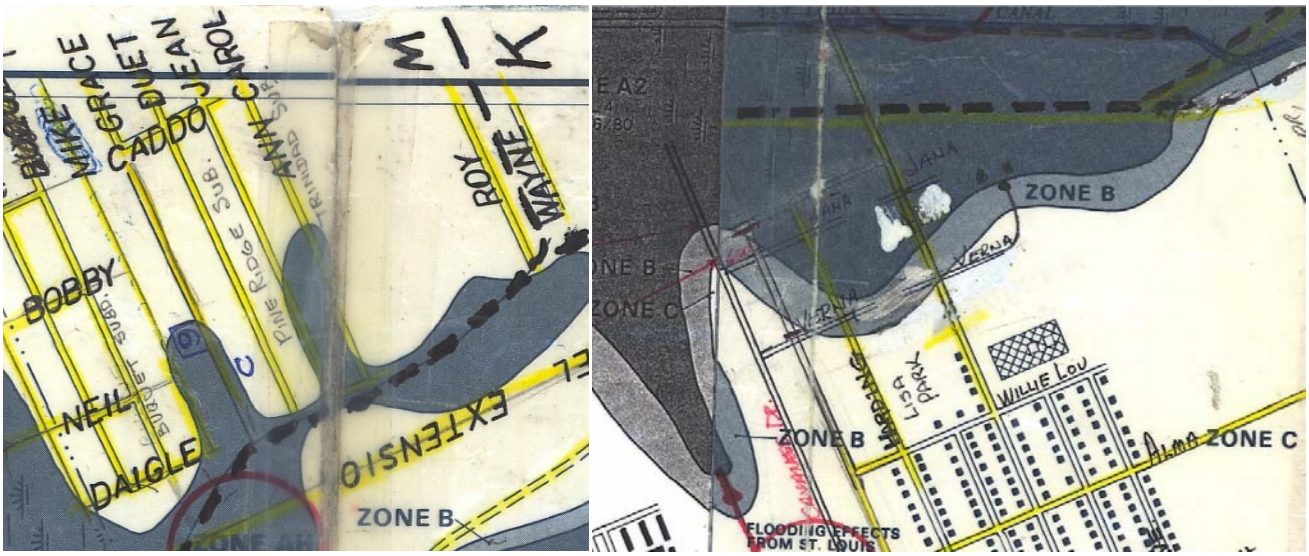


Figure 5 - Current FIRM for Bayou Cane

Preliminary Digital Flood Insurance Rate Map (DFIRM)

As part of the FEMA Map Modernization Program, FEMA has been charged with updating and developing Digital Flood Insurance Rate Maps (DFIRMs).

Please refer to the following figure that reveals sections of the proposed DFIRM that includes the study areas.

Figure 6 - Proposed DFIRM for Bayou Cane, Source: Louisiana DOTD and LSU AgCenter

In the preliminary DFIRM, the Jean Street area is outside of the Special Flood Hazard Area, but the Westview Drive area is not. The preliminary DFIRM shows that the Jean Street area will go from an area of mixed moderate and high flood hazard, to an area of minimal flood hazard, while the Westview Drive area will go from an area of mixed minimal, moderate and high flood hazard area to a Zone AE. Zone AE is an area in the Special Flood Hazard Area where elevations have been determined.

The BFE for Westview Drive is 5. It should be noted that the BFE is above *mean sea level (MSL),* not above *ground level*. The base flood elevation in the Westview Drive areas is 5 feet above main sea level, while the ground elevation ranges from 1 foot near the St. Louis Canal, and 5-6 feet near Verna Street. The ground elevation for the Jean Street area is 4.2 feet.[22] Please refer to Figure 6 that reveals sections of the DFIRM that includes the study areas.

For information on an individual structure, please contact Terrebonne's Floodplain Manager or refer to http://maps.lsuagcenter.com/floodmaps/?FIPS=22109.

DFIRM Status

Terrebonne Parish has not yet adopted the proposed DFIRM, as the parish is participating in the LAMP (Analysis and Mapping Procedures for Non-Accredited Levees) process and expects to have more accurate maps around 2017. The mitigation department requires the best available data using the DFIRM, plus one foot of freeboard in order to better mitigate flood hazards.

Step 3: Analysis Area Data

According to the parish's 2014 Hazard Mitigation Plan Update, flooding negatively affects the drainage systems in the parish. In addition, the use of drainage has caused subsidence by stopping sediment from settling. The forced drainage systems, which force the water out using pumps, contribute to the subsidence in particular. According to the plan, areas like Bayou Cane that are located north of Houma experience flooding from storm water and poor drainage. The parish has completed multiple drainage improvement projects, and many others are ongoing or planned for the future. Improving and upgrading drainage is also part of the parish's repetitive loss strategy.

The Westview Drive and Jean Street neighborhoods were developed in the 50s, 60s and 70s. At that time, drainage in subdivisions was designed to handle only a 5 or 10 year storm, and a 5 or 10 year storm was typically based on only 40 years of gage records. Now, with 80 years of records, we're finding that those 40 years were at the low period of a rainfall cycle and that now there are more frequent storms with increased rainfall.[23] We have also concluded that a 5 or 10 year storm design is not adequate to prevent flood problems. So, we have inherited a drainage system built to the standards of the day which is inadequate by today's standards.

In addition, the study areas were developed in a low-lying flat area that already had natural waterways, and subsequent man-made waterways, such as ditches and culverts, were built during the development of the areas. During a rainfall event in the study areas, the rain runs off of yards and streets to underground storm drains. These storm drains drain the water into ditches which carry the runoff to the canals.

[22] http://maps.lsuagcenter.com/floodmaps/?FIPS=22109

[23] http://iridl.ldeo.columbia.edu/SOURCES/.LDEO/.TRL/.NADA2004/.pdsi-atlas.html

The study areas are in a forced drainage area that is protected by levees along the Gulf Intracoastal Waterway. Forced drainage areas are areas which depend on pump stations to drain the water, rather than gravity. There are two drainage pumps that help pump the water out of the study areas – one above Synergy Center Boulevard for the Jean Street area, and one at the intersection of the Six Foot Ditch and the Intracoastal Waterway for the Westview Drive area. The levees that keep water out of the areas are located along the Gulf Intracoastal Waterway. There are also ridges along Bayou Terrebonne and Bayou Blue. Please refer to the figures below for examples of drainage culverts and open ditches in the study areas.

Figure 7 - Examples of Culverts and Ditches found in Bayou Cane

There are smaller pumps within the communities, but they are part of the Pollution Control Division, which manages the wastewater in the parish[24] (see picture below). The Collection Division, which is part of the Pollution Control Department under the Public Works Department, maintains the sewer collection lines, transport lines, pumping stations, holding basins, and oversees the expansion of the wastewater collection system. The Drainage Division, on the other hand, handles the maintenance of drainage facilities, such as the forced drainage and gravity drainage systems in the parish.[25] They also maintain the drainage pump stations, pumps and pump systems, clean canals, operate the Bayou Black flood control structure, maintain aids to navigation, clean lateral ditches, and inspect and maintain forced drainage levees.[26]

[24] http://www.tpcg.org/index.php?f=pollution_control
[25] http://www.tpcg.org/index.php?f=public_works
[26] http://www.tpcg.org/index.php?f=forced_drainage&p=index

Figure 8 - Sanitary System Pump in Westview Drive Study Area

The study areas are flat and many of the houses are built low to the ground. Although water is supposed to flow away from the houses, it sometimes flows towards them, causing shallow flooding. Subsidence also contributes to the change in water flow. One resident reported that the land around their home settled, causing a change in drainage flow.

At times, there are issues moving the runoff to the canals. Storm drain inlets get clogged with debris, or open ditches and culverts become blocked with vegetation or sediment. Sometimes a rainfall event results in so much water that it overloads the drainage system.

A forced drainage system is dependent on pump stations, and they can be overloaded by storm water. The pump stations run on diesel fuel, so power outages are not an issue. It is unknown whether floods have occurred due to overloading pump station capacity.

In the Jean Street area, water is pumped out to Bayou Terrebonne, which is then cycled out past Martin Luther King Drive and out into Bayou Cane (see Figure 9 below). The Jean Street forced drainage area begins in the Schriever Gray area and runs to the Mike Street area. The developments along Martin Luther King Drive drain into a retention pond, which flows into the canal west of the pump station. The developments closer to Jean Street are drained using a channel that flows into the canal near the pump station as well. Both of these drainage systems are west of the Jean Street study area.

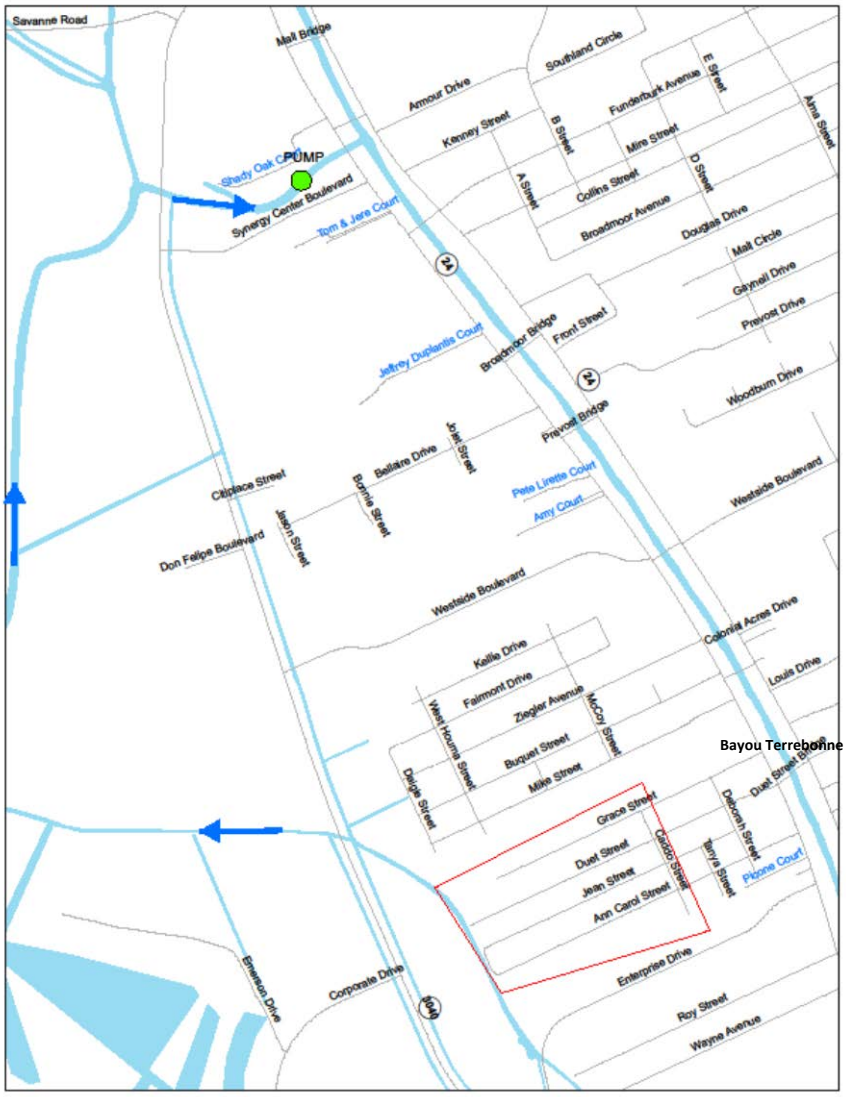


Figure 9 - Jean Street Study Area Overall Drainage Map; Source: TPCG Engineering Division

At the neighborhood level in the Jean Street area, water is conveyed using ditches and culverts. In Figure 10 below, the dotted lines are ditches and the arrows are culverts. The map may not show every ditch and culvert in the area. The culverts are relatively short pipes that run under a driveway or street, while the ditches are larger channels along the road or behind properties. The ditches and culverts in the study area help move the water from the streets to the bigger canals.

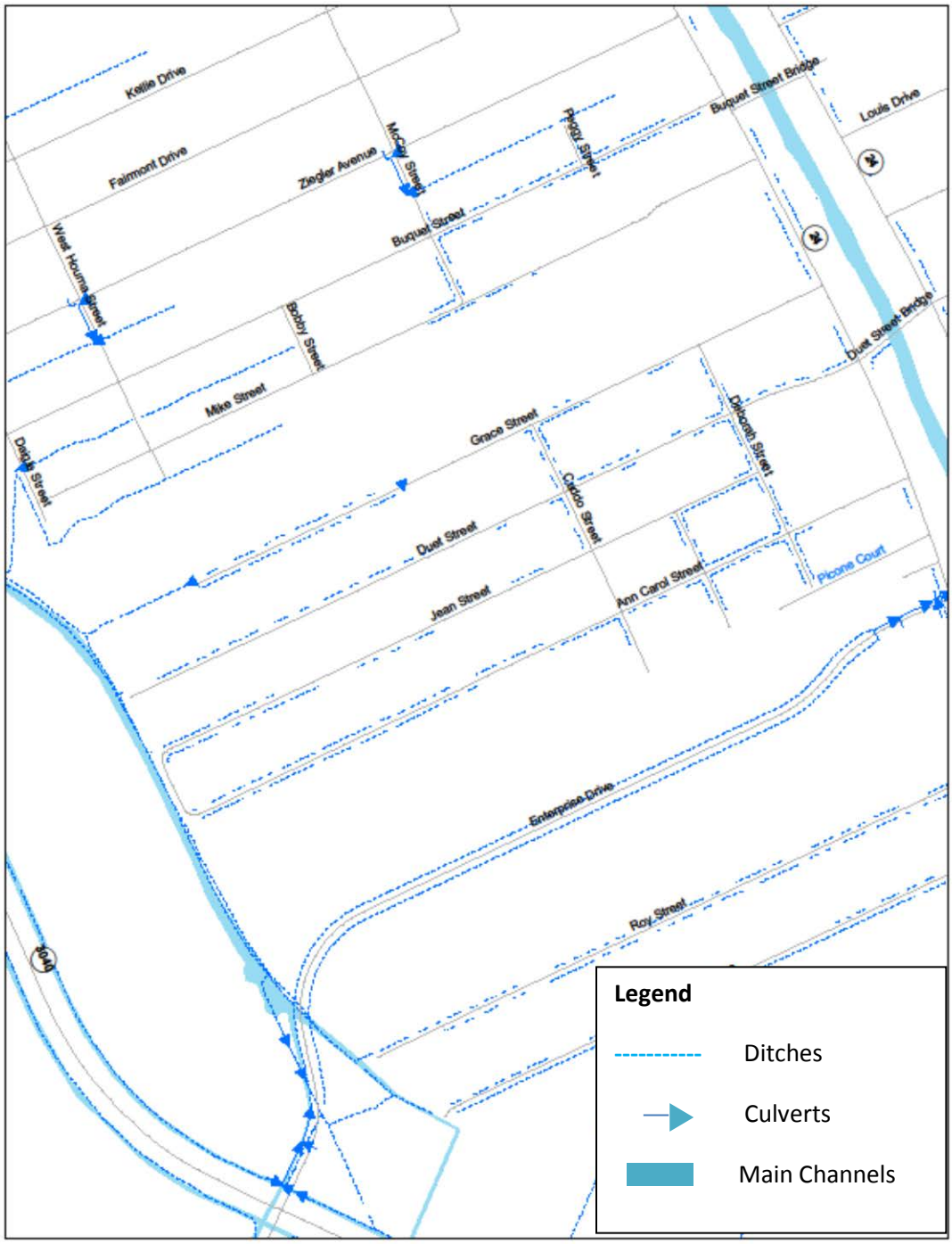


Figure 10 – Jean Street Study Area Drainage Map, Source: TPCG Engineering Division

In the Westview Drive area, water flows to the St. Louis Canal, and is then pumped out to the Intracoastal Waterway (see Figure 11 below). The entire forced drainage system runs from Bayou Terrebonne to Bayou Blue. There is a spoil bank created from dredging the St. Louis Canal on the east side of the canal. In addition, there are levees along the canal north of Sixth Street, which protect that area from excess water.

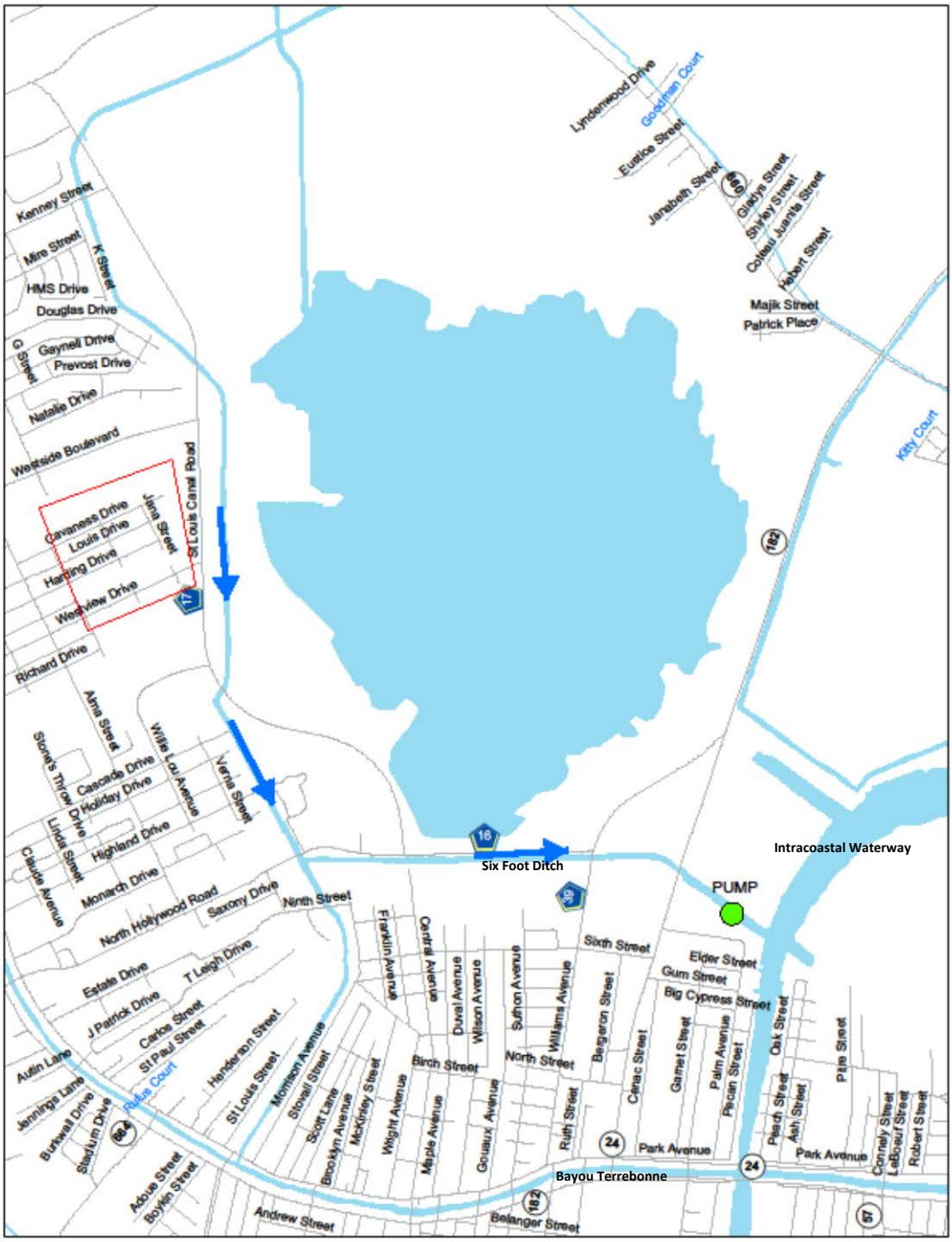
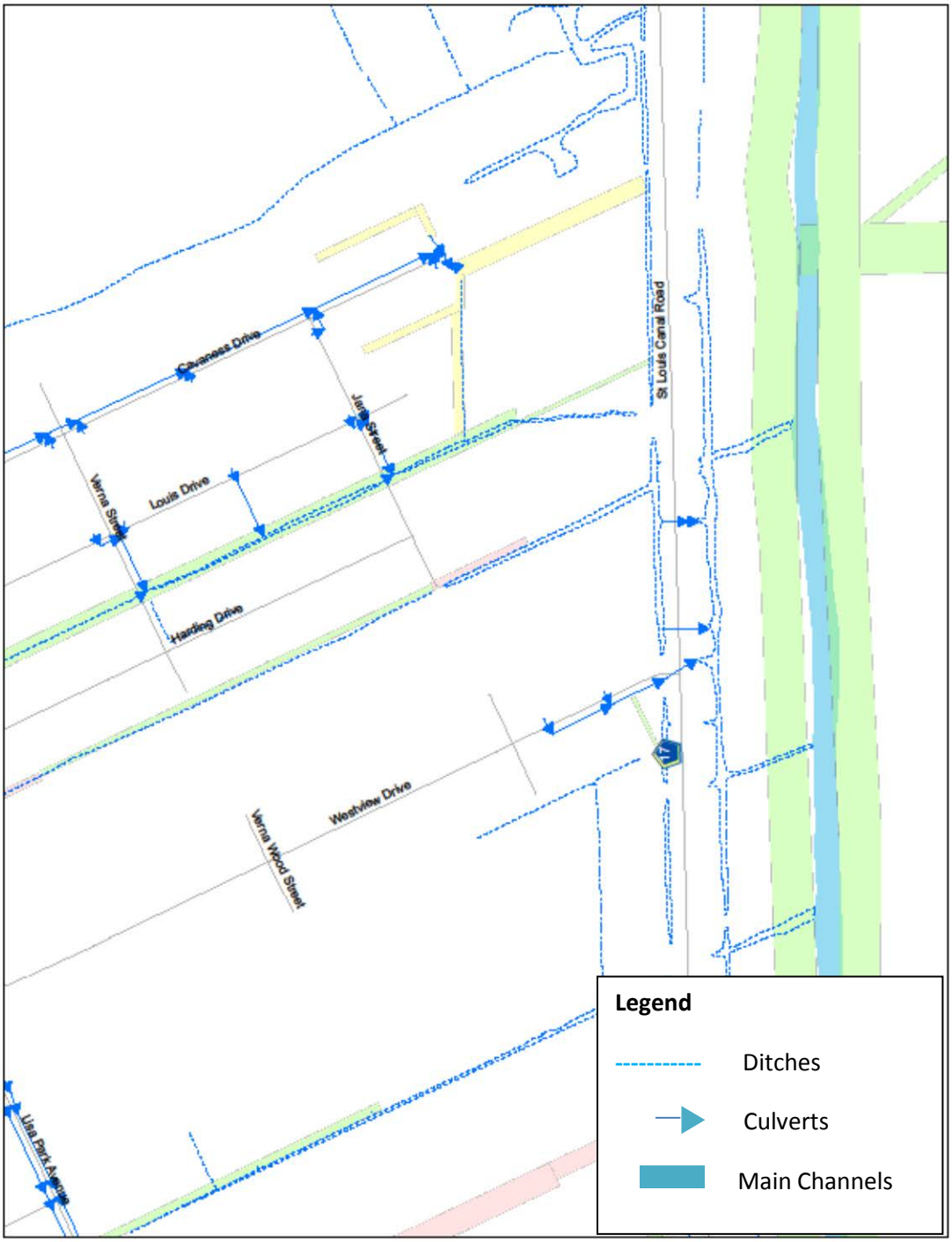


Figure 11 - Westview Drive Study Area Overall Drainage; Source: TPCG Engineering Division

At the neighborhood level in the Westview Drive area, when it rains, water is conveyed using culverts and ditches. In Figure 12 below, the dotted lines are ditches and the arrows are culverts. The map may not show every ditch and culvert in the area. The culverts are relatively short pipes that run under a driveway or street, while the ditches are larger channels along the road or behind properties. The culverts move the water from the streets to the ditches, which move the water to the bigger canals. The canals bring the water to the pump stations.

Figure 12 – Westview Drive Study Area Drainage Map, Source: TPCG Engineering Division



Claims Data

The Privacy Act of 1974 (5 U.S.C. 522a) restricts the release of certain types of data to the public. Flood insurance policy and claims data are included in the list of restricted information. FEMA can only release such data to state and local governments, and only if the data are used for floodplain management, mitigation, or research purposes. Therefore, this report does not identify the repetitive loss properties

or include claims data for any individual property. Rather, it discusses them only in summary form. UNO-CHART obtained claims data from FEMA Region VI for all repetitive loss properties in the Westview Drive and Jean Street study areas and aggregated the data. Claims vary depending on size of the home, the contents that were damaged, and the elevation of the home. The results are presented below and separated by neighborhood:

Westview Drive Study Area: There are 19 (20.7%) properties within the 92 property study area that qualify as repetitive loss. Of those 19 repetitive loss properties, 6 are considered to be severe repetitive loss properties. There have been 75 flood claims in the Westview Drive study area totaling $1,674,123.00.The average claim in the area is $22,321.64.The homeowners of the 19 repetitive loss properties have made 58 claims, and received $1,562,265.00 in flood insurance payments since 1978. Approximately 77.3% of the total number of claims came from the 19 repetitive loss payments. The average repetitive flood loss claim is $26,935.60.

Jean Street Study Area: There are 15 (8.9%) properties within the 168 property study area that qualify as repetitive loss. Of those 15 repetitive loss properties, 2 of them are considered to be severe repetitive loss properties. There have been 66 flood claims in the Jean Street study area totaling $629,177.00.The average claim in this area is $9,532.98. The homeowners for the 15 repetitive loss properties have made 47 claims, and received $ 547,094.00 in flood insurance payments since 1978. Approximately 72.9% of the total number of claims came from the 15 repetitive loss properties. The average repetitive flood loss claim is $11,640.30.

Major Flood Events

There have been five major flood events in both the Westview Drive and Jean Street neighborhoods. However, other smaller flood events have occurred in these areas as well.

The parish identifies 31 different rainfall events that caused flooding in the parish since 1996. A total of 11 events were identified by the parish as causing unique or abnormal flooding. In 2011, flooding from increased rainfall and snowmelt across the United States caused the Mississippi River to reach above normal levels and caused flooding in the parish. The parish has been impacted by several hurricanes in the last hundred years, Hurricane Betsey in 1965, Hurricane Juan in 1985, Hurricane Andrew in 1992, Hurricane Allison in 2001, Hurricane Lilli in 2002, Hurricanes Katrina and Rita in 2005, Hurricanes Gustav and Ike in 2008, and Hurricane Isaac in 2012. In addition to tropical events, the area also suffered flooding during heavy rainfall events. The majority of the flooding that occurred in the two study areas was the result of heavy rainfalls and hurricanes.

Only about half of the claims in each area reported flood depths. The average depth of flooding for the 31 homes that reported depths in the Jean Street study area is 2.9 feet. The 45 claims that reported depths in the Westview Drive study area had an average flood depth of 2.3 feet. Some structures have since been removed, replaced or elevated in both study areas.

Figure 13 - Jean Street Study Area Claims Data 1978-2013

Jean Street Study Area Claims Data 1978-2013		
Event Date	**Claims Made**	**Total Paid**
1978 Unspecified Event	2	$323.00
1980 Heavy Rain Event	1	$4,633.00
1981 Unspecified Event	1	$5,133.00

1982 Unspecified Event	1	$1,569.00
1985 Hurricane Juan	1	$496.00
1991 Heavy Rain Event	8	$146,771.00
1992 Hurricane Andrew	4	101,052.00
1995 Heavy Rain Event	1	33,367.00
2001 Tropical Storm Allison	1	1,578.00
2002 Hurricanes Lili and Isidore	18	$114,145.00
2003 Unspecified Event	1	$1,854.00
2005 Hurricane Katrina	4	$17,684.00
2008 Hurricane Gustav	1	$3,216.00
2009 Heavy Rain Event	11	$154,142.00
2012 Hurricane Isaac	8	$117,901
2013 Heavy Rain Event	1	$5,920.00
Total	**64**	**$709,784.00**

There were 16 flooding events that affected the Jean Street study area that caused flooding severe enough that homeowners made flood insurance claims. However, the neighborhood was most affected by flood events that include Hurricanes Lili and Isidore in 2002, and rain events in 1991, 2009, and 2012. The repetitive loss properties account for 72.9% of all flood insurance claims made in the study area. These flood events account for 45 (70.3%) of the 64 total flood claims for the Jean Street study area, and 34 (72.3%) of the 47 total repetitive flood loss claims. Overall, the repetitive loss homes filed an average of 3.29 claims per property. In the Jean Street study area, 2 (3%) of all flood insurance claims made came from properties that have since been acquired by the Parish. These claims accounted for $74,342.

Figure 14 - Westview Drive Study Area Claims Data 1978-2013

Westview Drive Study Area Claims Data 1978-2013		
Event Date	**Claims Made**	**Total Paid**
1980 Heavy Rain Event	1	$17,580.00
1991 Heavy Rain Event	17	$190,764.00
1992 Hurricane Andrew	3	3,849.00
1995 Heavy Rain Event	1	0.00
2001 Tropical Storm Allison	2	11,494.00
2002 Hurricanes Lili and Isidore	17	$345,101.00
2005 Hurricane Katrina	1	$0.00
2008 Hurricane Gustav	1	$0.00
2009 Heavy Rain Event	18	$726,473.00
2012 Hurricane Isaac	14	$378,862
Total	**75**	**$1,674,123.00**

There were 10 flood events that impacted the Westview Drive study area that caused homeowners to make flood insurance claims. Though there were ten major flood events experienced by the area, a heavy rainfall event in 1991, Hurricanes Lili and Isidore in 2002, and a heavy rain event in 2009, and Hurricane Isaac in 2012 account for the majority of the claims. These events account for 66 (88.0%) of

the 75 total flood claims in the Westview Drive study area and 54 (93.1%) of the 58 total repetitive flood loss claims. Overall, the repetitive loss homes have filed an average of 3.05 claims per property. In the Westview Drive study area, 17 (29%) of all flood insurance claims made came from properties that have since been acquired by the Parish. These claims accounted for $409,038.00.

Field Data

Between June 2015 and September 2015, the UNO-CHART team visited the study areas and collected data on each property. The team collected information such as the estimated elevation of each structure above the street and the grade, the type of foundation, and the type of structure.

Figure 15 - Home Elevated above Grade

Home Elevated Above Grade				
Height Above Grade	Westview Drive	%	Jean Street	%
0-6 inches	57	62.0%	56	33.3%
6 inches-1 foot	23	25.0%	17	10.1%
1-1.5 feet	5	5.4%	18	10.7%
1.5-2 feet	0	0.0%	5	3.0%
2-2.5 feet	0	0.0%	38	22.6%
2.5-3 feet	0	0.0%	12	7.1%
3-3.5 feet	0	0.0%	6	3.7%
3.5-4 feet	1	1.1%	0	0.0%
Unknown*	6	6.5%	16	9.5%
Total	**92**	**100.0%**	**168**	**100.0%**

Figure 16 - Home Elevated above Street

Home Elevated Above Street				
Height Above street	Westview Drive	%	Jean Street	%
0-6 inches	13	14.1%	116	69.1%
6 inches-1 foot	64	69.6%	31	18.5%
1-1.5 feet	2	2.2%	5	3.0%
1.5-2 feet	7	7.6%	0	0.0%
2-2.5 feet	0	0.0%	0	0.0%
2.5-3 feet	0	0.0%	0	0.0%
3-3.5 feet	0	0.0%	0	0.0%
3.5-4 feet	0	0.0%	0	0.0%
Unknown *	6	6.5%	16	9.5%
Total	**92**	**100.0%**	**168**	**100.0%**

Figure 17 - Structure's Foundation Type

Structure's Foundation Type				
Foundation Type	Westview Drive	%	Jean Street	%
Slab on Grade	85	92.4%	65	38.7%
Thick Slab	0	0.0%	3	1.8%
Split Level	0	0.0%	5	3.0%
Posts/ Piers	1	1.1%	75	44.6%
Crawlspace	0	0.0%	3	1.8%
Unknown*	6	6.5%	17	10.1%
Total	**92**	**100.0%**	**168**	**100.0%**

Figure 18 - Structure's Construction Type

Structure's Construction Type				
Construction Type	Westview Drive	%	Jean Street	%
Brick	84	91.3%	49	29.2%
Mobile Home	0	0.0%	55	32.7%
Siding (wood, vinyl)	2	2.2%	34	20.2%
Manufactured Home	0	0.0%	9	5.4%
Other	0	0.0%	5	3.0%
Unknown*	6	6.5%	16	9.5%
Total	**92**	**100.0%**	**168**	**100.0%**

*Structures marked unknown included those that were obstructed as well as vacant lots

- In the Westview Drive study area, 85 (92.4%) of structures in the area are built slab-on-grade and 0 (0.0%) are elevated on posts or piers. The average height related to grade is at grade (0-1 feet) for most structures in the area (87.0%).
- A total of 13 buildings (14.1%) in the Westview Drive study area are at the street level or lower, 92.4% of all structures are single-story, and the majority (91.3%) are brick buildings. A summary of this data is found in Appendix C.
- In the Jean Street study area, 65 (38.7%) structures in the area are built slab-on-grade and 75 (44.6%) are on posts or piers. The average height related to grade is at grade (0-1 feet) for a third of the structures in the area (33.3%).
- Also in the Jean Street study area, 116 buildings (69.1%) are at or below street level, 88.1% of all structures are single-story, and the majority of homes are brick (29.2%), or mobile homes (32.7%). A summary of this data is found in Appendix C.

Data Sheets

As discussed in Step 1: Neighborhood Notification, the letter that was mailed to the residents included a data sheet. This data sheet offered residents the opportunity to provide UNO-CHART with details about their flooding experiences and to voice their concerns regarding the flooding in the area.

Westview Drive Study Area

The UNO-CHART team mailed 86 letters and data sheets in the Westview Drive neighborhood with 7 returned as "undeliverable" or "vacant." Of the 79 remaining, 14 were returned completed. The Westview Drive neighborhood had a return rate of 17.72% for the data sheets. An additional 30 data sheets were sent out to repetitive loss properties that had not returned a response in order to reach out to homeowners who have flooded multiple times. The residents in the Westview Drive neighborhood who completed their data sheet and submitted to the UNO-CHART team offered insight into the flooding issues in the area:

- 71.4% reported their property has flooded at least once.
- The most reported flood events were heavy rain events that occurred in 1991 and 2009, as well as Hurricane Isaac in 2012.
- 71.0% of respondents cite drainage from nearby properties as the source of their flooding.
- 57.0% of respondents cite overbank flooding from a nearby ditch as the source of their flooding.
- 50.0% of respondents cite a clogged or undersized culvert as the source of their flooding.
- 64.0% of respondents report sandbagging when water threatens a residence.

Jean Street Study Area

The UNO-CHART team mailed 136 letters and data sheets in the Jean St. neighborhood with 6 returned as "undeliverable" or "vacant." Out of the remaining 130 letters, 24 were returned completed. The Jean Street neighborhood had a return rate of 18.60% for the data sheets. For those residents who returned data sheets, it was reported that:

- 62.5% of respondents reported their property being flooded at least once.
- The most reported flood events were heavy rain events that occurred in 1991 and 2009 as well as Hurricane Isaac in 2012.
- 61.0% of respondents cite a clogged or undersized culvert as the source of their flooding.
- 43.0% of respondents cite drainage from nearby properties and overbank flooding from nearby ditches and canals as the source of flooding.
- 39.0% of respondents reported sandbagging when water threatens a residence.

The full results of the homeowners' data sheets are found in Appendices A and C of this report.

Problem Statement

The Westview Drive and Jean Street areas are topographically flat and located at a low elevation. In addition, many of the homes have slab foundations that are built low to the ground. Based on the data collected from the five sources of information (community reports and plans, flood insurance data, drainage information, on-site surveying, and property owners), the following bullets summarize the repetitive flooding problems in the areas:

- There are 260 homes in the study area. As of June 2015, ninety-one of these properties carry flood insurance, and 63 total homes in both study areas have made insurance claims. A total of 34 of these homes that made claims have flooded to the extent that they qualify as repetitive loss structures under the NFIP; 10 of which are severe repetitive loss properties.

The parish has already mitigated 11 repetitive loss properties in the study area, through elevation or acquisition.

- The 24 repetitive loss properties have made 105 flood insurance claims for a total of **$2,077,100.00** since 1978, and the 10 severe repetitive loss properties have made claims totaling **$1,302,829.06**.
- For all homes in both areas, repetitive loss and non-repetitive loss, the total claims combined amount to over $2.4 million dollars in flood claims from multiple flooding incidents. There have been a total of 141 claims averaging $15,927.31.
- On the current Flood Insurance Rate Map (FIRM) for Terrebonne Parish, most structures in the Jean Street study area are located in Zone C, with a few in Zone AH, while the structures in the Westview Drive study area are located in Zones C, B and A2. On the DFIRM, all of the Westview study area is located in Zone A, and all of the Jean Street area is outside of the Special Flood Hazard Area.
- Only about half of the claims in each area reported flood depths. The average depth of flooding for the 31 homes that reported depths in the Jean Street study area is 2.9 feet. The 45 claims that reported depths in the Westview Drive study area had an average flood depth of 2.3 feet. Some structures have since been removed, replaced or elevated in both study areas.
- A majority of the homes in the study areas are slab on grade.
- The causes of flooding in the areas include hurricanes, heavy rainfall, inadequate drainage, and subsidence.

Step 4: Mitigation Measures

The project team considered the history of flooding in Terrebonne Parish and the type and condition of buildings in the study areas as part of the third step in the area analysis procedure – a review of alternative mitigation approaches to protect properties from flood damage. The parish has already mitigated 11 repetitive loss properties in the study area, through elevation or acquisition.

Property owners should consider the following alternatives, but understand they are not all guaranteed to provide protection at different levels of flooding. Seven approaches were reviewed:

I. Elevating the houses above the 100-year flood level
II. Barriers to floodwaters
III. Dry floodproofing
IV. Utility protection
V. Drainage improvements
VI. Drainage maintenance
VII. Maintaining flood insurance coverage on the building
VIII. Green infrastructure

It should be noted that residents of the study area may be limited to what mitigation measures they can implement if they are renters, and based on the construction and foundation of their properties. In addition, mitigation measures may require permits.

I. *Elevation*

Figure 19 - Elevated home in the Jean Street Area

Raising the structure above the flood level is generally viewed as the best flood protection measure, short of removing the building from the floodplain. All damageable portions of the building and its contents are high and dry during a flood, which flows under the building instead of into the house. Houses can be elevated on fill, posts/piles, or a crawlspace. A house elevated on fill requires adding a specific type of dirt to a lot and building the house on top of the added dirt. A house elevated on posts is either built or raised on a foundation of piers that rise high enough above the ground to elevate the house above the flow of flood water.

A house elevated on a crawlspace is built or raised on a continuous wall-like foundation that elevates the house above the flood level. If a crawlspace is used, it is important to include vents or openings in the crawlspace that are appropriately sized: one square inch for each square foot of the building's footprint. Examples of an elevated structure in the Jean Street study area can be found in Figure 19.

A. Cost: Most of the cost to elevate a building is in the preparation and foundation construction. The cost to elevate six feet is little more than the cost to go up two feet. Elevation is usually cost-effective for wood frame buildings on posts/piles or crawlspace because it is easiest to get lifting equipment under the floor and disruption to the habitable part of the house is minimal.

Elevating a slab house is much more costly and disruptive. In the Jean Street study area, 38.7% of the buildings in the study area are slab-on-grade, while in the Westview Drive study area, 93.5% of the homes are slab-on-grade. The actual cost of elevating a particular building depends on factors such as its condition, whether it is brick faced, and if additions have been added on over time. Per the Parish's Community Rating System Coordinator, the cost of elevating a slab on grade home utilizing HMGP funds is currently $70 per square foot to lift the house 2 feet, and $86 per square foot to lift the house 15 feet.

While the cost of elevating a home can be high, there are funding programs that can help. The usual arrangement is for a FEMA grant to pay 75% of the cost while the owner pays the other 25%. In the case of elevating a slab foundation, the homeowner's portion could be as high as $25,000 or more. In some cases, assistance can be provided by the Increased Cost of Compliance (ICC) provision of a flood insurance claim payment, which is discussed on page 43, and can also be used toward the non-federal cost-share.

B. Feasibility: Federal funding support for an elevation project requires a study that shows that the benefits of the project exceed the cost of the elevation. Project benefits include future savings in insurance claims that would otherwise be paid on the structure. Elevating a masonry home or a slab can cost over $100,000, which means that benefit/cost ratios may be low. Looking at each property individually could result in funding for the worst case properties, i.e., those that are lowest in elevation, subject to the most frequent flooding, and in adequate condition to elevate.

II. Barriers to Floodwaters

Small floodwalls, levees, or berms constructed around one or more properties are more dependable if flood depths are less than 3 feet and floodwaters rise and fall quickly. Homes that typically receive 3 feet of floodwater or less, or where the water does not remain for a considerable amount of time, can benefit from small floodwalls, levees or berms. Levees and berms are more suitable for larger lots, and small floodwalls that are located close to the house are appropriate for suburban style neighborhoods with limited front and side yard space. Given the suburban setting in the study area, floodwalls are more

Figure 20 - Water collects in this basin, or sump, and is pumped out by a sump pump.

Figure 21 - This home is surrounded by a floodwall that doubles as a planter. The driveway must be sandbagged during a flood event.

appropriate than levees and berms that will not fit on smaller lots. Given the flood depths reported by residents on the returned data sheets, barriers could be an appropriate mitigation measure for many homes in the study areas.

When considering barriers, residents who experience floodwaters that remain for several hours or days should include internal drainage provisions, as seepage can occur and water will end up inside the barrier. The more permeable the soil, the more floodwaters seep under the barrier. It is important to have a soil sample checked by an engineer to determine rate of permeability.

Per the USDA's Natural Resources Conservation Service[27], the two study areas contain mostly Schriever clay. This clay is a heavy clay and very fertile. But, it succumbs to moisture easily, expanding when wet and cracking when dry.[28] In addition, it drains poorly and is slowly permeable.[29] This clay is ideal for flood barriers, as it reduces seepage.

Homeowners who are interested in constructing a barrier to protect their house should consider the following requirements:

[27] http://websoilsurvey.nrcs.usda.gov/app/
[28] https://www.lsuagcenter.com/en/communications/publications/agmag/Archive/2013/Spring/An-Overview-of-Louisiana-Soils.htm
[29] https://soilseries.sc.egov.usda.gov/OSD_Docs/S/SCHRIEVER.html

- A method to close openings, such as the door in the photo in Figure 26 on page 41. Generally, this requires "human intervention," meaning someone needs to be available and have enough time to take action.
- A system to prevent sanitary sewer backup from flowing into the building.
- Internal drainage provisions are also recommended, including:
    - A system of drain tile (perforated pipes) that collects water that falls or seeps into the protected area and sends it to a collecting basin or "sump,"
    - A sump pump to send the collected water outside the barrier (Figure 20), and
    - Power to operate the sump pump around the clock during a storm.

A. Cost: The cost of a local barrier depends on the depth of flooding and the amount of engineering needed for the design. Where flooding is only inches deep and of short duration, almost any barrier of concrete or earth will work. The most conservative cost estimate for a floodwall is based on a two foot high engineered cantilevered concrete floodwall. A cantilevered wall has a footing to provide stability and keep the water pressure from pushing it over. The budget shown in Figure 22 is for a 40'x 40' home with a wall one foot outside the building wall. Labor accounts for about half of the price in the cost estimate.

It should be noted that smaller, non-engineered walls, such as the one in Figure 21, have been built by their owners for less than $10,000. FEMA does not fund individual floodwalls for residential properties; therefore, the homeowner must pay 100% of the cost for a floodwall. However, each person can determine how much of their own labor they want to contribute (which reduces out-of-pocket costs) and whether the cost of the wall is worth the protection that it may provide.

Figure 22 - Floodwall Cost Estimate

Two Foot high reinforced concrete cantilever wall, 168 feet @ $200/foot	$33,600
Internal drainage and sump pump system	$5,000
Sewer backup valve	$4,500
Generator for power outages	$900
TOTAL	**$44,000**

Residents interested in pursuing a retrofitting measure to protect their home or utilities should contact the Terrebonne Parish Consolidated Government Permits Office to determine whether a permit is required. The parish requires a site plan and a copy of the plat when getting a permit. Flood barriers are not recognized as a mitigation method by FEMA and will not reduce flood insurance premiums; they are strictly for flood protection. The installation of a flood barrier may cause nearby neighbors to flood, so it is best to get a renovation permit before installation. Residents cannot drain water to their neighbors' properties; instead they should drain to the front of the property, or into an adjoining drainage ditch. In addition, residents cannot build a flood barrier over a servitude, right-of-way or easement. Residents can check their plat for these issues.

III. Dry Floodproofing

This measure keeps floodwaters out of a building with a slab foundation by modifying the structure. Walls are coated with waterproofing compounds or plastic sheeting. Openings (e.g., doors, windows, and vents) are closed either permanently, or temporarily with removable shields or sandbags.

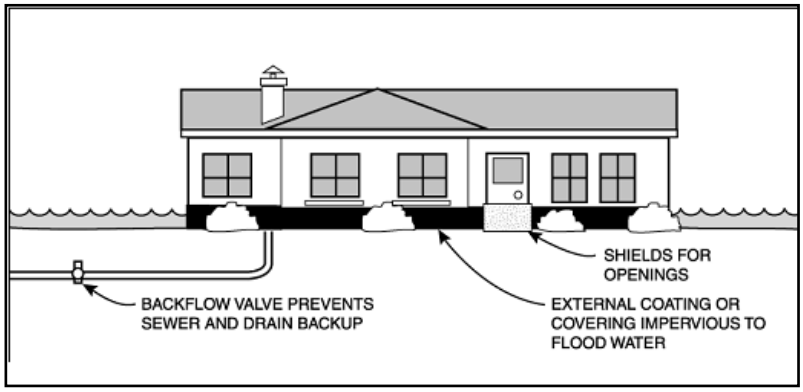


Figure 23 - A Dry Floodproofed Home

A floodproofing project has three components:

- The walls are made watertight. This is easiest to do for brick faced walls. The brick or stucco walls can be covered with a waterproof sealant and bricked (or stucco) over with a veneer to camouflage the sealant. Houses with wood, vinyl, or metal siding need to be wrapped with plastic sheeting to make the walls watertight, and then covered with a veneer to camouflage and protect the plastic sheeting.
- Provide closures, such as removable shields or sandbags, for the openings; including doors, windows, dryer vents, and weep holes.
- Account for sewer backup and other sources of water entering the building. For shallow flood levels, this can be done with a floor drain plug or standpipe; although a valve system is more secure.

Figure 24 - Flooding of the house up to 1 ½ feet. Damage could be prevented by dry floodproofing.

As seen in Figure 23, dry floodproofing employs the building itself as part of the barrier to the passage of floodwaters, and therefore this technique is only recommended for buildings with slab foundations that are not cracked. The solid slab foundation prevents floodwaters from entering a building from below. Also, even if the building is in sound condition, tests by the U.S. Army Corps of Engineers have shown that dry floodproofing should not be used for depths greater than 2 feet over the floor, because water pressure on the structure can collapse the walls and/or buckle the floor.

Dry floodproofing is a mitigation technique that is appropriate for some houses in both study areas: those with slab foundations that typically receive floodwater less than two feet in the house. From the fieldwork the project team found that 38.7% of the houses in the Jean Street study area, and 93.5% of the houses in the Westview Drive study area are slab-

on-grade foundations, and according to the data sheet responses, 65.2% of the respondents in the Jean Street study area, and 71.4% of the respondents in the Westview Drive study area experienced flooding. However, the average depth of flooding in both study areas has been over two feet. This method should only be used for homes that have experienced flooding less than two feet deep. In addition, there is always the possibility of a flood going higher than it has in the past.

Not all parts of a structure need to be floodproofed. It is difficult to floodproof a garage door, for example, so some owners let the garage flood and floodproof the walls between the garage and the rest of the house. Appliances, electrical outlets, and other damage-prone materials located in the garage should be elevated above the expected flood levels. Examples of floodproofed houses can be seen in Figures 25 through 28.

Figure 25 - This Baton Rouge, LA home had thin facing brick placed over the waterproofing materials.

Figure 26 - This Bayou Cane home has a steel door to keep flood waters out.

Figure 27 - This dry floodproofed building in Mandeville, LA has the walls waterproofed and removable shields placed in the windows

Figure 28 - This home in Jefferson Parish, LA has permanent shields sealing the space under the windows

Please note that dry floodproofing has the following shortcomings as a flood protection measure:

- It usually requires human intervention, i.e., someone must be home to close the openings.
- Success of dry floodproofing depends on the building's condition, which may not be readily evident. It is very difficult to tell if there are cracks in the slab under the floor covering.
- Periodic maintenance is required to check for cracks in the walls and to ensure that the waterproofing compounds do not decompose.
- There are no government financial assistance programs available for the dry floodproofing of residential buildings, therefore the entire cost of the project must be paid by the homeowner.

- The NFIP will not offer a lower insurance rate for dry floodproofed residences, but will for nonresidential structures.

Residents interested in pursuing a retrofitting measure to protect their utilities should contact the Terrebonne Parish Consolidated Government Permits Office to determine whether a permit is required.

A. Cost: The cost for a dry floodproofing project can vary according to the building's construction and condition. It can range from $5,000 to $20,000, depending on how secure the owner wants to be. Owners can do some of the work by themselves, although an experienced contractor provides greater security. Each property owner can determine how much of its own labor they can contribute, and whether the cost and appearance of a project is worth the protection from flooding that it may provide.

B. Feasibility: As with floodwalls, floodproofing is appropriate where flood depths are shallow and are of relatively short duration. It can be an effective measure for some of the structures and flood conditions found in the study areas. It can also be more attractive than a floodwall around a house.

IV. Utility Protection

This measure applies to several different utilities that can be adversely affected by floodwaters such as:

- Heating, Ventilation, and Air Conditioning (HVAC) systems
- Fuel meters and pipes
- Electrical service boxes, wiring and fixtures
- Sewage systems
- Water systems

Damage to utilities can prevent a residence that remains structurally sound after a flood from being reoccupied. Retrofitting utilities includes things as simple as raising them above the flood level, and building small walls around furnaces and water heaters to protect from shallow flooding as shown in Figure 29.

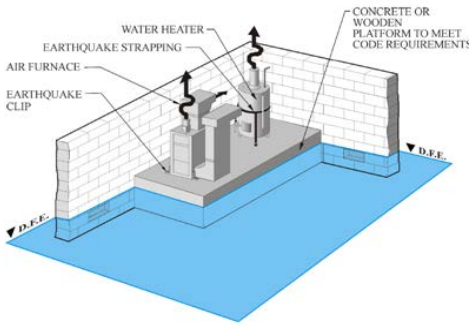


Figure 29 - Elevation of mechanical equipment; FEMA 348, Protecting Buildings from Flood Damage (1999)

Figure 30 - Elevation of HVAC in Westview Drive Area

According to the homeowner data sheets, only 2 (5%) of the respondents answered that they had moved utilities and/or contents to a higher level as a mitigation measure. There is a FEMA publication accessible on the web that addresses this concept. FEMA document 348: *Protecting Building Utilities from Flood Damage*[30] covers various ways to protect utilities; whether the building is a new construction, declared substantially damaged, or simply an existing structure in need of retrofitting, this document covers different techniques used in protecting utilities.

[30] http://www.fema.gov/media-library/assets/documents/3729

A. Cost: The cost for protecting utilities varies and is dependent upon the measure itself, condition of the system, structure, and foundation. Although methods for protecting utilities can be performed by the homeowners themselves, it is always a good idea to consult a professional contractor and/or engineer (depending on the project). The costs can be lower when done as part of a repair or remodeling project.

Residents interested in pursuing a retrofitting measure to protect their utilities should contact the Terrebonne Parish Consolidated Government Permits Office to determine whether a permit is required.

B. Feasibility: Given that the flooding experienced by the residents in the study areas includes both shallow and deep flooding, utility protection is a recommended mitigation measure. It should be incorporated even if the building will be protected by a levee or dry floodproofing to provide an extra layer of protection.

V. Drainage Improvements

Sometimes drainage can be improved at the household level. Some residents reported that they receive shallow flooding from rain storms. One resident installed a pipe connected to the gutter that directs water away from the house. Other residents installed extra drains in the backyard to help improve drainage. Still others use pumps to move the water to the drainage culverts and ditches.

At the neighborhood level, the community can improve drainage by cleaning and maintaining culverts and open ditches, ensuring that they are free of debris and allow water to flow unobstructed.

The parish would like to work on the pump station for the Jean Street area, as sometimes water goes over the banks on the south side and recirculates into the system. The parish is currently trying to obtain Hazard Mitigation Grant Program funding to fix this issue with the pump. The parish has already improved both pump engines, replaced culverts, and installed square culverts underneath roads to allow for more effective drainage.

In the Mike Street area, the parish completed a project which increased the size of the culverts and cleared the ditches in the backs of the houses. This does not affect the Jean Street area, but may be an option to help drainage in that area in the future.

The parish completed a project at the end of Westview Drive and St. Louis Canal road in 2014. The project added box culverts under the road to increase the water flowing under St. Louis Canal road and into the St. Louis Canal.

A heavy rain event in October 2015 stemming from the remnants of Hurricane Patricia, which resulted in 24 hours of rainfall of more than 11 inches into ground that was already saturated with water, did not cause water to enter any of the homes in either study area. Even the houses closest to the pumps did not flood. The pumps in the two study areas, which are automatically triggered by rising water levels, turned on at the appropriate times and remained in constant operation throughout the period of need. This is a significant improvement over a storm of lesser intensity 3 years ago.

VI. Drainage Maintenance Program

The Jean Street area and the Westview Drive area are in forced drainage areas Bonanza and 1-1B respectively (see drainage map below). In forced drainage areas, water is drained using a pump, rather

than gravity. The two study areas are in two different forced drainage areas, which means there are two different pumps helping drain each study area.

Figure 31 - Bayou Cane Drainage Map

Jean Street Area (Bonanza)

The canals in the Bonanza forced drainage area are inspected monthly by a maintenance contractor. This contractor is contracted to control the vegetation and cut grass. The maintenance also includes a monthly inspection. If the contractor finds anything in the canals they report it to the parish inspector. The canal levels are checked daily by pump attendants. There are inside outside gauges at each pump station to monitor the water levels. During rain events, the parish turns on a number of pumps. Most of the pumps are automated and activate on and off automatically, but pump attendants also monitor the levels. Some of the pump stations have a total of 5 engines, with 2-3 automated engines automated and 2 manual. In addition, the parish uses marsh buggies to respond to closures and has a daily crew that inspects drainage hot spots for blockages. One such hot spot is where the main canal crosses Martin Luther King Boulevard. Canals that are accessible by vehicle are checked often, while those that are off road are checked at least once a month, and/or when the parish receives reports from the residents. The Forced Drainage Division will be implementing a telemetry system with radio communications within the year, which will aid in remote monitoring of the pumps.

Westview Drive Area (1-1B)

The canals in the 1-1B forced drainage area are inspected monthly by a maintenance contractor. This contractor is contracted to control the vegetation and cut grass. The maintenance also includes a monthly inspection. If the contractor finds anything in the canals they report it to the parish inspector. The canal levels are checked daily by pump attendants. There are gauges at each pump station to monitor the water levels. During rain events, the parish turns on a number of pumps. Most of the pumps are automated and activate on and off automatically, but pump attendants also monitor the levels. Some of the pump stations have a total of 5 engines, with 2-3 automated engines automated and 2 manual. In addition, the parish uses marsh buggies to respond to closures and has a daily crew that inspects drainage hot spots for blockages. Canals that are accessible by vehicle are checked often, while those that are off road are checked at least once a month, and/or when the parish receives reports from the residents. In addition, as a part of the permit requirement for the area, water levels are monitored weekly by an engineering firm. The whole system must be maintained at a plus 1 level of elevation. The ground water elevation is checked weekly at 9 gauge locations inside the system, and 3 gauge locations outside of the system. After each inspection, a weekly report is sent to the parish. The Forced Drainage Division will be implementing a telemetry system with radio communications within the year, which will aid in remote monitoring of the pumps.

Terrebonne Parish's drainage maintenance program is so comprehensive that it exceeds the national standard level of effort set by the Community Rating System.

VII. Maintaining Flood Insurance

Although not a mitigation measure that reduces property damage from a flood, an NFIP policy does the following for the homeowner or renter:

- A flood insurance policy covers surface flooding from the overflow of inland or tidal waters or from storm water runoff, while homeowners insurance does not.
- Flood insurance may be the only source of assistance to help owners of damaged property pay for cleanup and repairs.
- Once in effect there is no need for human intervention.[31]
- Coverage is available for the contents of a home as well as for the structure.
- Renters can buy contents coverage, even if the building owner does not buy coverage for the structure itself.

Cost

Flood insurance rates are based on several factors, including what flood zone the building falls in and the age of the structure. Homes constructed before 1974 in Terrebonne Parish are "pre-FIRM" buildings, which mean that they were built before the date of the first Flood Insurance Rate Map (FIRM) for the community.

A building that is located in the Special Flood Hazard Area (SFHA) and constructed or substantially improved after the date of the most current FIRM – such as one built or substantially improved in 1987 – is required to be built above the base flood elevation, and is therefore subject to rates based on the

[31] There is a 30-day waiting period for a new flood insurance policy before it goes into effect.

actual risk rather than a subsidized rate. Rates on pre-FIRM buildings that are currently insured are subsidized because the flood risk was unknown at the time of construction.

CRS Class	Discount on SFHA premiums	Discount on non-SFHA premiums
10	0%	0%
9	5%	5%
8	10%	5%
7	15%	5%
6	20%	10%
5	25%	10%
4	30%	10%
3	35%	10%
2	40%	10%
1	45%	10%

Figure 32 - CRS Classes and Discounts
**Preferred Risk Policies do not receive a discount.*

Insurance Reform

In July 2012, Congress passed the Biggert-Waters Flood Insurance Reform Act of 2012 (BW-12). BW-12 was enacted to ensure the financial viability of the National Flood Insurance Program. Major components called for the elimination of subsidies currently allocated to flood insurance policyholders around the country. As of January 2013, policyholders began to see an increase (25%) in flood insurance for their non-primary residences. In October 2013, businesses, severe repetitive loss properties and those properties that have experienced losses that exceed the fair market value of their homes also began to see an increase (25%) in their premiums. Those policyholders whose properties were not insured as of July 2012, those with newly purchased properties or those who have allowed their policies to lapse were also set to receive an immediate increase to actuarial rates with no 25% phase in process for these properties.

However, as Congress began to witness the unintended consequences of BW- 12, the Homeowner Flood Insurance Affordability Act of 2014[32] was passed. Signed into law on March 21, 2014, the Affordability Act repeals and modifies certain provisions of section 207 of BW12 and makes additional program changes to other aspects of the NFIP. Overall, the new law reduces the recent rate increases on **some** policies, prevents **some** future rate increases, and implements a surcharge on **all** policyholders. The Act also repeals **specific** rate increases that have already gone into effect.

Grandfathering

Grandfathering applies to properties constructed in compliance with earlier Flood Insurance Rate Maps or those with continuous insurance coverage.[33] These properties can keep their original insurance rates when maps change. Additionally, subsidies will continue to follow the property during a real-estate transaction. Many details of this legislation continue to be discussed. Grandfathering will not apply to a pre-FIRM subsidized non-primary residence, business, severe repetitive loss property, or building that was substantially damaged or improved. Approximately half of the homes in each study area were built pre-FIRM, or before the effective date of the Flood Insurance Rate Map. These homes can receive subsidized rates from the NFIP, because they were built before the flood map was in place. If the homeowners keep their policy in force, they will keep that subsidized rate, despite any Flood Insurance Rate Map changes that may occur in the future. Because the parish has not yet ratified their preliminary

[32] http://www.fema.gov/media-library/assets/documents/93074
[33] http://www.floods.org/ace-files/documentlibrary/FEMA/FEMA_NFIP_Grandfathering_Fact_Sheet_Insurance_Agents_2009.pdf

DFIRMs, the effective flood map is still the map from 5/1/1985. Homeowners who do not have flood insurance yet may want to purchase a policy before the preliminary DFIRMs go into effect, as the base flood elevations in the parish have increased due to subsidence. Please see Appendix H for more information on the grandfather rule.

A summary of recent legislation can be found in Appendix E. Any resident who wants to know more should go to: http://www.fema.gov/flood-insurance-reform.[34] It is also important to talk with your flood insurance agent to make sure your policy is current and to learn more about the impending changes.

Community Rating System (CRS)

The CRS is a voluntary program that recognizes NFIP participating communities that go above and beyond the minimum requirements for floodplain management. Policy holders in participating communities are rewarded with reduced insurance premiums. CRS communities receive various credits for the floodplain management activities they implement. The more credit earned, the better the class ranking of that community. The CRS has 10 classes; a Class ranking of 10 has no flood insurance premium reduction, whereas a Class 1 carries the maximum discount.

Terrebonne Parish currently has a rating of 6 in the CRS, and receives $1,176,676 in discounts per year. The City of Houma, which is outside of our study areas, has a rating of 7 in the CRS, and receives $196,863 in discounts per year. Those properties that are not in the Special Flood Hazard Area or have Preferred Risk Policies do not receive a discount. Residents can check their flood insurance declaration page to verify they are receiving this discount.

VIII. Green Infrastructure[35]

Another flood mitigation measure is green infrastructure. Green infrastructure maximizes stormwater storage through porous surfaces and natural plants and systems. This allows rainwater to be stored rather than flooding streets, sidewalks and homes. It also removes some of the excess water from the local drainage system and reduces subsidence.

Neighborhood Level

Green infrastructure at the neighborhood level can be made up of bioswales, raingardens, constructed wetlands, retention ponds, detention ponds, pervious pavement and structural soils.

- Bioswales are a natural culvert that moves water from one place to another. They are planted with native grasses and plants and used for stormwater management.

[34] Also, www.floodsmart.gov
[35] The Louisiana Urban Stormwater Coalition & Dana Brown & Associates, Inc. Green Infrastructure: Planning & Policy.

Figure 33 - Bioswale, Source: EPA[36]

- Raingardens, another type of green infrastructure, are made up of plants planted in holes of sand rather than soil to allow for maximum drainage.

Figure 34 - Rain Garden, Source: The Joy of Water[37]

- Constructed wetlands mimic natural wetlands and serve to absorb runoff from a large area.
- Retention ponds hold water permanently, while detention ponds detain water before letting it slowly drain.

[36] http://water.epa.gov/infrastructure/greeninfrastructure/gi_what.cfm
[37] http://issuu.com/waterworksla/docs/the_joy_of_water_booklet_web

Figure 34 - Retention Pond, Source: EPA[38]

- In addition, pervious pavement and structural soils allow for slower stormwater drainage, and reduce the burden on local drainage systems.

Figure 35 - Pervious Pavement, Source: EPA[39]

Household Level

- French drains are another type of green infrastructure. They are a channel filled with rock to direct flow while allowing much of it to filter into the surrounding ground. They act as drains that filter water and can be installed in front, back and side yards.

[38] http://water.epa.gov/infrastructure/greeninfrastructure/gi_what.cfm
[39] http://water.epa.gov/infrastructure/greeninfrastructure/gi_what.cfm

Figure 36 - French Drain, Source: The Joy of Water[40]

- Rain barrels allow for stormwater management at the household level. Rain barrels collect rainwater from household gutters, and store it as gray water, which can be used for gardening.

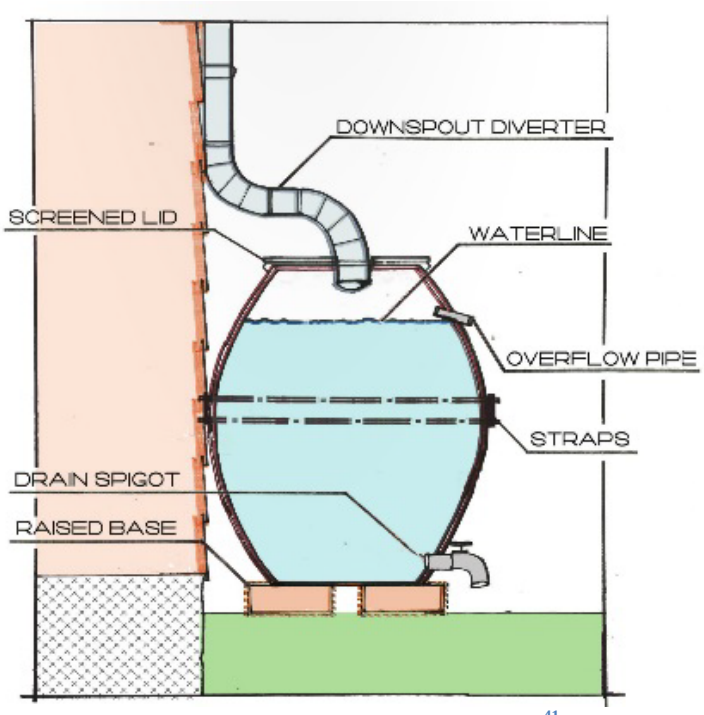


Figure 37 - Rain Barrel, Source: The Joy of Water[41]

For more information on green infrastructure projects, view The Joy of Water booklet, located at http://issuu.com/waterworksla/docs/the_joy_of_water_booklet_web.

[40] http://issuu.com/waterworksla/docs/the_joy_of_water_booklet_web
[41] http://issuu.com/waterworksla/docs/the_joy_of_water_booklet_web

Identifying Mitigation Measures

To determine which of the above mitigation measures may be suitable for a particular building, please refer to the following table of recommendations listed in order of preference. For example, recommended mitigation measures for a house that was built on a slab and experiences 12-18 inches of flooding include installing a barrier, implementing dry floodproofing, elevation and protection of utilities located below the base flood elevation. In addition, green infrastructure projects can be implemented at the individual, neighborhood and community level to help reduce flooding.

The mitigation recommendations for the homes in this study are based on the data shown in the table and data not included in this report (e.g., the photographs of the properties, responses on the data sheets, and insurance data subject to the Privacy Act). Results are found in Appendix D.

Some residents may want to mitigate against conditions experienced during a heavy rainstorm event. The suggested mitigation measure for these conditions is to elevate on posts or piers to two feet above the experienced flood level. A challenge of this type of mitigation measure is the guidelines and requirements for the mitigation grant process (many grants will only allow residents to elevate to the base flood elevation).

For those who want protection from the more frequent repetitive flooding caused by storm events with heavy rainfall that overwhelms the drainage system, refer to the table for appropriate mitigation techniques. The average depth of flooding for the 31 homes that made flood insurance claims in the Jean Street study area is 2.9 feet. The Westview Drive study area had an average flood depth of 2.3 feet.

	Elevation	Barrier	Dry Floodproofing	Utility Protection
House on slab (diagram 1A and 1B)				
Flood depth < 2 feet over first floor	3	1	2	4
Flood depth ≥ 2 feet over first floor	1			2
House on elevated foundation (diagram 5 – 9)				
Flood depth < 2 feet over first floor	1	2		3
Flood depth ≥ 2 feet over first floor	1			2

Figure 38 - Mitigation Recommendations for standard rainfall events[42] (Numbers indicate order of preference)

Possible Funding Sources:

There are several possible sources of funding for mitigation projects:

A. FEMA grants
B. Flood Insurance
C. Rebates
D. Small Business Administration Mitigation Loans

[42] These recommendations are based on Chapter 3 of FEMA 551: Selecting Appropriate Mitigation Measures for Floodprone Structures, and tailored to conditions in southern Louisiana

FEMA grants:

Most of the FEMA programs provide 75% of the cost of a project. In most Gulf communities, the 25% non-FEMA share is paid by the benefitting property owner. Each program has different Congressional authorization and slightly different rules. The grants are administered by the state and communities apply on behalf of their residents. Although these grants are not available for individual homeowners, homeowners can partner with their locality and the Governor's Office of Homeland Security and Emergency Preparedness (GOHSEP) to apply for the funds. Therefore, individual homeowners are the eventual recipients of the money.

Figure 39 - FEMA Grant Eligible Activities as of 8/25/15

ELIGIBLE ACTIVITIES	HMGP	PDM	FMA
1. Mitigation Projects	√	√	√
Property Acquisition and Structure Demolition	√	√	√
Property Acquisition and Structure Relocation	√	√	√
Structure Elevation	√	√	√
Mitigation Reconstruction	√	√	√
Dry Floodproofing of Historic Residential Structures	√	√	√
Dry Floodproofing of Non-residential Structures	√	√	√
Generators	√	√	
Localized Flood Risk Reduction Projects	√	√	√
Non-Localized Flood Risk Reduction Projects	√	√	
Structural Retrofitting of Existing Buildings	√	√	√
Non-structural Retrofitting of Existing Buildings and Facilities	√	√	√
Safe Room Construction	√	√	
Wind Retrofit for One- and Two-Family Residences	√	√	
Infrastructure Retrofit	√	√	√
Soil Stabilization	√	√	√
Wildfire Mitigation	√	√	
Post-Disaster Code Enforcement	√		
5 Percent Initiative Projects	√		
Advance Assistance	√		

ELIGIBLE ACTIVITIES	HMGP	PDM	FMA
5 Percent Initiative Projects	√		
Miscellaneous/Other (1)	√	√	√
2. Hazard Mitigation Planning	√	√	√
3. Management Costs	√	√	√

1. **The Hazard Mitigation Grant Program (HMGP):**[43] The HMGP provides grants to states and local governments to implement long-term hazard mitigation measures after a major disaster declaration. Projects must provide a long-term solution to a problem (e.g., elevation of a home to reduce the risk of flood damage as opposed to buying sandbags and pumps to fight the flood). Examples of eligible projects include acquisition and elevation, as well as local drainage projects.

2. **The Flood Mitigation Assistance Program (FMA):**[44] FMA funds assist states and communities in implementing measures that reduce or eliminate the long-term risk of flood damage to structures insured under the NFIP.

    - **Project Grants** to implement measures to reduce flood losses, such as elevation, acquisition, or relocation of NFIP-insured structures. GOHSEP administers project grants for the state of Louisiana.

3. **Pre-Disaster Mitigation Program (PDM):** The PDM program provides funds to states, territories, Indian tribal governments, communities, and universities for hazard mitigation planning and the implementation of mitigation projects prior to a disaster event. There are several requirements that must be met in order to receive PDM funding. For more information please visit https://www.fema.gov/pre-disaster-mitigation-grant-program.

B. ICC – Flood Insurance

There is a special funding provision in the NFIP for insured buildings that have been substantially damaged by a flood, "Increased Cost of Compliance (ICC)". ICC coverage pays for the cost to comply with floodplain management regulations after a flood if the building has been declared substantially damaged. ICC will pay up to $30,000 to help cover elevation, relocation, demolition, and (for nonresidential buildings) floodproofing. It can also be used to help pay the 25% owner's share of a FEMA funded mitigation project.

The building's flood insurance policy must have been in effect during the flood. This payment is in addition to the damage claim payment that would be made under the regular policy coverage, as long as the total claim does not exceed $250,000. Claims must be accompanied by a substantial or repetitive damage determination made by the local floodplain administrator. For more information, contact the

[43] For more information please visit https://www.fema.gov/hazard-mitigation-grant-program
[44] For more information please visit: https://www.fema.gov/flood-mitigation-assistance-grant-program

Office of Community Development, the insurance agent who wrote your flood insurance policy and/or visit http://www.fema.gov/increased-cost-compliance-coverage.

Coverage under the ICC does have limitations:

- It covers only damage caused by a flood, as opposed to wind or fire damage,
- The building's flood insurance policy must have been in effect during the flood,
- ICC payments are limited to $30,000 per structure,
- Claims must be accompanied by a substantial damage determination made by the local floodplain administrator,
- And, homeowners should make themselves aware of the approximate value of their homes, and in the case of incurring flood damage, be aware of the need for a substantial damage declaration in order to receive the ICC coverage.

Alternative language adopted into the local floodplain management ordinance would enable residents with shallower flooding to access ICC funding. Since local ordinances determine the threshold at which substantial damage and /or repetitive claims are reached, adopting language that would lower these thresholds would benefit the homeowners of repetitive loss properties. Adopting alternative language allows for cumulative damage to reach the threshold for federal mitigation resources more quickly, meaning that some of the properties in both study areas that sustain minor damage regularly would qualify for mitigation assistance through ICC.

C. Rebates

A rebate is a grant in which the costs are shared by the homeowner and another source, such as the local government, usually given to a property owner after a project has been completed. Many communities favor it because the owner handles all the design details, contracting, and payment before the community provides funding. The owner ensures that the project meets all of the program's criteria, has the project constructed, and then goes to the community for the rebate after the completed project passes inspection. Rebates are more successful where the cost of the project is relatively small, e.g., under $5,000, because the owner is more likely to be able to afford the bulk of the cost. The rebate acts more as an incentive, rather than as a grant that covers most of the cost.[45]

D. Small Business Administration Mitigation Loans

The Small Business Administration (SBA) offers mitigation loans to SBA disaster loan applicants who have not yet closed on their disaster loan. Applicants who have already closed must demonstrate that the delay in application was beyond their control. Measures eligible for SBA mitigation loans may only protect real estate property, not personal items, from the same type of future declared disaster. For more information visit the website www.sba.gov or call 1-800-827-5722. For example, mitigation loans made following a flood can only be used for a measure to protect against future flooding, not a tornado. If the measure existed prior to the declared disaster, an SBA mitigation loan will cover the replacement cost. If the measure did not exist prior to the declared disaster, the mitigation loan will only cover the cost of the measure if it is deemed absolutely necessary for repairing the property by a professional third-party, such as an engineer[46].

[45] More information on rebates can be found in the Corps of Engineers' report Local Flood Proofing Programs found at: http://crsresources.org/files/300/360_local_flood_proofing_programs_2005.pdf.

[46] For more information visit the SBA Disaster Loans home page on the web at https://www.sba.gov/content/disaster-assistance

Step 5: Findings and Recommendations

Findings

Properties in all three study areas are subject to flooding due to:

- heavy rainfall, from tropical storms and thunderstorms that overwhelms the forced drainage system
- low land elevation (between 4 and 5 feet)
- low building elevation (mostly slab on grade structures)

Recommendations

For Terrebonne Parish

Implemented by: Terrebonne Parish
Potential Funding sources: FEMA, Flood Insurance and Small Business Administration Loans, Parish Funds, and Staff Time

- Adopt this Area Analysis according to the process detailed in the CRS Coordinator's Manual, 2013.
- Encourage the owners of repetitive flood loss structures to pursue one or more mitigation measures.
- Continue to assist interested property owners in applying for mitigation grants.
- Continue to improve the drainage.
- Continue to work on activities related to the Community Rating System (CRS).
- Continue public information activities, such as outreach projects, websites, and flood protection assistance that help residents learn about and implement mitigation measures.

For the residents of Westview Drive and Jean Street Study Areas

Implemented by: Residents of Westview Drive and Jean Street study areas
Potential Funding sources: FEMA grants (HMGP, PDM, FMA), Flood Insurance, Rebates, Small Business Administration Mitigation Loans

- Review the mitigation measures listed in this report and implement those that are appropriate: elevation, barriers to floodwaters, dry floodproofing, elevating utilities, and obtaining flood insurance.
- Stay up to date with what Terrebonne Parish is doing in regards to flood protection: www.tpcg.org.
- Purchase or maintain flood insurance policies on the home (if a homeowner) and/or on the contents (homeowners and renters). More information can be found at www.floodsmart.gov .
- Stay informed of the changes being made to the NFIP by the implementation of the Biggert-Waters Flood Insurance Reform and Modernization Act of 2012: http://www.fema.gov/flood-insurance-reform or www.floodsmart.gov.
- Read through the LSU Homeowner's Handbook to Prepare for Natural Hazards for more information on appropriate mitigation measures, available online at: www.lsu.edu/sglegal/pubs/handbook.htm.

Public Meeting

Figure 40 - Neighborhood Meeting held on October 27, 2015

Results of this Area Analysis were presented at a public meeting on Tuesday, October 27, 2015 at the Lisa Park Elementary School Gym**.** In order to broaden the mitigation measures to a wider area of the neighborhood, and because both areas have similar homes throughout each neighborhood, the project team invited a larger audience to the second meeting. This area was labeled the outreach area, and included residents from Cavaness Drive to Richard Drive, and Harvey Avenue to St. Louis Canal Road, in the Westview Drive study area (Figure 41), and residents from Daigle Street to Main Street, and Ann Carol Street to Kellie Drive, in the Jean Street area (Figure 42). Residents of the two study areas, as well as residents of the outreach areas, were sent a postcard informing them of the meeting (See Appendix I). Notice of the meeting was also posted on Terrebonne Parish's website, www.tpcg.org. The maps of the analysis and outreach areas are below.

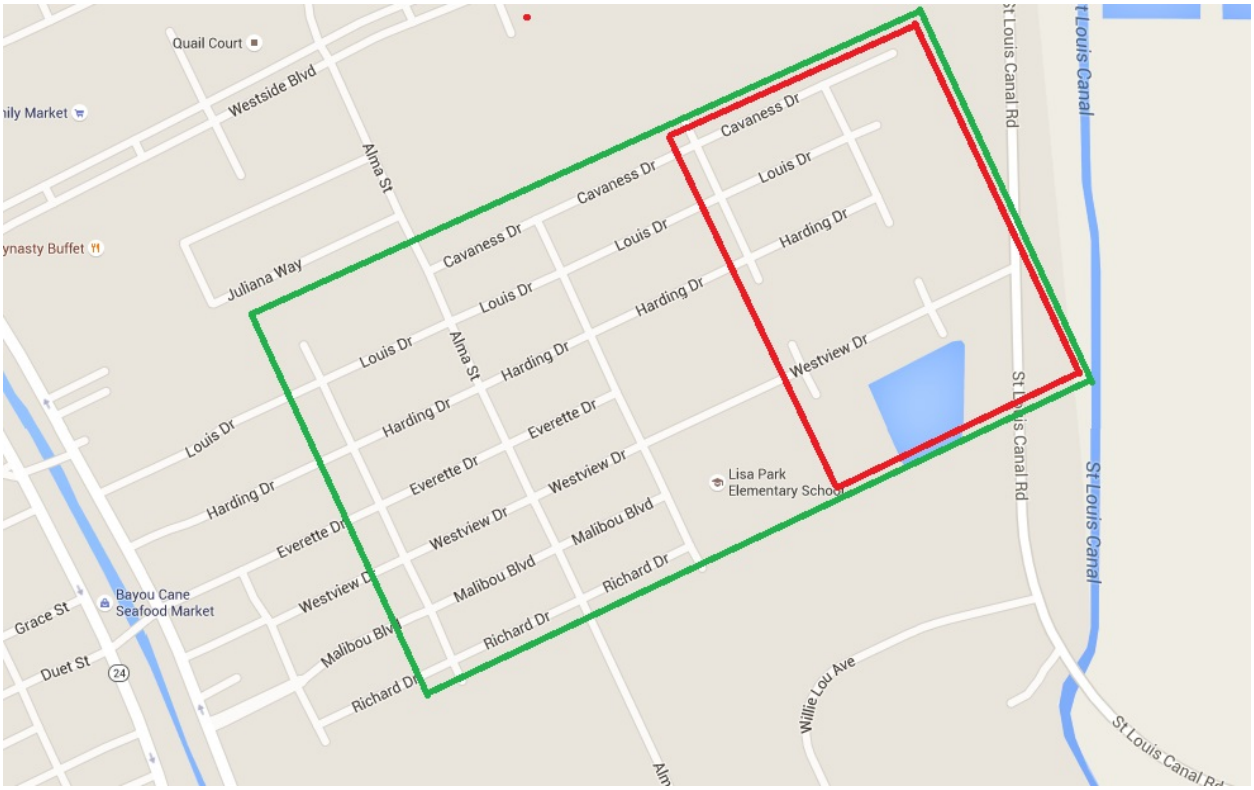


Figure 41 - Westview Drive Outreach Area Map

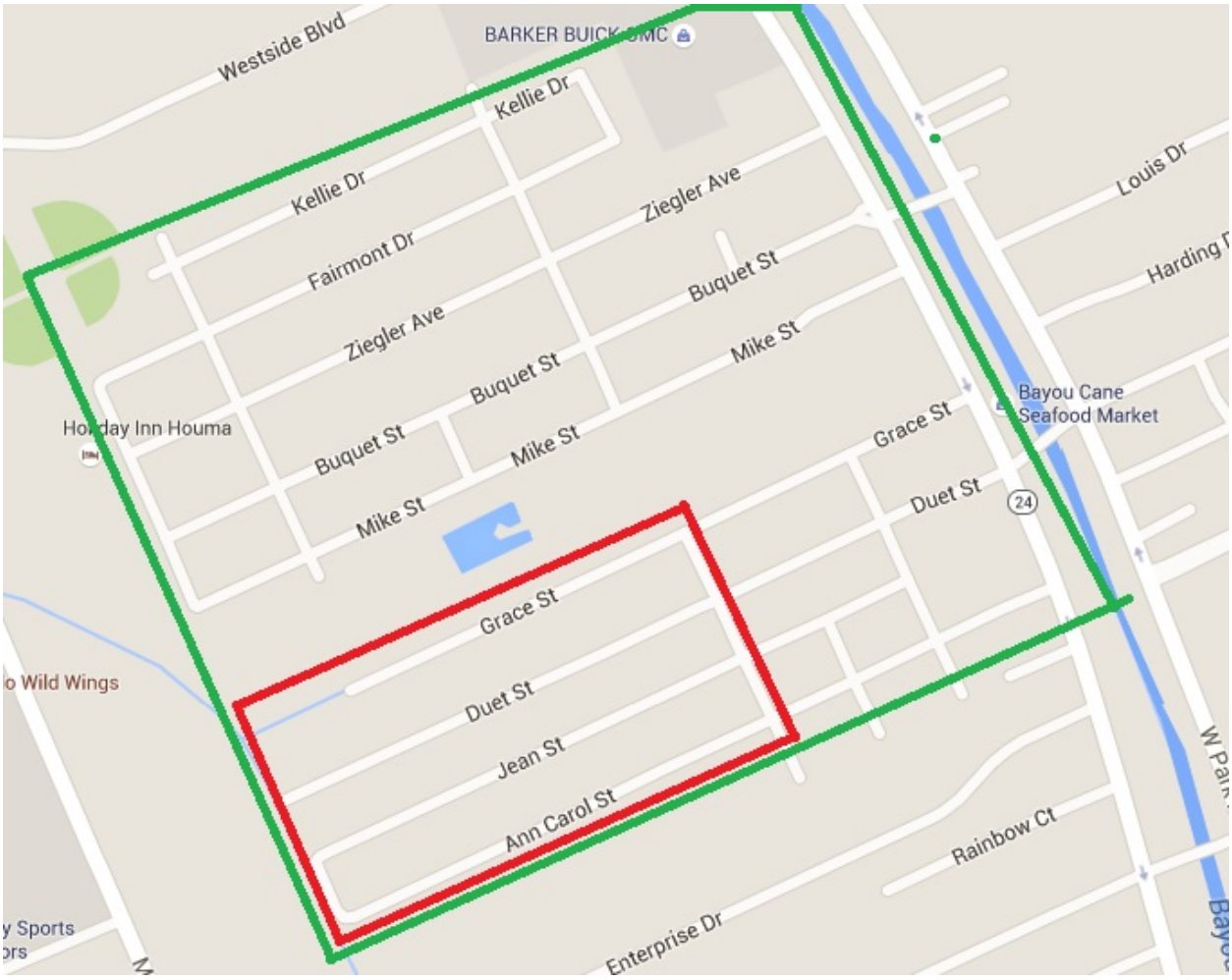


Figure 42 - Jean Street Outreach Area Map

Appendix A – Data sheet responses

The following tables represent responses from residents in the two study areas who returned the data sheets that were mailed out during the initial neighborhood notification process.

Table 1: Neighborhood	Frequency	Vacant or undeliverable	Total Mailed	%
Westview Dr.	14	7	86	17.7%
Jean St.	24	6	136	18.6%
Total	**38**	**13**	**222**	**18.3%**

A total of 222 surveys were mailed out between the two study areas. Both study areas responded at about the same frequency, 17.7% for the Westview Drive study area, and 17.7% for the Jean Street study area. Of the 222 surveys that were mailed out, 13 came back as "undeliverable," or were sent to vacant properties. The total number of homes recorded in the field data does not match the number of surveys mailed out, as extra addresses and homes were discovered during the fieldwork. Addresses for the mailing came from the Parish's GIS department.

Table 2: House's Foundation Type				
	Westview Drive	%	Jean Street	%
Slab	14	100.0%	17	70.8%
Crawlspace	0	0.0%	1	4.2%
Blocks	0	0.0%	4	16.7%
Posts/ Piles	0	0.0%	1	4.2%
Other	0	0.0%	1	4.2%
Total	**14**	**100.0%**	**24**	**100.0%**

*Percentage values in this table do not add up to 100% and total 100.1% as each percentage value is rounded to the first decimal place.

The most common foundation type reported in both study areas was slab on grade, with 100.0% frequency in the Westview Drive study area, and 69.6% frequency in the Jean Street study area.

Table 3: Has your property ever flooded?				
	Westview Drive	%	Jean Street	%
Yes	10	71.4%	15	62.5%
No	3	21.4%	8	33.3%
Unsure	1	7.14%	1	4.2%
Total	**14**	**100.00%**	**24**	**100.00%**

*Percentage values in this table do not add up to 100%, as each percentage value is rounded to the first decimal place.

A total of 71.4% of respondents in the Westview Drive study area reported flooding at least once, while 62.5% of respondents in the Jean Street study area reported flooding at least once. Respondents who reported an "unsure" response to flooding stated that the homeowners had moved into the building or home prior to the flooding and had not actually experienced the flood themselves, but were told of the flooding by the previous owners.

Since there was no single event that accounted for flooding in the two study areas and flooding occurred during several different events, respondents were asked to report when the flooding occurred. Respondents could answer the question in either a date format, or with the name of a storm, e.g., "Hurricane Isaac."

Table 4: In what years did your home flood?				
Year/ Event Flooded	**Westview Drive**	**%**	**Jean Street**	**%**
1987 Unspecified Event	0	0.0%	1	3.5%
1990 Unspecified Event	0	0.0%	2	6.9%
1991 Heavy Rain Event	4	23.5%	3	10.3%
1992 Hurricane Andrew	0	0.0%	0	0.0%
1993 Unspecified Event	0	0.0%	1	3.5%
1995 Heavy Rain Event	0	0.0%	1	3.5%
2002 Hurricane Lili	1	5.9%	2	6.9%
2008 Hurricane Ike	0	0.0%	1	3.5%
2009 Heavy Rain Event	4	23.5%	3	10.3%
2010 Unspecified Event	0	0.0%	1	3.5%
2012 Hurricane Isaac	3	17.7%	3	10.3%
Unsure/ No response	5	29.4%	11	37.9%
Total:	**17**	**100.0%**	**29**	**100.0%**

*Percentage values in the Jean St. column in this table do not add up to 100%, as each percentage value is rounded to the first decimal place.

A total of 23.5% of respondents in the Westview Drive study area reported flooding during heavy rain events in 1991 and 2009. During Hurricane Isaac, 17.7% of respondents in the Westview Drive study area reported flooding. A total of 10.3% of respondents in the Jean Street study area reported flooding during heavy rain events in 1991 and 2009, as well as during Hurricane Isaac. Approximately 37.9% of respondents in the Jean Street study area also reported either not knowing what event caused flooding, or did not have a response at all to flooding.

Table 5: What was the deepest the water got in your home?				
Water Depth	**Westview Drive**	**%**	**Jean Street**	**%**
0-6 inches	3	21.0%	5	21.0%
6-1 foot	6	43.0%	1	4.0%
1-2 foot	2	14.0%	4	17.0%
2-3 foot	0	0.0%	1	4.0%

3-4 foot	0	0.0%	0	0.0%
No level reported	3	21.0%	13	54.0%
Total	14	100.0%	24	100.0%

*Percentage values in the Westview Drive column of this table do not add up to 100%, as each percentage value is rounded to the first decimal place.

Respondents were asked to report the highest depths of water they experienced during flooding. A total of 21.0% of respondents in both study areas reported flooding below six inches. A total of 43.0% of respondents in the Westview Drive study area reported flooding depths at six inches to a foot. Approximately 17.0% of respondents in the Jean Street study area reported flood depths at one to two feet of water, while 54.0% of respondents did not give an actual flood depth.

Table 6: What year was the water the deepest?				
	Westview	**%**	**Jean**	**%**
1991	0	0.0%	2	8.0%
2002	0	0.0%	0	0.0%
2008	0	0.0%	0	0.0%
2009	0	0.0%	0	0.0%
2012	0	0.0%	0	0.0%
No response	14	100.0%	22	92.0%
Total	14	100.0%	24	100.0%

Respondents were also asked to report the years that the highest flood depths were recorded. Response rate was low for both study areas; in the Westview Drive study area, no respondents gave an actual date, and in the Jean Street study area, 8.0% of respondents reported that flooding in 1991 caused the highest water depths.

Respondents were asked to give details as to what they thought caused the majority of their flooding. A total of 71.0% of respondents in the Westview Drive study area reported that drainage from nearby properties was the main cause of flooding. Respondents in the Westview Drive study area also reported that overbank flooding from nearby ditch/canal (57.0%) and clogged/undersized drainage ditch/canal (50.0%) also contributed to flooding. In the Jean Street study area, 61.0% of respondents reported clogged/ undersized drainage ditch/canal were the cause of flooding, and 43.0% of respondents reported drainage from nearby properties, and overbank flooding from nearby ditch/canal to be the cause of flooding. Respondents from both study areas reported these three causes as the source of flooding.

Table 7: What do you feel was the cause of your flooding?								
	Westview Drive				**Jean Street**			
	Yes	**%**	**No**	**%**	**Yes**	**%**	**No**	**%**
Drainage from nearby properties	10	71.0%	4	29.0%	10	43.0%	12	52.0%

Storm sewer backup	3	21.0%	11	79.0%	6	26.0%	8	35.0%
Storm surge from nearby waterways	3	21.0%	11	79.0%	2	9.0%	14	61.0%
sanitary sewer backup	3	21.0%	11	79.0%	4	17.0%	19	83.0%
Clogged/ undersized drainage ditch/canal	7	50.0%	7	50.0%	14	61.0%	9	39.0%
Standing water next to house	1	7.0%	13	93.0%	2	9.0%	21	91.0%
Overbank flooding from nearby ditch/canal	8	57.0%	6	43.0%	10	43.0%	13	57.0%
Other:	3	21.0%	11	79.0%	7	30.0%	16	70.0%

Respondents were asked if they had taken additional steps to protect their home from flooding. The majority (64.0%) in the Westview Drive study area and 39.0% in the Jean Street study area reported sandbagging when water threatened. A total of 14.0% of respondents in the Westview Drive study area reported installing drains or pipes to improve drainage, as well as waterproofing the outside of the walls. A total of 26.0% of respondents in the Jean Street study area reported installing drains or pipes to improve drainage, and gave detailed accounts as to how this process has worked.

One respondent from the Jean Street area gave a detailed account of the pipe system installed: “I installed a pipe from one gutter to direct water away from back corner of house. I think I would need more and pipes run further away from home.” Another respondent from the Jean Street study area stated that: “The drains we installed only assist when flood waters are not covering them. We are only prepared to sandbag when a tropical storm or hurricane approaches. We don't have access or time to sandbag our house for a standard thunderstorm.”

Table 8: Have you taken any flood protection measures on your property?								
	Westview Drive				**Jean Street**			
	Yes	**%**	**No**	**%**	**Yes**	**%**	**No**	**%**
Moved utilities/ contents to a higher level?	2	14.0%	12	86.0%	4	17%	19	83.0%
Elevated all or parts of the building?	0	0.0%	14	100.0%	2	9%	21	91.0%
Regraded yard to keep water away from building?	1	7.0%	13	93.0%	2	9%	21	91.0%
Waterproofed the outside walls?	2	14.0%	12	86.0%	1	4%	22	96.0%
Installed drains or pipes to improved drainage?	2	14.0%	12	86.0%	6	26%	17	74.0%
Built a wall to keep	1	7.0%	13	93.0%	2	9%	21	91.0%

water away?								
Sandbagged when water threatened?	9	64.0%	3	21.0%	9	39%	14	61.0%
Other:	1	7.0%	13	93.0%	4	17%	19	83.0%

The survey asked which protective measures worked for respondents. The responses were mixed for the Westview Drive study area, as 43.0% of respondents reported that they were unsure of whether the measures worked, or did not give a response at all. A total of 36.0% of the respondents in the Westview Drive study area reported that some of the measures did work. When asked which of these measures worked, respondents had varying answers, but responded that raising utilities and household appliances worked the best. A total of 48.0% of respondents in the Jean Street study area reported that some of the mitigation measures worked, including sandbagging and installing pipes.

Table 9: Did any of the measures in item 10 work?	**Westview Drive**	**%**	**Jean Street**	**%**
Yes	5	36.0%	11	46.0%
No	3	21.0%	4	17.0%
Unsure/ No Response	6	43.0%	9	38.0%
Total	**14**	**100.0%**	**24**	**100.0%**

*Percentage values in the Jean Street column of this table do not add up to 100%, as each percentage value was rounded to the first decimal place.

Table 10: Do you have flood insurance?	**Westview Drive**	**%**	**Jean Street**	**%**
Yes	9	64.0%	11	46.0%
No	3	21.0%	11	46.0%
No response	2	14.0%	2	8.0%
Total	**14**	**100.0%**	**24**	**100.0%**

*Percentage values in the Westview Drive column of the table do not add up to 100%, as each percentage value is rounded to the first decimal place.

Respondents were asked if they carried flood insurance on their homes. A total of 64.0% of respondents in the Westview Drive study area reported having flood insurance, while 46.0% in the Jean Street study areas reported carrying flood insurance.

Table 11: Are you interested in pursuing measures to protect the property from flooding?		%		%
	Westview Drive		Jean Street	
Yes	11	79.0%	11	46.0%
No	2	14.0%	9	38.0%
No Response	1	7.0%	4	17.0%
Total	**14**	**100.0%**	**24**	**100.0%**

*Percentage values in the Jean Street column for this table do not add up to 100%, as each percentage value was rounded to the first decimal place.

The majority of Westview Drive study area respondents, 79.0%, are interested in pursuing measures to protect their property from flooding. A total of 46.0% of respondents in the Jean Street study area are also interested in pursuing measures to protect their property from flooding.

A comment section was provided on the survey form. Of the 39 respondents in both study areas, 51.0% gave additional comments detailing what they think might be causing the flooding, or gave a more detailed account to their flooding experiences. Of these comments, several homeowners stated that they believed that development along Martin Luther King Boulevard was and is causing more severe flooding in the neighborhood. The development began in 1989, and development has continued through the present day. More recent development has occurred along the Boulevard and further along Highway 3040. Another comment that respondents brought up was the issue of keeping ditches and drains clear, maintenance that can be done by both homeowners and the city. The other response topics included: drainage pumps, information related to flood insurance, and details about homeowners who owned multiple properties and use the residences for rental units.

Appendix B – Letter to residents of Bayou Cane

P. O. BOX 6097
HOUMA, LOUISIANA 70361
(985) 868-5050

P. O. BOX 2768
HOUMA, LOUISIANA 70361
(985) 868-3000

TERREBONNE PARISH
CONSOLIDATED GOVERNMENT

PLANNING & ZONING DEPARTMENT
REGULATORY DIVISION

July 15, 2015

Dear Bayou Cane Resident,

Terrebonne Parish has partnered with the University of New Orleans' Center for Hazards Assessment, Response and Technology (UNO-CHART) to conduct a study that looks into the repetitive flooding of your neighborhood. The purpose of this study is to get a better understanding of what the flooding issues in the neighborhood are, as well as offer ideas about how to mitigate and reduce future flood losses.

Terrebonne Parish and UNO-CHART would like to invite you to an informative meeting held on **Tuesday, July 28 at 6:30 PM located at the Lisa Park Gym, 6639 Lisa Park Avenue, Houma, LA 70360.** At this meeting there will be a short presentation explaining the study and how it will be carried out.

To improve our study and provide better recommendations to homeowners we have attached a data sheet for you to fill out. Any information you can provide us is greatly appreciated. After you complete the form, please bring it with you to the meeting on July 28, or mail it back to CHART in the stamped and addressed envelope provided.

After the meeting on July 28, UNO-CHART will be in the area doing some light fieldwork that will include taking pictures from the street of each building, noting the foundation type and building structure, estimated elevation of the street, etc. If you would like to talk to the research team about your flooding experiences, this information would greatly enhance this study. The research team **will not** enter your home unless you invite them.

After the study is completed, some preliminary recommendations will be developed. You will be invited to a final meeting with the UNO-CHART team to review the findings. The meeting time and location will be announced once the analysis is near completion. This study is designed to help your neighborhood and community become more resilient to future flooding. If you have any questions about this project, please feel free to call Geoffrey Large with the Planning & Zoning Department at (985) 873-6567, or if you want to talk to the research team, call Tara Lambeth at (504) 280-6071.

Thank you for your assistance, and we look forward to partnering with you and your community.

Geoffrey Large, MDipMS, CBO, CHCO, CCI, CSI.
Assistant Director, Planning and Zoning
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Appendix C – Neighborhood Data Collection and Findings

Aggregated Data

Table 1: Neighborhood

Table 1: Neighborhood		
Neighborhood	**Frequency**	**%**
Westview Drive	92	35.4%
Jean Street	168	64.6%
Total	**260**	**100.0%**

The Jean Street study area is the largest of the two study areas, and it contains 64.6% of the homes in this analysis.

Table 2: Is the Property Occupied?

Table 2: Is the Property Occupied?				
Is the property occupied?	**Westview Drive**	**%**	**Jean Street**	**%**
Yes	79	85.9%	152	90.5%
No	13	14.1%	15	8.9%
Unsure	0	0.0%	1	0.6%
Total	**92**	**100**	**168**	**100.0%**

Through field observations, it was determined that 85.9% of the homes in the Westview Drive study area were occupied. A total of 14.1% were unoccupied, and occupancy status was accounted for each home. In the Jean Street neighborhood, it was determined that 90.5% of the homes were occupied, with 8.9% unoccupied, and another 0.6% were undetermined. Both neighborhoods had vacant lots that once had houses, which were still counted in the study, since these homes had been removed by the city for mitigation purposes due to severe flooding.

Table 3: Structure's Foundation Type

Table 3: Structure's Foundation Type				
	Neighborhood			
Foundation Type	**Westview Drive**	**%**	**Jean Street**	**%**
1 A: Slab on Grade	85	92%	65	38.7%
1 B: Thick Slab	0	0.0%	3	1.8%
3: Split Level	0	0.0%	5	3.0%
5: Posts/ Piers	1	1.1%	75	44.6%
8: Crawlspace	0	0.0%	3	1.8%
Unsure	6	6.5%	17	10.1%
Total	**92**	**100.0%**	**168**	**100.0%**

*Percentage values in the Westview Drive column of this table do not add up to 100%, as each percentage value was rounded to the first decimal place.

The most common foundation type in the Westview Drive study area was slab on grade (92%). Slab on grade accounted for all recorded foundation types in the Westview Drive study area, except for one home, and the other 6.5% were undetermined. The 6 homes that were labeled as undetermined represent the homes that were acquired by the parish and are now vacant lots. In the Jean Street study area, the most common type of foundation structure was posts and piers (44.6%). The second most common type of foundation structure was slab on grade (38.7%). A few vacant lots with previously razed houses also exist in the Jean Street study area, but some of the 17 undetermined also represent homes that had skirting or barriers that blocked the view of the foundation type from the street.

Table 4: Number of Stories

Table 4: Number of Stories				
Number of Stories	**Westview Drive**	**%**	**Jean Street**	**%**
1	85	92.4%	148	88.1%
1.5	0	0.0%	1	0.6%
2	1	1.1%	4	2.4%
3	0	0.0%	0	0.0%
Unknown	6	6.5%	15	8.9%
Total	**92**	**100.0%**	**168**	**100.0%**

Over 88% of the homes in both study areas are one story. A total of 92.4% of the homes in the Westview Drive study area are one story, and 88.1% of the homes in the Jean Street study area are one story. Again, vacant lots with addresses were recorded in the field survey and account for the homes labeled as unknown.

Table 5: How high is the home elevated above grade?

Table 5: Home Elevated Above Grade				
Height Above Grade	**Westview Drive**	**%**	**Jean Street**	**%**
0-6 inches	57	62.0%	56	33.3%
6 inches-1 foot	23	25.0%	17	10.1%
1-1.5 feet	5	5.4%	18	10.7%
1.5-2 feet	0	0.0%	5	3.0%
2-2.5 feet	0	0.0%	38	22.6%
2.5-3 feet	0	0.0%	12	7.1%
3-3.5 feet	0	0.0%	6	3.7%
3.5-4 feet	1	1.1%	0	0.0%
Unknown	6	6.5%	16	9.5%
Total	**92**	**100.0%**	**168**	**100.0%**

Most homes (62.0%) in the Westview Drive study are built six inches or less above the adjacent grade. A total of 33.3% are built six inches to a foot above the adjacent grade. In the Jean Street study area,

elevations above grade are more varied. The most common elevation (33.3%) above grade is six inches or less. The second most common (22.6%) elevation above grade is between 2 and 2.5 feet.

Table 6: How high is the home elevated above the street?

Table 6: Home Elevated Above Street				
Height Above street	**Westview Dr.**	**%**	**Jean St.**	**%**
0-6 inches	13	14.1%	116	69.1%
6 inches-1 foot	64	69.6%	31	18.5%
1-1.5 feet	2	2.2%	5	3.0%
1.5-2 feet	7	7.6%	0	0.0%
2-2.5 feet	0	0.0%	0	0.0%
2.5-3 feet	0	0.0%	0	0.0%
3-3.5 feet	0	0.0%	0	0.0%
3.5-4 feet	0	0.0%	0	0.0%
Unknown	6	6.5%	16	9.5%
Total	**92**	**100.0%**	**168**	**100.0%**

*Percentage values in the Jean St. column of this table do not add up to 100%, as each percentage value was rounded to the first decimal place.

Most homes (69.6%) in the Westview Drive study area are six inches to a foot above the street level. A total of 69.1% of homes in the Jean Street study area are less than half a foot from street level.

In addition to looking at the elevation of the homes at grade, and the elevation of homes above the street level, the condition of the homes' foundation was also noted. Foundation condition was recorded to determine levels of subsidence as well as possibility for elevation.

Table 5: Foundation Condition

Table 5: Foundation Condition				
Foundation Condition	**Westview Drive**	**%**	**Jean Street**	**%**
Good	86	93.5%	137	81.6%
Fair	0	0.0%	5	3.0%
Poor	0	0.0%	8	4.8%
Unknown	6	6.5%	18	10.7%
Total	**92**	**100.0%**	**168**	**100.0%**

*Percentage values in the Jean St. column of this table do not add up to 100%, as each percentage value was rounded to the first decimal place.

The majority of the homes (93.5%) in the Westview Drive study area showed signs of a good foundation, and 6.5% could not be determined. Homes in the Jean Street study area also had a majority (81.6%) of homes with good foundations. A total of 3.0% of the homes had foundations in fair condition, and 4.8% had foundations in poor condition. A total of 10.7% could not be determined.

Table 8: Structure's Construction Type

Table 8: Structure's Construction Type				
Construction Type	**Westview Drive**	**%**	**Jean Street**	**%**
Brick	84	91.3%	49	29.2%
Mobile Home	0	0.0%	55	32.7%
Siding (wood, vinyl)	2	2.2%	34	20.2%
Manufactured Home	0	0.0%	9	5.4%
Other	0	0.0%	5	3.0%
Unsure	6	6.5%	16	9.5%
Total	**92**	**100.0%**	**168**	**100.0%**

Most homes in the Westview Drive study area are brick faced (91.3%), a small number (2.2%) were wood or vinyl faced, and 6.5% of homes could not be determined. Homes in the Jean Street study area varied more, and the most common homes consisted of 32.7% mobile home, 29.2% brick faced, and 20.2% were wood or vinyl faced.

Table 9: HVAC Mitigation				
Elevated	**Westview Drive**	**%**	**Jean Street**	**%**
Yes	3	3.3%	15	8.9%
No	89	96.7%	153	91.1%
Total	**92**	**100.0%**	**168**	**100.0%**

Some homes in both study areas show different types of mitigation. One mitigation measure that appeared frequently was elevated HVAC systems. In the Westview Drive study area 3.3% of the homes had elevated HVAC systems, and 8.9% of homes in the Jean Street study area had elevated HVAC systems.

Appendix D – Field Data/Mitigation Recommendations

Table 1: Westview Drive Study Area

Street Name	Building number	Occupied?	EC Diagram	# of Stories	Elevated above grade	Elevated above street	Structure type	Mitigation Recommendations
Cavaness Dr.	502	Yes	1 A	1	6"	1'	Brick	I, II, III, IV, V, VI, VII
Cavaness Dr.	512	Yes	1 A	1	6"	1'	Brick	I, II, III, IV, V, VI, VII
Cavaness Dr.	500	Yes	1 A	1	6 "	1'	Brick	I, II, III, IV, V, VI, VII
Cavaness Dr.	504	Yes	1 A	1	6"	1'	Brick	I, II, III, IV, V, VI, VII
Cavaness Dr.	506	Yes	1 A	1	6"	1'	Brick	I, II, III, IV, V, VI, VII
Cavaness Dr.	508	Yes	1 A	1	6"	1'	Brick	I, II, III, IV, V, VI, VII
Cavaness Dr.	510	Yes	1 A	1	6"	1'	Brick	I, II, III, IV, V, VI, VII
Cavaness Dr.	514	Yes	1 A	1	6"	1'	Brick	I, II, III, IV, V, VI, VII
Cavaness Dr.	516	Yes	1 A	1	6"	1'	Brick	I, II, III, IV, V, VI, VII
Cavaness Dr.	518	Yes	1 A	1	6"	1'	Brick	I, II, III, IV, V, VI, VII
Cavaness Dr.	600	Yes	1 A	1	6"	1'	Brick	I, II, III, IV, V, VI, VII
Cavaness Dr.	602	Yes	1 A	1	6"	1'	Brick	I, II, III, IV, V, VI, VII
Cavaness Dr.	604	Yes	1 A	1	6"	1'	Brick	I, II, III, IV, V, VI, VII
Cavaness Dr.	606	Yes	1 A	1	6"	1'	Brick	I, II, III, IV, V, VI, VII
Cavaness Dr.	608	Yes	1 A	1	6"	1'	Brick	I, II, III, IV, V, VI, VII
Harding Dr.	500	Yes	1 A	1	6"	1'	Brick	I, II, III, IV, V, VI, VII
Harding Dr.	502	Yes	1 A	1	0-6"	< 6"	Brick	I, II, III, IV, V, VI, VII
Harding Dr.	503	Yes	1 A	1	0-6"	< 6"	Brick	I, II, III, IV, V, VI, VII
Harding Dr.	504	Yes	1A	1	0-6"	< 6"	Brick	I, II, III, IV, V, VI, VII
Harding Dr.	505	Yes	1 A	1	0-6"	6-12"	Brick	I, II, III, IV, V, VI, VII

Harding Dr.	506	Yes	1 A	1	0-6"	6-12"	Brick	I, II, III, IV, V, VI, VII
Harding Dr.	507	Yes	1 A	1	0-6"	6-12"	Brick	I, II, III, IV, V, VI, VII
Harding Dr.	508	No	1 A	1	0-6"	0-6"	Brick	I, II, III, IV, V, VI, VII
Harding Dr.	509	Yes	1 A	1	0-6"	6-12"	Brick	I, II, III, IV, V, VI, VII
Harding Dr.	510	Yes	1 A	1	0-6"	0-6"	Brick	I, II, III, IV, V, VI, VII
Harding Dr.	511	No	1 A	1	0-6"	6-12"	Brick	I, II, III, IV, V, VI, VII
Harding Dr.	512	Yes	1 A	1	6-12"	0-6"	Brick	I, II, III, IV, V, VI, VII
Harding Dr.	513	Yes	1 A	1	0-6"	6-12"	Brick	I, II, III, IV, V, VI, VII
Harding Dr.	514	Yes	1 A	1	0-6"	0-6"	Brick	I, II, III, IV, V, VI, VII
Harding Dr.	515	Yes	1 A	1	0-6"	6-12"	Brick	I, II, III, IV, V, VI, VII
Harding Dr.	516	Yes	1 A	1	0-6"	0-6"	Brick	I, II, III, IV, V, VI, VII
Harding Dr.	517	No	1 A	1	0-6"	6-12"	Brick	I, II, III, IV, V, VI, VII
Harding Dr.	518	No	1 A	1	0-6"	0-6"	Brick	I, II, III, IV, V, VI, VII
Harding Dr.	519	Yes	1 A	1	0-6"	6-12"	Brick	I, II, III, IV, V, VI, VII
Jana St.	6527	Yes	1 A	1	0-6"	0-6"	Brick	I, II, III, IV, V, VI, VII
Jana St.	6531	Yes	1 A	1	0-6"	0-6"	Brick	I, II, III, IV, V, VI, VII
Jana St.	6537	Yes	1 A	1	0-6"	0-6"	Brick	I, II, III, IV, V, VI, VII
Jana St.	6529	Yes	1 A	1	6-12"	6-12"	Siding	I, II, III, IV, V, VI, VII
Louis Dr.	513	Yes	1 A	1	0-6"	6-12"	Brick	I, II, III, IV, V, VI, VII
Louis Dr.	604	Yes	1 A	1	0-6"	6-12"	Brick	I, II, III, IV, V, VI, VII
Louis Dr.	514	Yes	1 A	1	0-6"	6-12"	Brick	I, II, III, IV, V, VI, VII
Louis Dr.	518	No	1 A	1	0-6"	6-12"	Brick	I, II, III, IV, V, VI, VII
Louis Dr.	511	Yes	1 A	1	0-6"	6-12"	Brick	I, II, III, IV, V, VI, VII
Louis Dr.	602	Yes	1 A	1	0-6"	6-12"	Brick	I, II, III, IV, V, VI, VII
Louis Dr.	603	No	1 A	1	0-6"	6-12"	Brick	I, II, III, IV, V, VI, VII
Louis Dr.	500	Yes	1 A	1	0-6"	6-12"	Brick	I, II, III, IV, V, VI, VII
Louis Dr.	501	Yes	1 A	1	0-6"	6-12"	Brick	I, II, III, IV, V, VI, VII
Louis Dr.	502	Yes	1 A	1	0-6"	6-12"	Brick	I, II, III, IV, V, VI, VII
Louis Dr.	504	Yes	1 A	1	6-12"	6-12"	Brick	I, II, III, IV, V, VI, VII
Louis Dr.	505	Yes	1 A	1	6-12"	6-12"	Brick	I, II, III, IV, V, VI, VII

Louis Dr.	506	Yes	1 A	1	0-6"	6-12"	Brick	I, II, III, IV, V, VI, VII
Louis Dr.	507	Yes	1 A	1	0-6"	6-12"	Brick	I, II, III, IV, V, VI, VII
Louis Dr.	508	Yes	1 A	1	0-6"	6-12"	Brick	I, II, III, IV, V, VI, VII
Louis Dr.	509	Yes	1 A	1	0-6"	6-12"	Brick	I, II, III, IV, V, VI, VII
Louis Dr.	510	Yes	1 A	1	0-6"	6-12"	Brick	I, II, III, IV, V, VI, VII
Louis Dr.	512	Yes	1 A	1	0-6"	6-12"	Brick	I, II, III, IV, V, VI, VII
Louis Dr.	515	Yes	1 A	1	0-6"	6-12"	Brick	I, II, III, IV, V, VI, VII
Louis Dr.	516	Yes	1 A	1	0-6"	6-12"	Brick	I, II, III, IV, V, VI, VII
Louis Dr.	517	No	1 A	1	0-6"	6-12"	Brick	I, II, III, IV, V, VI, VII
Louis Dr.	519	Yes	1 A	1	0-6"	6-12"	Brick	I, II, III, IV, V, VI, VII
Louis Dr.	601	Yes	1 A	1	0-6"	6-12"	Brick	I, II, III, IV, V, VI, VII
Louis Dr.	600	Yes	1 A	2	0-6"	6-12"	Siding	I, II, III, IV, V, VI, VII
Louis Dr.	503	Yes	1 A	1	0-6"	6-12"	Brick	I, II, III, IV, V, VI, VII
Westview Dr.	608	Yes	1A	1	0-6"	6-12'	Brick	I, II, III, IV, V, VI, VII
Westview Dr.	501	Yes	1A	1	6-12"	1'	Brick	I, II, III, IV, V, VI, VII
Westview Dr.	504	Yes	1A	1	6"	1-2'	Brick	I, II, III, IV, V, VI, VII
Westview Dr.	512	Yes	1A	1	0-6"	1-2'	Brick	I, II, III, IV, V, VI, VII
Westview Dr.	515	Yes	1A	1	0-6"	6-12'	Brick	I, II, III, IV, V, VI, VII
Westview Dr.	511	Yes	1A	1	0-6"	0-6"	Brick	I, II, III, IV, V, VI, VII
Westview Dr.	516	Yes	1A	1	0-6"	6-12'	Brick	I, II, III, IV, V, VI, VII
Westview Dr.	601	Yes	1A	1	0-6"	6-12"	Brick	I, II, III, IV, V, VI, VII
Westview Dr.	603	Yes	1A	1	0-6"	6-12'	Brick	I, II, III, IV, V, VI, VII
Westview Dr.	605	Yes	1A	1	0-6"	6-12'	Brick	I, II, III, IV, V, VI, VII
Westview Dr.	607	Yes	1A	1	0-6"	6-12'	Brick	I, II, III, IV, V, VI, VII
Westview Dr.	609	Yes	1A	1	0-6"	1-1.5"	Brick	I, II, III, IV, V, VI, VII
Westview Dr.	611	Yes	1A	1	0-6"	1-1.5"	Brick	I, II, III, IV, V, VI, VII
Westview Dr.	500	Yes	1A	1	<6"	1'	Brick	I, II, III, IV, V, VI, VII
Westview Dr.	502	Yes	1A	1	6"	1-2'	Brick	I, II, III, IV, V, VI, VII
Westview Dr.	503	Yes	1A	1	6"	1'	Brick	I, II, III, IV, V, VI, VII
Westview Dr.	505	Yes	1A	1	6"	1'	Brick	I, II, III, IV, V, VI, VII

Westview Dr.	506	Yes	1A	1	6"	1-2'	Brick	I, II, III, IV, V, VI, VII
Westview Dr.	507	Yes	1A	1	6"	6"-1'	Brick	I, II, III, IV, V, VI, VII
Westview Dr.	508	Yes	1A	1	6"	1-2'	Brick	I, II, III, IV, V, VI, VII
Westview Dr.	510	Yes	1A	1	0-6"	1-2"	Brick	I, II, III, IV, V, VI, VII
Westview Dr.	513	Yes	1A	1	0-6"	1'	Brick	I, II, III, IV, V, VI, VII
Westview Dr.	514	Yes	1A	1	0-6"	1-2'	Brick	I, II, III, IV, V, VI, VII

Table 2: Jean Street Study Area

Street Name	Building number	Occupied?	EC Diagram	# of Stories	Elevated above grade	Elevated above street	Structure type	Mitigation Recommendations
Ann Carol St.	436	Yes	5	1	2'	6-12"	Mobile	I, II, IV, V, VI, VII
Ann Carol St.	410	Yes	5	1	1.5-2'	6"	Wood	II, IV, V, VI, VII
Ann Carol St.	411	Yes	8	1.5'	3'	0-6"	Wood	I, II, III, IV, V, VI, VII
Ann Carol St.	412	Yes	5	2	3'	0-6"	Wood	II, IV, V, VI, VII
Ann Carol St.	413 A	Yes	1A	1	0-6"	1-1.5'	Wood/ Vinyl	I, II, III, IV, V, VI, VII
Ann Carol St.	413 B	Yes	5	1	2'	1-1.5'	Wood/Vinyl	I, II, III, IV, V, VI, VII
Ann Carol St.	400	Yes	1A	1	0-6"	<6"	Brick	I, II, III, IV, V, VI, VII
Ann Carol St.	404	Yes	1A	1	0-6"	6"	Brick	I, II, III, IV, V, VI, VII
Ann Carol St.	406	Yes	1A	2	0-6"	6"	Brick	I, II, III, IV, V, VI, VII
Ann Carol St.	407	Yes	1A	1	0-6"	6"	Brick	I, II, III, IV, V, VI, VII
Ann Carol St.	417 A	Yes	1A	1	0-6"	6-12'	Brick	I, II, III, IV, V, VI, VII
Ann Carol St.	417	Yes	1A	1	0-6"	6-12'	Brick	I, II, III, IV, V, VI, VII
Ann Carol St.	417 B	Yes	1A	1	0-6"	6-12'	Brick	I, II, III, IV, V, VI, VII
Ann Carol St.	431	Yes	1A	1	6-12"	6-12"	Brick	I, II, III, IV, V, VI, VII
Ann Carol St.	439	Yes	1A	1	6"	6-12"	Brick	I, II, III, IV, V, VI, VII

Ann Carol St.	420 A	Yes	5	1	2.5-3'	0-6"	Mobile	I, II, IV, V, VI, VII
Ann Carol St.	422	Yes	5	1	1.5-2'	0-6"	Mobile	II, IV, V, VI, VII
Ann Carol St.	424	Yes	5	1	2.5 - 3'	0-6"	Mobile	I, II, IV, V, VI, VII
Ann Carol St.	429 A	Yes	5	1	3'	0-6"	Mobile	I, II, IV, V, VI, VII
Ann Carol St.	430	Yes	5	1	2.5'	0-6"	Mobile	I, II, IV, V, VI, VII
Ann Carol St.	430	Yes	5	1	2.5'	0-6	Mobile	I, II, IV, V, VI, VII
Ann Carol St.	432	Yes	5	1	2'	2ft	Mobile	II, IV, V, VI, VII
Ann Carol St.	438	Yes	5	1	2'	0-6"	Mobile	II, IV, V, VI, VII
Ann Carol St.	440	Yes	5	1	2'	0-6"	Mobile	I, II, IV, V, VI, VII
Ann Carol St.	435	Yes	1A	2	6"	6-12"	Stucco	I, II, IV, V, VI, VII
Ann Carol St.	415 A	Yes	1A	1	1 '	1-1.5'	Vinyl	I, II, IV, V, VI, VII
Ann Carol St.	417	Yes	1A	1	1 '	1-1.5'	Vinyl	I, II, IV, V, VI, VII
Ann Carol St.	428	Yes	1B	1	1.5-2'	0-6"	Vinyl	I, II, IV, V, VI, VII
Ann Carol St.	403	Yes	5	1	1-2'	1"	Wood	I, II, IV, V, VI, VII
Ann Carol St.	408	Yes	1 B	1	N/A	N/A	Wood	I, II, III, IV, V, VI, VII
Caddo St.	2101	Yes	5	1	2'	0-6"	Mobile	I, II, IV, V, VI, VII
Caddo St.	2103	Yes	5	1	2'	0-6"	Mobile	I, II, IV, V, VI, VII
Duet St.	330	Yes	1A	1	0-6	0-6	Brick	I, II, III, IV, V, VI, VII
Duet St.	340	Yes	5	1	2.5-3	0-6	Mobile	I, II, IV, V, VI, VII
Duet St.	349	Yes	1A	1	0-6"	6-12"	Aluminum	I, II, III, IV, V, VI, VII
Duet St.	331	Yes	1A	1	0-6	6 to 12	Brick	I, II, III, IV, V, VI, VII
Duet St.	332	Yes	1A	1	0-6	0-6	Brick	I, II, III, IV, V, VI, VII
Duet St.	333	Yes	1A	1	0-6	0-6	Brick	I, II, III, IV, V, VI, VII
Duet St.	334	No	1A	1	0-6	0-6	Brick	I, II, III, IV, V, VI, VII
Duet St.	335	Yes	1A	1	0-6	0-6	Brick	I, II, III, IV, V, VI, VII
Duet St.	300	Yes	1A	1	0-6"	1	Brick	I, II, III, IV, V, VI, VII
Duet St.	301	Yes	1A	1	6-12"	06-12"	Brick	I, II, III, IV, V, VI, VII
Duet St.	310	Yes	1A	1	0 - 6	0 - 6	Brick	I, II, III, IV, V, VI, VII
Duet St.	315	Yes	1A	1	0 - 6	6 to 12	Brick	I, II, III, IV, V, VI, VII
Duet St.	337	Yes	1A	1	0-6	6 to 12	Brick	I, II, III, IV, V, VI, VII

Duet St.	338	No	1A	1	6-12"	6 to 12	Brick	I, II, III, IV, V, VI, VII
Duet St.	339	Yes	1A	1	0-6	0-6	Brick	I, II, III, IV, V, VI, VII
Duet St.	341	Yes	1A	1	0-6	6 to 12	Brick	I, II, III, IV, V, VI, VII
Duet St.	342	Yes	1A	1	0-6	6 to 12	Brick	I, II, III, IV, V, VI, VII
Duet St.	343	Yes	1A	1	0-6	6 to 12	Brick	I, II, III, IV, V, VI, VII
Duet St.	344	Yes	1A	1	0-6	6 to 12	Brick	I, II, III, IV, V, VI, VII
Duet St.	345	Yes	1A	2	0-6	6 to 12	Brick	I, II, III, IV, V, VI, VII
Duet St.	348	Yes	1A	1	0-6	6 to 12	Brick	I, II, III, IV, V, VI, VII
Duet St.	317	Yes	1A	1	6-12"	6 to 12	Cinder	I, II, III, IV, V, VI, VII
Duet St.	319	Yes	1A	1	6-12"	6 to 12	Cinder	I, II, III, IV, V, VI, VII
Duet St.	309	Yes	1A	1	<6	<6	Cinderblock	I, II, III, IV, V, VI, VII
Duet St.	304	Yes	3	1	2'	0-6	Manufactured	I, II, IV, V, VI, VII
Duet St.	305	Yes	3	1	6-12"	6 to 12	Manufactured	I, II, IV, V, VI, VII
Duet St.	307	Yes	5	1	2'	0 - 6	Manufactured	I, II, IV, V, VI, VII
Duet St.	311	Yes	5	1	1.5'	0 - 6	Manufactured	I, II, IV, V, VI, VII
Duet St.	323	Yes	5	1	1'	0-6	Manufactured	I, II, IV, V, VI, VII
Duet St.	329	Yes	5	1	1.5'	0-6	Manufactured	I, II, IV, V, VI, VII
Duet St.	320	Yes	5	1	6-12"	<6	Piers	I, II, IV, V, VI, VII
Duet St.	321	Yes	5	1	6-12"	<6	Piers	I, II, IV, V, VI, VII
Duet St.	306	Yes	5	1	6-12"	<6	Wood	I, II, IV, V, VI, VII
Duet St.	312	Yes	5	1	2'	0 - 6	Wood	I, II, IV, V, VI, VII
Duet St.	313	Yes	1A	1	6	0 - 6	Wood	I, II, IV, V, VI, VII
Duet St.	314	Yes	3	1	0 - 6	0 - 6	Wood	I, II, IV, V, VI, VII
Duet St.	316	Yes	1B	1	6-12"	0-6	Wood	I, II, IV, V, VI, VII
Duet St.	318	Yes	5	1	6-12"	0-6	Wood	I, II, IV, V, VI, VII
Duet St.	322	Yes	5	1	1'	0-6	Wood	I, II, IV, V, VI, VII
Duet St.	324	Yes	5	1	1.5'	0-6	Wood	I, II, IV, V, VI, VII
Duet St.	325	Yes	5	1	2'	0-6	Wood	I, II, IV, V, VI, VII
Duet St.	326	Yes	5	1	2'	0-6	Wood	I, II, IV, V, VI, VII
Duet St.	328	Yes	1A	1	0-6	0-6	Wood	I, II, IV, V, VI, VII

Duet St.	346	Yes	8	1	1.5-2	0-6	Wood	I, II, IV, V, VI, VII
Grace St.	310	Yes	1A	1	0-6"	6-6.5"	Brick	I, II, III, IV, V, VI, VII
Grace St.	311	Yes	1A	1	<6"	0-6"	Brick	I, II, III, IV, V, VI, VII
Grace St.	305	Yes	5	1	2'	0-6"	Manufactured	I, II, IV, V, VI, VII
Grace St.	334	Yes	5	1	3'	0-6"	Manufactured	I, II, IV, V, VI, VII
Grace St.	325	Yes	5	1	2'	0-6"	Mobile	I, II, IV, V, VI, VII
Grace St.	301 B	Yes	5	1	2'	0-6"	Mobile	I, II, IV, V, VI, VII
Grace St.	301	Yes	5	1	2'	0-6"	Mobile	I, II, IV, V, VI, VII
Grace St.	302	Yes	5	1	2'	0-6"	Mobile	I, II, IV, V, VI, VII
Grace St.	303 A	Yes	5	1	2'	0-6"	Mobile	I, II, IV, V, VI, VII
Grace St.	303 B	Yes	5	1	2'	0-6"	Mobile	I, II, IV, V, VI, VII
Grace St.	303	Yes	5	1	2'	0-6"	Mobile	I, II, IV, V, VI, VII
Grace St.	306	Yes	5	1	2.5'	0-6"	Mobile	I, II, IV, V, VI, VII
Grace St.	309	Yes	5	1	2.5'	0-6"	Mobile	I, II, IV, V, VI, VII
Grace St.	313	Yes	5	1	2'	0-6"	Mobile	I, II, IV, V, VI, VII
Grace St.	314 A	Yes	5	1	2'	0-6"	Mobile	I, II, IV, V, VI, VII
Grace St.	316	Yes	8	1	2'	0-6"	Mobile	I, II, IV, V, VI, VII
Grace St.	317	Yes	5	1	2'	0-6"	Mobile	I, II, IV, V, VI, VII
Grace St.	318	Yes	3	1	0-6"	0-6"	Mobile	I, II, IV, V, VI, VII
Grace St.	319	Yes	5	1	1.5'	0-6"	Mobile	I, II, IV, V, VI, VII
Grace St.	320 A	Yes	5	1	2'	0-6"	Mobile	I, II, IV, V, VI, VII
Grace St.	320	Yes	5	1	2'	0-6"	Mobile	I, II, IV, V, VI, VII
Grace St.	321	Yes	5	1	3-3.5'	0-6"	Mobile	I, II, IV, V, VI, VII
Grace St.	322	Yes	5	1	2'	0-6"	Mobile	I, II, IV, V, VI, VII
Grace St.	323	Yes	5	1	2-2.5'	0-6"	Mobile	II, IV, V, VI, VII
Grace St.	342	Yes	5	1	2.5'	0-6"	Mobile	I, II, IV, V, VI, VII
Grace St.	325A	Yes	5	1	2.5'	0-6"	Mobile	I, II, IV, V, VI, VII
Grace St.	326	Yes	5	1	1.5'	0-6"	Mobile	I, II, IV, V, VI, VII
Grace St.	327	Yes	5	1	1.5'	0-6"	Mobile	I, II, IV, V, VI, VII
Grace St.	328	Yes	5	1	2'	0-6"	Mobile	I, II, IV, V, VI, VII

Grace St.	329	Yes	?	1	2'	0-6"	Mobile	*
Grace St.	330	Yes	5	1	2'	0-6"	Mobile	I, II, IV, V, VI, VII
Grace St.	332	Yes	5	1	1.5'	0-6"	Mobile	I, II, IV, V, VI, VII
Grace St.	335	Yes	5	1	3'	0-6"	Mobile	I, II, IV, V, VI, VII
Grace St.	337	Yes	5	1	2'	0-6"	Mobile	I, II, IV, V, VI, VII
Grace St.	339	Yes	5	1	1.5'	0-6"	Mobile	I, II, IV, V, VI, VII
Grace St.	300	Yes	5	1	6-12"	0-6"	Wood	I, II, IV, V, VI, VII
Grace St.	304	Yes	5	1	1.5'	0-6"	Wood	I, II, IV, V, VI, VII
Jean St.	441	Yes	5	1	2'	0-6"	Wood	II, IV, V, VI, VII
Jean St.	412	Yes	1A	1	0-6"	6-12"	Brick	I, II, III, IV, V, VI, VII
Jean St.	425	Yes	1A	1	0-6"	6-12"	Brick	I, II, III, IV, V, VI, VII
Jean St.	433	Yes	5	1	2'	0-6"	Mobile	I, II, IV, V, VI, VII
Jean St.	434 A	Yes	5	1	2'	0-6"	Mobile	I, II, IV, V, VI, VII
Jean St.	434	Yes	5	1	2'	0-6"	Mobile	
Jean St.	436 A	Yes	5	1	2'	0-6"	Mobile	I, II, IV, V, VI, VII
Jean St.	417	Yes	1A	1	6-12"	0-6"	Wood	I, II, III, IV, V, VI, VII
Jean St.	422	Yes	1A	1	0-6"	0-6"	Wood and Brick	I, II, III, IV, V, VI, VII
Jean St.	429	Yes	1A	1	0-6"	0-6"	Brick	I, II, III, IV, V, VI, VII
Jean St.	400	Yes	3	1	6-12"	0-6"	Brick	I, II, III, IV, V, VI, VII
Jean St.	401	Yes	1A	1	0-6"	6-12"	Brick	I, II, III, IV, V, VI, VII
Jean St.	403	Yes	1A	1	0-6"	0-6"	Brick	I, II, III, IV, V, VI, VII
Jean St.	407	Yes	1A	1	0-6"	0-6"	Brick	I, II, III, IV, V, VI, VII
Jean St.	408	Yes	1A	1	0-6"	0-6"	Brick	I, II, III, IV, V, VI, VII
Jean St.	409	Yes	1A	1	6-12"	0-6"	Brick	I, II, III, IV, V, VI, VII
Jean St.	410	Yes	1A	1	0-6"	0-6"	Brick	I, II, III, IV, V, VI, VII
Jean St.	418	Yes	1A	1	0-6"	6-12"	Brick	I, II, III, IV, V, VI, VII
Jean St.	419	Yes	1A	1	0-6"	0-6"	Brick	I, II, III, IV, V, VI, VII
Jean St.	420	Yes	1A	1	0-6"	0-6"	Brick	I, II, III, IV, V, VI, VII
Jean St.	421	Yes	1A	1	0-6"	0-6"	Brick	I, II, III, IV, V, VI, VII
Jean St.	423	Yes	1A	1	6-12"	6-1"	Brick	I, II, III, IV, V, VI, VII

Jean St.	424	Yes	1A	1	0-6"	0-6"	Brick	I, II, III, IV, V, VI, VII
Jean St.	426	Yes	1A	1	0-6"	0-6"	Brick	I, II, III, IV, V, VI, VII
Jean St.	427	Yes	1A	1	0-6"	6-12"	Brick	I, II, III, IV, V, VI, VII
Jean St.	428	Yes	1A	1	0-6"	0-6"	Brick	I, II, III, IV, V, VI, VII
Jean St.	437	Yes	5	1	2.5'	0-6"	Manufactured	I, II, IV, V, VI, VII
Jean St.	431 A	Yes	5	1	1.5'	0-6"	Mobile	I, II, IV, V, VI, VII
Jean St.	431	Yes	5	1	2'	0-6"	Mobile	I, II, IV, V, VI, VII
Jean St.	436	No	5	1	1'	0-6"	Mobile	II, IV, V, VI, VII
Jean St.	437 B	Yes	5	1	2'	0-6"	Mobile	I, II, IV, V, VI, VII
Jean St.	438	Yes	5	1	1.5'	0-6"	Mobile	II, IV, V, VI, VII
Jean St.	439	Yes	5	1	2.5'	0-6"	Mobile	I, II, IV, V, VI, VII
Jean St.	404	Yes	5	1	1.5"	0-6"	Vinyl	I, II, IV, V, VI, VII
Jean St.	405	Yes	1A	1	0-6"	0-6"	Vinyl	I, II, IV, V, VI, VII
Jean St.	411	Yes	1A	1	0-6"	0-6"	Wood	I, II, IV, V, VI, VII
Jean St.	414	Yes	1A	1	0-6"	0-6"	Wood	I, II, IV, V, VI, VII
Jean St.	416	Yes	1A	1	0-6"	0-6"	Wood	I, II, IV, V, VI, VII
Jean St.	402	No	1A	1	6-12"	0-6"	Wood	I, II, IV, V, VI, VII
Jean St.	406	Yes	?	1	1.5"	0-6"	Wood	

* The foundation and condition of some properties were undeterminable in the field and there are no mitigation recommendations for these homes. Vacant properties and properties that were acquired by the parish are not included in the mitigation recommendations.

Appendix E – Recent Legislative Changes that affect Flood Insurance

HOW RECENT LEGISLATIVE CHANGES AFFECT FLOOD INSURANCE

FEMA

The National Flood Insurance Program (NFIP) is in the process of implementing Congressionally mandated reforms required by the Homeowner Flood Insurance Affordability Act of 2014 that repeal and modify the Biggert-Waters Flood Insurance Reform Act of 2012 (BW-12). This fact sheet provides an overview of the changes to flood insurance rates under the NFIP. While the new law is implemented, policyholders are encouraged to maintain and keep their current flood insurance policies. Allowing policies to lapse will leave policyholders unprotected.

Policyholders who have questions about their flood insurance policies should contact their insurance agent.

CHANGES TO FLOOD INSURANCE SUBSIDIES

Several provisions of both the 2012 and 2014 laws apply to older buildings constructed before the effective date of the community's first Flood Insurance Rate Map (FIRM). Such buildings are referred to as "pre-FIRM." Many pre-FIRM buildings located in high-risk flood zones have flood insurance policies with subsidized rates. Most subsidies remain, although they will be phased out over time. The rate of phaseout will depend on the type of policy. The following charts explain how premium rates are affected for different policy types.

PRE-FIRM PRIMARY RESIDENCE POLICIES IN HIGH-RISK AREAS

For Most Pre-FIRM Primary Residences in High-Risk Areas, Subsidized Rates Remain in Effect, but with Newly Required Minimum Increases—and an 18 Percent Increase Limit for Any Individual Policy—Until Premiums Reach Their Full-Risk Rates.[1]

Policy Type	Impact On Rate
Existing policies	Policies can be renewed at subsidized rates.[2]
Newly written policies	Policies can be issued and renewed at subsidized rates.
Policies on newly purchased buildings	Policies can be issued and renewed at subsidized rates.
Policies re-issued after a lapse[3]	Policies for pre-FIRM buildings in high-risk areas that lapsed due to a late renewal payment (received after the 30-day grace period but less than 90 days after expiration) can be re-issued and renewed at subsidized rates.

PRE-FIRM BUILDING POLICES IN HIGH-RISK AREAS

For Other Pre-FIRM Buildings in High-Risk Areas, Subsidized Rates Continue, but Will Increase More Quickly to Reach Full-Risk Rates.

Policy Type	Impact On Rate
Policies for non-primary residences (secondary or vacation homes or rental properties)	25% annual increases at policy renewal until premiums reach their full-risk rates.
Policies for business buildings	Future 25% annual increases at policy renewal.
Policies for Severe Repetitive Loss properties	25% annual increases at policy renewal for severely or repetitively flooded properties that include 1 to 4 residences.

[1] Full-risk rates are determined using data from an Elevation Certificate.
[2] Full-risk rates could be lower than subsidized rates.
[3] Buildings with lapsed policies are not eligible for the subsidy unless the lapse was the result of the policy no longer being required to retain flood insurance coverage.

OTHER POLICIES

For Most Other Policy Types, Rates Will Increase by No More than 18 Percent for Any Individual Policy.

Policy Type	Impact On Rate
Policies for newer ("post-FIRM") buildings in high-risk areas	Not affected by subsidies; already paying full-risk rates.
Policies for buildings in moderate- to low-risk areas	Not affected by subsidies; properties in these areas (shown as B, C, or X zones on flood maps) do not pay subsidized rates.
Policies for buildings "grandfathered in" when map changes show higher flood risk	Grandfathering remains in effect at this time. Buildings constructed in compliance with earlier maps or continuously covered by flood insurance stay in their original rate class when maps change or properties are sold.
Policies for buildings covered by Preferred Risk Policy Eligibility Extension (PRP EE)	Properties continue to be eligible for lower, preferred-risk rates for the first year after a map change. Starting the following year, rates will increase by no more than 18% for any individual policy until premiums reach their full-risk rate.

REFUNDS

BW-12 required an immediate move to property-specific, full-risk rates when pre-FIRM properties were sold or new policies issued. Some policyholders saw significant premium increases. The new law allows a return to subsidized rates for most properties—and refunds of the difference paid between the subsidized rate and current full-risk rate. FEMA is working with participating insurance companies to start the refund process by the end of this year.

RATE CHANGES WHEN PROPERTIES ARE SOLD

The 2014 law protects policyholders from significant and unanticipated increases in flood insurance costs that could impact their property sales. Subsidized rates continue to apply, and as of May 1, 2014, both the policy and its subsidized rates can be transferred to the new owner. Grandfathered rates can also be transferred at the time of sale.

OTHER PROVISIONS OF THE NEW LAW

Surcharges. A new surcharge will be added to all new and renewed policies to offset the subsidized policies and achieve the financial sustainability goals of BW-12. A policy for a primary residence will include a $25 surcharge. All other policies will include a $250 surcharge. This new surcharge will be included on all policies, including full-risk-rated policies and Preferred Risk Policies. The surcharge will be implemented in 2015.

Deductibles. To help homeowners manage their premium costs, the law raises maximum residential deductible limits from $5,000 to $10,000.

To keep current as FEMA implements these and other changes to the National Flood Insurance Program, visit **fema.gov/flood-insurance-reform**.

Policyholders who have questions about their flood insurance policies should contact their insurance agents.

Appendix F – How April 2015 Program Changes Will Affect Flood Insurance Premiums

FEMA Fact Sheet

Federal Insurance and Mitigation Administration

How April 2015 Program Changes Will Affect Flood Insurance Premiums

The National Flood Insurance Program (NFIP) is in the process of implementing Congressionally mandated reforms required by the Homeowner Flood Insurance Affordability Act of 2014 (HFIAA) that repeal and modify the Biggert-Waters Flood Insurance Reform Act of 2012 (Biggert-Waters). The new law slows some flood insurance rate increases and offers relief to some policyholders who experienced steep flood insurance premium increases in 2013 and early 2014. Flood insurance rates and other charges will be revised for new or existing policies beginning on April 1, 2015. In addition to insurance rates, other changes resulting from Biggert-Waters and HFIAA will be implemented that will affect the total amount a policyholder pays for a flood insurance policy. Highlights of some of those changes follow. For full explanations and guidance, see WYO Bulletin (W-14053) and the Flood Insurance Manual.

The changes taking place in April include an increase in the Reserve Fund Assessment, the implementation of an annual surcharge on all new and renewed policies, an additional deductible option, an increase in the Federal Policy Fee, and rate increases for most policies. Key changes include:

- Implementing annual rate changes that set rates using rate-increase limitations set by HFIAA for individual premiums and rate classes:
  - Limiting increases for individual premiums to 18 percent of premium.
  - Limiting increases for average rate classes to 15 percent.
  - Mandatory increases for certain subsidized policyholders under Biggert-Waters and HFIAA.
- Increasing the Reserve Fund assessments required by Biggert-Waters.
- Implementing annual surcharges required by HFIAA.
- Guidance on substantially damaged and substantially improved structures, and additional rating guidance on buildings constructed before their communities' first Flood Insurance Rate Maps (FIRMs) became effective (known as pre-FIRM structures).
- Implementing a new procedure for properties newly mapped into the Special Flood Hazard Area (SFHA) and existing **Preferred Risk Policy Eligibility Extension** (PRP EE), a cost-saving flood insurance coverage option for property owners whose buildings were newly mapped into an SFHA. The premiums will be the same as the PRP, which offers low-cost flood insurance to owners and tenants of eligible residential and non-residential buildings located in moderate- to low-risk areas for the first year (calculated before fees and assessments) to comply with provisions of HFIAA.
- Reformulating expense loading on premiums, reducing the expense load on the highest-risk policies as an interim step while investigating expenses on policies as required by Biggert-Waters.

The changes will take effect on April 1, 2015.

Reserve Fund Assessment Increasing

- Biggert-Waters required the establishment of a Reserve Fund to help cover costs when claims exceed the annual premium collected by the NFIP. FEMA began collecting an assessment in 2013 to add money to the Reserve Fund.
- The Reserve Fund assessment initially applied to all policies other than PRPs in 2013. The assessment on those policies will increase in 2015.
- Starting in 2015, PRPs will begin contributing to the Reserve Fund.

Policy	2014 Fee (as a percent of premium)	2015 Fee (as a percent of premium)
Preferred Risk Policies (PRPs)	0%	10%
Property Newly Mapped into the SFHA (Previous Preferred Risk Policies Eligibility Extension [PRP EE])	0%	15%
All Other Policies	5%	15%

HFIAA Surcharge Begins

- HFIAA slowed the elimination of subsidies provided for in Biggert-Waters and amended most of the provisions mandating that certain policies transition immediately to full-risk rates.
- To compensate for the decrease in revenue, the new law calls for the addition of a surcharge on all policies that will be collected until, with limited exceptions, all subsidies are eliminated.
- The surcharge is a flat fee applied to all policies based on the occupancy type of the insured building and is ***not*** associated with the flood zone in which the building is located or the construction date of the building (e.g., pre- or post-FIRM).
- The surcharge also applies to a renter's contents-only policy based on the policyholder's occupancy of the building or unit.

Occupancy Type	Annual Surcharge
Primary Residential: single-family and individual condominium units	$25
Non-Primary Residential: single-family and individual condominium units	$250
Multifamily Residential: condominium and other buildings	$250
Non-Residential	$250

When a Map Change Occurs

- Current PRP EE policies and policies for insured buildings that are newly mapped into high-risk areas from moderate- to low-risk areas will be eligible to receive PRP rates for 1 year after the maps become effective. The Federal Policy Fee for these and existing PRP EE policies will increase to $45 to ensure the solvency and sustainability of the program.
- For these policies, the rates at renewal will increase no more than 18 percent each year.
- Grandfathering remains a cost-saving option for policyholders when new maps show their buildings in a higher-risk area (e.g., Zone A to Zone V; increase in Base Flood Elevation).

What Is Grandfathering?

When FIRM changes occur, the NFIP provides a lower-cost flood insurance rating option known as "grandfathering," which is available for property owners who:

- Have flood insurance policies in effect when the new flood maps become effective and then maintain continuous coverage; or
- Have built in compliance with the FIRM in effect at the time of construction.

To learn more, visit the NFIP's Grandfathering Fact Sheet at **floodsmart.gov/floodsmart/pdfs/Grandfathering+Fact+Sheet+for+Agents-2010.pdf**.

Other Changes Coming in April

- As required by HFIAA, the maximum deductible for a flood insurance policy will increase to $10,000 for single-family and two- to four-family dwellings. If used, the deductible must apply to both building and contents. For single-family homes, choosing the maximum deductible will result in up to a 40 percent discount from the base premium. It is important to remember that using the maximum deductible may not be appropriate in every financial circumstance and may not be allowed by lenders to meet mandatory purchase requirements.
- The Federal Policy Fee will increase by $1 for most policies other than the PRP, which remains $22. The exception is policies rated using the map change table, which will increase to $45 to ensure the solvency and sustainability of the program.
- A new rate table showing annual rate increases of 25 percent will be created for pre-FIRM buildings that have been substantially damaged or improved. However, repairs made to these structures typically must meet current building codes and, therefore, will usually receive a better rate using post-FIRM rate tables.
- In most cases, average rate increases for each rating class are capped at 15 percent; the annual surcharge and Federal Policy Fee are not included in the rate calculation and could result in the total amount charged a policyholder increasing by more than 18 percent.

For full explanations and guidance, see WYO Bulletin (W-14053) and the Flood Insurance Manual.

Read the latest WYO Bulletins for complete rate-change information at **NFIPiService.com**

Appendix G – HFIAA Surcharge Fact Sheet

FEMA Fact Sheet

National Flood Insurance Program (NFIP)

The HFIAA Surcharge

As of April 1, 2015, every National Flood Insurance Program (NFIP) policy includes an annual surcharge required by the Homeowner Flood Insurance Affordability Act of 2014 (HFIAA). The amount of the surcharge depends on the use of the insured building and the type of policy form insuring the building, regardless of its flood zone designation.

Policies for owner-occupied single-family detached buildings and individual condominium units that are the primary residence of a policyholder insured under the Dwelling Policy form will include a $25 surcharge. Additionally, contents-only policies insured under the Dwelling Form and held by a tenant in the tenant's primary residence will include the $25 surcharge.

Policies for all other buildings will include a $250 surcharge, which also applies to policies insured under the Residential Condominium Building Association Policy form, regardless of the number of units, attached and detached, or use of the building. In fact, even if the condominium association is being surcharged $250 for the entire building, a unit-owner with an individual policy that includes building coverage, can also be surcharge appropriately; based on the use. Lastly, all buildings insured under the General Property form will include a $250 surcharge. Policies covering buildings designed for use by more than one family will be charged a $250 surcharge, even if the landlord uses the building as a primary residence, or the building is owned by a condominium association.

What to Expect

It's important to know the annual amount due to your insurer for flood insurance at the time of application or renewal includes this surcharge. You do not need to make a separate payment. In addition, upon renewal of a policy, insurers will be sending out a notice to verify that the building is being used as a primary residence. The documentation must be provided to the insurer prior to the policy expiration date in order for the appropriate surcharge to be included in the renewal notice.

If a policyholder does not send back the documentation to their insurance agent that verifies the policy is for a primary residence, a $250 surcharge will be applied. Working with their agent, if an incorrect surcharge was used for renewal, policyholders are able to correct the surcharge during the current policy year. The correction will be made once the documentation is provided to the insurance agent.

Why A Surcharge

The Biggert-Waters Flood Insurance Reform Act of 2012 (Biggert-Waters) mandated that the Federal Emergency Management Agency (FEMA) eliminate certain subsidized rates that did not reflect the true risk available for structures that were built in high-risk areas before their communities entered the NFIP. To maintain the affordability of flood insurance for the policyholders eligible for subsidized rates, the most recent legislation –HFIAA– slowed the elimination of the subsidies. To support the financial stability of the NFIP, Congressionally-mandated surcharges are required for all policyholders to offset the slow-down of the elimination of current subsidized rates, and will continue until all subsidy is eliminated. The surcharge is paid at the time of application or renewal each year until the subsidies are eliminated. The surcharge revenue will go into the NFIP Reserve Fund that is used to help cover the cost of future claims in a catastrophic event and may also be used to pay the program's debt to the U.S. Treasury from previous catastrophic events.

Premium Caps Do Not Apply to the Surcharge

HFIAA placed limits on the percentage that NFIP premiums can increase each year. However, the HFIAA surcharge is not considered premium and is not included when calculating limits on insurance rate increases. So, for example, while total premium will not increase more than the 18 percent premium increases allowed for most individual policies, the total percentage increase in the cost of the policy may exceed 18 percent once the appropriate surcharge is added.

Learn More

Call your insurance agent for more information about your policy, the surcharge included in your premium, and the documentation needed to verify your primary residence. Visit www.fema.gov/flood-insurance-reform to learn more about legislative changes to the NFIP.

"FEMA's mission is to support our citizens and first responders to ensure that as a nation we work together to build, sustain, and Improve our capability to prepare for, protect against, respond to, recover from, and mitigate all hazards."

Appendix H – Grandfather Rule

FEMA

NFIP MAP & ZONE GRANDFATHER RULES

What is the Grandfather Rule?

A community will occasionally make structural improvements (dams, levees, etc.) to reduce the potential effects of flooding; experience new development aggravating the flooding situation, thereby expanding the floodplain; revise geographical boundaries resulting in the designation of additional flood hazard areas; or provide information to better delineate the Base Flood Elevation (BFE) and/or flood insurance risk zones. When these situations occur, the Flood Insurance Rate Map (FIRM) is revised and republished.

The implementation of a new FIRM raises the question-- HOW DOES THE NEW MAP AFFECT FLOOD INSURANCE RATES?

To recognize policyholders **who have remained *loyal customers of the NFIP*** by maintaining continuous coverage and/or ***who have built in compliance with the FIRM,*** the Federal Insurance and Mitigation Administration has "Grandfather rules" to allow such policyholders to benefit in the rating for that building.

Pre-FIRM (construction prior to the date of the community's initial FIRM)

1. If a policy was obtained prior to the effective date of a map change, the policyholder is eligible to maintain the prior zone and base flood elevation as long as continuous coverage is maintained. The policy can be assigned to a new owner at the option of the policyholder.

2. If a building is Pre-FIRM and a policy was not obtained prior to the effective date of a map change, the applicant is eligible to receive the Pre-FIRM (subsidized) rates based on the new zone rather than the actuarial (elevation based) rates.

Post-FIRM (construction on or after the date of the community's initial FIRM)

1. If a policy was obtained prior to the effective date of a map change, the policyholder is eligible to maintain the prior zone and base flood elevation as long as continuous coverage is maintained. The policy can be assigned to a new owner at the option of the policyholder.

2. If a building was constructed in compliance with a specific FIRM, the owner is always eligible to obtain a policy using the zone and base flood elevation from that FIRM, provided that proof (refer to the Flood Insurance Manual, Rating section for acceptable documentation) is submitted to the insurance company. Continuous coverage is not required.

Preferred Risk Policies

1. Buildings written on Preferred Risk Policies are required to be located in zones B, C, or X on the FIRM in effect on the date of application and on the date of each subsequent renewal.

2. A building, which becomes ineligible for a Preferred Risk Policy due to a map change to a special flood hazard area, can be rewritten on a standard rated policy using zones B, C, or X.

FOR MORE INFORMATION, REFER TO THE FLOOD INSURANCE MANUAL, RATE PAGE 21
Go to http://www.fema.gov/nfip/manual.shtm

Appendix I – Postcard for outreach meeting