

Natural Hazards Mitigation Plan – 2009 Update



St. Tammany Parish, Louisiana

Prepared by



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Natural Hazards Mitigation Plan

Contents

EX	ecutive Summary	ES-i
1.	Introduction	
	1.1. Planning Approach	1-2
	1.2. Topography and Land Use	1-10
	1.3. The Community Rating System	1-14
	1.4. References	1-16
2.	Hazard Profile	
	2.1 Tropical Storms	2-1
	2.2 Flooding	2-14
	2.2.A Repetitive Flooding	<u> 2-29</u>
	2.3 Tornadoes	2-37
	2.4 Wildfires	2-42
	2.5 Drought	2-45
	2.6 Fog	2-47
	2.7 Earthquakes	2-49
	2.8 Hailstorms	2-52
	2.9 Land Failure	2-54
	2.10 Winter Storm	2-57
	2.11 Dam Failure	2-60
	2.12 Levee Failure	2-63
	2.13 Termites	2-66
	2.14 Risk Summary	2-68
	2.15 References	2-69
3.	Vulnerability Assessment	
	3.1 Vulnerable Properties	3-1
	3.2 Damage Calculations	3-4
	3.3 Tropical Storms	3-10
	3.4 Flooding	3-17
	3.4.A Repetitive Flooding	3-19
	3.5 Tornadoes	3-21
	3.6 Wildfires	3-22
	3.7 Drought	3-24

3. Vulnerability Assessment (continued)

3.8 Fog	
3.9 Earthquakes	
3.10 Hailstorms.	
3.11 Land Failure	
3.12 Winter Storm	
3.13 Dam Failure	
3.14 Levee Failure	
3.15 Termites	
3.16 Vulnerability Summary	
3.17 Municipal Data	
3.18 References	

4. Goals

4.1 Background	
4.2 Goals	
4.3 2008 Update	

5. Property Protection

5.1	Keeping the Hazard Away	
5.2	Retrofitting	
5.3	Insurance.	5-11
5.4	The Government's Role	5-16
5.5	Conclusions	5-20
5.6	Recommendations	5-21
5.7	References	

6. Preventive Measures

6.1	Planning and Zoning	
6.2	Open Space Preservation	
6.3	Subdivision Regulations	
6.4	Building Codes	
6.5	Manufactured Homes	
6.6	Floodplain Regulations	6-19
6.7	Drainage Regulations	
6.8	Coastal Zone and Wetlands Protection	
6.9	Urban Forestry	
6.10	Conclusions	
6.11	Recommendations	
6.12	References	

7. Emergency Response

7.1 Threat Recognition	
7.2. Warning	
7.3. Response	
7.4 Evacuation and Sheltering	
7.5. Post-Disaster Recovery and Mitigation	
7.6 Conclusions	
7.7 Recommendations	
7.8 References	

8. Flood Control

8.1	Flood Control Measures	
8.2	SELA	
8.3	Watershed Management Plans	
8.4	Drainage Improvements	
8.5	Drainage System Maintenance	
8.6	Conclusions	
8.7	Recommendations	
8.8	References	

9. Public Information

9.1	Outreach Projects	
9.2	Real Estate Disclosure	
9.3	Libraries and Websites	
9.4	Technical Assistance	
9.5	Public Information Program Strategy	
9.6	Conclusions	
9.7	Recommendations	
9.8	References	

10. Action Plan

10.1	Program Action Items	10-7
10.2	Public Information Strategy	10-17
10.3	Administrative Action Items	10-21

Appendices

A. Public Involvement Activities – <u>2004 Plan</u> B. Public Involvement Activities – 2009 Update C. 2008 – 2009 Planning Committee Meetings D. Project Scoping



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Natural Hazards Mitigation Plan

Executive Summary

The original language in the 2004 Natural Hazards Mitigation Plan is shown in black. Revisions and changes for the 2009 Update are underlined in red.

1. Introduction St. Tammany Parish is subject to natural hazards that threaten life and health and have caused extensive property damage. Since 1965, St. Tammany Parish received <u>20</u> Presidential Disaster Declarations, more than any other parish in the state. To better understand these hazards and their impacts on people and property, and to identify ways to reduce those impacts, the Parish's Office of Emergency Preparedness undertook this *Natural Hazards Mitigation Plan*.

Under the Disaster Mitigation Act of 2000 (42 USC 5165), a mitigation plan is a requirement for Federal mitigation funds. Therefore, a mitigation plan will both guide the best use of mitigation funding and meet the prerequisite for obtaining such funds from the Federal Emergency Management Agency (FEMA). FEMA also recognizes plans through its Community Rating System, a program that reduces flood insurance premiums in participating communities. This *Mitigation Plan* and this *Update* meet the criteria of all these programs.

This *Hazard Mitigation Plan* was developed under the guidance of a Hazard Mitigation Planning Committee. The Committee's



Source: cbsnews.com

members include representatives of Parish offices, interested municipalities, and public and private stakeholder organizations. All municipalities were invited and Folsom, Sun, Abita Springs and Pearl River passed resolutions to participate in 2003. <u>Madisonville</u> <u>signed up for this 2009 *Update*</u>. Slidell, Covington, and Mandeville opted to prepare their own plans, but sent representatives to the Committee. Several members had been flooded, had wind damage, or had otherwise personally been affected by natural hazards.

The Committee met monthly from September 2003 through March 2004. It reviewed the hazards and their effects on people and property, considered a variety of ways to reduce and prevent damage, and recommended the most appropriate and feasible measures for implementation. Its work was coordinated with Parish and municipal staff and a variety of State and Federal agencies and private organizations. In 2008, the Committee was called back to duty to prepare a five year update of the plan.

The sections in this Executive Summary correspond to the chapters in the full Plan. The full text of the St. Tammany Parish *Natural Hazards Mitigation Plan* can be reviewed or downloaded from www.stpgov. org/departments_hazard.php **2. Hazard Profile** The Committee reviewed <u>14</u> hazards that cause the greatest threat to St. Tammany Parish. Chapter 2 reviews what causes them, their likelihood of occurring, and their impact on people and property. The following summary table was prepared.

Table 2-26 Hazard Risk Summary				
Hazard	Areas Exposed	Annual Chance	Threat to People	Property Damage
2.1 Tropical storms/hurricanes	Entire Parish	0.83	High	High
2.2 Flooding	Floodplains	1.00	Med	High
2.2.A Repetitive flooding	Entire Parish	0.20	Med	High
2.3 Tornadoes	Entire Parish	1.00	High	High
2.4 Wildfires	Forests	1.00	Low	Med
2.5 Drought	Entire Parish	0.05	Low	Low
2.6 Fog	Roads, airport	1.00	High	Low
2.7 Earthquake	Entire Parish	0.01	Low	Low
2.8 Hailstorm	Entire Parish	0.16	Low	Med
2.9 Land failure	Shoreline	1.00	Low	Low
2.10 Severe winter	Entire Parish	0.05	Med	Low
2.11 Dam failure	Downstream of dams	0.01	Low	Med
2.12 Levee failure	Leveed areas	0.02	Med	High
2.13 Termites	Entire Parish	1.00	Low	Med

3. Vulnerability Assessment Chapter 3 reviews how vulnerable St. Tammany Parish is to property damage, threats to public health and safety, and adverse impact on the local economy. This involved an assessment of the location and likely damage to critical facilities and other structures from different scenarios of strikes by the <u>14</u> hazards.

This effort concluded that the Parish can be expected to suffer over <u>\$540</u> million in average annual damage from all of the hazards listed in the table above. Some hazards are more important than others. The chapter concludes:

- 1. Tropical storms (including hurricanes) and flooding are by far the most severe hazards facing St. Tammany Parish in terms of property damage. Termites, <u>levee failure</u>, and hailstorms are the next most severe.
- 2. Fog is the most severe hazard facing St. Tammany Parish in terms of the threat to lives, safety and mental health. Other, more frequent, hazards, such as tornadoes, wildfires, termites and tropical storms are also important.
- 3. Tropical storms (including hurricanes) and flooding have the greatest overall impact on the area's economy. Termites are an added cost of living in the area.
- 4. Some types of property and areas are more vulnerable than others. Special emphasis should be placed on protecting manufactured homes and repeatedly flooded properties.



Isidore storm surge flooding at Mandeville Photo by Alex Brandon © 2003 The Times-Picayune Publishing Co., all rights reserved. Used with permission of The Times-Picayune **4. Goals** Following the hazard analysis and a review of the Parish's "New Directions 2025" planning effort, six goals were set for the mitigation plan:

- 1. Protect the lives and health of the Parish's residents from the dangers of natural hazards.
- 2. Ensure that public services and critical facilities operate during and after a disaster.
- 3. Ensure that adequate evacuation routes, streets, utilities <u>and public and emergency</u> <u>communications</u> are maintained and available during and after a disaster.
- 4. Protect homes and businesses from damage.
- 5. <u>Use new infrastructure and development planning to reduce</u> the impact of natural hazards.
- 6. Give special attention to repetitively flooded areas.

5. Property Protection Property protection measures are used to modify buildings or property subject to damage. They include acquisition, elevation, retrofitting, and insurance. These measures are implemented by the property owners, so appropriate government activities include information and financial support. The Parish has actively helped residents implement property protection measures with FEMA funds, <u>especially repetitively flooded homes</u>, but there has not been much done on measures that are not funded by FEMA.



6. Preventive Measures The Committee reviewed a variety of mitigation measures to protect new construction from hazards and see that future development does not increase

potential losses. This Plan calls for support of the plans and ordinances that will be prepared pursuant to the Parish's New Directions 2025 planning effort.

Most programs that regulate new development and preserve open space and natural areas are in good shape. <u>All participating communities</u> <u>adopted the International Building code and the</u> <u>2025 Plan is being implemented.</u> Improvements are needed in administrative procedures and the floodplain management regulations.



7. Emergency Services Early warning, warning dissemination and response plans were all found to be effective and they have been improved following a post-Katrina evaluation and adoption of a new emergency operations plan. Major concerns are with evacuation routes and procedures and post-disaster management of reconstruction and repairs.

8. Flood Control Advantages of levees, reservoirs, channel improvements, and other flood control projects include protecting roads and buildings, producing minimal disruption to the protected properties, and being maintained by a dependable government agency. Larger projects require planning at the watershed level. There are several efforts by the Corps of Engineers and the Department of Engineering to do this, including new watershed studies and models and a 10-Year Infrastructure Plan. Current funding levels are not sufficient to fund all needed flood control and drainage projects.



A good drainage maintenance program meant that this ditch did its job during Tropical Storm Isidore



9. Public Information There are many ways that public information can be used so that people and businesses will be more aware of the hazards they face and how they can protect themselves. The Committee identified the most important topics to cover (see chart) and the most effective ways to get the messages out.

10. Action Plan Chapter 10 is the culmination of the Committee's work. Keeping the goals in mind,

the Committee reviewed and discussed alternatives and set priorities with four factors in mind: addressing the greatest threats, ensuring the measures are appropriate, having the benefits exceed the costs, and pursuing affordable projects.

There are 17 action items -10 programmatic action items, 3 public information action items, and 4 actions to administer and support the recommended mitigation program to reach the six goals. Most of these action items can be implemented as additional assignments for Parish and municipal staff and additional funding would not be needed. Some action items, particularly the first, do need outside funding support.

Action item 1. Property protection projects The Parish will continue to seek State and Federal funding support for property protection measures. Priority will be for flood protection projects for repetitive loss properties. Concurrently, staff will pursue flexible funding arrangements, with the first priority being to fund area-wide flood control or drainage improvement projects that will protect many properties at a lower cost.

Action item 2. Public property <u>Pending funding, several public facilities will be</u> "hardened" to protect them for wind and floods. These will serve as demonstration projects to encourage the departments and municipalities to evaluate their own properties to determine if they need to be retrofitted or modified to protect them from the hazards.

Action item 3. Plans and regulations <u>Because most of the 2004 targets have been</u> implemented, action item 3 will be ongoing reviews of regulatory standards.

Action item 4. Building code The Parish and municipalities have adopted the latest International series of codes. Therefore, action item 4 calls for ongoing review of the standards to determine if later changes are needed to better protect new buildings from natural hazards.

Action item 5. Permit administration Procedures for administering and enforcing the building code and floodplain regulations will be



reviewed and strengthened, <u>the former through an evaluation by the Building Code</u> <u>Effectiveness Grading Schedule.</u> This effort will include improvements to procedures for permits and inspections after a disaster and having staff members become Certified Floodplain Managers.

Action item 6. Floodplain management <u>The Parish and the four municipalities in the</u> National Flood Insurance Program will improve their administrative capabilities. The cities will join the Community Rating System (CRS) and the Parish will improve its CRS classification. It is recommended that Sun join the National Flood Insurance Program.

Action item 7. Tree City The Parish and the municipalities will implement urban forestry programs to qualify them to be designated as Tree City USA communities. This effort will reduce their exposure to damage (especially to utility lines) from wind, winter storms, wildfires, and termites.

Action item 8. Emergency operations The *St. Tammany Parish Multi-Hazard Emergency Operations Plan* will be submitted for CRS credit. Two recently raised concerns will be addressed with the State.

Action item 9. Flood control projects The current approach to flood control projects with watershed modeling and planning will be pursued.

Action item 10. Drainage system maintenance <u>This action item has been</u> accomplished and is being deleted.

<u>New action item 10. Project scoping The</u> Parish will analyze 18 submitted projects to determine which ones are eligible for FEMA funding. Grant applications will be submitted for the top ranking projects.



Action item 11. Hazard mitigation materials As funding permits, the Parish will prepare background information, articles, and other explanations of priority hazard mitigation topics. Masters of these materials will be prepared and made available for reproduction and distribution by interested municipalities, schools, and area organizations.

Action item 12. Outreach projects The Parish and the municipalities will disseminate outreach projects based on the materials provided under action item 11. Such projects will include the hurricane preparedness and safety brochure, news releases, <u>newsletter articles</u>, <u>brochures</u>, and more information on the Parish's website.



Action item 13. Flood maps <u>The new Flood Insurance</u>

Rate Map has been published and there is a new state law on real estate disclosure of flood hazards, so this action item is being deleted.

<u>New action item 13. Public information topics</u> This action items lists the most important topics that the hazard mitigation materials and outreach projects should cover.

Action item 14. *Plan* adoption The Parish and municipal councils will adopt this *Natural Hazards Mitigation Plan Update*.

Action item 15. Mitigation Coordinating Committee The Natural Hazards Mitigation Planning Committee will be converted to a permanent advisory body in the Parish's resolution to adopt this <u>Update</u>. It will act as a forum for hazard mitigation issues and report progress and recommended changes to the Parish and municipal councils.

Action item 16. Financing More funds are needed for flood protection and drainage projects and for meeting the costshare requirement for state and federal projects, but raising local revenues will not be pursued at this time.



Action item 17. Community Rating System St. Tammany Parish is participating in the CRS as a Class 9 and is expected to move up to a Class 8, saving residents in the unincorporated areas over \$1,000,000 each year in flood insurance premiums. Once the appropriate action items have been implemented, the Parish will submit a request to move to a Class 7. It is recommended that Abita Springs, Madisonville, and Pearl River join the CRS.

Chapter 1. Introduction

The original language in the 2004 Natural Hazards Mitigation Plan is shown in black. Revisions and changes for the 2009 update are underlined in red.

The problem: St. Tammany Parish is subject to natural hazards that threaten life and health and have caused extensive property damage. Since 1965, St. Tammany Parish received <u>20</u> Presidential Disaster Declarations, more than any other parish in the state. To better understand these hazards and their impacts on people and property, and to identify ways to reduce those impacts, the Parish's Office of Emergency Preparedness undertook this *Hazards Mitigation Plan.*

"Hazard mitigation" does not mean that all hazards are stopped or prevented. It does not

suggest complete elimination of the damage or disruption caused by such incidents. Natural forces are powerful and most natural hazards are well beyond our ability to control. Mitigation does not mean quick fixes. It is a longterm approach to reduce hazard vulnerability. As defined by the Federal Emergency Management Agency (FEMA), "hazard mitigation" means any sustained action taken to reduce or eliminate the long-term risk to life and property from a hazard event.

Why this plan? Every community faces different hazards and every community has different resources and interests to bring to bear on its problems. Because there are many ways to deal with natural hazards and many agencies that can help, there is no one solution or cookbook for managing or mitigating their effects.

Planning is one of the best ways to correct these shortcomings and produce a program of activities that will best mitigate the impact of local hazards and meet other local needs. A well-prepared plan will ensure that all possible activities are reviewed and implemented so that the problem is addressed by the most appropriate and efficient solutions. It can also ensure that activities are coordinated with each other and with other goals and programs, preventing conflicts and reducing the costs of implementing each individual activity.



Table 1-1 St. Tammany Disaster Declarations		
Date	Hazard	
9/10/65	Hurricane Betsy	
8/18/69	Hurricane Camille	
4/27/73	Severe storm, flood	
1/31/77	Drought, flood	
5/2/79	Severe storm, flood	
4/9/80	Severe storm, flood	
4/20/83	Severe storm, flood	
11/1/85	Hurricane Juan	
4/29/91	Flood	
8/25/92	Hurricane Andrew	
2/2/93	Severe storm, flood	
5/8/95	Rainstorm, flood	
9/30/98	Hurricane Georges	
6/5/01	Hurricane Allison	
9/22/02	Trop Storm Isidore	
10/3/02	Hurricane Lili	
<u>9/15/04</u>	Hurricane Ivan	
<u>8/29/05</u>	Hurricane Katrina	
<u>9/24/05</u>	Hurricane Rita	
<u>9/2/08</u>	Hurricane Gustav	
Source:	Louisiana OEP, FEMA	

Mitigation activities need funding. Under the Disaster Mitigation Act of 2000 (42 USC 5165), a mitigation plan is a requirement for Federal mitigation funds. Therefore, a mitigation plan will both guide the best use of mitigation funding and meet the prerequisite for obtaining such funds from FEMA. FEMA also recognizes plans through its Community Rating System, a program that reduces flood insurance premiums in participating communities. This program is described at the end of this chapter.

This *Plan:* This *Plan* identifies activities that can be undertaken by both the public and the private sectors to reduce safety hazards, health hazards, and property damage caused by natural hazards. It fulfills the Federal mitigation planning requirements, qualifies for Community Rating System credit and provides the Parish and its municipalities with a blueprint for reducing the impacts of these natural hazards on people and property.

1.1. Planning Approach

This *Plan* is the product of a rational thought process that reviews alternatives and selects and designs those that will work best for the situation. This process is an attempt to avoid the need to make quick decisions based on inadequate information. It provides carefully considered directions to the Parish government and to the participating municipalities by studying the overall damage potential and ensuring that public funds are well spent.

Planning Committee: This *Hazard Mitigation Plan* was developed under the guidance of a Hazard Mitigation Planning Committee, created by a resolution of the St. Tammany Parish Council on September 4, 2003. All municipalities within St. Tammany Parish were invited to participate. Abita Springs, Folsom, Sun and Pearl River passed a resolution stating their commitment to the plan development. Mandeville, Covington and Slidell prepared their own plans, but still participated on the Committee.

The Committee's members include representatives of Parish offices, interested municipalities, and public and private stakeholder organizations. The member organizations and their representatives are shown in Table 1-2, on the next page. It should be noted that several members had been flooded, had wind damage, or had otherwise personally been affected by natural hazards. The Committee met monthly from September 2003 through March 2004. It reviewed the hazards and their effects on people and property, considered a variety of ways to reduce and prevent damage, and recommended the most appropriate and feasible measures for implementation.

Technical support for the planning effort was provided by the Parish Office of Emergency Preparedness, The Solutient Corporation, a database management and GIS company, and French & Associates, Ltd., a hazard mitigation consulting firm.

Planning process: The Hazard Mitigation Planning Committee followed a standard process, based on FEMA's guidance and requirements. Following a series of eight tasks (see <u>planning timetable next page</u>), the Committee assessed the hazards facing the parish, set goals, and reviewed a wide range of activities that can mitigate the adverse affects of the hazards.

Table 1-2 2003 – 2004 Hazard Mitigation Planning Committee			
Participant	Agency/Organization	Office	
Tom Buell	LEPC	Chair	
Cynthia Sicard	New Directions 2025	Co-Chair	
Larry Burch	LEPC		
Walter Haese	New Directions 2025		
Pat Brady	Greenleaves Homeowners Association		
Joe McCaffrey	Military Road Alliance	President	
Liz Vollenweider	Meadowbrook Homeowners Association		
Clarence Powe	St. Tammany Parish	Emergency Preparedness	
Rodney Hart	St. Tammany Parish	Emergency Preparedness	
Jean Thibodeaux	St. Tammany Parish	Engineer	
Larry Hess	St. Tammany Parish	Fire Services	
Suzanne Parsons	St. Tammany Parish	Cultural & Governmental Affairs	
Janet Pike	St. Tammany Parish	Information Services	
David deGeneres	St. Tammany Parish	Public Works	
Cliff Galante	St. Tammany Parish	Planning/Mitigation	
Kirt Gaspard	St. Tammany Parish Schools	School Board	
Clif Siverd	LEPC/City of Mandeville		
Kim Harbison	LEPC/City of Slidell	City Council	
Steven Michell	City of Covington		
Cindy Murry	Town of Abita Springs	Planning & Zoning	
John Mathies	Village of Folsom	Assistant to mayor	
Ruby Gauley	Town of Pearl River	Mayor Pro Tempore	
Hayward Jarrell	Village of Sun		
LEPC = Local Emergency Planning Committee			

Mitigation Planning Timetable							
Task			l	Montl	1		
		Oct	Nov	Dec	Jan	Feb	Mar
Task 1. Organize	Μ						
Task 2. Public involvement							
Task 3. Coordination							
Task 4. Hazard assessment			М	Μ			
Task 5. Goal setting				Μ			
Task 6. Mitigation activities				Μ	Μ		
Task 7. Draft plan						М	Μ
Task 8. Final plan							
M = Meeting of the Mitigation Planning Committee.							

Public Involvement: Task 2 of the planning process was to obtain input from the public, particularly residents and businesses that have been affected by natural hazards. The public was invited to participate through several concurrent means, including:

- Contact with Committee members and their organizations.
- A standing invitation to attend Committee meetings.

- Press releases.
- A special website was set up on the Parish's home page, www.stpgov.org/
- A video on mitigation planning was played periodically on the public access channel.
- A public meeting held at the end of the process to receive comments on the draft plan.

Examples of these efforts can be seen in Appendix A.



Coordination: Existing plans and programs were reviewed during the planning process. It should be underscored that this plan does not replace other planning efforts, such as the Parish's 2025 planning effort, stormwater management planning and the Local Emergency Planning Committee (LEPC) (which focuses on hazardous materials). This plan complements those efforts and, as noted in later chapters, builds on their recommendations.

During the planning process, contacts were made with regional, state, and federal agencies and organizations. On December 9, 2003, a letter was sent to a variety of stakeholder organizations as well as the following agencies to determine how their programs affect or could support the Parish's mitigation efforts.

State Agencies

- Coastal Zone Management
- Cooperative Extension Services
- Department of Wildlife & Fisheries
- Department of Transportation and Development Dam Safety
- Dept. of Transportation and Development National Flood Insurance Program
- Office of Emergency Preparedness
- State Geological Survey
- State Troopers

Federal Agencies

- Environmental Protection Agency
- Federal Emergency Management Agency
- National Aeronautics and Space Administration
- National Weather Service
- Natural Resources Conservation Service
- US Army Corps of Engineers
- US Fish & Wildlife Service
- US Geological Survey

Regional Agencies

- Parish School Board
- Regional Planning Commission
- Soil & Water Conservation District

Organizations

- East & West Chambers of Commerce
- Homebuilders Association
- Lake Pontchartrain Basin Foundation
- Nature Conservancy of Louisiana
- Northshore Area Board of Realtors
- Orleans Audubon Society
- Red Cross
- Sierra Club, Delta Chapter

At the end of the planning process, each of these agencies was sent a notice requesting their review of the draft *Plan*. They were advised that the draft could be reviewed on the Parish's website and they were asked to provide any comments in time for the March 11, 2004, public meeting. This notice also went to all municipalities in the Parish and the adjoining parishes of Tangipahoa, Washington, St. Bernard, and Orleans as well as Hancock County, Mississippi.

Hazard profile and vulnerability assessment: The Committee tackled Task 4 of the planning process during the months of November and December. The hazards reviewed include those locally reported and all natural hazards listed in the state's Hazard Profile. They are:

- 1. Tropical storms/hurricanes 6. Fog
- 2. Flooding
- 3. Tornadoes
- 4. Wildfires
- 5. Drought

- 7. Earthquake
 8. Hailstorm
 9. Land failure
- 10. Winter storm
- 11. Dam failure
- 12. Levee failure
- 13. Termites

The hazard data and the Committee's findings and conclusions are covered in Chapter 2 of this *Plan*. Chapter 2 assesses each hazard – what causes it and the likelihood of occurrence. Chapter 3 reviews the impact of these hazard on human development, i.e., how vulnerable St. Tammany Parish is to damage.

Goals: The Committee conducted a goal setting exercise at its December meeting. The goals were then drafted and revised at subsequent meetings. The results are discussed in Chapter 4 of this *Plan*.

Mitigation Strategies: The Mitigation Planning Committee considered everything that could affect the impact of the hazards and reviewed a wide range of alternatives. They are organized under five general strategies for reaching the goals. These strategies are the subject of Chapters 5 - 9 in this *Plan*.

- Property protection – e.g., relocation out of harm's way, retrofitting buildings

- Preventive e.g., zoning, building codes, and other development regulations
- Emergency management e.g., warning, response, evacuation
- Structural projects e.g., levees, reservoirs, channel improvements
- Public information e.g., outreach projects, technical assistance to property owners

Action plan: After the alternatives were reviewed, the Committee drafted an "action plan" that specifies recommended projects, who is responsible for implementing them, and when they are to be done. The action plan is included as Chapter 10 of this *Hazard Mitigation Plan*.

It should be noted that this *Plan* serves only to recommend mitigation measures. Implementation of these recommendations depends on adoption of this *Plan* by the St. Tammany Parish Council and the governing boards of each participating municipality.

2009 update: The Parish's August 2004 *Natural Hazards Mitigation Plan* was adopted by the St. Tammany Parish Council on March 3, 2005. The plan was subsequently approved by the State and FEMA. It was one of only four plans in the state that had been approved when Hurricane Katrina hit.

The Parish did not apply for Community Rating System credit for the plan. However, the Parish has remained active in obtaining mitigation grants to assist residents interested in mitigating their exposure to flooding. Having the 2004 Plan facilitated getting the grants faster than most other parishes. To date, the Parish has received \$ 6.8 million from seven different FEMA mitigation grants to move or elevate floodprone homes and has applications in for five more grants.

One condition of FEMA mitigation grants is a current mitigation plan. An update is required every five years for a plan to remain current. If the 2004 Plan is not updated, the Parish is in jeopardy of losing this important source of financial assistance that has helped so many residents.

In 2008, the Parish received a planning assistance grant from FEMA to update the 2004 plan. The Parish contracted with Solutient, the authors of the 2004 Plan, to conduct the update. Solutient was assisted by French & Associates (who also helped on the 2004 Plan) and CDM, who handled the project scoping.

The planning team reviewed plans, studies, after action reports, and other documents related to Hurricane Katrina and the Parish since 2004. These are listed in the references section at the end of each chapter, the new ones being underlined in red. Planning team members also interviewed Parish and municipal staff to identify what had happened over the last five years, what has changed, and what lessons had been learned. The chapters were revised accordingly and submitted to Parish staff and the Planning Committee for review.

The Planning Committee was revived and asked to coordinate the update effort. The same organizations are represented, but some of the people are different. The 2008 membership is shown in Table 1-2A.

Table 1-2A 2008 – 2009 Hazard Mitigation Planning Committee					
Participant	Agency/Organization	Office			
Tom Buell	LEPC	Chair			
Cynthia Sicard	New Directions 2025	Co-Chair			
Mayor Eddie Price	Mandeville				
Larry Burch	LEPC				
Walter Haese	New Directions 2025				
Pat Brady	Greenleaves Homeowners Association				
Dan Fox	Military Road Alliance				
Joe McCaffery	Military Road Alliance				
Liz Vollenweider	Meadowbrook Homeowners Association				
Ken Litzenberger	US Fish & Wildlife Service				
Chief Warhorse	Governors Office of Indian Affairs				
Michael Lowe	US Army Corps of Engineers				
Carlton Dufrechou	Lake Pontchartrain Basin Foundation				
Kirt Gaspard	St. Tammany Parish Schools	Risk Manager			
Dexter Accardo	St. Tammany Parish	Emergency Preparedness			
Rodney Hart	St. Tammany Parish	Emergency Preparedness			
Clarence Powe	St. Tammany Parish	Emergency Preparedness			
Suzie Sumpter	St. Tammany Parish	Mitigation			
Gina Hayes	St. Tammany Parish	Mitigation			
DeEtte Smythe	St. Tammany Parish	Engineer			
John O'Neil	St. Tammany Parish	Fire Services Director			
Suzanne P. Stymiest	St. Tammany Parish	Cultural & Governmental Affairs			
Shannon Davis	St. Tammany Parish	Public Works Director			
Kelly Rabalais	St. Tammany Parish	Legal office			
Gina Campo	St. Tammany Parish	President's Office			
Mark Ford	St. Tammany Parish	Code Enforcement			
Joe Shoemaker	St. Tammany Parish	Engineering			
Sidney Fontenot	St. Tammany Parish	Planning			
Kim Harbison	LEPC/City of Slidell	City Council			
Steven Mitchell	City of Covington	Fire			
Cindy Murry Chatelain	Town of Abita Springs	Planning & Zoning			
Donna Kirkpatrick	Town of Abita Springs				
Joyce Core	Village of Folsom	Village Clerk			
Diane Holly	Town of Pearl River				
Winston Cavendish	Village of Sun	Police Chief			
Steve Benton	Town of Madisonville	Floodplain Administrator			
Steven Michell	City of Covington				
Paula Joiner	American Red Cross				
Frances Barker	American Red Cross				
LEPC = Local Emergency Planning Committee					

The Committee's meetings were publicized in the press and on the Parish's website. The Committee met on September 29 and November 17, 2008, and on March 16, 2009. Members assisted the planning team in collecting data, reviewing the draft sections, and providing guidance. All of the conclusions and recommendations were specifically approved by consensus of the Committee.



Mitigation Planning Committee meeting, March 16, 2009



The same four municipalities, Abita Springs, Folsom, Pearl River, and Sun, continued to be involved, and a fifth, Madisonville, passed a resolution to participate.

A fourteenth hazard was added to meet FEMA's planning update criteria. Repetitive flooding was split from "regular" flooding and given more attention as a separate hazard.

On April 27, 2009, the Committee hosted a public meeting on the draft update and recommended it to the Parish and City Councils for adoption.

Project scoping: A separate, but related activity, was a review of specific mitigation projects that could some day be eligible for FEMA mitigation grants. The Committee members were asked to submit projects that met the grant criteria. Over a period of two months, 18 projects were nominated by Parish staff and citizen members. These projects are mentioned in their respective chapters. They included:

- <u>12 drainage/flood control projects (Chapter 8. Flood Control)</u>
- <u>4 projects to harden utility structures (Chapter 5. Property Protection)</u>
- <u>1 project to clear damaged property (Chapter 5. Property Protection)</u>
- <u>1 municipality's flood warning sirens (Chapter 7. Emergency Response)</u>

The 18 projects were reviewed to ensure they met the grant criteria. They were then reviewed for their benefits and costs using the "STAPLEE" criteria (see box). The next step was a feasibility study for each project, followed by a detailed project scoping of the highest ranking ones. This work is covered in more detail in Appendix D. Social Technical Administrative Political Legal Economic Environmental The STAPLEE Criteria

1.2. Topography and Land Use

St. Tammany Parish is located in southeastern Louisiana, on the north shore of Lake Pontchartrain (see Map 1-1). The Parish measures approximately 25 miles north to south and 35 miles east to west. It covers 877 square miles and is the fifth largest parish in the state.

Map 1-2 identifies the municipalities and the main features of the Parish. Lake Pontchartrain is to the south. To the east is the Pearl River, the boundary between Louisiana and Mississippi. To the southeast is the City of Slidell and US Highways 11 and 90 and Interstate 10, the main roads to the eastern entry to New Orleans.



In the western part of the Parish are the cities of Covington, Mandeville, Madisonville and Abita Springs. Crossing the Lake from Mandeville is the Causeway, the 24 mile over water link to the western suburbs of New Orleans. Folsom, Sun and Pearl River are located to the north of the two larger population centers.



April 2009 DRAFT

Most of St. Tammany Parish is geologically considered Easter Pleistocene Terrace and Gulf Coast Flatwood. In the northeast and east, the predominant landscape feature is the floodplain of the Bogue Chitto and Pearl Rivers. Along the Lake to the south, the land is mostly marsh. These three main features (upland, floodplain and marsh) can be seen on Map 1-3: in 1982, the terrace and flatwood is mostly forest (dark green), shrub (light brown), and farm or grass (dark brown). The larger floodplains/wetland forests to the east are orange and the marsh is light green.

Land use: The population of St. Tammany Parish has nearly tripled since 1970, making it the fastest growing parish in Louisiana. With an influx of nearly 500 people per month, the present population is over 195,000. If the current growth rate continues, the St. Tammany Economic Development Foundation predicts the population will exceed 225,000 by 2007.

The change in settlement from this growth can be seen in Maps 1-3 and 1-4 on the next page. Urban areas are shown as red. The red areas increased greatly from 1982 (Map 1-3) to 2000 (Map 1-4). There is a corresponding loss of forest and shrub land (dark green and light brown) and some marsh (light green). The Pearl River floodplain remained largely unchanged, probably because most of it is a State or Federal wildlife preserve.

Table 1-3 shows that the Parish's population tripled between 1970 and 2000. The latest available data from the US Census Bureau (2006) estimates the population at 231,000. The graph below is from the Parish's 10-year infrastructure plan, which was published in 2005.

Table 1-3 Population					
1970	63,500				
1980	110,800				
1990	144,500				
2000	190,000				
2006	<u>231,000</u>				

Both Table 1-3 and the graph show a steady increase in population in St. Tammany Parish. It is expected that the growth

rate will be even higher in response to the surge of growth that has followed Hurricane Katrina.





Table 1-4 provides the numbers that correspond to the areas on Maps 1-3 and 1-4. While the Parish's population increased by 73% between 1980 and 2000, the amount of land in urban development increased by 318% in the 18 years, 1982 – 2000. Most of this came from the forest and marsh areas. This reflects a national trend: land areas are urbanizing faster than the rate of population growth as new developments have larger lots and lower density than development before 1970.

Table 1-4 Habitat Classification						
	1982	(Map 1-3)	2000 (Map 1-4)			
	Area Percent of		Area	Percent of		
Habitat	(acres)	Parish Area	(acres)	Parish Area		
Marsh	52,938	7.4%	41,849	5.8%		
Upland Forest	126,425	17.6%	122,479	17.0%		
Wetland Forest	237,232	32.9%	203,244	28.2%		
Shrub/Scrub	54,909	7.6%	51,770	7.2%		
Ag-Grass-Barren	47,156	6.5%	48,912	6.8%		
Urban	22,238	3.1%	70,821	9.8%		
Water	179,641	24.9%	181,466	25.2%		
Total	720,540	100.0%	720,540	100.0%		
Source: Urbanization Effects on Habitat Change in St. Tammany Parish						

While St. Tammany Parish is faced with a variety of natural hazards and all the problems that accompany fast growth, it also has the potential to mitigate their adverse effects through current and new programs and projects. The St. Tammany Economic Development Foundation notes:

St. Tammany has an educated and diverse work force. Nearly 85 percent of its residents have graduated from high school and more than 28 percent have a Bachelor's degree or higher...

Post-Katrina, St. Tammany continues to be the destination of choice for households migrating from southern parishes and newcomers from the northeast and west coast with roughly 300 new homes permitted monthly in the first quarter of 2006. (www.stedf.org)

In other words, while nature has presented the Parish with a variety of hazards, the Parish has the human resources that can face those hazards and manage the impact they have on people and property.

1.3. The Community Rating System

The Federal Emergency Management Agency's National Flood Insurance Program (NFIP) administers the Community Rating System (CRS). Under the CRS, flood insurance premiums for properties in participating communities are reduced to reflect the flood protection activities that are being implemented. This program can have a major influence on the design and



implementation of flood mitigation activities, so a brief summary is provided here.

1.3.1. General A community receives a CRS classification based upon the credit points it receives for its activities. It can undertake any mix of activities that reduce flood losses through better mapping, regulations, public information, flood damage reduction and/or flood warning and preparedness programs.

There are ten CRS classes: class 1 requires the most credit points and gives the largest premium reduction; class 10 receives no premium reduction (see Table 1-5). A community that does not apply for the CRS or that does not obtain the minimum number of credit points is a class 10 community.

As of October 1, 2008, Thirty-<u>eight</u> Louisiana communities participate, including Slidell (class <u>8</u>), Mandeville (class <u>7</u>), and St. Tammany Parish (class <u>9</u>). <u>Mandeville, Shreveport, and</u> Jefferson and East Baton Rouge Parishes have the best classifications in the state, Class <u>7</u>.

Table 1-5 Community Rating System Premium Reductions							
Class	Premium Reduction In Outside Class Points Floodplain Floodplain						
1	4,500+	45%	10%				
2	4,000-4,499	40%	10%				
3	3,500-3,999	35%	10%				
4	3,000-3,499	30%	10%				
5	2,500-2,999	25%	10%				
6	2,000-2,499	20%	10%				
7	1,500-1,999	15%	5%				
8	1,000-1,499	10%	5%				
9	500- 999	5%	5%				
10	0 - 499	0	0				

1.3.2. Program incentive The CRS provides an incentive not just to start new mitigation programs, but to keep them going. There are two requirements that "encourage" a community to implement flood mitigation activities.

First, the Parish will receive CRS credit for this *Plan* when it is adopted. To retain that credit, though, the Parish must submit an evaluation report on progress toward implementing this *Plan* to FEMA by October 1 of each year. That report must be made available to the media and the public.

Second, the Parish must annually recertify to FEMA that it is continuing to implement its CRS credited activities. Failure to maintain the same level of involvement in flood protection can result in a loss of CRS credit points and a resulting increase in flood insurance rates to residents.

It is expected that this undesirable impact of loss of CRS credit for failure to report on the plan's progress or for failure to implement flood loss reduction projects will be a strong encouragement for the Parish to continue implementing this *Plan* in dry years when there is less interest in flooding.

1.3.3. Benefits of CRS participation <u>Table 1-6 shows the direct dollar benefit to the</u> communities and their policy holders for participation in the CRS. The savings per policy are for properties in the FEMA mapped 100-year floodplain ("Special Flood Hazard Area"). The savings are lower for policies outside the mapped floodplain (see Table 1-5). Sun is not in the NFIP, so it would not benefit from the CRS.

Table 1-6 CRS Dollar Savings on Flood Insurance Premiums								
	Parish	Abita Springs	Folsom	Pearl River	Madison ville			
Total NFIP policies in force	37,171	395	22	206	323			
Policies in mapped floodplain	13,334	97	5	45	278			
Total annual premium for community	\$17,655,080	\$155,790	\$8,909	\$80,299	\$308,887			
Average individual annual premium	\$475	\$394	\$405	\$390	\$956			
Class 9 savings per floodplain policy	\$37	\$32	\$38	\$26	\$46			
Class 9 savings for community	\$562,870	\$3,524	\$230	\$1,693	\$14,828			
Class 8 savings per floodplain policy	\$74	\$64	\$77	\$53	\$91			
Class 8 savings for community	\$1,058,868	\$6,636	\$422	\$2,879	\$29,406			
Class 7 savings per floodplain policy	\$112	\$96	\$115	\$79	\$135			
Class 7 savings for community	\$1,554,853	\$9,748	\$613	\$4,066	\$43,985			

In addition to the direct financial reward for participating in the Community Rating System, there are many other reasons to participate in the CRS. As FEMA staff often say, "if you are only interested in saving premium dollars, you're in the CRS for the wrong reason." The other benefits that are more difficult to measure in dollars include:

- 1. The activities credited by the CRS provide direct benefits to residents, including:
 - Enhanced public safety;
 - A reduction in damage to property and public infrastructure;
 - Avoidance of economic disruption and losses;
 - Reduction of human suffering; and
 - Protection of the environment.
- 2. A community's flood programs will be better organized and more formal. Ad hoc activities, such as responding to drainage complaints rather than an inspection program, will be conducted on a sounder, more equitable basis.
- 3. A community can evaluate the effectiveness of its flood program against a nationally recognized benchmark.
- 4. Technical assistance in designing and implementing a number of activities is available at no charge from the Insurance Services Office.

- 5. The public information activities will build a knowledgeable constituency interested in supporting and improving flood protection measures.
- 6. A community would have an added incentive to maintain its flood programs over the years. The fact that its CRS status could be affected by the elimination of a flood-related activity or a weakening of the regulatory requirements for new developments would be taken into account by the governing board when considering such actions.
- 7. Every time residents pay their insurance premiums, they are reminded that the community is working to protect them from flood losses, even during dry years.

More information on the Community Rating System can be found at www.fema.gov/nfip/crs.shtm

1.4. References

- 1. Community Rating System Coordinator's Manual, FEMA, 2007
- 2. Example Plans, FEMA/Community Rating System, 2006
- 3. *Getting Started Building Support for Mitigation Planning*, FEMA, FEMA-386-1, 2002
- 4. Local Multi-Hazard Mitigation Planning Guidance, FEMA, July 1, 2008
- 5. National Flood Insurance Program insurance and CRS data
- 6. St. Tammany Economic Development Foundation (www.stedf.org/)
- 7. State and Local Plan Interim Criteria Under the Disaster Mitigation Act of 2000, FEMA, 2002
- 8. *State of Louisiana Hazard Mitigation Plan: Hazard Profiles*, Louisiana Office of Emergency Preparedness, April 18, 2003.
- 9. <u>State of Louisiana Hazard Mitigation Plan Update</u>, Louisiana Governor's Office of Homeland Security and Emergency Preparedness, April 14, 2008.
- 10. Urbanization Effects on Habitat Change in St. Tammany Parish, 1982 2000, Coastal Research Laboratory, University of New Orleans, 2001

Chapter 2. Hazard Profile

This chapter reviews the natural hazards that face St. Tammany Parish. Thirteen natural hazards were selected for this assessment. They were either listed in the State's Hazard Profile or identified by the Planning Committee as having affected St. Tammany Parish in recent history.

- 1. Tropical storms/hurricanes
- 2. Flooding
- 2A Repetitive flooding
- Tornadoes
 Wildfires

- Drought
 Fog
- 7. Earthquake
- 8. Hailstorm
- 9. Land failure
- 10. Winter storm
 - 11. Dam failure
 - 12. Levee failure
 - 13. Termites
- This chapter has <u>14</u> sections, one for each hazard. Each section begins with a description of the hazard. This is followed by a summary of historical occurrences in the Parish, the frequency or likelihood of future occurrences and where they occur. There is then a summary of what they can do to people and structures. Chapter 3, Vulnerability Assessment, reviews the impacts of the hazards on critical facilities, properties and the communities in St. Tammany Parish.

2.1. Tropical Storms

2.1.1. The Hazard Tropical storms and hurricanes are large-scale systems of severe thunderstorms that develop over tropical or subtropical waters and have a defined, organized circulation. The larger storms generally form over the eastern Atlantic Ocean and move westward. The hurricane season runs from May through November, with the peak activity in September.

Tropical storms and hurricanes are categorized by their wind speed, as shown in Table 2-1. While best known for their winds, these storms can also bring flooding of coastal regions, heavy rains that cause inland flooding, thunderstorms, lightning, and tornadoes. Inland flooding and tornadoes are covered in later sections of this chapter. This section focuses on the storm surge and high winds caused by tropical storms and hurricanes.

Table 2-1 Saffir-Simpson Scale						
Туре	Category Winds (mph)		Surge (ft)			
Depression	TD	< 39				
Tropical Storm	TS	39-73				
Hurricane	1	74-95	4-5			
Hurricane	2	96-110	6-8			
Hurricane	3	111-130	9-12			
Hurricane	4	131-155	13-18			
Hurricane	5	>155	>18			

In June and October, storms are more likely to come from the Gulf, while in July – September, they generally form in the South Atlantic. The peak recorded wind speed in the parish was 125 miles per hour during Hurricane Camille in 1969. Tropical storms and hurricanes get their energy from warm waters and lose strength as the system crosses land. However, because St. Tammany Parish is so close to the Gulf, there is not enough land for the winds to dissipate. The Parish will receive the full strength of a storm or hurricane when it makes landfall.

One byproduct of the winds and pressures created by these big storms is storm surge. This is an increase in water levels along the Gulf and Lake Pontchartrain when water is pushed toward the shore by pressure differences and the force of the storm's winds. When a storm makes landfall at high tide, the water level and wind driven waves are even higher. This combination can bring flooding up to 15 feet or more above normal sea level. In a flat area like St. Tammany Parish, 15 feet can cover large areas along the coast.

2.1.2. Historical Occur**rences** The first recorded hurricane struck in 1711. The state has had an average of 3 or 4 each decade since detailed records have been kept. Only four hurricanes have made landfall in Louisiana as major hurricanes of category 4 or 5 intensity: unnamed hurricanes in 1909 and 1915, Hurricane Audrey in 1957, and Hurricane Camille in 1969. Camille is the only category 5 hurricane to hit Louisiana since the 1850's. Recent storms are shown in Table 2-2. The 2004 – 2008 data show the wind speeds for the hurricanes at landfall (NOAA - NCDC).



Table 2-2 Historical Average Wind Speeds							
Nomo	Veer	Tropical	Hurricane Category				
name	rear	Storm	1	2	3	4	5
Audrey	1957	60	78	88		120	
Betsy	1965	40	70	93	105	120	
Camille	1969						190
Edith	1971	69		98			
Fern	1971						
Carmen	1974	52	86		121	150	
Babe	1977	57	75				
Debra	1978	57					
Bob	1979	46	75				
Claudette	1979	52					
Chris	1982	58					
Danny	1985	52	85				
Elena	1985	56			115		
Juan	1985	65	77				
Beryl	1988	49					
Florence	1988	69	81				
Andrew	1992	57	92			132	
Danny	1997	63	78				
Hermine	1998	42					
Alison	2001	60					
Isidore	2002	60					
Lili	2002	60					
Bill	2003	50					
<u>Ivan</u>	<u>2004</u>				<u>120</u>		
Katrina	<u>2005</u>				<u>125</u>		
<u>Rita</u>	<u>2005</u>				<u>120</u>		
<u>Gustav</u>	2008			<u>110</u>			
<u>lke</u>	<u>2008</u>			<u>110</u>			
Source: State Hazard Profile and Unisys Weather							

In this century, Hurricane Audrey has killed the most people in the state (556) and Hurricane Andrew caused the most property damage (\$25 billion) (figures are for the entire US, not just Louisiana).

Hurricane Betsy: On September 10, 1965, Hurricane Betsy's storm surge of 10 feet overtopped levees on Lake Pontchartrain. New Orleans suffered its worst flooding since the hurricane of 1947. Flood water reaches the eves of houses in some places in the city. Hundreds of ships, tugs, and barges were sunk or driven aground as far upriver as Baton Rouge. Offshore and coastal oil installations, along with public utilities, reported unprecedented damage. Fall crops were in ruins and many livestock drowned.



Even though 300,000 people went to

shelters Betsy claimed 58 lives in Louisiana (81 overall). It was the first United States hurricane to produce over \$1 billion damage, thus becoming known as "Billion Dollar Betsy."

In today's dollars, Betsy cost \$8.4 billion. Betsy was the third costliest hurricane of the 20th Century. Hurricanes Hugo (1989 – \$7 billion) and Andrew (1992 – \$25 billion), exceed Betsy's devastation. Andrew also hit the state, but most of its damage was in south Florida.



Tropical Storm Allison: In June 2001, Tropical Storm Allison hit Texas. After it vented, it moved across Louisiana, causing more flooding than wind damage. Up to 30 inches of rain fell in some areas. The Bogue Falaya River at Covington exceeded flood stage for several days, cresting twice with near-record flooding, threatening levees and producing major flooding. All told, the flooding caused nearly \$30 million in damage for the state and resulted in disaster declarations for 27 parishes.

Allison's flooding occurred primarily in the southeast portion of the Parish. Numerous streets were impassable. It was estimated that over 1,000 houses were flooded, primarily in the Slidell area. The areas affected by TS Allison are shown in Map 2-1.



Tropical Storm Bertha: Bertha developed over the north central Gulf of Mexico on August 04, 2002, and moved inland over southeast Louisiana. The tropical storm was downgraded to a depression shortly after moving inland over southeast Louisiana. Some localized flash flooding from heavy rainfall developed over southeast Louisiana on August 5 and 6. Run-off from heavy rainfall caused a few rivers in St. Tammany Parish to exceed flood stage.

Tropical Storm Isidore:

Isidore had been a hurricane over Mexico. It was a tropical storm by September 26, 2002. In the morning, it made landfall at Grand Isle. By the afternoon it was over central Mississippi and downgraded to a tropical depression.

Tropical Storm Isidore had a large circulation with high force winds extending several hundreds of miles from its center. This caused a significant storm surge over a large area. At Lake Pontchartrain, storm surges



of 4 to 5 feet above normal were measured. Low lying areas, roadways and some nonelevated structures on the Lake were flooded.



St. Tammany Parish was particularly hard hit with storm surge flooding when Isidore moved north and the winds shifted to a southwest direction causing water levels to rapidly increase along the north shore of Lake Pontchartrain. The storm surge overtopped or breached a small local levee system in southern portions of Slidell causing water to flood several hundred homes. Approximately 1,000 homes were flooded in the parish from either storm surge, river flooding, or from flooding from heavy rain.



Most areas recorded sustained winds of

35 to 45 mph with some gusts to 50 mph in squalls. The highest wind speeds were observed near the coast and Lake. Approximately 2,500 people sought refuge in approximately 40 shelters in the state. Insured losses exceeded \$100 million in Louisiana.

Hurricane Lili: On the heels of Isidore, Lili hit the State on October 2, 2002. It had been a category 4 storm, but dropped to a category 1 hurricane just before landfall. Lili caused 3 to 5 feet of storm surge tides across most of coastal southeast Louisiana. Along Lake Pontchartrain, the storm flooded low-lying roadways and structures. Up to 10 inches of rain fell.

Due to the rapid weakening, no sustained hurricane force winds were measured in southeast Louisiana. Highest wind gusts in New Orleans were 51 mph, in Baton Rouge, 47 mph, and at mid Lake Pontchartrain Causeway 69 mph.

Strong wind gusts downed trees and large tree branches across much of southeast Louisiana. Property damage occurred when the trees and tree limbs fell onto houses and automobiles. In St. Tammany Parish, one man was injured when a tree fell on his mobile home. Several short lived tornadoes touched down producing only minor property damage. Heavy rainfall was not widespread, in part due to the rapid movement of the hurricane away from the area. Flash flooding occurred in only a couple of areas. The areas affected are shown in Map 2-3.



Wind Damage Caused by Lili Photo by Scott Threlkeld © 2003 The Times-Picayune Publishing Co., all rights reserved. Used with permission of The Times-Picayune



Tropical Storm Bill: This storm moved into southeast Louisiana on Monday, June 30, 2003, and then moved north northeast across St. Tammany Parish. Here are some data:

- Storm surge of 3 to 5 feet above normal along Lake Pontchartrain
- Sustained winds of 35 to 45 mph
- Maximum gust was 62 mph at the north end of the Causeway in Mandeville
- In 48 hours, it rained 6 to 10 inches
- Maximum measured rainfall was 10.16 inches at Folsom
- Significant river flooding developed during the next five days
- Three tornadoes touched down in southeast Louisiana
- Four injuries

Hurricane Katrina: Since the 2004 Plan was prepared, St. Tammany Parish has been in four Presidential Disaster Declarations for hurricanes: Ivan, Katrina, Rita, and Gustav. Katrina caused much more damage than the other three because it made landfall much closer to the Parish. As seen on Map 2-3A, the eye of Katrina passed over the Parish, while Ivan's eye hit Mobile and Rita and Gustav landed well to the west.

Katrina was one of the strongest storms to impact the coast of the United States during the last 100 years. At landfall in southeastern Louisiana, it had wind speeds over 140 mph and sustained winds of 125 mph. Wind gusts of over 100 mph were measured in New Orleans, just west of the eye. At its peak strength, Katrina was comparable to Camille's intensity. However, it was a significantly larger storm and impacted a broader area.

Katrina brought rain, too – one inch per hour over a large area. As much as a total of 10 inches fell on some areas east of the storm's track.



The storm surge was as high as 20 – 30 feet on the Mississippi coast. "The eastern end of St. Tammany Parish suffered an extreme surge which came from Lake Borgne as well as up the Pearl and Bonfouca river systems, traveling miles inland in Slidell. St. Tammany's surge was associated with the wind shift as Katrina moved inland, sloshing piled-up water in Lake Pontchartrain northeastward." (Patrick J. Fitzpatrick, Mississippi State University)

A post-storm assessment located the high water lines from Katrina's storm surge (see Map 2-3B). East of Mandeville, it was ½ mile inland. To the west and east, the surge went farther inland. At the Pearl River, it was up to 20 miles inland from the mouth. These high water lines roughly coincide with the category 2 storm surge evacuation zone shown on Map 2-4.



2.1.3. Area Affected Tropical storms and hurricanes can affect the entire parish. The satellite photos on pages 2-3 and 2-5 convey their size. Every place in the parish is susceptible to their winds, rain, and tornadoes. Map 2-4 on the previous page shows the coastal areas that will be evacuated for flooding by categories 1 through 4 storms.

Low lying and coastal areas south of I-12 are most subject to storm surge flooding. Maps 2-1, 2-2 and 2-3 show these areas were particularly hard hit by the three recent storms. The 100-year storm surge elevation at the Causeway and I-10 is 11.6 feet. The flood elevation drops one foot each 2.75 miles inland.



2.1.4. Frequency As seen in Table 2-3, Louisiana has had an average of 3 or 4 hurricanes each decade since detailed records have been kept. Given the size of hurricanes and the size of Louisiana, if a hurricane affects the State, it will likely affect St. Tammany Parish.
Table 2-3 Louisiana Storm History					
Decade	Hurricanes	T.S.s	Total		
1850's	3	1	4		
1860's	7	2	9		
1870's	6	3	9		
1880's	7	3	10		
1890's	3	6	9		
1900's	2	7	9		
1910's	3	2	5		
1920's	3	2	5		
1930's	2	8	10		
1940's	3	9	12		
1950's	2	7	9		
1960's	4	1	5		
1970's	4	3	7		
1980's	4	5	9		
1990's	3	2	5		
Totals	57	61	118		
Source: National Weather Service					

Based on the historical record, a tropical storm or hurricane should be expected somewhere within the state every 1.2 years (0.83 chance). A hurricane should make landfall every 2.8 years. As noted in Table 2-4, the odds of a severe category 4 or 5 hurricane coming closer to St. Tammany Parish are lower. See section 2.2.4 for more information on relating risk and frequency.

Table 2-4 Frequency of Hurricanes Passing Within 80 Miles of New Orleans				
Intensity Frequency				
Category 1	8 years			
Category 2	19 years			
Category 3	32 years			
Category 4	70 years			
Category 5 180 years				
Source: USGS, "Environmental Atlas of Lake Pontchartrain," in LOEP Hazard Profiles				

2.1.5. Threat to People Luckily, tropical storms and hurricanes are not the killers they used to be. Table 2-5 shows that Hurricane Audrey in 1957 was the last major killer storm. The primary reasons for this development are the storm tracking and warning programs of the National Weather Service and the public information and evacuation activities of state and local emergency managers. Hurricane George in 1996 was not a direct hit, but did produce the largest evacuation in the region's recent history <u>before Katrina</u>. Katrina killed 1,833 people, 1,377 in Louisiana alone.

Nine out of ten deaths during hurricanes are caused by storm surge flooding. High winds cause injuries, as noted in the descriptions of the recent storms on the previous

pages. These are usually the result of falling tree limbs and flying debris. These injuries could be avoided through evacuation or sheltering in a structure built to withstand the high winds.

Because their winds, storm surge and river flooding can be so dangerous and affect such a large area, evacuation is the most important safety precaution for tropical storms and hurricanes. Evacuation procedures are reviewed in Chapter 5 and the public information programs that educate residents about those procedures are covered in Chapter 9. Safety concerns with the flooding and tornadoes that accompany tropical storms and hurricanes are reviewed later in this Chapter.

Table 2-5 Killer Storms				
Fatalities	Dates			
45	8/19-20/1812			
218+	8/10-12/1856			
47	8/11/1860			
110	10/12/1886			
2,000	10/1-2/1893			
353	9/20/1909			
275	9/29/1915			
51	9/19-20/1947			
526	6/27/1957			
81	10/3/1964			
<u>1,377</u>	Katrina (2005)			
Source: NOAA				

The high winds cause hazards to human health, too. Downed trees and damaged buildings are a potential health hazard due to instability, electrical system damage, broken pipelines, chemical releases, and gas leaks. Sewage and water lines may also be damaged. Salt water and fresh water intrusions from storm surge send animals, such as snakes, into areas occupied by humans.

2.1.6. Property Damage Property can be damaged by the various forces that accompany a tropical storm. High winds can directly impact structures in three ways: wind forces, flying debris and pressure. By itself, the force of the wind can knock over trees, break tree limbs and destroy loose items, such as television antennas and power



lines (see photo). Many things can be moved by high winds.

As winds increase, so does the pressure against stationary objects. Pressure against a wall rises with the square of the wind speed, as shown in Table 2-6. For some structures, this force is enough to cause failure. The potential for damage to structures is increased when debris breaks the building "envelope" and allows the wind pressures to impact all surfaces (the building envelope includes all surfaces that make up the barrier between the indoors and the outdoors, such as the walls, foundation, doors, windows, and roof).

Table 2-6 Wind Pressures				
Windspeed	Pressure			
25 mph	2 lbs/ft ²			
75 mph	50 lbs/ft ²			
125 mph	1,250 lbs/ft ²			
Pressure is measured in pounds per square foot				

Buildings needing maintenance and mobile homes are most subject to wind damage. High winds mean bigger waves. Extended pounding by waves can demolish any structure not properly designed. The waves also erode sand beaches, roads, and foundations. When foundations are undermined, the building will collapse.



The resulting typical damage to structures from the different storm categories is shown in Table 2-7. The Beaufort Scale applies to high winds while the Saffir-Simpson Scale is for the five categories of hurricane winds.

Table 2-7. Beaufort and Saffir-Simpson Scales of Wind Damage				
Name	Wind speed	Expected Property Damage		
Strong gale	47-54 mph	Chimneys blown down, slate tiles torn from roofs		
Whole gale	55-63 mph	Trees broken or uprooted		
Storm	64-75 mph	Trees Uprooted, cars overturned		
Category 1 Hurricane	74-95 mph	Minimal: Damage is done primarily to shrubbery and trees, unanchored mobile homes are damaged, some signs are damaged, no real damage is done to structures.		
Category 2 Hurricane	96-110 mph	Moderate: Some trees are toppled, some roof coverings are damaged, major damage is done to mobile homes.		
Category 3 Hurricane	111-130 mph	Extensive: Large trees are toppled, some structural damage is done to roofs, mobile homes are destroyed, structural damage is done to small homes and utility buildings.		
Category 4 Hurricane	131-155 mph	Extreme: Extensive damage is done to roofs, windows, and doors; roof systems on small buildings completely fail; some curtain walls fail.		
Category 5 Hurricane	>155 mph	Catastrophic: Roof damage is considerable and widespread, window and door damage is severe, there are extensive glass failures, and entire buildings could fail.		

A fast moving storm with high winds, such as Bill, will produce more wind damage. While a slow moving storm that drops a lot of rain, like Allison, creates more flooding and more flood damage. Allison caused \$30 million in property damage in Louisiana, but over \$1 billion in flood damage to Texas. Tropical Storm Bill caused \$44 million in property damage in 11 parishes from several different forces:

- Winds: \$31 million
- Tornadoes: \$2 million
- Storm surge flooding: \$4 million
- River and flash flooding: \$7 million



Hurricane Damage in St. Tammany Parish Photo by Scott Threlkeld © 2003 The Times-Picayune Publishing Co., all rights reserved. Used with permission of The Times-Picayune

The Louisiana Department of Insurance provided statistics on the types of insurance claims submitted after Isidore and Lili. These are shown in Table 2-8.

Following these two storms, the St. Tammany Parish President summarized their impacts. They included:

- 1 single family home destroyed
- 709 homes, mobile homes, and apartment houses with major damage
- 338 homes, mobile homes, and apartment houses with minor damage
- 70,000 power outages
- 31,000 cubic yards of debris picked up
- 331 residents stayed in one of 7 shelters

2.1.7. 2009 update: Hurricane Katrina was certainly the most destructive natural disaster to hit St. Tammany Parish. While it raised the general consciousness about the Parish's exposure and the public's respect for what a hurricane can do, one storm does not make a trend. The overall risk of the Parish to tropical storms and hurricanes has not statistically changed since the 2004 Plan was prepared.



Table 2-8 Insurance Claims					
Type of Claim Isidore Lili					
Wind: Homeowners	\$71,000,000	\$400,000,000			
Wind: Commercial	\$10,000,000	\$49,000,000			
Flood \$52,000,000 \$32,000,000					
Auto	\$24,000,000	\$22,000,000			
Total \$157,000,000 \$503,000,000					
Note: Figures are for the whole state Source: Louisiana Department of Insurance					

2.2. Flooding

2.2.1. The Hazard This section reviews flooding caused by heavy rains that come with tropical storms, hurricanes, thunderstorms, and prolonged rain. Coastal flooding caused by storm surges is discussed in the previous section. Flooding caused by a dam or levee failure is discussed in later sections of this chapter.

By definition, flooding is caused by more water than the drainage system can convey. Flooding is dependent on three factors: precipitation, conditions in the watershed, and conditions in the drainage channel.

Precipitation: St. Tammany Parish receives an average of 64 inches of rain each year. The rain comes from tropical storms, convective thunderstorms, and storms caused by the interaction of warm moist air with colder air from the north. As seen in Table 2-9, the parish's precipitation is not spread out evenly over the year. The amount of rain that falls varies from storm to storm and varies over an area. Where this rain goes depends on the watershed.



The watershed: A "watershed" is an area of land that drains into a lake, stream or other body of water. The runoff from rain is collected by ditches and sewers which send the water to small streams (tributaries), which send the water to larger channels and

eventually to the lowest body of water in the watershed (the main channel, Lake Pontchartrain or the Gulf). When one of these conveyance channels receives too much water, the excess flows over its banks and into the adjacent area – causing a flood.

St. Tammany Parish has 7 major watersheds, which are shown on Map 2-5 on the next page. Data on these watersheds are displayed in Table 2-10. Within these major watersheds are smaller subwatersheds that drain into the tributaries. All of these streams have adjacent floodplains that are inundated during a flood.



There are several watershed conditions that affect flooding. The first is the size of the watershed. Smaller watersheds will flood more quickly. The Pearl River has a much larger watershed in Mississippi upstream of St. Tammany Parish. As with most major rivers and watersheds, the Pearl River responds more slowly to rain and runoff than do the other, smaller, streams in the Parish. But when floods do occur on the Pearl River, the duration of the flooding can extend for much longer than it does for the smaller streams.



Table 2-10 Watershed and Floodplain Data					
Watershed	Area of Watershed (square miles) *	Area of Floodplain (square miles)	Percent Of Watershed in Floodplain		
Bayou Chinchuba	67,345	26,701	40%		
Bayou Lacombe	181,755	72,821	40%		
Bayou Liberty	70,980	29,725	42%		
Pearl River - W-15/Gum Creek	453,655	330,200	73%		
Tangipahoa River	60,162	35,390	59%		
Tchefuncte-Abita-Ponchitolawa	482,611	140,084	29%		
W-14 - Bayou Vincent	94,919	77,207	81%		
Total:	1,411,427	712,128	50%		
* Areas are for the St. Tammany Parish portions of the watersheds only					

The second watershed factor that affects flooding is the slope of the land. More rain will run off the land and into the streams if the terrain is steep. Because much of St. Tammany Parish is so flat, water tends to pond where it falls and run off slowly. This results in very localized flooding conditions, before the water reaches the local drainage system.

A third factor is what development has done to the watershed and drainage system. Given the flat topography of the area, the natural drainage ways that drain runoff can be hard to discern and are often disrupted or even built on during construction. In areas that have been developed, farm fields and forests have been converted to pavements and rooftops. As a result, the amount of stormwater that runs off increases. The original natural drainage system cannot handle the increased loads and localized flooding occurs.

These watershed conditions mean that St. Tammany Parish is faced with two types of flooding: longer-lasting, overbank flooding from the larger rivers and quick or "flash" stormwater flooding in areas where the runoff overloads the local drainage system. The former may be caused by rain falling upstream in the watershed while the latter is caused by rain falling on the affected area. Because overbank flooding takes longer to occur, there may be advance warning time, but there is very little warning of local stormwater flooding.

The channel: Flooding can be aggravated by obstructions in the drainage system. There are two kinds: channel obstructions, such as small bridge or culvert openings or log jams, and floodplain obstructions, such as road embankments, fill and buildings.

Channel obstructions will aggravate smaller, more frequent floods, while floodplain obstructions impact the larger, less frequent floods where most of the flow is overbank, outside the channel. Channel obstructions can be natural (e.g., log jams or growth) or man made (e.g., broken culverts or debris). Channel obstructions can be cleared out by



Recent Stormwater Flooding

- The News Banner, June 2003
- ~ COVINGTON Heavy rains caught residents of western St. Tammany Parish off guard Sunday and caused flooding of some streets and homes.
- Unlike Tropical Storm Bill, which brought heavy rains and tidal surges to the area last month, there was little warning of the deluge that quickly materialized around mid-morning...
- [Mandeville Mayor Eddie] Price said the levels in Lake Pontchartrain directly affect drainage in Mandeville. Rain water would leave streets and yards quicker if the lake was low, but its current high levels hinder the flow of water through drainage channels.
- Another problem Price cited was clogged drains, a situation further complicated when running water picks up trash and blocks culverts. In one case on Lakeshore Drive, he said workers found a sheet of plywood blocking one culvert.

work crews or washed away during larger floods. Floodplain obstructions tend to be more permanent. They are discussed in Chapter 6's section on floodplain regulations.

2.2.2. Historical Occurrences

Floods have been caused by localized storms, rain over several days on saturated ground, and tropical storms. Over the last three decades, a flood great enough to have St. Tammany Parish declared a Federal disaster area has occurred on the average of every 3 - 4 years.

Riverine flooding: Flood heights on the larger rivers are recorded at individual river gages. There are seven reporting and recording gages in St. Tammany Parish, shown on Map 2-6. Data on recent flood events are listed in Table 2-12, on the next page. <u>Only two gages reported flood heights since 2004 close to these records. They are too far upstream to have been impacted by Katrina's storm surge.</u>

 Table 2-11

 Major Floods

 April 1973

 January 1977

 May 1979

 April 1980

 April 1983

 April 1991

 February 1993

 May 1995

 June 2001

 Sept, 2008

Each gage has its own datum, or starting point for measuring stage or height. That datum can be converted to elevation above sea level, but many users are more comfortable with the gage's stage figures. Some gages have a "flood stage," which is the height when the stream goes out of banks or starts causing property damage. These figures are shown in Table 2-12, along with the five highest recorded flood crests. Some gages have been in operation for a longer time and therefore show earlier floods. Table 2-12 shows that these streams have flooded in every month of the year, except July and December. More years of records or looking at the top 10 floods would include those months. In other words, it can flood in St. Tammany Parish at any time of the year.



Table 2-12 Historical Flood Records					
Gage Historical Floods					
Gage Name	Data	Crest	Date	Storm	
Bogue Falaya near Camp Covington		54.6 ft	09/27/2002	Isidore	
Elevation of Stage 0	34.40 ft	53.9 ft	03/07/1998		
Flood Stage	45.00 ft	53.6 ft	10/03/2002	Isidore/Lili	
		53.0 ft	08/06/2002		
		52.3 ft	06/08/2001	Allison	
		<u>51.4 ft</u>	<u>9/2/2008</u>	<u>Gustav</u>	
Bogue Falaya at Lee Road		24.0 ft	01/21/1993		
Elevation of Stage 0		23.6 ft	04/08/1983		
Flood Stage		22.7 ft	06/11/2001	Allison	
		21.8 ft	10/04/2002	Isidore/Lili	
		21.4 ft	03/08/1998		
		24.0 ft	01/21/1993		
Bogue Falaya Boston St		17.1 ft	01/21/1993		
Elevation of Stage 0	0.34 ft	16.5 ft	06/11/2001	Allison	
Flood Stage	6.00 ft	16.5 ft	02/22/1961		
		14.2 ft	01/07/1998		
		14.0 ft	10/04/2002	Isidore/Lili	
		<u>13.0 ft</u>	<u>9/2/2008</u>	<u>Gustav</u>	
Tchefuncte at Folsom		24.1 ft	04/06/1983		
Elevation of Stage 0	5.47 ft	22.3 ft	05/03/1953		
Flood Stage		22.1 ft	11/14/1961		
		22.1 ft	02/22/1961		
		21.9 ft	01/21/1993		
Tchefuncte at Covington		32.0 ft	02/03/1988		
Elevation of Stage 0	9.74 ft	31.2 ft	02/28/1987		
Flood Stage		29.9 ft	05/03/1953		
		29.5 ft	11/15/1961		
		29.3 ft	02/22/1961		
Boque Chitto at Bush		21 2 ft	04/08/1983		
Elevation of Stage 0	3 33 ft	17 4 ft	01/27/1990		
Elovation of etage e	9.00 ft	17.1 ft	03/31/1980		
	0.00 11	16.3 ft	01/30/1994		
		16.0 ft	01/22/1993		
Pearl River at Pearl River		21.1 ft	04/09/1983		
Elevation of Stage 0	6.13 ft	19.8 ft	04/01/1980		
Flood Stage	14.00 ft	19.7 ft	04/19/1900		
		19.6 ft	01/30/1990		
		19.2 ft	04/26/1979		

Stormwater flooding: Stormwater flooding follows local heavy rains. There were many problems during the tropical storms and hurricanes noted in section 2.1. They are also caused by thunderstorms, which are most likely to happen in the spring and summer months and during the afternoon and evening hours, but they can occur year-round and at all hours.

Generally, local thunderstorms and their accompanying hazards do not warrant a disaster declaration or a lot of documentation. Therefore, there are few public records of their occurrences. Some of the bigger ones are listed in Table 2-13.

	Table 2-13 Recent Thunderstorms and Their Impacts			
Date	Severity	Reported Impact		
4/11/95	5" – 7"	100 homes in Slidell flooded		
5/8/95	7.7"	Widespread street flooding, several homes reported water damage.		
5/9/95	9" – 16"	I-12 and US 190 flooded, hundreds evacuated, 6,000 applied to FEMA for disaster assistance		
4/14/96	6" – 9"	Widespread street flooding, flooding of a few houses		
8/10/96	2" – 3"	Widespread street flooding, flooding of a few houses		
2/13/97	2"	Street flooding		
7/8/97	"heavy"	Street flooding		
1/7/98	3" – 6"	\$100,000 estimated damage to homes and businesses in Slidell and Mandeville. Roads flooded in Abita Springs		
1/12/98	"heavy"	Widespread street flooding, flooding of a few houses in Covington		
1/22/98	2.5"	Street flooding		
3/7/98	3" – 5"	Widespread street flooding, flooding of a few buildings		
7/14/98	3.5"	3 buildings and numerous streets flooded in Covington		
3/3/01	"heavy"	Street flooding		
5/10/04	"torrential"	60 homes flooded, \$300,000 in property damage		
6/13/07		1 killed, 1 injured, \$60,000 in property damage		
5/14/08	4.5"	"A few homes experienced minor flooding"		
		Source: National Climatic Data Center		

2.2.3. Area Affected

Riverine flooding: The area affected by overbank flooding from the larger bayous and streams has been mapped as the floodplain. St. Tammany Parish has had several different flood maps. The official floodplain study for insurance and regulatory purposes is the *Flood Insurance Study* by the Federal Emergency Management Agency (FEMA). The floodplains mapped by FEMA are shown on Map 2-7. Table 2-10 shows that one-half of St. Tammany Parish is in the mapped floodplain.

FEMA uses the "base" flood as the basis for its regulatory requirements and flood insurance rate setting. This *Plan* uses the base flood, too. The base flood is the one percent chance flood, i.e., the flood that has a one percent (one out of 100 or .01) chance of occurring in any given year (see next section).

The area inundated by the base flood is called the Special Flood Hazard Area on FEMA maps (called Flood Insurance Rate Maps, or FIRMs). In riverine areas, this is noted as an



A Zone. In areas subject to coastal waves, it is designated as a V Zone. St. Tammany Parish has a very narrow V Zone along the lakeshore and a larger one on the Gulf. Areas outside the mapped Special Flood Hazard Area are called X Zones.

Another term used is the "500-year flood." This has a 0.2% or .002 chance of occurring in any given year. While the odds are more remote, it is the national standard used for protecting critical facilities, such as hospitals and fire stations. These areas are shown as "X 500" on Map 2-7.

Advisory flood hazard maps: Following Hurricane Katrina, FEMA concluded that some of its mapped A and V Zones understated the Special Flood Hazard Area. In April 2006, FEMA issued the following notice:

FEMA has completed an early assessment of the 1%-annual-chance (or 100-year) flood elevations for coastal areas and areas along Lake Pontchartrain. The analysis incorporates storm data from the past 35 years, including Hurricanes Katrina and Rita, new and existing long-term tidal gage records, and other existing engineering studies...

For coastal areas the results of the storm data analysis indicated that the existing 1%-annualchance flood elevations are 6 to 9 feet higher than the Stillwater Elevations (SWELs) published in the effective Flood Insurance Study (FIS). Specifically, the effective SWELs of <u>9.0 to 12.1 feet are increased to a uniform Advisory SWEL of 18 feet (relative to the National Geodetic Vertical Datum [NGVD] of 1929) in areas south and east of US 90 and, to account for storm reduction between the Gulf of Mexico and Lake Pontchartrain flooding sources, are increased to a uniform Advisory SWEL of 15 feet NGVD29 between Interstate 10 and US 90.</u>

For areas north and west of Interstate 10 and along Lake Pontchartrain, FEMA is encouraging people to adopt freeboard and elevate structures to at least 1 foot above the current BFEs shown on the effective FIRMs.

With the notice came a series of advisory maps for the Lake Pontchartrain floodplain, such as the one below for the shoreline of the Lake at Interstate 10. The term "ABFE" is used to denote that the numbers listed are *advisory* base flood elevations. While they did not have to be adopted for insurance purposes or for Parish regulations, they did reflect FEMA's best estimate of the true hazard of the base flood.



The ABFE maps only raised the base flood elevations from storm surge along Lake Pontchartrain. As seen in Map 2-7B, the new advisory maps did not extend the floodplain boundary inland everywhere and did not affect the floodplain delineations for riverine flooding.

DFIRM: FEMA

intends to replace both the current Flood Insurance Rate



Map and the advisory maps with a new FIRM. It will be on an aerial photograph base map and be in a digital format for ease with geographic information systems (GIS). It is known as a Digital Flood Insurance Rate Map or DFIRM.

The preliminary DFIRM for the Parish was presented to the public at an open house on October 22 at the Parish office. The maps are currently under review and won't become effective until sometime in 2009.

The extent of the floodplain mapped by FEMA did not increase very much. Map 2-7C compares the official Special Flood Hazard Area, the 100-year regulatory floodplain between the current official 1999 FIRM and the preliminary DFIRM.

While the boundaries may not change much, the preliminary DFIRM greatly expanded the high velocity wave action area or V Zone. Map 2-7D shows this area along Lake Pontchartrain.

Stormwater flooding: FEMA's mapping standard is for watersheds greater than one square mile. Stormwater flooding that occurs in smaller watersheds are therefore not shown on floodplain maps. Further, stormwater flooding is not limited to any area of the Parish – it occurs almost everywhere, in and out of the mapped floodplain.

One measure of the extent of the problem is the workload of the Public Works Department maintaining local drainage and roadside ditches. Between January 1 and September 30, 2003, the Department issued over 1,700 work orders to clean or remove debris from ditches. Most were based on calls from concerned residents.



2.2.4. Frequency Past floods are indications of what can happen in the future, but mitigation plans are based on the risk of future flooding. Flood studies extrapolate from historical records to determine the statistical potential that storms and floods of certain magnitude will recur. Such events are measured by their "recurrence interval," i.e., a 10-year storm or a 50-year flood.

These terms are often misconstrued. Commonly, people interpret the 50year flood definition to mean "once every 50 years." This is incorrect. Statistically speaking, a 50-year flood has a 1/50 (2% or .02) chance of occurring in any given year. A 50-

What are the odds of a flood?							
<u>Chance</u>	Chance of Flooding over a Period of Years						
Time			Flood	Size			
Period	10-year	25-year	50-year	100-year			
1 year	10%	4%	2%	1%			
10 years	65%	34%	18%	10%			
20 years	88%	56%	33%	18%			
30 years	96%	71%	45%	26%			
50 years	99%	87%	64%	39%			
These numb because they if a house is or 25-year mortgage, it the 100-year guaranteed) 30 year perio chance that 30-year morte	flood. Du r flood. Du may have r flood, bu that a 10-y od. Compa the house gage.	ot convey the larger, gh, it may l uring the a 26% ch ut the odd year flood are those of will catch	the true less frequ be subject proverbia ance of b ds are 96 will occur odds to th fire during	flood risk ent, floods. t to the 10- al 30-year eing hit by 5% (nearly during the ne only 5% g the same			

year flood could occur two times in the same year, two years in a row, or four times over the course of 50 years. It is possible to not have a 50-year flood over the course of 100 years.

Map 2-7 and this plan use the base or 100-year flood and the Special Flood Hazard Area shown on FEMA's Flood Insurance Rate Map to signify the riverine flood hazard faced by the Parish. In Chapter 3, a frequency of 0.01 or once in 100 years is used for the whole Parish. However, there were 9 flood disaster declarations in the last 27 years (Table 2-11), so the chance of a major overbank riverine flood is once every three years, or 0.33.

The chance of stormwater flooding or a smaller overbank flood is much more frequent. Southeast Louisiana averages 100 - 110 thunderstorm events each year. They average 80 - 90 minutes in duration. Assuming the average severe storm affects 100 square miles,

the odds of a severe thunderstorm hitting any particular square mile in St. Tammany Parish in any given year are 1 to 1 or 100%.

2.2.5. Threat to People: The hazard presented by floodwaters is dependent on how deep it is and how fast it moves. The speed of moving water, or velocity, is measured in feet per second. In St. Tammany Parish, velocities are generally less than five feet per second. The relationship between depth and velocity is shown in the graph to the right.



It doesn't take much depth or velocity to be dangerous. A car will float in less than 2 feet of moving water and can be swept downstream into deeper waters. This is one reason floods kill more people trapped in vehicles than anywhere else. Victims of floods have often put themselves in perilous situations by ignoring warnings about travel or mistakenly thinking that a washed-out bridge is still there.

People die of heart attacks, especially from exertion during a flood fight. Electrocution is a cause of flood deaths, claiming lives in flooded areas that carry a live current created when power lines drop or electrical components short out. Floods also can damage gas lines, floors, and stairs, creating secondary hazards such as gas leaks, unsafe structures, and fires. Fires are particularly damaging in areas made inaccessible to fire-fighting equipment by high water or flood-related road or bridge damage.

While such problems are often not reported, three general types of health hazards accompany floods. The first comes from the water itself. Floodwaters carry whatever was on the ground that the upstream runoff picked up, including dirt, oil, animal waste, and lawn, farm and industrial chemicals. Pastures and areas where cattle and hogs are kept can contribute polluted waters to the receiving streams.

Rain and floodwaters saturate the ground which leads to infiltration into sanitary sewer lines. When wastewater treatment plants are flooded, there is nowhere for the sewage to flow. Infiltration and lack of treatment lead to overloaded sewer lines which back up into low lying areas and some homes. Even though diluted by flood waters, raw sewage can be a breeding ground for bacteria, such as e coli, and other disease causing agents.

The second type of health problem comes after the water is gone. Stagnant pools become breeding grounds for mosquitoes, and wet areas of a building that have not been cleaned breed mold and mildew. A building that is not thoroughly and properly cleaned becomes a health hazard, especially for small children and the elderly.

Another health hazard occurs when heating ducts in a forced-air system are not properly cleaned after inundation. When the furnace or air conditioner is turned on, the sediments left in the ducts are circulated throughout the building and breathed in by the occupants. If the water system loses pressure, a boil order may be issued to protect people and animals from contaminated water.



Source: St. Tammany Parish



The third problem is the long-term psychological impact of having been through a flood and seeing one's home damaged and irreplaceable keepsakes destroyed. The cost and labor needed to repair a flood-damaged home puts a severe strain on people, especially the unprepared and uninsured. There is also a long-term problem for those who know that their homes can be flooded again. The resulting stress on floodplain residents takes its toll in the form of aggravated physical and mental health problems.

Van Sandt strode through her home Friday, focused on cleaning and rebuilding just hours after the water receded. Then she stopped to pick up her mother's old Bible, now sopping and blurred, from the bedroom floor.

"The water pressure opened our cabinet doors and just pushed everything out," Van Sandt said, her voice starting to shake as she tried to thumb the pages. "Oh God, the videotapes of the grandchildren doing their Easter egg hunts and at Christmas. They're all gone, too."

Times-Picayune, 9/28/02

2.2.6. Property Damage As with the threat to people, depth and velocity of flooding determine property damage. Flood velocity is important because the faster water moves, the more pressure it puts on a structure and the more it will erode stream banks and scour the earth around a building's foundation.

In a few situations, deep or fast moving waters will push a building off its foundation, but this is rare and St. Tammany Parish has few riverine areas where the depths and velocities are that high. More often, structural damage is caused by the weight of standing water, known as "hydrostatic pressure."

Due to the relatively low velocities and shallow flood depths in the Parish, the most common type of damage inflicted by a flood is caused by soaking. When soaked, many materials change their composition or shape. Wet wood will swell and, if dried too quickly, will crack, split or warp. Plywood can come apart. Gypsum wallboard will fall apart if it is bumped before it dries out. The longer these materials are wet, the more moisture, sediment and pollutants they will absorb.

Soaking can cause extensive damage to household goods. Wooden furniture



Proper cleaning after a flood requires stripping walls and floors and letting them dry thoroughly

may become so badly warped that it cannot be used. Other furnishings such as upholstery, carpeting, mattresses, and books usually are not worth drying out and restoring. Electrical appliances and gasoline engines will not work safely until they are professionally dried and cleaned. In short, while a building may look sound and unharmed after a flood, the waters can cause a lot of damage. As shown in the photo on the previous page, to properly clean a flooded building, the walls and floors should be stripped, cleaned, and allowed to dry before being recovered. This can take weeks and is expensive.

Flood insurance data: Since 1978, here have been over 5,000 flood insurance claims paid in the planning area (the Parish, not including Slidell, Covington or Mandeville). 98% of the claims are in the unincorporated areas of



the Parish. The rest (90 claims) are in Abita Springs, Folsom, Madisonville, and Pearl River. The claim payments range up to \$220,000 for the building and \$255,300 for contents.

The average claim payments for major flood events are shown in Table 2-17, These numbers show that the May 1995 storm was the worst in terms of both numbers and average dollar damage. Floods from Isidore/Lili rank second in dollar damage.

Table 2-17 Claims Data for Recent Floods						
		E	Building	C	ontents	
Date	Storm	Number	Average Claim	Number	Average Claim	
April 1983		477	\$14,126	339	\$5,854	
October 1985		216	\$10,355	142	\$5,835	
May 1995		1,313	\$18,480	647	\$10,380	
June 2001	Allison	659	\$13,791	386	\$6,949	
Sept/Oct. 2002	Isidore/Lili	862	\$16,832	448	\$10,167	
All Claims 5,082 \$15,983 2,701 \$7,174						
Note: the total includes claims for events other than named storms						
Source: FEMA flood insurance claims records						

2.2.7. 2009 update: Table 2-17A shows total claim payments to properties in the communities participating in the NFIP from 1978 (since record keeping began) to 2008. Altogether, the residents of the Parish have collected 1.5 billion dollars in flood insurance claim payments since 1978.

Table 2-17A shows the claims from all municipalities and the unincorporated areas. For the planning area for this Plan, it can be seen that Abita Springs, Folsom, and Pearl River account for less than ½ of 1% of the totals. More detailed insurance data is only available for the unincorporated areas of the Parish, but that effectively represents the entire planning area's recent flood experience.

Table 2-17A Total Flood Insurance Claims					
	<u> 1/1/1978 – 6</u>	<u>/30/2008</u>			
<u>Community</u>	<u>Total</u> Claims paid	Total Payments	Substantial Damage Payments		
Abita Springs	<u>49</u>	<u>\$619,715</u>	<u>6</u>		
<u>Covington</u>	<u>353</u>	<u>\$5,819,919</u>	<u>35</u>		
<u>Folsom</u>	<u>6</u>	<u>\$77,829</u>	<u>0</u>		
Madisonville	<u>118</u>	<u>\$4,246,030</u>	<u>30</u>		
Mandeville	<u>905</u>	<u>\$31,437,422</u>	<u>176</u>		
Pearl River	<u>17</u>	<u>\$280,898</u>	<u>0</u>		
<u>Slidell</u>	<u>7,114</u>	<u>\$422,000,922</u>	<u>3,028</u>		
St. Tammany Parish	<u>14,407</u>	<u>\$1,036,166,213.</u>	<u>5,470</u>		
<u>Sun</u>		Not in NFIP			
Total	<u>22,969</u>	<u>\$1,500,648,948</u>	<u>8,745</u>		
Source:	FEMA flood insu	rance claims records			

Table 2-17B provides insurance claims data for the unincorporated areas of the Parish since 2002. The numbers speak for themselves. A comparison of Tables 2-17 and 2-17B illustrate how large an area Katrina affected and how hard it hit the Parish. Two-thirds of all the flood insurance claims in St. Tammany Parish since 1978 came from Katrina. The average claim amount (\$107,675) was more than five times the averages from the earlier storms.

Table 2-17B Flood Insurance Claims St. Tammany Parish, 1/1/2002 - 6/30/2006								
Date	Storm Number Average Clain							
June-July 2003	<u>Bill</u>	<u>165</u>	<u>\$10,571</u>					
<u>May 2004</u>	<u>No name</u>	<u>45</u>	<u>\$15,101</u>					
October 2004	Matthew	<u>78</u>	<u>\$12,142</u>					
August-Sept 2005	<u>Katrina</u>	<u>8,851</u>	<u>\$107,675</u>					
September 2005	<u>Rita</u>	<u>25</u>	<u>\$29,354</u>					
Total 9,237 \$103,739								
Note: the total include Source: FE	es claims for e	events other urance claim	<u>than named storms</u> <u>s records</u>					



Flood Damage from Katrina in Slidell

The photo on the right shows bags of decomposing fertilizers and animal feeds that emitted ammonia gas, requiring special clean up precautions by an environmental firm. This underscores the health and safety hazards that accompany flooding.

Source: FEMA Photo Library

2.2.A Repetitive Flooding

Some areas flood more frequently than others. Properties closest to the lakefront or streams and those in areas with drainage problems will be flooded more often than other properties, even more than those in the mapped 100-year floodplain.

2.2.A.1 Repetitive Loss Properties: FEMA defines a "repetitive loss" property as one which has received two flood insurance claim payments for at least \$1,000 over any 10-year period since 1978. These properties are important to the National Flood Insurance Program and the Community Rating System because even though they comprise 1% of the policy base, they account for 30% of the country's flood insurance claim payments. There are several FEMA programs that encourage communities to identify the causes of their repetitive losses and develop a plan to mitigate the losses. Because of the special attention needed to be given to repetitive loss properties, repetitive flooding is treated as a separate hazard in this 2009 update.

<u>In 2004, there were</u> 1,345 repetitive loss properties in St. Tammany Parish. They are plotted in map 2-8 and are listed in Table 2-14, distributed by community and FIRM Zone (as reported on the insurance policy). Table 2-14 shows that the majority of the repetitive flooding problem is in the unincorporated areas and Slidell.

Table 2-14 has been updated with 2008 data, with the last column listing the totals from the 2004 Plan. It can be seen that the numbers have increased dramatically in the four years, mostly due to Katrina. The largest increases were in the A Zones of Slidell, in the V Zones of Mandeville, and in the unincorporated areas.

Table 2-14	Table 2-14 Repetitive Loss Properties by Community and FIRM Zone						
	Α	v	X 500	x	N/A	<u>Total</u> 2008	Total 2004
Abita Springs	<u>2</u>	<u>0</u>	<u>0</u>	<u>2</u>	<u>1</u>	<u>5</u>	4
Covington	<u>38</u>	<u>0</u>	<u>6</u>	<u>14</u>	<u>0</u>	<u>58</u>	48
Folsom	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	0
Madisonville	<u>7</u>	1	<u>1</u>	<u>1</u>	<u>1</u>	<u>11</u>	1
Mandeville	<u>45</u>	<u>38</u>	<u>4</u>	<u>12</u>	<u>1</u>	<u>100</u>	36
Pearl River	<u>0</u>	<u>0</u>	<u>0</u>	<u>1</u>	<u>1</u>	<u>2</u>	2
Slidell	<u>729</u>	<u>0</u>	<u>16</u>	<u>87</u>	<u>5</u>	<u>837</u>	434
Sun	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	1
Unincorporated areas	<u>992</u>	<u>76</u>	<u>39</u>	<u>330</u>	<u>11</u>	<u>1,448</u>	819
Total	<u>1,813</u>	<u>115</u>	<u>66</u>	<u>447</u>	<u>20</u>	<u>2,461</u>	1,345
FIRM Zones: A: 100-year floodplain, riverine areas. V: 100-year floodplain, coastal areas. X500: between the 100-year and 500-year floodplain boundaries. X: Outside 100-year floodplain.							
Source: FEMA flood insurance records as of 7/31/2008							

The flood insurance records provide the following statistics on the 827 <u>repetitive loss</u> properties in 2004 in the planning area (i.e., unincorporated areas, Abita Springs, Folsom, and Pearl River). There are now 1,455, all but seven of them in the unincorporated areas. The 2004 numbers are updated with the 2008 figures in parentheses.

- 3 have been acquired or elevated, but the records show that the rest are still subject to flood damage. (123 are now listed as having been mitigated)
- 31 (72) have been paid a flood insurance claim six or more times, but most of them qualify by having been flooded only twice. (See table 2-15A for all 2008 numbers)
- 778 (94%) are single family residences. (1,347 and 93%)
- 364 (44%) are no longer carrying flood insurance (or are insured as a different address) (732 and 50%)
- 71% (74%) are rated as being in the mapped floodplain, indicating that 29% (26%) are subject to local drainage problems outside the mapped floodplain. Actually, this is close to the national average, although some in the X Zone may have been remapped as in the A Zone since the original policy was written.
- The highest total payment was \$604,000 to a house that had 7 claims. Seven properties have received over ½ million dollars in claim payments, five are single family homes and the other two are

Table 2-15A 2008 Repetitive Loss Data						
<u>Number</u> Of Claims	Number of Properties	Total Paid	<u>Average</u> <u>Claim</u>			
<u>2</u>	<u>859</u>	<u>\$75,246,192</u>	<u>\$43,799</u>			
<u>3</u>	<u>337</u>	<u>\$39,123,437</u>	<u>\$38,697</u>			
<u>4</u>	<u>131</u>	<u>\$17,100,295</u>	<u>\$32,634</u>			
<u>5</u>	<u>56</u>	<u>\$9,119,820</u>	<u>\$32,571</u>			
<u>6</u>	<u>23</u>	<u>\$4,346,017</u>	<u>\$31,493</u>			
<u>7</u>	<u>15</u>	<u>\$2,875,736</u>	<u>\$27,388</u>			
<u>8</u>	<u>10</u>	<u>\$1,820,875</u>	<u>\$22,761</u>			
<u>9</u>	<u>6</u>	<u>\$1,533,368</u>	<u>\$28,396</u>			
<u>10</u>	<u>8</u>	<u>\$2,078,613</u>	<u>\$25,983</u>			
<u>11</u>	<u>3</u>	<u>\$621,032</u>	<u>\$18,819</u>			
<u>12</u>	<u>2</u>	<u>\$513,315</u>	<u>\$21,388</u>			
<u>13</u>	<u>1</u>	<u>\$184,388</u>	<u>\$14,184</u>			
<u>14</u>	<u>2</u>	4402,068	<u>\$14,360</u>			
<u>15</u>	2	<u>\$586,141</u>	<u>\$19,538</u>			
<u>Total</u>	<u>1,455</u>	<u>\$155,551,298</u>	<u>\$40,334</u>			
Source:	FEMA flood insu	urance records as o	of 7/31/2008			

non-residential properties. Only one of them is listed as having been mitigated.

 952 (65%) of the repetitive loss properties were flooded by Hurricanes Katrina or Rita. 533 of the 859 properties with only two losses (62%) were flooded by Hurricanes Katrina or Rita. In other words, had it not been for those two storms, the Parish's rep loss numbers would have increased only 11% over the 2004 figures instead of the 76% increase it experienced.

Table 2-15A provides some other interesting information on the losses paid. The average claim is greatest for those properties with only two claims. This is most likely because the Katrina claims were so large. The average claim value decreases for those properties with more and more claims because the other floods caused less damage.

At the high end of the number of claims, though, it can be seen that 19 properties in the Parish have had 10 or more flood insurance claims. These 19 properties have received a total of \$4.3 million in payments.

The 19 properties with 10 or more claims had total payments ranging from \$124,000 to \$378,000. These were added to the seven properties with over \$ ½ million in claim payments to make the Parish's "Top 25" repetitive loss properties. Here are some statistics on them:

- <u>Twenty-one are single family homes, one is "assumed condo," and three are non-residential.</u>
- Five of the single family homes are listed as "mitigated."
- Ten of the unmitigated properties are rated in the X Zone, meaning that even if they were substantially damaged, there are no regulatory requirements to bring them up to the flood protection code standards.

2.2.A.2 Area Affected: In 2004, there were 827 repetitive loss properties in the planning area (i.e., outside the three cities that are preparing their own mitigation plans). The planning team was able to plot 595 of them. Many addresses cannot be plotted (e.g., post office boxes or lot numbers) and there are problems with the rest of the source data. For example, properties rated as in a city or FIRM Zone were plotted as being outside that city or in another FIRM Zone. Some work is needed to correct these problems, but conclusions can still be drawn from the aggregate data.

The 595 sites are listed in Table 2-15 and plotted on Map 2-8. It can be seen that the greatest problem areas are in the Pearl River and Bayou Vincent watersheds, to the east and south of Slidell, and the Tchefuncte watershed that drains through Covington.

Table 2-16 shows that Parish-wide, the average repetitive loss property has been paid 2.74 claims. There have been more claims per property in the Bayou Chinchuba watershed (3.08) and the fewest in the Tangipahoa River and Tchefuncte-Abita-Ponchitolawa watersheds. Average total payments have been highest in the Bayou Lacombe, Pearl River W15 Gum Creek, and W14 Bayou Vincent watersheds.

Table 2-15 Distribution of Repetitive Loss Properties in the Planning Area					
Watarabad		FIRM Zones	;	Total	
Watershed	A/V	X 500	Х	TOLAI	
Bayou Chinchuba	10	4	13	27	
Bayou Lacombe	21	2	4	27	
Bayou Liberty	36	8	15	59	
Pearl River - W-15/Gum Creek	59	1	59	119	
Tangipahoa River	0	0	2	2	
Tchefuncte-Abita-Ponchitolawa	34	13	53	100	
W-14 – Bayou Vincent	230	12	19	361	
Total	390	40	165	595	
Source: FEM	A, St. Tamma	any Parish GIS	6		



Table 2-16 Repetitive Loss Flood and Claims History by Watershed					
Watershed	Number	Average	Average total payment		
watersneu	Number	Losses	Building	Contents	
Bayou Chinchuba	27	3.08	\$31,788	\$19,998	
Bayou Lacombe	27	2.56	\$45,793	\$19,801	
Bayou Liberty	59	2.62	\$32,702	\$13,953	
Pearl River W15 Gum Creek	119	2.73	\$45,231	\$13,302	
Tangipahoa River	2	2.50	\$40,545	\$19,812	
Tchefuncte-Abita-Ponchitolawa	100	2.51	\$32,915	\$14,089	
W14 Bayou Vincent	261	2.93	\$43,670	\$19,041	
Not plotted	232	2.68	\$32,174	\$14,389	
Parish	827	2.74	\$38,276	\$15,915	
Source: F	EMA, St. Tamm	nany Parish GIS			

Note: 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 local governments only if the data are used for floodplain management, mitigation, or research purposes. Therefore, this report does not identify the repetitive loss properties, map individual properties, or include claims information for any individual property.

2.2.A.3 Repetitive Loss Areas: Many of the repetitive loss properties are scattered throughout the Parish. Most of those in the X Zone appear to be drainage flooding problems. A review of Map 2-8 helped identify nine repetitive loss areas in the floodplain, i.e., clusters of similarly situated repetitive loss properties. Six of them are around Slidell as shown on Map 2-9.

- Area 1. Approximately 20 properties along the main stem of the Tchefuncte River, between Covington and the Lake.
- Area 2. The 25 properties in the Bayou Chinchuba watershed, which are concentrated along the lakeshore.
- Area 3. The 24 properties in the Bayou Lacombe watershed, which are concentrated along Bayou Lacombe, just south of US 190.
- Area 4. Approximately 35 properties north of I-12 and east of US 11, north of Slidell.
- Area 5. 15 properties on Bayou Vincent, north of US 190, west of Slidell.
- Area 6. Approximately 35 properties in the Coin Du Lestin area along Bayou Bonfouca, southwest of Slidell.



- Area 7. Approximately 15 properties in the Northshore Beach area along the lakeshore, southwest of Slidell.
- Area 8. Approximately 12 properties in the Treasure Island area along the lakeshore, south of Slidell.
- Area 9. Six properties near the confluence of Doubloon Branch and the Pearl River, east of Slidell.

These 9 areas have 187 properties from FEMA's flood insurance records, but there are likely to be many more repetitively flooded properties in these areas. Some properties did not have flood insurance during all the floods, and not all on the FEMA list could be plotted.

These areas should have their flooding problems addressed on a neighborhood or area basis, while the other 662 properties, being scattered around the Parish, should be looked at individually.

The 1,455 repetitive loss properties listed in 2008 were plotted and analyzed using the University of New Orleans, Center for Hazard Assessment, Response, and Technology (CHART) Repetitive Flood Portal. The new data show no significant change in areal

distribution. Areas 1 and 2 are between Covington and the Lake. They are shown on Map 2-9A which shows how so many properties are scattered and so few are concentrated in specific areas. The other areas are shown on Map 2-9B.

Areas 2, 3, 6, and 7 are exceptions to the general statement that there were no significant changes since 2004. Area 2 seems to have disappeared, perhaps because of annexation by Mandeville or mitigation work.

Areas 3, 6, and 7 are those most directly affected by Hurricane Katrina. The plotting also revealed two new areas east of Slidell with 10 or more repetitive loss properties (see Map 2-9B).



In 2006, the UNO's CHART conducted an in-depth analysis of the repetitive flooding problem in Area 6, "Repetitive Loss Area Analysis – Bayou Liberty Study Area." At the time of that study, there were 94 repetitive loss properties of which 18 qualified as Severe repetitive losses. However, the study area comprised 303 properties that were subject to the same repetitive flooding problem.

Based on this data, a simple rule of thumb would be that for every property on FEMA's repetitive loss list, there are at least two more in the neighborhood that are subject to repetitive flooding. They have not shown on FEMA's records as two flood insurance claims for the same address, most likely because they did not have insurance during earlier floods. Another likely reason is that different addresses or different insurance companies were used over time and FEMA's database didn't track the property as the same one getting repetitive claims.



Updated figures for the 11 areas are displayed in Table 2-16A. The last column uses the multiplier of three to estimate the total number of properties in the planning area subject to repetitive flooding.

2.2.A.4 Severe Repetitive

Losses: Since the 2004 Plan was prepared, Congress has introduced a new term, "severe repetitive loss properties." As defined by the Flood Insurance Reform Act of 2004, these are 1-4 family residences that have had four or more claims of more than \$5,000 or two to three claims that cumulatively exceed the reported building's value.

Table 2-16A 2008 Repetitive Loss Areas						
	FEMA	Rep Loss Pro	perties			
<u>Area</u>	<u>Rep Loss</u>	<u>Severe</u>	<u>Total</u>	<u>Times 3</u>		
<u>1</u>	<u>9</u>	<u>6</u>	<u>15</u>	<u>45</u>		
<u>2</u>	<u>1</u>	<u>1</u>	<u>2</u>	6		
<u>3</u>	<u>50</u>	<u>8</u>	<u>58</u>	<u>174</u>		
<u>4</u>	<u>45</u>	<u>6</u>	<u>51</u>	<u>153</u>		
<u>5</u>	<u>17</u>	<u>4</u>	<u>21</u>	<u>63</u>		
<u>6</u>	<u>64</u>	<u>21</u>	<u>85</u>	<u>255</u>		
<u>7</u>	<u>66</u>	<u>5</u>	<u>71</u>	<u>213</u>		
<u>8</u>	<u>11</u>	<u>0</u>	<u>11</u>	<u>33</u>		
<u>9</u>	<u>3</u>	<u>0</u>	<u>3</u>	<u>9</u>		
<u>10</u>	<u>15</u>	<u>3</u>	<u>18</u>	<u>54</u>		
<u>11</u>	<u>11</u>	<u>6</u>	<u>17</u>	<u>51</u>		
<u>N/A</u>	<u>1,048</u>	<u>55</u>	<u>1,103</u>	<u>3,309</u>		
<u>Total</u>	<u>1,340</u>	<u>115</u>	<u>1,455</u>	<u>4,365</u>		
	Source: FEM	A Flood Insurand CHART Repetitiv	ce Data as of 7/3 re Flood Portal	<u>1-08,</u>		

The new term was created to identify those properties that are "the worst of the worst," i.e., those repetitive loss properties most in need of attention. The flood insurance policies for these properties have been transferred to a "special direct facility" so FEMA can closely monitor them and can better offer assistance to the property owners. The Act also created new funding mechanisms to help mitigate flood damage for these properties.

Here are some statistics on St. Tammany Parish's severe repetitive loss properties:

- As seen in Maps 2-9A and B, where they appear as red dots, and in Table 2-16A, severe rep loss properties are scattered all over the Parish.
- <u>75 (65%) are in A Zones, 2 are in V Zones, and 38 (33%) are outside the mapped</u> regulatory floodplain.
- These 115 properties have received a total of \$23 million in flood insurance claims. While they account for 8% of all repetitive losses, they have received 15% of all rep loss claims.
- All of the "Top 25" repetitive loss properties are either severe rep losses or no longer insured.

2.2.A.5 Frequency: By definition, repetitive flooding occurs twice in a ten year period. A frequency of 0.2 is used.

2.2.A.6 Threat to People: The threat to people is the same as for "regular" flooding, as described in the previous section.

2.2.A.7 Property Damage: The damage to property is the same as for "regular" flooding, as described in the previous section, although smaller repetitive floods do not cause as much damage.

2.3. Tornadoes

2.3.1. The Hazard A tornado is a swirling column of air extending from a thunderstorm to the ground. Tornadoes can have wind speeds from 40 mph to over 300 mph. A majority of tornadoes have wind speeds of 112 mph or less.

Tornadoes can move forward at up to 70 miles per hour, pause, slow down and change directions. Most have a narrow path, less than a 100 yards wide and couple of miles long. However, damage paths can be more than 1 mile wide and 50 miles long. Summer and fall see the peak of tornado activity in southeast Louisiana. Tornadoes peak in the afternoon, when convectional heating is at a maximum.



Louisiana experiences a higher rate of tornadoes than the eastern and western parts of the country because of the recurrent collision of moist, warm air moving north from the Gulf of Mexico with colder fronts moving east from the Rocky Mountains. The state is also more subject to hurricanes that can breed tornadoes.

Table 2-18 Fujita Tornado Measurement Scale and Occurrences in Louisiana Since 1950					
Category	Wind Speed	Examples of Possible Damage	Number in Louisiana		
F0	Gale (40-72 mph)	Light damage. Some damage to chimneys; break branches off trees; push over shallow-rooted trees; damage to sign boards.	321		
F1	Moderate (73-112 mph)	Moderate damage. Surface peeled off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off roads.	698		
F2	Significant (113-157 mph)	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light-object missiles generated.	292		
F3	Severe (158-206 mph)	Severe damage. Roofs and some walls torn off well- constructed houses; trains overturned; most trees in forest uprooted; cars lifted off ground and thrown.	132		
F4	Devastating (207-260 mph)	Devastating damage. Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.	18		
F5	Incredible (261-318 mph)	Incredible damage. Strong frame houses lifted off foundations and carried considerable distance to disintegrate; automobile-sized missiles fly through the air in excess of 100-yards; trees debarked; incredible phenomena will occur.	2		
	Total tornadoes in Louisiana, 1950-20021,463				
		Source: LOEP Hazard Profile			

2.3.2. Historical Occurrences

Table 2-19 presents data on the 30 tornadoes that have hit St. Tammany Parish since 1950. These have been plotted on Map 2-10. Most caused no deaths or injuries and relatively minor property damage.

The exception is the November 1997 F2 that hit the Covington area. This twister injured 43 people and caused an estimated \$3.5 million in damage. <u>Another F2 hit southwest of the Slidell airport in November 2004. It damaged more than 150 houses in the Bel Air subdivision, making nine of them uninhabitable. Four people were injured.</u>

Table 2-19 Tornadoes in St. Tammany Parish							
Location	Date	Magnitude	Deaths	Injuries	Damage	Width	Length
N/A	11/13/1957	F1	0	0	\$250,000	100 Yards	2 Miles
N/A	9/11/1961	F2	0	2	\$25,000	100 Yards	4 Miles
N/A	10/4/1964	F2	0	0	\$25,000	183 Yards	1 Miles
N/A	7/8/1970	F1	0	0	\$2,500	33 Yards	0 Miles
N/A	8/4/1974	F1	0	0	\$2,500	33 Yards	1 Miles
N/A	11/20/1974	F2	0	0	\$25,000	33 Yards	7 Miles
N/A	4/13/1980	F0	0	0	\$0		0 Miles
N/A	10/7/1982	F0	0	0	\$300	3 Yards	0 Miles
N/A	12/28/1983	F0	0	0	\$25,000	50 Yards	3 Miles
N/A	12/11/1985	F0	0	0	\$25,000	23 Yards	3 Miles
N/A	11/16/1987	F0	0	0	\$25,000	10 Yards	0 Miles
N/A	4/2/1988	F1	0	0	\$2,500,000	60 Yards	2 Miles
N/A	9/3/1988	F1	0	0	\$25,000	20 Yards	0 Miles
N/A	9/16/1988	F0	0	0	\$2,500	20 Yards	0 Miles
N/A	8/26/1992	F1	0	0	\$25,000	20 Yards	14 Miles
N/A	8/26/1992	F1	0	0	\$2,500	20 Yards	1 Miles
Slidell	4/14/1996	F0	0	0	\$0	10 Yards	0 Miles
Slidell	6/29/1997	N/A	0	0	\$0	0 Yards	0 Miles
Slidell	7/8/1997	N/A	0	0	\$0	0 Yards	0 Miles
Covington	11/21/1997	F2	0	43	\$3,500,000	200 Yards	9 Miles
Talisheek	11/21/1997	F1	0	0	\$75,000	50 Yards	1 Miles
Slidell	1/7/1998	F0	0	0	\$200	30 Yards	0 Miles
Mandeville	8/7/1998	N/A	0	0	\$0	0 Yards	0 Miles
Pearl River	4/3/2000	F0	0	0	\$0	30 Yards	0 Miles
Slidell	7/22/2000	F0	0	0	\$0	20 Yards	0 Miles
Abita Springs	8/23/2000	F0	0	1	\$10,000	30 Yards	2 Miles
Slidell	11/6/2000	F1	0	0	\$65,000	30 Yards	1 Miles
Slidell	10/3/2002	F1	0	0	\$25,000	30 Yards	0 Miles
Goodbee	11/11/2002	F1	0	0	\$35,000	150 Yards	0 Miles
Covington	10/3/2002	F0	0	0	\$25,000	25 Yards	0 Miles
<u>Slidell</u>	11/24/2004	<u>F2</u>	<u>0</u>	<u>4</u>	\$750,000	50 Yards	4 Miles
<u>Folsom</u>	<u>5/15/2008</u>	<u>F1</u>	<u>0</u>	<u>0</u>	<u>\$50,000</u>	75 Yards	<u>5 Miles</u>
Source: National	Climatic Data	Center					

2.3.3. Area Affected Map 2-10 shows the historical tornadoes in St. Tammany Parish. The larger ones have their full path and direction plotted.

While it appears that no tornadoes have occurred in the northeastern portion of the parish, that may be a reflection of where the lower population densities are (the reported locations may be due to where the people are). Most meteorologists agree that outside of mountainous and very large urban areas, no place is safe from tornadoes. Therefore, the entire parish is considered susceptible to this hazard.



2.3.4. Frequency The history of tornadoes from 1950 to 2002 shows that Louisiana averages 24-29 tornadoes a year. Since 1975, the average has been more than thirty per year. Seventy percent of these have been at the F0 to F1 levels. More occur in the northern part of the state than in the south.

St. Tammany Parish has had $\underline{32}$ reported tornadoes since 1950 and $\underline{27}$ since 1972. Given the recent increase in activity (or in reports of funnel clouds), it can be concluded that the parish can experience one tornado each year.

2.3.5. Threat to People While the majority of the historical tornadoes have produced little damage and few injuries, there have been several violent ones. Between 1950 and 1994, Louisiana had 134 deaths and 2,169 injures from tornadoes, ranking it 13th and 16th in the nation, respectively.

Table 2-20 shows the variation in tornado deaths from year to year. It notes that most people killed by tornadoes are indoors. The number of people who live in mobile homes is far smaller than the number who live in permanent homes, however they have had more deaths. One of the tornadoes that were formed by Tropical Storm Bill touched down at a mobile home park and injured 4 people.

Table 2-20 Tornado Fatalities in the United States						
Year	Vehicle	Permanent Home	Mobile Home	Other	Total	
1995	4	15	8	3	30	
1996	2	8	14	1	25	
1997	3	38	15	11	67	
1998	16	46	64	4	130	
1999	6	39	36	13	94	
2000	3	6	18	2	29	
2001	3	15	17	5	40	
<u>2002</u>	<u>4</u>	<u>15</u>	<u>32</u>	<u>4</u>	<u>55</u>	
<u>2003</u>	<u>0</u>	<u>24</u>	<u>25</u>	<u>5</u>	<u>54</u>	
<u>2004</u>	<u>2</u>	<u>15</u>	<u>8</u>	<u>10</u>	<u>35</u>	
<u>2005</u>	<u>2</u>	<u>3</u>	<u>32</u>	<u>1</u>	<u>38</u>	
2006	<u>7</u>	<u>29</u>	<u>28</u>	<u>2</u>	<u>66</u>	
Totals	<u>52</u>	<u>253</u>	<u>297</u>	<u>61</u>	<u>663</u>	
Source: N	Source: National Weather Service					

The major health hazard

from tornadoes is physical injury from flying debris or being in a collapsed building or mobile home. Based on national statistics for 1970 - 1980, for every person killed by a tornado, 25 people were injured and 1,000 people received some sort of emergency care.

Within a building, flying debris or missiles are generally stopped by interior walls. However, if a building has no partitions, any glass, brick or other debris blown into the interior is life threatening. Following a tornado, damaged buildings are a potential health hazard due to instability, electrical system damage, and gas leaks. Sewage and water lines may also be damaged.

2.3.6. Property Damage Structures within the direct path of a tornado vortex are often reduced to rubble. The damage caused by high winds, pressure and flying debris is discussed in the section on hurricanes. Tornadoes have even greater wind forces.

Structures adjacent to the tornado's path are often severely damaged by high winds flowing into the tornado vortex, known as inflow winds. It is here, adjacent to the tornado's path where the building type and construction techniques are critical to the structure's survival. Although they strike at random, making all buildings vulnerable, three types of structures are more likely to suffer damage:

- Mobile homes,
- Homes on crawlspaces (more susceptible to lift), and
- Buildings with large spans, such as airplane hangers, gymnasiums and factories.

In 1999, FEMA conducted an extensive damage survey of residential and non-residential buildings in Oklahoma and Kansas following an outbreak of tornadoes on May 3, 1999, which killed 49 people. The assessment found

- The failure for many residential structures occurred where the framing was attached to the foundation or when nails were the primary connectors between the roofing and the walls. A home in Kansas was lifted from its foundation where the addition of nuts to the bolts anchoring the wood framing to the foundation may have been all that was needed to have kept this from happening.
- Roof geometry also played a significant role in a building's performance.
- Failure of garage doors, commercial overhead doors, residential entry doors or large windows caused a significant number of catastrophic building failures.
- Manufactured homes on permanent foundations were found to perform better than those that were not on solid walls.

Infrastructure damage is usually limited to above ground utilities, such as power lines.

2.3.7. 2009 update: The tornado activities since the 2004 Plan was prepared continued the frequency and trends set over the previous 50 years. There is no change in the Parish's exposure to this hazard.

2.4. Wildfires

2.4.1. The Hazard Wildfires are uncontrolled fires that spread through vegetation, such as forests or grasslands. They often begin unnoticed and spread quickly and are usually signaled by dense smoke that fills the area for miles around. Wildfires are a natural process, vital to restoring appropriate vegetation to an area. They are a natural hazard when they threaten built up areas.

People start more than four out of every five wildfires, usually as debris burns, arson, or carelessness. Lightning strikes are the next leading cause of wildfires.

Wildfire behavior is based on three primary factors, fuel, topography, and weather. The type, and amount of fuel, as well as its burning qualities and level of moisture affect wildfire potential and behavior. Topography affects the movement of air (and thus the fire) over the ground surface. The slope and shape of terrain can change the rate of speed at which the fire travels. Fire moves faster in hilly areas and up steep slopes.



Weather affects the probability of wildfire and has a significant effect on its behavior. Areas that have experienced prolonged droughts are at the highest risk of wildfires. Temperature, humidity and wind (both short and long term) affect the severity and duration of a fire.

2.4.2. Historical Occurrences The state of Louisiana has experienced more than 37,000 wildfires during the years 2000 - 2002. The year 2000 was a drier year and suffered 3 - 4 times more fires than 2001 and 2002. Table 2-21 shows when they occurred during those years. It can be seen that late summer is the time when they are most likely to occur.

Since 1980, St. Tammany Parish has experienced an average of 300 – 400 reported wildfires each year. This number has generally declined from a high of over 800 in 1981. The number of acres burned has also declined, from a high of 15,000 in 1981 to an average of 4,000 over the last 10 years. This may be due to the conversion of forest land to housing and other development during this time.





Table 2-22 provides encouraging data: both the number of wildfires in the Parish and the size of the areas burned have gone done over the last 40 years. The trend line shows fewer than 200 fires now, down from 700 a year in the 1960's More detailed numbers are available on fires in the Big Branch Marsh National Wildlife Refuge. Their numbers show that the acreage of the prescribed burns exceeds that of the wildfires, an indication that good forestry management is being practiced.

2.4.3. Area Affected The primary areas affected by wildfires are the forests. Sixty-five percent of St. Tammany Parish is covered in timber. Areas in forest and agriculture are shown in green on the existing land use map in Chapter 1, Map 1-4.

While loss of timber is a problem, the real hazard is when wildfires threaten developed areas. As more development moves into and next to forested areas, the hazards to people and property increases. The major areas exposed to the wildfire hazard are the homes and subdivisions that are located in what is called the urban-wildland interface.

2.4.4. Frequency Based on the experiences of $\underline{1990 - 2000}$, St. Tammany Parish can expect 300 - 400 wildfires each year. The majority of them should be in areas set aside as forests, such as the wildlife refuges. The minority will be in areas where fires can threaten people and buildings.

2.4.5. Threat to People Fires pose an obvious threat to life and safety. However, there have been no reported deaths or injuries from wildfires in St. Tammany Parish.

2.4.6. Property Damage While people can get out of the way of a fire, buildings can't. Even though the number of wildfires is decreasing, the number of buildings

damaged by them is increasing. The red line in the chart below shows the general trend in the state since 1988. This is primarily due to the increased number of buildings located in or adjacent to rural forested areas.



2.4.7. 2009 update: Table 2-22A shows the number of timber acres that burned since 1980. It can be seen that while the burned acreage increased in 2006, after Katrina, they were no worse than some of the bad years in the 1990's.

After Katrina, there was concern about fires in blown down areas and debris piles. Burn bans were issued, but were not wholly effective. The Louisiana Office of Forestry asked for fire fighting assistance from other states in October 2005. The Slidell Sentry-News quoted an Office spokesman: "We flew over St. Tammany and there were fires everywhere. A majority of our fires in all the parishes have been from debris burning followed by arson."

The out of state firefighters went home by April 2006 as the number of wildfires decreased. The state Fire Marshall reported that though downed timber and dry conditions continued to create dangerous conditions, the number of fires had decreased somewhat as the public had become aware of the problem and cut back on open burning. (Capital City Press)

Other than the post-Katrina problems, the data from the 2004 Plan continues to represent the Parish's exposure to wildfires.

Table 2-22A Wildfire History					
Year	No. of Fires	Acres Burned			
1980	577	9,482			
1981	877	14,800			
1982	413	5,549			
1983	281	4,010			
1984	430	6,677			
1985	357	5,516			
1986	550	10,829			
1987	518	12,026			
1988	298	6,806			
1989	329	7,201			
1990	353	5,963			
1991	164	2,663			
1992	162	3,013			
1993	146	3,035			
1994	154	4,101			
1995	232	3,522			
1996	172	3,806			
1997	124	1,779			
1998	162	2,654			
1999	311	3,357			
2000	376	6,110			
2001	123	2,033			
2002	105	1,415			
2003	96	890			
2004	89	994			
2005	140	1,586			
2006	295	3,587			
2007	99	1,187			

2.5. Drought

2.5.1. The Hazard Drought is a period of less than usual precipitation. Its duration and severity are usually measured by deviation from norms of annual precipitation and stream flows. Although it has relatively high levels of average annual rainfall, Louisiana has had droughts, especially in the northern part of the state.

There are four classes of drought, based upon what is impacted by the shortage of water:

- Meteorological Drought: Less precipitation than an expected average or normal amount based on monthly, seasonal, or annual time scales.
- Hydrologic Drought: Less stream flows and reservoir, lake, and groundwater levels.
- Agricultural Drought: A reduction in soil moisture enough to affect plant life, usually crops.
- Socioeconomic Drought: A reduction in water supply to the extent that demand exceeds the supply.

2.5.2. Historical Occurrences History shows a relationship between southern Louisiana precipitation and the establishment of La Niña weather patterns. La Niña, characterized by unusually cold ocean temperatures in the Pacific, can bring abnormally warm and dry weather conditions to Louisiana. During about 80% of past significant La Niña occurrences, winter and spring rainfall has been below normal.

This pattern was seen during the last dry spell in the State, 1998 to 2000. The year 2000 was the driest winter in over 100 years (and the period of the most wildfires during the last 20 years). In September 2000, the Parish was declared a disaster area by the Secretary of Agriculture in order to make farmers eligible for USDA disaster assistance.

2.5.3. Area Affected The entire parish can affected by drought.

2.5.4. Frequency There is no commonly accepted return period or frequency for defining the risk from droughts like there is for flooding and other hazards. The State's hazard profile selected the time when stream flow per square mile of drainage area is less than 2 cubic feet per second.

"The July to January mean monthly flow with non-exceedence probability of 0.05 was selected as the threshold to characterize hydrologic drought. The July to January mean monthly stream flow will be less than this value, on average, once in 20 years."

In other words, using the state's definition, the frequency of a drought is once in 20 years, or 0.05.

2.5.5. Threat to People Unlike other hazards, droughts do not happen quickly. They evolve over time as certain conditions are met and are spread over a large geographical area. While they don't kill or injure people outright, they do have serious consequences, including:
- Reduced water supply for drinking and domestic use
- Reduced water supply and pressure for fire fighting
- Reduced water for livestock and farming
- Reduced capacity of hydroelectric power generators
- Reduced stream flows for navigation and recreation
- Reduced water quality

2.5.6. Property Damage Drought does not directly damage structures and other human development. It does increase the risk of damage by fire, especially in the urban-wildland interface.

In areas with expansive soils, drought can shrink the soils under foundations. The result may crack walls and floors or even undermine supports. Out of the 250,000 homes built each year on expansive soils, 10% sustain significant damage during their useful lives, some beyond repair, and 60% sustain minor damage. Similar damage can occur to roads and bridges.

The effects of expansive soils are most prevalent when prolonged periods of drought are followed by long periods of rainfall. Houses and small buildings are impacted more by expansive soils than larger buildings. Large buildings are not as susceptible because their weight counters pressures from soil swelling. The 2000 drought caused cracks in levees. However, they were not considered threatening to the stability of the levees.

According to the Soil Survey of St. Tammany Parish, there is only one soil type where the shrinkswell potential is "high" or "very high." The Harahan soil series are located in marshes that have been drained. They are shown as the two dark brown areas on the Lakeshore in Map 2-11. These areas were drained for development. While the sites are no longer in a wetland, they are subject to the hazard of expansive soils.



2.5.7. <u>2009 update:</u> There have been no instances of drought or new data since the 2004 Plan was prepared.</u>

2.6. Fog

2.6.1. The Hazard Fog is a cloud that is on the ground. Fog forms once evaporation into the air results in super saturation, usually because the ground surface is very wet and the air is cooler. Fog is common in situations over water or where a daytime shower saturates the soil, vegetation and boundary layer and then skies clear in the evening into the night hours.

2.6.2. Historical Occurrences Fog is not a hazard so severe or widespread that there are Weather Service records of its occurrence. However, it can be a major problem on the Causeway. Since January 1998, fog conditions were bad enough to close the bridge to traffic 59 times. These incidents are shown in the graph in Table 2-23.



Table 2-23 shows that fog on Lake Pontchartrain is a problem during the colder months. The most closures were in 2000. During the six year period, fog was bad enough to close the Causeway an average of 10 times. Data available for the last three years show that there were another 20 fog incidents each year that were not severe enough to close the bridge. They follow the same time pattern shown in Table 2-23.

2.6.3. Area Affected The previous section focuses on the Causeway because that is where the information is readily available. The entire parish is affected, although fog is really a hazard only on roads, airports, and other transportation routes. The Gulf Coast has a higher level of fog occasions than most of the rest of the country.

2.6.4. Frequency There are no data available for the frequency of fog days for the parish as a whole. Based on Table 2-23, fog will be bad enough to be a problem on the roads to New Orleans on the average of 30 times a year.

2.6.5. Threat to People Whether driving or flying, fog results in travel delays and in some cases cancellations. While often seen as a nuisance, fog can be deadly to travelers:

- In April 1916, a freight train ran into the rear end of another train in Slidell, killing two trainmen.
- In November 1969, a small plane ran out of fuel on its way to the Slidell airport. The pilot tried to land nearby, but did not see the trees because of the fog. The plane was totaled.
- March 21, 1987: Four people were killed and 35 were injured on the twin spans in a series of chain-reaction accidents involving 49 vehicles.
- In September 1989, another small plane hit trees as it attempted to land at the Slidell airport.
- Feb. 9, 1990: Six vehicles were damaged and four people were injured in three separate accidents on the U.S. 11 bridge.
- On December 31, 1996, fog on the Interstate 10 bridge was deemed the cause for series of accidents that involved 100 cars, trucks and buses. One woman was killed and 24 injured, two critically. The twin spans were closed for most of the day.
- On January 14, 1998, the Times-Picayune reported "A speeding pickup truck hit the rear of an 18-wheeler early Tuesday on the fog-covered Interstate 10 twin spans, causing a fiery four-vehicle smashup that left the pickup driver's passenger dead and the highway's eastbound lanes closed for almost nine hours."

In the two cases involving airplanes, the accident reports put the blame on pilot error. The 1989 report stated "Probable Cause: The pilot in command's disregard of the weather information provided during two briefings and his decision to continue VFR flight into IMC conditions."

2.6.6. Property Damage The primary threat to property is damage to vehicles caused by collisions when traveling in fog.

2.6.7. <u>2009 update: News-</u> paper reports since the 2004 Plan was prepared continue to describe accidents due to fog on the Causeway, I-10, and US 90.



Source: Times-Picayune, Staff photo by David Grunfeld

2.7. Earthquakes

2.7.1. The Hazard Earthquakes are one of nature's most damaging hazards. Earthquakes, and the potential damage from earthquakes, are more widespread that people realize. Earthquakes are caused by the release of strain between or within the Earth's tectonic plates. The severity of an earthquake depends on the amount of strain, or energy, that is released along a fault or at the epicenter of an earthquake. The energy released by an earthquake is sent to the earth's surface and released.

There are several common measures of earthquakes, including the Richter Scale and the Modified Mercalli Intensity (MMI) scale. The Richter Scale is a measurement of the magnitude, or the amount of energy released by an earthquake. Magnitude is measured by seismographs. The Modified Mercalli Intensity is an observed measurement of the earthquake's intensity felt at the earth's surface. The MMI varies, depending on the observer's location in relation to the earthquake's epicenter.

Table 2-24 Earthquake Measurement Scales					
Richter	Mercalli	Felt Intensity			
	Ι	Not felt except by a very few people under special conditions. Detected mostly by instruments			
0-4.3	=	Felt by a few people, especially those on upper floors of buildings. Suspended objects may swing.			
	=	Felt noticeably indoors. Standing automobiles may rock slightly.			
1219	IV	Felt by many people indoors, by a few outdoors. At night, some people are awakened. Dishes, windows, and doors rattle.			
4.3-4.0	V	Felt by nearly everyone. Many People are awakened. Some dishes and windows are broken. Unstable objects are overturned.			
4.8-6.2	VI	Felt by everyone. Many people become frightened and run outdoors. Some heavy furniture is moved. Some plaster falls.			
	VII	Most people are alarmed and run outside. Damage is negligible in buildings of good construction, considerable in buildings of poor construction,			
	VIII	Damage is slight in specially designed structures, considerable in ordinary buildings, great in poorly built structures. Heavy furniture is overturned.			
6.0-7.3	IX	Damage is considerable in specially designed buildings. Buildings shift from their foundations and partly collapse. Underground pipes are broken.			
	Х	Some well-built wooden structures are destroyed. Most masonry structures are destroyed. The ground is badly cracked. Landslides occur on steep slopes.			
7.3-8.9	XI	Few, if any, masonry structures remain standing. Rails are bent. Broad fissures appear in the ground.			
	XII	Virtually total destruction. Waves are seen on the ground surface. Objects are thrown in the air.			
		Source: Multi-Hazard Identification and Risk Assessment			

An earthquake's intensity depends on the geologic makeup of the area and the stability of underlying soils. The effects of earthquakes can be localized near its epicenter or felt significant distances away. For example, a 6.8-magnitude earthquake in the New Madrid Fault in Missouri would have a much wider impact than a comparable event on the California Coast. The thick sandstone and limestone strata of the central United States behave as "conductors" of the earthquake's energy, and tremors can be felt hundreds of

miles away. By contrast, the geology of the West Coast allows the energy to be dissipated relatively quickly which keeps the affects of the earthquake more localized.

Earthquakes can trigger other types of ground failures which could contribute to the damage. These include landslides, dam failures, and liquefaction. In the last situation, shaking can mix groundwater and soil, liquefying and weakening the ground that supports buildings and severing utility lines. This is a special problem in floodplains where the water table is relatively high and the soils are more susceptible to liquefaction.

Although Louisiana lies in an area of low seismic risk, a number of earthquakes have occurred in the State over the last 200 years. The more severe earthquakes are related to the New Madrid seismic zone to the north of Louisiana. Most of these earthquakes were of low magnitude and occurred infrequently.

The famous 1812 New Madrid quake was felt in New Orleans. A repeat of that severe an incident is predicted to produce MMI of III or IV in southern Louisiana. The Louisiana Geological Survey reports that the "New Madrid seismic zone remains the area most likely to produce earthquakes that could affect Louisiana."

2.7.2. Historical Occurrences There are no local records of earthquakes. Here are reports of the few that have been closest to St. Tammany Parish.

The largest earthquake to have occurred in Louisiana, was centered at Donaldsonville, about 60 miles west of New Orleans at 6:17 a.m. on October 19, 1930. Maximum intensity reached MMI VI at Napoleonville, where the entire congregation rushed from a church, as the entire building rocked noticeably. Intensity V effects were noticed at Allemands, Donaldsonville, Franklin, Morgan City, and White Castle, where small objects overturned, trees and bushes were shaken, and plaster cracked. The total felt area was estimated at 15,000 square miles.

The Louisiana quake closest to St. Tammany Parish was on November 6, 1958. This MM Intensity IV earthquake was confined to an area within a five- to seven-mile radius of downtown New Orleans. The assigned MM Intensity IV is based on reports of maximum effects as windows shook and doors rattled

On November 19, 1958, a local earthquake in the Baton Rouge area shook houses and rattled windows. Scores of residents telephoned the Weather Bureau, Civil Defense, police and radio stations. The shock was also felt in Baker and Denham.

2.7.3. Area Affected The entire parish would be affected by an earthquake.

2.7.4. Frequency Based on the area's lack of experience with earthquakes, the odds of one striking St. Tammany Parish in any given year would be less than 1% (0.01).

2.7.5. Threat to People Approximately 1,600 people have been killed by earthquakes in the US since colonial times, 1,000 of them were in California and 700 of those were in the 1906 San Francisco quake. The single most common cause was collapse of a building.

Other threats to people include collapsing roads and bridges, flooding from dam breaches, fires from ruptured gas lines, and release of hazardous chemicals from broken storage tanks or trucks.

2.7.6. Property Damage All of the earthquakes that occurred in Louisiana since 1843 were of low magnitude, resulting mostly in limited property damage - i.e., broken windows, damaged chimneys, and cracked plaster.

2.7.7. 2009 update: The only earthquake worth reporting since the 2004 Plan occurred on December 20, 2005, 20 miles southwest of Hammond. While it was only a magnitude 3.0, it was felt in Mandeville and Lacombe. There was no reported damage.

2.8. Hailstorms

2.8.1. The Hazard Hailstones are ice crystals that form within a severe thunderstorm. Extreme temperature differences from the ground upward produce strong updraft winds that cause ice formation. Frozen droplets gradually accumulate on the ice crystals until, having developed sufficient weight, they fall as precipitation.

The size of hailstones is a direct function of the severity and size of the storm. High velocity updraft winds keep hail in suspension in thunderclouds. Hailstorms generally occur more frequently during the late spring and early summer. The hotter the Earth's surface, the stronger the updraft will be. Higher temperatures relative to elevation result in



increased suspension time, allowing hailstones to grow in size.

2.8.2. Historical Occurrences National Weather Service records show 40 hailstorms in St. Tammany Parish over the last 20 years. Seven of them had hail as large as 1.75 inches and one (May 24, 1988) had hailstones up to 3 inches. The average was 1.1 inches in diameter. These storms are plotted on Map 2-12.

The Institute for Building and Home Safety, an insurance organization, identified the January 23, 2000, storm in New Orleans as the eighth most damaging storm in the nation in the period from 1994 to 2000. Ranging from dime to golf ball-size, the hail damaged roofs, windows, and vehicles, resulting in nearly 42,000 homeowner and 37,500 auto insurance claims at an estimated cost of \$353 million.

2.8.3. Area Affected As seen in Map 2-12, hailstorms can occur anywhere in the Parish.

2.8.4. Frequency The State's Hazard Profile reports that between 1955 and 2002. Louisiana experienced 792 days with hailstorms, an average of 17 storms annually. It states that there is a 16% probability of hail of any size in any year in St. Tammany Parish.

2.8.5. Threat to People Hail rarely causes loss of life, although large hailstones can cause bodily injury.

2.8.6. Property Damage Significant property damage does not result until hailstones reach 1.5 inches in diameter, which occurs in less than half of all hailstorms. When hail hits, it can damage cars, shred roof coverings, and lead to water damaged ceilings, walls, floors, appliances, and personal possessions.



Hail can inflict severe damage to roofs, windows and siding, depending on hailstone size and winds. One study of insured losses in St. Louis found that 75% of the dollar damage was to roofing, 12% to awnings, 6% to exterior paint, 4% to glass and 3% to siding (*Hail Loss Potential in the US*, page 2).

As with tornadoes, mobile homes are at a high risk to damage from thunderstorms. Wind and water damage can result when windows are broken by flying debris or hail.

Hail can destroy long stemmed vegetation, such as wheat and corn crops. About 2% of United States crop production is damaged by hail each year. Hail from thunderstorms causes nearly \$1 billion in property and crop damage each year.



Vindows and cars are especially vulnerable to hail damage Source: University of Nebraska website

2.8.7. 2009 update: The NCDC records show

eight more hailstorms in St. Tammany Parish since 2004. These have been plotted on Map 2-12. Four of the storms had hail of 1.75 inches in diameter or larger. This is consistent with the location, size, and frequency used in the 2004 Plan.

2.9. Land Failure

2.9.1. The Hazard Land failure is a term that describes the combined effects of sealevel rise and land subsidence. Both of these geologic processes impact Louisiana in a similar manner, making it difficult to separate the effects of one from the other. The most prominent causes of sea-level rise are the melting of the Earth's glacial ice caps and sea floor spreading.

Subsidence refers to the gradual settling or sinking of the Earth's surface due to removal or movement of subsurface earth materials. Some principal causes of subsidence are compaction, underground mining, removal of groundwater, and sinkholes. In coastal Louisiana, large amounts of sediment are being deposited by the Mississippi River in a relatively short amount of time, causing the crust to compensate for the extra weight of the sediment.

Geology and soil types do not have much effect on subsidence rates. Other causes like human occupancy, buildings and infrastructure, oil and gas extraction, and lowering of the water due to groundwater extraction have much more of an effect. Human acceleration of natural processes through levying rivers, draining wetlands, dredging channels, and cutting canals through marshes exacerbates the subsidence problem.

Because it is difficult to separate the effects of subsidence and sea-level rise, a new approach to categorizing the hazard has been developed. A coastal vulnerability index (CVI) is determined based on rate of sea-level rise, coastal erosion, wave height, tidal characteristics, regional coastal slope, and coastal geomorphology. The CVI for the Louisiana coast is high to very high. Some portions rank very high for every factor with the exception of wave height. The main factors responsible for the high ranking, however, are geomorphology, coastal slope, and rate of relative sea-level rise.

The US Geological Survey estimates that the rate of sea-level rise in Louisiana is approximately 3.0 feet/century and the US EPA estimates that it is approximately 3.4 feet/century. There is little to suggest that these processes will cease to occur in the future, indeed rates may increase due to the naturally occurring sediment deposition. The highest rate of subsidence is occurring at the Mississippi River delta (3.5 feet/century). Subsidence rates decrease away from the delta in a northeast, northwest, and western direction.

A system of subsidence faults in southern Louisiana developed due to the extra weight from rapid sediment deposition from the Mississippi River. The system stretches across the southern portion of the State of Louisiana from Beauregard Parish in the east to St. Tammany Parish in the west, and includes every Parish to the south of this line.

There are three subsidence faults in the St. Tammany Parish area, known as the Goose Point, Causeway and Madisonville Faults. They are mostly under Lake Pontchartrain and generally parallel the lakeshore.

2.9.2. Historical Occurrences

Records show that the level of Lake Pontchartrain rose about 25 centimeters or 10 inches since 1931 (Table 2-25).

There are no single incidents or occurrences of land failure. It is a process. An acre of land along the coast disappears every 24 minutes.

Sea-level rise and land subsidence have not been identified as significant contributors to direct disaster damages



in Louisiana. For the most part, sea-level rise and subsidence are two processes that are slow acting, so their effects are not as evident as sudden-occurrence hazards like earthquakes.

2.9.3. Area Affected Map 2-13 shows the Lake shoreline areas that have been lost due to erosion and/or subsidence.

2.9.4. Frequency As noted under historical occurrences, there is no recurrence interval. Land failure is a constant process. Some shoreline loss is accelerated during tropical storms and hurricanes, which are discussed in section 2.1.

2.9.5. Threat to People Land failure does not present an immediate threat to life, safety or public health.

2.9.6. Property Damage The growth faults that affect the southern portion of the state mean very slow ground movement or fault creep. These faults pose a threat more to property than life. Over time, the land on each side of the fault line moves slowly in different directions (c. 1/10 foot per year). The results can be seen in the photo of the Goose Point Fault in chapter 3, section 3.11.

Sea level rise and subsidence along the Louisiana coast means that over time, there is less land between developed areas and water. The process means development will be more exposed to damage by storm surge and wetland vegetation will be more subject to saltwater intrusion or submergence.

Land and wetlands act as cushions during tropical storms and hurricanes. Less cushion means storm surges will reach farther inland and levees will have to be raised to maintain flood protection levels.

2.9.7. 2009 update: There have been no reports of problems since the 2004 Plan was prepared. The 2008 State Hazard Mitigation Plan Update reports St. Tammany Parish as being a low subsidence problem area.



2.10. Winter Storm

2.10.1. The Hazard Winter storms can occur as heavy snowfalls, ice storms or extreme cold temperatures. Winter storms can occur as a single event or they can occur in combinations which can make an event more severe. For example, a moderate snowfall could create severe conditions if it were followed by freezing rain and subsequent extremely cold temperatures.

Winter months in southern Louisiana have average seasonal temperatures in the low 50s. Normal minimum daily temperatures in Covington are 42° in December, 40° in January and 43° in February. While average temperatures remain above freezing, cold fronts extending from Canada through the State occur at least once during most winters. Severe winter weather in Louisiana consists of freezing temperatures and heavy precipitation, usually in the form of rain, freezing rain, or sleet, but sometimes in the form of snow.

An ice storm occurs when freezing rain falls from clouds and freezes immediately upon impact. Freezing rain is found in between sleet and rain. It occurs when the precipitation falls into a large layer of warm air and then does not have time to refreeze in a cold layer (near or below 32°F) before it comes in contact with the surface which is also near or below 32°F, as illustrated below.



2.10.2. Historical Occurrences Ice storms hit northern Louisiana in February 1994 and December 2000. In 1994, ice accumulated 2 to 3 inches thick. When combined with gusty winds, it snapped power lines, power poles, and trees. Over 100,000 people were without electrical power for several days, and more than 256,000 acres of forest were damaged.

The 2000 ice storm caused similar damage. One person was killed and over 250,000 people were without power. About 30 transmission lines atop "H"-shaped steel towers were snapped due to the weight of the ice, and numerous traffic accidents occurred across

the State. With millions of dollars in damage and one death attributed to the storms, the State received a presidential disaster declaration.

Winter storms are not as severe in southeast Louisiana. The Slidell Weather Service Forecast Office reports 2 inches of snow on February 12, 1988, and March 12, 1993.

On January 1, 2002, rain, sleet and snow fell to the north and west of Lake Pontchartrain. Eventually one-half to two inches of snow accumulated, resulting in automobile accidents on icy roadways and the closing of some bridges.

The National Climatic Data Center records show that sleet and snow fell on Christmas Day in 2006, resulting in a dusting of up to one half inch in the area. Many bridges, overpasses, and other elevated roadways became icy, resulting in some closings and traffic accidents. New Orleans Armstrong International Airport was also closed for several hours due to icing conditions.

2.10.3. Area Affected The entire parish is susceptible to winter storms. Their effects may be moderated in areas closest to Lake Pontchartrain.

2.10.4. Frequency "Freeze" warnings for farmers are not unusual, but they do not signify a winter storm. According to the National Climatic Data Center, the entire state of Louisiana is in the lowest category of probable snow depth -0 to 10 inches of snow depth with a 5% chance of being equaled or exceeded in any given year. The chance of a winter storm that is considered severe (considering the area's housing conditions and lack of emergency equipment) is 5% (.05).

2.10.5. Threat to People Winter storms bring the following two types of safety hazards:

- Weather related hazards, including hazardous driving and walking conditions and heart attacks from shoveling snow.
- Extreme cold, from the low temperatures, wind chill, and loss of heat due to power outages.

About 70% of the injuries caused by snow and ice storms result from vehicle accidents and 25% occur to people caught out in the storm. Certain populations are especially vulnerable to the cold, including the elderly, the homeless, and lower income families with heating problems. House fires occur more frequently in winter due to lack of proper safety precautions when using alternate heating sources (e.g., unattended fires and improperly placed space heaters).

2.10.6. Property Damage Ice causes more property damage than snow. It can overload trees, limbs and utility lines. As a result of severe ice storms, telecommunications and power can be disrupted for days. <u>Icy roads can mean damage to vehicles and economic losses when roads or businesses are closed.</u>

With today's energy consciousness, buildings are much better insulated than they were 50 years ago. Cold weather does not have a major impact on buildings.

Prolonged periods of snow and cold temperatures can be damaging to agriculture. Fruit trees can be damaged by severe cold or ice accumulation, and livestock may freeze or be more susceptible to disease.

2.10.7. 2009 update: Only one instance of a winter storm has been reported since 2004, the Christmas, 2006, storm reported on the previous page. There have been no winter storm deaths reported in the state during that time. The 2008 State Hazard Mitigation Plan Update reports St. Tammany Parish as being a low ice storm hazard area.

2.11. Dam failure

2.11.1. The Hazard Dams are made to hold back large amounts of water. If they fail or are overtopped, they can produce a dangerous flood situation because of the high velocities and large volumes of water released. A break in a dam can occur with little or no warning on clear days when people are not expecting rain, much less a flood. Breaching often occurs within hours after the first visible signs of dam failure, leaving little time for evacuation.

Dam failures are usually caused by either structural problems with the dam or by hydrologic problems. Structural problems include seepage, erosion, cracking, sliding and overturning that are a result of the age of the dam or lack of maintenance. Hydrologic problems typically occur when there is excessive runoff due to heavy precipitation. A dam failure can occur if the dam has to impound (hold back) more water than it was designed to, or if the spillway capacity is inadequate for the amount of water needing to pass downstream.

A dam can suffer a partial failure or a complete failure, but the potential energy of the water stored behind even a small dam can cause loss of life and great property damage downstream. The following factors influence the impact of a dam failure:

- Level of failure (partial or complete)
- Speed of failure (sudden or gradual)
- Amount of water released
- Nature of the development or infrastructure located downstream.

Dams are classified under three levels of hazard:

- High hazard: failure will probably cause loss of human life.
- Significant hazard: failure results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or impact other concerns. These are usually in rural areas but could be located in areas with population and significant infrastructure.
- Low hazard: failure results in no probable loss of human life and low economic and/or environmental losses. Most losses from a failure would be limited to the owner's property.

2.11.2. Historical Occurrences There have been no significant dam failures in Louisiana. There was one incident in 1985. Park managers at the Cotile Lake Dam in Rapides Parish reported seepage due to sand and gravel deposits that displaced concrete slabs. There was no dam failure or controlled breach reported in this incident.

2.11.3. Area Affected There are 16 dams in St. Tammany Parish inventoried by the Department of Transportation and Development Dam Safety Program. All but two are considered "low hazard." The two on the Pearl River Canal are rated as "significant hazard." For security reasons, their exact sites are not provided. Their general locations are plotted on Map 2-14.

Dam ownership can be an indicator of how well they are maintained. Generally state and federal dams are larger and better maintained.

- 9 St. Tammany Parish dams are listed as owned by individuals
- 4 dams are owned by corporations or homeowners associations
- 2 locks and dams on the Pearl River Canal are owned by the US Army Corps of Engineers
- 1 dam at the Huey P. Long Fish Hatchery is owned by the state Department of Wildlife and Fisheries.



2.11.4. Frequency Based on the absence of any experience with dam failure in the state, the odds of one occurring and causing damage in St. Tammany Parish would be less than 1% (0.01).

2.11.5. Threat to People Because of their sudden onset, dam failures have the potential to kill people caught unawares. Between 1960 and 1997, there have been at least 23 dam failures with one or more fatalities. There were 318 deaths as a result of these failures. However, the development downstream of the dams in St. Tammany Parish do not indicate a high level of exposure to life safety problems.

The most important factor for protecting people is a timely warning. Dams are often not very visible, so most people are not aware of the hazard and may not understand the need to evacuate on a sunny day.

2.11.6. Property Damage The effects of a dam failure on property is similar to that of a flood, discussed in section 2.2.6. The one difference is that velocities are likely to be higher in a dam failure scenario, so the potential for property damage is higher in those areas immediately downstream of a dam.

2.11.7. 2009 update: There have been no dam failures in Louisiana or other new developments in the field since the 2004 Plan was prepared.

2.12. Levee Failure

2.12.1. The Hazard For the purposes of this *Plan*, "levees" include floodwalls, seawalls and other barriers along bodies of water to protect an area from flooding. Also for the purposes of this *Plan*, levee failure includes overtopping, breach, or collapse of the levee. Technically, overtopping is not a "failure," it is simply a case of water going higher than the design protection level. However, the results are the same to the people and properties affected.

As with dam failure, the severity of levee failure depends upon the amount of development that would be affected by flooding. Some of the causes of levee failure are also similar to the causes of dam failures:

- Overtopping due to flood heights exceeding levee design protection elevation
- Flooding from upstream sources internal to the levee
- Erosion caused by embankment leaking or piping
- Erosion of the levee base caused by moving floodwaters
- Improper operation and maintenance, including failure to inspect and repair seepage problems

A levee failure may not be much of a hazard where the levee is small, people know it won't protect them from larger floods, and new construction takes the flood hazard into account. Levee failure can be a great hazard where the levee is large, people assume they will never be flooded, and no flood protection measures are taken for new construction. Examples of the damage wrought in this situation were seen during the 1993 flood on the Upper Mississippi and Missouri Rivers.

This hazardous situation is often the case where FEMA has mapped leveed areas as being outside the 100-year floodplain. Map 2-15 shows how these areas are marked on FEMA's Flood Insurance Rate Map (FIRM). Being outside the "A Zone," there are no Federal or State flood protection requirements for new construction.



2.12.2. Historical Occurrences Levees have been overtopped or breached during flood events and non-flood events in Louisiana. A section of levee along the Mississippi River near Marrero, Louisiana, failed in a non-flood-related event. The failure was due to scouring and erosion of sand along the river bank.

The National Weather Service reported that during tropical storm Isidore on September 26, 2000, storm surge overtopped or breached a "small local levee system" in southern portions of Slidell causing water to flood several hundred homes.

An interesting case involves Jackson, Mississippi, upriver on the Pearl in 1982. The US Army Corps of Engineers had constructed levees in the 1960s to protect the town from flooding. The levees were overtopped in the 1979 flood, with some 40% of the damage being inflicted on buildings constructed after the levee was built.

2.12.3. Area Affected There are three subdivisions south of Slidell that are protected by substantial levees. They are located on Map 2-16. Kingspoint and Fox Hollow (the area also shown on Map 2-15) are protected by levees managed by Drainage District #4. To the southwest, Oak Harbor has a levee managed by Drainage District #5. There are approximately 1,500 homes in these two areas. Storm surge from Hurricane Katrina overtopped these levee systems.

2.12.4. Frequency The two drainage districts' levees are sizeable. Drainage District #4's qualifies as protecting the area to the 100-year flood. It is assumed that the levees would overtop or fail during a 200-year flood. Therefore, the odds of levee failure is the same as the odds for a 200-year flood, or 0.005. Because of the two levee failures, this figure is revised to the odds for a 50-year flood, or 0.02.

2.12.5. Threat to People Unlike dam failure, a levee failure should not come as a surprise. It will happen during high water when levee conditions would be monitored by the owning agency. Therefore, the area should not have a high level of exposure to life safety problems. The most important factor for





This levee is south of Slidell. It protects the Kingspoint subdivision to the right.

protecting people is a timely warning. However, if people consider themselves safe from flooding and do not evacuate, then the results could be deadly.

2.12.6. Property Damage The effects of a levee failure on property is similar to that of a flood, discussed in section 2.2.6. The one difference is that velocities are likely to be higher where water rushes through the breach, so the potential for property damage is higher in those areas closest to the levee.

2.12.7. 2009 update: The Kingspoint, Fox Hollow, and Oak Harbor levees were overtopped by Katrina's storm surge. While the Kingspoint and Fox Hollow levees were shown as providing 100-year flood protection (see Map 2-15), the Oak Harbor area was still mapped as being in the Special Flood Hazard Area.

The Kingspoint and Fox Hollow areas are older than Oak Harbor. The former has ten repetitive loss properties and the latter has five. On the other hand, Oak Harbor has no repetitive loss properties and no flood insurance claims other than from Katrina. Therefore, the three levees had provided some protection over the years.

The Oak Harbor levee is approximately 13 feet above sea level, roughly the same elevation as Katrina's storm surge. Some water flowed over the top, but the development is designed with a golf course and artificial lakes connected by a system of pipes, valves, and pumps. The system allows the drainage district to empty the lakes before a storm event to use them as retention ponds. Three pumps, having a capacity of 36,000 gallons per minute can drain the lakes.

Probably because the Oak Harbor area was listed as Special Flood Hazard Area on the Flood Insurance Rate Map, most residents had flood insurance when Katrina hit. This system prevented damage to many homes on higher ground, but there were still 77 flood insurance claims that averaged over \$100,000.

The best known levee failure from Katrina was the canal levee failures in the City of New Orleans. Because of the devastation these caused, FEMA has revised and tightened its mapping standards and regulations, making it much harder for leveed areas to be mapped as "free from flooding."

2.13. Termites

2.13.1. The Hazard Termites are small pale colored insects that live off of wood and wooden structures at or near the ground. These creatures are similar to ants as they both live in colonies, they both have workers that gather and collect food, and they both have a queen that is in charge of the colony. Queen termites can lay upwards of 10,000 eggs per year and the worker termites are responsible for maintaining and caring for these eggs.

Termites tend to live close to the ground and near areas of moisture and sources of food or wood. Their role in nature is to recycle wood. They can cause significant damage to any wooden structure if the conditions are favorable for a termite colony's development.

There are two types of termites that live in southeastern Louisiana: drywood termites and subterranean termites. Drywood termites live in the wood that they are ingesting and do not require soil and moisture.

Subterranean termites require soil and moisture in order to survive. They will bring the soil and moisture with them into the wood that they are infesting. Mud tubes are created and lead from the colony's home to the infested wood in order to supply the area with moisture and soil.

The Formosan termite is a species of the subterranean termite. Formosans are very aggressive. They have the largest colonies of any termites in North American and can cause extensive damage in a short time. To reach food and water, Formosan termites can chew through materials such as thin sheets of soft metals, rubber, stucco, and seals on water lines.



2.13.2. Historical Occurrence The Formosan termite was originally introduced into the New Orleans area and other coastal areas just after World War II. By the time it was identified in 1966, the insect was firmly entrenched into the local environment. Because this termite has no natural predators in the area, it is free to breed and spread without control.

Termite infections of structures have been devastating. The national estimates dealing with termite damage has risen from \$750 million in 1988, to \$2 billion by 1993. The estimate of losses for the state of Louisiana on a yearly basis is around \$500 million, with \$300 million of this being in the New Orleans area.

2.13.3. Area Affected The main concentration of termites occurs in southeastern Louisiana, specifically, those areas south of Interstates 10 and 12. Most of St. Tammany Parish is affected. The termite problem is expected to continue to spread throughout the parish and across the state.

2.13.4. Frequency The termite threat is a year-round issue. There is an annual peak between the months of April and June, with the heaviest concentration of swarms in May. The number of termites is dependent on the weather that occurred in the spring. Since 1989, there has been an increase in the number of swarms in the New Orleans metro area almost every year between 1989 and 1998.

2.13.5. Threat to People The greatest risk to people is safety around and in a structure or object that may have been damaged by a termite infestation. Termites can reduce the load bearing weight of support beams in houses and businesses, putting them

at greater risk of having part or all of the structure collapse when force is applied. If termites have weakened a tree or pole, a slight wind could prove to be enough to push the pole over or remove a branch from the tree.

2.13.6. Threat to Property According to Louisiana State University's Agricultural Center, Formosan termites "can cause major structural damage to a home in six months and almost complete destruction in two years."

Termites, especially Formosan termites, will often infiltrate the building through a weakness in the foundation or at a location where the building comes into contact with soil. There have been recorded instances where a termite infestation has caused a house to split in half. An apartment complex was demolished 14 years after its construction due to the damage it had suffered.

Signs of subterranean termites

Indoors

- Earthen masses on door frames, edges of walls, floors, ceiling, stairs, skirting or other areas of the house
- Blistering of paint on windows, door frames and skirting
- Damp areas on walls
- Distortion of floor, window or door frames

Outdoors

- Large number of alates (winged termites) either inside or outside the house
- Mud tubes over foundation walls, piers and edges of concrete slabs
- Trees with earthen material near the base and on the bark
- Damaged fences, utility poles and landscaping timbers

Source: LSU AgCenter

2.13.7. 2009 update: After

Katrina, there was a concern that downed trees, lumber, wet wallboard, and other debris fed Formosan termites. A public information campaign was launched to advise residents to clean up debris and keep wood off the ground.

There was also a widespread rumor that mulch from trees downed by Katrina was being shipped around the country with Formosan termite in it. This proved to be an urban legend and contrary to a state Department of Agriculture quarantine.



2.14. Risk Summary

This chapter provides information on the $\underline{14}$ natural hazards that can impact St. Tammany Parish. In this chapter, data on the hazards are provided in terms of severity, historical occurrences, areas affected, frequency, and their threat to people and property.

While it is hard to compare different natural phenomena, a general summary can show their relative importance to the Parish. This is done in Table 2-26. For each hazard, the following information has been summarized from the discussions in the earlier sections of this chapter to convey the exposure presented to St. Tammany Parish for each hazard.

Areas Exposed: What part(s) of the Parish is subject to the hazard? This is discussed in the "Area Affected" section under each hazard.

Annual Chance: What are the odds of an occurrence in any given year? The chance is provided in terms of a factor between 0 (no chance) and 1.0 (100% chance of occurring in any year). More information on how the factor was derived can be found in the "Frequency" sections.

Threat to People: A relative measure of "high," "medium," or "low" based on the discussion in the section with the same name under each hazard. If more than one person was killed or 10 people were injured due to the hazard in recent years, it is rated as "high." If there were no recorded deaths or injuries lately, the threat is rated as "low."

Property Damage Potential: A relative measure of "high," "medium," or "low" based on the discussion under each hazard. This factors in the estimated damage per structure times the number of structures likely to be damaged by the hazard. For example, a tornado that will destroy 50 \$100,000 homes produces \$5 million in property damage, the same as a flood that causes \$25,000 in damage to 200 homes.

Table 2-26 Hazard Risk Summary						
Hazard	Areas Exposed	Annual Chance	Threat to People	Property Damage		
2.1 Tropical storms/hurricanes	Entire Parish	0.83	High	High		
2.2 Flooding	Floodplains	1.00	Med	High		
2.2.A Repetitive flooding	Entire Parish	0.20	Med	High		
2.3 Tornadoes	Entire Parish	1.00	High	High		
2.4 Wildfires	Forests	1.00	Low	Med		
2.5 Drought	Entire Parish	0.05	Low	Low		
2.6 Fog	Roads, airport	1.00	High	Low		
2.7 Earthquake	Entire Parish	0.01	Low	Low		
2.8 Hailstorm	Entire Parish	0.16	Low	Med		
2.9 Land failure	Shoreline	1.00	Low	Low *		
2.10 Severe winter	Entire Parish	0.05	Med	Low		
2.11 Dam failure	Downstream of dams	0.01	Low	Med		
2.12 Levee failure	Leveed areas	0.02	Med	High		
2.13 Termites	Entire Parish	1.00	Low	Med		
* While land failure by itself does not cause much property damage in any given year, it does increase the potential for property damage by storm surge.						

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Chapter 3. Vulnerability Assessment

Chapter 2 reviewed the hazards that face St. Tammany Parish. If they struck vacant land, there would not be much cause for concern. Because the parish has 230,000 residents and thousands of homes, businesses and critical facilities, the potential for damage and deaths can be high.

This chapter reviews how vulnerable St. Tammany Parish is to property damage, threats to public health and safety, and adverse impact on the local economy. The potential for property damage is measured in dollars. It accounts for how much is exposed to damage and the likelihood of damage occurring.

Except where noted, this assessment does not include Slidell, Covington or Mandeville, because those cities developed their own mitigation plans.

A four step process was followed to calculate the cost to St. Tammany Parish of the hazards reviewed in Chapter 2:

- Step 1: Inventory appropriate categories of property subject to damage
- Step 2: Determine the cost of various levels of damage by the hazards
- Step 3: Determine the exposure of the properties and people to hazard scenarios

Step 4: Calculate the impact, based on the exposure and the probability of occurrence

Sections 3.1 and 3.2 review the first two steps. Sections 3.3 - 3.15 describe the exposure for different scenarios for each hazard. They then and present tables with the resulting summary data for each hazard, followed by a narrative discussion of the estimated loss of life, injuries and impact on the economy from each hazard. Section 3.16 summarizes the findings.

3.1. Vulnerable Properties

In September 2003, the Parish Office of Emergency Preparedness (OEP) assembled a master list of critical infrastructure and key assets. The list was organized according to 11 categories used by the US Department of Homeland Security's 2003 publication, *The Physical Protection of Critical Infrastructures and Key Assets*. OEP added three more categories of "key assets."

A total of 568 facilities and assets in the entire Parish were identified by OEP. The categories are summarized in Table 3-1. They are oriented toward protecting the nation and its economy from terrorism. The Committee reviewed these categories and their subcategories in light of their exposure to damage and disruption by natural hazards.



For example, while banks and post offices have special roles in the national economy and can be prime targets for a terrorist, they do not have any greater exposure to damage by a natural hazard than other commercial structures. Damage to one or a few from a hurricane or tornado will not knock out the financial or shipping system they support. It was felt that if one bank or branch bank facility were damaged, people would go to another branch office.

There is a threshold where loss of a large number of these facilities, such as several hospitals or 10 or 20 fire stations, would reach a critical mass. There would be more than just a dollar loss to the community and the Parish. This impact is discussed under the threat to public health and safety and impact on the economy parts of sections 3.3 - 3.15.

In 2008, facilities located in the corporate limits of Slidell, Covington, and Mandeville, were eliminated. As shown in Table 3-2, this review reduced the number of individual critical facilities from 568 for the entire Parish to 235 for this planning effort (plus power lines). The categories of agriculture, defense industrial base, banking, postal, and subcategories, such as libraries and museums, were dropped altogether, either because there are none in the Parish or they were not deemed critical to responding and recovering from a natural disaster (even though they may be terrorist targets).

Table 3-1 Critical Infrastructures and Key Assets					
Property	Description	Parish			
Agriculture and food	Centers that supply seed and feed and that handle harvested crops and food processing	0			
Water	Centers for water supply, treatment and storage and wastewater treatment	56			
Public health	Hospitals, health clinics, mental health facilities, nursing homes, blood-supply facilities, laboratories	25			
Emergency services	Police and fire stations, emergency operations centers, and ambulance services	64			
Defense industrial base	Defense industries, ports and shipping facilities	0			
Telecommunications	Facilities that support telephone, television, radio and data transmission	12			
Energy	Sites that generate, transmit and distribute electricity, natural gas, gasoline and other oil products	13			
Transportation	Airports, railroads, major highways, and riverine and maritime shipping facilities, key bridges, bus terminals	19			
Banking and finance	Banks, lending institutions, and the regulatory and support facilities that service them	66			
Chemical industry and hazardous materials	Sites for research, production, storage and distribution of chemicals and hazardous materials	15			
Postal and shipping	Post offices, packaging and shipping companies	34			
	Key Assets				
Government	City halls, local, state and federal offices, community centers, museums, and libraries	51			
Schools	Elementary and high schools, colleges, school offices and day care centers	164			
Shelters	Schools that have been identified as shelters for evacuation or temporary housing of disaster victims	49			
	Total	568			
Note: The numbers are for the entire Parish, before the list was trimmed down.					
Source: St. Tammany Parish Office of Emergency Preparedness					

As noted in Chapter 2, the hazards facing St. Tammany Parish either provide plenty of warning time (e.g., tropical storms) or present a low threat to life safety (e.g., earthquakes and hailstorms). Because of these factors, it was felt that schools were not critical, unless they served as shelters. The same rationale supported not listing transportation facilities. However, telecommunications towers and electrical power lines and substations were added.

The resulting list of critical facilities and infrastructure is shown in Table 3-2. They are differentiated based on their structural characteristics as well as the service they provide. For example, both hospitals and nursing homes provide public health services, but hospitals are generally much larger structures.

In addition to the critical facilities and key assets, five types of "other structures" were identified. Because Parish tax assessment records were not available digitally, Census data and other sources were used to determine the number and value of these properties. These are listed at the end of Table 3-2.

The critical facilities from the Office of Emergency Preparedness' inventory were plotted in the Parish's GIS system. Land use maps were used to determine the distribution of the other structures. For example, businesses were concentrated in commercial districts (there are very few industries in the Parish). Mobile home parks were also plotted. An example of the GIS layers used is in Map 3-1.

3.1.1. 2009 update Based on lessons learned from Katrina, OEP reviewed the list of facilities that it considered to be critical during and after an event. While some changes were made, they did not affect the categories used in this natural hazards analysis. The new list was plotted and is used in this chapter, starting with Table 3-2.



Table 3-2 Vulnerable Properties in Planning Area				
Property	Count			
Water/wastewater				
Water plants	0			
Wastewater plants	0			
Wells	11			
Water towers	1			
Public health				
Hospitals	2			
Nursing care	0			
Emergency services				
Fire stations	18			
Police/sheriff	4			
Telecommunications				
Radio/TV towers	8			
Cell towers	119			
Energy				
Switching stations	55			
Power lines (miles)	200			
Chemical/haz mat	6			
Critical government	6			
Shelters	13			
Total critical facilities	435			
Other structures				
Single family	60,815			
Mobile homes	10,732			
Multi-family	307			
Businesses	3,265			
Government	647			
Total all structures 76,208				

3.2. Damage Calculations

Step 2 of the vulnerability assessment was to calculate the impact of the <u>14</u> hazards reviewed in Chapter 2 in terms of property damage and loss of their use. Averages and typical situations were used. This approach cannot predict which facilities will be hit by which hazard, but it does provide a general estimate of the level of damage that would be expected, based on available data.

Step 2 started with determining the value of the property being damaged. Each type of facility can range from small to large and there is a similar range in their dollar value. Typical values of the structures were determined using data from the US Census and University of New Orleans offices. Averages were used. Outliers were not included (i.e., where the value of most properties were concentrated together, but one or two were much more expensive. In these cases, the more expensive ones were not counted toward the average value.).

For example, most general purpose government buildings in the Parish are in the \$50,000 - \$500,000 range. The new Parish Justice Center is much larger and estimated to be worth \$40,000,000. It was not included in the calculations that concluded that the current

market value of a typical government building was worth \$300,000.

Contents value was calculated as a percentage of the structure's value. Table 3-3 shows the relative value of the typical contents to the typical structure type. These ratios were taken from FEMA guidance.

For each facility, two types of damage were calculated: physical damage and "downtime," a factor that represents loss of use of the facility.

Table 3-3 Contents Value as aPercentage of Structure Value				
Occupancy	Value			
Residential	50%			
Commercial	100%			
Health Care	150%			
Emergency services	150%			
General government	100%			
Schools/shelters	100%			
Source: Understanding Your Risks, FEMA, page 3-11				

3.2.1. Physical damage Three levels of physical damage were used:

- Minor damage: Many structures exposed to a storm or other hazard will suffer only moderate damage. For examples, a hurricane may just damage the roof and windows of some structures. For this calculation, 5% of the structure's value was used. Because the structure stays substantially intact, no contents losses were considered.
- Moderate damage: This category represents more serious damage, such as a collapsed wall or floodwater over the first floor of a building. Moderate damage is calculated as 40% of the structure's value plus 40% of the content's value.
- Major damage: This category is used when a building is demolished or heavily damaged. An example of the former is a house leveled by a tornado. An example of the latter is floodwater more than 1.5 feet over the lowest floor (i.e., over the

electrical outlets). The average dollar figure for this category is 75% of the structure's value and 75% of the contents' value.

3.2.2. Downtime Loss of use of a facility is called "downtime." Downtime is an estimate of the dollar cost to people when a facility is not available because it is damaged or not accessible. A facility could suffer no structural damage, but still have a downtime cost. An example would be a business that has lost power for a few days due to a storm. It would not be physically damaged, but it would not be able to open for business or work. A downtime cost was figured for each of the three levels of damage.

Table 3-4 lists the categories of property that were used in this vulnerability assessment effort. The category of "single family" is highlighted. Here's how the table was populated with the data for single family homes:

- 1. According to the records available from the Census and the University of New Orleans' Real Estate Market Data Center, the average value for a single family home (not including mobile homes) is \$124,000.
- 2. Minor damage to a single family home is 5% of the average value of the structure, or \$6,200. As noted above, it is assumed that there is no damage to the contents.
- 3. Downtime due to minor damage to a single family home was concluded to be negligible. The house would still be livable, so there would be no loss of use.
- 4. Moderate damage to a home is 40% of its structural value plus 40% of its contents value. For residential properties, contents is calculated at 50% of the structure's value (see Table 3-3). This equates to \$49,600 plus \$24,800 = \$74,400 for the average house.
- 5. Moderate damage is considered to make the house uninhabitable until repairs are made. Given the widespread demand for repairs after a disaster, they won't be made quickly. The Planning Committee concluded that the building would be unusable as a home for an average of 3 months. \$200 per night was used as the cost of a motel, food, and other expenses of a disposed family. Motels are assumed to represent the "true cost" of temporary housing. Three months are 90 days, for a downtime cost of \$18,000 per family when a residential building has suffered moderate damage.
- 6. The "major damage" category is calculated at 75% of the value of the house and its contents: $(\$124,000 \ge 0.75) + (\$62,000 \ge 0.75) = \$139,500$.
- 7. It is estimated that it will take a family 18 months to replace a house that has been destroyed or that suffered major damage. This would include reconstruction or settling an insurance claim, seeking new funds, and finding an available residence at the same time many others are seeking new housing. At \$200 per day and 540 days, the downtime is valued at \$108,000.

2009 update According to the St. Tammany Economic Development Foundation, the average price of a single family home (not including mobile homes) in post-Katrina St. Tammany Parish is \$224,263. This figure represents an 81% increase over the property value used in the 2004 *Plan*. The Mitigation Planning Committee concluded that the same ratio would be appropriate for updating the values of all types of structures.

These numbers are displayed in the "single family" row in Table 3-4. The basis for the downtime for the other categories of properties are shown in Table 3-5.

Table 3-4 Physical Losses and Downtime Costs							
		Minor Damage Moo		Moderate	Damage	Major Damage	
Property	Value	Physical	Downtime	Physical	Downtime	Physical	Downtime
Water/wastewater							
Water plants	\$905,000	\$45,250	\$0	\$724,000	\$168,000	\$1,357,500	\$720,000
Wastewater plants	\$905,000	\$45,250	\$0	\$724,000	\$168,000	\$1,357,500	\$720,000
Wells	\$90,500	\$4,525	\$0	\$36,200	\$0	\$67,875	\$42,000
Water towers	\$452,500	\$22,625	\$0	\$181,000	\$168,000	\$339,375	\$720,000
Public health							
Hospitals	\$45,250,000	\$2,262,500	\$0	\$84,843,750	\$360,000	\$84,843,750	\$10,950,000
Nursing care	\$3,620,000	\$181,000	\$0	\$3,620,000	\$360,000	\$6,787,500	\$4,380,000
Emergency services							
Fire stations	\$1,991,000	\$99,550	\$0	\$1,991,000	\$42,000	\$3,733,125	\$180,000
Police/sheriff	\$1,991,000	\$99,550	\$0	\$1,991,000	\$8,400	\$3,733,125	\$36,000
Telecommunications							
Radio/TV towers	\$1,810,000	\$90,500	\$0	\$1,448,000	\$67,200	\$2,715,000	\$864,000
Cell towers	\$452,500	\$22,625	\$2,400	\$181,000	\$16,800	\$339,375	\$72,000
Energy							
Switching stations	\$7,240,000	\$362,000	\$30,000	\$2,896,000	\$30,000	\$5,430,000	\$75,000
Power lines (miles)	\$27,150	\$1,358	\$30,000	\$10,860	\$90,000	\$20,363	\$210,000
Chemical/haz mat	\$5,430,000	\$271,500	\$0	\$4,344,000	\$30,000	\$8,145,000	\$60,000
Critical government	\$543,000	\$27,150	\$0	\$434,400	\$8,400	\$814,500	\$36,000
Shelters	\$5,430,000	\$271,500	\$0	\$4,344,000	\$0	\$8,145,000	\$0
Other structures							
Single family	\$224,263	\$11,213	\$0	\$134,558	\$21,600	\$252,296	\$129,600
Mobile homes	\$61,540	\$3,077	\$0	\$36,924	\$7,200	\$69,233	\$7,200
Multi-family	\$724,000	\$36,200	\$0	\$434,400	\$172,800	\$814,500	\$172,800
Businesses	\$543,000	\$27,150	\$9,600	\$434,400	\$134,400	\$814,500	\$3,504,000
Government	\$543,000	\$27,150	\$0	\$434,400	\$16,800	\$814,500	\$72,000

3.2.3. Downtime calculations The costs of physical damage to a property were based directly on the value of the structure and its contents. Downtime calculations were more subjective. Table 3-5, on the next two pages, summarizes the basis for these costs.

2009 update The Social Security Administration calculates an annual cost of living adjustment. From 2003 through 2007, the adjustment totaled 15.4%. Given the impact of Katrina on the Parish, a factor of 20% is used to bring the costs of downtime up to 2008 estimates.

Table 3-5 Basis for Downtime Costs				
Property	Basis and Assumptions			
Water/wastewater				
Water and wastewater treatment plants *	Loss of drinking water for the average system: $24,000/day$ for people to seek other sources. Loss of wastewater treatment for the average system: $24,000/day$ in environmental damage. No loss of use or downtime from minor damage. 7 days for moderate damage (the facility will be repaired quickly due to its importance to the community): 7 x $24,000 = 168,000$. One month loss of water/wastewater treatment if the plant is destroyed (alternative resources would be in place within a month): 30 x $24,000 = 720,000$.			
Wells	No losses for minor or moderate damage. The typical Parish water system has more than one well, so loss of one can be compensated for by the others while repairs are made. If the well is destroyed, it is assumed that the other wells would also be damaged, so there would be increased operating costs for 7 days at a cost of \$6,000 per day.			
Water towers *	Same costs as downtime for treatment plants			
Public health				
Hospitals *	No downtime from minor damage – the hospital will stay in operation. Loss of use from moderate damage would cost \$12,000/day in delayed treatment. Damage would be repaired sufficiently to allow full reuse in 30 days (\$360,000). Loss of use from a destroyed hospital would cost \$30,000/day for 1 year = \$10,950,000.			
Nursing care *	No downtime from minor damage – the nursing home will stay in operation. Loss of use from moderate damage would be similar to loss of use of a house: residents would have to relocate to a similar facility at a cost \$120/day per person. With an average of 100 residents per home, for a total of \$12,000/day. Moderate damage would be repaired in 1 month (30x \$12,000 = \$360,000. Loss of use of a destroyed nursing home would cost \$12,000/day for 1 year = \$4,380,000.			
Emergency services				
Fire stations *	No downtime from minor damage – the facility will stay in operation. Moderate damage would mean loss of some equipment and would require relocation to another site, increasing response time: \$6,000/day in increased loss to property due to fires. Downtime would be 7 days: \$42,000. Downtime for a destroyed fire station would be 30 days, the time needed to locate an alternate site, and replace the equipment: \$180,000. (Note that cost of replacing the equipment is counted as part of the physical damage to the contents.)			
Police/sheriff *	No downtime from minor damage – the facility will stay in operation. Moderate damage would require relocation of the operation for 7 days while repairs are made at \$1,200/day for increased travel costs, furniture rental, etc. – \$8,400. Downtime for a destroyed facility would be 30 days, the time needed to locate an alternate site, and replace the equipment: \$36,000. (Note that cost of replacing the equipment is counted as part of the physical damage to the contents.)			
Telecommunications				
Radio/TV towers *	No downtime from minor damage – the facility will stay in operation. Loss of use is valued at \$9,600/day, the same daily cost as for a business. Moderate damage will keep the facility closed for 7 days (\$67,200). If the facility were destroyed, it would take 90 days to reopen a new one (\$864,000).			
Cell towers	One day of downtime for minor damage, 7 days for moderate damage, and 30 days for major damage. Loss of use of the tower would shut down cell phone service in a localized area. Given the prevalence of cell phones, the loss of use is more of a nuisance than a major cost. Each day a cell phone tower cannot be used is valued at \$2,400.			
Energy				
Switching stations	The loss of power is estimated to cost \$30,000 per day in damage to properties that do not have power backup. Damage would be due to thawed food in freezers, overheating of materials that need fans or air conditioning, and closing of businesses dependent on electricity. 1 day of downtime for minor or moderate damage (either repairs would be made in one day or an alternative routing of power would be accomplished). 2.5 days of downtime for major damage.			
Power lines (miles)	Loss of one mile of lines is considered as having the same dollar loss per day as for loss of one switching station. Minor damage: loss of power for one day (\$30,000). Moderate damage: loss power for 3 days and loss of poles (rerouting of power will not work if there are no lines to carry it) (\$90,000). Destruction of power lines: 7 days of downtime (\$210,000).			
Chemical/haz mat	It is assumed that hazardous materials are given enough care in storage and shipping that no release would result from minor damage to the building or site. Moderate damage would cause enough of a leak to evacuate the neighborhood, resulting in closed businesses, containment efforts, and health and safety hazards calculated to cost \$30,000. Destruction would mean a release of a greater amount of the chemical(s) that would affect a larger area – \$60,000. It is assumed that in either case, the problem would be neutralized in one day.			
* It is assumed that these facilities have a local standby source of electricity, such as a generator, and would be able to continue operation during a power loss.				

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Table 3-5 Basis for Downtime Costs			
Property	Basis and Assumptions		
Critical gov't *	Same assumptions and costs as police stations.		
Shelters	If the damage occurs before the site is to be used as a shelter, people would be directed to another shelter. Where the hazard is slower onset and where it can go is predictable (e.g., shelters in the hurricane evacuation zones), it will not be used. There is therefore, no downtime cost for shelters.		
Other structures			
Single family	The basis and assumptions for downtime costs due to loss of use of a home is explained on page 3-5. 2009 update: \$240/day.		
Mobile homes	Minor damage to a mobile home would have the same impact as minor damage to a single family house: it would still be livable, so there would be no downtime costs. Moderate damage would keep a family out for one month, until the home is repaired or replaced. The cost of temporary housing would be the same as for a single family home: \$240/day for 30 days = \$7,200. A destroyed mobile home would also put a family out for one month. After that time, a new unit would be brought in or the family would relocate.		
Multi-family	Same costs due to loss of use as a single family home from minor and moderate damage. The average multi-family structure in St. Tammany Parish is estimated to have 8 units, so the dislocation costs are multiplied times 8 ($$240 \times 90 \times 8 = $172,800$ per building). A destroyed multi-family structure is estimated to take 2 years to replace. However, residents are expected to find new housing within 12 weeks, so the downtime is the same as for moderate damage.		
Businesses	One day of downtime from minor damage: \$9,600/day for the average business in St. Tammany Parish (from UNO Real Estate Market Data Center). Moderate damage is estimated to result in the business being closed for 14 days. This will mean either a loss in sales or a loss in wages, depending on the nature of the business, for a downtime cost of \$134,400. Major damage to the structure is considered to put the typical business out of operation for one year. Some will reopen sooner (especially if they are insured) while others will close for good (\$9,600 x 365 = \$3,504,000).		
Government	No downtime from minor damage – the facility will stay in operation. The basis for moderate damage is the same as for police/sheriff facilities: \$1,200/day for increased travel costs, furniture rental, etc. However, not being critical facilities, repairs are assumed to take twice as long. Moderate damage would put the site in temporary quarters for 14 days (\$16,800) and destruction for 60 days (\$72,000).		
* It is assumed that these facilities have a local standby source of electricity, such as a generator, and would be able to continue operation during a power loss.			

Sections 3.3 - 3.15 review the exposure of the properties described in section 3.2 to each of the <u>14</u> hazards covered in Chapter 2. Typical disaster scenarios are described. These identify an expected number of properties that will receive minor and moderate damage and/or be destroyed. The cost of the resulting property damage and downtime are presented in the tables. The impact of the scenario on people and the local economy are reviewed in narrative form.

3.2.4. Future development When determining the impact of hazards on people and property, it is important to consider how things will look in the future, in addition to the current exposure. Future development in St. Tammany Parish is guided by the 2025 Land Use Plan. The plan's "Supporting Policy and Statement of Fundamental Principles" (see next page) stress that future development will focus on infilling in existing areas and that natural features, such as floodplains will need to be preserved.

Accordingly, other than having an increase in the numbers of people and property vulnerable to natural hazards (which is picked up in the revised tables in this chapter), it is not foreseen that future development will alter the pattern of this vulnerability. If anything, the development further inland and the preservation of floodplains will reduce the Parish's exposure.

2025 Land Use Plan Supporting Policy and Statement of Fundamental Principles

2. General Parish-wide Land Use Recommendations

a) The Parish should encourage redevelopment within existing cities and towns, villages and hamlets, whether incorporated or not, both as a means to efficiently accommodate growth where infrastructure currently exists or can be installed or expanded efficiently, and to serve market segments which prefer proximity to associated uses and required services....

B. Land Use Considerations

1. Commercial and Institutional

a) ... The redevelopment of existing commercial uses should be encouraged before new areas are allowed for commercial or institutional uses. Commercial uses should be focused in existing towns, villages or hamlets, or new centers, reflected in the ND 2025 Land Use Plan....

c) Conservation areas

(5) Expand and extend existing protected areas, and establish a "network" of contiguous green space throughout the Parish. This will facilitate species preservation and leverage the value of existing green spaces and corridors (such as the public and private preserves already dedicated, and the Tammany Trace and stream corridors). The 100-year flood plain network throughout the Parish (as currently defined by the Federal Emergency Management Agency (FEMA), or as may be updated) should be a base starting point for designation of green space/ conservation use....

C. Other Significant Elements

1. Flood protection

a) Much of St. Tammany, including coastal areas as well as stream floodplains, is subject to storm water or tidal flooding. The coastal (lakefront) areas, south of Interstate 12, are also heavily populated and developed. Recent flooding experiences (whether caused by tropical storms or heavy rain falls) have dramatically illustrated the number of lives and value of property at stake. Accordingly, prevention of any additional contribution to flooding in the Parish was identified as one of the top four priorities for future land use decisions in the Parish....

c) Any development within the 100-year floodplain (as currently defined by the Federal Emergency Management Agency (FEMA), or as may be updated with more accurate information in the future (by FEMA or other reputable source), or within areas of flat topography and "very wet" (hydric) soils, shall be required to use low impact development – site and structure design and construction – techniques. In follow-up work under this ND 2025 Comprehensive Plan process, such areas and techniques shall be carefully delineated.

d) Flood protection strategies should be developed and implemented prior to the permitting of new development, since this approach is less costly than remedial responses.

Source: www.stpgov.org/pdf/1179350027.pdf

3.3. Tropical Storms

Three tropical storm scenarios are summarized here: a tropical storm, a category 2 hurricane and a category 5 hurricane. In Table 3-16 at the end of this chapter, the damage figures are adjusted to reflect the annual frequency of these storms. For example, the total cost of damage for the Category 5 hurricane is multiplied times 0.0055 to reflect the fact that one would hit the Parish every 180 years (see Section 2.1.4).

3.3.1 Tropical storm scenario This scenario is based on the reports of damage from tropical storms Allison, Bertha, Isidore, Lili and Bill. Winds would reach 50 - 60 miles per hour and the storm surge would be up to 5 feet along the Lake Pontchartrain shore. The damage caused by riverine and local drainage flooding is covered under those hazards.

Property: Damage from wind affects properties throughout the Parish. Mobile homes and telecommunications towers are particularly vulnerable. Damage from surge flooding is limited to properties in the coastal velocity (V) Zone. Under this scenario:

- Wind damage
 - 25% of the mobile homes receive minor damage
 - 10% of the mobile homes receive moderate damage
 - 5% of the properties throughout the Parish receive minor damage
 - 1% of the properties throughout the Parish receive moderate damage
 - 5 miles of power lines receive minor damage
- Water damage from storm surge
 - 25% of the properties in the V (coastal velocity) Zone receive minor damage

The cost of the physical damage and downtime to these properties is shown in Table 3-6. For each level of damage, the number of properties affected is listed in the "Count" column. For example, there are 119 cell towers in St. Tammany Parish. Under this scenario, 5% of them receive minor damage, so $(119 \times 0.5) = 5.95$ is the count for cell towers in the minor damage column.

The "Cost" column is the dollar cost of damage to those properties. In Table 3-4, minor physical damage to a cell tower is 5% of the tower's value or <u>\$22,625</u>. <u>\$2,400</u> is used as the cost of one day's downtime due to minor damage. With 5.95 towers affected, the "Cost" column shows the total cost, or (<u>\$22,625</u> + <u>\$2,400</u>) x 5.95 = <u>\$148,899</u>.

People: Under the tropical storm scenario, there are no deaths and only a few minor injuries from falling limbs or flying debris. Many of the residents in the threatened areas evacuate and most of them find friends or relatives to house them. 300 families still need to be sheltered. There are no reported outbreaks of health problems.

Table 3-6 Costs from a Tropical Storm							
	Minor Damage		Moderate Damage		Destroyed		Total
Property	Count	Cost	Count	Cost	Count	Cost	Cost
Water/wastewater							
Water plants	0.0	\$0	0.0	\$0	0.0	\$0	\$0
Wastewater plants	0.0	\$0	0.0	\$0	0.0	\$0	\$0
Wells	0.6	\$2,489	0.1	\$3,982	0.0	\$0	\$6,471
Water towers	0.1	\$1,131	0.0	\$3,490	0.0	\$0	\$4,621
Public health							
Hospitals	0.1	\$226,250	0.0	\$1,704,075	0.0	\$0	\$1,930,325
Nursing care	0.0	\$0	0.0	\$0	0.0	\$0	\$0
Emergency services							
Fire stations	0.9	\$89,595	0.2	\$365,940	0.0	\$0	\$455,535
Police/sheriff	0.2	\$19,910	0.0	\$79,976	0.0	\$0	\$99,886
Telecommunications							
Radio/TV towers	0.4	\$36,200	0.1	\$121,216	0.0	\$0	\$157,416
Cell towers	6.0	\$148,899	1.2	\$235,382	0.0	\$0	\$384,281
Energy							
Switching stations	2.8	\$1,078,000	0.6	\$1,609,300	0.0	\$0	\$2,687,300
Power lines (miles)	5.0	\$156,788	0.0	\$0	0.0	\$0	\$156,788
Chemical/haz mat	0.3	\$81,450	0.1	\$262,440	0.0	\$0	\$343,890
Critical government	0.3	\$8,145	0.1	\$26,568	0.0	\$0	\$34,713
Shelters	0.7	\$176,475	0.1	\$564,720	0.0	\$0	\$741,195
Other structures							
Single family	3,349.5	\$37,558,411	608.1	\$94,966,880	0.0	\$0	\$132,525,291
Mobile homes	2,737.5	\$8,423,252	1,073.2	\$47,353,894	0.0	\$0	\$55,777,146
Multi-family	17.8	\$646,152	3.1	\$1,864,044	0.0	\$0	\$2,510,196
Businesses	178.0	\$6,541,690	32.7	\$18,571,909	0.0	\$0	\$25,113,600
Government	34.6	\$938,749	6.5	\$2,917,132	0.0	\$0	\$3,855,881
Total							\$226,784,534

People have a positive attitude (see box). They've been through these storms before and will likely see them again.

Life safety threat: low. Mental health impact: low.

Economy: Productivity for the first few days after a tropical storm is down as people stay home from work to clean up, some roads are blocked, and some businesses are closed. Some companies, like contractors and home improvement stores, see an increase in business. Prices

Ron Barrosse, who has owned a camp on Lakeview Drive since 1995, said he had never seen strong winds and tidal surges like the ones that picked up his neighbor's vacation home from its foundation about 200 feet offshore and dumped it in a parking lot Thursday about 10 a.m..

Within 15 minutes of the terrifying scene, Barrosse ditched his plans to wait out Isidore in his elevated house and headed inland. But by Friday morning he was back, clearing wood and garbage from his property.

"It's the price you pay for living in paradise," he said.

Times-Picayune, 9/28/02

will rise for construction materials and oil and gas that comes from offshore rigs that were shut down. Prices are back to normal in two months.

Local governments must pay for shelters, clean up, and debris disposal. A federal disaster declaration is expected to help cover up to 75% of these costs. Due to the relatively light
level of damage, uninsured property owners will make due with partial repairs, savings or borrowed funds.

Overall economic impact: minor.

3.3.2. Category 2 hurricane This scenario extrapolates from the reports of damage from past hurricanes and the tropical storms. Winds would reach 100 miles per hour and the storm surge would be up to 8 feet along the Lake Pontchartrain shore. The damage caused by riverine and local drainage flooding is covered under those hazards.

Property: Under this scenario, the effects are similar to a tropical storm but there is more damage. Damage from wind affects more properties (especially mobile homes) throughout the Parish,. Damage from surge flooding is greater as it reaches higher and farther inland.

- Wind damage
 - 50% of the mobile homes receive minor damage
 - 25% of the mobile homes receive moderate damage
 - 20% of the properties throughout the Parish receive minor damage
 - 10% of the properties throughout the Parish moderate damage
 - 5% of the properties throughout the Parish major damage
 - 15 miles of power lines receive minor damage
 - 5 miles of power lines receive moderate damage
- Water damage from storm surge
 - 25% of the properties in the V (coastal velocity) Zone receive minor damage
 - 50% of the properties in the V (coastal velocity) Zone receive moderate damage
 - 25% of the properties in the V (coastal velocity) Zone receive major damage

People: Before the category 2 hurricane hits, families are advised to evacuate. Most of them do, but 25% dare to wait it out. As a result 2 people are killed when their homes are destroyed. Another 10 are injured. 1,000 families need shelter.

A boil order is issued for some areas as private wells are flooded and a wastewater treatment plant shuts down, allowing raw sewage to flow directly into the stream. Health problems are in the form of upset stomachs from lack of safe drinking water and eating spoiled food, and complications from heat and insect bites. Septic systems in repetitively flooded areas need to be replaced.

Forty-five percent of the flooded households do not have insurance Several hundred homes are more than 50% damaged and must meet the flood protection requirements as a condition of their repair permits. While mitigation funds are sought, there won't be enough for everyone. Most of the owners of substantially damaged properties will have to find the money to bring their homes up to code. Some discuss walking away from their places.

		Table 3-7 Co	osts from	a Category 2 H	lurricane)	
	Minor	Damage	Moder	ate Damage	Maj	or Damage	Total
Property	Count	Cost	Count	Cost	Count	Cost	Cost
Water/wastewater							
Water plants	0.0	\$0	0.0	\$0	0.0	\$0	\$0
Wastewater plants	0.0	\$0	0.0	\$0	0.0	\$0	\$0
Wells	2.2	\$9,955	1.1	\$39,820	0.6	\$60,431	\$110,206
Water towers	0.2	\$4,525	0.1	\$34,900	0.1	\$52,969	\$92,394
Public health							
Hospitals	0.4	\$905,000	0.2	\$17,040,750	0.1	\$9,579,375	\$27,525,125
Nursing care	0.0	\$0	0.0	\$0	0.0	\$0	\$0
Emergency services							
Fire stations	3.6	\$358,380	1.8	\$3,659,400	0.9	\$3,521,813	\$7,539,593
Police/sheriff	0.8	\$79,640	0.4	\$799,760	0.2	\$753,825	\$1,633,225
Telecommunications							
Radio/TV towers	1.6	\$144,800	0.8	\$1,212,160	0.4	\$1,431,600	\$2,788,560
Cell towers	23.8	\$595,595	11.9	\$2,353,820	6.0	\$2,447,681	\$5,397,096
Energy							
Switching stations	11.0	\$4,312,000	5.5	\$16,093,000	2.8	\$15,138,750	\$35,543,750
Power lines (miles)	15.0	\$470,363	5.0	\$504,300		\$0	\$974,663
Chemical/haz mat	1.2	\$325,800	0.6	\$2,624,400	0.3	\$2,461,500	\$5,411,700
Critical government	1.2	\$32,580	0.6	\$265,680	0.3	\$255,150	\$553,410
Shelters	2.6	\$705,900	1.3	\$5,647,200	0.7	\$5,294,250	\$11,647,350
Other structures							
Single family	12,471.7	\$139,847,045	6,699.0	\$1,046,100,141	3,349.5	\$1,279,159,058	\$2,465,106,245
Mobile homes	5,420.5	\$16,678,846	2,792.0	\$123,193,147	591.1	\$45,178,310	\$185,050,303
Multi-family	63.9	\$2,313,108	35.7	\$21,676,439	17.8	\$17,622,817	\$41,612,364
Businesses	667.8	\$24,540,574	356.0	\$202,498,695	178.0	\$768,715,377	\$995,754,646
Government	131.6	\$3,571,732	69.2	\$31,201,724	34.6	\$30,651,960	\$65,425,417
Total							\$3,852,166,047

Attitudes are not as positive as after the tropical storm. Stress takes a toll in areas that have been flooded several times before. Homes and small businesses are put up for sale. Some are purchased and others are left vacant or are converted to rental properties. Neighbors report a decline in property values.

Life safety threat: moderate. Mental health impact: moderate.

Economy: Productivity is down for a week as people stay home from work to clean up, some roads are blocked, and some businesses are closed. A small number of marginal businesses will not reopen. Contractors and home improvement stores get a lot more business. Prices for construction related services and materials are not back to normal for six months.

Up to 75% of local governments' expenses for rescue operations, traffic control, shelters, clean up, debris disposal, and repairs to the wastewater treatment plant are covered by the federal disaster declaration. Local governments must find the 25% local share needed for these expenses and for mitigation projects in repetitively flooded areas.

Overall economic impact: moderate.

3.3.3. Category 5 hurricane This is the "worst case" hurricane scenario. Winds would exceed 150 miles per hour and the storm surge would be up to 18 feet along the Lake Pontchartrain shore. The damage caused by riverine and local drainage flooding is covered under those hazards.

Property: Wind damage is considered to be spread evenly throughout the Parish. Damage from surge flooding is the greatest hazard. It is calculated to <u>cause major</u> <u>damage everywhere in the coastal velocity (V) Zone</u>.

- Wind damage
 - 25% of the mobile homes receive moderate damage
 - 75% of the mobile homes receive major damage
 - 40% of the properties throughout the Parish receive minor damage from wind
 - 25% of the properties throughout the Parish moderate damage from wind
 - 25% of the properties throughout the Parish major damage from wind
 - 50 miles of power lines receive minor damage
 - 15 miles of power lines receive moderate damage

	Table 3-8 Costs from a Category 5 Hurricane											
	Mino	r Damage	Moder	ate Damage	Мај	or Damage	Total					
Property	Count	Cost	Count	Cost	Count	Cost	Cost					
Water/wastewater												
Water plants	0.0	\$0	0.0	\$0	0.0	\$0	\$0					
Wastewater plants	0.0	\$0	0.0	\$0	0.0	\$0	\$0					
Wells	4.4	\$19,910	2.8	\$99,550	2.8	\$302,156	\$421,616					
Water towers	0.4	\$9,050	0.3	\$87,250	0.3	\$264,844	\$361,144					
Public health												
Hospitals	0.8	\$1,810,000	0.5	\$42,601,875	0.5	\$47,896,875	\$92,308,750					
Nursing care	0.0	\$0	0.0	\$0	0.0	\$0	\$0					
Emergency services												
Fire stations	7.2	\$716,760	4.5	\$9,148,500	4.5	\$17,609,063	\$27,474,323					
Police/sheriff	1.6	\$159,280	1.0	\$1,999,400	1.0	\$3,769,125	\$5,927,805					
Telecommunications	0.0		0.0		0.0							
Radio/TV towers	3.2	\$289,600	2.0	\$3,030,400	2.0	\$7,158,000	\$10,478,000					
Cell towers	47.6	\$1,191,190	29.8	\$5,884,550	29.8	\$12,238,406	\$19,314,146					
Energy												
Switching stations	22.0	\$8,624,000	13.8	\$40,232,500	13.8	\$75,693,750	\$124,550,250					
Power lines (miles)	50.0	\$1,567,875	15.0	\$1,512,900	0.0	\$0	\$3,080,775					
Chemical/haz mat	2.4	\$651,600	1.5	\$6,561,000	1.5	\$12,307,500	\$19,520,100					
Critical government	2.4	\$65,160	1.5	\$664,200	1.5	\$1,275,750	\$2,005,110					
Shelters	5.2	\$1,411,800	3.3	\$14,118,000	3.3	\$26,471,250	\$42,001,050					
Other structures												
Single family	24,325.9	\$272,769,690	15,203.7	\$2,374,171,990	16,438.7	\$6,277,880,167	\$8,924,821,847					
Mobile homes	0.0	\$0	2,683.0	\$118,384,734	8,267.0	\$631,863,876	\$750,248,611					
Multi-family	122.8	\$4,445,217	76.7	\$46,601,098	86.7	\$85,645,833	\$136,692,148					
Businesses	1,306.0	\$47,997,023	816.3	\$464,297,737	875.3	\$3,779,879,012	\$4,292,173,772					
Government	258.6	\$7,021,290	161.6	\$72,928,311	170.6	\$151,265,175	\$231,214,776					
Total							\$14,682,594,223					

- Water damage from storm surge in the coastal velocity (V) Zone
 - 100% of the properties within in the V Zone receive major damage

It should be noted that there is a quantum jump in the cost of property damage above a Class 3 hurricane. The Tropical storm estimate is 382 million and the Category 2 is 6.7 <u>billion</u>. However, the Category 5 hurricane is estimated to cost more than 25 billion in damage. This is because there is a great increase in the number of buildings damaged by wind <u>and storm surge</u>. Most new buildings are built to be able to withstand winds up to 100 miles per hour, but few can hold up against a Category 5's winds of greater than 150 miles per hour.

People: Under the category 5 hurricane scenario, all families in the four evacuation areas are strongly advised to evacuate. Again, 25% do not leave, in part because they expect the roads to be too crowded to allow them out. Search and rescue operations are necessary to check destroyed structures. Twenty people are killed when their homes are destroyed. Another 50 are injured severely enough to be hospitalized. 5,000 families need shelter.

Surge flooding is deep enough to destroy two treatment plants in the category 1 and 2 areas. Hundreds report health problems, such as upset stomachs, insect and snake bites, and heat problems. The latter is aggravated by a lack of power in many areas. Septic systems in repetitively flooded areas need to be replaced.

Forty-five percent of the flooded households do



Under the hurricane scenarios, loss of life is likely Photo by Chuck Cook © 2003 The Times-Picayune Publishing Co., all rights reserved.

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not have insurance. Several thousand homes are more than 50% damaged and must meet the flood protection requirements as a condition of their repair permits. While mitigation funds are sought, there won't be enough for everyone. Most of the owners of substantially damaged properties will have to find the money to bring their homes up to code. Many will abandon their homes to the mortgage holders.

Severely damaged neighborhoods are considered for acquisition. It takes a month to decide which ones should be cleared and which will be allowed to rebuild. It takes many more months to secure funding.

Delays in obtaining help to repair and rebuild keep thousands of families in temporary housing, adding greatly to commuting and travel times. Those waiting for a decision on whether they will be allowed to rebuild are particularly hard hit. The destruction, the costs, the delays, and the uncertainty take their toll and there is an increase in divorces and reported mental health problems.

Life safety threat: high. Mental health impact: very high.

Economy: Productivity is down for several months as large areas have been devastated and people either stay home or have to relocate to other areas. Commercial areas close to the lake are destroyed and may not be rebuilt in the same location. Two hundred stores, shops and small businesses will not reopen. Contractors and home improvement stores suffer damage themselves and additional support comes in from out of state (including some unsavory people who do not perform acceptable work).

Prices for many basic commodities remain high for several months. Prices for construction related services and materials are not back to normal for two years.

Up to 75% of local governments' expenses for search and rescue operations, traffic control, shelters, clean up, debris disposal, and repairs to the treatment plants and other public properties are covered by the federal disaster declaration. However, the plants are down for several weeks and the local governments do not receive funds for all the expenses they claim. They must also finance the local cost-share. A new landfill is needed to handle the huge amounts of debris.

Local permit staff are overwhelmed with applications, inspections, and enforcement work. Several staff are more concerned over their own damaged homes than in going to work. A debate arises over whether permits and code requirements should be waived in order to let people back in their homes as quickly as possible. Local governments must find the 25% local share needed for mitigation projects in repetitively flooded areas.

Overall economic impact: high.

3.4. Flooding

This section addresses the 100-year flood, which is assumed to affect all properties in the mapped 100-year floodplain to some degree plus 5% of the properties outside the mapped floodplain. <u>Only the riverine floodplain (A Zones) are reviewed as the tropical storm and hurricane sections cover coastal or V Zone flooding</u>. The next section deals with the smaller, repetitive floods.

While a single flood will not cover the entire area, over time, all of the streams in the Parish will flood their 100-year floodplains on an average of once every 100 years. This flooding will affect all of the critical facilities that have been plotted in the <u>most recently</u> <u>mapped floodplain shown on the DFIRM Map 2-7D</u> and all of the other structures estimated to be located in that floodplain.

Property: There are an estimated 44,400 buildings in the 100-year riverine floodplain. Approximately 2/3 of them have been permitted in the floodplain since the Parish began enforcing the floodplain management regulations of the National Flood Insurance Program. The Parish has required that these buildings be elevated or otherwise protected from the 100-year flood. Although they are likely to be affected (especially if they have been modified since they met code), for the purposes of this analysis, 2/3 of the structures in the 100-year floodplain (29,600) are not considered to be damaged.

Of the other third of the structures in the 100-year floodplain that were built before the floodplain management regulations became effective, 1/2 will have flooding deep enough to cause major damage, and 1/2 will suffer moderate damage. Five percent of the buildings outside the mapped floodplain will suffer minor damage. Water towers and power lines are not considered to be damaged by flooding.

People: As with a tropical storm, many did not evacuate. Shelters are needed for 1,000 families who were made homeless and cannot find a place to stay. Fifteen cars are washed into the flooded streams, most of them having ignored warnings or barricades. Three people are killed. Injuries are minor, most due to accidents during evacuation or clean up and repairs to damaged structures.

A boil order is issued for some areas as private wells and septic systems are flooded and most wastewater treatment plants shut down, allowing raw sewage to flow directly into the stream. Unlike coastal surge, overbank floodwaters are full of sediment, farm chemicals and sewage. Health problems are in the form of upset stomachs from lack of safe drinking water and eating spoiled food. Respiratory problems are reported when people turn on their furnaces or air conditioners and <u>mold and</u> sediment filled air is circulated throughout. Septic systems in repetitively flooded areas need to be replaced.

Forty-five percent of the flooded households do not have insurance. Nearly 5,000 homes are more than 50% damaged and must meet the flood protection requirements as a condition of their repair permits. While mitigation funds are sought, there won't be enough for everyone. Most of the owners of substantially damaged properties will have to find the money to bring their homes up to code. Some will walk away from their places.

		Table 3	-9 Costs f	from a 100-year	Flood		
	Mino	r Damage	Mode	rate Damage	Maj	or Damage	Total
Property	Count	Cost	Count	Cost	Count	Cost	Cost
Water/wastewater							
Water plants	0.0	\$0	0.0	\$0	0.0	\$0	\$0
Wastewater plants	0.0	\$0	0.0	\$0	0.0	\$0	\$0
Wells	0.6	\$2,489	0.0	\$0	0.0	\$0	\$2,489
Water towers	0.0	\$0	0.0	\$0	0.0	\$0	\$0
Public health							
Hospitals	0.1	\$226,250	0.0	\$0	0.0	\$0	\$226,250
Nursing care	0.0	\$0	0.0	\$0	0.0	\$0	\$0
Emergency services							
Fire stations	0.9	\$89,595	0.5	\$1,018,533	0.5	\$1,960,476	\$3,068,604
Police/sheriff	0.2	\$19,910	0.0	\$0	0.0	\$0	\$19,910
Telecommunications							
Radio/TV towers	0.4	\$36,200	0.0	\$0	0.0	\$0	\$36,200
Cell towers	6.0	\$148,899	0.0	\$0	0.0	\$0	\$148,899
Energy							
Switching stations	2.8	\$1,078,000	0.0	\$0	0.0	\$0	\$1,078,000
Power lines (miles)	0.0	\$0	0.0	\$0	0.0	\$0	\$0
Chemical/haz mat	0.3	\$81,450	0.3	\$1,460,916	0.3	\$2,740,470	\$4,282,836
Critical government	0.3	\$8,145	0.3	\$147,895	0.3	\$284,067	\$440,107
Shelters	0.7	\$176,475	0.5	\$2,176,344	0.5	\$4,080,645	\$6,433,464
Other structures							
Single family	3,040.7	\$34,096,211	3,066.8	\$478,900,198	3,066.8	\$1,171,187,160	\$1,684,183,570
Mobile homes	536.6	\$1,651,119	541.2	\$23,879,682	541.2	\$41,364,877	\$66,895,678
Multi-family	15.3	\$555,652	18.7	\$11,325,522	18.7	\$18,415,165	\$30,296,339
Businesses	163.3	\$5,999,628	163.8	\$93,177,860	163.8	\$707,434,230	\$806,611,718
Government	32.3	\$877,661	22.6	\$10,205,319	22.6	\$20,051,010	\$31,133,990
Total							\$2,634,858,054

Stress takes a toll in the repetitively flooded areas. Homes and small businesses are put up for sale. Some are purchased and others are left vacant or are converted to rental properties. Neighbors report a decline in property values.

Life safety threat: moderate. Mental health impact: moderate.

Economy: Productivity is down for a week as people stay home from work to clean up and some businesses are closed. Many had minor damage to their structures, but lost their inventories that were stored on lower shelves, keeping them closed longer. A small number of marginal businesses will not reopen. Contractors and home improvement stores get a lot more business. Prices for construction related services and materials are not back to normal for six months.

Some roads and three bridges are washed out. Up to 75% of local governments' expenses for road and bridge repairs, rescue operations, traffic control, shelters, clean up, debris disposal, and repairs to the wastewater treatment plants and other public properties are covered by the federal disaster declaration. Local governments must find the 25% local share needed for this work and for mitigation projects in repetitively flooded areas.

Overall economic impact: high.

3.4A Repetitive Flooding

By definition, repetitive flooding occurs two times over ten years. Therefore, the fiveyear storm is used to estimate damage. While a single storm will not flood the entire area, over 5 years, all of the areas in the Parish would be affected. While a "typical" scenario will not affect everywhere, the frequency of repetitive floods means that the aggregate costs will accurately reflect the annual risk.

Property: In Section 2.2A.3, it was concluded that "for every property on FEMA's repetitive loss list, there are at least two more in the neighborhood that are subject to repetitive flooding. There are 2,461 repetitive loss properties on FEMA's list in the planning area. Using the 3:1 rule of thumb, there are 7,383 properties in the Parish subject to repetitive flooding. This figure is 5% of the total number of buildings in the Parish. For damage estimating, 5% of each property type is considered subject to repetitive flooding in Table 3-10.

It is assumed that chronic repetitive flooding would not be tolerated for critical facilities. Such a problem would be fixed through drainage improvements or retrofitting. Therefore, critical facilities are not counted in the property damage estimates. Five percent of the properties on FEMA's list are non-residential, approximately the same ratio of non-

residential to residential properties for the Parish as a whole.

Flood insurance records on repetitive loss properties show that, when Katrina and Rita are not counted, the average claim has been \$21,000 for both structural and contents damage, or 9% of the value for a single family house. Therefore, while some repetitive loss claims have been high, the claims paid after the smaller, repetitive floods are not that great. For Table 3-10, property damage is estimated at 9% of the property value. There is no downtime from this nuisance level of flooding.



Shallow Flooding in the Parish Source: Dept of Public Works

People: The 5-year storm does not kill or injure anyone. Everyone who left their homes finds friends or relatives to house them and no shelters are opened. There are no reported health problems, although some septic systems need work. Because those affected are those that flood most frequently, everyone is either adequately insured or can afford to make needed repairs. Septic systems in repetitively flooded areas need to be replaced.

Life safety threat: low. Mental health impact: low.

Economy: Few businesses are flooded. Productivity is hardly affected as those flooded stay home from work to clean up. The primary cost to local governments is traffic control and clean up. There is no federal disaster declaration, so all costs are funded locally.

Overall economic impact: minor.

	Table 3-10 Costs from Repetitive Flooding								
	Mino	r Damage	Moder	ate Damage	Major D	Total			
Property	Count	Cost	Count	Cost	Count	Cost	Cost		
Water/wastewater									
Water plants	0	\$0	0	\$0	0	\$0	\$0		
Wastewater plants	0	\$0	0	\$0	0	\$0	\$0		
Wells	1	\$2,489	0	\$0	0	\$0	\$2,489		
Water towers	0	\$1,131	0	\$0	0	\$0	\$1,131		
Public health	0								
Hospitals	0	\$226,250	0	\$0	0	\$0	\$226,250		
Nursing care	0	\$0	0	\$0	0	\$0	\$0		
Emergency services	0								
Fire stations	1	\$89,595	0	\$0	0	\$0	\$89,595		
Police/sheriff	0	\$19,910	0	\$0	0	\$0	\$19,910		
Telecommunications	0								
Radio/TV towers	0	\$36,200	0	\$0	0	\$0	\$36,200		
Cell towers	6	\$148,899	0	\$0	0	\$0	\$148,899		
Energy	0								
Switching stations	3	\$1,078,000	0	\$0	0	\$0	\$1,078,000		
Power lines (miles)	0	\$0	0	\$0	0	\$0	\$0		
Chemical/haz mat	0	\$81,450	0	\$0	0	\$0	\$81,450		
Critical government	0	\$8,145	0	\$0	0	\$0	\$8,145		
Shelters	1	\$176,475	0	\$0	0	\$0	\$176,475		
Other structures	0								
Single family	3,041	\$61,373,180	0	\$0	0	\$0	\$61,373,180		
Mobile homes	537	\$2,972,014	0	\$0	0	\$0	\$2,972,014		
Multi-family	15	\$1,000,174	0	\$0	0	\$0	\$1,000,174		
Businesses	163	\$7,978,281	0	\$0	0	\$0	\$7,978,281		
Government	32	\$1,579,790	0	\$0	0	\$0	\$1,579,790		
Total							\$76,771,982		

3.5. Tornadoes

Section 2.3 and Table 2-18 note the relatively low risk of St. Tammany Parish to tornado damage. On an average of once each year, an F0 or F1 tornado would hit somewhere.

Property: The average property damage caused by these tornadoes was \$220,000. Adjusting for inflation and incorporating downtime produces a figure of <u>\$400,000</u> for the annual average tornado damage.

People: The tornado strikes with only a few minutes' warning. No one is killed, but a few are injured from flying debris. Several families need new homes, but they have property insurance, so there is disruption, but no long term financial hardship.

Life safety threat: low. Mental health impact: low.

Economy: The odds are that an "average" tornado will not hit a major employer or

critical facility. The tornado touch down is very local, so there is no impact on the area's economy, such as an increase in prices for construction materials.

Local government expenses are limited to clean up and debris disposal. A federal disaster declaration is unlikely, so all costs are funded locally.

Overall economic impact: nil.



Tornadoes are not likely to cause much property damage in St. Tammany Parish.

3.6. Wildfires

Property: With an average of 200 fires a year, calculating costs of wildfires is done by the annual impact, rather than on the basis of a typical fire. To date, wildfires have not destroyed any primary structures, although a few outbuildings and trailers have burned. As noted in section 2.4.6, with more rural development, the trend across the state is for more buildings being damaged.

Because most development in the urban-wildland interface is of single family homes, the primary type of structure exposed to wildfire damage is a single family home. For this cost estimate, it is assumed that in the future one single family home will be burned by wildfires every fourth year (or 0.25 every year).

Given the nature of wildfires and the limits of fire fighting capabilities during a forest fire, a building that catches fire is considered destroyed. There would be no structures suffering partial damage.

	Table 3-11 Annual Costs from Wildfires										
	Minor D	amage	Moderate	Damage	Major D	Total					
Property	Count	Cost	Count	Cost	Count	Cost	Cost				
Water/wastewater											
Water plants	0	\$0	0	\$0	0	\$0	\$0				
Wastewater plants	0	\$0	0	\$0	0	\$0	\$0				
Wells	0	\$0	0	\$0	0	\$0	\$0				
Water towers	0	\$0	0	\$0	0	\$0	\$0				
Public health											
Hospitals	0	\$0	0	\$0	0	\$0	\$0				
Nursing care	0	\$0	0	\$0	0	\$0	\$0				
Emergency services											
Fire stations	0	\$0	0	\$0	0	\$0	\$0				
Police/sheriff	0	\$0	0	\$0	0	\$0	\$0				
Telecommunications											
Radio/TV towers	0	\$0	0	\$0	0	\$0	\$0				
Cell towers	0	\$0	0	\$0	0	\$0	\$0				
Energy											
Switching stations	0	\$0	0	\$0	0	\$0	\$0				
Power lines (miles)	0	\$0	0	\$0	0	\$0	\$0				
Chemical/haz mat	0	\$0	0	\$0	0	\$0	\$0				
Critical government	0	\$0	0	\$0	0	\$0	\$0				
Shelters	0	\$0	0	\$0	0	\$0	\$0				
Other structures											
Single family	0	\$0	0	\$0	0.25	\$95,474	\$95,474				
Mobile homes	0	\$0	0	\$0	0	\$0	\$0				
Multi-family	0	\$0	0	\$0	0	\$0	\$0				
Businesses	0	\$0	0	\$0	0	\$0	\$0				
Government	0	\$0	0	\$0	0	\$0	\$0				
Total							\$95,474				

People: Wildfires in St. Tammany Parish have not killed or injured anyone (so far), so the life safety threat is low. Fires are hazardous to residents and fire fighters, though. To date, no one has been made homeless.

Life safety threat: low. Mental health impact: low.

Economy: There is little or no economic impact of wildfires to development, such as homes and businesses. There is an impact to the forestry industry. According to the State Forestry Division, the forest products industry is Louisiana's second largest manufacturing employer. Loss of their raw material could result in closures or cutbacks of local operations.

Forests provide other benefits, including wildlife habitat, recreational opportunities and scenic beauty (these adverse affects are factored in the mental health impact). Unlike houses and businesses, forests cannot be replaced quickly. Burned out areas will not be attractive for development.

Local government expenses are limited to fire fighting, traffic control, and clean up. A federal disaster declaration is unlikely, so all costs are funded locally.

Overall economic impact: minor.

3.7. Drought

Property: Section 2.5.6 notes that, by itself, a drought does not damage developed property. However, over the long run, certain soils expand and contract, resulting in damage to buildings. 10% of buildings in areas with such soils suffer minor damage "during their useful lives." Assuming the "useful life" of a building to be 75 years, the *annual* impact of drought in areas with such soils is considered to affect 1/75 of 10% of the buildings present.

The areas with expansive soils are shown on Map 2-9. Other areas, especially in floodplains, may have such soils, but they are not rated high enough by the Parish's *Soil Survey* to cause property damage. A review of development in those areas produced the following estimated number of properties:

- 2,000 single family homes
- 300 multi-family homes
- 40 businesses

Each year, 1/75 of 10% of them will suffer minor damage. The resulting numbers are shown in Table 3-12. Even though, by definition, a drought occurs on the average of once every 20 years, these figures are an annual cost of the expansion and contraction of soils in sensitive areas. It is assumed that there is no damage to contents.

People: The effects of drought are not likely to be threatening to human health or safety. However, if one occurs during a heat wave, reduced water supplies limit ways to escape from the heat.

Life safety threat: nil. Mental health impact: nil.

Economy: Drought can have an impact on the area's economy. It hits the agricultural sector most severely. Both crops and livestock suffer. However, only 2% of St. Tammany Parish's employment comes from agriculture and forestry, so the impact on the Parish as a whole would be minor.

Lack of water results in lower stream and lake levels, which reduces boating opportunities and loss of income for the recreation sector. Again, this is not a major source of income for the Parish.



The major economic impact of drought is to crops and livestock.

	Table 3-12 Costs from Drought									
	Minor E	Damage	Moderate	Damage	Major I	Damage	Total			
Property	Count	Cost	Count	Cost	Count	Cost	Cost			
Water/wastewater										
Water plants	0	\$0	0	\$0	0	\$0	\$0			
Wastewater plants	0	\$0	0	\$0	0	\$0	\$0			
Wells	0	\$0	0	\$0	0	\$0	\$0			
Water towers	0	\$0	0	\$0	0	\$0	\$0			
Public health										
Hospitals	0	\$0	0	\$0	0	\$0	\$0			
Nursing care	0	\$0	0	\$0	0	\$0	\$0			
Emergency services										
Fire stations	0	\$0	0	\$0	0	\$0	\$0			
Police/sheriff	0	\$0	0	\$0	0	\$0	\$0			
Telecommunications										
Radio/TV towers	0	\$0	0	\$0	0	\$0	\$0			
Cell towers	0	\$0	0	\$0	0	\$0	\$0			
Energy										
Switching stations	0	\$0	0	\$0	0	\$0	\$0			
Power lines (miles)	0	\$0	0	\$0	0	\$0	\$0			
Chemical/haz mat	0	\$0	0	\$0	0	\$0	\$0			
Critical government	0	\$0	0	\$0	0	\$0	\$0			
Shelters	0	\$0	0	\$0	0	\$0	\$0			
Other structures										
Single family	2.67	\$29,902	0.00	\$0	0	\$0	\$29,902			
Mobile homes	0.00	\$0	0.00	\$0	0	\$0	\$0			
Multi-family	0.40	\$14,480	0.00	\$0	0	\$0	\$14,480			
Businesses	0.05	\$1,448	0.00	\$0	0	\$0	\$1,448			
Government	0.00	\$ 0	0.00	\$0	0	\$ 0	\$0			
Total						Total	\$45,830			

Local government expenses are limited to providing water for drinking and fire fighting. Such supplies should not be threatened, but watering bans or encouraging reduced use may be needed. In any case, there would be no direct dollar cost to local governments.

Overall economic impact: nil.

3.8. Fog

Property: The primary threat to property is damage to vehicles caused by collisions when traveling in fog. It is assumed that the Causeway implements precautions sufficient to prevent damaging accidents.

However, as noted in section 2.6.5, there have been some bad accidents on inland highways and roads. Over the last 15 years, there were four major accidents on Parish highways that damaged 159 vehicles, or an average of 10 each year. Assuming that there are twice that many minor accidents that don't make the newspapers, it is estimated that an average of 10 cars will be destroyed due to accidents caused by fog each year. Twenty more cars and trucks will be damaged to a level equal to 50% of their value. At a value of <u>\$24,000</u> per vehicle, the annual cost of fog damage would <u>\$480,000</u>.

People: The major accidents over the last 15 years killed 6 people and injured 63. It is assumed that the non-reported accidents injured a at least that many. This results in an average of one people killed and 10 injured each year. Because vehicle accidents are commonplace and can be avoided relatively easily, there is no long-term mental health impact on the affected population (drivers).

Life safety threat: moderate. Mental health impact: moderate.

Economy: Downtime due to accidents caused by fog can be significant when they block commuters' expressways for hours. Otherwise, no particular businesses or industry is considered to be affected.

Local government expenses relate to policing the areas during a fog and after accidents. These would not exceed the normal costs of daily operations.

Overall economic impact: nil.

3.9. Earthquakes

Property: The level of damage expected from an earthquake in southern Louisiana is quite low. It would be no worse than a Modified Mercali Intensity level of V, where some dishes and widows are broken.

Table 3-13 varies from the system used for the other hazards. For the other hazards, "minor damage" is considered to be 5% of the building's value. The expected earthquake damage is more like 1% of the value of the contents. No downtime is expected.

It is expected that the quake would impact 1% of each property category. The "count" column is therefore 1% of the number of such properties in the Parish, as noted in Table 3-2.

		Table 3-1	3 Costs fro	m Earthquak	es		
	Minor I	Damage	Moderate	e Damage	Major D	Damage	Total
Property	Count	Cost	Count	Cost	Count	Cost	Cost
Water/wastewater							
Water plants	0.00	\$0	0	\$0	0	\$0	\$0
Wastewater plants	0.00	\$0	0	\$0	0	\$0	\$0
Wells	0.11	\$100	0	\$0	0	\$0	\$100
Water towers	0.01	\$45	0	\$0	0	\$0	\$45
Public health							
Hospitals	0.02	\$9,050	0	\$0	0	\$0	\$9,050
Nursing care	0.00	\$0	0	\$0	0	\$0	\$0
Emergency services							
Fire stations	0.18	\$3,584	0	\$0	0	\$0	\$3,584
Police/sheriff	0.04	\$796	0	\$0	0	\$0	\$796
Telecommunications							
Radio/TV towers	0.08	\$1,448	0	\$0	0	\$0	\$1,448
Cell towers	1.19	\$5,385	0	\$0	0	\$0	\$5,385
Energy							
Switching stations	0.55	\$39,820	0	\$0	0	\$0	\$39,820
Power lines (miles)	2.00	\$543	0	\$0	0	\$0	\$543
Chemical/haz mat	0.06	\$3,258	0	\$0	0	\$0	\$3,258
Critical government	0.06	\$326	0	\$0	0	\$0	\$326
Shelters	0.13	\$7,059	0	\$0	0	\$0	\$7,059
Other structures							
Single family	608.15	\$1,363,848	0	\$0	0	\$0	\$1,363,848
Mobile homes	107.32	\$66,045	0	\$0	0	\$0	\$66,045
Multi-family	3.07	\$22,226	0	\$0	0	\$0	\$22,226
Businesses	32.65	\$177,295	0	\$0	0	\$0	\$177,295
Government	6.47	\$35,106	0	\$0	0	\$0	\$35,106
Total							\$1,735,934

People: The level of an expected earthquake is not considered life threatening. Some minor injuries may result from falling objects. Because the likelihood of an earthquake occurring or reoccurring is low, no long-term mental health affects are expected.

Life safety threat: low. Mental health impact: low.

Economy: Because of the very limited property damage expected from a Modified Mercali Intensity level of V, the impact of the earthquake on the local economy and government expenditures is considered to be nil.

Overall economic impact: nil.

3.10. Hailstorms

Property: Hail damage is limited to roofs, windows and vehicles. All of it is considered to fit in the "minor damage" (5%) level. However, a hail storm can affect a large area and many structures. One storm is estimated to impact 1,000 properties. The impact is calculated to be evenly distributed among the types of properties. There are 56,000 primary structures in the planning area, so 1,000/56,000 = 0.018. This ratio, 0.018 is used to calculate the number of properties affected by each category.

Hail damage to hospitals, towers, wells and power lines, is considered negligible. No damage to contents are expected.

Hail damage to vehicles can be severe. Based on insurance company claims reports, the average hail claim is for 2,000 (updated for 2008 to 2,400). Assuming one vehicle in the open for each structure, 1,000 vehicles would be affected, for a total cost of 2,400,000.

		Table 3-	14 Costs fr	om Hailstor	m		_
	Minor	Damage	Moderate	e Damage	Major I	Damage	Total
Property	Count	Cost	Count	Cost	Count	Cost	Cost
Water/wastewater							
Water plants	0.00	\$0	0	\$0	0	\$0	\$0
Wastewater plants	0.00	\$0	0	\$0	0	\$0	\$0
Wells	0.00	\$0	0	\$0	0	\$0	\$0
Water towers	0.02	\$407	0	\$0	0	\$0	\$407
Public health							
Hospitals	0.04	\$81,450	0	\$0	0	\$0	\$81,450
Nursing care	0.00	\$0	0	\$0	0	\$0	\$0
Emergency services							
Fire stations	0.32	\$32,254	0	\$0	0	\$0	\$32,254
Police/sheriff	0.07	\$7,168	0	\$0	0	\$0	\$7,168
Telecommunications							
Radio/TV towers	0.14	\$13,032	0	\$0	0	\$0	\$13,032
Cell towers	2.14	\$48,463	0	\$0	0	\$0	\$48,463
Energy							
Switching stations	0.99	\$358,380	0	\$0	0	\$0	\$358,380
Power lines (miles)	3.60	\$4,887	0	\$0	0	\$0	\$4,887
Chemical/haz mat	0.11	\$29,322	0	\$0	0	\$0	\$29,322
Critical government	0.11	\$2,932	0	\$0	0	\$0	\$2,932
Shelters	0.23	\$63,531	0	\$0	0	\$0	\$63,531
Other structures							
Single family	1,094.66	\$12,274,636	0	\$0	0	\$0	\$12,274,636
Mobile homes	193.18	\$594,403	0	\$0	0	\$0	\$594,403
Multi-family	5.53	\$200,035	0	\$0	0	\$0	\$200,035
Businesses	58.77	\$1,595,656	0	\$0	0	\$0	\$1,595,656
Government	11.64	\$315,958	0	\$0	0	\$0	\$315,958
Total							\$15,622,514
Vehicle losses	1000	\$2,400,000					\$2,400,000
Total							\$18,022,514

People: Hail is not considered a threat to life and limb. Once a storm begins, people can quickly seek shelter.

Life safety threat: nil. Mental health impact: nil.

Economy: As with drought, the major economic sector affected by hail is agriculture, particularly long stemmed crops. This is such a small part of St. Tammany Parish's economy that the overall impact is minor. Given the high percentage of affected buildings and vehicles that are insured for hail damage, the impact on the economy is negligible.

Overall economic impact: nil.

3.11. Land Failure

Property: Section 2.9 describes this hazard and notes that, by itself, land failure does not damage structures. The damage to buildings is done by other hazards, particularly storm surge from tropical storms. Land failure accelerates exposure to those hazards.

The exception to this is road damage, where the gradual differential settling over time does damage property, as seen in the photograph. There are only a handful of locations where this occurs and where the cost of the repairs cannot be included in the normal maintenance and replacement schedule. An annual outlay of <u>\$120,000</u> is estimated for repairs and reconstruction specifically attributed to land failure.



People: Life safety threat: zero. Mental health impact: zero.

Economy: Overall economic impact: nil.

3.12. Winter Storm

Property: Winter storms bring cold temperatures, snow and ice. Of these, ice causes the most problems to property. Freezing rain that accumulates on tree branches and utility lines can create a very heavy weight. When the overloaded tree branches come down, they damage roofs and vehicles. When utility lines are lost, so is the utility service.

Under the winter storm scenario, an estimated <u>2% of the</u> buildings in the Parish suffer minor damage from trees and tree limbs and broken water pipes. This ratio is used to calculate the number of properties affected by each category.

	Table 3-15 Costs from Winter Storm									
	Minor	Damage	Moderate	e Damage	Major	Damage	Total			
Property	Count	Cost	Count	Cost	Count	Cost	Cost			
Water/wastewater										
Water plants	0.00	\$0	0	\$0	0	\$0	\$0			
Wastewater plants	0.00	\$0	0	\$0	0	\$0	\$0			
Wells	0.22	\$996	0	\$0	0	\$0	\$996			
Water towers	0.02	\$453	0	\$0	0	\$0	\$453			
Public health										
Hospitals	0.04	\$90,500	0	\$0	0	\$0	\$90,500			
Nursing care	0.00	\$0	0	\$0	0	\$0	\$0			
Emergency services										
Fire stations	0.36	\$35,838	0	\$0	0	\$0	\$35,838			
Police/sheriff	0.08	\$7,964	0	\$0	0	\$0	\$7,964			
Telecommunications										
Radio/TV towers	0.16	\$14,480	0	\$0	0	\$0	\$14,480			
Cell towers	2.38	\$59,560	0	\$0	0	\$0	\$59,560			
Energy										
Switching stations	1.10	\$431,200	0	\$0	0	\$0	\$431,200			
Power lines (miles)	2.00	\$54,300	0	\$0	0	\$0	\$54,300			
Chemical/haz mat	0.12	\$32,580	0	\$0	0	\$0	\$32,580			
Critical government	0.12	\$3,258	0	\$0	0	\$0	\$3,258			
Shelters	0.26	\$70,590	0	\$0	0	\$0	\$70,590			
Other structures										
Single family	1,216.29	\$13,638,484	0	\$0	0	\$0	\$13,638,484			
Mobile homes	214.64	\$660,448	0	\$0	0	\$0	\$660,448			
Multi-family	6.14	\$222,261	0	\$0	0	\$0	\$222,261			
Businesses	65.30	\$2,399,851	0	\$0	0	\$0	\$2,399,851			
Government	12.93	\$351,064	0	\$0	0	\$0	\$351,064			
Total						Total	\$18,073,826			

The scenario also assumes that two mile of power lines are downed.

People: In the last 10 years, eight people have been killed and 21 injured by snow, ice and extreme cold events in Louisiana. None of these were in St. Tammany Parish. In fact, the National Weather Service lists only has <u>two</u> snow/ice event for the Parish since 1950, in January 2002 <u>and December 2006</u>.

Life safety threat: nil. Mental health impact: nil.

Economy: As seen in Table 3-15, the cost of repairs and damage due to loss of electricity accounts for more than ¹/₄ of the property damage. This would have a minor affect on the economy.

Local government expenditures would be limited to traffic control and helping people without heat. This would be covered under normal operating costs.

Overall economic impact: minor.

3.13. Dam Failure

Property: The 16 dams in St. Tammany Parish are of two levels of hazard. Fourteen are "low hazard," meaning little or no property damage is expected if they breach. The other two are "significant hazard." This category means there is a potential for economic damage or environmental disruption.

The two "significant hazard" dams are both located on the Pearl River Canal in the Bogue Chitto National Wildlife Refuge. There is the potential for environmental disruption, but there is little development exposed.

There are some hunting/fishing camps downstream of the dams, so there is a possibility of a safety hazard and building damage. Assuming each camp is valued at \$25,000 and 20 camps receive moderate damage, the total estimated physical damage cost is \$25,000 x $0.4 \times 20 = $200,000$.

Because the camps are not permanently occupied, there is no downtime cost if they are damaged.

People: Life safety threat: low. Mental health impact: nil.

Economy: Overall economic impact: nil.

3.14. Levee Failure

Property: A levee will fail during a flood, when high waters put pressure on the structure or overtop it. The levees in St. Tammany Parish are substantial, as seen in the photograph on page 2-52. These levees are assumed to hold during a small flood, such as the 5-year storm scenario used in section 3.4. No property damage is expected.

Should one of the levees protecting the Kingspoint, Fox Hollow or Oak Harbor subdivisions fail from a larger flood, every building in the area would suffer substantial damage. The flood depths would be up to five feet and none of the buildings have been elevated or other otherwise incorporate flood protection features. <u>An evaluation of the flood insurance claims after Katrina splashed water over the Oak Harbor levee showed an average of just over \$100,000 in flood insurance claim payments per house. However, these were not flooded as deeply as a true levee failure. Based on the claims for homes in the area that were not protected by the levee, it is estimated that the expected deep flooding would mean an average of \$210,000 per house in a levee failure.</u>

There are 1,500 homes in the three leveed areas, for a total damage cost of \$315,000,000 in property damage. Since the homes were damaged significantly, there would be an average of 18 months of downtime until the home could be repaired and reoccupied. This produces a total downtime cost of 1,500 homes x 540 days x \$240/day = \$194,400,000. The total cost of property damage from all three levees failing is therefore \$509,400,000.

People: When a levee fails, it can be sudden. It is expected that when flood levels reach a height where there is a potential for failure, the levee district will ensure that the area is evacuated and that patrols will monitor and respond to any threat. Therefore, the life safety threat is considered to be minor.

People who think they are safe from flooding will be aggrieved when they see their homes substantially damaged. Many are unlikely to have flood insurance because they are not in the mapped floodplain. The mental health impact on these residents is considered to be moderate.



Life safety threat: low. Mental health impact: moderate.

Economy: The area exposed to levee failure is entirely residential, so there would be little impact on local businesses. However, a flood large enough to cause the levee to fail would affect a large part of the Parish. The economic impact of such a flood is considered to be included in the discussion of the 100-year flood.

Overall economic impact: nil.

3.15. Termites

Property: Termites are one of the few natural hazards that can be controlled. Effective preventive measures and extermination work. While that keeps the property damage down, the cost of preventing the problem has been estimated to be $\frac{1,200 - 1,800}{1,200 - 1,800}$ for a typical house (initial chemical barrier or bait treatment). Annual maintenance fees can run $\frac{100 - 300}{2}$.

Any structure can have a termite problem, even brick structures on slab foundations. If there's wood in the building, termites can find it. Therefore, every building in the Parish is subject to damage. While the above figures are for an average house, commercial and multi-family structures must be factored in. Accordingly, the mid-range figures are used for this estimate: \$1,500 for the initial treatment and \$200 for the annual fees.

Although every type of building is potentially subject to damage, not every building needs treatment. For planning purposes, each year it is assumed that 4,000 properties receive the initial treatment (3,000 of them are the new buildings built each year) and 40,000 properties pay an annual fee.

This approach provides an annual cost of termite damage prevention at

(4,000 x \$1,500) + (40,000 x \$200) = \$6,000,000 + \$8,000,000 = \$14,000,000.

Not all damage is prevented. A figure of \$500,000 is used to represent the cost of actual damage to treated and untreated buildings in the Parish. Therefore, $\frac{14,500,000}{14,500,000}$ is used as the total annual cost to protect property from and repair damage caused by termites.

People: Life safety threat: low. Mental health impact: low.

Economy: Overall economic impact: minor. There is no major economic impact caused by termites, just an additional cost of owning property in southeastern Louisiana.

3.16. Vulnerability Summary

This chapter provides information on how natural hazards affect St. Tammany Parish in terms of property damage, the threat to people, and impact on the area's economy. Property damage is measured in dollars while the impacts on people and the economy are summarized in subjective terms of "low," "moderate," and "high."

These impacts vary from nil to widespread destruction and death from a category 5 hurricane. However, the severity of these impacts need to be tempered with their likelihood of occurrence. The odds of an occurrence in any given year, i.e.,. the annual chance, can be found in the "Frequency" sections of Chapter 2. In some cases, such as tornadoes and drought, the damage figures already reflect the average annual damage, so 1.0 is used for the annual chance.

3.16.1. Property damage Table 3-16 displays the impacts of the hazards on property using the 2009 updated figures. The property damage figures are multiplied times the annual chance of occurrence to produce a dollar figure that represents average annual damage from that hazard.

Tal	ble 3-16 Property Damage	Summary	
Hazard	Property Damage from Single Occurrence	Annual Chance	Average Annual Damage
Tropical storm	\$226,784,534	0.8300	\$188,231,163
Category 2 hurricane	\$3,852,166,047	0.0526	\$202,623,934
Category 5 hurricane	\$14,682,594,223	0.0055	\$80,754,268
100-year flood	\$2,634,858,054	0.0100	\$26,348,581
Repetitive flooding	\$76,771,982	0.2000	\$15,354,396
Tornadoes	\$400,000	1.0000	\$400,000
Wildfires	\$95,474	1.0000	\$95,474
Drought	\$45,830	0.0500	\$2,291
Fog	\$480,000	1.0000	\$480,000
Earthquake	\$1,735,934	0.0100	\$17,359
Hailstorm	\$18,022,514	0.1600	\$2,883,602
Land failure	\$120,000	1.0000	\$120,000
Severe winter	\$18,073,826	0.0500	\$903,691
Dam failure	\$200,000	0.0100	\$2,000
Levee failure	\$509,400,000	0.0200	\$10,188,000
Termites	\$14,500,000	1.0000	\$14,500,000
Total			\$542,904,761

Table 3-16 shows that, based on the assumptions and calculations presented in this chapter, natural hazards cost St. Tammany Parish property owners and their insurers over <u>\$542 million</u> each year. Tropical storms account for <u>88%</u> of that figure. The tropical storm figure comes from wind damage and storm surge damage along the lakeshore. Inland flooding caused by a storm is counted <u>under the two flood categories</u>. The combined effects of wind and water damage from tropical storms, hurricanes and rain account for <u>\$513</u> million or <u>95%</u> of the property damage caused by all natural hazards.

3.16.2. Impact on people Lives and economic impacts have been given subjective ratings in the previous sections. In Tables 3-17 and 3-18, these are given a numerical value. "High" is 100, "moderate" is 40, "low" is 10, and "nil" is 1. The mental health impact score is multiplied times 0.25 and added to the life safety score to produce a relative score for the threat to people.

The resulting "people score" is a numerical representation of the relative impact each hazard has on safety, health and mental health. Unlike the dollars used in the previous table, these numbers have no discrete meaning. They are used to compare the values of "high," "moderate," "low," and "nil" between hazards.

The different columns cannot be compared between the tables, but the impact of the different hazards can be compared by reviewing the scores in each table. For example a "people score" of 10.38 for tropical storms can be compared to the people scores for the other hazards, but not to the economic impact scores.

Tabl	e 3-17 Su	immary o	of the Imp	act on Po	eople	
Hazard	Life S	Safety	Mental Health		Annual Chance	People Score
Tropical storm	Low	10	Low	2.5	0.8300	10.38
Category 2 hurricane	Mod	40	Mod	10	0.0526	2.63
Category 5 hurricane	High	100	High	25	0.0055	0.69
100-year flood	Mod	40	Mod	10	0.0100	0.50
Repetitive flooding	Nil	1	Low	2.5	0.2000	0.35
Tornadoes	Low	10	Low	2.5	1.0000	12.50
Wildfires	Low	10	Low	2.5	1.0000	12.50
Drought	Nil	1	Nil	1	0.0500	0.10
Fog	Mod	40	Nil	1	1.0000	41.00
Earthquake	Low	10	Low	2.5	0.0100	0.13
Hailstorm	Nil	1	Nil	1	0.1600	0.32
Land failure	Nil	0	Nil	0	1.0000	0.00
Severe winter	Nil	1	Nil	1	0.0500	0.10
Dam failure	Low	10	Low	2.5	0.0100	0.13
Levee failure	Mod	40	Mod	10	0.0200	1.00
Termites	Low	10	Low	2.5	1.0000	12.50

Table 3-17 shows a different emphasis than Table 3-16's property damage figures. The greatest threat to people is fog. More people are killed each year due to fog than due to any of the other hazards. More frequent hazards, such as tornadoes, wildfires, termites and tropical storms also score high.

3.16.3. Economic impact In Table 3-18, the subjective economic impact scores are also given numerical values of 100, 40, 10, and 1. These are multiplied times the property damage cost and divided by 1,000,000. The result is multiplied times the annual chance of occurrence to produce a score that reflects the likelihood of a dollar impact. As with Table 3-17, the resulting "economic score" is a numerical representation of the relative impact each hazard has the economy of St. Tammany Parish. These numbers can only be used to compare the values of "high," "moderate," "minor," and "nil" between hazards.

Та	ble 3-18 \$	Summary	of the Economic Imp	oact	
Hazard	Overall Impact		II Impact Property Damage		Economic Score
Tropical storm	Minor	10	\$226,784,534	0.8300	1,882.31
Category 2 hurricane	Mod	40	\$3,852,166,047	0.0526	8,104.96
Category 5 hurricane	High	100	\$14,682,594,223	0.0055	8,075.43
100-year flood	High	100	\$2,634,858,054	0.0100	2,634.86
Repetitive flooding	Minor	10	\$76,771,982	0.2000	153.54
Tornadoes	Nil	1	\$400,000	1.0000	0.40
Wildfires	Nil	1	\$95,474	1.0000	0.10
Drought	Minor	10	\$45,830	0.0500	0.02
Fog	Nil	1	\$482,000	1.0000	0.48
Earthquake	Nil	1	\$1,735,934	0.0100	0.02
Hailstorm	Nil	1	\$18,022,514	0.1600	2.88
Land failure	Nil	1	\$120,000	1.0000	0.12
Severe winter	Minor	10	\$18,073,826	0.0500	9.04
Dam failure	Nil	1	\$200,000	0.0100	0.00
Levee failure	Nil	1	\$509,400,000	0.0200	10.19
Termites	Minor	10	\$14,500,000	1.0000	145.00

The numbers in Table 3-18 show a pattern similar to Table 3-16's property damage. The hazards of tropical storms/hurricanes/flooding have the greatest impact. However, termites are a greater factor here, primarily because they are so widespread and the hazard is present every year.

3.16.4. 2009 update The data in the tables have been updated to reflect increased numbers of properties, increased costs, inflation, and the lessons learned from Hurricane Katrina.

The 2008 State Hazard Mitigation Plan Update used a similar technique to estimate property losses from different hazards. It used a combination of damage estimates and recurrence frequency to arrive at "annual estimated losses" or "AEL." The data for St. Tammany Parish are shown in table 3-19A.

The State Plan Update included a map for each hazard, showing where the risk was low, medium, or high. The designation for St. Tammany Parish is shown in the "Risk Zone" column in Table 3-19A. The "Ranking" column shows how the Parish's AEL ranks among all parishes in the state.

These figures are not the same as this Plan estimated. One reason is that the State Plan Update did not use the preliminary FIRM's much larger storm surge area (V Zone). Another is that this plan combined the wind and storm surge effects under tropical storms and hurricanes while 100-year flooding does not include coastal storm surge. While different techniques were used, both systems concluded that hurricanes, tropical storms, and flooding are the hazards that have the greatest impact on the Parish.

Table 3-19A. State Mitigation Plan Update Data				
Hazard	AEL	Risk Zone	Ranking	
Hurricane/high wind	\$51,423,712	High	4	
Storm surge	\$1,139,500	Medium	9	
Flood (NFIP claims)	\$52,314,087	High	4	
Tornado	\$130,684	Medium	28	
Ice storm	-	Low	Not ranked	
Subsidence (land failure)	-	Low	Not ranked	
Wildfire	-	High	4	
Dam failure	-	Medium	Not ranked	
Levee failure	-	Low	Not ranked	

3.16.5. Conclusions The three tables and the earlier facts and figures in this chapter help prioritize the relative severity of the natural hazards on property and people in St. Tammany Parish. The Committee concluded the following:

- 1. Tropical storms (including hurricanes) and flooding are by far the most severe hazards facing St. Tammany Parish in terms of property damage. Termites, <u>levee</u> <u>failure</u>, and hailstorms are the next most severe.
- 2. Fog is the most severe hazard facing St. Tammany Parish in terms of the threat to lives, safety and mental health. Other, more frequent, hazards, such as tornadoes, wildfires, termites and tropical storms are also important.
- 3. Tropical storms (including hurricanes) and flooding have the greatest overall impact on the area's economy. Termites are an added cost of living in the area.
- 4. Some types of property and areas are more vulnerable than others. Special emphasis should be placed on protecting manufactured homes and repeatedly flooded properties.

3.17. Municipal Data

The data presented in the previous pages of this Chapter are for the entire Parish planning area, that is the unincorporated areas of the Parish and the <u>five</u> participating municipalities. Table 3-2 provides a count of each type of property analyzed for the entire area. It is important that each local government recognize how the <u>14</u> hazards affect their individual jurisdictions.

3.17.1. Vulnerable properties Table 3-19 provides the property data totals broken down for the <u>six</u> different participants. It should be noted that some sources of data, such as for cell towers and power lines, did not include locational information. Available data only allowed estimates of some of the "other structures" based on extrapolation.

However, the data are sufficient for general conclusions. For example, this work concluded that over <u>95% of the vulnerable properties</u> in the planning area are in the unincorporated areas of the Parish.

Table 3-19 Vulnerable Properties in Planning Area by Jurisdiction							
Property	Uninc. Parish	Abita Springs	Folsom	Sun	Pearl River	Madison ville	Total
Water/wastewater							
Water plants							
Wastewater plants		1					1
Wells		4	2	2	1	2	11
Water towers		1		2			3
Public health							
Hospitals	2						2
Nursing care							
Emergency services							
Fire stations	11	1	1	1	3	1	18
Police/sheriff	1	1	1			1	4
Telecommunications							
Radio/TV towers							8
Cell towers		2		1		1	116
Energy							
Switching stations		1				1	54
Power lines (miles)							200
Chemical/haz mat	5				1		6
Critical government		1	1	1	2	1	6
Shelters	4	2	2		4	1	13
Total critical facilities	23	14	7	7	11	8	442
Other structures							
Single family	57,603	1,160	483	137	1,070	362	60,815
Mobile homes	10,256	132	85	70	189		10,732
Multi-family	285	8	3		7	4	307
Businesses	3,033	93	25	10	56	48	3,265
Government	618	8	4	3	10	4	647
Total all structures	71,818	1,415	607	227	1,343	426	76,208

3.17.2. Hazard location As noted in the "Area Affected" sections of Chapter 2, all but <u>seven</u> of the <u>14</u> hazards affect all areas of the Parish and all the municipalities somewhat equally. For example, in Section 2.3.3 on tornadoes, it was concluded, "the entire parish is considered susceptible to this hazard." This means that the relative vulnerability of each jurisdiction is proportionally the same.

Two of the hazards are more site specific:

- Tropical storms/hurricanes: While the wind impacts are Parish-wide, the lakeshore storm surge and flooding do not reach four <u>of the five</u> cities (Map 2-7). Tables 3-20 <u>3-24 reflect this difference.</u>
- Flooding: As noted in Section 3.4.<u>A, repetitive loss flooding is</u> assumed to affect the entire community. However, the 100-year flood damage estimates are based on the structures in the mapped 100-year floodplain. The data in Tables 3-20 <u>3-24</u> are based on available GIS floodplain maps and building counts.

Five of the hazards do not affect the inland municipalities

- Wildfire: This is considered a rural concern, so it only impacts the unincorporated areas of the Parish.
- Drought: The property damage impact is in two lakeshore areas (Map 2-11)
- Land failure: This is a lakeshore hazard (Map 2-13).
- Dam failure: Only the two dams on the Pearl River are calculated to cause any property damage if they failed. These are expected to affect unincorporated areas only (Map 2-14).
- Levee failure: Only three levee systems are affected, and they are in the unincorporated areas south and east of Slidell (Map 2-16).

Abita Springs has 1,415 buildings, with 278 of them in the 100-year floodplain. Tropical storms, hurricanes and flooding cause the greatest average annual damage.

Table 3-20 Property Damage Summary for Abita Springs				
Hazard	Property Damage from Single Occurrence	Annual Chance	Average Annual Damage	
Tropical storm	\$4,353,745	0.8300	\$3,613,608	
Category 2 hurricane	\$77,502,238	0.0526	\$4,076,618	
Category 5 hurricane	\$307,941,016	0.0055	\$1,693,676	
100-year flood	\$39,812,392	0.0100	\$398,124	
Repetitive flooding	\$1,543,985	0.2000	\$308,797	
Tornadoes	\$5,500	1.0000	\$5,500	
Wildfires	\$0	1.0000	\$0	
Drought	\$0	0.0500	\$0	
Fog	\$4,800	1.0000	\$4,800	
Earthquake	\$35,394	0.0100	\$354	
Hailstorm	\$342,223	0.1600	\$54,756	
Land failure	\$0	1.0000	\$0	
Severe winter	\$426,795	0.0500	\$21,340	
Dam failure	\$0	0.0100	\$0	
Levee failure	\$0	0.0200	\$0	
Termites	\$200,000	1.0000	\$200,000	
Total			\$10,377,572	

Folsom has <u>607</u> buildings and a relatively small 100-year floodplain with no buildings in it <u>(flood damage is based on the assumption that 5% of the buildings outside the mapped floodplain will suffer minor damage during a 100-year flood</u>). Tropical storms, hurricanes, flooding, and <u>termites</u> cause the greatest average annual damage.

Table 3-21 Property Damage Summary for Folsom				
Hazard	Property Damage from Single Occurrence	Property Damage from Annual Single Occurrence Chance		
Tropical storm	\$2,028,800	0.8300	\$1,683,904	
Category 2 hurricane	\$30,683,001	0.0526	\$1,613,926	
Category 5 hurricane	\$119,441,769	0.0055	\$656,930	
100-year flood	\$379,587	0.0100	\$3,796	
Repetitive flooding	\$630,525	0.2000	\$126,105	
Tornadoes	\$3,200	1.0000	\$3,200	
Wildfires	\$0	1.0000	\$0	
Drought	\$0	0.0500	\$0	
Fog	\$4,800	1.0000	\$4,800	
Earthquake	\$14,703	0.0100	\$147	
Hailstorm	\$156,169	0.1600	\$24,987	
Land failure	\$0	1.0000	\$0	
Severe winter	\$206,135	0.0500	\$10,307	
Dam failure	\$0	0.0100	\$0	
Levee failure	\$0	0.0200	\$0	
Termites	\$116,000	1.0000	\$116,000	
Total			\$4,244,101	

Natural Hazards Mitigation Plan

Sun is the smallest municipality, with <u>227</u> buildings, <u>28</u> of them in the 100-year floodplain. Tropical storms, hurricanes, <u>and termites</u> cause the greatest damage.

Table 3-22 Property Damage Summary for Sun				
Hazard	Property Damage from Single Occurrence	Annual Chance	Average Annual Damage	
Tropical storm	\$947,854	0.8300	\$786,719	
Category 2 hurricane	\$11,032,085	0.0526	\$580,288	
Category 5 hurricane	\$43,131,360	0.0055	\$237,222	
100-year flood	\$3,668,321	0.0100	\$36,683	
Repetitive flooding	\$199,710	0.2000	\$39,942	
Tornadoes	\$2,000	1.0000	\$2,000	
Wildfires	\$0	1.0000	\$0	
Drought	\$0	0.0500	\$0	
Fog	\$4,800	1.0000	\$4,800	
Earthquake	\$4,616	0.0100	\$46	
Hailstorm	\$65,384	0.1600	\$10,461	
Land failure	\$0	1.0000	\$0	
Severe winter	\$102,431	0.0500	\$5,122	
Dam failure	\$0	0.0100	\$0	
Levee failure	\$0	0.0200	\$0	
Termites	\$72,200	1.0000	\$72,200	
Total			\$1,775,483	

Pearl River is the second largest of the <u>five</u> cities. It has <u>1,343</u> buildings, with <u>104</u> of them in the 100-year floodplain. Tropical storms, hurricanes, flooding, <u>and termites</u> cause the greatest average annual damage.

Table 3-23 Property Damage Summary for Pearl River				
Hazard	Property Damage from Annual Single Occurrence Chance		Average Annual Damage	
Tropical storm	\$4,307,931	0.8300	\$3,575,583	
Category 2 hurricane	\$66,854,868	0.0526	\$3,516,566	
Category 5 hurricane	\$261,159,516	0.0055	\$1,436,377	
100-year flood	\$14,561,691	0.0100	\$145,617	
Repetitive flooding	\$1,399,395	0.2000	\$279,879	
Tornadoes	\$7,000	1.0000	\$7,000	
Wildfires	\$0	1.0000	\$0	
Drought	\$0	0.0500	\$0	
Fog	\$4,800	1.0000	\$4,800	
Earthquake	\$32,622	0.0100	\$326	
Hailstorm	\$317,517	0.1600	\$50,803	
Land failure	\$0	1.0000	\$0	
Severe winter	\$391,217	0.0500	\$19,561	
Dam failure	\$0	0.0100	\$0	
Levee failure	\$0	0.0200	\$0	
Termites	\$255,200	1.0000	\$255,200	
Total			\$9,291,712	

Madisonville is the only city on Lake Pontchartrain. It has 426 buildings, with 372 of them in the A Zone 100-year floodplain and 41 in the V Zone coastal storm surge floodplain. Tropical storms, hurricanes and flooding cause the greatest average annual damage.

Table 3-24 Property Damage Summary for Madisonville				
Hazard	Property Damage from Single Occurrence	Annual Chance	Average Annual Damage	
Tropical storm	\$1,646,609	0.8300	\$1,366,686	
Category 2 hurricane	\$43,339,118	0.0526	\$2,279,638	
Category 5 hurricane	\$156,891,902	0.0055	\$862,905	
100-year flood	\$69,438,883	0.0100	\$694,389	
Repetitive flooding	\$540,713	0.2000	\$108,143	
Tornadoes	\$3,100	1.0000	\$3,100	
Wildfires	\$0	1.0000	\$0	
Drought	\$0	0.0500	\$0	
Fog	\$4,800	1.0000	\$4,800	
Earthquake	\$12,643	0.0100	\$126	
Hailstorm	\$137,627	0.1600	\$22,020	
Land failure	\$6,000	1.0000	\$6,000	
Severe winter	\$189,949	0.0500	\$9,497	
Dam failure	\$0	0.0100	\$0	
Levee failure	\$0	0.0200	\$0	
Termites	\$112,600	1.0000	\$112,600	
Total			\$5,469,905	

3.17.3. Conclusions

Property damage: Tables 3-20 - 3-24 can be compared to Table 3-16, which is for the entire planning area, i.e., the five cities plus the unincorporated areas of the Parish. With the exception of Folsom and Sun, which have very small floodplains, the relative distribution of damage is similar to the Parish as a whole – tropical storms, hurricanes and flooding are the most severe hazards, with termites in the next tier of severity.

Impact on people: It is expected that the impact of the hazards on life safety and mental health would have similar distributions, with one exception. Fog is primarily a problem along the lakeshore, especially on the bridges. Four of the five cities are inland. Accordingly, the greatest life safety and mental health hazards to the residents of Abita Springs, Folsom, Sun and Pearl River are from tornadoes, tropical storms, and termites. Madisonville has additional fog and storm surge safety hazards.

Economic impact: Each municipality has its own economic base and business district. It is concluded that the relative distribution of the economic impact of the nine relevant hazards is similar to the Parish as a whole: tropical storms, hurricanes, and flooding have the greatest impact by far.

3.18. References

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- 7. National Flood Insurance Program claims data, FEMA, 2003
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- 9. Reports from Parish offices
- 10. Soil Survey of St. Tammany Parish, Louisiana, USDA, Soil Conservation Service, 1990.
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- 12. *Surface Transportation Weather Applications*, Paul Pisano and Lynett C. Goodwin, undated
- 13. The Economic Base of St. Tammany Parish, Louisiana, Taimerica Management Company, January, 2003
- 14. *The Physical Protection of Critical Infrastructures and Key Assets*, US Department of Homeland Security, 2003
- 15. Times-Picayune articles
- 16. Understanding Your Risks Identifying Hazards and Estimating Losses, FEMA 286-2, 2001
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Chapter 4. Goals

Goals are needed for this planning effort to guide the review of the possible mitigation measures. This Plan needs to make sure that the recommended actions are consistent with what is appropriate for St. Tammany Parish. Mitigation goals need to reflect community priorities and be consistent with other plans for the Parish.

4.1. Background

4.1.1. ND 2025 The goals of this plan need to be consistent with and complement the goals of other Parish planning efforts. The primary planning effort is the program called "New Directions 2025" (ND 2025). While the ND 2025 plans are still being developed, in 1999, the ND 2025 Steering Committee and the Parish Police Jury adopted the "Vision Element" to provide direction to the effort.

As with the entire ND 2025 effort, the Vision Element has a Natural Hazards section. Although the Vision Element does not have specific goals, the "value statements" provide guidance, similar to goals statements. There are four value statements for natural hazards:

- 1. All residents and their property will be protected from natural hazards to the maximum feasible extent. We will find ways to achieve these goals that also enhance and complement the natural beauty of St. Tammany Parish.
- 2. For those natural hazards from which residents cannot be protected in place, both adequate warning and safe escape measures will be available to save as many lives as possible.
- 3. All future development will be sited and constructed in such a way so as to not only (a) be at less risk than existing development but also (b) to not increase the risk to pre-existing developments.
- 4. Enhanced cooperation will exist among all bodies of local government.

4.1.2. Goal setting exercise On

December 6, 2003, the Hazard Mitigation Planning Committee conducted an exercise to outline its goals for this mitigation plan. Each member was given the handout that appears on the next page, asking for their five goals for the mitigation program. The handout includes a list of possible responses.

Committee members wrote down their top five choices on a Post-it card. Each member then posted them on the wall and explained their choices.


Goals Exercise

What should be the goals of our mitigation program?

Here are possible answers to this question. They are just food for thought. Pick the five that you think are most important. You may reword them or add new ones if you want.

You have five cards. Use one card for each of your top five answers.

Protect businesses from damage
Protect homes from damage
Protect new/future buildings from damage
Protect forests
Protect marshes/wetlands/environmentally sensitive areas
Protect people's lives
Protect public health
Protect public services (fire, police, etc.)
Protect critical facilities
Protect streets and utilities
Protect the Causeway and bridges to New Orleans
Protect power stations and power lines
Protect downtowns/shopping centers
Protect centers of employment
Protect schools
Protect scenic areas, greenways, buffers, etc.
Protect cars and other vehicles
Protect farms, crops and livestock
Protect repetitively flooded areas
Protect a particular area:
Protect a particular property:
Protect a particular property:
Make sure future development doesn't make things worse
New developments should pay the full cost of protection measures
Restrict development in hazardous areas
Minimize public expenditures
Minimize property owners' expenditures
Maximize the share paid by benefiting property owners
Maximize use of state and federal funds
Use public/private partnerships
Help people protect themselves
Other:
Other:
Other:

The cards were then organized by similar topics. There was quite a bit of consistency in the members' topics. The handout has more than 30 possible goal statements, but the members' nominations covered no more than 10 topics. Several of them were not listed in the handout. The Committee members' nominations were relatively easy to fit into a concise number of goals.

The exercise revealed important information to guide the planning effort, both in what was selected from the handout and what was not selected from the handout. For example, members did not stress protecting natural



areas or which sources of funding to use. They focused on protecting people and property.

There was no favoritism shown for, say, residences over other types of property, but there was a strong concern to protect critical facilities and public services, particularly to make sure they will be able to protect people when needed. While this Plan addresses all hazards, flooding was foremost in the members' minds because it has proven to be the most common and damaging of the hazards reviewed.

4.2. Goals

At the end of the exercise, the Mitigation Planning Committee agreed on six general goals for this planning effort:

- 1. Protect the lives and health of the Parish's residents from the dangers of natural hazards.
- 2. Ensure that public services and critical facilities operate during and after a disaster.
- 3. Ensure that adequate evacuation routes, streets, utilities <u>and public and emergency</u> <u>communications</u> are maintained and available during and after a disaster.
- 4. Protect homes and businesses from damage.
- 5. <u>Manage new development to minimize Use new infrastructure and development</u> <u>planning to reduce</u> the impact of natural hazards on future construction.
- 6. Give special attention to repetitively flooded areas.

These goals are certainly consistent with the vision statements of ND 2025 and practically repeat the first three statements of that earlier planning effort.

4.3. 2009 update

There have been no new master plans at the Parish level since the 2004 Mitigation Plan was prepared. The "New Directions 2025" effort has implemented some more documents, but they reference the goals and overall vision that was prepared in 2000.

At its November 17, 2008, meeting, the Mitigation Planning Committee discussed the 2004 Plan's six goals noted in the previous section. The Committee reaffirmed that they are still appropriate for the updated hazard profiles and vulnerability assessments.

The Committee revised Goal 3 to include communications as a critical item that needs to work during and after a disaster. Goal 5 was reworded to be more specific.

Chapter 5. Property Protection

Property protection measures are used to modify buildings or property subject to damage. Property protection measures fall under three approaches:

- Modify the site to keep the hazard from reaching the building,
- Modify the building so it can withstand the impacts of the hazard, and
- Insure the property to provide financial relief after the damage occurs.

Property protection measures are normally implemented by the property owner, although in many cases technical and financial assistance can be provided by a government agency. These are discussed later in this chapter.

5.1. Keeping the Hazard Away

Generally, natural hazards do not damage vacant areas. As noted in Chapters 2 and 3, the major impact of hazards is to people and improved property. In some cases, properties can be modified so the hazard does not reach the damage-prone improvements. A fire break is an example of this approach – brush and other fuel are cleared away from the building so a fire may not reach it. Keeping the hazard away works for three of the hazards addressed in this plan: flooding, wildfires, and termites.

5.1.1. Flooding: There are <u>five</u> common methods to keeping a flood from reaching and damaging a building:

- Erect a barrier between the building and the source of flooding,
- Move the building out of the floodprone area,
- Elevate the building above the flood level,
- Demolish the building, and
- <u>Replace the building with a new one that is elevated above the flood level.</u>

Barriers: A flood protection barrier can be built of dirt or soil ("berm") or concrete or steel ("floodwall"). Careful design is needed so as not to create flooding or drainage problems on neighboring properties. Depending on how porous the ground is, if floodwaters will stay up for more than an hour or two, the design needs to account for



leaks, seepage of water underneath, and rainwater that falls inside the perimeter. This is usually done with a sump and/or drain to collect the internal groundwater and surface water and a pump and pipe to pump the internal drainage over the barrier.

Barriers can only be built so high. They can be overtopped by a flood higher than expected. Barriers made of earth are susceptible to erosion from rain and floodwaters if not properly sloped, covered with grass, and maintained. A berm can settle over time, lowering its protection level. A floodwall can crack, weaken, and lose its watertight seal. Therefore, barriers need careful design and maintenance (and insurance on the building, in case of failure).

Relocation: Moving a building to higher ground is the surest and safest way to protect it from flooding. While almost any building can be moved, the cost goes up for heavier structures, such as those with exterior brick and stone walls, and for large or irregularly shaped buildings. However, experienced building movers can handle any job.

In areas subject to flash flooding, deep waters, or other high hazard, relocation is often the only safe approach. Relocation is also preferred for large lots that include buildable areas outside the floodplain or where the owner has a new flood-free lot (or portion of the existing lot) available.



This low floodwall has landscaping to minimize the adverse impact on the property's appearance.



Building elevation: Raising a building above the flood level can be almost as effective as moving it out of the floodplain. Water flows under the building, causing little or no damage to the structure or its contents.

Raising a building above the flood level is cheaper than moving it and can be less disruptive to a neighborhood. Elevation has proven to be an acceptable and reasonable

means of complying with floodplain regulations that require new, substantially improved, and substantially damaged buildings to be elevated above the base flood elevation.

One concern with elevation is that it may expose the structure to greater impacts from other hazards. If not braced and anchored properly, an elevated building may have less resistance to the shaking of an earthquake and the pressures of high winds.



Demolition: Some buildings, especially heavily damaged or repetitively flooded ones, are not worth the expense to protect them from future damage. It is cheaper to demolish them and either replace them with new, flood protected structures ("pilot reconstruction"), or relocate the occupants to a safer site. Demolition is also appropriate for buildings that are difficult to move—such as larger, slab foundation, or masonry structures—and for dilapidated structures that are not worth protecting. Generally, demolition projects are undertaken by a government agency, so the cost is not borne by

the property owner, and the land is converted to public open space use, such as a park.

One problem that sometimes results from an acquisition and demolition project is a "checkerboard" pattern in which nonadjacent properties are acquired. This can occur when some owners, especially those who have and prefer a waterfront location, prove reluctant to leave. Creating such an acquisition pattern in a community simply adds to the maintenance costs that taxpayers must support.



Demolishing a repetitively flooded home

Pilot reconstruction: If a building is not in good shape, it may not be worth it (and even dangerous) to elevate it. An alternative is to demolish the structure and build a new one on the site that meets or exceeds all flood and wind protection codes. This was formally known as "demo/rebuild." FEMA funding programs call this approach "pilot reconstruction." It is still a pilot program, not a regularly funded option.

Certain rules must be followed to qualify for Federal funds for pilot reconstruction:

- <u>Pilot reconstruction is only possible after it has been shown that acquisition or elevation are not feasible, based on the program's criteria.</u>
- Funds are only available to people who owned the property at the time of the event for which funding is authorized.
- It must be demonstrated that the benefits exceed the costs.
- <u>The new building must be elevated to the advisory base flood elevation.</u>
- The new building must not exceed more than 10% of the old building's square footage.
- The new building must meet all flood and wind protection codes.
- There must be a deed restriction that states the owner will buy and keep a flood insurance policy.
- The maximum Federal grant is 75% of the cost up to \$150,000. FEMA is developing a detailed list of eligible costs to ensure that disaster funds are not used to upgrade homes.

5.1.2. Wildfire One way to defeat fire is by keeping fuel away from the building. This is called the concept of "defensible space." Defensible space involves providing sufficient space between the structure and flammable vegetation.

Within this space, the fire service has room to battle the wildfire before it reaches the structure or to stop a structural fire before it ignites the wildland vegetation. With sufficient defensible space, the structure even has a chance to survive on its own when fire service personnel and equipment are not available, as often happens during a significant wildfire.



5.1.3. Termites The best way to protect a house from termites is to not let them in. One way to do this is to create a continuous chemical barrier which blocks potential routes of termite entry. A trench is dug around slabs, piers or other supports touching the soil. The soil put in the trench is saturated with termiticides. This approach will protect a structure for approximately five years. Other barriers include wood treatment, termiticide foams, and bait stations.

5.1.4. Implementation in St. Tammany Parish The Parish and the cities of Slidell, Mandeville, Covington and Abita Springs have had a good deal of experience with acquisition, demolition, or elevation to protect buildings from flooding. All have received several grants from FEMA to manage these programs. In the last year, the Parish assumed day to day administration from a contractor and created a four person Flood Hazard Mitigation office in the Department of Planning.

Over 100 properties have been acquired and cleared or elevated in St. Tammany Parish. Elevation projects have included both elevating the whole structure and adding a second story and abandoning the first, floodprone, floor. Examples are illustrated on the next page.

Parish staff have learned many lessons from this work. The main concern is constraints placed on them by Federal funding rules. It is believed that funds could be saved and projects administered more quickly if more local flexibility were allowed.

It is assumed that property owners have constructed defensible spaces and termite barriers, but there is no government involvement or data <u>because building permits are not</u> <u>needed</u>.





Small barriers are successful when flooding is short term and soils are relatively impermeable. That was not the case for this barrier. The repetitively flooded property is being acquired by the Parish. An example of the checkerboard pattern that results when only one or two properties are purchased and cleared. All FEMA funded acquisition/elevation projects are voluntary.



This St. Tammany Parish house was elevated with FEMA funding support.



The roof has been removed as this house is being readied for a new second story.

5.1.5. CRS Credit The Community Rating System provides flood insurance discounts to those communities that implement various floodplain management activities that meet certain criteria. Comparing local activities to those national criteria helps determine if local activities should be improved.



The CRS provides the most credit points for acquisition and relocation because this measure permanently removes insurable buildings from the floodplain. Under Activity 520 – Acquisition and Relocation, the Parish could receive up to 100 points. The score could be higher, depending on how many repetitive loss properties were protected.

The CRS credits barriers and elevating existing buildings (Activity 530 – Flood Protection). Elevating a building above the flood level will also reduce the flood insurance premiums on that individual building. A CRS score of up to 84 points is possible, more if repetitive loss properties were protected.

Because barriers are less secure than elevation, not as many points are provided. The Parish would receive 20 - 25 points.

Higher scores are possible, but they are based on the number of buildings removed compared to the number remaining in the floodplain. In both cases, the Parish would receive what is known as the lower "default" credit. The default approach favors large communities that may have acquired or elevated many structures, but still have thousands left in the floodplain.

Sun is not in the National Flood Insurance Program and therefore ineligible for CRS credits (although it voted to apply in 2008). Abita Springs, Folsom, Madisonville, and Pearl River have not joined the CRS.

5.1.6. 2009 Update Since the 2004 Plan and Hurricane Katrina, the Parish has had many more opportunities for buying or elevating flooded homes. More than 30 homes have been elevated, rebuilt or bought out and cleared. Nineteen have been elevated in Madisonville and two in Abita Springs.

The Southern Pine Council has initiated a program to encourage elevation of floodprone buildings. To the right is an excerpt from a recent publication that showcased a St. Tammany Parish home that was elevated with FEMA mitigation funding support.

Termites: Debris and downed trees from Katrina and Rita provided more food for termites and opportunities for them to enter houses. On the next page is the first page of a handout by the LSU Ag Center, advising residents to clear wood and debris away from the structure, a measure similar to creating defensible space for fire protection.

<u>A later page in the handout notes</u> <u>"Pressure-treated wood is not eaten by</u> <u>subterranean termites, and wood being</u> <u>replaced from a flood should be replaced</u> <u>with treated wood. These treatments also</u> <u>stop fungus from attacking the wood."</u>

Raised Floors Help this Community Meet Floodplain Management Goals



The National Flood Insurance Program (NFIP) Community Rating System (CRS) provides discounts on flood insurance premiums in those communities that establish floodplain management programs that exceed NFIP minimum requirements.

St. Tammany Parish in Louisiana is one of those communities. Citizens of St. Tammany receive a 5% discount on their premiums due to ordinances that more strictly define the systems and techniques used to construct a foundation in floodprone areas. Raised floors are part of the solution.

In designated flood zones, the parish limits the volume of fill that can be placed to elevate the floor of a structure above base flood elevation (BFE). These measures help prevent displacement of floodwaters onto adjacent property. Furthermore, if the structure must be raised over a certain height above natural ground grade to meet BFE, then the builder must use pierand-beam or pile construction. These open foundations do not displace floodwaters and also allow high velocity waters to flow under the structure.

St. Tammany is also an active participant in the Federal Emergency Management Agency (FEMA) floodproofing program. Under programs such as Flood Mitigation Assistance, FEMA provides grants to help owners of flood-prone homes have their houses raised. To qualify, a homeowner must have a federal flood insurance policy in effect and must have made at least two claims on the policy within the past 10 years.



Raising a house can be a costly option for the homeowner. This slab-on-grade home in St. Tammany Parish, Louisiana, was raised at a total cost of approximately \$150,000. A matching grant from FEMA's Pre-Disaster Mitigation program pays 75% of the expense to raise a home, with the homeowner bearing the remaining 25% of the cost.

Source: Raised Floor Systems, Southern Pine Council, p. 9



Keep Formosan Subterranean Termites From Spreading After Hurricanes

Cleaning up wood debris after a hurricane or other severe wind storm can inadvertently spread one of Louisiana's most destructive pests – the Formosan subterranean termite. The highest concentrations of this termite in the continental United States are in Lake Charles and New Orleans, cities flooded following Hurricanes Rita and Katrina. Any cellulose material (wood, paper or products made from them) can contain termites.

Do Not Move Termites – Do Not Provide Food For Termites

- Wood-to-ground contact is a condition that can attract termites. Debris should be picked up around the house as quickly as possible to avoid having termites relocate near your home.
- Wet wood or wallboard also can attract termites, especially if brown rot sets in; brown rot fungi produce attractants that termites move toward.
- Formosan subterranean termites in wood (including trees) or other locations above water will certainly survive. As soon as the floods recede, termites will move back down to lower levels to resume foraging.
- Wood taken from damaged buildings and other structures could be infested with termites. Lumber and other cellulosecontaining material could become infested with termites if left on the ground too long.

- Any salvaged wood to be saved should be stored off the ground and away from the house.
- Any untreated wood in Southeast and Southwest Louisiana should be considered as potentially infested with termites, especially Formosan subterranean termites.
- Keep all salvaged items made of wood, paper and their products from being transported in state or out of state until they are inspected by a termite inspector.
- Downed trees, limbs and other woody plant material may be infested with termites or become infested if they remain on the ground too long.

Dispose of Termite-infested Wood

- Painted wood from construction before 1978 is probably lead-contaminated and should not be incinerated; this wood needs to be taken to a facility for proper disposal.
- Don't bury wood. Even pesticide treatments won't prevent buried wood from eventually becoming infested with termites; buried debris will provide food for termites that will seek new food sources when the buried wood is exhausted.
- Downed trees and large shrubs on the ground should be cut into movable segments and taken to a facility for proper disposal.

First page from an LSU Ag Center handout

5.2. Retrofitting

Section 5.1 focused on keeping the hazard from reaching a building or damage-prone part of a property. An alternative is to modify or "retrofit" the site or building to minimize or even prevent damage. There are a variety of techniques to do this. This section looks at the measures that can be implemented to protect existing buildings from damage.

5.2.1. Flooding Flood retrofitting measures include **dry floodproofing** where all areas below the flood protection level are made watertight. Walls are coated with waterproofing compounds or plastic sheeting. Openings (doors, windows, and vents) are closed, either permanently, with removable shields, or with sandbags.

Dry floodproofing of new and existing nonresidential buildings in the regulatory floodplain is permitted under State, FEMA and local regulations. Dry floodproofing of existing residential buildings in the floodplain is also permitted as long as the building is not substantially



damaged or being substantially improved. Owners of buildings located outside the regulatory floodplain can always use dry floodproofing techniques.

The alternative to dry floodproofing is **wet floodproofing:** water is let in and everything that could be damaged by a flood is removed or elevated above the flood level. Structural

components below the flood level are replaced with materials that are not subject to water damage. This is the approach used for the first floor of the elevated homes illustrated in the previous section.

For example, concrete block walls are used instead of wooden studs and gypsum wallboard. The furnace, water heater, and laundry facilities are permanently relocated to a higher floor. Where the flooding is not deep, these appliances can be raised on blocks or platforms.



5.2.2. Wind The high wind forces of tropical storms, hurricanes and tornadoes can be resisted by securing the roof, walls and foundation with adequate fasteners or tie downs. These help hold the building together when the combination of high wind and pressure differences work to pull the building apart.

Another retrofit is to strengthen garage doors, windows and other large openings. If winds break the building's "envelope," the pressures on the structure are greatly

increased. Windows can be protected with storm shutters or special glass.

Tornado retrofitting measures include constructing an underground shelter or "safe room" to protect the lives of the occupants. Their worth has been proven by recent tornadoes in Oklahoma, as shown in the photo to the right. They can be installed for approximately \$3,000.



5.2.3. Earthquake Earthquake retrofitting measures include removing masonry overhangs that will fall onto the street during shaking. Bracing the building provides structural stability, but can be very expensive.

Less expensive approaches may be more costeffective for an area like St. Tammany Parish that faces a relatively low earthquake threat. These include tying down appliances, water heaters, bookcases and fragile furniture so they won't fall over during a quake and installing flexible utility connections that will not break when shaken.

5.2.4. Other hazards and measures



- Burying utility lines is a retrofitting measure that addresses the winds from <u>hurricanes</u>, tornadoes, thunderstorms, and the ice that accompanies winter storms.
- Installing or incorporating backup power supplies minimizes the effects of power losses caused by downed lines.
- Roofs can be replaced with materials less susceptible to damage by hail, such as modified asphalt or formed steel shingles.
- Wildfire retrofitting measures include replacing roofing with fireproof materials and installing spark arrestors on chimneys.
- Winter storm retrofitting measures include improving insulation on older buildings, relocating water lines from outside walls to interior spaces, <u>and insulating water lines</u> <u>in crawlspaces and under elevated buildings</u>. Windows can be sealed or covered with an extra layer of glass (storm windows) or plastic sheeting.

5.2.5. Implementation in St. Tammany Parish Some properties have been retrofitted to protect them from flooding, wildfire, and high winds. However, because these projects are so small, they generally do not require a building permit. Therefore, there are no records of them.

A study of flood retrofitting behavior was conducted in Slidell in the 1980's by the University of New Orleans. Questionnaires were distributed to homes in floodprone areas. Of the respondents who had had water in their homes, 31% reported to have later implemented one or more flood protection measure.

There is one known case of a house in the Bayou Liberty area that had its walls dry floodproofed. When flooded, though, the water seeped underneath through the slab and the house suffered damage. This highlights the need for technical guidance, a thorough investigation of the condition of the structure, and careful construction of any retrofitting measure for flood protection.

5.2.6. CRS credit: Credit for dry and wet floodproofing and sewer backup protection is provided under Activity 530 – Retrofitting. Because these property protection measures are less secure than barriers and elevation, not as many points are provided. Retrofitting to protect a building for hazards other than flooding is not credited under the CRS.

5.2.7. 2009 Update Because most retrofitting projects do not need permits, there are no records of how many have been constructed or installed since the 2004 Plan.

The 2006 University of New Orleans' study of the Bayou Liberty area noted the following:

The major disadvantage of wet floodproofing is that the lower area of the structure cannot be finished. While the area can still be used, there should be no carpeting, furniture, insulation, and other materials subject to water damage that cannot be removed in time. There are 32 "elevated basement" foundations where the first floor has been finished. However, in some cases, the owners have opted not to refinish them after they were flooded.

A wet floodproofed raised basement house can be considered an elevated building under FEMA guidance. In other words, the first floor (or basement) can be wet floodproofed and the second story becomes the new lowest floor. This would be done instead of elevating the entire structure, which would be much more expensive. Such an approach greatly reduces the homeowner's cost of meeting the requirements for substantially damaged homes. Flood insurance premiums would be greatly reduced, too.

It should be noted that dry floodproofing is only effective for shallow flooding, such as repetitive drainage problems. It does not protect from the deep flooding along the Lake and larger rivers caused by Hurricane Katrina.

Project scoping: As part of the mitigation planning process, projects were submitted specifically to pursue FEMA mitigation grants. Four retrofitting projects were submitted:

- Hardening the Parish's Slidell utility operations office for wind protection
- Hardening Wastewater Treatment Plant #3 for wind protection
- Raising electrical panels and floodproofing two sewage lift stations
- Floodproofing electrical panels in lift stations close to Lake Pontchartrain

5.3. Insurance

Technically speaking, insurance does not mitigate damage caused by a natural hazard. However, it does help the owner repair, rebuild and (hopefully) afford to incorporate some of the other property protection measures in the process. Insurance has the advantage that, as long as the policy is in force, the property is protected and no human intervention is needed for the measure to work.

5.3.1. Private property A standard **homeowner's insurance** policy will cover a property for the hazards of tornado, wind, hail, and winter storms. Separate endorsements are usually needed for earth movement (e.g., earthquake) coverage.

Most homeowner's insurance policies will pay for collapse or other structural damage caused by termites. Insurance for termites can also come in the form of a warranty sold by the company that applied the termiticide to the structure.

Although most homeowner's insurance policies do not cover a property for flood damage, an owner can insure a building for damage by surface flooding through the National Flood Insurance Program. **Flood insurance** coverage is provided for buildings and their contents damaged by a "general condition of surface flooding" in the area.

Sample premiums are shown in Table 5-1.

Most people purchase flood insurance because it is required by the bank when they get a mortgage or home improvement loan. Usually these policies just cover the building's structure and not the contents. Renters can buy contents coverage, even if the owner does not buy structural coverage on the building. A review of the 6,500 claims that have been paid in the planning area found that over onehalf did not include a claim for damage to contents, a signal that the policy holders did not have contents coverage.

Table 5-1 Example Flood Insurance Premiums			
Building Exposure	Premium		
In the Special Flood Hazard Area (AE Zone)			
Pre-FIRM ("subsidized") rate	\$1,689		
Post-FIRM (actuarial) rates			
2 feet above the base flood elevation	\$440		
1 foot above the base flood elevation	\$643		
At the base flood elevation	\$1,167		
1 foot below the base flood elevation	\$4,379		
Outside the Special Flood Hazard Area	\$1,029		
Premiums are for \$150,000 in building coverage and \$75,000 in contents coverage for a one story house with no basement and a \$500 deductible, <u>using the October 2008 Flood Insurance Manual</u> . Premiums include the 5% Community Rating System discount in <u>unincorporated St. Tammany Parish. Premiums are higher in the municipalities, which are not in the CRS.</u>			

5.3.2. Public property Governments can purchase commercial insurance policies. Larger local governments often self-insure and absorb the cost of damage to one facility, but if many properties are exposed to damage, self-insurance can be a major drain on the treasury. Communities cannot expect Federal disaster assistance to make up the difference after a flood.

Under Section 406(d) of the Stafford Act.

If an eligible insurable facility damaged by flooding is located in a [mapped floodplain] ... and the facility is not covered (or is underinsured) by flood insurance on the date of such flooding, FEMA is required to reduce Federal disaster assistance by the *maximum* amount of insurance proceeds that would have been received had the buildings and contents been fully covered under a National Flood Insurance Program (NFIP) standard flood insurance policy. [Generally, the maximum amount of proceeds for a non-residential property is \$500,000.]

[Communities] Need to:

- Identify all insurable facilities, and the type and amount of coverage (including deductibles and policy limits) for each. The anticipated insurance proceeds will be deducted from the total eligible damages to the facilities.
- Identify all facilities that have previously received Federal disaster assistance for which insurance was required. Determine if insurance has been maintained. A failure to maintain the required insurance for the hazard that caused the disaster will render the facility ineligible for Public Assistance funding....
- [Communities] *must* obtain and maintain insurance to cover [their] facility buildings, equipment, contents, and vehicles for the hazard that caused the damage in order to receive Public Assistance funding. Such coverage must, at a minimum, be in the amount of the eligible project costs. FEMA will not provide assistance for that facility in future disasters if the requirement to purchase insurance is not met. FEMA Response and Recovery Directorate Policy No. 9580.3, August 23, 2000

In other words, the law expects public agencies to be fully insured as a condition of receiving Federal disaster assistance.

5.3.3. Implementation in St. Tammany Parish Data on private insurance policies are not available. Flood insurance has been available in St. Tammany Parish since the early 1970's. Current flood insurance coverage and historic claim payments are shown in Table 5-2.

Some additional statistics include:

- Of the 23,561 policies in the unincorporated Parish, 20,284 (86%) are for post-FIRM buildings, i.e., built since the early 1970's.
- 42% of the policies are for buildings in the mapped floodplain. The fact that the majority of the policies are not in the "official" Special Flood Hazard Area indicates the extent of the stormwater flooding problem.
- Using this Plan's estimate of 17,600 buildings in the floodplain, between 50% and 60% of the buildings in the Special Flood Hazard Area are covered by insurance. Put another way, at least 40% of the mapped floodprone buildings are not insured for flood damage.

These figures show that there is broad awareness of flood insurance, 50% coverage is above the national average. However, coverage is still below what it should be in an area as floodprone as St. Tammany Parish (These figures are updated in Section 5.3.5).

Table 5-2 Flood Insurance Coverage				
Coverage	No. of Policies	Total Coverage	No. of Paid Claims	Total Paid Claims
Unincorporated Parish				
Single family	34,816	\$9,269,621,700	13,454	\$944,901,109
2-4 family	819	\$134,783,200	384	\$27,373,242
Other residential	965	\$110,132,200	228	\$26,019,042
Other structures	1,262	\$433,458,700	388	\$40,236,951
Total	37,862	\$9,947,995,800	14,454	\$1,038,530,343
Abita Springs				
Single family	367	\$91,418,000	49	\$619,715
2-4 family	11	\$2,305,000	0	\$0
Other residential	1	\$82,600	0	\$0
Other structures	20	\$5,013,400	0	\$0
Total	399	\$98,819,000	49	\$619,715
Folsom				
Single family	23	\$4,626,500	6	\$77,829
2-4 family	0	\$0	0	\$0
Other residential	0	\$0	0	\$0
Other structures	0	\$0	0	\$0
Total	23	\$4,626,500	6	\$77,829
Pearl River				
Single family	201	\$46,416,100	17	\$280,898
2-4 family	2	\$518,300	0	\$0
Other residential	0	\$0	0	\$0
Other structures	8	\$2,329,600	0	\$0
Total	211	\$49,264,000	17	\$280,898
Madisonville				
Single family	282	\$63,510,500	99	\$3,045,326
2-4 family	2	\$206,400	1	\$55,206
Other residential	2	\$317,200	2	\$3,400
Other structures	41	\$12,412,600	17	\$1,160,650
Total 327 \$76,446,700 119 \$4,264,581				
Source: Federal Emergency Management Agency. Figures are as of <u>9/30/2008</u>				

Folsom insures its public buildings under a commercial property insurance policy, which excludes earthquake and flood coverage. Abita Springs and Pearl River have commercial policies, but do not have flood insurance coverage on Town properties. <u>The Parish</u> insures its public buildings under a commercial property insurance policy, which excludes earthquake and flood coverage. All Parish buildings in the Special Flood Hazard Area are covered by flood insurance.

The Parish has a risk manager who calculates how much damage can be absorbed by the Parish in order to have lower insurance premiums. For most properties and coverage, there is a \$100,000 deductible per occurrence, making the Parish self-insured for the first \$100,000 in damage from most events. There is a separate 5% or \$250,000, whichever is greater, deductible that applies to the perils of wind and hail. There are lower deductibles for some liability exposures and on a few buildings. Parish buildings covered for flood damage have either a \$500 or \$5,000 deductible that applies separately to building and contents, when included.

5.3.4. CRS Credit There is no credit for purchasing flood or other kinds of insurance, but the Community Rating System does provide credit for local public information programs that explain flood insurance to property owners. The CRS also reduces the premiums for those people who do buy NFIP coverage.

On the other hand, in order to participate in the CRS, a community must certify that it has adequate flood insurance on all properties that it has been *required* to insure. The minimum requirement is to insure community-owned properties in the mapped floodplain that have received Federal aid, as specified by the Flood Disaster Protection Act of 1973.

5.3.5. 2009 Update The statistics on flood insurance coverage have been updated with more details in a new Table 5-4, on the next page. Total coverage for the Parish, as a percentage of buildings in the different flood zones, does not appear to have changed much. Table 5-4 shows that the total number of policies in the unincorporated portions of the Parish increased from 23,561 to 36,684 between 2003 and 2008. (It should be noted that even though Table 5-3 and 5-4 came from the same source for the same time period, the totals are not the same.)

Table 5-4 also shows improved flood insurance policy coverage by all zones. There are some anomalies, such as Folsom A Zones and the V Zone coverage in the unincorporated areas. These are probably due to policies written in one zone that have not been revised when the new Flood Insurance Rate Map changed the area's zone designation. For example, most of the Parish's V Zones were A Zones until the preliminary DFIRM came out. The DFIRM was used for this *Plan's* building counts.

The flood insurance coverage figures in Table 5-2 have been updated for 2008 and to include Madisonville (which was not involved in the 2004 *Plan*). It is significant to note that the Parish has received over \$1 billion in flood insurance claims payments.

The changes in coverage and claims payments are shown in Table 5-3. The increase in claims payments and coverage can be attributed to Katrina. It appears that there were no flood insurance claims paid in Folsom and few in Abita Springs because of Katrina. These communities are farther inland and did not flood much.

Table 5-3 Changes in Flood Insurance Since 2003			
	Change in No. of Policies	Change in Paid Claims	
Unincorporated Parish	↑ 61%	↑ 1,200%	
Abita Springs	↑ 78%	↑ 3%	
Folsom	↓ 72%	No change	
Pearl River	↑ 211%	↑ 19%	
Madisonville	(not in 2004 <i>Plan</i>)	(not in 2004 <i>Plan</i>)	
Source: FEMA. Figures are as of 9/30/2008			

Table 5-4, 2008 Flood Insurance Statistics						
		Flood	Flood Insurance Policies			lings
Community	Zone	Pre-FIRM	Post-FIRM	Total	Number	Coverage
Abita Springs	A Zones	64	37	101	240	42%
	V Zones	0	0	0	0	N/A
	X Zones	71	226	297	1,173	25%
	Total	135	263	398	1,413	28%
Folsom	A Zones	3	2	5	0	N/A
	V Zones	0	0	0	0	N/A
	X Zones	7	11	18	607	3%
	Total	10	13	23	607	4%
Madisonville	A Zones	154	112	266	374	71%
	V Zones	1	0	1	42	2%
	X Zones	4	42	46	10	**
	Total	159	154	313	426	73%
Pearl River	A Zones	17	14	31	104	30%
	V Zones	0	0	0	0	N/A
	X Zones	68	98	166	1,237	13%
	Total	85	112	197	1,341	15%
Unincorporated	A Zones	1,629	10,449	12,078	21,988	55%
	V Zones	68	210	278	1,473	19%
	X Zones	1,524	22,804	24,328	48,393	50%
	Total	3,221	33,463	36,684	71,854	51%
Totals	A Zones	1,867	10,614	12,481	22,787	55%
	V Zones	69	210	279	1,531	18%
	X Zones	1,674	23,181	24,855	51,118	49%
	Total	3,610	34,005	37,615	75,436	50%
Note: The number of b	Note: The number of buildings figures are the same as for the tables used in Chapter 3, not including Sun and					in and

uninsurable structures, such as wells, power lines and cell towers
** There may be more policies rated in an X Zone than there are buildings because the favorable rates can be "grandfathered" for a property. If a new FIRM shows an X Zone property in an A Zone, the building can be rated as if it stil

fathered" for a property. If a new FIRM shows an X Zone property in an A Zone, the building can be rated as if it still were in the X Zone.

Source: Federal Emergency Management Agency. Figures are as of 9/30/2008

All of the municipalities except Sun have hazard insurance coverage on their public buildings. Sun only carries liability insurance on its public property. Madisonville, which is almost 100% floodplain, also has flood insurance coverage on its public buildings.

5.4. The Government's Role

Property protection measures are usually considered the responsibility of the property owner. However, local governments should be involved in all strategies that can reduce flood losses, especially acquisition and conversion of a site to public open space. There are various roles the Parish or a municipality can play in encouraging implementation of these measures.

5.4.1. Possible roles There are several different ways the Parish or a municipality could support property protection activities by private property owners.

Government facilities: One of the first duties of a local government is to protect its own facilities. Fire stations, water treatment plants and other critical facilities should be a high priority for retrofitting projects and insurance coverage. This also sets the example and provides models for private property owners.

Public Information: Providing basic information to property owners is the first step in supporting property protection measures. Owners need general information on what can be done. They need to see examples, preferably from nearby. Public information activities that can promote and support property protection are discussed in Chapter 9.

Financial assistance: The local government can be a pass-through and administrator for State or Federal funding programs, or it can contribute its own funds to provide more locally-appropriate arrangements. This is discussed more in the next section.

Acquisition agent: The community can be the focal point in an acquisition project. Most funding programs require a local public agency to sponsor the project. The Parish or a municipality could process the funding application, work with the owners, and provide some or all of the local share. In some cases, the local government would be the ultimate owner of the property, but in other cases a school or other public agency could assume ownership and the attendant maintenance responsibilities.

Mandates: Mandates are considered a last resort if information and incentives aren't enough to convince a property owner to take protective actions. An example of a fire safety retrofitting mandate that many communities have is the requirement that the electrical service on an older house be brought up to current code as a condition of any building permit.

There is a mandate for improvements or repairs made to a building in the regulated floodplain (<u>A and V Zones</u>). If the project equals or exceeds 50% of the value of the original building it is considered a "substantial improvement." The building must then be elevated or otherwise brought up to current flood protection codes.

Another possible mandate is to require less expensive hazard protection steps as a condition for any building permit. For example, if a person applied for a permit for electrical work, the community could require that the service box be moved above the base flood elevation.

5.4.2. Financial Assistance Communities can help owners by helping to pay for a retrofitting project. Financial assistance can range from full funding of a project to helping residents find money from other programs. Some communities assume responsibility for sewer backups, street flooding, and other problems that arise from an inadequate public sewer or public drainage system.

Less expensive community programs include low interest loans, forgivable low interest loans and rebates. A forgivable loan is one that does not need to be repaid if the owner does not sell the house for a specified period, such as five years. These approaches don't fully fund the project but they cost the community treasury less and they increase the owner's commitment to the project. Often, small amounts of money act as a catalyst to pique the owner's interest to get a self-protection project moving (see box).

The more common outside funding sources are listed below. Unfortunately, some are only available after a disaster, not before, when damage could be prevented.

Property Protection Rebates

The City of Guthrie, Oklahoma has a rebate program for installation of tornado shelters and safe rooms. The City provides up to \$1,500 per house, which can cover the majority of the cost.

The Village of South Holland, Illinois received national recognition for its rebate program to help property owners fund retrofitting projects to protect against surface and subsurface flooding. If a project is approved, installed, and inspected, the Village will reimburse the owner 25% of the cost up to \$2,500. Over 450 floodproofing and sewer backup protection projects have been completed under this program. Perhaps not surprisingly, contractors have become some of the best agents to publicize this program.

Pre-disaster funding sources

- FEMA's Pre-Disaster Mitigation (PDM) grants (administered by the <u>Governor's</u> <u>Office of Homeland Security and Emergency Preparedness, GOHSEP</u>)
- FEMA's Flood Mitigation Assistance (FMA) grants (administered by GOHSEP)
- Community Development Block Grant (administered by the Office of Governor's Division of Administration)
- Small Business Administration's Pre-Disaster Mitigation Loan Program
- The Statewide Flood Control Program managed by the Louisiana Department of Transportation and Development
- Conservation organizations, such as the Conservation Foundation, although generally these organizations prefer to purchase vacant land in natural areas, not properties with buildings on them
- The U.S. Army Corps of Engineers funds acquisition and elevation projects. There are plans to elevate over 160 structures in the Parish under SELA (see section 8.2).

Post-disaster funding sources

- Insurance claims
- The National Flood Insurance Program's Increased Cost of Compliance. This
 provision increases a flood insurance claim payment to help pay for a flood
 protection project required by code as a condition to rebuild the flooded building.
 It can also be used to help pay the non-federal cost-share of an elevation project.

Post-disaster funding sources, Federal disaster declaration needed

- FEMA's disaster assistance (for public properties), however as noted in section 5.3.2, after a flood, the amount of assistance will be reduced by the amount of flood insurance that the public agency should be carrying on the property) (administered by <u>GOHSEP</u>)
- Small Business Administration disaster loans (for non-governmental properties)
- FEMA's Hazard Mitigation Grant Program (administered by <u>GOHSEP</u>)

State post-Katrina funding sources

- Louisiana Recovery Authority's (LRA) Road Home Program

In addition to the limited amounts of funding available is the restriction on the use of those funds. Currently, FEMA programs, the sources with the most resources for property protection, are limited to acquisition, elevation, and, under certain circumstances, small local drainage projects. Acquisition means the property is cleared and preserved forever as public open space. The Hazard Mitigation Grant Program implemented following Hurricane Katrina allows funds to be used for pilot reconstruction.

5.4.3. Implementation in St. Tammany Parish The Parish has been very active as a financial assistance and acquisition agent, using FEMA funds to purchase or elevate flooded properties. <u>Normally</u>, FEMA funds pay for 75% of the costs and the balance is paid by the property owner. <u>With Hurricanes Katrina and Rita repairs</u>, the 25% non-FEMA match has been covered by the State. The Parish fully funds an office that administers this program.

The mitigation staff has found the following:

- If given the option, most people prefer to sell their homes rather than elevate them and stay in the floodplain.
- The Parish shares the concern that even though the structure may be protected from flood damage, leaving homes in floodprone areas presents health and safety hazards.
- Most elevation projects have been second story conversions. Because there are many complications with elevating a slab foundation and few qualified contractors, the Parish is no longer encouraging this approach.

- The cost to elevate a 2,000 square foot home using the preferred second story conversion approach has been between \$150,000 and \$200,000.
- Homeowners pay 25% of the cost of a project. They must provide their share up front. Because of these costs, somewhat more than half of the offers to mitigate have been declined by the owners.
- The cost to maintain acquired properties that are turned over to the Parish has increased. The Parish does little for those properties in rural areas, but is obligated to mow those in developed neighborhoods. A recent bid for a mowing contract for 16 properties will cost \$12,000 each year.
- The Parish has not pursued financial assistance on less expensive retrofitting projects.
- Parish staff have provided some information and technical assistance, as discussed in Chapter 9.
- Parish staff are very interested in more flexible funding arrangements, such as the "demo/rebuild" approach (which has since been authorized under FEMA's Hazard Mitigation Grant Program as "pilot reconstruction," in part due to the voiced concerns of local officials, like the Parish's staff).

5.4.4. CRS credit Except for public information programs, the Community Rating System does not provide credit for efforts to fund, provide incentives or mandate property protection measures. The CRS credits are provided for the actual projects, after they are completed (regardless of how they were funded or who instigated them).

5.4.5. 2009 Update Since the 2004 Plan and Hurricane Katrina, the Parish has taken an even more active role in helping residents. As seen in Table 5-5, the Parish has processed 78 completed applications for FEMA mitigation grants. Many more have inquired. All the grants have been for single family homes that are on FEMA's repetitive loss property list.

Table 5-5 Recent Mitigation Grant Projects				
Technique Completed Applied for				
Acquisition/clearance	3	15		
Elevation	28	26		
Pilot reconstruction	4	2		
	35	43		

The relatively new Increased Cost of Compliance program has also been utilized. The Parish's Department of Permits and Regulatory has assisted with 204 applications that have provided \$4,197,502 in flood insurance claim payments to help elevate homes. Madisonville helped with eight for \$239,815 and Abita Springs worked on one for \$20,000.

5.5. Conclusions

- 1. There are several ways to protect individual properties from damage by natural hazards. The advantages and disadvantages of each should be examined for each situation.
- 2. Property owners can implement some property protection measures at little cost, especially for sites in areas of low hazards (e.g., shallow flooding, earthquakes, and winter storms). For other measures, such as relocation, elevation and safe rooms, the owners may need financial assistance.

2009 update: Due partly to the attention given to FEMA funded retrofitting projects, there is little information on property owner use of less expensive measures for hazards such as shallow flooding, wind, and termites.

3. Less than 60% of the buildings in the Parish's floodplains are covered by flood insurance.

2009 update: The overall level of flood insurance coverage in the mapped floodplains of the Parish, Abita Springs, Madisonville, and Pearl River has not improved and hovers in the 55% – 60% range overall (with a high of 74% in Madisonville, which is 100% floodprone). This is in spite of the fact that Parish residents have received over \$1 billion in flood insurance claim payments.

- 4. The Parish and the municipalities have appropriate levels of self-insurance and commercial insurance coverage on their own properties.
- 5. Local government agencies can promote and support property protection measures through several activities, ranging from public information to financial incentives to full funding.

2009 update: The Parish, Abita Springs and Madisonville have had an upsurge in funding and assisting property protection projects since Hurricane Katrina. Over 250 buildings have been elevated or relocated with funding support from FEMA or the NFIP's Increased Cost of Compliance. All of the 78 FEMA grant applications have been for repetitive loss properties.

6. The Parish has actively helped residents implement property protection measures with FEMA funds, but could do more with information, technical assistance, and more flexible FEMA funding rules. Alternatives to public acquisition and the traditional elevation approaches are needed.

5.6. 2009 Recommendations

- 1. Public information efforts that explain property protection measures that can help owners reduce their exposure to damage by natural hazards and the various types of insurance coverage that are available should be continued.
- 2. Because properties in floodplains will be damaged sometime, a special effort should be made to provide information and advice to floodplain property owners. Special attention should be given to repetitive loss areas <u>and to promoting flood insurance coverage</u>.
- 3. All property protection projects that use FEMA funds must be voluntary. Other than State and Federally-mandated regulations, local incentives should be positive, such as providing financial and technical assistance.
- 4. Each public entity should evaluate its own properties to determine if they need to be retrofitted.
- 5. The Parish should <u>continue to</u> seek State and Federal funding support for property protection measures and flexible funding arrangements to allow rebates for lower cost measures and alternatives to elevation and acquisition of severely flooded properties.

5.7. References

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5-22

Chapter 6. Preventive Measures

Preventive measures are designed to keep the problem from occurring or getting worse. Their objective is to ensure that future development is not exposed to damage and does not increase damage to other properties. They include the following:

- 6.1 Planning and zoning
- 6.2 Open space preservation
- 6.3 Subdivision regulations
- 6.4 Building codes
- 6.5 Manufactured home regulations
- 6.6 Floodplain regulations
- 6.7 Drainage regulations
- 6.8 Coastal zone and wetlands protection
- 6.9 Urban forestry

The first two measures, planning, zoning and open space preservation, work to keep damage-prone development *out* of the hazardous or sensitive areas. The other measures impose standards on new developments to protect them from natural hazards, especially flooding and stormwater flooding.

6.1. Planning and Zoning

6.1.1. General: Planning and zoning activities direct development away from problem areas, especially floodplains and wetlands. They do this by allowing land uses that are more compatible to the natural conditions of the land. Use of the land can be tailored to match the land's hazards, typically by reserving hazardous areas for parks, greenways, golf courses, backyards, wildlife refuges, natural areas, or similar compatible uses. They can also allow developers more flexibility in arranging improvements on a parcel of land through the planned development approach.

Comprehensive Plans: These plans are the primary tools used by communities to address future development. They can reduce future property damage by indicating open space or low density development within floodplains and other hazardous areas. Unfortunately, natural hazards are not always emphasized or considered in the specific land use recommendations.

Generally, a plan has limited authority. It reflects what the community would *like to see* happen. Its utility is that it guides other local measures, such as capital improvement programs, zoning ordinances, and subdivision regulations.

Zoning: A zoning ordinance regulates development by dividing a community into zones or districts and setting development criteria for each zone or district. Zoning codes are considered the primary tool to implement a comprehensive plan's guidelines for how land should be developed.

Zoning ordinances can limit development in hazardous areas, such as reserving floodplain zones for agricultural uses. Often, developers will produce a standard grid layout, like that shown in the R-1 district in the photograph to the right. As an alternative. the ordinance can allow or encourage flexibility in lot sizes and location so developers can avoid hazardous areas. One way to do this is through the planned unit development (PUD) approach. The PUD approach allows adjustment of site designs standards and land use densities to preserve open space and/or floodplains from development.



A zoning ordinance can designate wetlands and floodprone areas for agricultural, conservation, or other uses that suffer minimal damage from a flood.



Capital Improvement Plans: A capital improvement plan will guide a community's major public expenditures for the next 5 to 20 years. Capital expenditures may include acquisition of open space within the hazardous areas, extension (or withholding) of public services into hazardous areas, or retrofitting existing public structures to withstand a hazard.

6.1.2. Implementation in St. Tammany Parish It must first be noted that some of the traditional land use planning and zoning approaches assume that development sites have both hazardous and non-hazardous land. The approaches assume that a developer can chose to not build in a floodplain. These approaches need to be tempered by the fact that 50% of St. Tammany Parish is in the floodplain and all of it is subject to many of hazards discussed in Chapter 2, especially stormwater flooding.

The Comprehensive Plan for St. Tammany Parish is being revised under the program called "New Directions 2025" (ND 2025). To date, this effort has produced the "Vision Element" which is discussed in Chapter 4. Some of the other elements, such as transportation, have been published or are coming out soon.

The natural hazards element is still a working draft. The latest draft calls for keeping new development away from hazardous areas, where possible. The third value statement is:

 All future development will be sited and constructed in such a way so as to not only (a) be at less risk than existing development but also (b) to not increase the risk to pre-existing developments.

ND 2025 is also developing a land use element. It includes a future land use plan, the current draft of which is shown as Map 6-1. Comparing Map 6-1 to the floodplain in Map 2-7 shows that the draft land use element goes far toward setting aside the floodprone areas. Most of the undeveloped areas in the Bogue Chitto and Pearl River floodplains and the lakeshore floodplain (areas south of US 190) are preserved as conservation (light green). Many other floodplains are reserved for timber.



The 2025 Land Use Plan - Supporting Policy and Statement of Fundamental Principles include many statements that support preserving floodplains and natural areas as open spaces. It also promotes clustering rather than sprawl, something promoted in the PUD approach illustrated on page 6-2. Some example statements include:

- III. Recommended Policies
- B. Land Use Considerations
 - 1.c) ...Commercial and institutional uses should be located on major highways or at crossroads, within Planned Districts, and not in flood prone areas or impaired watersheds....
 - 2.c) Participants in the ND 2025 Land Use planning process recommend that industrial uses be avoided in flood plains or in areas where they would adversely affect drainage, water or air quality, sensitive environmental areas and traffic....
 - 6.b) Among influences that should guide the designation of residential development areas cited by citizen participants are:
 - (1) Proximity to employment centers (including the south shore of Lake Pontchartrain);
 - (2) Siting, relative to floodplains, commercial and industrial uses and to environmentally sensitive areas, and site plan design quality;
 - (3) The clustering of homes within a significant greenspace, in addition to the "large lot" approach; ...
 - (11) Planning of residential developments to ensure no added flood loading to watersheds or sewage effluent that travels beyond individual tracts (unless it passes to a central treatment system).
 - 7.c) Rural Conservation Areas
 - (5) Expand and extend existing protected areas, and establish a "network" of contiguous green space throughout the Parish. This will facilitate species preservation and leverage the value of existing green spaces and corridors (such as the public and private preserves already dedicated, and the Tammany Trace and stream corridors). The 100-year flood plain network throughout the Parish (as currently defined by the Federal Emergency Management Agency (FEMA), or as may be updated) should be a base starting point for designation of green space/ conservation use.



(6) Corollary benefits of land conservation and habitat protection include (among others): flood protection; stream water quality; hunting, fishing, bird watching, and other "nature-based" recreational activities; and the preservation of St. Tammany's preeminent biodiversity (foremost in Louisiana) for future research and related benefits.

- C. Other Significant Elements
 - 1. Flood protection
 - a) Much of St. Tammany, including coastal areas as well as stream floodplains, is subject to storm water or tidal flooding. The coastal (lakefront) areas, south of Interstate 12, are also heavily populated and developed. Recent flooding experiences (whether caused by tropical storms or heavy rain falls) have dramatically illustrated the number of lives and value of property at stake. Accordingly, prevention of any additional contribution to flooding in the Parish was identified as one of the top four priorities for future land use decisions in the Parish. [emphasis added]
 - 6. Sewage and stream water quality ...
 - c) New septic or sewer systems should be carefully regulated within the 100-year floodplain and within 100 feet of any stream. Central sewer systems should be mandated for new developments.
 - d) Any development within the 100 or 200-year floodplain (as currently defined or as may be revised in the future by an authoritative source) should be strictly controlled, and low impact development techniques required.

The element also notes the need for capital improvements programming as a way to affect future losses from hazards and to coordinate flood protection with other Parish objectives, such as water quality and recreation:

- 5. Adequate Public Facilities
 - a) ... Continued development, unsupported by adequate public facilities and services (including green spaces), will destroy or damage property through flooding and otherwise diminish residents' quality of life and property values. Accordingly, the Parish, its citizens, landowners, developers and municipalities must find ways to provide adequate facilities and services, or limit growth until such time as they can do so. ...
 - c) Parish planning must be pro-active and anticipatory, since it is much more expensive to address public facility and service needs after development occurs than before.

The ND 2025 materials note:

The Maps depict generalized areas designated for future land uses, by broad category (as clarified below and noted on the maps). Neither the Map nor this document constitutes a "zoning" map or policy, nor do they indicate – except broadly – levels of intensity of use. Efforts that will follow adoption by the Parish Council of this 2025 Land Use Plan and Policy Statement will develop detailed zoning and other parish policies (such as, capital improvement, incentives, and regulatory) that will, in effect, "implement" this recommended Plan. These policies will provide greater detail than was called for in these documents, although the intent of these documents is to direct the formulation of such new or revised Parish policies regarding future Land Use.

Accordingly, rather than review the current zoning ordinance and capital improvements plan, this *Mitigation Plan* calls for adoption of the 2025 Land Use Plan and Policy *Statement* and drafting of zoning regulations and a capital improvements plan that are consistent with the land use patterns shown in Map 6-1 and the policy statements, such as those listed above.

The Parish does allow planned unit developments (PUDs).

The Villages of Folsom and Sun and the Towns of Abita Springs and Pearl River do not have separate comprehensive or land use plans. All four communities have zoning ordinances. Folsom's small floodplain is zoned for small lot residential use.

6.1.3. CRS Credit The Community Rating System provides flood insurance discounts to those communities that implement various floodplain management activities that meet certain criteria. Comparing local activities to those national criteria helps determine if local activities should be improved.



Up to 100 points are provided for regulations that encourage developers to preserve floodplains or other hazardous areas from development. There is no credit for a plan, only for the enforceable regulations that are adopted pursuant to a plan. Up to 600 points are provided for setting aside floodplains for low density zoning, such as 5 acre lots or conservation. ND 2025's Future Land Use Plan encourages such zoning. These credits are found in Activity 430LD – Land Development Criteria.

Sun is not in the National Flood Insurance Program and therefore ineligible for CRS credits. Folsom would receive no credit.

6.1.4. 2009 Update The ND 2025 plan set the stage for the follow-on implementation tools. The most important of these is the comprehensive rezoning of the Parish. This involves a review of the zoning classification of every property in the unincorporated parts of the Parish. The result will replace the current 20-year old Zoning Ordinance.

Under this effort, the Parish has been divided into five Study Areas and each one is tackled in order. All of them are planned to be ready by the end of 2009. The first area completed is the south central part of the Parish, between Mandeville and Slidell. The presentations on the proposed rezoning note that natural hazards were taken into account:

- <u>"Higher density development should be placed in areas which are less susceptible to</u> <u>catastrophic impacts of tropical storm events.</u>
- <u>"Due to an increase in elevation, I-12 is the traditional line of evacuation for St. Tammany</u> <u>Parish" – (South Central Study Area rezoning PowerPoint presentation)</u>

While not much can be done about existing development, due to the flood hazard and wildlife conservation areas, the rezoning has resulted in lower allowable densities lakeward of I-12.

Madisonville, Sun, Pearl River, and Abita Springs do not have their own comprehensive plans. Folsom is in the process of developing one. There have been no amendments to the municipalities' zoning ordinances. They all allow development in the floodplain (Madisonville is almost 100% floodprone and has no choice), but require such development to meet flood protection standards.

6.2. Open Space Preservation

6.2.1. General Keeping the floodplain and other hazardous areas open and free from development is the best approach to preventing damage to new developments. Open space can be maintained in agricultural use or can serve as parks, greenway corridors and golf courses.

Comprehensive and capital improvement plans should identify areas to be preserved by acquisition and other means, such as purchasing an easement. With an easement, the owner is free to develop and use private property, but property taxes are reduced or a payment is made to the owner if the owner agrees to not build on the part set aside in the easement.

Although there are some Federal programs that can help acquire or reserve open lands, open space lands and easements do not always have to be purchased. Developers can be encouraged to dedicate park land and required to dedicate easements for drainage and maintenance purposes. These are usually linear areas along property lines or channels. Maintenance easements also can be donated by streamside property owners in return for a community maintenance program.



6.2.2. Implementation in St. Tammany Parish There is currently a sizeable amount of the Parish preserved as open space in the form of National and State wildlife and game refuges and state parks. These are shown in Map 6-2. The largest coincide with mapped floodplains along the Pearl River or the Lake Pontchartrain shoreline.

As noted in the previous section, the New Directions 2025 Plan calls for preserving even more floodplains, wetlands and other sensitive areas as open space. A recent referendum to increase local taxes to fund setting lands aside for conservation and open space purposes failed to pass. It was concluded that a greater effort would be needed to inform the public about both the recreational and flood protection benefits of preserving open space.

Section 40-039.0 of the Parish's subdivision regulations requires that the developer of each subdivision with more than 25 lots shall



the Pearl River floodplain from development.

set aside land within their development for the use of the residents for recreational purposes at a ratio of not less than 580 square feet per residential lot. The developer may pay a fee in lieu of dedicating land for open space.

Sun does not have a mapped floodplain. Folsom's floodplain is either currently developed as residential or open for residential development.

6.2.3. CRS credit Preserving floodprone areas as open space is one of the highest priorities of the Community Rating System. Up to 700 points can be given, based on how much of the floodplain is in parks, wildlife refuges, golf courses, or other uses that can be depended on to stay open (Activity 420 – Open Space Preservation).

The CRS is a Federal program designed to credit state and local activities above and beyond what the Federal government does. Therefore, there is no credit for Federal lands kept as open space. Based on the open space areas shown in Map 6-2, the Parish would receive an estimated 38 points. Additional credit is provided if there are deed restrictions on the parcels or if they are kept in a natural state. The state wildlife refuge would qualify for this last credit.

Abita Springs and Pearl River should receive 38 points, too. Folsom would receive no open space credit and Sun is not in the National Flood Insurance Program and therefore ineligible for CRS credits.

6.2.4. 2009 Update With a few exceptions, there has been no change in the amount of open space in the Parish. The largest exception is the purchase of the "French property" of 22.19 acres in the Bayou Liberty floodplain. Other exceptions are the several properties that have been purchased and cleared with FEMA mitigation grants (see Section 5.4.5). These parcels must stay open according to a FEMA-required deed restriction. The Parish may purchase and clear some blighted properties in the future, too.

The new Digital Flood Insurance Rate Maps (DFIRMs) are on an aerial photo base map. A review of the existing development shows that the new floodplains in Folsom, Sun, Abita Springs, and Pearl River are 80% - 90% open space. The DFIRM printout for the Folsom area, below, is a good example of this, where most of the floodplain is in darker, wooded areas.



Being on the lakeshore, Madisonville is almost 100% in the floodplain, but still has large open areas inside the corporate limits.

6.3. Subdivision Regulations

6.3.1. General Subdivision regulations govern how land will be subdivided and sets construction standards. These standards generally address roads, sidewalks, utilities, storm sewers and drainageways. They can include the following hazard protection standards:

- Requiring that the final plat show all hazardous areas
- Road standards that allow passage of fire fighting equipment and snow plows
- Requiring power or phone lines to be buried
- Minimum water pressures needed for fire fighting



- Requiring that each lot be provided with a building site above the flood level
- Requiring that all roadways be no more than one foot below the flood elevation.

6.3.2. Implementation in St. Tammany Parish Subdivision Regulatory Ordinance No. 499 has the following provisions related to natural hazard protection:

- The placement of fill is restricted on lots less than 90 feet wide in areas where there are no approved drainage plans. Bringing fill in from off the site is restricted to the area below the building's roof line. "There shall be no net change in the average elevation of the natural grade of the lot outside of the roofshed." This provision will help protect neighbors from the adverse stormwater drainage effects of filling lots.
- The initial subdivision plan submitted to the Parish for review must show wetlands, state the flood zone and designate the slab elevations.
- A qualified hydrologist shall present engineering proposals "to certify that the runoff will not be increased by the proposed development."
- Finished floor elevation for residential home construction must be at least 6" above the nearest adjacent road.
- Floodplain standards are prescribed for mobile home parks, recreational vehicle parks, and campgrounds.
- Standards are set for water supply and fire hydrants in subdivisions in areas with community water supplies.
- Subdivision plans are to be reviewed by the local fire chief.
- The inside turning radius in a cul-de-sac shall be at least 26 feet.

 "Access to a mobile home for fire protection services shall be such as to permit fire apparatus to approach within one hundred feet (40') [sic] of each mobile home."

Sun does not have a subdivision ordinance, but Folsom, Abita Springs and Pearl River do. Folsom's regulations have the following provisions:

 The ordinance sets drainage standards and requires easements along all drainage channels.



Local subdivision regulations set street design standards to ensure access by emergency vehicles

- It requires areas subject to flooding to be clearly marked on preliminary and final plats.
- Cul-de-sacs must have at least a 40 foot turn around radius.

Pearl River's is shorter, although cul-de-sacs must have a 50 foot radius. The Town also requires a "servitude" of at least 25 feet on each side of a "canal or important surface drainage course."

6.3.3. CRS credit Some credit is provided for prohibiting fill or requiring compensatory storage. The Parish's provision would need a special review to receive credit. It would also receive up to 10 points for requiring finished floor elevations to be 6" above the street.

Folsom and the Parish would receive 5 points for requiring final (i.e., filed) subdivision plats to show the floodplain. This is credited as a real estate disclosure activity, which is also discussed in Chapter 9. There are no CRS credits for requirements for hazards other than flooding.

6.3.4. 2009 Update Since 2004, there have been no major revisions to the subdivision ordinances for the Parish or the municipalities. One Parish amendment is discussed later in Section 6.7.4.
6.4. Building Codes

6.4.1. General The building code provides one of the best methods of addressing all the hazards in this plan. It is the prime measure to protect new property from damage by high winds, tornadoes, earthquakes, hail, and winter storms. When properly designed and constructed according to code, the average building can withstand the impacts of most of these forces.

Hazard protection standards for all new and improved or repaired buildings can be incorporated into the local building code. Provisions that should be included are:

- Requiring sprinkler systems for fire protection in larger or public buildings.
- Setting roof and chimney standards to minimize fire hazards.
- Mandating hurricane protection standards for windows and doors.
- Making sure roofing systems will handle high winds and there is adequate hurricane strapping,
- Providing special standards for tying the roof, walls and foundation together to resist the effects of wind (see illustration),
- Including insulation standards that ensure protection from extreme heat and cold as well as energy efficiency,
- Regulating overhanging masonry elements that can fall during a quake,
- Requiring new buildings to have tornado "safe rooms," and
- Ensuring that foundations are strong enough for earth movement and that all structural elements are properly connected to the foundation.



structural elements are properly connected to the foundation.

6.4.2. State building code Louisiana RS 40:1728 B states: "If a building code is adopted by any political subdivision of this state, it must adopt the state uniform construction code." This is to ensure that community codes meet minimum standards and so builders will have the same set of rules in different communities. Up to now, the state Code has been the Standard Building Code of the Southern Building Code Congress International, Inc..

As with the other national model building codes, the Standard Building Code provides the basis for good building safety programs, especially protection from fire and electrical hazards. However, it is not "state of the art" when it comes to addressing natural hazards. Nationally, the model codes are being replaced by the new International Code series. On January 1, 2004 the State Uniform Construction Code will change as a result of Act 387, which became law on June 18, 2003. Louisiana's State Uniform Construction Code now consists of:

- The 2000 edition of the International Building Code, published by the International Code Council, which replaces the 1997 Standard Building Code.
- The 1999 edition of the National Electrical Code Published by the National Fire Protection Association.



- The 2000 edition of the Louisiana State Plumbing Code, published by Louisiana Department of Health and Hospitals.

Act 387 requires that local governments adopt the latest version of the State Uniform Construction Code by January 1, 2004.

6.4.3. I-Code standards Here is some information on the International or I-codes.

Wind standards: After a disaster, FEMA often sends a Building Performance Assistance Team to evaluate how well buildings built to code held up. A recent evaluation of wind and tornado damage concluded that the local codes should be amended to incorporate wind load standards ASCE 7-95 and 7-98. The new I-codes have already incorporated these standards into their codes.

The Institute for Business and Home Safety (IBHS) has also reviewed the I-codes with respect to hazards such as hurricanes, floods, hail, and tornadoes. The IBHS recommends that the International Residential Code should be amended to increase design for wind loads to meet hurricane resistant standards, SSTD-10-99.

Tornado safe rooms are discussed in section 5.2. A building code could require them in new construction.

Flood standards: The I-Codes have a section on flood protection that communities must adopt separately. These are discussed in section 6.6.

Fortified Homes: IBHS has a set of recommendations to strengthen a building to better resist the impacts of natural hazards.



The specific requirements for a "Fortified" home are available through the IBHS website at www.ibhs.com. A Fortified Tornado Windstorm Protection Checklist, provided on the website, defines nearly 20 standards, such as the size and depth of anchor bolts and materials for windows and skylights.

IBHS has researched the
cost for implementing the
Fortified program. Table
6-1 shows the increased
cost of constructing a
"Fortified" home. For less
than 10% above the cost
of the average home, a
builder can incorporate all
of the recommended
criteria for a safer
building.

Hail standards: The IBHS also supports stronger codes for roofing standards so they can

Table 6-1 Cost of a home meeting IBHS' "Fortified" code recommendations						
	Standard Home	"Fortified" Home	Incremental Cost			
Impact resistant windows and doors	\$5,450	\$15,500	\$10,050			
Garage doors	\$650	\$1,250	\$600			
Roof decking	\$650	\$1,750	\$1,100			
Sealing roof joints	\$0	\$650	\$650			
Roof covering	\$2,350	\$3,350	\$1,000			
Concrete/steel down pours	\$0	\$500	\$500			
Fortified inspection costs	\$0	\$1,000	\$1,000			
Total incremental cost			\$14,900			
Percentage of base cost	9.8%					
Source: Institute for Business and Home Safety Note that cost figures are for Florida						

better resist damage from hail. It recommends that communities adopt the Underwriters Laboratory Standard 2218, to increase the impact resistance of roofing.

6.4.4. Code Administration Just as important as the code standards is the enforcement of the code. There were many reports of buildings that lost their roofs during Hurricane Andrew in Florida because sloppy construction practices did not put enough nails in them. Adequate inspections are needed during the course of construction to ensure that the builder understands the requirements and is following them. Making sure a structure is properly anchored requires site inspections at each step.

There is a national program that measures local building code natural hazard protection standards and code administration. The Building Code Effectiveness Grading Schedule

(BCEGS) is used by the insurance industry to determine how well new construction is protected from wind, earthquake and other non-flood hazards. It is similar to the 10-year old Community Rating System and the century-old fire insurance rating scheme: building permit programs are reviewed and scored, a class 1 community is the best, and a class 10 community has little or no program.



A building code is worthless without adequate plan reviews and inspections during construction to ensure compliance **6.4.5. Implementation in St. Tammany Parish** St. Tammany Parish has been enforcing the Standard Building Code and the CABO code for one and two family dwellings. Plans are to adopt the I-Codes as required by State law by May 2004. Abita Springs and Pearl River will also need to adopt the required codes.

BCEGS is administered by the Property Insurance Association of Louisiana. Due to staff shortages, PIAL has only reviewed those communities that have requested a classification. The BCEGS residential/commercial code enforcement scores for Mandeville and Slidell are 3/3 and 5/5, respectively. The other cities and St. Tammany Parish have not requested a BCEGS score.

6.4.6. CRS credit The Community Rating System encourages strong building codes. It provides credit in two ways: points are awarded based on the community's BCEGS classification and points are awarded for adopting the International Code series. Up to 120 points are possible. St. Tammany Parish would receive up to 60 points when it adopts the current State Uniform Construction Code requirements.

The CRS also has a prerequisite for a community to attain a CRS Class 8 or better: the community must have a BCEGS class of 6 or better. To attain a CRS Class 4 or better, the community must have a BCEGS class of 5 or better. In other words, a strong building code program is a must to do well in the Community Rating System.

Mandeville received a BCEGS class of 3/3 which allowed it to become a CRS Class 7 last year. A Class 7 is the best rating in the state at this time. St. Tammany Parish would have to request a BCEGS classification if it wanted the BCEGS credit and to improve its classification to be better than a Class 8.

6.4.7. 2009 Update

State Building Code: The state's Uniform Construction Code laws were changed in 2005, due to a recognition of the need for a strong code following Hurricanes Katrina and Rita. In 2007, the official Uniform Construction Code was revised to be:

- <u>The 2006 International Building Code</u>
- The 2006 International Existing Building Code
- The 2006 International Residential Code
- <u>The 2006 International Mechanical Code</u>
- <u>The Louisiana State Plumbing Code</u>
- The 2006 International Fuel Gas Code
- The 2005 National Electrical Code

Each code has specific sections amended in the State's adoption language, but they relate to administrative matters, rather than construction standards. Effective January 1, 2007, the Uniform Construction Code became mandatory for all parishes and cities. Except for an exclusion for farm and private outdoor recreation structures, these amendments brings the state's code up to the national "state of the art." All but the Existing Building Code have been adopted as part of the "Building Code of St. Tammany Parish."

Abita Springs adopted the International Codes in 2000. The other municipalities adopted it as the state's required code after it was mandated in 2005.

I Code Standards: The state's adoption language specifically references the higher standards of IBHS' Fortified program and the Federal Alliance for Safe Homes' Blueprint for Safety. The latter is an educational program for builders on how to build, remodel or restore homes using disaster-resistant techniques, technologies and products.



FEMA conducted an evaluation of how well buildings held up to flooding and winds during Katrina. The flood findings and recommendations are covered in Section 6.6. The evaluation team noted that many codes are designed for higher winds, but there was still a lot of damage. The team's *Summary Report on Building Performance, Hurricane Katrina* 2005, recommended:

- Adoption and enforcement of the latest building codes (which was done in 2007),
- Pay special attention to the design of the building envelope and cladding,
- Strengthen connections and the load path during renovation and repairs, and
- Pay more attention to the design, construction, and operation of critical facilities.

The Institute of Building and Home Safety evaluated the performance of homes constructed to its Fortified criteria in areas in Texas hit by Hurricane Ike. The field team reported:

The Fortified...for safer living[®] homes in Audubon Village ... performed remarkably well structurally. and had minor interior damage. Of the approximately 200 homes that were previously standing in the area, 14 remain. Ten of those houses are Fortified (see photo). Three other Fortified homes were, in fact, most likely destroyed when older conventionally built homes crashed into them as a result of the storm surge.



Nine of the 10 Fortified...for safer living® homes in Audubon Village, Bolivar Peninsula, Texas. Source: http://disastersafety.org/text.asp?id=hurricane_ike

Code administration: The 2004 Plan recommended that the Parish pursue a BCEGS evaluation. This was not done.

CRS credit: The credit for adopting the latest building codes has been increased. The Parish should receive 95 points and the municipalities should receive almost as much credit. However, they will not receive the additional points for a BCEGS classification unless they request one from the Property Insurance Association of Louisiana.

6.5. Manufactured Homes

6.5.1. General Manufactured or "mobile" homes are usually not regulated by local building codes. They are built in a factory in another state and are shipped to a site. They do have to meet construction standards set by the US Department of Housing and Urban Development. All mobile type homes constructed after 1976 must comply with HUD's National Manufactured Home Construction and Safety Standards. These standards apply uniformly across the country and it is illegal for a local unit of government to require additional construction requirements. Local jurisdictions may regulate the location of these structures and their on-site installation.

As is well known, the greatest mitigation concern with manufactured housing is protection from damage by wind. The key to local mitigation of wind damage to mobile homes is their installation.

Following tornadoes in Oklahoma and Kansas, FEMA's Building



Performance Assistance Team found that newer manufactured housing that had been anchored to permanent foundations performed better. They also found that newer homes are designed to better transmit wind up-lift and overturning forces to the foundation. Unfortunately, the FEMA team found that building officials were often unaware of manufacturer's installation guidelines with respect to permanent foundations.

6.5.2. State requirements The Louisiana Manufactured Housing Commission was created in 2001. It is responsible for licensing and regulating the sale and installation of

mobile homes. RS 51:912 establishes a variety of installation requirements including frame and roof tie downs. An installer must be licensed and must obtain a state permit. Installation must be done in accordance with manufacturers' specifications and the installer must certify to the Commission that a home is in compliance with Part 912. These state installation standards preempt any local regulations.

The law notes that "In flood-prone areas, the foundation shall comply with the requirements set forth in the manual, Manufactured Home Installation In Flood Hazard Areas, published by the Federal Emergency Management Agency."



6.5.3. Implementation in St. Tammany Parish Parish permits are required for installation of a mobile home, either on its own lot or in a mobile home park. Permit staff check tie-downs and, in the floodplain, make sure the lowest floor and air conditioning unit are elevated above the base flood elevation.

6.5.4. CRS credit The NFIP allows communities to exempt mobile homes in existing mobile home parks from some of the flood protection requirements. The CRS provides up to 50 points if the community does not use this exemption. Because the St. Tammany Parish Flood Hazard Area Ordinance does not differentiate between mobile homes parks and those not in parks, it would receive this credit.

Folsom's Flood Damage Prevention Ordinance does have the exemption, so the Village would not receive this credit. There are no CRS credits for manufactured housing standards for hazards other than flooding.

6.5.5. 2009 Update The Parish and all of the municipalities have ordinances that regulate manufactured housing and mobile home parks. The Parish is revising its zoning regulations and will have a manufactured housing overlay district, which identifies where such housing is allowed (which does not include "inappropriate places").

Folsom has a mobile home district in its zoning ordinance, which allows individual units and parks. It allows only mobile homes that have been certified as meeting the U.S. Department of Housing and Urban Development's Mobile Home Construction Safety Standards. It also specifies tie down requirements.

6.6. Floodplain Regulations

6.6.1. General Most communities with a flood problem participate in the National Flood Insurance Program (NFIP). The NFIP sets minimum requirements for the participating communities' standards for development, subdivision of land, construction of buildings, installation of mobile homes, and improvements and repairs to buildings. These are usually spelled out in a separate ordinance.

The NFIP minimum requirements are summarized in the box on the next page. It should be stressed that these are *minimum* requirements. While there are no additional state requirements in Louisiana, local conditions, such as high velocity flooding or the presence of a potential dam failure, warrant higher local standards.

6.6.2. Enforcement To ensure that communities are meeting the NFIP standards, FEMA periodically conducts a Community Assessment Visit. During this visit, the maps and ordinances are reviewed, permits are checked, and issues are discussed with staff. Failure to meet all of the requirements can result in one or more consequences:

- Reclassification under the Community Rating System to a lower class,
- Probation, which entails a \$50 surcharge on every flood insurance policy in the community, or
- Suspension from the NFIP.

In 2004, Lafourche Parish was cited and reclassified from a CRS Class 9 to a Class 10, in effect kicking it out of the CRS. Suspension is more serious. It means that the community is out of the NFIP and the following sanctions would go into effect:

- Flood insurance will not be available. No resident will be able to purchase a flood insurance policy.
- Existing flood insurance policies will not be renewed.
- No direct Federal grants or loans for development may be made in identified flood hazard areas under programs administered by Federal agencies such as HUD, EPA, and the Small Business Administration.
- Federal disaster assistance will not be provided to repair insurable buildings located in identified flood hazard areas for damage caused by a flood.
- No Federal mortgage insurance or loan guarantees may be provided in identified flood hazard areas. This includes policies written by FHA, VA, and others.
- Federally insured or regulated lending institutions, such as banks and credit unions, must notify applicants seeking loans for insurable buildings in flood hazard areas that there is a flood hazard and the property is not eligible for Federal disaster relief.

These sanctions can be severe for any community with a substantial number of buildings in the floodplain. Most communities with a flood problem have joined the NFIP and are in full compliance with their regulatory obligations.

Minimum National Flood Insurance Program Regulatory Requirements

The National Flood Insurance Program (NFIP) is administered by the Federal Emergency Management Agency (FEMA). As a condition of making flood insurance available for their residents, communities that participate in the NFIP agree to regulate new construction in the area subject to inundation by the 100-year (base) flood. The floodplain subject to these requirements is shown as an A or V Zone on the Flood Insurance Rate Map (FIRM).

There are five major floodplain regulatory requirements. Additional floodplain regulatory requirements may be set by state and local law.

- 1. All development in the 100-year floodplain must have a permit from the community. The NFIP regulations define "development" as any manmade change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations or storage of equipment or materials.
- 2. Development along a river or other channel cannot obstruct flows so as to cause an increase in flooding on other properties. An analysis must be conducted to demonstrate that the cumulative effect of the proposed development, when combined with all other existing and anticipated development, will not increase the water surface elevation of the base flood more than one foot at any point within the community.
- New buildings may be built in the floodplain, but they must be protected from damage by the base flood. In riverine floodplains, the lowest floor of residential buildings must be elevated to or above the base flood elevation (BFE). Nonresidential buildings must be either elevated or floodproofed.
- 4. Development in the coastal high hazard area (shown as a V Zone on the FIRM) cannot obstruct the flow of waves, so the lower areas of an elevated building must remain open, as illustrated in the middle example to the right.
- Under the NFIP, a "substantially improved" building is treated as a new building. The NFIP regulations define "substantial improvement" as any reconstruction, rehabilitation, addition, or other improvement of a structure, the



cost of which equals or exceeds 50 percent of the market value of the structure before the start of construction of the improvement. This requirement also applies to buildings that are substantially damaged.

Communities are encouraged to adopt local ordinances that are more comprehensive or provide more protection than the Federal criteria. The NFIP's Community Rating System provides insurance premium credits to recognize the additional flood protection benefit of higher regulatory standards.

One way to assure good administration and enforcement is to have certified floodplain managers on staff. The Association of State Floodplain Managers administers the national Certified Floodplain Manager (CFM[®]) program. Certification involves a three hour exam and a requirement for continuing education each year. The exam covers the regulatory standards of the National Flood Insurance Program as well as mapping, administration, enforcement, and flood hazard mitigation.

6.6.3. Implementation in St. Tammany Parish The Parish's Flood Hazard Area Ordinance meets all of the NFIP's floodplain regulatory requirements. As noted in the previous section, the rules for mobile home parks are higher than the minimum requirements. The Ordinance also designates an area to the east of Slidell where new buildings must be elevated one foot above the base flood elevation.

Folsom's, Abita Springs' and Pearl River's Flood Damage Prevention Ordinances meet the minimum requirements. Sun has a Flood Insurance Rate Map, but does not have floodplain regulations and is not in the NFIP. The sanctions listed in section 6.6.2 are in effect within the Village limits.

The Parish and all eight municipalities received a Community Assessment Visit (CAV) in 1999. Over 150 "potential violations" to the regulations were recorded. Most of them related to not having floors or equipment elevated high enough or enclosing and reusing areas that are supposed to be kept floodable. Most of them have been resolved through later work with FEMA and the State NFIP Coordinator's office.

Another finding was the absence of mapped floodways. Floodways were felt to be inappropriate given the shallow, wide and slow moving streams in the Parish. They are a regulatory tool that prevents new development from increasing flood levels on other properties. The CAV report noted "Without delineation of floodways this requirement is almost impossible to enforce." It noted that an alternative approach used by several communities is to restrict the total amount of fill allowed on a floodplain lot.

The "No. 1" recommendation was that all nine communities adopt a higher standards ordinance, including counting improvements cumulatively and requiring one foot of freeboard above the base flood elevation. The CAV report also recommended that the Village of Sun join the NFIP, administrators of the floodplain regulations go to more training, and better procedures be adopted for post-flood inspections and determining substantial damage.

The CAV report noted several discrepancies in the Flood Insurance Rate Map that should be corrected. There will soon be a parish-wide FIRM with new flood elevations and maps. This will be coordinated with the watershed mapping being conducted by the Parish and described in section 8.3. Formal coordination of these efforts could be established under FEMA's Cooperating Technical Partnership agreements.

Although there are more than 1,500 Certified Floodplain Managers in the country and hundreds in Texas and Oklahoma, there are only 14 in Louisiana. There are no CFMs on the Parish's staff or any of the cities' staffs.

6.6.4. CRS credit: There are many higher regulatory standards that warrant CRS credit. As noted above, the Parish only qualifies for two of 13 different elements. The towns and villages do not have any higher standards.

There are many additional floodplain management standards that the Parish and the municipalities could adopt that would be helpful for protecting new buildings. These include:

- Delineating a floodway, the area of higher hazard near the channel. This would allow development outside the floodway (called the "floodplain fringe") without engineering studies to determine their impact on others.
- Requiring all new construction to be elevated one or two feet above the base flood elevation to provide an extra level of protection from waves and higher floods. As shown on Table 5-1, this extra protection is reflected in a distinct reduction in flood insurance rates.
- Having all developers (not just the larger ones) provide flood data where none are available.
- Specifications to protect foundations from erosion, scour and settling.
- Prohibiting critical facilities from all or parts of the floodplain.
- Prohibiting hazardous materials.
- Requiring buffers adjacent to streams or natural areas.
- Restrictions on use of enclosures below elevated buildings.
- Flood storage lost due to filling and construction must be compensated for by removal of an equal volume of storage.

The CRS also provides credit for having trained staff and a higher credit if the staff are Certified Floodplain Managers.

It should be noted that one of the prerequisites for participation in the CRS is that the community be in full compliance with the minimum requirements of the NFIP. A community with a number of "potential violations" risks being removed from the CRS entirely.

6.6.5. 2009 Update: The Parish took FEMA's recommendation on filling to heart and passed a prohibition of filling in the floodplain or "critical drainage area." Filling for foundation construction is allowed, providing an equal amount of soil is removed from the site. These provisions should receive 70 – 80 points under the CRS.

The Village of Sun voted in October 2008 to join the NFIP. It has passed the appropriate ordinance, but has not yet submitted the application.



FEMA conducted an evaluation of how well buildings held up to flooding during Katrina. The team's Summary Report recommended more attention to design of structures in coastal floodplains, using the new advisory base flood elevations, adoption of a freeboard requirement, requiring stronger foundations in areas subject to debris, and use of new FEMA guidance for builders.

The Parish adopted FEMA's advisory base flood elevations (ABFEs) in 2006, as noted in Chapter 2, Section 2.2.3. The major impact of this is that new construction and repairs to substantially damaged buildings are protected to one foot above the base flood elevation in areas flooded by Katrina,



Recommended Residential Construction for the Gulf Coast Building on Strong and Safe Foundations FEMA 550 / hby 2006

west of Interstate 10 (although some areas were exempted from this requirement). This standard will be replaced when the preliminary Digital Flood Insurance Rate Map is adopted in 2009 (also explained in Section 2.2.3).

Enforcement: FEMA conducted more Community Assistance Visits for the Parish and the municipalities in 2006 and 2007. The general findings are plotted in Table 6-2.

Table 6-2 Recent Community Assistance Visit Findings							
	Parish	Abita Springs	Folsom	Madisonville	Pearl River		
CAV Date	9/13/07	11/9/06	11/2/06	5/30/07	3/14/07		
Ordinance	Minor Prob	OK	OK	OK	OK		
Maps and flood study	OK	Minor Prob	Minor Prob	OK	OK		
Enforcement procedures	Major Prob.	OK	OK	Minor Prob	OK		
Potential violations	116	0	0	0	0		
* Information not available, but a 2002 CAV found no problems.							

Table 6-2 shows that the most serious problems were found with the Parish, which may be due to the fact that 95% of the development in the planning area is in the unincorporated areas, subject to the Parish's ordinance. FEMA found problems with permit tracking, expired permits, cross checking building permits when other permits are issued, and turnover in staff.

After follow up contacts, the CAV staff reported that Parish staff was working hard with FEMA to rectify the problems and that the number of potential violations had been cut in half.

Statewide, the number of Certified Floodplain Managers has greatly increased from 14 to 100. However, except for Slidell, there are none on the regulatory staff of the Parish or the municipalities in the Parish.

CRS: Currently the Parish is only receiving partial credit for enforcing freeboard in a portion of the floodplain. Adoption of the ABFEs and the state's building code will provide more points, but the best approach would be to adopt the recommendations of the FEMA post-Katrina evaluation of the performance of the regulatory standards.

6.7. Drainage Regulations

New development in mapped floodplains can be protected from overbank and coastal flooding by floodplain regulations. As discussed in Sections 2.2.1 and 2.2.A, St. Tammany Parish is also subject to stormwater flooding, i.e., flooding from stormwater runoff that has not yet reached the larger channels.

6.7.1. General There are three ways to prevent flooding problems caused by stormwater runoff:

- Ensure that new subdivisions and other development have adequate storm sewers and/or drainageways to carry the water away,
- Require new developments to hold their excess runoff on site, so it won't overload the existing drainageways, and
- Set construction standards so buildings are protected from shallow water.

Drainageway standards are typically in subdivision regulations. Standards for storm sewers, ditches, culverts, etc. are best set when an area is laid out and developed. Traditionally, the national standard is to require that the local drainage system carry the 10-year storm. Recently, communities are finding that older estimates of the 10-year storm understated the true hazard, so they are addressing larger storms.

One problem with requiring the drainage system to carry water away is that runoff increases with urban development (see the illustration on page 2-16). The runoff equivalent of a 10-year storm occurs more frequently, from smaller storms. The problem is just sent downstream onto someone else's property.

Accordingly, modern subdivision regulations require new developments to ensure that the post-development peak runoff will not be greater than under pre-development conditions. This is usually done by constructing retention or detention basins to hold the runoff for a few hours or days, until flows in the system have subsided and the downstream channels can accept the water without flooding

If the storm sewers or roadside ditches cannot handle a heavy rain, the standard subdivision design uses the streets to carry excess runoff. If the flows exceed the street's capacity, adjacent properties will flood. Therefore, the third approach to protecting from stormwater flooding is to make sure new buildings are elevated one or two feet above the street or above adjacent grade.



2002 stormwater flooding showing how close the floor is to the ground Source: Dept of Public Works



6.7.2. Implementation in St. Tammany Parish Section 40-037.0 of the Parish's subdivision regulations has some specific drainage requirements for new developments. Two special rules are of note. Section 40-037.01 has special rules for subsurface drainage in District 13, the floodprone area east and south of Slidell. Section 40-037.02 sets standards for the Parish to accept maintenance responsibility for new retention/detention basins.

Section 40-037.04 and .05 set requirements for filling. Importing fill is restricted to the area under the roof and "There shall be no net change in the average elevation of the natural grade of the lot outside of the roofshed." If the finished floor must be more than 2 feet above grade to meet floodplain regulations, the building must be on piers or pilings.

Section 40-061.01 requires a hydrological study for all new subdivisions to design the appropriate retention/detention facility. The standards for the facility are in subsection 4:

4. All drainage structures will be designed to provide for reductions in peak rate of runoff for all storm events up to the 100 year storm. The peak rate of runoff for the 25, 50 and 100 year storm shall be reduced by 25%. At no time shall the rate of runoff exceed that of the pre-development conditions of the subject parcel.

Subsection 6 requires that the first floor of all new buildings be at least 6 inches above the street.

Sections 40-037.04 and .05 have different standards for different floodplain zones. Chapter 7 of the Parish Code, Drainage and Flood Control, has additional requirements for protecting drainageways and the use of fill. At the end of the floodplain regulations are sections on drainage and paving plans. When comparing the rules in the subdivision ordinance, the floodplain ordinance, and other locations in the Parish Code, these provisions can be confusing.

These rules would be amended under proposed revisions to the subdivision regulations and new Watershed Protection Regulations. The current drainage regulations would be replaced by watershed-based rules. Developers will be prohibited from filling certain areas and must prepare drainage plans before they can receive a permit. Conflicts between ordinances will be cleared up under these proposals. Sun does not have a subdivision regulation. Folsom's ordinance requires drainage facilities to provide for a 5-year storm (Section 18.3(h)). There is no mention of retention or detention of stormwater or elevating buildings above the street level. Neither Abita Springs or Pearl River require new developments to provide retention/detention basins.

6.7.3. CRS credit: The Parish's drainage and retention/detention regulations are exemplary and would score very well under the CRS. The retention/detention rules would receive the maximum possible score for managing storms up to and including the 100-year storm. It would get a very high score for the provisions for Parish maintenance. These scores would be adjusted to reflect the fact that they are not enforced everywhere, but would still be in the neighborhood of 150 points.

The filling rules would receive some credit, but because they are unique, a special review would be needed to score them. The requirement for drainage plans and elevation of buildings above the street would qualify for 25 points. The erosion and sediment control rules would receive 30 points.

The municipalities' programs would not be credited by the CRS.

6.7.4. 2009 Update: The proposed watershed protection regulations were not adopted as such. Instead, in 2005, the Parish amended its subdivision ordinance to include new provisions restricting "the placement of fill material on lots less than ninety (90) feet in width to prevent storm water from being displaced onto adjacent property thereby increasing the potential or actual flood damage to adjacent property."

The restrictions are greater in areas mapped as regulatory floodplain – the amount of fill is limited to the area of the "roofshed," i.e., not much more than the building's footprint.

Some communities, such as Pearl River, have passed stormwater ordinances, but they focus on water quality aspects. While they require "best management practices," they do not specifically require stormwater retention, detention, or requirements for local drainage. The municipalities' drainage regulations are still the standard subdivision requirements.

6.8. Coastal Zone and Wetlands Protection

6.8.1. General The area south of Interstates 12 and 10 has been designated as the Parish's coastal zone. This zone acts as a buffer to storm surge, protecting inland areas form flooding. Wetlands provide water storage during floods and regulate the rate of flow of flood waters. A study in Illinois found that for every 1% increase in protected wetlands along a steam corridor, peak stream flows decreased by 3.7%.

Research is showing that wetlands can provide effective treatment of wastewater. The coastal zone and wetlands are habitat to as diverse a population of species as the rain forest. It is the nursery ground for the marine species that support the area's commercial and recreational fishing industries. The State dubs them "the richest, most productive ecosystem in the world."



Because of all these factors, the coastal zone and wetlands have been set aside for special protection. The Department of Natural Resources,

the U.S. Army Corps of Engineers, and the U.S. Fish and Wildlife Service administer several programs to protect and restore them. Several private organizations, particularly

several programs to protect and restore them. Several private organizations, particularly the Lake Pontchartrain Foundation, the Sierra Club, and sportsmen's association, are also active.

Central to hazard mitigation and preventive activities are the requirements for a State Coastal Use Permit (CUP) and a Corps' 404 wetlands permit. The objective of these programs is to make certain that any activity affecting the coastal zone or wetlands, such as a project that involves dredging or filling, will cause the least amount of damage. Less damage to these areas means more protection of the Parish from storm surge and flooding.

Some other permits that may be required for work in wetlands or near water bodies include a Department of Environmental Quality Water Quality Certification, a State Lands Office Permit, or a Scenic Streams permit. All of these programs have been charged with reviewing certain activities that take place in the Louisiana Coastal Zone. Their work is somewhat coordinated with a common permit application form.

Generally, the agencies responsible for coastal use or 404 permits want to protect waters and wetlands by preventing development that will adversely affect them. If a permit is issued, the impact of the development is typically required to be mitigated. Wetland mitigation can include creation, restoration, enhancement or preservation of wetlands. The appropriate type of mitigation is addressed in each permit.

Natural Hazards Mitigation Plan

6.8.2. Implementation in St. Tammany Parish The Parish's coastal zone program was approved by the State in 1992. The guidance for St. Tammany Parish is that any development that takes place on a waterway or below the 5' contour should apply for a Coastal Use Permit (CUP) from the State or a local CUP from the Parish's Coastal Zone Management Office.

Which agency will review the application depends on the nature of the use and its location. For example, those activities on state water bottom will be "Uses of State Concern" and the state would handle the application. A boat slip being dug off of a man made canal would constitute a "Use of Local Concern" and be processed by the Parish. However, applications are sent to the DNR for that determination.

6.8.3. CRS credit: The CRS favors activities that directly impact flood damage to buildings. It does provide extra credit for regulations that protect an area's natural and beneficial functions (25 points) and for preserving open space areas in their original natural state. The latter credit is not available for lands owned by the Federal government, such as a national wildlife refuge, but is provided for state lands.

6.8.4. 2009 Update Information about the Parish's coastal zone program cannot be found on the Parish's website and the Parish's advisory committee is listed as "inactive" in state references. State permits are still required, though. A joint state-Corps of Engineers permit form was revised in 2004.



6.9. Urban Forestry

6.9.1. General Trees are particularly subject to damage by wind, ice and snow storms. Downed trees and branches break utility lines and damage buildings, parked vehicles and anything else that was under them. An urban forestry program can reduce the damage potential of trees.

Urban foresters or arborists can select hardier trees which can better withstand high wind and ice accumulation. Only trees that attain a height less than the utility lines should be allowed along the power and telephone line rights-of-way. Just as important as planting the right trees is correct pruning after a storm. If not done right, the damaged tree will not heal properly, decay over the next few years, and cause a hazard in the future. A trained person should review every damaged tree to determine if it should be pruned or removed.



Trees are the first victims of ice storms

By having stronger trees, programs of proper pruning, and on-going evaluation of the trees, communities can prevent serious damage to their tree population. A properly written and enforced urban forestry plan can reduce liability, alleviate the extent of fallen trees and limbs caused by wind and ice build-up, and provide guidance on repairs and pruning after a storm. Such a plan helps a community qualify to be a Tree City USA.



6.9.2. Implementation in St. Tammany Parish There are only 23 Tree Cities USA in Louisiana, but they include Abita Springs, Covington and Mandeville. Counties and parishes are not eligible for the program, but they can implement the credited activities.

Pearl River also has a forestry program. The Town has two ordinances that regulate trees and landscaping (Ordinances #96-1112 and #01-00). These ordinances set requirements on the size of new trees allowed near power lines and protect existing trees and foliage. Ordinance #96-1112 establishes a Town Tree Committee to monitor compliance and requires tree trimming contractors to be licensed.

6.9.3. CRS credit Being a part of the National Flood Insurance Program, the CRS recognizes only activities that affect flood damage. It does not provide credit for projects or programs that only affect damage from other types of hazards.

6.9.4. 2009 Update The Town of Abita Springs has lost its Tree City USA designation, but Slidell has joined up. The program now allows counties and parishes to participate. Terrebonne and Jefferson Parish are new participants.



6.10. Conclusions

1. New Directions 2025 and its future land use plan have many recommendations that support natural hazard mitigation, especially protection of future development from flooding. It is important that the zoning ordinance, capital improvement plan, and other products that will be prepared pursuant to ND 2025 implement those recommendations.

2009 update: The rezoning effort and the 10-year infrastructure plan (covered in Chapter 8) are indicators that the Parish is serious about implementing ND 2025.

- 2. While the larger floodprone areas are preserved under Federal and State ownership, there are more opportunities to preserve more open space, especially as when new developments are proposed.
- 3. The Parish has very good standards and requirements for new subdivisions.
- 4. The International series of codes have improved provisions for protecting new buildings from damage by natural hazards. The Parish has not yet adopted the I-Codes nor has it had its program reviewed by the Building Code Effectiveness Grading Schedule.

2009 update: The Parish and the municipalities adopted the I-Codes when they adopted the recently required state building code. However, there have been no BCEGS evaluations of staffing and administration, a requirement if the Parish wanted to improve past a CRS Class 8.

- 5. Installation of new mobile homes appears to be adequately administered to ensure proper tie downs and flood protection.
- 6. The Parish's Flood Insurance Rate Map will be updated. A formal agreement between FEMA and the Parish would help.

2009 update: The draft preliminary Digital Flood Insurance Rate Map has been published and is being reviewed by the Parish and by affected property owners.

7. The Parish's floodplain regulations barely exceed the minimum national requirements. Both the standards and enforcement could be strengthened in several ways.

2009 update: The latest series of FEMA Community Assistance Visits underscores the need for improved procedures and for training and certifying staff.

8. The Parish has excellent standards and requirements for new subdivisions and drainage regulations.

9. The Parish's programs for drainage regulations and coastal zone and wetlands protection are good. The former will be greatly improved with the adoption of the proposed Watershed Protection Regulations.

2009 update: Instead of adopting separate watershed protection regulations, the drainage and filling requirements have been strengthened since 2004.

10. An urban forestry program can be effective against damage and power losses from wind and ice storms.

6.11. 2009 Recommendations

- 1. The next zoning ordinance, capital improvement plan, and other products that will be prepared pursuant to ND 2025 should implement the 2025 plan's recommendations.
- 2. The Parish should use every opportunity to preserve floodplain areas as open space or other use compatible with the flooding hazard.
- 3. The Parish and the municipalities with building codes should adopt the latest International series of codes, the new state Uniform Construction Code. [Dropped as no longer needed]
- 4. The Parish <u>and those municipalities interested in the CRS</u> should request a BCEGS rating from the Property Insurance Association of Louisiana.
- 5. In cooperation with the municipalities in the Parish, permit department staffs should review the I-Codes and the recommendations of the Institute for Business and Home Safety and draft language to strengthen new buildings against damage by high winds, tornadoes and hail.
- 6. The Parish should continue to administer its regulations for subdivisions, mobile homes, and coastal zone and wetlands protection.
- 7. The Parish should enter into a Cooperative Technical Partnership with FEMA to guide development of the new Flood Insurance Rate Map. When the Flood Insurance Rate Map is being revised, the benefits of mapping a regulatory floodway should be reviewed. [Dropped as no longer needed]
- 8. In cooperation with the construction industry, the Parish should review and strengthen its floodplain regulations. Community Rating System credits should be used as an initial guide for regulatory standards.
- 9. The Parish should review and strengthen its procedures for administering and enforcing its floodplain regulations. In particular, procedures are needed to require permits and conduct inspections after a flood or other disaster.
- 10. The Parish should have at least two Certified Floodplain Managers on staff.

- 11. The Parish should implement an urban forestry program based on the criteria of the Tree City USA program.
- 12. The Village of Sun should <u>submit its application to</u> join the National Flood Insurance Program.
- 13. The Parish Council should adopt the proposed Watershed Protection Regulations. [Dropped as no longer needed]

6.12. References

- 1. Coastal Construction Manual, FEMA 55, 2000
- 2. CRS Coordinator's Manual, FEMA, 2007.
- 3. Design and Construction Guidance for Community Shelters, FEMA, 2000.
- 4. Federal Alliance for Safe Homes http://www.flash.org/
- 5. <u>Home Builder's Guide to Coastal Construction Technical Fact Sheets</u>, FEMA 499, <u>2005</u>
- 6. Interviews and meetings with Parish and municipal staff, Fall 2003, 2009
- 7. <u>Louisiana Mapping Project</u>, <u>www.lamappingproject.com/dfirm/StTammany_DFIRM/imap.php</u>
- 8. Manufactured Home Installation In Flood Hazard Areas, FEMA-85, 1985.
- 9. *Midwest Tornadoes of 1999, Observations, Recommendations and Technical Guidance,* FEMA, Building Performance Assessment Report, Preliminary Report, July 13, 1999
- 10. *Multi-Hazard Identification and Risk Assessment*, Federal Emergency Management Agency, 1997.
- 11. Ordinances and regulations for the Villages of Sun and Folsom and the Towns of Madisonville, Abita Springs and Pearl River.
- 12. <u>Recommended Residential Construction for the Gulf Coast: Building on Strong and</u> <u>Safe Foundations, FEMA 550, 2006</u>
- 13. St. Tammany Parish Code of Ordinances:
 - Appendix B, Chapter 40, Subdivision Regulatory Ordinance No. 499
 - Chapter 7, Drainage and Flood Control
 - Chapter 7, Article 2. Flood Hazard Area Ordinance
- 14. St. Tammany Parish Permit Handbook
- 15. "St. Tammany Parish, Louisiana, CAV Summary Report," Halff Associates, 1999
- 16. <u>South Central Study Area rezoning presentation, found at</u> <u>http://www.stpgov.org/departments_planning_rezoning.php</u>

Natural Hazards Mitigation Plan

- 17. <u>Summary Report on Building Performance, Hurricane Katrina 2005</u>, FEMA 548, 2006
- 18. *Subdivision Design in Flood Hazard Areas*, American Planning Association and FEMA, PAS Report 473, 1997.
- 19. <u>Tree City USA website, www.arborday.org/programs/treeCityUSA/</u>
- 20. Websites of the Institute for Business and Home Safety (www.ibhs.org) and various state agencies.
- 21. Wildland/Urban Interface Fire Protection, FEMA, 1989
- 22. Windstorm Mitigation Manual for Light Frame Construction, Illinois Emergency Management Agency, 1997

Chapter 7. Emergency Response

Emergency response measures protect people <u>before</u>, during, and after a disaster. A good emergency management program addresses all hazards (<u>man-made</u> <u>or natural</u>) and it involves all Parish departments, municipalities <u>and other local</u>, <u>state and federal</u> <u>assets</u>.

At the state level, programs are coordinated by the <u>Governors Office of Homeland Security and</u> <u>Emergency Preparedness (GOHSEP)</u>. St. Tammany Parish emergency response is coordinated through the St. Tammany Parish Office of Homeland Security and Emergency Preparedness (OHS/EP). Hazardous conditions and situations exist in all communities, and St. Tammany Parish is no exception. They range from such natural hazards as hurricanes and flooding to serious chemical spills and nuclear attack. ... The Parish Office of Emergency Preparedness (OEP) has the responsibility to identify real and potential hazards and, to the extent possible, prepare plans for coping when and as they occur.

St. Tammany Parish Multi-Hazard
Emergency Operations Plan, 2002

The municipalities generally rely on the Parish for emergency response and do not have their own staff or activities, although elected officials and staff do work together and with the Parish before, during, and after an event.

This chapter reviews emergency response measures following a chronological order of responding to an emergency:

- 7.1. Threat recognition identifying an oncoming problem before it hits
- 7.2. Warning getting the word out
- 7.3. Response doing what can be done in the time available
- 7.4. Evacuation and shelter getting people out of harm's way
- 7.5. Recovery and mitigation clean up, repair and prepare for the next one

7.1. Threat Recognition

The first step in responding to a hurricane, flood, tornado, or other natural hazard is knowing when weather conditions are such that an event could occur. With a proper and timely threat recognition system, adequate warnings can be disseminated.

7.1.1. Tropical storms/hurricanes The National Weather Services' National Hurricane Center in Miami monitors all tropical storm and hurricane activity. It uses computer models to estimate where the storm will make landfall, the predicted wind speeds and the likely storm surge levels. These predictions are updated periodically and disseminated to the media and through emergency management channels.



The Hurricane Center runs the predicted storm through a computer model called SLOSH (Sea, Lake, and Overland Surges from Hurricanes). This provides information on how deep and how far inland storm surges are expected to go.

7.1.2. Floods A flood threat recognition system predicts the time and height of the flood crest. This can be done by measuring rainfall, soil moisture, and stream flows upstream of the community and calculating the subsequent flood levels.

On larger rivers, the measuring and calculating is done by the National Weather Service. Support in NOAA's efforts is provided by cooperating partners from state and local agencies. Flood threat predictions are disseminated on the NOAA Weather Wire or NOAA Weather Radio. NOAA Weather Radio is considered by the federal government as the official source for weather information.

On smaller rivers, locally established rainfall and river gages are needed to establish a flood threat recognition system. The National Weather Service may issue a "flash flood watch." This means the amount of rain expected will cause ponding and other flooding on small streams and depressions. These events are so localized and so rapid that a "flash flood warning" may not be issued, especially if no remote threat recognition equipment is available.

In the absence of a gauging system on small streams, the best threat recognition system is to have local personnel monitor rainfall and stream conditions. While specific flood crests and times will not be predicted, this approach will provide advance notice of potential local or flash flooding.

7.1.3. Severe weather The National Weather Service is the prime agency for detecting meteorological threats, such as tornadoes, fog, hailstorms, and winter storms. Severe weather warnings are transmitted through the NOAA Weather Radio System. As with floods, the Federal agency can only look at the large scale, e.g., whether conditions are appropriate for formation of a tornado.

For tornadoes and thunderstorms, local emergency managers can provide more sitespecific and timely recognition by sending out trained spotters to watch the skies when the Weather Service issues a watch or warning.

Severe snow storms can often be forecast days in advance of the expected event, which allows time for warning and preparation. Though more difficult, the National Weather Service can also forecast ice storms.

7.1.4. Wildfires The Wildland Fire Assessment System is an internet-based information system administered by the U.S. Forest Service in Idaho. It monitors weather conditions, such as moisture and wind, and provides a national view of weather and fire potential, including national fire danger and weather maps. Current conditions and predictions are available at www.fs.fed.us/land/wfas/map_list.htm



The Wildland Fire Assessment System predicts conditions favorable for wildfires. There must be a local observation system to identify and report local fires.

7.1.5. Dam failure A key part of a dam safety program is for the emergency management office to be in touch with the operators of upstream dams. There should be periodic communication checks and clear criteria for when a dam appears threatened and when the community should notify downstream properties.

7.1.6. Implementation in St. Tammany Parish The Sheriff's Communications Office monitors NOAA's Weather Wire and Radio. If a problem is broadcast, OHS/EP is notified. As the threat level increases, the OHS/EP gears up for action, staffs the Emergency Operations Center, issues standby notices to shelters, etc.

Tropical storms: OHS/EP has the SLOSH model in-house and can run it based on data from the National Hurricane Center (see page 7-10). This allows the Parish to know where the worst hit areas will likely be and where to issue evacuation orders. There are also gages in Lake Pontchartrain that can provide more specific local information on lake and surge levels.

Floods: The National Weather Service monitors five river gages in St. Tammany Parish. It issues periodic updates of current river levels and predicted stages. The gages monitored are listed in the example NWS Hydrologic Statement in the box. They are also located on Map 2-6. Their stage data are listed in Table 2-12.

For the gages it monitors, the Weather Service is able to issue a specific *prediction* of when and how high the river will crest. The example to the right was issued on a Sunday. The Pearl River was predicted to crest on Monday at river stage 10.8 at Bogalusa and be at 7.4 at Pearl River. Table 2-12 notes that the datum for the Pearl River gage is 6.13 feet above sea level, so on Monday the river at Pearl River will be at 6.13 + 7.3 =13.43 feet above sea level. This elevation can be transferred to a contour map to determine what areas will be affected. The emergency managers do not have to wait for the flood to come to know where it will go.

HYDROLOGIC STATEMENT NATIONAL WEATHER SERVICE NEW ORLEANS/BATON ROUGE LA 1002 AM CST SUN DEC 21 2003									
FORECASTS INCLUDE 24-HR OBSERVED RAINFALL ENDING AT 6AM CST TODAY AND FORECAST RAINFALL THROUGH 6AM CST TOMORROW						т			
FOR FLOOD CREST STAGE AND DATE INFORMATION SEE THE LATEST RIVER FLOOD WARNING OR STATEMENT NEWFLWNEW OR NEWFLSNEW									
LOCATION	FLD STG	STG TDA	24-HR CHG	F MON	DRECA TUE	AST 7/ WED	AM THU	FRI	
TCHEFUNCTE RIVE FOLSOM US HWY 190 NR	R 16 20	5.5 9.8	0.0 0.0						
BOGUE FALAYA CAMP COVINGTON COVINGTON	45 6	34.5 0.1	0.0 0.5						
BOGUE CHITTO RIV TYLERTOWN FRANKLINTON BUSH	ER 15 12 11	6.1 0.2 3.6	0.0 0.0 0.0	6.1 0.2	6.0 0.1	6.0 0.1	6.0 0.1	6.0 0.0	
LOWER PEARL RIVE BOGALUSA PEARL RIVER	ER 18 14	11.0 7.5	M -0.1	10.8 7.4	10.5 7.3	10.3 7.0	10.0 6.9	9.8 6.7	
National Weather Service river stage report and flood prediction statement									

River gage information is disseminated on the NOAA Weather Wire and is available to the public at www.srh.noaa.gov/lix/html/rvs.shtml. OHS/EP is developing GIS maps that can relate different flood stages to the ground and show what areas will be affected by different flood levels. The plan is to eventually link the GIS software to the gage data and produce real-time flood inundation maps.

The National Weather Service can also issue more general flood statements on smaller streams throughout the Parish.

Severe weather: OHS/EP is working with the National Weather Service to better coordinate severe weather notifications, more specific than the Weather Radio or Weather Wire.

Wildfire: There are several Forest Service fire towers in the northern part of the Parish that monitor fire conditions. Alerts for the general public and burn bans are issued during drought and windy weather conditions.

Dam failure: There are only two "dams" on the State Dam Safety Program's list that are considered of significant hazard. These are the two Corps of Engineers' locks on the Pearl River Canal. Because at times of high flow these locks can be opened by the Corps, the potential for a dam failure is remote. Procedures have not been established to give early warning to the Parish of a possible failure.

7.1.7. CRS credit Credit can be received for utilizing National Hurricane Center warnings and river flood stage predictions for the gages listed on the previous page. The actual score is based on how much of the community's floodplain is affected by these systems. A total of 40 points is possible under Activity 610 – Flood Warning Program.

7.1.8. 2009 update The responsibility for monitoring weather situations and alerts has been transferred from the Sheriff's Communications Office to OHS/EP. The Parish is using newer techniques to monitor severe weather warnings. The National Weather Service sends more Parish-specific notifications by text message, short message service (SMS), and e-mail to OHS/EP.

The river gauge monitoring system proposed in the 2004 Plan is now a reality. The Parish has developed its own gauging system and flood inundation model. Staff monitor 10 gauges on strategic rivers and streams around the Parish to aid in planning efforts during flooding.

One item raised by Planning Committee members is the release of water from the Ross Barnett Reservoir near Jackson, Mississippi, into the Pearl River. There is concern that uncoordinated releases may aggravate flooding when the river in the Parish is high, such as from high tides or storm surge.

The Parish Information Services department has developed GIS maps that can relate different flood stages to the ground and show what areas will be affected by different flood levels. This GIS software is linked to the gage data and flood inundation model and can produce real-time flood inundation maps. An example of a coastal inundation map is on page 7-10.

As the threat level increases, the OHS/EP raises the Parish emergency level protocols as a reaction to the pending threat and issues alerts and notification to departments and agencies that support the response efforts.

7.2. Warning

7.2.1. General After the threat recognition system tells the emergency management office that a flood, tornado, thunderstorm, winter storm or other hazard is coming, the next step is to notify the public and staff of other agencies and critical facilities. The earlier and the more specific the warning, the greater the number of people who can implement protection measures.

The National Weather Service issues notices to the public using two levels of notification:

Watch: conditions are right for flooding, thunderstorms, tornadoes or winter storms. *Warning:* a flood, tornado, etc. has started or has been observed.

A more specific warning may be disseminated by the community in a variety of ways. The following are the more common methods:

- Commercial or public radio or TV stations
- The Weather Channel
- Cable TV emergency news inserts
- Telephone trees/mass telephone notification
- NOAA Weather Radio
- Tone activated receivers in key facilities
- Outdoor warning sirens
- Sirens on public safety vehicles
- Door-to-door contact
- Mobile public address systems
- E-mail notifications

Multiple or redundant systems are most effective – if people do not hear one warning, they may still get the message from another part of the system. Each has advantages and disadvantages:

- Radio and television provide a lot of information, but people have to know when to turn them on. They are most appropriate for hazards that develop over more than a day, such as a tropical storm, hurricane, or winter storm.
- NOAA Weather Radio can provide short messages of any impending weather hazard or emergency and advise people to turn on their televisions for more information, but not everyone has a Weather Radio.



NOAA Weather Radios

NOAA Weather Radio is a nationwide network of radio stations that broadcasts warnings, watches, forecasts and other hazard information 24 hours a day. For St. Tammany Parish, information comes from transmitters in New Orleans and Bogalusa.

NOAA weather radios can be very effective for notifying people, businesses, schools, care facilities, etc., of weather threats. They have a monitoring feature that issues an alarm when activated by the Weather Service.

- Outdoor warning sirens can reach many people quickly as long as they are outdoors. They do not reach people in tightly-insulated buildings or those around loud noise, such as at a factory, during a thunderstorm, or in air conditioned homes. They do not explain what hazard is coming, but people should know to turn on a radio or television.
- Automated telephone notification services are also fast, but can be expensive and do not work when phones lines are down. Nor do they work for unlisted numbers, calling screener services, <u>or cellular service</u>, unless people sign up for notifications.
- Where a threat has a longer lead time, going door-to-door and manual telephone trees can be effective.

Just as important as issuing a warning is telling people what to do. A warning program should have a public information aspect. Citizens should know the difference between a tornado warning (when they should seek shelter in low spot), a flood warning (when they should stay out of low areas), and other appropriate warnings and responses.

7.2.2. StormReady The National Weather Service established the StormReady program to help local governments improve the timeliness and effectiveness of hazardous weather related warnings for the public.



To be officially StormReady, a community must:

- Establish a 24-hour warning point and emergency operations center,
- Have more than one way to receive severe weather warnings and forecasts and to alert the public,
- Create a system that monitors weather conditions locally,
- Promote the importance of public readiness through community seminars, and
- Develop a formal hazardous weather plan, which includes training severe weather spotters and holding emergency exercises.

Being designated as a StormReady community by the Weather Service is a good measure of a community's emergency warning program for weather hazards. It is also credited by the Community Rating System.

7.2.3. Implementation in St. Tammany Parish Annex C of the *St. Tammany Parish Multi-Hazard Emergency Operations Plan* sets warning procedures. It states

The primary public warning system is the parish-wide telephone system. The details of that operation protocol are confidential and not part of this annex.

The Parish has contracted with FirstCall Interactive, a commercial telephone service company in Baton Rouge. Staff can send FirstCall an address, an area, a radius around a site, or other geographical description and FirstCall can send out hundreds of phone messages at one time to all the people in that area. This is known as a reverse 911 system.

Annex C mentions other methods of disseminating a warning, including cable TV, radio, and the Emergency Alert System. The rest of the Annex is relatively generic and does not provide specific guidance. Here is an example:

When a warning or information regarding an emergency is received, the Emergency Preparedness Director will notify key local officials, alert emergency personnel in response organizations, and notify the population by using the public emergency warning system.

There are no details on things like what constitutes "an emergency" and who are the key officials who should be notified.

OHS/EP staff have NOAA Weather Radios and encourage their use. However, it is not known how many schools, hospitals and other facilities have them.

The Parish has worked with the Emergency Alert System and can implement a cable TV override system that can send an emergency message to everyone watching television or listening to a radio. This approach can be very effective for those hazards that have a longer lead time, such as tropical storms.

StormReady: Currently Bossier and Caddo Parishes are the only Louisiana communities in StormReady. Nearby, Waveland, Columbia and Hattiesburg, Mississippi are StormReady communities. <u>By 2009, the list has expanded to include Acadia,</u> <u>Calcasieu, East Baton Rouge, Lafayette, Ouachita, St. Charles, St. Landry, and Union</u> <u>Parishes, the cities of Baton Rouge and Lake Charles, and the nearby Mississippi</u> <u>communities of Hattiesburg, Columbia, Prentiss, and Jones and Forrest Counties.</u>

7.2.4. CRS credit Community Rating System points are based on the number and types of warning media that can reach the community's floodprone population. Depending on the location, communities can receive up to 25 points for the telephone calling system and the Parish's Emergency Alert Radio System and more points if there are additional measures, such as telephone trees. Being designated as a StormReady community can provide 25 more points. These credits are in Activity 610 – Flood Warning Program.

7.2.5. <u>2009 update</u> The Parish has purchased its own reverse 911 system called Dialogic (DCC) that utilizes 48 independent phone lines, allowing staff the ability to send out hundreds of phone messages at one time to an address, an area, a radius around a site or other geographical location to residential phones. Citizens have the opportunity to register their unlisted and cellular numbers into the system if they would like to receive parish notifications.

Cable TV, radio, and the Emergency Alert System can also disseminate warnings. The Parish updated the *Multi-Hazards Emergency Operations Plan* in 2008. The new version gives specific guidance on disseminating warnings.

Project scoping: As part of the mitigation planning process, priority projects were submitted specifically to pursue FEMA mitigation grants. The Village of Sun submitted a project to install new warning sirens in the village.

7.3. Response

7.3.1. General The protection of life and property is the most important task of emergency responders. Concurrent with threat recognition and issuing warnings, a community should respond with actions that can prevent or reduce damage and injuries.

Typical actions and responding parties include the following:

- Activating the emergency operations center (emergency preparedness),
- Closing streets or bridges (sheriff or public works),
- Shutting off power to threatened areas (utility company),
- Passing out sand and sandbags, (public works),
- Holding children at school/releasing children from school (school superintendent),
- Opening evacuation shelters (Red Cross),
- Monitoring water levels (engineering), and
- Establishing security and other protection measures (police/sheriff).

An emergency action plan ensures that all bases are covered and that the response activities are appropriate for the expected threat. These plans are developed in coordination with the agencies or offices that are given various responsibilities.

Planning is best done with adequate data. One of the best tools is a map that shows what areas would be affected under different conditions. An example is Map 2-4, which shows which areas to evacuate under different hurricane categories.

A flood stage forecast map shows areas that will be under water at various flood stages. Different flood levels are shown as color coded areas, so the emergency manager can quickly see what will be affected. Emergency management staff can identify the number of properties flooded, which roads will be under water, which critical facilities will be affected, who to warn, etc.. With this information, an advance plan can be prepared that shows problem sites and determines what resources will be needed to respond to the predicted flood level.





Emergency response planning make flood response activities more efficient

Emergency response plans should be updated annually to keep contact names and telephone numbers current and to make sure that supplies and equipment that will be needed are still available. They should be critiqued and revised after disasters and exercises to take advantage of the lessons learned and changing conditions. The end result is a coordinated effort implemented by people who have experience working together so that available resources will be used in the most efficient manner.

7.3.2. Implementation in St. Tammany Parish The objective of the *St. Tammany Parish Multi-Hazard Emergency Operations Plan* is "to provide guidance for the various departments within St. Tammany Parish Government, municipalities within the Parish, and all agencies within the Parish of St. Tammany with an emergency assignment before, during and following any declared emergency."

The *Emergency Operations Plan* is designed to work for all types of natural and technological hazards. The document has a *Basic Plan* which assigns responsibilities, such as communications, law enforcement, evacuation, shelter, and public health, to the various Parish departments.



The *Basic Plan* is augmented with annexes, standard operating procedures and other guidance documents that cover the details of various aspects of emergency response., such as communications, evacuation, sheltering, damage assessment, and severe weather. There are no annexes for specific natural hazards, such as flooding or hurricanes.

Parish staff have developed checklists for the most threatening hazards, tropical storms and hurricanes. There are four levels of preparation:

Level 4. Tropical storm in the Atlantic Level 3. Tropical storm in the Gulf of Mexico Level 2. Tropical storm threatening the Parish Level 1. Imminent danger of storm hit

Action items are listed for each office and each level, as well as routine preparatory activities and post-event assignments. Each action item is assigned to a specific person.

Parish staff have experience working together and responding to disasters, especially tropical storms and flooding. Staff knows how to use the SLOSH model and its GIS-based flood stage forecast maps (see next page).

7.3.3. CRS credit: By itself, the *St. Tammany Parish Multi-Hazard Emergency Operations Plan* would not receive CRS credit. However, there is more to the program than this one plan. An in-depth review of the Parish's geographic information system capabilities and the appropriate annexes and checklists would be needed to determine if the Parish's warning program would qualify for up to 100 points.

7.3.4. <u>2009 update</u>. The Parish prepared a "Hurricane Katrina Post Action Review" in December 2005. The major findings were:

- The Emergency Operations Center worked well, but some improvements were recommended, such as ensuring there are enough sleeping quarters and office equipment,
- <u>Communications was the number one problem after the storm</u>,
- There were problems with supplies of fuel, generators, food, and water, and
- Additional training would help all participants.

The report concluded "Overall the Parish scored very high marks with its Departments as

well as with its coordinating agencies. As always, there is room for improvement. As was mentioned by more than one Parish employee, there was no standard for Katrina."

Following the after action reviews, the *Multi-Hazards Emergency Operations Plan* was updated. It now has an appendix for the emergency response to hurricanes, the number one threat to St Tammany Parish.

The GIS system and hurricane storm surge model (SLOSH) can prepare the equivalent of a flood stage forecast map in real time. An example is to the right.



Area agencies have also improved their fog hazard response activities. The Causeway Bridge Commission has instituted a variety of measures to improve traffic safety during limited visibility. These include warning signs, single lane restrictions, no passing enforcement, and rolling convoys, where Causeway Police lead a line of vehicles, setting a safe speed.



7.4. Evacuation and Shelter

7.4.1. General In an area subject to the tremendous forces that accompany hurricanes, evacuation is a prime life safety concern. Given the 1 - 2 days of lead time provided by the National Hurricane Center, evacuation on a large scale is a realistic lifesaving task. In other situations, such as a tornado, it is safer to keep people where they are rather than expose them to danger from an event that gives little warning.

"The principle of evacuation is to move citizens from a place of relative danger to a place of relative safety, via a route that does not pose significant danger." (Emergency Management: Principles and Practice, p. 219) There are <u>six</u> key ingredients to a successful evacuation:

- Adequate warning
- Adequate routes
- <u>Proper timing to ensure the routes</u> <u>are clear</u>
- Traffic control
- Knowledgeable travelers



Source: FEMA

- Care for special populations (e.g., handicapped, prisoners, hospital patients, and school children)

Those who cannot get out of harms' way need shelter. For tropical storms, a stick-built house (not a mobile home) often suffices, but for hurricanes, something sturdier is needed. That is why schools so often serve as shelters during a storm as well as a place for those who have lost their homes after the storm.

Typically, the Red Cross will staff a shelter and ensure that there is adequate food, bedding and washing facilities. Shelter management is a specialized skill. Managers must deal with problems like scared children, families that want to bring their pets in, and the potential for an overcrowded facility.

7.4.2. Implementation in St. Tammany Parish Annex D of the *St. Tammany Parish Multi-Hazard Emergency Operations Plan* has general guidelines for evacuation. It notes what must be considered and states "Predetermined, detailed plans for specific hazards will be used when these emergencies occur. Appropriate annexes and operating guidelines will be used to coordinate the operation."

One way to double the evacuation routes' carrying capacity is to reverse the flow of traffic in lanes going into the area to be evacuated. As seen in the above photo, there is a lot of wasted roadbed if all lanes are not used to carry people away from danger. Annex D notes that "the State might activate lane reversal evacuation" for a category 3 hurricane. Because the main routes are state highways, only the State has the authority to do this, although OHS/EP will be working closely with State staff.

The Parish's *Emergency Operations Plan* includes the needed assignments of responsibility for determining when an evacuation should be conducted and how to handle special populations. The Parish also has several different ways of informing the public about what to do when an evacuation is initiated. Examples of the brochures that are used are on pages 7-13, 7-16, 9-2 and 9-3.

Probably the weakest links in evacuation from St. Tammany Parish are the routes themselves. Map 7-1 shows the main evacuation routes in red and blue. There are only three roads that lead north, away from the Gulf, and two of them are only two-lane highways. Further, they not only have to handle the Parish's population, but thousands more evacuees from New Orleans.

The Causeway Commission has the resources and



experience to conduct a reverse lane evacuation. However, currently, traffic moves slowly (at times at a standstill) during the morning and afternoon commutes on Route 190. It is difficult to imagine the same few roads handling all the evacuees from the New Orleans metropolitan areas. As noted in the letter on the cover of the brochure referenced above, "If an evacuation is called, leave immediately. Our roads will be full."

The Parish has four park and ride facilities and has plans for up to 13 more. These will have security cameras that can be monitored at the emergency operations center. These should help reduce some congestion, if people are willing to leave their cars behind.

Another complication during an evacuation during a storm is that some roads will go under water. As discussed in sections 2.2 and 2.2A, stormwater runoff can flood streets on short notice. The state highways are no exception.

Evacuees who leave the Parish will likely be sheltered in Mississippi. OHS/EP has plans for nursing homes and others with special needs. Annex D of the *Multi-Hazard Emergency Operations Plan* has general guidelines for sheltering and when people return. It designates the Red Cross as the prime staff. Because the strength and likely impact area of a tropical storm or hurricane can be predicted, the OHS/EP can ensure that the shelters that are opened after the disaster will not have been damaged by flood waters.

7.4.3. CRS credit: Because it is primarily concerned with protecting insurable buildings, the CRS does not provide any special credit for evacuation or sheltering of people. It is assumed that the emergency response plan would include all necessary actions in response to a flood.

7.4.4. <u>2009 update</u> The *St. Tammany Parish Multi-Hazard Emergency Operations Plan* has been revised since the 2004 *Mitigation Plan*. Evacuation guidance is now in Emergency Support Function 1 (ESF-1). It includes the Contra-Flow Plan developed and coordinated by the Louisiana State Police. When activated, the in-bound lanes of fourlane highways and Interstates are reversed, allowing twice as much traffic to evacuate outbound.

The plan is explained in the hurricane safety brochure (see page 9-3), which can be found on the Parish's website (www.stpgov.org/pdf/1210177443.pdf). A color brochure is also inserted in a Sunday edition of the St. Tammany Times Picayune at the start of hurricane season each year. Hard copies are distributed through the community outreach bus (the Mobile Community Information Center), when emergency management staff make hurricane outreach presentations, and upon request to libraries, nursing homes, hospitals, and other organizations in the Parish.

ESF-6 of the Parish's new *Multi-Hazard Emergency Operations Plan* covers sheltering. Evacuees from St. Tammany Parish can be sheltered anywhere in the country. The annual evacuation guide includes information on emergency shelters in other parts of the state, what to do with pets (which are not allowed in most shelters), and disaster safety.

These procedures and materials paid off during Hurricane Gustav in August 2008, which was considered a very successful evacuation of the New Orleans metropolitan area. However, there were still problems for evacuees when they entered Mississippi. These have been reported to the Louisiana state authorities to work out with the Mississippi Highway Patrol.


7.5. Post-Disaster Recovery and Mitigation

7.5.1. General After a disaster, communities should undertake activities to protect public health and safety and facilitate recovery. Appropriate measures include:

- Patrolling evacuated areas to prevent looting,
- Providing safe drinking water,
- Monitoring for diseases,
- Vaccinating residents for tetanus and other diseases,
- Clearing streets, and
- Cleaning up debris and garbage.

Throughout the recovery phase, everyone wants to get "back to normal." The problem is, "normal" means the way they were before the disaster, exposed to repeated damage from future disasters. There should be an effort to help prepare people and property for the next disaster. Such an effort would include:

- Public information activities to advise residents about mitigation measures they can incorporate into their reconstruction work,
- Evaluating damaged public facilities to identify mitigation measures that can be included during repairs,
- <u>Identifying other mitigation measures that can lessen the impact of the next</u> <u>disaster</u>,
- Acquiring substantially or repeatedly damaged properties from willing sellers,
- Planning for long term mitigation activities, and
- Applying for post-disaster mitigation funds.

7.5.2. Regulating reconstruction Requiring permits for building repairs and conducting inspections are vital activities to ensure that damaged structures are safe for people to re-enter and repair.

There is a special requirement to do this in floodplains, regardless of the type of disaster or cause of damage. The National Flood Insurance Program requires that local officials enforce the substantial damage regulations. These rules require that if the cost to repair a building in the mapped floodplain equals or exceeds 50% of the building's market value, the building must be retrofitted to meet the standards of a new building in the floodplain. In most cases, this means that a substantially damaged building must be elevated above the base flood elevation.



After a disaster, all buildings need to be inspected to determine if they are safe to reenter. A substantially damaged building needs to be "red tagged" to stop repairs unless it will meet code requirements. This requirement can be very difficult for understaffed and overworked offices after a disaster. If these activities are not carried out properly, not only does the community miss a tremendous opportunity to redevelop or clear out a hazardous area, it may be violating its obligations under the NFIP. The sanctions for failure to properly enforce the floodplain reconstruction regulations are spelled out in section 6.6.2. In some areas, mutual aid agreements have been established so building inspectors from a community not affected by the disaster can work in the communities that were hit the hardest.

7.5.3. Implementation in St. Tammany Parish The Louisiana Office of Emergency Preparedness has published a *Disaster Recovery Manual* with guidance for communities. It focuses on damage assessment and requesting assistance. It mentions the NFIP and rules for repairing structures where there is a Federal interest, but it does not provide guidance on inspecting buildings. There is one page on public information, but it does not mention messages on reconstruction rules or mitigation. The hazard mitigation section just explains the FEMA grant programs.

Annex K of the *St. Tammany Parish Multi-Hazard Emergency Operations Plan* is Damage Assessment. It is concerned with procedures and does not have any instructions or checklists on inspecting buildings for safety or code requirements. Similarly, Annex N, Public Information, covers procedures and assignments, but does not have any sample materials or messages.

The Parish's *Flood Hazard Area Ordinance* includes the NFIP requirements for determining if a building is substantially damaged. The Parish's practice is to wait for reconstruction applicants to come to the Permits Department. Repairs that do not include structural changes (e.g., those that just include replacing carpeting, sheetrock, and insulation) do not need permits.

There are no special public information activities to tell people to apply for a permit. Residents interested in a mitigation project funded by the NFIP's Increased Cost of Compliance do apply and request a substantial damage determination.

These practices could permit many substantially damaged properties to be repaired without inspection. The result could jeopardize the Parish's standing in the NFIP. These practices also miss opportunities to inform disaster victims about property protection measures that they can incorporate during repairs.

7.5.4. CRS credit: There are no written post-disaster mitigation procedures that would warrant CRS credit. If some were developed and adopted, up to 10 points could be provided as part of the planning credit (Activity 510 – Floodplain Management Planning).

7.5.5. <u>2009 update ESF-5</u>, Appendix 5, of the updated 2008 *St. Tammany Parish Multi-Hazard Emergency Operations Plan* is the Damage Assessment Plan. It is based on state guidance released in 2005. It has damage assessment forms, but, as with its predecessor, it does not have any instructions or checklists on inspecting buildings for safety or code requirements. The annual hurricane safety brochure has a page on re-entry information (right), but needing permits to rebuild damaged buildings and mitigation opportunities are not mentioned.

The Permits and Regulatory Department's webpage has information on permits and application forms (www.Stpgov.org/depa rtments permits down loads. php). ESF-15 covers Emergency Public Information, but also does not have any sample materials or messages. The Parish's website does have information on mitigation grants (www.stpgov.org/depar tments homeland.php).

Project scoping: As

part of the mitigation

St. Tammany Re-Entry Information

Disaster Action Guidelines for Pet Owners

- TAKE YOUR PETS WITH YOU!
- Pets are not allowed inside emergency shelters for humans. PLAN AHEAD for your pets' care by friends, relatives, vet hospitals, or boarding facilities. Also try pet-friendly hotels.
- Have a pet carrier, portable kennel or crate for each pet.
- Be sure all pets are wearing a secure collar with ID attached. Consider permanent microchip implant for identification.
- Have written copies of vaccination records, any necessary medication, veterinarian contact information and a recent picture of your pet.
- Bring a 2-week supply of pet food and water, along with leashes, a pet first-aid kit and any medicine your pet needs. To check for pet friendly hotels, go to www.petswel-come.com OR www.petsallowed-hotels.com

If You Must Evacuate

- Stay tuned to your local radio and television stations for
- emergency broadcasts. If ordered to evacuate, you must do so immediately.
- The official emergency broadcast stations are 870 AM and 106.7 FM.
- Take your Disaster Supply Kit with you!
- Take important papers with you, including your driver's license, special medical information, insurance policies, and property inventories
- Let friends and relatives know where you are going. Make sure your neighbors have a safe ride
- Turn off electricity, water, and gas.
- Lock windows and doors.

returning after evacuation TELEVISION: Cable Channel 10 - Acce

INTERNET: www.stpgov.org

St. Tammany

eighborhood who may need help during a s

Emergency Communication

FIRST CALL SYSTEM: will call land line phones ONLY

PHONE: 1-866-898-2323 will give information on

RADIO: WWL - 870 AM OR 105.3 FM OR 94.7 FM



St. Tammany Parish Special Needs Shelter For information on the St. Tammany Parish Government's Special Needs Shelter please refer to the St. Tammany Parish Government Web site at www.stpgov.org or call (985) 898-3074 or SALT at (985) 809-5450. Information will also be made available on local cable channel 10 before and during an event such as a hurricane or flooding. Pre-register now for the special needs shelter!

Radio Information In times of emergency, our best way to communicate with you is via commercial radio. WWL - 870 AM is the official

Internet are great news sources, we rely most heavily on radio during times of crisis. Please ensure your car radio is working and acquire batteries for your portable radio. Stay tuned for the latest information regarding hurricane tracks,

evacuation orders or recommendations and, after a storm

for re-entry information

emergency information source. We also make every effort to energency institution source: we also these every enotitio communicate with all radio stations in listening range, and with media in communities where evacuees tend to tem-porarily relocate such as Lafayette, Houston and Jackson, to name only a few. While television, newspapers and the



Excerpt from the Parish's annual hurricane safety brochure

planning process, priority projects were submitted specifically to pursue FEMA mitigation grants. Several properties damaged by Hurricane Katrina were abandoned by their owners becoming a threat to the health and safety of the Parish. The Parish has condemned and recommended demolition for most of these properties and is seeking a FEMA grant for the clearance work.

7.6. Conclusions

1. There are several threat recognition systems that can provide the Parish with advance notice of an impending emergency.

2009 update: The new notification methods of the National Weather Service and the National Hurricane Center, such as text messaging and e-mail, have worked well.

- 2. The Parish depends on telephones and the media for warning residents. These media should reach most people who need to know of the threat.
- 3. The *St. Tammany Parish Multi-Hazard Emergency Operations Plan* has overall guidance on responding to many different kinds of hazards. There are additional documents, such as annexes and checklists, that provide specific guidance for responding to individual natural hazards. Such guidance could be very helpful when things happen quickly and for hazards that have predictable impacts, such as tropical storms and flooding.

2009 update: The *Emergency Operations Plan* was updated in 2008 and is up for another review in 2010. It has been augmented with better GIS and flood stage forecasting tools. The new Contra-Flow Plan has proven itself during Hurricanes Katrina and Gustav, reducing concerns about problems during evacuation from the Parish or from Orleans and Jefferson Parishes. However, there are still concerns about traffic traveling into Mississippi and releases from the Ross Barnett Reservoir and other reservoirs that may aggravate flooding in St. Tammany Parish.

4. The plans and guidance documents on post-disaster inspections and capitalizing on post-disaster mitigation opportunities. In fact, current procedures do not adequately ensure that the Parish's obligations to the National Flood Insurance Program will be met. They also miss opportunities to advise people on property protection measure they can implement during repairs and reconstruction.

7.7. 2009 Recommendations

- 1. The *St. Tammany Parish Multi-Hazard Emergency Operations Plan* should be reviewed in detail to determine where improvements can be made and how to maximize submitted for credit under the Community Rating System. The CRS will provide a critique of the plan that would show whether any more improvements would be useful.
- 2. The *Emergency Operations Plan* review should identify where geographic information systems, NOAA Weather Radios, and other new tools can be used to support the Parish's emergency operations. Work that has been initiated to prepare flood stage forecast maps for developed areas should continue and be converted to real-time inundation mapping. [Dropped as no longer needed]

- 3. The Parish needs to ensure that all steps are being taken to alleviate traffic jams during an evacuation of the Parish and advise state officials of problems of traffic entering the state of Mississippi when the state activates Contra-Flow plan for evacuation of the New Orleans area and of Parish concerns over releases from the Ross Barnett Reservoir.
- 4. The Parish's emergency preparedness, public information, and permits staffs should work together to develop post-disaster procedures for public information, reconstruction regulation and mitigation project identification.

7.8. References

- 1. CRS Coordinator's Manual, Community Rating System, FEMA, 2007
- 2. CRS Credit for Flood Warning Programs, FEMA, 2006
- Disaster Recovery Manual, Louisiana Office of Emergency Preparedness, 2002, revised 2005
- 4. Emergency Management: Principles and Practice for Local Government, International City Management Association, 1991.
- 5. FirstCall Interactive website, www.firstcall.net/
- 6. Flood Fight Operations, FEMA, 1995
- 7. Guide for All-Hazard Emergency Operations Planning, FEMA SLG-101, 1996
- 8. *Guidelines on Community Local Flood Warning and Response Systems*, Federal Interagency Advisory Committee on Water Data, 1985
- 9. <u>"Hurricane Katrina Post Action Review"</u>, St. Tammany Parish Planning Department and Office of Emergency Preparedness, December 2005
- 10. Information on StormReady communities can be found on the National Weather Service website, www.nws.noaa.gov/stormready/
- 11. Interviews and meetings with Parish staff, Fall 2003, 2008, 2009
- 12. <u>"Louisiana Citizen Awareness & Disaster Evacuation Guide, Southeast," Governor's</u> Office of Homeland Security and Emergency Preparedness, 2008
- 13. *St. Tammany Parish Multi-Hazard Emergency Operations Plan*, Office of Emergency Preparedness, 2002<u>, revised 2008</u>
- 14. Various checklists provided by OHS/EP
- 15. Various National Weather Service websites
- 16. Wildland Fire Assessment System website, www.fs.fed.us/land/wfas/

Chapter 8. Flood Control

Flood control projects have traditionally been used by communities to control or manage floodwaters. They are also known as "structural" projects that keep flood waters away from an area as opposed to "non-structural" projects, like retrofitting, that do not rely on structures to control flows.

8.1. Flood Control Measures

Four general types of flood control projects are reviewed here: levees, reservoirs, diversions, and dredging. These projects have three advantages not provided by other mitigation measures:

- They can stop most flooding, protecting streets and landscaping in addition to buildings,
- Many projects can be built without disrupting citizens' homes and businesses, and
- They are constructed and maintained by a government agency, a more dependable long-term management arrangement than depending on many individual private property owners.

However, as shown below, they also have shortcomings. The appropriateness of using flood control depends on individual project area circumstances.

Pros and Cons of Structural Flood Control Projects				
<u>Advantages</u>	Shortcomings			
May provide the greatest amount of protection for land area used.	They <u>can</u> disturb the land and disrupt natural water flows, often destroying wildlife habitat.			
Because of land limitations, may be the only practical solution in some circumstances.	They require regular maintenance, which if neglected, can have disastrous conse- quences.			
Can incorporate other benefits into structural project design, such as water supply and recreational uses.	They are built to a certain flood protection level that can be exceeded by larger floods, causing extensive damage.			
Regional detention may be more cost-efficient and effective than requiring numerous small detention basins.	They can create a false sense of security as people protected by a project often believe that no flood can ever reach them.			
	Although it may be unintended, in many circumstances they promote more intensive land use and development in the floodplain.			

Natural Hazards Mitigation Plan

8.1.1. Levees and Floodwalls Probably the best known flood control measure is a barrier of earth (levee) or concrete (floodwall) erected between the watercourse and the property to be protected. Levees and floodwalls confine water to the stream channel by raising its banks. They must be well designed to account for large floods, underground seepage, pumping of internal drainage, and erosion and scour.

Key considerations when evaluating use of a levee include:

- Design and permitting costs,
- Right of way acquisition,
- Removal of fill to compensate for the floodwater storage that will be displaced by the levee,
- Internal drainage of surface flows from the area inside the levee,
- Cost of construction,
- Cost of maintenance,
- Mitigation of adverse impacts to wetlands, etc.,
- <u>Loss of</u> river access and views, and
- Creating a false sense of security (while levees may reduce flood damage for smaller more frequent rain events, they may also overtop or breach in extreme flood events and subsequently create more flood damage than would have occurred without the levee).

Drainage District 4's levee doubles as a trail



Drainage District 5's levee system requires large pumps to drain the protected area

Levees placed along the river or stream edge degrade the aquatic habitat and water quality of the stream. They also are more likely to push floodwater onto other properties upstream or downstream. To reduce environmental impacts and provide multiple use benefits a setback levee is the best project design. The area inside a setback levee can provide open space for recreational purposes and provide access sites to the river or stream.

Floodwalls perform like levees except they are vertical-sided structures that require less surface area for construction. Floodwalls are constructed of <u>steel sheet pile or</u> reinforced concrete, which makes the expense of installation cost prohibitive in many circumstances. Floodwalls also degrade adjacent habitat and can displace erosive energy to unprotected areas of shoreline downstream.

Seawalls are barriers or retaining walls that are built facing a large lake, ocean or the Gulf. They are intended to protect the land from erosion by wave action. However, they often have an adverse impact on the shore and on neighboring properties and the

movement of sand. The natural forces that transport sand and replenish beaches are disrupted by the wall, often increasing shoreline erosion on adjacent properties. Therefore, they are not encouraged and are even prohibited in many areas.

8.1.2. Reservoirs and Detention Reservoirs reduce flooding by temporarily storing flood waters behind dams or in storage or detention basins. Reservoirs lower flood heights by holding back, or detaining, runoff before it can flow downstream. Flood waters are detained until the flood has subsided, then the water in the reservoir or detention basin is released or pumped out slowly at a rate that the river can accommodate downstream.

Reservoirs can be dry and remain idle until a large rain event occurs. Or they may be designed so that a lake or pond is created. The lake may provide recreational benefits or water supply (which could help mitigate a drought).

Flood control reservoirs are most commonly built for one of two purposes. Large reservoirs are constructed to protect property from existing flood problems. Smaller reservoirs, or detention basins are built to protect property from the impacts of new development (i.e., more runoff).

Regardless of size, reservoirs protect the development that is downstream from the reservoir site. Unlike levees and channel modifications, they do not have to be built close to or disrupt the area to be protected. Reservoirs are most efficient in deeper valleys where there is more room to store water, or on smaller rivers where there is less water to store.

In urban areas, some reservoirs are simply



The Whisper Wood area will be protected from flooding by this Parish reservoir

manmade holes, excavated to store floodwaters (see top photo). Reservoirs in urban areas are typically constructed adjacent to streams (though usually outside of the floodplain). When built in the ground, there is no dam for these retention and detention basins and no dam failure hazard. Wet or dry basins can also serve multiple uses by doubling as parks or other open space uses.

There are several considerations when evaluating use of reservoirs and detention:

- There is the threat of flooding the protected area should the reservoir's dam fail,
- There is a constant expense for management and maintenance of the facility,
- They may fail to prevent floods that exceed their design levels,

- Sediment deposition may occur and reduce the storage capacity over time,
- They can impact water quality as they are known to affect temperature, dissolved oxygen and nitrogen, and nutrients, and
- If not designed correctly, in-stream reservoirs may cause backwater flooding problems upstream

8.1.3. Diversion A diversion is a new channel that sends floodwaters to a different location, thereby reducing flooding along an existing watercourse. Diversions can be surface channels, overflow weirs, or tunnels. During normal flows, the water stays in the old channel. During flood flows, the floodwaters spill over to the diversion channel or tunnel, which carries the excess water to a receiving lake or river.

Diversions are limited by topography; they will not work in some areas. Unless the receiving water body is relatively close to the



stream to a lake or larger river

floodprone stream and the land in between is low and vacant, the cost of creating a diversion can be prohibitive.

8.1.4. Dredging Dredging is often viewed as a form of conveyance improvement. However, it has the following problems:

- Given the large volume of water that comes downstream during a flood, removing a foot or two from the bottom of the channel will have little effect on flood heights.
- Dredging is often cost prohibitive because the dredged material must be disposed of somewhere.
- Unless instream and/or tributary erosion are corrected upstream, the dredged areas usually fill back in within a few years, and the process and expense have to be repeated.
- If the channel has not been disturbed for many years, dredging will destroy the habitat that has developed.



To protect the natural values of the stream, Federal law requires a Corps of Engineers permit before dredging can proceed. This can be a lengthy process that requires much advance planning and many safeguards to protect habitat (and adds to the cost of the project).

8.1.5. CRS credit Structural flood control projects that provide 100-year flood protection and result in revisions to the Flood Insurance Rate Map are not credited by the CRS in order to not duplicate the larger premium reduction provided by removing properties from the mapped floodplain.

The CRS credits smaller flood control projects that meet the following criteria:

- They must provide protection to at least the 25-year flood,
- The design and construction must be certified by a licensed professional engineer,
- They must meet certain environmental protection criteria,
- They must meet Federal, State and local regulations, such as Corps of Engineers' 404 permit and State dam safety rules, and
- They must meet certain maintenance requirements.

These criteria ensure that credited projects are well-planned and permitted. Any of the measures reviewed in this section would be recognized under Activity 530 – Flood Protection, although it would be very hard to qualify a dredging project. Credit points are based on the type of project, how many buildings are protected, and to what flood protection level.

8.1.6. 2009 Update This section is a background review of flood control measures, so an update is not necessarily relevant. However, there have been two changes in the Federal government's position on measures discussed here. First, it will be harder to get funding for levees and harder to show levees on flood insurance maps as protecting areas from the base flood. There is also a new National Levee Safety Committee which recommended improvements to levee systems and programs in 2009.



The failure of the New Orleans levee system made it harder to get support for new levees. Source: FEMA

Second, the CRS has reviewed its credit for flood control structures and has tightened up on the environmental protection standards that they must meet.

8.2. SELA

Larger structural flood control projects have regional or watershed-wide implications and can be very expensive. Because of this, they are often planned, funded and implemented at a regional level by the Parish, State agencies, the U.S. Army Corps of Engineers, or the USDA Natural Resources Conservation Service.

The Southeast Louisiana Urban Flood Control Project, or SELA, was authorized by Congress after the May 1995 floods in Orleans, Jefferson and St. Tammany Parishes. It is specifically charged with dealing with rainfall flooding.

The U.S. Army Corps of Engineers is the lead Federal agency, which will fund 75% of the costs of the projects. In St. Tammany Parish, the Corps has identified seven areas of severe flood threat or repetitive flooding that could qualify for support:

- 1. Abita Springs: elevating 45 structures along the Abita River to the base flood elevation. No local sponsor identified, yet.
- 2. Bayou Chinchuba: elevating 36 structures in Mandeville to the base flood elevation. Mandeville would be the local sponsor.
- 3. Lacombe: elevating 84 structures south of US 90 and west of Bayou Lacombe to the base flood elevation. No local sponsor identified, yet.

The total cost for these three elevation projects is estimated at \$8,450,000 (2004 dollars). These projects need local sponsors to assume the 25% non-federal shares (although the owners could pay the share for their homes, as is the practice for FEMA elevation projects – see section 5.1.4). Currently, some FEMA funded elevation projects are underway in some of the affected areas, which will reduce the economic benefits of a Corps project.

- 4. Covington: enlarging and concrete lining for 2 miles of Mile Branch to provide 25-year capacity, \$4,200,000. Covington would be the local sponsor, but the City had some objections to the latest plan. The City and the Corps are currently discussing options.
- 5. "Slidell Area:" improvements to several canals and bridges north of the City, \$23,275,000. The local sponsor would have been Drainage District #3, but voters turned down a sales tax increase that would have funded the non-federal share. The Corps and Slidell are discussing alternative projects for the W-14 canal.
- 6. An earlier Hurricane Protection Plan for the Schneider Canal area, south of Slidell, that had been put on hold for lack of a local sponsor: 9 miles of levees and drainage structures for \$19,000,000. The potential sponsor, Slidell, has not supported this project.
- 7. There was also a proposed hurricane protection project for Mandeville, which the City opposed and which may not have been economically justified. It would cost \$15,685,000.

In sum, all the SELA projects are dependent on local sponsorship and local assumption of the non-federal cost share. Whether any of them will be funded is in question.

8.2.1. <u>**2009 Update**</u> Most of the St. Tammany projects are still in need of local sponsors and are still unscheduled, but the W-14 Canal is proceeding, pending funding from Congress. While preliminary investigations were done with the various municipalities, the Parish government has expressed an interest in acting as the cost-sharing partner for the entire Parish.

	Table 8-1 Status of SELA Projects	
Project	Status	Scheduled completion
1. Abita Springs	Section 533(d) report required.	Aug 2011
2. Bayou Chinchuba	Section 533(d) report required.	Aug 2011
3. Bayou Lacombe	Section 533(d) report required.	Aug 2011
4. Mile Branch Channel Improvements	Section 533(d) report required.	Aug 2011
5. Slidell Area Plan	W-14 Canal 533(d) report currently underway.	Nov 2008
6. Schneider Canal Hurricane Protection	Draft PMP completed, Dec 2008 Project management plan under development. Section 533(d) report to follow.	Dec 2008 (PMP only)
7. Mandeville Hurricane Protection	Section 533(d) report required.	Aug 2011
Section 533(d) reports are used to used to add work within certain lir	o obtain construction approval for authorized portions of mits.	SELA and can be

Source: www.mvn.usace.army.mil/pd/projectsList/ProjectData/108791/reports/FS%20SELA%201Nov07.doc



8.3. Watershed Management Plans

Since flood control is generally the most expensive type of mitigation measure in terms of installation costs, maintenance requirements and environmental impacts, a thorough study of alternatives is needed before choosing a project. The best way to do this is with a master plan at the watershed level.

A master plan starts with a computer model of the watershed. The model accounts for factors like rainfall, terrain features, runoff characteristics, existing and proposed development, channel dimensions, and "roughness" of the overbank floodplain. Different storms can be routed through the model to see what happens. Past storms are used to calibrate the model with actual experiences.

Retaining runoff onsite is not always the best way to manage stormwater. With all areas retaining and releasing water at the same time, downstream basins are discharging to a stream at the same time that upstream basins are. There might be less water in the channel if downstream areas were allowed to drain during the storm. By the time upstream basins discharge, stream flows would be back down and better able to handle the flows. A watershed model can calculate these flows, their timing and their impacts.

Once developed, the models can perform several services, including:

- Provide an up-to-date map of the 100-year floodplain, which can be used to revise the official FEMA Flood Insurance Rate Map,
- Determine the impact of alternative flood control projects, such as improving a channel here or building a reservoir there,
- Revise floodplain maps, after projects are constructed and operating,
- Determine the impact of new developments on stream flows and whether they should retain runoff on site or speed their excess runoff directly to a large receiving body of water, and
- When coupled with real-time rain or river gage readings, provide an early flood warning service.

The watershed models will be completed during the first half of 2004. <u>As it turned out</u>, they were completed by the end of 2007.

Because watershed modeling is the best way to design flood control projects (and has the other advantages listed above), the Parish's Department of Engineering has embarked on an extensive master planning program. Map 8-1 shows the ten watersheds and subwatersheds that are currently contracted for study. The program is starting with the smaller, more floodprone areas, south of I-12.

Full implementation will depend on having sufficient funding. Current plans are to have each basin pay for its own projects, after they are identified.



8.3.1. 2009 Update Some of the watersheds and contracts were changed since the plans shown in Map 8-1. Here is the status of the watershed modeling completed since the 2004 *Plan*.

- <u>Tchefuncta-Bogue Falaya:</u> Due to the size of the watershed, flood control projects were not shown to be feasible. The report recommended regulating new development so flood problems do not get worse.
- Bayou Tete L'Ours: The preliminary report found that increasing storage volume in the basin will help prevent flooding in several areas. One of the studied alternatives was creating a regional detention facility east of Westwood Drive. At the time of the study the estimated cost was \$2.5 million plus the cost of land.
- Bayou Chinchuba: Buchart-Horn's model indicates that detention facilities in the Upper Bayou and the Min Bayou regions might provide a solution to the problem but further research is needed.
- Bayou Castine: Kyle Associates' report concluded that several modifications to drainage were needed and that the Parish should look into a master plan effort. It was also indicated that the conversion of the sludge pond at Quail Creek to detention would have a definite impact on Quail Creek, helping alleviate the areas around Dupre Street as well.
- Little Bayou Castine: Buchart-Horn's report recommended channel improvements, culvert capacity upgrading, and retention. By February 2009, retention upgrades were under construction.

- French Branch: Kyle Associates' February 2009 report recommended drainage improvements in six sub-watersheds that will protect hundreds of homes East of Slidell. Projects include increasing storage capacity in Meadowlake Pond and removal of drainage obstructions in the French Branch Lateral Canal.
- Bayou Lacombe: Several bridges and culverts have inadequate capacity to pass the 100-year flood and there are storage deficiencies. Flood problems were caused by the construction of residences too close to the stream channel. The study found that the construction of 3 storage reservoirs (Cypress Bayou, Tributary No. 1 to Cypress Bayou, and Bayou Lacombe Tributary No. 4) was the most cost effective solution for this area. It would cost \$4 million (2004 dollars).
- Bayou Liberty: Burk-Kleinpeter modeled and presented 3 storage detention pond alternatives to improve drainage on this basin at Camp Villere, Upper Watershed, and Huntwyck Village. They also studied replacing/upgrading the Tammany Trace Bridge as well as modifying Bayou Liberty below I-12.

These recommended projects have been incorporated into the Parish's 10-year infrastructure plan. The project details are listed in Table 8-2. A map of the project sites appears below.



	Table 8-2 10-Year Infrastructure Plan's	Flood Cor	ntrol Projects	
Basin	Projects	Рор	Flooded Structures	Cost
	North Perrilloux Road-detention pond	28,736	386	\$300,000
Madisonville	Dominion -Ruelle de Chene channel improvements and detention pond			\$500,000
Total Cost:	Myrtle Grove channel improvements			\$100,000
\$2.49 million	Myrtle Grove detention pond			\$600,000
	Storage facilities along Brewster			\$250,000
	Channel improvements south of I-12 and west of 1077			\$40,000
	Storage facilities south of I-12 and west of 1077			\$700,000
Tete L'Ours	66.5 ac detention lake west of Westwood drive	3,736	113	\$3,000,000
Total Cost:	Riverwood Storage Facility and channel improvements			\$1,200,000
φ4.7 million	Century Oaks Detention pond			\$500,000
	Bayou Chinchuba detention facility	8,031	125	\$2,000,000
Bayou	Fairway Drive East Detention facility			\$2,000,000
Chinchuba	Mayhaw branch detention facility			\$1,500,000
Total Cost:	Tammany Trace detention facility			\$1,000,000
\$6.8 million	Controls at lakes at Greenleaves			\$300,000
Bayou Castine	Labarre Street Detention pond and channel improvements	10,371	314	\$350,000
Total Cost:	New Canaan Hills detention facilities and new channel improvements			\$150,000
\$3.8 million	Forest Brook and Quail creek storage facilities and channel improvements			\$2,200,000
	Detention pond-North of Forest Brook and West of Pine View Heights Farms			\$600,000
	Quail Creek/Hidden Pines Detention Facility			\$500,000
Bayou Cane	Storage facility north of Cane Bayou Estates	854	3	\$800,000
Bayou Pacquet	Drainage Connector to I-12			\$5,000,000
Bayou	200 ac-ft reservoir on Cypress Bayou (Primary Road)	6,927	389	\$1,600,000
Lacombe	620 ac-ft detention pond on Cypress Bayou -Intermediate Pond			\$4,000,000
Total Cost: \$17.5 million	150 ac-ft detention pond (Tributary 1 to Cypress Bayou)			\$1,300,000
	150 ac-ft detention pond (north of Cloverland Acres)			\$2,000,000
	1180 ac-ft detention pond on Big Branch			\$7,300,000
	Channel relocation and storage north of Cloverland Acres			\$500,000
	Graci Drive and Brier Lakes Culvert Improvements and detention pond			\$750,000
	Camp Villere detention pond	8,677	392	\$2,450,000

Table	8-2 10-Year Infrastructure Plan's Flood	Control F	Projects (Contin	ued)
Basin	Projects	Рор	Flooded Structures	Cost
	Upper watershed detention pond			\$3,150,000
Bayou Liberty	Huntwyck village detention pond			\$730,000
Total Cost:	Tammany Trace bridge improvements and obstruction removal			\$260,000
\$7.1 million	Snag the channels			\$560,000
Slidell Area	W-15 detention facility and channel improvements	82,358	5536	\$4,000,000
	Extend Lowe pond canal			\$300,000
Total Cost: \$24.5 million	Storage facility south of Cherrywood subdivision			\$400,000
	Gum Bayou Diversion			\$400,000
	Haas road pond			\$1,200,000
	J Smith detention pond			\$2,500,000
	Bayou Vincent detention pond (ski pond)			\$1,000,000
	Bayou Vincent channel storage and improvements			\$2,400,000
	Poor Boy canal			\$4,000,000
	Detention facility south of North Blvd			\$2,000,000
	Channel improvements and storage facility south of Lakewood subdivision			\$2,000,000
	Lake Village area Improvements			\$800,000
	French Branch channel improvements			\$3,500,000
	Sub Total Cost			\$72,690,000
	Contingency (15%)			\$10,903,500
	Future Cost based on a 10 yr growth (20%)			\$16,718,700
	Total Cost	149,690	7258	\$100,312,200

Project scoping: As part of the mitigation planning process, priority projects were submitted specifically to pursue FEMA mitigation grants. Of the projects listed in Table 8-2, the following were submitted

- Tammany Hills retention improvements, Covington, to protect 300 homes
- Hwy 1088 Area drainage improvements (Fountains Subdivision), Mandeville, 100 homes protected
- <u>Cloverland Acres bypass canal, LaCombe, 70 homes</u>
- Black River detention along Brewster Road in Madisonville,
- Labarre Street Drainage Improvements, Mandeville, 50 houses
- Brownswitch Road Drainage Improvements, Slidell
- Highway 59 Area Drainage Improvements, Mandeville, 100 200 homes
- Highway 22 and Causeway Boulevard, flooding of streets and 4 businesses
- French Branch channel work
- Cypress Bayou detention pond

8.4. Drainage Improvements

8.4.1. General Man-made ditches and storm sewers help drain areas where the surface drainage system is inadequate, or where underground drainageways may be safer or more practical. Particularly appropriate for depressions and low spots that will not drain naturally, drainage and storm sewer improvements are designed to carry the runoff from smaller, more frequent storms.

There are three types of drainage improvements that are usually pursued to reduce stormwater flooding: putting drainageways in underground pipes (subsurface drainage), channelization, and removing obstructions caused by stream crossings, such as culverts and bridges with small openings

Because drainage ditches and storm sewers convey water faster to other locations, improvements are only recommended for small local problems where the receiving stream or river has sufficient capacity to handle the additional volume and flow of water. To reduce the cumulative downstream flood impacts of numerous small drainage projects, additional detention or run-off reduction practices should be provided in conjunction with the drainage system improvements.

8.4.2. Storm sewers Storm sewer improvements include installing new sewers, enlarging small pipes, and preventing back flows. The advantage of converting an open channel to a storm sewer is that it creates more useable ground surface. It also reduces maintenance problems, because it is harder for debris to get in the pipes and clog the flow of water.

From a flood protection perspective, piping ditches and installing storm sewers has some problems.



- The biggest problem is that a pipe is only so large. What happens to the 10-year storm when a pipe is only designed to carry the 5-year flow?
- Pipe openings and storm sewer inlets need to be kept cleaned in order for the water to get into the pipes.
- It's an expensive approach, although it can save maintenance costs in the long run and reduce the potential for accidents or injuries if someone is hurt in an open channel.

Converting an open channel to a storm sewer should only be done if there are arrangements for handling the overflow, either through a swale over the pipe or through streets. **8.4.3. Channelization** "Channelization" means straightening, deepening and/or widening a ditch or drainageway to remedy local drainage or flooding problems. There are the concerns with this approach that need to be kept in mind:

- Channelized streams can create or worsen flooding problems downstream as larger volumes of water are transported at a faster rate.
- Channelized streams rise and fall faster. During dry periods the water level in the channel is lower than it should be, which creates water quality problems and degrades habitat.
- Channelized waterways tend to be unstable and experience more streambank erosion. The need for periodic reconstruc-



tion and silt removal becomes cyclic, making channel maintenance very expensive.

On the other hand, properly sloped and planted channel banks are more aesthetically and environmentally appealing, and can prove cheaper to maintain than concrete ditches. A combination of restored wetland detention, vegetated swales, infiltration trenches and other best management practices that increase infiltration (reducing runoff), and improve water quality can be implemented in conjunction with stormwater system improvements. As shown in the photos below, these projects can have multiple benefits.



8.4.4. Crossings and roadways In some areas, roads and bridges are flooded during heavy rains. While buildings may not be damaged, residents, customers, commuters, and emergency vehicles may not be able to get through. A common safety hazard occurs when people try to drive through flooded streets or assume that a bridge that is underwater is still there. As noted in section 2.2.4, floods kill more people trapped in vehicles than anywhere else.

Another concern is when a small culvert or bridge opening constricts flows and causes localized backwater flooding. One way to identify such places is to check the flood profiles, graphic portrayals of flood elevations. Obstructions that back up water appear as stair steps on the graph (see illustration).

The common solution to these problems is to raise the roadbed and enlarge the culvert or bridge opening. However, designers need to consider the potential for a raised road acting as a dam, flooding people upstream and larger openings allowing more water downstream. Plans need to ensure that the projects do not worsen flooding on someone else.



8.4.5. Implementation in St. Tammany Parish The Department of Engineering inspects, surveys, and designs corrections to problem drainage sites. Many of the proposed drainage improvements that involve lateral ditches and natural drains require a Corps of Engineers' wetlands determination, and if needed, a Section 404 Permit.

The Department manages a drainage and special projects program. These projects consist of maintenance and improvements of drainageways, drainage structures, roadways, bridges, retaining wall structures, and erosion control structures. Once analysis and design is complete, the larger projects are bid out to a contractor. The smaller ones are coordinated through the Department of Public Works for project construction.

The budget for this work comes from two sources. A two cent sales tax funds work on roads and roadside drainage facilities. Projects away from roads, such as retention basins, are funded from general funds. Currently general funds are budgeted at \$900,000 toward flood control and drainage improvements. Some additional funds are provided by "impact fees" that are voluntarily paid by developers. In all, the available funding is not sufficient to make a major impact on the Parish's flooding and drainage problems.

The Town of Pearl River has mapped several locations where roads should be elevated so they can be passable during high water and bridge openings that should be enlarged to reduce the blockage to flow.

8.4.6. CRS credit The Community Rating System credits capital improvement plans that fund drainage improvements that reduce the need for maintenance or that eliminate bottlenecks, logjams and other maintenance problems. Up to 50 points are provided in Activity 540 – Drainage System Maintenance.

Natural Hazards Mitigation Plan

8.4.7. 2009 Update The Parish has some additional funds from "impact fees" that were once voluntary and are now required to be paid by developers. This has allowed the Department to acquire additional drainage related equipment, perform more work internally, and rely less on outside contractors. Map 8-3 shows the extent of the ditch improvement projects for 2007 (in blue).

<u>The Department of Public Works now has 200 – 300 more drainageways under its</u> jurisdiction. They range in length from a few hundred feet to several miles. The 2007 ditching project list (www2.stpgov.org/pdf/ditching_projects.pdf) of the Department of Public Works has over 500 projects that range from a few hundred feet to over 7 miles of roadside ditch work.

The municipalities have relied on the Parish and the drainage districts for their major drainage improvement projects.

Project scoping: As part of the mitigation planning process, priority projects were submitted specifically to pursue FEMA mitigation grants. Two drainage improvement projects were submitted by a citizen member of the Mitigation Planning Committee:

- Defiance Drive drainage connection to the Whisperwood retention pond.
- South Queens Drive street drain connection to Whisperwood retention pond



8.5. Drainage System Maintenance

8.5.1. General The drainage system may include detention ponds, stream channels, swales, ditches, bayous and culverts. Drainage system maintenance is an ongoing program to clean out blockages caused by debris, sediment or vegetation and repair streambank erosion.

"Debris" refers to a wide range of blockage materials that may include tree limbs and branches that accumulate naturally, or large items of trash or lawn waste accidentally or intentionally dumped into channels, drainage swales or detention basins. Maintenance of detention ponds may also require revegetation or repairs of the restrictor pipe, berm or overflow structure.

Maintenance activities normally do not alter the shape of the channel or pond <u>(unless silt is removed)</u>, but they do affect how well the drainage system can do its job. Sometimes it is a very fine line that separates debris that should be removed

from natural material that helps form habitat. Therefore, written procedures that are consistent with state laws and environmental concerns are usually needed.

Government agencies usually accept responsibility for maintaining bridge openings and facilities on public property. However, in most areas, the responsibility for drainageway maintenance on private property, when no easements have been granted, is with the individual private property owner. This often results in very little maintenance being accomplished.



Periodic inspections and debris removal are needed to prevent dams in ditches and streams



8.5.2. Dumping One approach that can reduce drainage problems and the workload of the maintenance crews is an anti-dumping program. Many communities have nuisance ordinances that prohibit dumping garbage or other "objectionable waste" on public or private property.

Drainageway dumping regulations need to also apply to "nonobjectionable" materials, such as grass clippings or tree branches which can kill ground cover or cause obstructions in channels. Regular inspections to catch violations should be scheduled.

Many people do not realize the consequences of their actions. They may fill in the ditch in their front yard not realizing that it is needed to drain street runoff. They may not understand how regrading their yard, filling a wetland, or discarding leaves or branches in a watercourse can cause a problem to themselves and others. Therefore, a dumping enforcement program should include public information materials that explain the reasons for the rules as well as the penalties.

8.5.3. Implementation in St. Tammany Parish The

primary duty of the Department of Public Works is to take care of roads and drainage. The Department maintains an inventory



Routine road and drainage maintenance activities include sign replacement, road repairs and grading, ditch cleaning and grading, grass and brush cutting and other miscellaneous duties. This work is performed by up to 125 people who are organized under three areas, each under the direction of a Road Foreman.

Between January 1 and September 30, 2003, the Department issued over 1,700 work orders to clean or remove debris from ditches. Most were based on calls from concerned residents. This routine maintenance is funded by sales and road taxes. The latter limits work to roadside ditches

taxes. The latter limits work to roadside ditches and lateral ditches that will affect Parish roads. If a problem is found that warrants a major project, it is passed on to the Department of Engineering, as noted in section 8.4.5. Abita Springs, Folsom and Pearl River have their own maintenance programs.

The Parish has a very active litter abatement program, with components such as adopt-aroad, recycling, clean up days, public information materials, a Litter Safety Kit, and an extensive website. The informational materials do not stress the impact of litter and debris on drainageways. If they did, it might increase cooperation when people realize how they can be directly affected.

8.5.4. CRS credit: Community Rating System credit is provided for a formal drainage system inspection and maintenance program with published procedures that clearly identify what can be removed and what "debris" should be allowed to stay in natural channels. Up to 250 points are possible under Activity 540 – Drainage System Maintenance. The Parish is currently receiving 200 points.

The CRS also provides up to 30 points for enforcing and publicizing a regulation that prohibits dumping in the drainage system. The Parish is receiving 15 points for its regulation. It would receive the full 30 points if it publicized the rules.



HE HOUSE

OU FLOOD MAY BE OUR OWN

STRICT FINE FOR ILLEGAL DUMPING

Village of South Holland

Stream dumping notice

8.5.5. 2009 Update The Department of Public Works now has a full time staff of 140 and an additional 20 seasonal staff. The seasonal staff work during March through August and are dedicated to mowing and clearing ditches and culverts. A total of 25 full time staff are dedicated to ditch and lateral maintenance and oversight. Group Leaders organize crews each day to inspect roads, culverts and lateral ditch drainage ways. These staff respond to citizen complaints related to drainage and general roadway conditions.

The Department routinely removes sediment from the ditches and lateral drainage ways. The Department has recently acquired a "floating track excavator" in order to remove silted-in lateral drainage ways that would otherwise be inaccessible. It also obtained a "tracked dump truck" that is used as a sediment collection vehicle.

In 2003, the Department issued 1,700 work orders to clean or remove debris from ditches Between January 1 and December 31, 2008, this number was nearly twice that (3,514).

While the municipalities respond to reports of drainage problems, they don't all have a regular inspection program. Abita Springs does an inspection at the beginning of hurricane season. It also sends out a newsletter at that time, reminding residents to keep their ditches clear for their own protection.

The Parish and the municipalities have littering ordinances. However, Madisonville's specifically mentions all types of debris prohibited from "ditches, drainage channels, branches, rivers, or waterways of any kind" (Chapter 14, Section 14.19). Pearl River has a stormwater ordinance which is primarily concerned with water quality, not quantity. However, it does require people to keep their watercourses "free of trash, debris, excessive vegetation and other obstacles that would pollute, contaminate or significantly retard the flow of water..." (Section 1.3-4, Ordinance 12-12-06A).

If there is any debate over the intent of a local ordinance, there is good authority to enforce dumping rules under state law. RS 38:215 reads:

215. Obstruction of drainage prohibited

No person shall willfully obstruct any natural or artificial drainage canal, creek, bayou, or small river, or any public or private drainage.

Whoever violates this Section shall be fined not less than twenty-five dollars nor more than one hundred dollars and in default of payment of fine and costs shall be imprisoned for not less than thirty days nor more than six months.

Each obstruction shall constitute a separate offense.

Failure on the part of anyone who has felled or cut trees in such manner that the tops obstruct any drainage or has placed any other obstruction in any drainage to remove the obstruction shall constitute prima facie evidence of willful intent within the meaning of this Section.

The word drainage as used in this Section means any natural drain or any artificial drain which has been used for the purposes of drainage for at least ten years.

This statute can be enforced by any local police officer, reducing the need for each community to have the specific language on their books.

8.6. Conclusions

- There are several different kinds of flood control projects that can reduce both riverine and stormwater flooding. They have their advantages and disadvantages. Among the advantages are their ability to protect roads and buildings, minimal disruption to the protected properties, and maintenance by a government agency. Among the disadvantages of flood control projects are the disruption to the environment, the potential for sending floodwaters onto other properties, and the construction and long term maintenance costs.
- 2. Larger flood control projects require planning at the watershed level and could use outside sources of funding. There are several efforts by the Corps of Engineers and the Department of Engineering to do this.

2009 update: While the Corps' SELA planning work has taken a lot of time, the Parish has conducted master watershed studies and initiated a 10-year infrastructure improvement plan to organize and prioritize these projects.

- 3. Current funding levels are not sufficient to fund all needed flood control and drainage projects.
- 4. The Parish's drainage system maintenance program is good, but the procedures could be improved to maximize CRS credit. [Deleted as no longer needed.]
- 5. The Parish's dumping regulations could be publicized for better enforcement.

8.7. 2009 Recommendations

- 1. The current approach to flood control projects, with watershed modeling and planning as listed in the 10-year infrastructure plan, should be pursued., provided they meet the following criteria:
 - a. Each project's study should look beyond the immediate project site to ensure that no other properties will be adversely impacted.
 - b. Each project should be based on a watershed master plan or, at a minimum, coordinated with other projects in the same watershed.
 - c. Each project's study should consider alternative non-structural approaches to protect the affected properties from flood damage.
 - d. Opportunities for stream and natural areas restoration should be incorporated wherever feasible.
 - e. Communities and property owners that may be affected by the project should be notified.

f. All relevant federal, state and local permits should be obtained.

- 2. New, dependable sources of funding for flood control, drainage improvements, and drainage maintenance should be sought. More funds are needed for Parish projects and for meeting the cost-share requirement for state and federal projects.
- 3. The Parish's drainage system maintenance program procedures should be revised to maximize CRS credit. [Deleted as no longer needed.]
- 4. The Parish's dumping regulations should be publicized.

8.8. References

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- 2. <u>Bayou Chinchuba Watershed Management Plan</u>, Buchart Horn, Inc. May 2005
- 3. Bayou Lacombe Watershed Management Plan, CDM Inc., September 2004
- 4. Bayou Liberty Watershed Study, Phase 2, Burk-Kleinpeter, Inc., August 2003
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- 6. CRS Coordinator's Manual, Community Rating System, FEMA, 2007
- 7. CRS Credit for Drainage System Maintenance, FEMA, 2006
- 8. Feasibility Drainage Study of Lowe's Pond, J.V. Burkes & Associates, Inc., 1996
- Flood Insurance Study and Flood Insurance Rate Map, St. Tammany Parish Unincorporated areas, FEMA, April 19, 1999 and preliminary 2009 Digital Flood Insurance Rate Map (undergoing appeal)
- 10. Interviews with and input from with Parish <u>and municipal</u> officials, Fall, 2003. <u>Winter 2008 2009.</u>
- 11. Interview with staff of the US Army Corps of Engineers, New Orleans District, January 2004.
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- 13. *St. Tammany Parish, Louisiana, Reconnaissance Study*, U.S. Army Corps of Engineers, New Orleans District, July 1996
- 14. 10-Year Infrastructure Plan, St. Tammany Parish, 2005
- 15. The Southeast Louisiana Urban Flood Control Project for St. Tammany Parish, Program Implementation Report, Richard C. Lambert and Brown, Cunningham & Cannuch, consulting engineers, 2000.

Chapter 9. Public Information

A successful hazard mitigation program involves both the public and private sectors. Public information activities advise property owners, renters, and businesses about hazards and ways to protect people and property from these hazards. These activities can motivate people to take the steps necessary to protect themselves and others.

Information can bring about voluntary mitigation activities at little or no cost to the government. Property owners mitigated their flooding problems long before there were government funding programs. A University of New Orleans study in the 1980's found that people acted on information (see box). In fact, 31% of respondents from the Slidell area had implemented one or more flood protection measure without outside financial assistance.

The usual approach to delivering information involves two levels of activity. The first is to broadcast a short and simple version of the message to everyone potentially affected. The second level provides more detailed information to those who respond and want to learn more.

This chapter starts with activities that reach out to people and tell them to be advised of the hazards and some of the things they can do. It then covers additional sources of information for those who want to learn more. It ends with an overall public information strategy.

Information Brings Results

Dr. Shirley Laska of the University of New Orleans has studied various programs that encourage floodprone homeowner "selfprotective behavior." In her book she notes

"The research reported herein demonstrates considerable interest among and effort by flooded homeowners to retrofit their homes to protect them from future flood damage. Several measures were undertaken by those who retrofitted. Moreover, they spent their own money – often considerable sums – to implement the measures....

"Having some source of retrofitting information appeared to encourage retrofitting, and the measures implemented by flooded homeowners who did consult an information source were evaluated by those owners as more protective than the measures implemented by homeowners who did not rely on a source [of information]."

Floodproof Retrofitting – Homeowner Self-Protective Behavior, University of Colorado, 1991, pages 221 and 223

9.1. Outreach Projects

9.1.1. General Outreach projects are the first step in the process of orienting property owners to the hazards they face and the concept of property protection. They are designed to encourage people to seek out more information in order to take steps to protect themselves and their properties.

Research has proven that outreach projects work. However, awareness of the hazard is not enough; people need to be told what they can do about the hazard, so projects should include information on safety, health and property protection measures. Research has also shown that a properly run local information program is more effective than national advertising or publicity campaigns. Therefore, outreach projects should be locally designed and tailored to meet local conditions. **Community newsletters/direct mailings:** The most effective types of outreach projects are mailed or distributed to everyone in the community. In the case of floods, they can be sent to floodplain property owners.

News media: Local newspapers can be strong allies in efforts to inform the public. Press releases and story ideas may be all that's needed to whet their interest. After a tornado in another community, people and the media become interested in their tornado hazard and

how to protect themselves and their property. Local radio stations and cable TV channels can also help. These media offer interview formats and cable TV may be willing to broadcast videos on the hazards.

Other approaches: Examples of other outreach projects include:

- Presentations at meetings of neighborhood, civic or business groups,
- Displays in public buildings or shopping malls,
- Signs in parks, along trails and on waterfronts that explain the natural features (such as the river) and their relation to hazards (such as floods),
- Brochures available in municipal buildings and libraries, and
- Special meetings, workshops and seminars.



9.1.2. Implementation in St. Tammany Parish There are several types of outreach projects implemented in the Parish:

- For the past three years, the Parish has printed more than 90,000 colorful brochures on hurricane preparedness (see box). 65,000 are distributed through newspapers, 20,000 to elementary school children, and 5,000 through libraries and other means.
- The Parish's public access channel airs various videos throughout the year. Prepared by FEMA, the National Weather Service, Louisiana State University, and other public organizations, they explain flood and wind mitigation measures, driving safety, "surviving the hurricane," and similar topics.



Each year, the Parish distributes a brochure with hurricane safety information and an evacuation map

- Local newspapers and television stations have special articles and programs at the beginning of hurricane season.
- Several brochures are made available at the permit office and other public places. Most of them were prepared by the State Department of Transportation and Development or Federal agencies, such as FEMA and the EPA. They include information about flood insurance, hurricane safety, and emergency preparedness.
- The Parish developed a brochure that covers several topics for CRS credit: the flood hazard, flood warning procedures, flood safety, flood insurance, property protection and drainage system maintenance. It was developed in 1992 and has not been updated since.
- The Parish has two pages of "flood hazard information" in the Northshore Telephone Directory. It includes similar topics.
- Abita Springs has a quarterly newsletter.
- Pearl River includes news items with its sewer bills.

KEEPING YOUR DITCHES CLEAN CAN HELP PREVENT STREET FLOODING CAUSE BY STORM WATER RUN OFF Notice in Abita Springs' Spring 2009 newsletter

9.1.3. CRS credit The Community Rating System provides up to 290 points for outreach projects on flood topics. 100 of those points are for having a public information program strategy. This *Plan* qualifies for the strategy credit (see section 9.5).

9.1.4. 2009 Update Since the 2004 Mitigation Plan, the following annual outreach projects have been added:

- The hurricane safety brochure has been distributed for the last seven years. Each one draws on lessons learned. For example, the 2008 edition has a page on re-entry after the evacuation, which can be seen on page 7-16 and at www.stpgov.org/pdf/1210177443.pdf.
- The Parish President has an e-newsletter that is sent to subscribers. On the next page is an excerpt that includes articles on flooding and evacuating with pets. Each newsletter explains how interested parties can subscribe.
- <u>The hurricane evacuation map and basic</u> information is published in a free section of the St. Tammany Times-<u>Picayune in May.</u>
- The Parish President meets twice a year with the boards of homeowners associations to discuss issues. They invariably include drainage and hazard concerns.



- <u>The Parish Department of Homeland Security and Emergency Preparedness makes</u> presentations to interested groups on hazard preparations, evacuation, and safety.
- While they don't have a regular newsletter, Folsom, Sun and Pearl River do include news items as they arise in their water or sewer bills.

Preparedness Presentation Available

The St. Tammany Parish Office of Homeland Security & Emergency Preparedness is happy to provide a hurricane preparedness presention to civic organizations, groups, churches or businesses. The full presentation takes approximately one hour. A short version takes 30-45 minutes. Contact Dexter Accardo at 985-898-2359 or email daccardo@stpgov.org to schedule.

Take Your Pets With You

- Pets are not allowed to be with their owners inside emergency shelters
- Plan in advance for your pets' care by friends, relatives, vet hospitals, or boarding facilities. Also try pet-friendly hotels.
- Have a pet carrier, portable kennel or crate for each pet.
- Be sure all pets are wearing a secure collar with ID attached. Consider permanent microchip implant for identification.
- Have written copies of vaccination records, any necessary medication, veterinarian contact information and a recent picture of your pet.
- Bring a 2-week supply of pet food and water, along with leashes, a pet first-aid kit and any medicine your pet needs.

St. Tammany Parish Flood Facts

(Source: National Flood Insurance Program) Flooding costs St. Tammany Parish Since 1978, insured flood losses in St. Tammany Parish totaled more than \$1.5 billion. More St. Tammany Parish residents are flood insured.

More St. Lammany Parish residents are flood insured.

Policies have increased 15 percent to 51,554 as of June 2007.

However, 26 percent of St. Tammany households remain at financial risk. There are 70,000+ households in St. Tammany and

only 51,554 flood insurance policies in effect. Insured St. Tammany Parish residents need to maintain coverage.

Residents need to keep their insurance policy current, to ensure they are covered during peak hurricane season.

National Flood Insurance Program

Generally, Homeowner's and Renter's Insurance Policies don't provide protection for rising water (flooding). To get that protection for your home and its contents, you need flood insurance. There is typically a 30-day waiting period before a policy becomes effective. To be covered for the beginning of storm season, apply for flood insurance today. To learn more about flood insurance, go to www.floodsmart.gov

If you do not have a land-line telephone, St. Tammany Parish's First Call Alert System will not be able to reach you in the event of a called evacuation. Monitor all news media, including Channel 10, for current emergency information.

To Receive This Newsletter:

To receive future newsletters, go to the parish website, www.stpgov.org, click the link on the home page that says "Register to receive automatic email updates" and give us your email information.

Please share this information with others in your organization who might wish to receive the newsletter directly.



St. Tammany Parish Kevin Davis, Parish President **Parish Council** Marty Dean Gary Cooper James A. "Red" Thompson R Reid Falconer Marty Gould Rebecca Crawford-Howell Al Hamanei Chris Canulette E.L. Bellisario Henry Billiot Steve Stefancik Jerry Binder **Richard Artigue** Ken Burkhalter

Parish President's Office 985-898-2362 Parish Council Office 985-898-2591

Second page of the May 2008 St. Tammany Parish Newsletter

Source: www.stpgov.org/leadership_president_newsletter.php?id=1002

9.2. Real Estate Disclosure

9.2.1. General Many times after a flood or other natural disaster, people say they would have taken steps to protect themselves if only they had known they had purchased a property exposed to a hazard. There are some Federal and State requirements, but they have their limits.

Federal law: Federally regulated lending institutions must advise applicants for a mortgage or other loan that is to be secured by an insurable building whether the property

is in a floodplain as shown on the Flood Insurance Rate Map (which is described in Section 2.2.3). If so, flood insurance is required for buildings located within the floodplain if the mortgage or loan is federally insured. However, because this requirement has to be met only 10 days before closing, often the applicant is already committed to purchasing the property when he or she first learns of the flood hazard.

State law: State law sets standards for real estate sales and licensing of agents and brokers RS 37:1454 states "It is unlawful for any person or his agent to file with the commission any notice, statement, or other document, required under the provisions of this Chapter which is false or contains any material misstatement of fact." This can be circumvented by not mentioning anything about natural hazards in the information about a property for sale.



properties are exposed to.

RS 37:1455 itemizes reasons for revocation of a real estate license. Section 27 reads: "Failure to disclose to a buyer a known material defect regarding the condition of real estate of which a broker, salesperson, or timeshare interest salesperson has knowledge."

The shortcoming of these laws is that they only affect sales that involve a real estate agent and the salesperson must be aware of the hazard. Due to the sporadic occurrence of flood events, a property owner or an agent may legitimately not be aware of past or potential flooding problems with a property being sold. For example, Hurricane Katrina did not trigger any flood insurance claims in Folsom and only one in Abita Springs, but both have mapped flood hazard areas.

Practices by local real estate boards can overcome the deficiencies of these laws and advise newcomers about the hazard earlier than just before closing. They could check the Flood Insurance Rate Map before listing a property or encourage disclosure of past flooding experiences.

9.2.2. Implementation in St. Tammany Parish The Parish has one additional law on the books: Section 40-070.0 lists what must be shown on a final subdivision plat. Subsection aa includes "flood zone and wetland demarcation lines or shading." This only works for subdivisions that have been platted since the requirement went into effect and then only if the title search sees it and advises the buyer.

The area's multiple listing service does not include a listing of whether a property is in a flood zone or wetland. Disclosure practices are left up to the individual broker or agent.

9.2.3. CRS credit Communities in Louisiana receive 5 points for the state law. St. Tammany Parish receives another 5 points for its plat requirement. Up to 46 more points are available if real estate agents implement a program that checks the FIRMs before a property is listed and provides the flood hazard information to house hunters. Ten points would be provided if local real estate agents give out brochures that advise people to check out a property's hazards before they commit to a purchase.

9.2.4. 2009 Update The Louisiana Real Estate Commission issued a new seller's disclosure form in March 2008. It notes that "In accordance with Act 308 of the 2003 Louisiana Legislature (LSA-R.S. 9:3195-3199), effective July 1, 2004, a seller of residential real property must furnish purchasers with a Property Disclosure Document." The form includes the following questions:

- (4) Has any flooding, water intrusion, accumulation, or drainage problem been experienced with respect to the land? If yes, indicate the nature and frequency of the defect at the end of this section.
- (5) What is/are the flood zone classification(s) of the property?
 - (a) What is the source and date of this information? (Check all that apply.)

 Survey/Date Flood Elevation Certificate/Date
 Flood Insurance Policy/Date Other /Date
 - (b) Does SELLER have a flood elevation certificate in SELLER'S possession that will be shared with BUYER?
- (6) If the property is mortgaged, did the lender require you to buy flood insurance?
- (7) Has the property ever had termites or other wood-destroying insects or organisms?
- (8) Was there any damage to the property?
- (9) Was the damage repaired?
- (10) Is the property currently under a termite contract?...
- (12) Has any structure on the property ever taken water by flooding (rising water or otherwise)? If yes, give the nature and frequency of the defect at the end of this section....
- (28) Has there been property damage related to the land or the improvements thereon, including, but not limited to, fire, windstorm, flood, hail, lightning, or other property damage?
 - (a) If yes, were all related property damages, defects, and/or conditions repaired?

These new provisions should greatly improve the buyer's level of knowledge of a property's exposure to hazards. They could qualify the Parish for an additional 5 - 15 points of CRS credit.

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9.3. Libraries and Websites

The two previous activities tell people that they are exposed to a hazard. The next step is to provide information to those who want to know more. The community library and local websites are obvious places for residents to seek information on hazards, hazard protection, and protecting natural resources.

Books and pamphlets on hazard mitigation can be given to libraries, many of them obtained free from state and federal agencies. Libraries also have their own public information campaigns with displays, lectures, and other projects, which can augment the activities of the local government.



Today, websites are becoming more popular as research tools. They provide quick access to a wealth of public and private sites and sources of information. Through links to other websites, there is almost no limit to the amount of up to date information that can be accessed by the user.

In addition to on-line floodplain maps, websites can link to information for homeowners on how to retrofit for tornadoes, earthquakes and floods and a "FEMA for Kids" site. This website teaches children how to protect their home and what to have in a family disaster kit.

9.3.1. Implementation in St. Tammany Parish A search of the St. Tammany Parish Library catalog reveals the following numbers of publications.

- 26 publications on hurricanes
- 50 publications on flood
- 1 video on tornado safety
- 2 publications on wildfires
- 1 publication on fog
- 5 publications on earthquakes
- 1 publication on hail

The documents on the subject of "flood" represent a broad and thorough coverage of the subject, ranging from floodplain maps, to flood protection project reports and floodproofing/retrofitting manuals. There are still some excellent state and local references, including "Building Your Louisiana Home" and other publications from the LSU AgCenter's Extension Service that could be added.



The Parish has an active website, www.stpgov.org, which is kept updated with information on governmental activities, including the mitigation planning process. FEMA's floodplain maps are available on the site and the Parish is developing a more active, GISbased map service. However, other than a form that people can submit to the Office of Emergency Preparedness on their evacuation and sheltering needs, there is not much information for people wanting to know how to reduce their exposure to natural hazards.

There are some very useful sites that the Parish could link to. The most extensive flood mitigation website in the country is at LSU AgCenter's Extension Service, www. louisianafloods.org. In addition to LSU's many publications, the site offers current river levels and flood predictions, advice on floodproofing and flood insurance, and a link to the national Extension Disaster Education Network (EDEN). There is also a "virtual mall," billed as a "place to 'shop' for floodproofing products, contractors, and professional services, and to see examples of floodproofing installations."

Abita Springs has a website that includes its newsletter. There are no mitigation pages or links to other sites.

9.3.2. CRS credit The Community Rating System provides up to 30 points for having a variety of flood references in the local public library and up to 36 more for similar material on municipal websites (Activity 350 – Flood Protection Information). The Parish is currently earning 27 points for the library

9.3.3. 2009 Update. The St. Tammany Parish Library has greatly increased the number of references on hurricanes and floods since 2004. There are now 276 documents and other materials listed under "hurricane" in the catalog and 216 under "flood."

Bigger improvements have come to the Parish's website, www.stpgov.org. It has kept viewers up to date with the President's e-newsletter and notices of hazard-related activities, including the meetings of the Hazard Mitigation Planning Committee and upcoming drainage improvement projects. Different departments' pages have different hazard-related links, such as:

- <u>Citizens Services page: special needs survey to help the Parish identify who</u> <u>needs special help to evacuate or for shelter</u> (www.stpgov.org/pdf/STPGOV special needs survey.pdf)
- <u>Engineering: flood zone and critical drainage area maps</u> (www.stpgov.org/departments engineering.php)
- Fire Services: links to local fire protection districts and the State Fire Marshall (www.stpgov.org/departments_fire.php)
- Homeland Security and Emergency Preparedness: numerous links to information on family disaster planning, flood preparation, flood insurance, hurricane preparedness, evacuation, and the hazard mitigation planning effort (www.stpgov.org/departments_homeland.php)
- <u>Management Information Services: links to GIS maps, such as a Katrina storm</u> surge map (www.stpgov.org/departments_archive.php)

- Permits: the preliminary Flood Insurance Rate Map (www.lamappingproject.com./)
- Public Works: a work order request form for drainage projects (www.stpgov.org/departments_public_orders.php)

The Parish's website has become very popular as a source of information. The Parish tracks hits and the number of pages viewed. The data for 2008 is displayed graphically below. Usage increased dramatically in August and September, when Hurricanes Gustav and Ike threatened the area. During the events, there were was many as 18,000 different users each day. Parish staff kept the information on vital topics, such as evacuation, reentry, and boil orders, updated 24 hours a day.



While the Parish has not been receiving any CRS credit for its website, it could earn as many as 50 points if a few additional items of information were added and the homepage included a link to a flood protection page.

Abita Springs and Folsom have websites, but they are set up to provide much information on hazards. It would not take much work for them to develop a one page mitigation site

with links to Parish, State, FEMA, and university sites that have pertinent information.

For example, there are also two new and very useful websites that can help St. Tammany Parish residents. One is run by the University of New Orleans (FloodHelp. uno.edu) and focuses on repetitive flood losses and the other is by Louisiana State University (Louisiana Floods.org). With a little explanation, links from the Parish's website to these can qualify for much of the CRS credit.



9.4. Technical Assistance

9.4.1. Hazard information Many benefits stem from providing map information to inquirers. Residents and business owners that are aware of the potential hazards can take steps to avoid problems and/or reduce their exposure to flooding. Real estate agents and house hunters can find out if a property is floodprone and whether flood insurance may be required.

Communities can easily provide map information from FEMA's Flood Insurance Rate Maps (FIRMs) and Flood Insurance Studies. They may also assist residents in submitting requests for map amendments and revisions when they are needed to show that a building is outside the mapped floodplain.



Some communities supplement what is shown on the FIRM with information on additional hazards, flooding outside mapped areas and zoning. When the map information is provided, community staff can explain insurance, property protection measures and mitigation options that are available to property owners. They should also remind inquirers that being outside the mapped floodplain is no guarantee that a property will never get wet.

9.4.2. Property protection assistance While general information provided by outreach projects or the library helps, most property owners do not feel ready to retrofit their buildings without more specific guidance. Local building department staffs are experts in construction. They can provide free advice, not necessarily to design a protection measure, but to steer the owner onto the right track.

Building or public works department staff can provide the following types of assistance:

- Visit properties and offer protection suggestions,
- Recommend or identify qualified or licensed contractors,
- Inspect homes for anchoring of roofing and the home to the foundation,
- Provide advice on protecting windows and garage doors from high winds, and
- Explain when building permits are needed for home improvements.

There is a concern that a local official might provide wrong information and the community would be sued when the project failed. To counter this, there are guidelines for local programs and training on how to identify the right measures.

FEMA conducts a free week-long course at its Emergency Management Institute on property protection measures for flooding. FEMA and the Corps of Engineers periodically conduct one or two day retrofitting workshops.
9.4.3. Implementation in St. Tammany Parish The Permits and Regulatory Department provides map information to any inquirer. This service is publicized by a letter sent each year to local banks, real estate offices and insurance agencies. The FEMA floodplain maps are also available for access on the Parish's website.

The office in the Planning Department that administers the mitigation funding programs does talk to inquirers about the benefits and hazards of alternatives. Staff does not give advice because of resource constraints and the potential for liability.

The Parish has conducted a one day seminar on flood protection measures and mitigation funding programs. This was done in 2000, in conjunction with a flood awareness week. The Parish publicized that during the week, staff would be available at the Government Complex to meet with and talk to people on mitigation.

9.4.4. CRS credit The Community Rating System provides 140 points for providing map information to inquirers. Up to 71 points are available for providing one-on-one flood protection assistance to residents and businesses and making site visits. Both services must be publicized. The Parish is currently receiving the full 140 points for map information, but only 3 points for technical assistance.

9.4.5. 2009 Update The map information service has been automated to some degree on the Parish's website. The current Flood Insurance Rate Map is on the GIS page (www2.stpgov.org/publicgis/GISPublicViewer.aspx) and there are links to other pages to see the post-Katrina advisory flood hazard areas and the preliminary FIRM. However, to receive CRS credit for this system, there needs to be a way for users to find the flood hazard for a property by typing in an address, some additional information on flood insurance, and a number to call for more information.

The mitigation funding office has reduced its staff and is now in the Department of Homeland Security and Emergency Preparedness. To receive CRS credit for visiting properties and providing one-on-one technical advice, the service would have to be publicized.

9.5. Public Information Program Strategy

9.5.1. General A public information program strategy is a document that receives CRS credit. It is a review of local conditions, local public information needs, and a recommended action plan of activities. A strategy consists of the following parts, which are incorporated into this plan.

- The local flood hazard discussed in Chapter 2 of this plan.
- The property protection measures appropriate for a specific hazard discussed in chapter 5.
- Flood safety measures appropriate for the local situation Flood safety measures are on the next page and Hurricane safety is discussed in the box on page 9-13.

- The public information activities currently being implemented within the community including those by non-government agencies – discussed in sections 9.1 – 9.4.
- Goals for the community's public information program covered in Chapter 4.
- The outreach projects that will be done each year to reach the goals in section 9.7's recommendations and Chapter 10's action plan.
- The process that will be followed to monitor and evaluate the projects in Chapter 10's action plan.

9.5.2. Public information topics At its February 7, 2004, meeting, the Mitigation Planning Committee reviewed the various public information activities currently underway with the goals of this *Mitigation Plan* in mind. An exercise was conducted to identify the most important topics that should be explained to the public.

Flood Safety Do not walk through flowing water. Drowning is the number one cause of flood deaths. Currents can be deceptive; six inches of moving water can knock you off your feet. Use a pole or stick to ensure that the ground is still there before you go through an area where the water is not flowing. Do not drive through a flooded area. More people drown in their cars than anywhere else. Don't drive around road barriers; the road or bridge may be washed out. Stay away from power lines and electrical wires. Electrical current can travel through water. The number two flood killer after drowning is electrocution. Report downed power lines to the Police or Sheriff by calling 911. Look out for animals that have been flooded out of their homes and who may seek shelter in yours. Use a pole or stick to poke and turn things over and scare away small animals. Look before you step. After a flood, the ground and floors are covered with debris including broken bottles and nails. Floors and stairs that have been covered with mud can be very slippery. Be alert for gas leaks. Use a flashlight to inspect for damage. Don't smoke or use candles, lanterns, or open flames unless you know the gas has been turned off and the area has been ventilated. Carbon monoxide exhaust kills. Use a generator or other gasoline-powered machine outdoors. The same goes for camping stoves. Charcoal fumes are especially deadly -cook with charcoal outdoors. Clean everything that got wet. Flood waters have picked up sewage and chemicals from roads, farms, factories, and storage buildings. Spoiled food, flooded cosmetics, and medicine can be health hazards. When in doubt, throw them out. Take good care of yourself. Recovering from a flood is a big job. It is tough on both the body and the spirit and the effects a disaster has on you and your family may last a long time.

As The Storm Approaches

THESE SIMPLE TASKS COULD SAVE YOUR LIFE AND YOUR HOME

- Listen for weather updates on local stations and on NOAA Weather Radio. Don't trust rumors, and stay tuned to the latest information.
- Check your Disaster Supplies Kit. Obtain any needed items.
- Refill prescriptions. Maintain at least a two week supply during hurricane season.
- Clear yard of potential flying debris, e.g. lawn furniture, potted plants, bicycles and trash cans.
- Protect your windows and glass doors! Brace double entry and garage doors at the top and bottom.
- Fill your car's gas tank and check oil, water and tires. Gas pumps don't operate without electricity.
- Secure your boat early. Drawbridges will be closed to boat traffic after an evacuation order is issued.
- Leave the swimming pool filled and super-chlorinated. (Cover the filtration system.)
- Get cash. Banks and ATMs won't be in operation without electricity and few stores will be able to accept credit cards or personal checks.
- Do not get on congested evacuation routes and try to out run the storm.

IF YOU CAN STAY HOME

If you live in a sound structure $\ensuremath{\textit{OUTSIDE}}$ the evacuation area and do $\ensuremath{\textit{NOT}}$ live in a mobile home, stay home.

- Make sure your windows are protected and home is secured.
- Offer your home as shelter to friends or relatives who live in vulnerable areas or mobile homes.
- Clean containers for drinking water and your bath tub for storing clean water. Line the tub with plastic sheeting or clean shower curtain, or caulk the drain with silicone caulking – it will hold water for weeks and cleans up easily when dry. Plan on three gallons per person, per day for all uses.
- Check your Disaster Supplies Kit. Make sure you have at least a two-week supply of non-perishable foods. Don't forget a non-electric can opener.
- During the storm, stay inside and away from windows, skylights and glass doors. Find a safe area in your home – an interior, reinforced room, closet or bathroom on the lower floor.
- Wait for official word that the danger is over. Don't be fooled by the storm's calm "eye."
- If you lose power, turn off major appliances, such as the air conditioner and water heater, to reduce damage.
- If flooding threatens your home, turn off electricity at the main breaker.

118 20

IF YOU MUST EVACUATE

Stay tuned to your local radio and television station for emergency broadcasts. If ordered to evacuate, you must do so immediately.

- The official emergency broadcast stations are 870AM and 106.7FM. On the Northshore, 106.1FM will carry St. Tammany information courtesy of Action News.
- Take your Disaster supplies kit with you!
- Take important papers with you, including your driver's license, special medical information, insurance policies and property inventories.
- Let friends and relatives know where you are going. Make sure your neighbors have a safe ride.
- Turn off electricity, water & gas.
- Lock windows and doors.

DISASTER SUPPLIES KIT

One of the most important tools for emergency preparedness is the Disaster Supplies Kit. Below are the most important items. Stock up today and store in a water-resistant container! Replenish as necessary, especially at the beginning of hurricane season, June 1.

- Two-week supply of prescription medicines.
- Two-week supply of non-perishable/special dietary foods.
- Drinking Water/containers: 3 gal/per person/per day for two weeks.
- Flashlights and batteries for each member of the family. Portable radio and (7 sets) batteries.
- First aid book and kit including bandages, antiseptic, tape, compresses, non-aspirin pain reliever, anti-diarrhea medication
- Mosquito repellent & citronella candles.
- Two coolers (one to keep food; the other to go get ice).
- Plastic tarp for roof/window repair, screening, tools, nails, etc.
- Water purification kit (tablets, chlorine (plain) and iodine).
- Infant necessities (medicine, sterile water, diapers, ready formula, bottles).
- Clean up supplies (mop, buckets, towels, disinfectant).
- Camera and film.
- Non-electric can opener.
- Extra batteries for camera, portable TV & lamps, etc.
- Plastic trash bags.
- Toilet paper, paper towels and pre-moistened towelettes.
- If you evacuate you also should take:
- Pillows, blankets, sleeping bags or air mattresses.
- Extra clothing, shoes, eyeglasses, etc.
- Folding chairs, lawn chairs or cots.
- Personal hygiene items (toothbrush, toothpaste, deodorant, etc.).
- Quiet games, books, playing cards and favorite toys for children.
 Important papers (driver's license, special medical information.
- Important papers (driver's license, special mediinsurance policies and property inventories).
 Food & water for shelter.
- Precious commodities before and after a storm:

For Information Concerning Re-Entry Into St. Ta

- Cash. (With no power, banks may be closed, checks and credit
- cards unaccepted, and ATMs may not be operational).

 Charcoal, Wooden Matches and Grill.
- Ice, food & water for shelter.

The back cover to the flyer shown on page 9-2 includes hurricane safety tips.

Each Committee member was given the handout that appears on the next page. The handout lists 54 possible topics that would be useful for residents and businesses to know. The members were asked to check the 10 topics they felt were most important to convey. They could also add other topics not listed.

The handout on the next page shows the actual scores for each topic. After a review of the results, the higher scoring topics were organized and combined. It was concluded that the following topics deserved the most attention:

- Safety precautions for all types of hazards, but especially storms, floods and fog. Evacuation is recognized as the most important safety precaution for tropical storms and hurricanes.
- Flood protection measures, including rules for new construction and insurance.
- Termite protection.
- Keeping drainageways clear and protection from local drainage problems.
- Family and emergency preparedness measures.
- What the Parish is doing and sources of assistance.
- Protecting water quality and wetlands and the benefits of open space.

9.5.3. Media A second exercise was conducted to identify the most effective ways to convey the various messages to residents and businesses. This time a handout with 31 different ways to communicate was given to each Committee member. They were asked to identify the five most important ways. The handout with the "votes" of the members is shown on page 9-16.

The results were tallied and discussed by the Committee. Given that there are 200,000 people living in St. Tammany Parish and over half of them are in the floodplain, the Committee did not favor labor intensive approaches, such as visits to a home or one-on-one technical advice. Mass media are preferred, such as:

- Mailings to everyone, provided they are done without great expense, such as with utility bills.
- News releases, newsletters, newspaper articles, and newspaper supplements.
- Cable TV notices, videos and TV programs.
- Information on the Parish's website with links to other sources.
- Displays at appropriate places and during special events.
- Handouts, flyers and other materials for the displays, to give to school children and libraries, and to distribute at special events and meetings.

9.5.4. CRS credit The Community Rating System provides 100 points for a public information program strategy. A mass mailing to all properties can earn up to 60 more points and can meet the publicity requirements to receive credit for several other activities.

Public Information Topics

There are a variety of messages that can be delivered to property owners, businesses, school children and other members of the "public." The following are listed in alphabetical order.

Please review these messages and check off the 10 that you think are the most important. Scratch out any messages that should not be used and feel free to suggest different words.

- Beautifying the lakeshore
- 4 Benefits of open space
- Dealing with contractors
- Earthquake safety precautions
- 4 Economic impact of natural hazards
- 10 Emergency protection measures
- 5 Family preparedness
- 5 Flood Insurance Rate Maps
- 5 Flood safety precautions
- 1 Floodproofing a business
- 4 Floodproofing a house
- 8 Fog safety precautions
- 3 Health hazards
- How to evacuate during a storm/flood 9
- How to get out of buying flood insurance
- 5 Local drainage protection
- 3 Making sure your yard drains
- 2 Materials on the website
- 1 Past disasters in the Parish
- Preparing a building for a winter storm
- 4 Preserving and protecting wetlands
- 2 Protecting a manufactured home from wind -
- 5 Protecting water quality
- 1 References in the local library
- 1 Reporting construction violations
- 5 Reporting dumping violations
- Retrofitting a building for tornado protection 1
- Retrofitting for earthquake protection
- Rules against dumping in streams 4

- 8 Rules on building in the floodplain
- Safety in buildings 1
- 1 Safety in vehicles
- 2 Sources of assistance
- 3 Status of flood control projects
- 1 Status of implementing the mitigation plan
- 3 Storm safety precautions
- 1 Substantial damage regulations
- 7 Termite protection/eradication
- 1 Tornado safety precautions
- 3 Warning signals
- Ways to protect a building from hail
- What a flood insurance policy covers 4
- What other agencies are doing 2
- 9 What the Parish is doing
- 2 When flood insurance must be purchased
- 5 Whether a building is in a floodplain
- 2 Who is responsible for flooding
- 2 Why channel maintenance is important
- Why it floods 5
- Why levee maintenance is important
- Wildfire property protection measures
- Wildfire safety precautions
- 4 Wind protection measures
- 1 Winter storm safety precautions
- 2 Other: Keep ditches clear
- Other: Upgrade building code requirements
- Other: Enforce building codes
- Other: Other:

Handout used to determine the topics that a public information program should cover. The numbers are the number of Committee members who chose that topic as one of their top ten.

Public Information Media

There are many different ways to convey the messages about hazards, safety precautions, and ways to protect one's property. The following are listed in alphabetical order.

Please review these media and check off the **5** that you think are the most important. Scratch out any media that should not be used and feel free to suggest different ones.

- 8 Cable TV notices
- 1 Displays in home improvement stores
- 3 Educational programs in grade schools
- 1 Educational programs in high schools
- 1 Educational programs in junior high
- 3 Handouts/flyers at public places
- 3 Homeowner's flood protection handbook
- Mass mailing to all floodplain residents/businesses
- 1 Mass mailing to all lakeshore residents/businesses
- 4 Mass mailing to all residents/businesses
- 6 Newspaper articles
- 1 Newspaper supplements
- 6 News releases
- Open houses/contractors' shows
- 5 Parish/town-wide newsletter
- Park/recreation department educational programs
- 2 Presentations at neighborhood meetings
- Presentations to banks and lenders
- Presentations to contractors
- 1 Presentations to insurance agents
- Presentations to organizations or clubs
- 1 Presentations to real estate agents
- 2 References available in the library
- 5 Shopping mall displays
- 4 Special events (e.g., "Hurricane Awareness Week")
- 0 Technical advice from Parish staff
- 0 Telephone book/"Yellow Book"
- 7 Utility bill stuffers
- 2 Videos/Cable TV programs
- Visits to a home by Parish staff
- 5 Web site with links to other sources
- 4 Other: Reverse 911
- Other:

Handout used to determine the best ways for a public information program to convey messages to residents and businesses.

9.5.5. 2009 Update The Parish did not apply for CRS credit for having a Strategy. Implementation of the recommended activities is covered in Section 10.2.

Public Information Topics: To update the Strategy, at its March 2009 meeting, the Mitigation Planning Committee members repeated the two exercises described on the previous three pages. The raw scores for the public information topics are shown in Table 9-1, below. The Committee used the same topics and instructions as were used in 2004. This included a note that members could scratch out any topics that should not be covered. These were counted as minus 1.

To simplify reviewing all these topics, they were classified under five categories of mitigation measures, which are shown in the second column in Table 9-1. Their relative importance to the Committee can be seen in the pie chart in Figure 9-1 on the next page.

	Table 9-1 2009 Public Information Topics										
1	Other	Beautifying the lakeshore		1	Retrofitting for earthquake protection						
	Í Í	Benefits of open space	2	Regs	Rules against dumping in streams						
		Dealing with contractors	8	Regs	Rules on building in the floodplain						
		Earthquake safety precautions	3	Safety	Safety in buildings						
		Economic impact of natural hazards	4	Safety	Safety in vehicles						
8	Safety	Emergency protection measures	4	Help	Sources of assistance						
5	Prop	Enforce building codes	3	Prop	Status of flood control projects						
7	Safety	Family preparedness			Status of implementing the mit. plan						
4	Regs	Flood Insurance Rate Maps	6	Safety	Storm safety precautions						
7	Safety	Flood safety precautions	1	Regs	Substantial damage regulations						
-1	Prop	Floodproofing a business	1	Prop	Termite protection/eradication						
2	Prop	Floodproofing a house	1	Safety	Tornado safety precautions						
6	Safety	Fog safety precautions	3	Regs	Upgrade building code requirements						
2	Safety	Health hazards	3	Safety	Warning signals						
10	Safety	How to evacuate during a storm/flood			Ways to protect a building from hail						
-1	Prop	How to get out of buying flood insurance	1	Prop	What a flood insurance policy covers						
5	Prop	Keep ditches clear		''	What other agencies are doing						
3	Prop	Local drainage protection	3	Help	What the Parish is doing						
1	Prop	Making sure your yard drains	3	Prop	When flood insurance must be purchased						
3	Help	Materials on the website	2	Prop	Whether a building is in a floodplain						
1	Other	Past disasters in the Parish	1	Other	Who is responsible for flooding						
-1	Prop	Preparing a building for a winter storm	2	Prop	Why channel maintenance is important						
4	Regs	Preserving and protecting wetlands	2	Prop	Why it floods						
1	Prop	Protecting a manufactured home from wind	2	Prop	Why levee maintenance is important						
2	Other	Protecting water quality	3	Prop	Wildfire property protection measures						
	Í Í	References in the local library	2	Safety	Wildfire safety precautions						
		Reporting construction violations	3	Prop	Wind protection measures						
1	Regs	Reporting dumping violations	2	Safety	Winter storm safety precautions						
1	Prop	Retrofitting for tornado protection									

The pie chart in Figure 9-1 shows that safety is the number one topic that should be disseminated to the residents of St. Tammany Parish. This includes topics like emergency protection measures, family preparedness, flood, fog, storm and wildfire safety precautions, and evacuation guidance. Next in importance are the property protection measures, including protection of buildings from the different hazards and the various flood control measures, including drainage and ditch flooding protection. Regulations topics chosen were mostly about floodplain and wetland rules.

A review of the results in Table 9-1 also shows which hazards the Mitigation Planning Committee felt are the most important ones. These are displayed in the pie chart in Figure 9-2. Flooding and drainage problems were clearly felt to deserve the most attention. Storms, which involve wind and rain, came in second. However, many of the topics, such as family preparedness and what the Parish has been doing, apply to all hazards.



Public Information Media: The tallies from the Committee's 2009 preferences on what media would best reach the Parish's residents are shown in Table 9-2, below. A summary by general category of media is shown in Figure 9-3, on the next page.

	Table 9-2. 2009 Public Information Media										
9	Cable TV notices		Presentations to banks and lenders								
	Displays in home improvement stores		Presentations to contractors								
1	Educational programs in grade schools		Presentations to insurance agents								
	Educational programs in high schools	1	Presentations to organizations or clubs								
3	Educational programs in junior high		Presentations to real estate agents								
9	Handouts/flyers at public places		References available in the library								
2	Homeowner's flood protection handbook	3	Reverse 911/DCC								
	Mass mailing to all floodplain residents/businesses		Shopping mall displays								
	Mass mailing to all lakeshore residents/businesses	1	Special events (e.g., "Hurricane Awareness Week")								
	Mass mailing to all residents/businesses		Technical advice from Parish staff								
7	Newspaper articles		Telephone book/"Yellow Book"								
3	Newspaper supplements	1	Utility bill stuffers								
8	News releases	4	Videos/Cable TV programs								
	Open houses/contractors' shows		Visits to a home by Parish staff								
5	Parish/town-wide newsletter	9	Web site with links to other sources								
	Park/recreation department educational programs	1	Other: TV & radio public service messages								
4	Presentations at neighborhood meetings	1	Other: Parish hot line								

Figure 9-3 shows that the Mitigation Planning Committee recommends newspaper/newsletters and television as the best ways to communicate with the residents of St. Tammany Parish. Documents, such as handouts, flyers, and utility bill stuffers, and face to face contact, such as presentations and booths at events, are also noted as effective.

It is important to note that there was only one topic related to websites. It had as many "votes" as any other single topic, so websites should be considered as an important media, too.



9.6. Conclusions

- 1. There are many ways that public information can be used so that people and businesses will be more aware of the hazards they face and how they can protect themselves.
- 2. Many of the public information activities can be implemented by community staff By formalizing its activities, a community can earn nearly 500 points under the Community Rating System.
- 3. Outreach projects, libraries and websites are currently being used as public information services in St. Tammany Parish.

2009 update: The Parish has increasingly used its website and the President's enewsletter to disseminate hazard-related information. There is potential for cooperative efforts with the municipal websites and mitigation web pages administered by the State, FEMA, and area universities.

- 4. <u>2009 update: The Parish has used flyers extensively and successfully, especially the annual hurricane preparedness brochure.</u>
- 5. The most important topics to cover in public information activities are:
 - Safety precautions for all types of hazards, but especially storms, floods and fog. Evacuation is recognized as the most important safety precaution for tropical storms and hurricanes.
 - Flood protection measures, including rules for new construction and insurance.
 - Termite protection.
 - Keeping drainageways clear and protection from local drainage problems.
 - Family and emergency preparedness measures.
 - What the Parish is doing and sources of assistance.

- Protecting water quality and wetlands and the benefits of open space.

2009 update: Based on the 2009 Mitigation Planning Committee exercise, the following topics should be covered:

- <u>Safety precautions, including emergency protection measures, family prepared-</u><u>ness, fog safety, and evacuation guidance.</u>
- Property protection measures, including protection of buildings and insurance
- Flood control measures, including drainage and ditch flooding protection.
- Regulations related to flood and wetland protection
- <u>Where people can get help with the above topics</u>
- Topics that are credited by the Community Rating System
- 6. The most appropriate ways to get the messages out are:
 - Cable TV notices, videos and TV programs.
 - Mailings to everyone, provided they are done without great expense, such as with utility bills.
 - News releases, newsletters, newspaper articles, and newspaper supplements.
 - Information on the Parish's website with links to other sources.
 - Displays at appropriate places and during special events.
 - Handouts, flyers and other materials for the displays, to give to school children and libraries, and to distribute at special events and presentations.

2009 update: Based on the 2009 Mitigation Planning Committee exercise, the following media should be used:

- <u>Cable TV notices, videos and TV programs.</u>
- <u>News releases, newsletters, newspaper articles, and newspaper supplements.</u>
- Handouts, flyers and brochures to give to school children and to distribute at special events and presentations.
- Information on the Parish's website with links to other sources.

9.7. 2009 Recommendations

1. Mass media approaches should be used to periodically advise everyone in the Parish about safety precautions, family preparedness, drainage system maintenance, dumping regulations, permit requirements, what the Parish is doing, and where one can receive more information or assistance. These approaches include Cable TV, news releases, and postings on the website.

The Parish should periodically issue news releases and encourage newspapers to run articles on the priority topics. This can be done in conjunction with events such as National Fire Safety Week and National Flood Safety Week.

- 2. <u>The Parish should continue to disseminate the hurricane preparedness brochure and tailor each year's edition to current concerns.</u>
- 3. <u>The municipalities</u> should each develop a newsletter or other medium, such as a utility bill stuffer, to be distributed to all residents in their jurisdiction. This newsletter should cover the following topics:
 - Safety precautions
 - Family preparedness
 - Property protection measures for flooding and wind
 - Drainage system maintenance
 - Dumping regulations
 - Permit requirements
 - <u>What the municipality is doing</u>
 - Where one can receive more information or assistance
 - Additional topics specifically credited by the Community Rating System:
 - Flood insurance
 - Substantial improvement/substantial damage regulations
 - Natural and beneficial floodplain functions
- 4. Handouts and flyers produced by the Parish, the Red Cross, the Parish Schools, FEMA, the State, and other organizations should be reviewed to determine if they should be revised or new ones should be made.
- 5. A display on safety and property protection should be prepared. It should include floodplain maps, photos of flood retrofitted homes, Red Cross brochures on family preparedness and the Parish's hurricane brochure, photos of good and bad examples of drainage maintenance, and other pictures and handouts on the other priority topics.

The display materials should be used during public activities, such as home improvement fairs at shopping malls, meetings with neighborhood associations and other organizations, hurricane preparedness week, etc. They could also be loaned to libraries, schools, and other public locations.

- 6. The Parish's website should have a mitigation page with information and links to other sites. <u>The site should be designed so it will qualify for CRS credit.</u>
- 7. Parish staff should meet with the Northshore Area Board of Realtors to review hazard disclosure practices and how the Parish's map information service can help. [Dropped as no longer needed.]

9.8. References

- 1. Are You Ready? A guide to Citizen Preparedness, FEMA, 2002.
- 2. CRS Coordinator's Manual, Community Rating System, FEMA, 2007.
- 3. CRS Credit for Outreach Projects, Federal Emergency Management Agency, 2006.
- 4. Interviews with Parish and municipal officials, Fall, 2003, 2008, 2009
- 5. *Floodproof Retrofitting: Homeowner Self-Protective Behavior*, Shirley Bradway Laska, University of Colorado, 1991.
- 6. Parish brochures, flyers, and other public informational materials.
- 7. *Stormwater Management Public Information Resource Guide*, South Suburban Mayors and Managers Association, 1999
- 8. Websites for St. Tammany Parish, <u>Folsom, Abita Springs</u>, the St. Tammany Parish Library, the Northshore Area Board of Realtors, LSU's AgCenter, <u>and the University of New Orleans</u>.

Chapter 10. Action Plan

The culmination of the St. Tammany Parish *Natural Hazards Mitigation Plan* is this Action Plan. The general direction of the overall program is outlined here. Specific activities pursuant to the general direction are detailed in Sections 10.1 - 10.3. These sections assign recommended projects and deadlines to the appropriate offices.

Goals The overall directions can be summarized under the six goals established by the Planning Committee and listed in Chapter 4 <u>as updated in 2009</u>:

- 1. Protect the lives and health of the Parish's residents from the dangers of natural hazards.
- 2. Ensure that public services and critical facilities operate during and after a disaster.
- 3. Ensure that adequate evacuation routes, streets, utilities <u>and public and emergency</u> <u>communications</u> are maintained and available during and after a disaster.
- 4. Protect homes and businesses from damage.
- 5. <u>Use new infrastructure and development planning to reduce the impact of natural hazards.</u>
- 6. Give special attention to repetitively flooded areas.

General recommendations appear at the end of Chapters 5-9 for each of the five general mitigation strategies. This chapter converts those <u>updated</u> general recommendations to specific action items, generally following the same order as Chapters 5-9. <u>It also</u> reviews the progress made toward the 2004 action items and recommends changes.

Priorities The Planning Committee reviewed and discussed many things that can be done to protect people and property from the 13 natural hazards introduced in Chapter 2. It was recognized that priorities must be set so the Parish's resources can focus on those activities that will do the most good. Accordingly, four factors were used to prioritize what should be pursued:

- **1.** The greatest threats: Efforts should focus on those hazards that present the greatest threats to the Parish. Chapter 3 reviewed the Parish's vulnerability to the 13 hazards and concluded in section 3.16.4:
 - a. Tropical storms (including hurricanes) and flooding are by far the most severe hazards facing St. Tammany Parish in terms of property damage. Termites, <u>levee failure</u>, and hailstorms are the next most severe.
 - b. Fog is the most severe hazard facing St. Tammany Parish in terms of the threat to lives, safety and mental health. Other, more frequent, hazards, such as tornadoes, wildfires, termites and tropical storms are also important.

- c. Tropical storms (including hurricanes) and flooding have the greatest overall impact on the area's economy. Termites are an added cost of living in the area.
- d. Some types of property and areas are more vulnerable than others. Special emphasis should be placed on protecting manufactured homes and repeatedly flooded properties.
- 2. Appropriate measures: The recommended action items need to be appropriate for the type of threat presented. For example, Chapter 3's analysis notes that the major threat presented by storms and floods is property damage, so property protection and preventive measures, such as acquisition and code enforcement should be directed toward those hazards.

On the other hand, the threat presented by fog is a life safety one. No property protection measures or building codes will protect people from automobile and airplane accidents. Appropriate measures for life safety threats are emergency warning and public information activities.

3. Costs and benefits: The Committee considered the costs and relative benefits of alternative measures. These factors are listed in the description of each action item. Costs can usually be listed in terms of dollars, although most of the recommendations involve staff time rather than the purchase of equipment or services that can be readily measured in dollars.

In many cases, benefits, such as lives saved or future damage prevented, are hard to measure in dollars, so narrative discussions are provided. In all cases, the Committee concluded that the benefits (in terms of reduced property damage, lives saved, health problems averted and/or economic harm prevented) outweighed the costs for the recommended action items.

4. Affordability: Not only must the benefits exceed the costs, the projects must be affordable given the Parish's and municipalities' available resources and staffing. Projects such as acquiring and clearing large floodprone areas were discarded because they did not meet these criteria. Other activities, such as elevating or acquiring selected properties, are dependent on outside or additional funding and further analysis to ensure the benefits outweigh the costs.

Based on these factors, the Committee prioritized the possible activities that could be pursued. Some possible projects, such as constructing more evacuation routes, were not pursued because they did not meet the above criteria. The result was 17 action items that address the major hazards, are appropriate for those hazards, are cost-effective, and are affordable.

Action items <u>The 2004 *Plan* recommended</u> seventeen action items in the following pages. Each action item starts with a short description. The next four subheadings identify

- the agency responsible for implementing the action item,
- the deadline for accomplishing the action item,
- the cost of implementation, and
- the benefits of implementing the action item.

All of the action items can be tied to the above listed goals and the recommendations in Chapters 5-9. These relationships are shown in Table 10-1. The recommendations and the discussions in the earlier chapters provide more background and direction on each action item.

The last column in Table 10-1 shows the activity in the Community Rating System that provides credit points for the action. The column also shows how many points the Parish and the municipalities would receive (note that the Parish already receives some of these credits, but the municipalities do not).

Section 10.1 addresses general program items and projects. Section 10.2 lists the public information action items and Section 10.3 reviews additional tasks needed to administer and support *Plan* implementation.

2009 Update The status of each of 2004's 17 action items is added at the end of the discussion on each action item. Recommended action items for 2009 follow. Two new summary tables have been added. Table 10-2 shows the relation between the action items and the 14 natural hazards addressed by this mitigation plan. Table 10-3 summarizes which departments and municipalities are responsible for each action item. Note that two of the 2004 action items are being replaced by new ones.

Mitigation Committee Several action items refer to the Mitigation Committee. A plan is worthless if there is no instrument for ensuring that it is carried out. Accordingly, the creation of a permanent Mitigation Coordinating Committee is proposed to monitor the implementation of the *Plan*, report to the Parish Council and municipalities on its progress, and recommend revisions to this *Plan* as needed. This is explained in action item 15.

Table 10-1 Action Items, Goals, and Recommendations											
Action Item		Goal 2. Public services/critical facilities	Goal 3. Evacuation routes, streets, & utilities	Goal 4. Protect homes and businesses	Goal 5. Use infrastructure and planning	Goal 6. Repetitively flooded areas	Chapter – Recommendation	CRS Activity - Credit Points			
10.1. Program Action Items											
1. Property protection projects				Х		Х	5-3, 5-5, 8-1	530 - 84			
2. Public property		Х	Х			Х	5-4				
3. Plans and regulations					Х		6-1, 6-6, <mark>6-13</mark>	430 –25			
4. Building code					Х		<mark>6-3</mark> , 6-5	430 – 95			
5. Permit administration					Х	Х	6-4, 6-9, 6-10, 7-4	430 – 15			
6. Floodplain management					Х	Х	6-2, 6-8, 6-10, 6-12	420 – 38			
7. Tree City	Х	Х	Х	Х			6-11				
8. Emergency operations	Х	Х	Х				7-1, <mark>7-2</mark> , 7-3	610 –150			
9. Flood control projects	Х	Х	Х	Х		Х	8-1				
10. Drainage system maintenance		X		X		X	8-3	540 50			
10. Project scoping	Χ	X	Х	Χ		Х	5-5, 7-4, 8-1				
10.2. Public Information Strategy											
11. Hazard mitigation materials	Х			Х			8-4, 9-2, 9-3, 9-4	330 - 100			
12. Outreach projects	Х			Х			9-1, 9-2, 9-3, 9-5	350 – 50			
13. Flood maps	X			X	X	X	6 7, 9 5, 9 6				
13. Public information topics	Х		Х	Х	X	Х	5-1,5-2,8-4,9-1-9-6				
10.3. Administrative Action Items											
14. Plan adoption	Х	Х	Х	Х	Х	Х		510 –200			
15. Mitigation Committee		Х	Х	Х	Х	Х					
16. Financing			Х	Х		Х	8-2	540 - 50			
17. Community Rating System	Х	Х	Х	Х	Х	Х					

This table relates the 17 action items to the 6 goals of this *Plan*. The goals are stated in full on pages 4-3 and 10-1. The table also shows the relation between the action items and the recommendations at the end of chapters 5 - 9. For example action item 1, Property protection projects, supports goals 1, 4, and 6. It is derived from the 3rd and 5th recommendations at the end of Chapter 5. It is estimated that the Parish would receive 84 points under the CRS for this work. Municipal scores may be different.

Table 10-2 Action Items by Natural Hazard														
Action Item	Tropical storms	Flooding	Repetitive flooding	Tornadoes	Wildfires	Drought	Fog	Earthquakes	Hailstorms	Land failure	Winter storm	Dam failure	Levee failure	Termites
10.1. Program Action Items														
1. Property protection projects	Х	Х	Х											
2. Public property	Х	Х	Х	Х	Х			Х	Χ	Χ	Х	Х	Х	Х
3. Plans and regulations	Х	Х	Х	Х				Х		Χ				Х
4. Building code	Х	Х	Х	Х				Х	Х	Х	Х			Х
5. Permit administration	Х	Х	Х	Х				Х	Х	Х	Х			Х
6. Floodplain management		Х	Х									Х	Х	
7. Tree City	Х			Х	Х						Х			Х
8. Emergency operations	Х	Х	Х	Х	Х		Х	Х	Х	Х	Х	Х	Х	
9. Flood control projects		Х	Х											
10. Project scoping	Х	Х	Х											
10.2. Public Information Strategy														
11. Hazard mitigation materials	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х
12. Outreach projects	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х
13. Public information topics	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х
10.3. Administrative Action Items														
14. <i>Plan</i> adoption														
15. Mitigation Committee														
16. Financing		Х	Х											
17. Community Rating System		Х	Х											
This table relates the 17 2009 action ite	ems t	o the	e 14	haz	ards	des	crib	ed ir	n Ch	apte	r 2.	•	•	•

Natural Hazards Mitigation Plan

Table 10-3 Action Items by Responsible Entity											
Action Item	Homeland Security/Emergency Preparedness	Engineering	Permits and Regulatory	Public Works	Cultural and Governmental Affairs	Chief Administrative Officer	Abita Springs	Folsom	Madisonville	Pearl River	Sun
10.1. Program Action Items											
1. Property protection projects	Х	Х									
2. Public property	Х										
3. Plans and regulations			Х				Х	Х	Х	Х	X
4. Building code			Х				Х	Х	Х	Х	Х
5. Permit administration			Х				Х		Х	Х	
6. Floodplain management			Х				Х	Х	Х	Х	X
7. Tree City				Х			Х	Х	Х	Х	Х
8. Emergency operations	Х										
9. Flood control projects		Х									
10. Project scoping	Х	Х									
10.2. Public Information Strategy											
11. Hazard mitigation materials					Х						
12. Outreach projects					X		Х	Х	Х	X	X
13. Public information topics					X		Х	Х	Х	X	X
10.3. Administrative Action Items											
14. <i>Plan</i> adoption	X						X	X	X	X	X
15. Mitigation Committee	X										
16. Financing						X					
17. Community Rating System			X				X		Х	X	
This table relates the 17 2009 action items to the Parish departments and municipalities responsible for implementing them.											

10.1. Program Action Items

Action Item 1. Property protection projects Continue to seek State and Federal funding support for property protection measures. Priority will be for flood protection projects for repetitive loss properties. All property protection projects that use FEMA funds will be voluntary.

While St. Tammany Parish will continue to support traditional funding programs, staff will also pursue flexible funding arrangements. The first priority will be to fund areawide flood control or drainage improvement projects that will protect many properties at a lower cost. Where a watershed management plan concludes that certain properties will not be protected by a project, the Parish will seek funding for property protection measures on an individual property basis.

Staff will also work with funding agencies to allow funding for rebates for lower cost measures and alternatives to elevation and acquisition of severely flooded properties. Staff will monitor national and regional developments in policies, procedures and programs that protect properties from repetitive flooding.

Responsible agency: Parish Planning Department/Mitigation Office

Deadline: Varies with each funding cycle's application deadline

Cost: Staff time to arrange funding. The local cost share will be funded by the Parish for publicly-administered flood control and drainage improvement projects (see action item 16) and by the property owners for those projects that focus on one property at a time. In 2003, the costs to administer these programs has been \$122,000 for staff time \$12,000 for overhead and \$12,000 to maintain acquired properties.

Benefits: This approach will ensure that those properties most in need of flood protection will be addressed first and that the most cost-effective approaches will be used. The actual benefits of each project will vary, but at a minimum, Federal funding programs require that the Parish demonstrate that the benefits exceed the costs over time. The costs to the Parish should be compared to the millions of dollars in Federal funds that this effort has brought in.

2009 Update: As reported in Section 5.4.5, the Parish has continued its work to seek funding support for property protection measures. This workload significantly increased with the Hazard Mitigation Grant Program funds made available after Hurricane Katrina. More applications are in the mill.

As reported in Section 8.2, the Parish is working to be the local sponsor for the Corps of Engineers' SELA projects, a key step in getting those projects funded. There has been no action on alternative funding sources, such as rebates, primarily because of the heavy workload needed to pursue all the available sources of Federal and State funding.

2009 Action Item: This action item will continue. FEMA mitigation grants should be pursued at each grant cycle. Project scoping of property protection and flood control projects should be completed to facilitate obtaining FEMA funding (new Action Item 10).

The alternative funding for small projects should remain a lower priority because efforts should focus on readily available funding sources for areas that suffered major damage from recent storms.

Responsible agency: The mitigation grant programs have been transferred from the Planning Department to the Office of Homeland Security and Emergency Preparedness (OHS/EP). OHS/EP is responsible for the property protection projects and the Engineering Department is responsible for the flood control and drainage projects.

Deadline: Varies with each funding cycle's application deadline

Action Item 2. Public property Each department and municipality will evaluate its own properties to determine if they need to be retrofitted or modified to protect them from the hazards that they are exposed to. Priority will be given to critical facilities and major roads. Projects to protect a critical facility in the floodplain will be forwarded to the Planning Department's Mitigation office for submittal for federal funding support.

Responsible agency: Each agency head

Deadline: Report to the Mitigation Committee by March 31, 2005

Cost: Staff time to do the evaluation. Individual projects will be submitted for the following year's budget.

Benefits: Keeping critical facilities operational during and after a natural disaster is vital to public health and safety. Identifying and addressing their exposure to damage will not only reduce property damage to the facilities, it will ensure that they will be available when needed. It is hard to put a dollar value on potential damage averted, but damage to even one facility could exceed \$100,000 in repair costs plus the adverse ripple effect on people and other properties.

2009 Update: This action item has not been implemented. The project scoping work triggered a review of public facilities. Several were submitted and have made the cut for further analysis (Section 5.2.7 and new Action Item 10).

2009 Action Item: Scoping the proposed projects to harden several public facilities will be pursued as a demonstration project that will show the costs and benefits of such property protection actions.

 <u>OHS/EP will disseminate the results to all department heads and the municipalities to encourage them to inventory their publicly owned properties to see if</u> floodproofing or hardening would be appropriate. <u>OHS/EP's message should include a checklist of all the hazards in this *Plan* that affect structures (i.e., all except for drought and fog), and typical mitigation measures for each.
</u>

Responsible agency: Office of Homeland Security and Emergency Preparedness

Deadline: The project scoping should be completed by July 31, 2009. The message to the departments and municipalities should be sent by October 31, 2009.

Action Item 3. Plans and regulations Revisions to the zoning ordinance, capital improvement plan, and other plans and regulations will incorporate the 2025 plan's recommendations and appropriate recommendations from this *Mitigation Plan*. The Parish and the municipalities will continue to administer their regulations for subdivisions, mobile homes, and coastal zone and wetlands protection. The Watershed Protection Regulations will be adopted.

Responsible agency: Planning and Permits Departments

Deadline: Ongoing.

Cost: Staff time.

Benefits: The current regulatory programs help ensure that hazardous areas will be avoided and new developments will be protected from damage (to some degree). By incorporating the recommendations of the New Directions 2025 plan and the watershed mapping and management efforts, these programs will be strengthened.

2009 Update: Several of the recommended plans and regulations have been adopted in one form or another, as reported in Chapter 6. The zoning ordinance is being revised, one area at a time and some of the municipalities are developing their own comprehensive plans (Section 6.1.4). The zoning ordinance revisions will include new language for mobile homes (Section 6.5.5). Alternative language has been adopted for watershed protection (Section 6.7.4) and Chapter 6 recommends no further action on it (Section 6.1.1.13).

2009 Action Item: The Parish and the municipalities will review and evaluate their regulatory standards periodically and make changes as needed.

Responsible agency: Department of Permits and Regulatory, each municipality.

Deadline: This is an ongoing activity.

Action Item 4. Building code The Parish will adopt the new State Uniform Construction Code, the 2000 IBC, required by Act 387, replacing the Standard Building Code presently enforced. The Parish will consider adopting the 2000 International Residential Code (IRC) and the 2000 International Mechanical Code. Meetings will be held with municipalities, developers and builders to review and address any concerns regarding the adoption of the I-Codes and/or any amendments recommended by the Permit Department Staff to strengthen the standards for new buildings against damage by high winds, tornadoes and hail..

Responsible agency: Permits Department, each municipal permit office.

Deadline: December 31, 2005

Cost: Staff time.

Benefits: This will improve the hazard protection standards for new construction and will ensure the Parish is compliant with State law. Involving the development and construction industry will ensure that the changes are realistic and supported by those who must implement them.

2009 Update: As reported in Section 6.4.7, all jurisdictions participating in this *Plan* Update adopted the various International Codes for new buildings. The Mitigation Planning Committee deleted the recommendation in Chapter 6 calling for adoption of the new codes as no longer needed (Section 6.11.3).

2009 Action Item: It is still a good idea to incorporate additional hazard protection standards, such as those recommended by the Institute of Business and Home Safety, the Federal Alliance for Safe Homes, and FEMA's post-Katrina mitigation assessment team. However, changes should not come hurriedly, especially soon after the new codes were adopted. Incorporating natural hazards will be considered every time the code standards are reviewed.

Responsible agency: Department of Permits and Regulatory, each municipality.

Deadline: This is an ongoing activity.

Action Item 5. Permit administration The Parish will request a BCEGS rating from the Property Insurance Association of Louisiana. Based on the BCEGS findings, the Permits Department will review and strengthen its procedures for administering and enforcing the building code and floodplain regulations.

Concurrently, procedures will be developed to require permits and conduct inspections after a flood or other disaster. This will be coordinated with the Office of Emergency Preparedness' assignment to prepare post-disaster procedures for public information and mitigation project identification Staff from the Permits, Planning and Engineering Departments will review the reference materials for the Certified Floodplain Managers exam and determine which people would be most appropriate to become CFMs.

Responsible agency: Permits, Planning, Engineering and Emergency Preparedness and municipal permit offices

Deadlines:

- Request the BCEGS review by May 31, 2005
- Develop the procedures by May 31, 2005
- Pass the CFM exam by May 31, 2005

Cost: Staff time. The CFM exam is \$100 per person plus Association dues (\$80/year). There could also be a cost for the required continuing education, depending on how the credits are earned.

Benefits: Improved procedures mean that staff will pay more attention to the details of factors vital to natural hazard mitigation when they review plans and inspect sites, such as ensuring that a structure is securely connected to the foundation. Certification will also ensure that staff understand the Parish's and the municipalities' responsibilities under the National Flood Insurance Program.

2009 Update: There have been some staff changes in the Parish's permit office. The new floodplain manager has studied and plans to take the CFM exam. A recent Community Rating System (CRS) verification visit found that the Parish probably has enough points to improve from a Class 8 to a Class 7 (there are only five Class 7s in the state and none have a better class). However, a BCEGS rating is a prerequisite to go to a Class 7.

There is CRS credit for having a BCEGS rating and CFMs on staff, so all municipalities interested in CRS credit should implement this recommendation, too. It is likely that the CRS will initiate a new credit for having a post-disaster recovery and mitigation plan, similar to what is proposed here.

2009 Action Item:

- The floodplain manager, at least one other Parish permit staff member, and the floodplain managers for Madisonville, Abita Springs, and Pearl River will become Certified Floodplain Managers (Sun is not in the NFIP and Folsom's minor flood problem does not warrant the extra effort).
- The Parish and these three municipalities should apply for a BCEGS rating.
- Permit, OHS/EP, and public information staff will develop post-disaster procedures for public information and mitigation project identification.

Responsible agency: Department of Permits and Regulatory, OHS/EP, Cultural and Governmental Affairs, Madisonville, Abita Springs, and Pearl River.

<u>Deadline:</u>

- The CFM exams should be taken and the BCEGS request should be submitted by October 31, 2009. The Parish and the three municipalities should apply for a BCEGS rating.
- The post-disaster procedures will be drafted before the 2010 hurricane season.

Action Item 6. Floodplain management In coordination with the meeting with developers and builders to be held pursuant to action item 4, the Parish's floodplain regulations will be reviewed to determine where revisions would better protect new buildings. Community Rating System credits will be used as an initial guide for regulatory standards.

When the Flood Insurance Rate Map is being revised, the benefits of mapping a regulatory floodway will be reviewed.

The Parish will use every opportunity (within funding constraints) to preserve floodplain areas as open space or other use compatible with the flooding hazard. In coordination with action item 3, developers will be encouraged to set aside floodprone areas toward their open space credits.

It is recommended that Sun join the National Flood Insurance Program.

Responsible agency: Permits, Planning, Engineering

Deadline: Regulatory standard review to be concluded by July 31, 2004

Cost: Staff time.

Benefits: A strong and effective floodplain management program is the most important tool to keep a community's flood problems from getting worse. To be effective, a program needs regulatory standards that address local hazards, adequate maps and appropriate procedures. This action item maps out how to develop those components.

2009 Update: Residents and businesses of the planning jurisdictions have received over \$1 billion in flood insurance claim payments (Section 5.3.3), There are now nearly 39,000 policies in the Parish, Abita Springs, Folsom, Madisonville, and Pearl River, more policies than in 30 states.

St. Tammany Parish households are dependent on NFIP insurance policies to help them recover from a flood, so the Parish and the municipalities need to place a priority on keeping their good standing in the National Flood Insurance Program. Recent Community Assistance Visits found some problems, most of which have been rectified, but steps should be taken to avoid repeating them (Section 6.6.5).

The question of having a floodway on the Flood Insurance Rate Map has been settled. The new Digital FIRM does not show one. The Mitigation Planning Committee notes that the mapping recommendation should be deleted as no longer needed (Section 6.11.7). The Parish has set aside some more floodprone open space (Section 6.2.4), but it is a small area compared to the size of all the floodplain. The Village of Sun voted in October 2008 to join the NFIP. It has passed the appropriate ordinance, but has not yet submitted the application (Section 6.6.5).

2009 Action Item:

- <u>The Parish, Abita Springs, Madisonville, and Pearl River will have at least one</u> <u>Certified Floodplain Manager on staff (as per Action Item 5)</u>,
- <u>The Parish, Abita Springs, Madisonville, and Pearl River will have at least one</u> <u>member of the Louisiana Floodplain Management Association who attend at least</u> <u>one training session each year,</u>
- The Parish and all five municipalities will create a library of appropriate references, including the Coastal Construction Manual and FEMA 480, the desk reference on the NFIP rules, and
- The municipalities will apply to join the Community Rating System and the Parish will improve its CRS classification. This will devote more resources to monitoring local floodplain management and permit administration and encourage a review of their open space and regulatory standards.

The Village of Sun will submit its application to join the NFIP.

Responsible agency: Department of Permits and Regulatory, each municipality.

<u>Deadline:</u>

- <u>Staff should take the CFM exams, join the LFMA, and create the libraries by</u> <u>October 31, 2009.</u>
- <u>The CRS applications should be submitted by April 1, 2010</u>
- The Village of Sun should submit its NFIP application by June 30, 2009.

Action Item 7. Tree City The Parish will implement an urban forestry program modeled on the criteria of the Tree City USA program. This will involve:

- A tree care ordinance
- An Arbor Day observance and proclamation
- A landscape architect to provide advice and assistance

Current environmental programs will be reviewed to see how much of these criteria are already underway in the Parish. Note that Abita Spring is already a Tree City, so this action item is for the Town to maintain its eligibility

Responsible agency: Planning

Deadline: December 31, 2005

Cost: Staff time

Benefits: In addition to improving a community's appearance, an active urban forestry program will address the major problems caused by high winds and winter storms – loss of power, telephone and cable services and damage to vehicles and buildings due to falling trees or limbs.

2009 Update: As noted in Section 6.9.4, Abita Springs has lost its Tree City USA designation. The rules have changed and Parishes can now join.

2009 Action Item: The Parish and each municipality will apply for designation as a Tree City USA.

Responsible agency: Department of Public Works, each municipality

Deadline: The application should be submitted by April 1, 2010 (so any needed funds can be allocated under the next year's budget).

Action Item 8. Emergency operations The *St. Tammany Parish Multi-Hazard Emergency Operations Plan* will be reviewed in detail to determine where improvements can be made and how to maximize credit under the Community Rating System. This process will include the following:

- Identification of where geographic information systems, NOAA Weather Radios, and other new tools can be used to support the Parish's emergency operations,
- Completing the project to prepare flood stage forecast maps for developed areas and adding real-time inundation mapping.
- A review to ensure that all steps are being taken to alleviate traffic jams during an evacuation of the Parish and/or New Orleans.

Responsible agency: Office of Homeland Security and Emergency Preparedness

Deadline: May 31, 2005

Cost: Staff time.

Benefits: An emergency response plan that has been carefully prepared, that is based on all available data on the hazards and their potential impact, that utilizes the latest planning and management tools, and that is regularly exercised will greatly improve local disaster response capabilities. Better disaster response means less loss of life, injury to people and damage to property.

2009 Update: The Parish did evaluate its emergency operations and produced the new St. Tammany Parish Multi-Hazard Emergency Operations Plan after Hurricane Katrina (Sections 7.3.4 and 7.4.4). The revisions have been tested successfully by Hurricane Gustav.

Natural Hazards Mitigation Plan

Problems and issues continue to be identified with every emergency. While the Contra-Flow plan worked well in Louisiana, problems arose when evacuees entered Mississippi. There are also concerns that releases from the Ross Barnett Reservoir may aggravate Pearl River flooding in the Parish.

2009 Action Item:

- The Multi-Hazard Emergency Operations Plan will be submitted for CRS credit. This will provide an additional critique of the plan that would show whether any more improvements would be useful. It could also result in up to 150 points of CRS credit.
- Evacuation problems that arose during Hurricane Gustav will be reported to the State Police and the Governors Office of Homeland Security and Emergency Preparedness so that they can be avoided during the next emergency.
- <u>Concerns over releases from the Ross Barnett Reservoir will be reported to the appropriate State agencies.</u>

Responsible agency: Office of Homeland Security and Emergency Preparedness

<u>Deadline:</u>

- <u>Submit the needed documentation with the CRS class improvement papers, by</u> <u>April 1, 2010 (see Action Item 6).</u>
- <u>Submit the needed information to the State by June 1, 2009, before the 2009</u> <u>hurricane season starts.</u>

Action Item 9. Flood control projects The current approach to flood control projects with watershed modeling and planning will be pursued. Priority will be given to protecting critical facilities, evacuation routes, and buildings. The criteria spelled out in section 8.7.1 will provide guidelines to ensure that projects do not adversely affect the environment or increase flood problems on other properties.

Responsible agency: Engineering Department

Deadline: Ongoing

Cost: Continue the current budget level of \$900,000/year. See also action item 16.

Benefits: The benefits of each project will vary, but this approach ensures that the projects selected will provide the most protection for the cost. This action item calls for ensuring the projects meet the criteria set in Section 8.7.1. Several of those criteria assure that adverse impacts will not be transferred on to neighboring or downstream properties.

2009 Update: The list of projects has greatly increased in the new 10-Year Infrastructure Plan and the watershed models (Section 8.3.1). Eight priority projects were selected for project scoping.

Natural Hazards Mitigation Plan

2009 Action Item:

- The Parish will pursue scoping and funding of the eight priority projects with FEMA funds.
- <u>The Parish will pursue funding the projects listed in the 10-Year Infrastructure</u> <u>Plan as funds become available.</u>

Responsible agency: Department of Engineering

Deadline: As funds become available

Action Item 10. Drainage system maintenance The Parish will continue its program of inspecting and cleaning drainage channels and retention basins. The drainage system maintenance program procedures will be revised to increase CRS credit. This will involve preparing more detailed procedures that identify sites that need special attention more frequently than the rest of the drainage system.

Responsible agency: Public Works Departments

Deadline: Ongoing

Cost: Staff time.

Benefits: An obstruction to a channel, such as a plugged culvert, can result in overbank flooding during a small rainstorm. By inspecting and maintaining the drainage system, potential flood problems can be identified and corrected before the next big rain. A proactive preventive activity can prevent thousands of dollars in flood damage, closed streets and threats to people.

2009 Update: The drainage system maintenance procedures were revised (Section 8.5.5). When the 2008 CRS verification visit reviewed them, they received almost the maximum credit.

2009 Action Item: The Mitigation Planning Committee recommends that this action item be deleted as no longer needed (Section 8.7.3). It is expected that the Parish and the municipalities will continue to implement their drainage maintenance programs.

Responsible agency: N/A

Deadline: N/A

New Action Item 10. Project scoping The Mitigation Planning team received 18 proposed projects that warranted further review to see if they were eligible and appropriate for a FEMA mitigation grant. This process is described in Section 1.1's 2009 Update and in Appendix D. The scoping will be completed and the best projects will be submitted for funding from FEMA.

<u>Responsible agency:</u> Office of Homeland Security and Emergency Preparedness, with technical support from the Engineering Department and the Department of Environmental Services.

Deadline: The scoping work will be completed by July 31, 2009. The applications for funding will be submitted based on each program's timetable.

Cost: Staff time to complete the scoping. There will be a local cost share for each project submitted, as detailed in Appendix D.

Benefits: To make the cut and receive detailed scoping, the benefits of each project have to be reviewed and it must be shown that they exceed the total costs of implementing them. The benefits and costs of each are summarized in Appendix D.

10.2. Public Information Strategy

Public information efforts that explain safety precautions, property protection measures, and insurance coverage will be continued and expanded.

Action Item 11. Hazard mitigation materials As funding permits, the Parish will prepare background information, articles, and other explanations of the hazard mitigation topics listed in section 9.7.2. Projects will include:

- The annual hurricane preparedness and safety brochure (see example, page 9-2).
- Short articles on different topics to be provided to newspapers, the website and other media.
- A newsletter or collection of articles that covers all of the topics listed in section 9.7.2.
- Brochures and handouts that can be reproduced at low cost.
- Short, one-sentence, notices that are appropriate for cable TV crawlers and utility bill messages.
- A collection of videos and programs that can be played on the cable TV's public access channel.
- Materials suitable for a display, such as maps and photographs.

Masters of these materials will be prepared and made available for reproduction and distribution by interested municipalities, schools, and area organizations. As funding permits, Parish offices will reproduce appropriate ones for their use.

Responsible agency: Cultural and Governmental Affairs

Deadline: The first materials will be ready by December 31, 2004

Cost: Staff time to prepare the masters. Reproduction of the materials will be borne by the users.

Benefits: By preparing a master set of locally pertinent articles and materials, each interested office can select the most appropriate media and distribute the messages. By simply inserting an article in a newsletter or putting it on the website, the local level of effort is greatly reduced, which increases that likelihood that the messages will get out. The messages will also be technically correct and consistent throughout the Parish.

2009 Update: All the 2004 action items were completed with the exception of brochures specifically dealing with flood protection. Other brochures, such as one on fill placement, were provided. The annual hurricane safety brochure has been updated each year and proved guite popular. The Parish has initiated use of old approaches, such as public meetings, and new media, including the President's e-newsletter and a greatly expanded website (Sections 9.1.4, 9.3.3, and 9.4.5).

2009 Action Item: Based on past successes and the results of the public information program strategy exercises (Section 9.5.5), the following materials will be prepared to help disseminate hazard awareness and preparedness messages:

- The annual hurricane preparedness and safety brochure.
- Short articles and news releases on different topics to be provided to newspapers, municipal newsletters, the website and other media.
- Short, one-sentence, notices that are appropriate for cable TV crawlers.
- A collection of videos and programs that can be played on the cable TV's public access channel.
- Handouts, flyers and brochures as identified by OHS/EP to give to school children and to distribute at special events and presentations.
- Information on the Parish's website with links to other sources.

Responsible agency: Cultural and Governmental Affairs

Deadline:

- The annual hurricane preparedness and safety brochure will be ready for late Spring dissemination.
- The short articles and news releases will be timed with relevant activities. For example, information on the flood hazard will be distributed when the new Digital FIRM is finalized and takes effect. Evacuation and storm safety information will be distributed during hurricane season and when storm warnings are issued. Wildfire precautions can be publicized during National Fire Safety Week.
- The other materials will be collected and drafted by April 1, 2010.

Action Item 12. Outreach projects As funding permits, the Parish will prepare and disseminate outreach projects based on the materials provided under action item 11. Such projects will include:

- Distribution of the hurricane preparedness and safety brochure in the early summer.

- News releases issued periodically and in conjunction with special events, such as hurricane preparedness week.
- Playing videos and short programs on the public access cable channel.
- Running one two sentence crawlers on the public access cable channel.
- Putting brochures out at public places, such as permit offices, libraries, the Courthouse and the administrative offices.
- Setting up a display at appropriate locations and festivities.
- Providing brochures and display materials for Parish officials when they speak to neighborhood and civic organizations.
- Putting more information on the Parish's website and adding links to other sites with relevant materials.

Responsible agency: Cultural and Governmental Affairs, Management Information System

Deadline: The first projects will be released by December 31, 2004

Cost: Staff time.

Benefits: There are many benefits to having a well-informed public. For example, deaths from lightning have steadily decreased over the years because people are more aware of what they should and should not do. More self-help and self-protection measures will be implemented if people know about them and are motivated to pursue them.

2009 Update: The annual brochure, newspaper materials, and public meetings have been implemented (Sections 9.1.4 and 9.4.5). The website has been used more than predicted (Section 9.3.3).

The display was not prepared, but can be cumbersome and is probably not as effective as a good PowerPoint presentation at public meetings. It should be dropped.

2009 Action Item: The following outreach projects will be implemented:

- The hurricane safety brochure.
- <u>News releases and articles developed under Action Item 11.</u>
- Placing brochures and other materials collected or developed under Action Item <u>11 in public places and making them available to schools and organizations, such</u> <u>as neighborhood associations.</u>
- <u>Continuing the automated e-mail system that sends current news, including</u> <u>emergency information on pending hazard events, to residents who register.</u>
- <u>Running videos collected or developed under Action Item 11 on cable TV channels.</u>
- Expanding the Parish's website to include more flood information and links relevant to CRS credit and assisting the municipalities to link to the hazard pages.

<u>Responsible agency:</u> Cultural and Governmental Affairs, OHS/EP, and each <u>municipality</u>

Deadline: Each entity will select the best times to implement these projects.

Action Item 13. Flood maps The Parish will work with its watershed modeling contractors and FEMA to ensure that the next Flood Insurance Rate Map will accurately depict all flood hazards. The resulting maps (or information from the maps, such as flood elevations) will be made available to the public via the website and the Parish's map information service.

Parish staff will meet with the Northshore Area Board of Realtors to review hazard disclosure practices and how the Parish's map information service can help real estate agents advise purchasers of property about the flood hazard.

Responsible agency: Engineering, Management Information Systems

Deadline:

- The schedule for the new maps are dependent on FEMA's timetable.
- A meeting will be held with the Board of Realtors by December 31, 2004.

Cost: Staff time.

Benefits: Learning about the flood hazard, where it is and how high water can go, is the first step to protecting a property from flood damage. This action item will facilitate making that information available to all present and future residents of the Parish.

2009 Update: The new draft Digital Flood Insurance Rate Map has been published and explained at public meetings. The new state laws regarding real estate disclosure are expected to greatly improve the buyer's level of knowledge of a property's exposure to hazards (Section 9.2.4).

2009 Action Item: The new FIRM is essentially done, so the Mitigation Planning Committee recommends that mapping issues be deleted (Section 6.11.7). The Mitigation Planning Committee also recommends that disclosure issues be deleted (Section 9.7.7).

Responsible agency: N/A

Deadline: N/A

New Action Item 13. Public information topics Action Items 11 and 12 identify the most appropriate methods and media to inform the public about the 14 hazards and how people can best protect themselves. This action item focuses on the messages: what those outreach projects should cover. The following topics are the priorities for this effort:

Natural Hazards Mitigation Plan

- <u>Safety precautions, including emergency protection measures, family prepared-</u><u>ness, fog safety, and evacuation guidance.</u>
- Property protection measures, including protection of buildings and insurance, especially for flooding, wind, storms, wildfires, earthquakes, and termites.
- Flood control measures, including drainage, ditch flooding protection, and dumping regulations.
- Regulations related to flood and wetland protection, including permit requirements
- The Parish's and the municipalities' hazard mitigation projects
- Topics that are credited by the Community Rating System (for specific CRScredited projects)
- <u>Where people can get help with the above topics</u>

Responsible agency: Cultural and Governmental Affairs, and each municipality

Deadline: Each entity will select the best times to implement these projects.

Cost: Staff time. There will be some cost to copying and distributing projects like newsletters, for example, but the costs can be minimized by "piggy backing" on other projects.

Benefits: As noted for Action Items 11 and 12, there are many benefits to having a wellinformed public. Considering the costs to the government of responding to accidents, repairing damaged public facilities, and losing tax income because of a disaster, the cost to educate people on how to avoid harm and property damage is a small investment.

10.3. Administrative Action Items

This section reviews the additional action items that are needed to administer and support the recommendations of the two previous sections.

Action Item 14. *Plan* adoption The Parish Council will adopt this *Natural Hazards Mitigation Plan* by passing the resolution in Section 10.4. The Parish's resolution creates the Mitigation Coordinating Committee which is described in the next action item. The participating municipalities will adopt a similar resolution, to include those action items that are pertinent to the community. The municipal resolutions will assign the appropriate person responsible for each action item.

Responsible agency: Parish Council

Deadline: June 30, 2004

Cost: Staff time.

Benefits: Council adoption of the *Plan* will ensure its implementation. This is also a requirement for recognition of the *Plan* by FEMA funding programs and the Community Rating System.

2009 Update: The Plan was adopted in 2005 by the Parish, Abita Springs, Folsom, Pearl River and Sun. Madisonville did not participate at that time.

2009 Action Item: This Update to the Plan will be submitted to the State and FEMA for review to ensure that it meets their planning criteria. Once it is approved, it will be submitted to the Parish Council and each municipal council for adoption. Then, it will be submitted to the Community Rating System for credit.

Responsible agency: Office of Homeland Security and Emergency Preparedness, and each municipality

Deadline: Each entity will adopt the Update within two months of final FEMA approval of the draft *Plan.*

Action Item 15. Mitigation Coordinating Committee The Natural Hazards Mitigation Planning Committee will be converted to a permanent advisory body in the Parish's resolution to adopt this *Plan*. It will:

- Act as a forum for hazard mitigation issues
- Disseminate hazard mitigation ideas and activities to all participants.
- Monitor implementation of this Action Plan and
- Report on progress and recommended changes to the Parish Council and each participating municipality.

The Committee will not have any powers over staff or the municipalities. It would be purely an advisory body. Its primary duty is to collect information and report to the Parish Council, the municipalities, and the public on how well this *Plan* is being implemented. Other duties include reviewing mitigation proposals, hearing resident concerns about flood protection and related matters, passing the concerns on to the appropriate entity, and posting its meetings and reports on the Parish's website.

The Mitigation Committee will be, in effect, St. Tammany Parish's hazard mitigation conscience, reminding the member agencies and municipalities that they are all stakeholders in the plan's success. The resolution charges it with seeing the *Plan* carried out and recommending changes that may be needed. While it has no formal powers, its work should act as a strong incentive for the offices responsible for the action items to meet their deadlines.

Responsible agency: Staff support for the Committee will be provided by the Office of Homeland Security and Emergency Preparedness

Deadline: The progress reports are due on the anniversary of the date the *Plan* is adopted by the Parish Council. An annual evaluation of the plan's implementation is required for credit under the Community Rating System. A five year update is required for continuing credit of this *Plan* under the Community Rating System and FEMA's mitigation funding programs.

Cost: Staff time.

Benefits: Those responsible for implementing the various recommendations have many other jobs to do. A monitoring system helps ensure that they don't forget their assignments or fall behind in working on them. The *Plan* should be evaluated in light of progress, changed conditions, and new opportunities.

2009 Update: The committee did not meet after adoption of the *Plan* in 2005. It was reinstituted in 2008 as the Mitigation Planning Committee to manage preparation of this Update. While many original members were re-appointed, they did not all attend.

2009 Action Item:

- <u>The Committee will assume it's new name as the Mitigation Coordinating</u> <u>Committee.</u>
- <u>The Parish President and the mayors will appoint its members with an eye to</u> <u>having fewer, but more interested participants.</u>
- <u>The Committee will prepare the annual evaluations and ensure that they fulfill the</u> <u>annual report requirement for Community Rating System credit.</u>

Responsible agency: The Office of Homeland Security and Emergency Preparedness will coordinate the activities of the Committee.

Deadline: The Committee will meet before the first anniversary of the Parish's adoption of the Update in order to prepare the annual evaluation.

Action Item 16. Financing More funds are needed for flood protection and drainage projects and for meeting the cost-share requirement for state and federal projects. New, dependable sources of funding for flood control, drainage improvements, and drainage maintenance will be sought.

Among other things, a dependable source of funds would allow the Parish to prepare an annual capital improvements budget for drainage improvements. This would receive special CRS credit.

Responsible agency: Chief Administrative Officer

Deadline: Ongoing

Cost: Staff time.

Benefits: Flooding and tropical storms are the greatest hazards facing St. Tammany Parish and without proper controls, flooding will get worse. Constructing flood protection and drainage improvement projects are the most expensive hazard mitigation activities recommended by this *Plan*, but they are the only ones that will reduce the impact of these hazards.

Additional funds are needed, if only to help match available State and Federal funds. A dependable source of funds would finance the planning, construction and maintenance needed to reduce flooding and to prevent obstructions and other problems from aggravating flooding.

2009 Update: Thanks to Hurricane Katrina and other complications, this project did not get started.

2009 Action Item: Creating a new source of revenue can be likened to raising taxes. Given the current economic times, this should not be pursued for the immediate future.

Responsible agency: Chief Administrative Officer

Deadline: When conditions appear appropriate the CAO should present some alternatives to the Mitigation Committee.

Action Item 17. Community Rating System St. Tammany Parish is participating in the CRS as a Class 9. Based on the recommendations in this *Mitigation Plan*, the Parish can improve to a Class 8, saving residents in the unincorporated areas over \$400,000 each year in flood insurance premiums. Once the appropriate action items have been implemented (see Table 10-1), the Parish will submit a request for the class improvement.

The Town of Abita Springs has an active floodplain management program and staff has attended training. The Town currently administers several activities that would receive CRS credit. Therefore, it is recommended that Abita Springs review the CRS Application and other documents and determine if it should apply to join. For each class in the CRS, Abita Springs' residents would save a total of \$2,000 each year, a savings that may not cost any additional effort of Town staff time.

Responsible agency: Planning Department

Deadline: December 31, 2004

Cost: Staff time.

Benefits: In addition to saving residents money, CRS participation has been shown to provide an effective incentive to implement and maintain floodplain management activities, even during times of drought. Therefore, by tying the action items to CRS credits, there is an added reason to ensure that they are implemented.

Natural Hazards Mitigation Plan
2009 Update: The Parish did not apply for a class improvement, but is expected to move from a Class 9 to an 8 based on the results of the 2008 "cycle" verification visit. It is calculated that with a little effort, the Parish could improve to a 7. Abita Springs has not applied.

2009 Action Item:

- The Parish should review the following actions with FEMA's ISO/CRS Specialist for the area to confirm that implementing them will result in the class improvement:
 - o Adoption of this Update and preparation of the annual evaluation reports
 - Implementation of the public information strategy action items
 - o Obtaining a BCEGS evaluation
 - o <u>Submitting the Multi-Hazard Emergency Operations Plan for credit</u>
 - <u>Getting two Certified Floodplain Managers for both the CRS credit and to</u> <u>ensure that the Parish stays in good standing in the NFIP</u>
 - Expanding and making a few changes to the website.
- Abita Springs, Madisonville, and Pearl River should apply to the CRS, with assistance from the Parish's CRS Coordinator and the ISO/CRS Specialist. It is expected that they can receive a Class 9 substantially based on activities administered by the Parish. Folsom does not have the flood hazard to warrant the work and Sun must be in the NFIP for at least a year before it can apply.

Responsible agency: Department of Permits and Regulatory (CRS Coordinator) and the municipalities

Deadline: Within six months of adoption of this Update and receipt of the BCEGS classification.

Appendix A. Public Involvement Activities - 2004 Plan

<u>This appendix records the public involvement activities during the preparation of the</u> original 2004 *Natural Hazards Mitigation Plan.* Public involvement during the 2008 – 2009 update effort is summarized in Appendix B.

As discussed in Section 1.1, St. Tammany Parish's mitigation planning included several efforts to seek public input into the planning process. This appendix includes examples from those efforts.

On page A-2 is the news release that was issued announcing the planning effort and inviting the public to attend the Committee meetings. Several newspapers ran this story.

A link to special website was established on the Parish's site (www.stpgov.org) to explain the program and to solicit public input. Several of the site's pages are shown, starting on page A-3. Copies of the minutes of each Planning Committee meeting were also posted on the site.

The public was invited to submit information on their own experiences with natural hazards. On page A-6 is the questionnaire to facilitate their comments. A click of a button and the results are sent to Solutient.

The announcement for the final public meeting is included on page A-7. This is the news release that was provided to all participants. They were encouraged to distribute it to local media in addition to the official release by the Parish. It is followed by one of the articles that was published.



KEVIN DAVIS, PARISH PRESIDENT

ST. TAMMANY PARISH

P. O. Box 628 Covington, LA 70434 985-898-2362 and 985-646-4082 Fax: 985-898-5237 e-mail: kdavis@stpgov.org web site: http://stpgov.org

For Immediate Release, September 30, 2003 Contact: Suzanne Parsons Stymiest at 985-898-5243

Davis Announces New Public Safety Initiative

St. Tammany Parish President Kevin Davis announced a new effort to reduce or prevent St. Tammany Parish's vulnerability to natural disasters. Over the next six months, a Hazard Mitigation Planning Committee will review plans to reduce the safety hazards, health hazards, and property damage caused by tropical storms, floods, tornadoes, and other natural disasters. The Committee will produce a plan to guide parish hazard mitigation measures.

St. Tammany Parish is vulnerable to natural hazards that threaten life and health, as well as cause extensive property damage. Since Hurricane Betsy in 1965, the Parish has been declared a disaster area by the President 13 times. Davis stated, "While these hazards are acts of nature, the impacts on residents, public facilities, businesses, and private property can be reduced through planning."

The Parish's Office of Emergency Preparedness is leading the effort. A Hazard Mitigation Planning Committee, created by the St. Tammany Parish Council, is coordinating public participation. The Committee's members include representatives of Parish offices, interested municipalities, homeowner associations, and public organizations. The public is invited to attend all meetings.

The committee will review a variety of mitigation measures, organized under five general strategies:

- Property protection e.g., relocation out of harm's way, retrofitting buildings, insurance
- Preventive e.g., zoning, building codes, and other development regulations
- Emergency services e.g., warning, sandbagging, evacuation
- Flood control projects e.g., levees, reservoirs, channel improvements
- Public information e.g., outreach projects, technical assistance to property owners

The next Hazard Mitigation Planning Committee meeting will be Saturday morning, November 8, 8:30 - 12:30 a.m. at the Office of Emergency Preparedness at the old Courthouse on Boston Street in Covington. The meeting is open to the public. The draft plan is expected to be ready for public and municipal review in February 2004.

For more information on this project, contact Clarence Powe, Deputy Directory (Planning), Office of Emergency Preparedness, 985/645-2492, <u>cpowe@stpgov.org</u>.

###

Natural Hazards Mitigation Plan

April 2009 DRAFT

St. Tammany Parish Home

St. Tammany Parish Natural Hazards Planning Meetings Schedule Public Input More Information Links

Background

St. Tammany Parish is subject to natural hazards that threaten life and health and have caused extensive property damage. Since Hurricane Betsy in 1965, the Parish has been declared a disaster area by the President 13 times. As noted by Parish President Kevin Davis, "While these hazards are acts of nature, the impacts on residents, public facilities, businesses, and private property can be diminished through hazard mitigation planning".

The effort is being led by the Parish's Office of Emergency Preparedness. It is being coordinated by a Hazard Mitigation Planning Committee, created by the St. Tammany Parish Council. The Committee's members include representatives of Parish offices, interested municipalities, property owner associations, and public organizations.

The committee will review a variety of mitigation measures, organized under five general strategies:

- Property protection e.g., relocation out of harm's way, retrofitting buildings, insurance
- Preventitive e.g., zoning, building codes, and other development regulations
- Emergency services e.g., warning, sandbagging, evacuation
- · Flood control projects e.g., levees, reservoirs, channel improvements
- Public information e.g., outreach projects, technical assistance to property owners

Hazard Mitigation Planning Committee <u>meetings</u> are held at the Office of Emergency Preparedness at the old Courthouse on Boston Street in Covington. The meetings are open to the public. The draft plan is expected to be ready for public and municipal review in February 2004.

We want your comments: Use the hazards data form to tell us about your experiences with natural hazards and your suggestions for hazard mitigation activities the Parish could undertake.

For more information:

Clarence Powe, Deputy Director (Planning), Office of Emergency Preparedness, (985) 867-3787 cpowe@stpgov.org St. Tammany Parish Home

St. Tammany Parish Natural Hazards Planning

Meetings Schedule Hazard Mitigation Planning Committee meetings are held at the Office of Emergency Preparedness at the old courthouse on Boston Steet in Covington. The meetings are open to the public. The draft plan is expected to be ready for public and municipal review in February 2004.

Hazards Planning H **Committee Informa** Meetings Schedu Public Input More Informatio Links



The St. Tammany Parish Hazards Planning Committee organizational meeting, September 18, 2003

Date	Day	Time	Main Topics
September 18, 2003	Thursday	6:00 PM - 8:00 PM	Organizational meeting, identify sources of hazard data. Read minutes of meeting. (Adobe PDF forr
November 8, 2003	Saturday	8:30 AM - 12:30 PM	Hazard Assessment (what are the hazards facing us? and what can the hazards do to us?), Goal setting Read minutes of meeting. (Adobe PDF forr
December 6, 2003	Saturday	8:30 AM - 12:30 PM	Mitigation activities Read minutes of meeting. (Adobe PDF forr
January 10, 2004	Saturday	8:30 AM - 12:30 PM	Mitigation activities Read minutes of meeting. (Adobe PDF forr
February 7, 2004	Saturday	8:30 AM - 12:30 PM	Action items, draft plan Meeting Agenda. (Adobe PDF format)
To be announced.			Public meeting, final recommendations

St. Tammany Parish Home

St. Tammany Parish Natural Hazards Planning

Links

For more information on natural hazards and ways to protect against them, check the following websites:

Hazards Planning Home Committee Information Meetings Schedule Public Input More Information Links

All Hazards

Fact Sheets

http://www.fema.gov/fima/how2.shtm Red Cross family disaster planning http://http://www.redcross.org/services/disaster/beprepared/familyplan.html

Tropical Storms and Hurricanes

Hurricane Awareness Week

http://www.nhc.noaa.gov/HAW2/english/intro.shtml

Hurricane Awareness Downloads

http://www.nhc.noaa.gov/HAW2/english/downloads.shtml

Flood Protection

LSU Ag Center's Louisiana Floods Website http://www.louisianafloods.org Avoiding Flood Damage: A Checklist for Homeowners http://www.fema.gov/pdf/hazards/flddam.pdf Homeowner's Guide to Retrofitting: Six Ways to Protect Your House From Flooding http://www.fema.gov/mit/tsd/dl_rfit.htm Protecting Building Utilities From Flood Damage http://www.fema.gov/hazards/floods/pbuffd.shtm

Flood Insurance

National Flood Insurance Program - About National Flood Insurance http://www.fema.gov/nfip/whonfip.shtm National Flood Insurance Program - How to Buy Flood Insurance http://www.fema.gov/nfip/answe2d.shtm

Tornadoes

FEMA: Recommendations to Better Protect From Tornado Damage http://www.fema.gov/hazards/tornadoes/prskit328.shtm

Thunderstorms and Lightning

http://www.fema.gov/hazards/thunderstorms

Winter Storms

http://www.fema.gov/hazards/winterstorms

St. Tammany Parish, Louisiana Natural Hazards Planning Questionnaire

Please use this form to tell us about your experiences with natural hazards and your suggestions for hazard mitigation activities the Parish could undertake. Please use a separate form for each incident.

In what community did the incident occur?				
In what Zip code did the incident occur?				
Type of hazard (check one)				
Tropical Storms/Hurricanes		Land Failure		
Riverine Flooding	🗖 Fog	C Severe Winter		
Local Drainage Problems	🗖 Earthquake	🗖 Dam Failure		
Tornadoes	Hailstorm	Levee Failure		
Wildfires				
Dale of incident:				
Type of damage (check a	ll that apply)			
Personal Injury/Health Problem Damage to building				
Damage to vehicle(s)	Lost business or work			
Damage to yard, landscaping Other:				
Approximate dollar damage:				
Percentage of the recovery costs covered by insurance:				
Recommendations or suggestions for the Hazards Mitigation Planning Committee:				
-				
Please fax this form to: (504) 304-2001 or mail to: Laural Bass – Solutient 2021 Lakeshore Dr., Suite 310				

New Orleans, LA 70122



For Immediate Release, March 18, 2004 Contact: Suzanne Parsons Stymiest at 985-898-5243

Public Meeting to Review Hazards Plan

The St. Tammany Parish Natural Hazards Mitigation Planning Committee announces the completion of its Natural Hazards Mitigation Plan. This six month effort reviewed the major hazards to which the Parish is exposed, including tropical storms, floods, tornadoes, earthquakes, fog, and winter storms.

The Committee evaluated a variety of measures that can reduce exposure to the dangers and damage posed by the hazards, and selected 17 action items recommended for implementation by the Parish and participating municipal governments. Participating municipal governments are Covington, Mandeville, Folsom, Slidell, Abita Springs, Sun and Pearl River.

The resulting plan, including an executive summary, is available for review on the <u>Hazardous</u> <u>Mitigation Planning Committee's website</u>.

A public meeting will be held at 6:00 p.m., March 31st in the Council Chambers at the St. Tammany Parish Administrative Complex located on Koop Drive, Mandeville. Comments may be submitted at the public meeting or, in writing, to:

Clarence Powe Deputy Directory (Planning) Office of Homeland Security and Emergency Preparedness P.O. Box 628 Covington, LA 70434 985/867-3787 Fax: 985/898-3030 cpowe@stpgov.org

The Mitigation Planning Committee will meet after the public meeting, review recommended changes, and submit the mitigation plan to the St. Tammany Parish Council for adoption. The plan will also be submitted to all participating village, town and city councils.



Dal

SA Accepted

Slidell Century, March 29, 2004

Appendix B. Public Involvement Activities – 2009 Update

Appendix A reviews the public involvement activities implemented when the Natural Hazards Mitigation Plan was prepared in 2004. A similar effort was included in the work plan for the 2009 *Update*. There were six major efforts:

- <u>The planning work was announced and the public was invited to attend Planning</u> <u>Committee meetings. Before each meeting, a news release was posted on the Parish's</u> <u>website (page B-2), distributed to the media, and published in several area papers.</u> <u>The article in the New Orleans Times-Picayune electronic edition appears on</u> <u>page 1-8.</u>
- 2. <u>A special page on the Parish's website was established (pages B-3 and B-4)</u>. It <u>included:</u>
 - <u>A summary of the project</u>,
 - The Planning Committee meeting schedule,
 - Minutes of the Planning Committee meetings,
 - The complete 2004 Plan, and
 - Links to other mitigation sites that can help residents interested in protecting themselves from the effects of natural hazards.
- 3. <u>The website included a special form that the public could use to submit information, comments, and concerns. It is shown on page B-5. Unfortunately, only one person used this venue.</u>
- 4. Parish staff gave presentations at four public meetings. The first three were hosted by Council members on February 25, March 3, and March 10, 2009. The fourth was held in conjunction with a meeting of the Local Emergency Planning Committee on March 19. These were well publicized and well attended. An article in the March 1 St. Tammany News describing the February 25 meeting is on pages B-6 and B-7. The sign-in sheets for these meetings are on pages B-8 – B-15.
- 5. <u>A letter was sent to the agencies listed on pages 1-4 and 1-5, inviting them to submit</u> comments or help with more information. The letter template is on page B-16.
- 6. <u>The public meeting to review the final draft was held on April 27, 2009</u>. [Materials from that meeting will be added after April 27.]



News

Archives 2005 | 2006| 2007 | 2008

Parish To Update Natural Hazards Mitigation Plan (09-22-2008)

Parish To Update Natural Hazards Mitigation Plan

Parish President Kevin Davis announced today that St. Tammany Parish will begin updating the parish's Natural Hazards Mitigation Plan at the end of September. Over the next 6 months, a Hazard Mitigation Planning Committee will review actions to increase public and property safety in the event of tropical storms, floods, tornadoes, or other natural hazards. The first plan was created in 2004.

"This is part of our emergency planning process," said Davis. "Planning is key to successful emergency management. When a storm hits, there is no time to make a recovery plan. The Natural Hazards Mitigation Plan helps us look at the overview of local emergency planning."

A Hazard Mitigation Planning Committee, working under the auspices of the parish Department of Homeland Security and Emergency Preparedness, will meet Monday, September 29 at 7:00 PM in the Media Room of the Emergency Operations Center, 510 East Boston Street, Covington. All meetings of the Committee are open to the public. The Committee's members include representatives of Parish offices, interested municipalities, property owner associations, and public organizations.

Parish To Update Natural Hazards Mitigation Plan Meeting Monday, September 29 7:00pm Emergency Operations Center (Media Rm.) 510 East Boston Street, Covington

Open to the Public

		Search [GO]
St. Tamm	any Parish Govern	Work Orders Employment Directions Access TV
Home Leadership Citizen	Services Departments & Agen	cies About St. Tammany Community Resources Contact
		ROAD WORK AHEAD
Departments &	Hazard Mitigation Plan	ning
Agencies	510 East Dastan Street	
Administration	Covington, LA Phone: (985) 898-2359 Eav: (985) 898-2359	
Animal Services	Fax: (905) 090-3030	
Archive Management Office		
Commission on Cultural Affairs	-	
Community Action Agency	St. Tammany Parish is in the pro	cess of undating its Natural Hazards Mitigation Plan. The first meeting
Cultural & Governmental Affairs	was held on September 29th, 20 complete. A Hazard Mitigation Pl safety in the event of tropical ste created in 2004. The Blanning (08 and the process is anticipated to take approximately 6 months to anning Committee will review actions to increase public and property orms, floods, tornadoes, or other natural hazards. The first plan was committee working under the auspices of the St Tammany Parish
Homeland Security & Emergency Operation Center	Department of Homeland Securit Committee's members include rep associations, and public organizat	y and Emergency Preparedness, will hold 3 additional meetings. The resentatives of Parish offices, interested municipalities, property owner ions.
Engineering	St. Tammany Parish is subject to property damage. Since Hurrican President 20 times. As noted by f	natural hazards that threaten life and health and have caused extensive e Betsy in 1965, the Parish has been declared a disaster area by the Parish President Kevin Davis, "While these hazards are acts of nature, for the part of the pa
Environmental Services	hazard mitigation planning".	racilities, businesses, and private property can be diminished through
Facilities Management	Community input is a vital part of r to attend the meetings and to re comment form that you can downl	evising the current plan. All St. Tammany Parish residents are welcome view and comment on the changes being made. We have provided a oad and submit, or you can e-mail comments direct.
Finance	Meeting Dates:	
Fire Services	November 17, 2008	March 16, 2009
Management Information Systems	 Emergency Operation Center 510 E. Boston Street Covington, Louisiana 70433 	510 E. Boston Street Covington, Louisiana 70433
Permits & Regulatory	April 27, 2009	
Personnel	 Council Chambers 21490 Koop Drive Mandeville, Louisiana 70471 	
Planning		lick here to download form
Public Works	Contact Info:	
Purchasing	Fax: Dale Kirby/STPHM - 504-304-2001	MAIL: Eduardo Parra CDM Field Office

http://www.stpgov.org/departments_hazard.php

3/26/2009

April 2009 DRAFT

Hazard Mitigation Planning - Departments & Agencies - St. Tammany Parish Governmen... Page 2 of 2

Social Socias	610 Lotus Dr. North Mandeville, Louisiana 70471
	E-MAIL: dkirby@solutient.com
	Additional Information
	 Hazard Mit Mtg Minutes 9-29-08 (pdf) Hazard Mit Mtg Minutes 11-17-08 (pdf) Natural Hazards Planning Questionnaire (pdf) Final Draft Plan - Appendix A - Public Involvement Activities (pdf) Final Draft Plan - CH 10 Action Plan (pdf) Final Draft Plan - CH 9 Public Information (pdf) Final Draft Plan - CH 8 Flood Control (pdf) Final Draft Plan - CH 7 Emergency Services (pdf) Final Draft Plan - CH 6 Preventative Measures (pdf) Final Draft Plan - CH 5 Property Protection (pdf) Final Draft Plan - CH 4 Goals (pdf) Final Draft Plan - CH 2 Hazard Profile (pdf) Final Draft Plan - CH 1 Introduction (pdf) Final Draft Plan - CH 2 Hazard Profile (pdf) Final Draft Plan - CH 2 Hazard Profile (pdf) Final Draft Plan - CH 2 Hazard Profile (pdf) Final Draft Plan - CH 2 Hazard Profile (pdf) Final Draft Plan - CH 2 Hazard Profile (pdf) Final Draft Plan - CH 2 Hazard Profile (pdf) Final Draft Plan - CH 2 Hazard Profile (pdf) Final Draft Plan - CH 2 Hazard Profile (pdf) Final Draft Plan - CH 2 Hazard Profile (pdf) Final Draft Plan - CH 2 Hazard Profile (pdf) Final Draft Plan - CH 1 Introduction (pdf) Final Draft Plan - CH 1 Introduction (pdf) Final Draft Plan - CH 1 Introduction (pdf) Final Draft Plan - Cover (pdf)
	Additional Mitigation Links
	Current River Level Links (pdf) FEMA Links (pdf) Information About Flooding (pdf)
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http://www.stpgov.org/departments hazard.php

April 2009 DRAFT

St. Tammany Parish, Louisiana Natural Hazards Planning Questionnaire

Please use this form to tell us about your experiences with natural hazards and your suggestions for hazard mitigation activities the Parish could undertake. Please use a separate form for each incident.

In what community did the incident occur?				
In what Zip code did the incident occur?				
Type of hazard (check one)				
 Tropical storms/hurricanes Flooding Repetitive flooding Tornadoes Wildfires 	 Drought Fog Earthquake Hailstorm Land failure 	 Winter storm Dam failure Levee failure Termites 		
Date of incident:				
Type of damage (check all that apply):				
 Personal injury/health problem Damage to vehicle(s) Damage to yard, landscaping Damage to yard, landscaping 				
Approximate dollar damage: \$				
Percentage of the recovery costs covered by insurance:				
Which topics would you like more information on?				
 How to protect yourself and your family from danger How to protect your home from damage How to keep your business running during and after a disaster Evacuation instructions Information on specific hazards: Other 				
What other recommendations or suggestions do you have? (use other side if needed)				

Please fax this form to Dale Kirby/STPHM @ (504) 304-2001 or attach it via e-mail to <u>dkirby@solutient.com</u>



lget y plan

olice Tuesday

ment of \$200,000 a year for the next three years, then will not recur.

Both are recurring sources of revenue and will still leave Covington with \$1 million for roads, bridges and drainage projects.

Another \$72,000 for the

SEE BUDGET, PAGE 6A

Hazard mitigation projects unveiled

By Erik Sanzenbach St. Tammany News

The St. Tammany Parish Homeland Security and Emergency Operations Department on Wednesday presented a series of projects that would mitigate flooding and keep key utilities in the parish up and running in the case of an emergency or natural disaster.

Director of Homeland Security Dexter Accardo, who headed up the Hazard Mitigation Plan Committee, said the parish has put together a "wish list" of needed projects that, if funded, are ready to go.

There are 15 construction projects on the committee's list. Ten are designed to stop flooding in several parts of the parish by improving drainage. Four projects presented by the Environmental Services Department are designed to keep sewage, water and other utilities operating during and after an emergency. Another project would buy a siren system for the town of Bush that would warn residents of impending tornadoes.

Accardo said there is also a need to fund the acquisition and demolition of blighted and abandoned structures that remain in the parish after Hurricane Katrina.

"They present a health and safety hazard, especially during an emergency," Accardo told a gathering of parish residents at the St. Tammany Parish Council Chambers.

Accardo said the parish has to come up with a hazard mitigation plan every four years. In order to get funding for the projects, there has to be a plan in place. Accardo said the parish has been "proactive" in deciding what projects should be in the plan.

"The parish has a good reputation for being ready to go with projects," he said. "We try to be ready, or else the money disappears."

The projects, prioritized using a long list of requirements, have to be ready to go in case the funding comes in. Even though the projects just need funding, Accardo said they are just proposals, and there could be changes made to the

SEE MITIGATION, PAGE 6A



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people and serve several parishes in the region. While that facility is envisioned to meet long-term June to reature worldrenowned pianist Ronnie Kole.

Called "An Evening with

MITIGATION: Two more meetings

» FROM PAGE 1A

plan. The two main issues that faced the committee in making a hazard mitigation plan were drainage and environmental problems in the parish.

Elizabeth deEtte Smythe, director of the engineering department, said most of the drainage projects are to stop flooding of homes in various subdivisions located from Madisonville to Slidell. Some projects require digging retention ponds, installing drainage culverts, covering drainage ditches and installing more drainage pipes. So far, the total needed for all the drainage projects is \$10.2 million.

Glenn Daughdrill of the parish's Environmental Services department said there are several projects that need to be done to keep parish utilities operating during and after emergencies.

Some of these include strengthening utility operations buildings to withstand Category 3 hurricanes, installing submersible pumps that operate under water in the sewage lift stations and installing water resistant electrical panel boxes that control sewage and water systems in low-lying parts of the parish.

Gina Campo, director of departments for St. Tammany Parish, said there is some money in the pipeline already. She said the Louisiana Recovery Authority is sending an unknown amount of funding to the parish for damages done by Hurricanes Gustav and Ike last year.

She said the parish is waiting to see if it will be a recipient of any funds from the economic stimulus legislation signed into law by President Obama last week.

"Kotary nas been a wonder-

ful blessing; they really

picked up the ball and ran

with it."

"That's why we put the list together. It's a pilot program to have projects ready to go," Campo said.

There will be two more public meetings on the hazard mitigation plan.

Residents can attend the second meeting at 6:30 p.m. Tuesday at Boyet Junior High, 59295 Rebel Drive in Slidell.

The final meeting will be at 6:30 p.m. March 10 at the Fire District 3 Training Center located at 29278 U.S. Highway 190 at the corner of South Mill Road in Lacombe.

For a complete list of the hazard mitigation plan's proposed projects, go to the parish's Web site at www.stpgov.org and click on the Hazard Mitigation Planning link.

AUTHOR: Reich to sign books **» FROM PAGE 1A** manned drones and satel- throughout the world. The

Dexter Accardo, Director of the Office of Homeland Security and Emergency Preparedness explains the Natural Hazards Mitigation Plan Update at the February 25 public meeting.

Natural Hazards Mitigation Plan

April 2009 DRAFT

St. Tammany Parish Natural Harards Mitigation Plan Public Information Meeting February 25, 2009

	NAME	E-MAIL ADDRESS	AGENCY	PHONE NO.
-	RODNEY HART	thartestpoor. Org	STP-GOV	985-869-3188
2	BLENN Duandrill	adauahdrillestpourora	STP-60U	2918-682-186
3	1 destre Smythe	Ed smithe ashagov. org	STP-Dedf. Ok. Engr.	(988) 898 - 2552
4	(UMENCE Dowe	Provide 25toan, ore	STPLOU	(985) 867-3787
£	Tom Ruell	Utablell to y mail woon	mit reen on commit	(935)789-2125
9	Polly H-Greene	Strediture bellouthive	HITIMMAN FUNE	585-892-2223
7	Albert Adams	ago D a dams obellowthenet	Resident-Chenlewes	985-674-2505
8	TOHN O'NEIL	1 SNEN @ STPGOL. CN 6	STP GOU	3Kat 184 2048
6	CIAN CAMPO	OCAMDO (@ STPEN, ORG	StPG	5986 POS 2865
10	WATER BAUMY	Walloaks and a how, Com	Residunt Honesaner	936-624-8155
11	HUN BAUNY	IMASAMI @ VAHOO	Pesta ENT-Homecului	5518 -127-586
12	Brendin Harb	brendinharbevahoo.com	Property Owner	(504)256-5547
13	H R. MARSTHI	/	11 1 11	985 Lal 3372
14	KIT ROTH		SAVELITTLE BAYOU CASTINE"	985-624-8746
15	John Monlezun	None	11	11 12 11 11
16	ERIK SANZENBACH	statics 200 amail.com	St. TAMMANN NEWS	649-0253
17	DEXTER ACUMUS	DACCUANO RSTP601 Cry	STV	838-2354
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Natural Hazards Mitigation Plan

Lacombe Town Hall Meeting

MARCH 10, 2009 Please call me regarding a problem or situation

Name/Address	Phone & Email
1.D. Musterno 6/107 Anologno	882-7199
2 Darry Luckada 30093 West Ave	882-5260
3. Barbara Show 28575	
4. Slammi Meeds	le26-8464
5. Margo Rosts	8827574
6. Wade D. Amphein	705-1079
7. JENNIFER Muller	882-262
8 DAN Welson	9600862
9	
10	

Lacombe Town Hall Meeting

Contact List for Future Meetings

Name 1. <u>George Barry</u>	Email or Phone 882 5572
2	
3.	
4	
5	
6	
No.0492 P. 2	Mar. 17. 2009_ 4:15PM

NA	ME	ADDI	RESS	Phone/ew	IAI J
RENG	Young	2639	4 PICHON RD	. 882-5814	6
Niki EG	eore Dargis	65252	Maple St	727-371	16
Richard	Joyce Ors	Coran	65411 Const	a 727-91	608
Holly	HORACES	6541	5- LORETTA D	e 626.7	732
Philip /c	Ira mae abe	1 65322	maple St	MULA 674-7	901
Barbara	Shaw-	2857	5 Berry Tod	22 Rd 882	-716 4
Avryz	ANDRÍE COS	4635	25 Holly 51	- 630-0	595
Nelson Non	mars JR.	65780	Mulborey St.	624-99	12
Poul Ols	n	65266	Muple 5th	626-490	8
RONALD	CR5554	60283	Sherwood		26
CARLO	HER NANDEZ	2818	MESA CT	626-7	578
DANNEA	STAKE GEORGE	65386	Mulbarry St.	727-16	,70
Warte D	ander	60430	6 Sapphires	7 705-10	>29
Mika	Malley :	23369	OSCAR ST	626-7	234
JENNITE	e Muller	62145	HWY 434	887-7	1830
Poy J.	SPIZALE	65530	MAPLE ST	502-	74-75
Drw Wil	SON	29470	LYON LAWE	985-960-0	S(2)
WAYNENV	KIE KELLEY	23329	OSCAR St. 70	448 985-727	-1658
Betsy	ELrod .	33396 0	Dacas St	11448 985-67	4-55
Sheelp	TA MALLOY	23369) 05 cm	104F8 985-6	2.6-72
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April 2009 DRAFT

St. Tammany Parish Natural Harards Mitigation Plan March 19, 2009

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	John WICKERS	CCCAGBELLSOUTH. NET	COMMUNTY CHRISTIAN CHOCK	(385) 259-1689
(1)	Carol T. Nicosia	larolnieosia @ Oilmoo. O	I'ma, ma	(BOH) 912-6521
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ŝ	GREG BRENAN	9 brenanayakov.com	BAPTIST DISASTER Rev Will	5800-966-586
9	MIKE DOHM	MFDOHM @ YAHDD. COM	LDS CHURCH	985-718-9753
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ST. TAMMANY PARISH OFFICE OF HOMELAND SECURITY & EMERGENCY PREPAREDNESS

EMERGENCY OPERATION CENTER 510 EAST BOSTON STREET SUITE 102 COVINGTON, LA 70433 PHONE: (985) 898-2359 FAX: (985) 898-3030 DEXTER ACCARDO/DIRECTOR E-mail: daccardo@stpgov.org Kevin Davis Parish President

October 31, 2008

In 2004, St. Tammany Parish prepared a Hazard Mitigation Plan. This Plan identifies activities that can be undertaken by both the government and the private sector to reduce the safety hazards, health hazards, and property damage caused by natural hazards, such as tropical storms, floods, tornadoes, wildfire, and drought. You can see the 2004 Plan at <u>www.stpgov.org</u> then under "Topics of Interest" – Hazard Mitigation Planning.

Since 2004, we have had more than our share of experiences with natural hazards, such as Hurricanes Katrina, Rita, and Gustav. We have also implemented some of the Plan's recommendations and have received seven mitigation grants worth over \$6 million. It is time to update our mitigation plan to reflect these developments, address lessons learned, and implement changes to past disasters.

Because of your involvement in hazard mitigation activities, we are sending you this invitation to participate in our efforts to update the 2004 plan. Our work will be coordinated by our Mitigation Planning Committee. Information on our efforts and the Committee's meeting schedule can also be found on our above referenced website. You are welcome to send a representative to some or all of the meetings.

If you have any plans, programs, activities or ideas that could help us in our efforts to identify the best ways to reduce the dangers and minimize the damage from these natural hazards, we would appreciate it if you could contact our planning consultant:

French Wetmore French & Associates, Ltd. 2601 Havelock Court Steilacoom, Washington, 98388 Phone and fax: 253/302-5846 FrenchAsoc@aol.com

We expect the plan to be drafted by February 2009. We will send you an executive summary of it and will post the entire draft on our website after it has been completed and accepted by the St. Tammany Parish Council.

Sincerely,

Clarence Powe Hazard Mitigation Committee

April 2009 DRAFT

Materials from the April 27 public meeting will be added here.

Appendix C. 2008 – 2009 Planning Committee Meetings

The membership and general activities of the Mitigation Planning Committee during the 2009 Update is discussed on pages 1-6 – 1-9. The Committee met four times:

- <u>September 29, 2008</u>
- <u>November 17, 2008</u>
- March 16, 2008, and
- <u>April 27, 2009 (following the public meeting)</u>

Publicity about the committee meetings is discussed in Appendix B. This appendix has the minutes from the four meetings and the member sign-in sheets.

St. Tammany Parish Hazard Mitigation Plan Update Meeting September 29, 2008

Called to Order at 7:12 pm by Tom Buell-Chairman

Attendees:

Tom Buell	Eduardo Parra
French Wetmore	Rodney hart
Suzanne Parsons	Patty Sanchez
Dexter Accardo	Jeffrey LaCour
Paula Joiner	Dale Kirby
Frances Barker	Amy Webbeking
Colleen Nell	Gene Bellisario
Heather Bachman	George Carbo
John O'Neil	Keala J. Hughes
Chief Warhorse	Margaret Sanz
Noreen DeBlanc	Mauro Leiva

Agenda: Introductions

Background on Planning Project Chapter 1. Introduction Chapter 2. Hazard Profile Chapter 3. Vulnerability Assessments Assignment for next meeting

Tom Buell opened the meeting and thanked everyone for attending. He introduced French Wetmore of French & Associates, Ltd. who will be the lead consultant on the project.

French asked that all attendees introduce themselves and identify the agency they represent. After introductions, French began by identifying that the Planning Committee has been reconvened and holding its first meeting in an effort to revise the 2004 Plan. Parish staff and consultants are researching into what's changed since 2004, what's been accomplished, and what lessons we learned from Katrina and the other storms.

The committee will be used for Input, feed back and as a sounding board. Butch Badon and Suzie Sumpter, both from St. Tammany Parish Government, will serve as the contacts for the project. The three consulting firms will be the staff support, make revisions and implement ideas into the plan. The meetings will be run by the chairman, Tom Buell. The first meeting will focus on chapters 1, 2 & 3.

There will be three additional meetings. There was no formal vote on the dates and times, just discussion and then a consensus. The dates and locations are as follows:

6:00 pm

Monday, November 17, 2008

EOC (1, 2 & 3) 510 E. Boston Street Covington, Louisiana

Monday, March 16, 2009	6:00 pm	EOC (4, 5, 6, 7, 8, 9) 510 E. Boston Street Covington, Louisiana
Monday, April 27, 2009 Public Meeting	6:00 pm	Council Chambers 21490 Koop Drive Mandeville, Louisiana

After the public meeting, the Committee will make any appropriate changes and send it to the Parish Council for adoption.

The 2004 Hazard Mitigation Plan will be updated with input from the appointed committee, St. Tammany Parish public and the assistance of consulting firms (French & associates, CDM & Solutient of New Orleans). The plan consists of 10 chapters. Revisions to the plan will be incorporated in a six step process; those steps being:

- 1. Planning Committee
- 2. Public Input
- 3. Research
- 4. Draft for Public Review
- 5. Public Meeting
- 6. Council Adoption

Public involvement/input will be the big focus. The means to reach the public are through press releases, website, presentations to groups and organizations, public meetings. Comments should be emailed to French at <u>FrenchAsoc@aol.com</u> or faxed to Dale Kirby/STPHM @ 504-304-2001. Background on the Planning Project was addressed for all those who were new to the committee and for the public. French touched on Chapters 1, 2 & 3 to clarify the purpose of each chapter in the plan. Then French emphasized the importance of everyone staying on track and the following though on the assignments for the next meeting.

Assignments are as follows:

- 1. Read chapters 1 & 2
- 2. Identify groups/organizations to present to
- 3. Identify speakers
- 4. Identify projects for scoping (elevating, acquisition, pilot, etc...)
- 5. Read other chapters as you get them
- 6. Make the next meeting mark your calendar now!

Meeting was adjourned at 8:34 pm

	9/29/00	
NAME	E-MAIL ADDRESS	PHONE NO.
French Wetmore	French Asoc @ adl. Low	208/334-3412
SUZAME PARSONS	Sparsonsestreauder	985 898 5243
DEXTER ACLARAC	DA UNDO PSTONICA	988-898-2359
PAULA JOINER	Diviner@archo.org	985-892-4317
Frances Basker	Fbarker @ arcon org	985-892-4317.
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St. Tammany Parish Natural Harards Planning Committee 9/29/08

St. Tammany Parish Hazard Mitigation Plan Update Meeting November 17, 2008

Called to Order at 6:13 pm by Tom Buell-Chairman

Attendees:

Tom Buell
French Wetmore
Suzanne Parsons
Dexter Accardo
Suzie Sumpter
Clarence Powe
Gina Campo
Greg Gorden
John O'Neil
Sidney Fontenot
deEtte Smythe
Cindy Chatelain

Eduardo Parra Rodney Hart Patty Sanchez Jeffrey LaCour Dale Kirby Bobbie Westerfield Gene Bellisario George Carbo Gregory Bush Margaret Sanz Winston Cavendish Wally Haese

Agenda: Introductions

Update on Planning Project Review of Chapter 1. Introduction Review of Chapter 2. Hazard Profile Review of Chapter 3. Vulnerability Assessments Setting Goals Overview of Mitigation measures Project Scoping Assignments for next meeting Adjourn

The meeting was called to order by Chairman Tom Buell and he thanked everyone for attending. Tom called for a quick run through of introduction from everyone who was in attendance. The meeting was then turned over to French Wetmore of French & Associates, Ltd. who will be the lead consultant on the project.

French began with a quick update regarding the status of the revisions to the 2004 Hazard Mitigation Plan in an effort to fill in any new attendees. Parish staff and consultants are researching into what's changed since 2004, what's been accomplished, and what lessons we learned from Katrina and the other storms. Any and all revisions or updates are posted in red when viewing the plans proposed changes on line.

The committee will be used for Input, feed back and as a sounding board. Clarence Powe and Suzie Sumpter, both from St. Tammany Parish Government, will serve as the contacts for the project. French discussed the benefits of CRS participation and what efforts could be made to increase public involvement. Suggestions were made for the Plan updates to be announced by Dexter Accardo at the next Council meeting, LEPC meeting and the EOC quarterly training in December. Drainage Districts should be notified and the "Agency Letter" sent to them by Suzie.

Eduardo spoke to some of them already and all of them should be directed to speak directly to him.

Suzanne Parsons Stymist notified French that chapter 2 of the plan was missing data from the Flood of 2004. Clarence has the data on the flood or "rain event" and will be responsible for getting that data to Dale or French in order to update the table on rain events and their impact.

Greg Gorden will take the responsibility to look at chapter 3 regarding the vulnerability of water plants and will check the data for accuracy. Suzanne mentioned that telecommunication lines (cable and fiber optics) have been left out of this section also. New to Chapter 3 is section 3.2.4 "Future Development" and 3.4A "Repetitive Flooding".

French asked everyone to look at the assessment and determine if we wish to change the assessment section as only one thing has changed to date. Take into consideration that if the assessments do not change, then should the goals change? On chapter 4.2 Goals, changes were made as follows:

Sidney Fontenot	# 3 utilities are maintained, made available and implemented during and after a disaster.
Suzanne Parsons Stymist	# 5 use of new infrastructure and development planning to reduce the impact of natural hazards.
Tom Buell	# 7 Public and Emergency Communications

French ran through chapters 5 through 10 touching on the major points of the chapters. Project scoping was discussed in length. 14 projects were submitted to date and Dale explained the "STAPLEE" method everyone demonstrating how they will conduct the cost benefit analysis for each project and how the rating was achieved and projects will be prioritized. The final time frame for resolution to participate and to submit any project for scoping is December 5th, 2008.

There are two additional meetings remaining and the dates and locations are as follows:

Monday, March 16, 2009	6:00 pm	EOC (4, 5, 6, 7, 8, 9) 510 E. Boston Street Covington, Louisiana						
Monday, April 27, 2009 Public Meeting	6:00 pm	Council Chambers 21490 Koop Drive Mandeville, Louisiana						

The March meeting will focus on chapters 5 through 9.

Assignments are as follows:

- 1. Read updates as you get them on chapters 5 9
- 2. Identify groups/organizations to present to
- 3. Identify speakers
- 4. Make the next meeting mark your calendar now!

Meeting was adjourned at 8:27 pm

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St. Tammany Parish

St. Tammany Parish Hazard Mitigation Plan Update Meeting March 16, 2009 St. Tammany Parish Hazard Mitigation Plan

Update Meeting

March 16, 2009

Called to Order at 6:09 pm by Clarence Powe

Attendees:

Amy Webbeking-FEMA French Wetmore-French & Associates Daynelle Schenck-STP GAC Dexter Accardo-STP OHSEP Suzie Sumpter-STP OHSEP Clarence Powe-STP OHSEP Gina Campo-STP Gina Hayes-STP Mitigation John O'Neil-STP Fire Services Kirt Gaspard-STP School Board deEtte Smythe-STP Engineering Cindy Chatelain-Town of Abita Springs Eduardo Parra-CDM Rodney Hart-STP OHSEP Patty Sanchez-GOHSER/JLWA Jeffrey LaCour-FEMA PLANNING Dale Kirby-Solutient Shannon Davis-STP Public Works Steve Benton-Madisonville Avinash Mehta-CDM Will Murry-LA DOTD Harvey Kincaid-FEMA Wally Haese-Natural Hazards 2025

Agenda: Introductions Update on Planning Project **Public Involvement Activities** Review update of Chapter 1. Introduction Review update of Chapter 2. & 3. Hazard Profile and Vulnerability Assessments Review update of Chapter 4. Goals Chapter 5. Property Protection Chapter 6. Preventive Measures Chapter 7. Emergency Services Chapter 8. Flood Control Chapter 9. Public Information a. Public information strategy exercise Projects to be Scoped Chapter 10. Action Plan Assignments for next meeting (Monday April 27) Adjourn

The meeting was called to order by Clarence Powe due to Chairman Tom Buell not in attendance. Clarence welcomed everyone and thanked them for attending. There was a quick run through of introductions from everyone who was in attendance. The third of four meetings was then turned over to French Wetmore of French & Associates, Ltd. who is the lead consultant on the project.

French began with a quick update regarding the status of the revisions to the 2004 *Hazard Mitigation Plan* to fill in any new attendees. Parish staff and consultants are researching into what's changed since 2004, what's been accomplished, and what lessons we learned from Katrina and the other storms. Any and all revisions or updates are posted in red when viewing the plan's proposed changes.

A special welcome went out to Madisonville as we are glad to have them on board and participating.

French then asked that the minutes from the previous meeting be approved by the committee. All accepted and the minutes will be posted on the St. Tammany Parish website.

Summary of changes to chapters were as follows:

Chapter 1:

a) Added to Committee list is Steve Benton, Madisonville's Flood Plain Administrator

b) Expanded on how we are doing updates per State and FEMA comments

Chapter 2:

a) Repetitive Flooding was pulled out and is going to be looked at in depth as a separate issue.

b) Levee failure was revised a good bit from 2004

Chapter 3:

a) Feasibility Study, Impact on

Money
 People – mental and physical
 Economy

b) Addition of Madisonville

Chapter 4:

a) Goals have been reviewed and very little changes were made.

Chapter 5:

a) Property Protection changes

1) Pilot Reconstruction-new technique added to the plan.

2) Elevation
3) Defensible space
4) Public buildings – harden facilities, window protection

Chapter 6:

a) State Building Code has been adopted by all municipalities – it is the minimum. For better protection use the "fortified standard" for better protection. There is question as to whether the standard building code is good enough.

Chapter 7:

a) Clarence has updated all information

b) Contra flow works well – however; there was discussion regarding contra flow when cars enter Mississippi. Wally Haese suggested communication between the two States

c) GIS Data

Chapter 8:

a) Project Scoping – 18 total projects have been indentified, 10 projects for drainage which mostly came from the chapter.

b) DeEtte Smythe brought up the issue of releasing flows from the Ross Barnett Reservoir in Jackson, Mississippi. The timing of the releases from the reservoir into the Pearl River during a storm or severe rain event could cause major issues down river or could aid in the capacity of water storage. Managing the release needs to be placed as an emergency response and coordinated with the State of Mississippi.

c) Wally Haese added the W14 Canal in Slidell should also come under the same release control needs.

Chapter 9:

a) Public information strategy exercises were done by all who attended the meeting. French said he'd include the results in the next draft.

Chapter 10:

No changes have been made yet because we want to get comments on chapters 1 - 9. French will need input from everyone.

Scoping was explained by Dale Kirby and Eduardo Parra. Feasibility studies are currently being worked on.
We will be closing the "Committee website" pending any changes and the draft will be posted in its entirety on the STP Public site.

The next meeting date and location is as follows:

Monday, April 27, 2009	6:00 pm	Council Chambers
Public Meeting	-	21490 Koop Drive
		Mandeville, Louisiana

Assignments are as follows:

- 1. Read the next draft when it's posted and make comments
- 2. Spread the word about the next meeting
- 3. Make the next meeting mark your calendar now!

The meeting was adjourned at 8:09 pm

St. Tammany Parish Natural Harards Mitigation Plan March 16, 2009

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З	Eduardo Parra	Protocy Codm. com	CISM	832-623-3444
4	AVINASH MCHTA	MEHTAA Q)COM WW	CDM	504-799-1129
5	Dale Kirby	DKIRBY@SOLUTIENT.COM	So lutient	504 - 304-2000
9	Shannon DAVIS	Shannen Davis Costp gov d	13 Public Works	1.5.5 × 838 586
7	JOHN ONCIL	JONER (D) STRW. Jr.G	571 GOV.	SHS DEN DANE
8	Steve BENTON	Maduffoodplaine yakoo.com	MADISO NUILLE	(385) 966-2500
6	MILL MURRAY	William Murray Cloth, ta, ao	CA DUTU	985-893-6223
10	Cinan Chatelain	Minfulli@vishmian	PHILLA PHILA HIMAT	1140-668 586
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St. Tammany Parish Hazard Mitigation Plan Update Meeting April 27, 2009

Minutes to be added after the April 27 meeting

April 27 meeting sign in sheets to be added after the April 27 meeting

Appendix D. Project Scoping

A separate, but related activity, from the mitigation plan update was a review of specific mitigation projects that could some day be eligible for FEMA mitigation grants. The Committee members were asked to submit projects that met the grant criteria. Over a period of two months, 18 projects were nominated by Parish staff and citizen members. These projects included:

- <u>12 drainage/flood control projects</u>
 - o <u>Tammany Hills retention improvements, Covington, to protect 300 homes</u>
 - Hwy 1088 Area drainage improvements (Fountains Subdivision), Mandeville, 100 homes protected
 - o <u>Cloverland Acres bypass canal, LaCombe, 70 homes</u>
 - Black River detention along Brewster Road in Madisonville,
 - o Labarre Street Drainage Improvements, Mandeville, 50 houses
 - o Brownswitch Road Drainage Improvements, Slidell
 - <u>Highway 59 Area Drainage Improvements, Mandeville, 100 200 homes</u>
 - o Highway 22 and Causeway Boulevard, flooding of streets and 4 businesses
 - French Branch channel work
 - Cypress Bayou detention pond
- <u>2 drainage improvement projects:</u>
 - o <u>Defiance Drive drainage connection to the Whisperwood retention pond.</u>
 - South Queens Drive street drain connection to Whisperwood retention pond
- <u>4 projects to harden utility structures</u>
 - o <u>Hardening the Parish's Slidell utility operations office for wind protection</u>
 - <u>Hardening Wastewater Treatment Plant #3 for wind protection</u>
 - <u>Raising electrical panels and floodproofing two sewage lift stations</u>
 - o Floodproofing electrical panels in lift stations close to Lake Pontchartrain
- <u>1 project to clear several properties damaged by Hurricane Katrina that were</u> <u>abandoned by their owners becoming a threat to health and safety. The Parish has</u> <u>condemned and recommended demolition for most of these properties and is seeking</u> <u>a FEMA grant for the clearance work.</u>
- <u>The Village of Sun submitted a project to install new warning sirens in the village.</u>

The 18 projects were reviewed to ensure they met the grant criteria. They were then reviewed for their benefits and costs.

More details on the projects that had the best results will be included in the next version of Appendix D, when the project scoping is completed.

Real time river gage data

These sites show the current river levels and, when the river is rising, the National Weather Service's predicted flood levels.

Tangipahoa River at highway 190 near Robert: http://ahps.srh.noaa.gov/ahps2/hydrograph.php?wfo=lix&gage=robl1&view=1,1,1, 1,1,1,1,1

Tchefuncte River at highway 190 near Covington: http://ahps.srh.noaa.gov/ahps2/hydrograph.php?wfo=lix&gage=cusl1&view=1,1,1, 1,1,1,1,1

Tchefuncte River near Folsom: http://ahps.srh.noaa.gov/ahps2/hydrograph.php?wfo=lix&gage=fls11&view=1,1,1, 1,1,1,1,1

Bogue Falaya at Camp Covington: http://ahps.srh.noaa.gov/ahps2/hydrograph.php?wfo=lix&gage=cgsl1&view=1,1,1, 1,1,1,1,1

Bogue Falaya at Boston Street in Covington: http://ahps.srh.noaa.gov/ahps2/hydrograph.php?wfo=lix&gage=cvel1&view=1,1,1, 1,1,1,1,1

Bogue Chitto River near Bush (south of Sun): http://ahps.srh.noaa.gov/ahps2/hydrograph.php?wfo=lix&gage=bshl1&view=1,1,1, 1,1,1,1,1

Pearl River at I-59, near the City of Pearl River: http://ahps.srh.noaa.gov/ahps2/hydrograph.php?wfo=lix&gage=perl1&view=1,1,1, 1,1,1,1,1

Flood safety

FEMA has some sites on flood safety at http://www.fema.gov/hazard/flood/fl_during.shtm

http://www.fema.gov/hazard/flood/fl_after.shtm

Flood insurance

FEMA's FloodSmart program is designed to guide the user through the basics of insurance http://www.floodsmart.gov/floodsmart/pages/index.jsp

A more traditional approach is at http://www.fema.gov/plan/prevent/floodins/infocon.shtm

Red Cross links:

The Red Cross/FEMA flyer on recovering from a flood is at: http://www.redcross.org/disaster/safety/Firststp.pdf The full book, "Repairing Your Flooded Home," is at http://www.redcross.org/services/disaster/0,1082,0_570_,00.htm

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Repetitive flooding

http://reploss.solutient.com/Portal.aspx

Property protection measures

http://www.louisianafloods.org/

FEMA's Homeowner's Guide to Retrofitting: Six Ways to protect Your House from Flooding is on FEMA's website at http://www.fema.gov/library/viewRecord.do?id=1420

FEMA's recent *Protecting Building Utilities from Flood Damage* is at http://www.fema.gov/library/viewRecord.do?id=1750

FEMA has a variety of fact sheets on flood protection at http://www.fema.gov/plan/prevent/howto/index.shtm#4

FEMA's FloodSmart program has an interactive site called "Test the Waters" that invites users to see what kind of flood damage they are exposed to. http://www.floodsmart.gov/floodsmart/static/testthewaters.jsp

So does the Red Cross: http://www.redcross.org/services/prepare/0,1082,0_240_,00.html

The Institute for Business and Home Safety has flyers on its site: On flood protection: http://www.ibhs.org/publications/list.asp?id=75

Protecting from water damage: http://www.ibhs.org/publications/list.asp?id=80

References on protection from other hazards can be found in FEMA's library: http://www.fema.gov/plan/prevent/howto/index.shtm#4