

Santa Rosa County  
Local Mitigation Strategy (LMS) Plan

**Santa Rosa County**  
**Local Mitigation Strategy (LMS) Plan**

**Section Five**  
**Vulnerability Assessment**

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**5.1 Introduction**

*(Appendix 4.2 provides broad statistical information – from state contractor sources -- that supports discussion throughout Section 5. Additional statistical information – usually derived from local sources -- is located within this section and is provided mostly as tables.)*

This section of the Santa Rosa County LMS details the specific structures and facilities within the county vulnerable to the hazards as listed in Section Four. The hazards identified as likely to be present or occur included:

- Hurricane/Tropical Storm
- Flooding
  - o General Flooding
  - o Dam Safety
- Land Erosion
  - o Expansive Soils
  - o Highly Erosive Soils
- Severe Storms
  - o Tornado & Waterspout
  - o Thunderstorms and Lightning
  - o Winter Storms
  - o Heat Wave and Drought
- Wildfire

In order to streamline the analysis, each municipality will be examined individually by sectors followed by a comprehensive analysis of the entire county to account for mitigation in the unincorporated county areas.

Vulnerability is assessed from a broad perspective in the text. Specific vulnerability of structures, infrastructure, or other items that may deserve mitigation consideration is provided through HAZUS-MH (Hazards U.S. – Multiple Hazards), a data system provided by the ~~State of Florida~~ Federal Emergency Management Agency (FEMA), *(See Appendix 4.2 for a combined section of mapped hazards and potential for damages in for each category)*. Additionally, LMS Committee staff has developed a number of tables based upon local data that assesses the financial/property value of

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potential damages. This documentation is included in each subsection of this chapter, as appropriate and available.

The facilities targeted in this section were identified through a thorough, comprehensive public involvement process initiated by the LMS Task Force. These facilities were then prioritized and ranked by the Task Force according to function and immediate need for mitigation. Where data and information was available, Geographic Information System (GIS) analysis is incorporated in identifying vulnerable facilities in relation to hazard areas. The result will be the identification and mapping of all facilities in the County. In addition, the analysis in this section will lead to the creation of specific policies, recommendations, and strategies to address the mitigation deficiencies in Section Six. Section Six will also identify the desired scheduling of the future planning efforts of the Task Force as well as the desired schedule for implementation of proposed mitigation initiatives by the participating jurisdictions and organizations.

Note that development trends throughout the County tend to favor the Fairpoint Peninsula, Navarre Beach, and the Pace and Milton areas. Municipalities have reflected very slow growth due to buildout or rural location of the communities. Growth of the City of Milton is primarily due to annexation of new vacant lands under development.

## **5.2 City of Gulf Breeze**

### 5.2.A Community Mitigation Overview

*(See Appendix 5.2 .A for map series)*

The City of Gulf Breeze is vulnerable to the following types of natural disasters:

- Hurricane/Tropical Storm
- Flooding
  - o General Flooding
  - o Storm Surge
- Land Erosion
- Severe Storms
  - o Tornado & Waterspout
  - o Thunderstorms and Lightning
  - o Winter Storms
  - o Heat Wave and Drought
- Wildfire

A U.S. Geological Survey map of the City is shown as Map 5-1 at the end of this chapter of the plan.

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The City of Gulf Breeze is Santa Rosa County's largest coastal urban area with a total population of 5,780 (. There are approximately 2,681 parcels of land in Gulf Breeze that have a "Just Value" of roughly \$961,774,324.

The City of Gulf Breeze is at the western terminus of the Fairpoint Peninsula. This peninsula is approximately one mile from the Gulf of Mexico and is separated from the Gulf by Santa Rosa Island (a coastal barrier island) and the unincorporated community of Pensacola Beach in Escambia County. To the south of Gulf Breeze between Santa Rosa Island and the peninsula lies Santa Rosa Sound, a salt-water body. To the west and north of the City and peninsula is Pensacola Bay. The City of Pensacola in Escambia County lies three miles north of Gulf Breeze. East of Gulf Breeze is additional land area of unincorporated Santa Rosa County.

About one half of the City is within the Naval Live Oaks Unit of Gulf Islands National Seashore (owned by the National Park Service). This property includes the entire eastern portions of the City. This property consists of pine and live oak and includes some forested wetlands. With the exception of the National Park Service's headquarters and visitor center, along with a group camping area, only recreational trails and picnicking areas are located in this area. U.S. Highway 98 (Gulf Breeze Parkway) traverses the Naval Live Oaks property. The history of disaster damage is low in this area due to the absence of infrastructure. It is possible, however, to have hurricane storm surge cover U.S. 98 in category 3-5 storms. Additionally, wildfire can be an issue, especially when fire approaches neighborhoods and businesses that are built against the boundaries of the park on its east and west sides. (Controlled burns are made by trained personnel to mitigate fire risk.)

The remainder of Gulf Breeze is extensively developed with residential, commercial, institutional (government, schools and hospital), and some light industrial development. Flooding is a concern near Deer Point, along CR 399 near the Bob Sikes Bridge, at businesses along U.S. 98 at the southern entrance/end of the "Three Mile Bridge" crossing to Pensacola, and at some homes that line the shoreline around much of the Fairpoint Peninsula. Wind damage from hurricanes can potentially be extremely high due to the City's position on the coast. Wildfire could be a threat on some vacant lots, however Gulf Breeze is essentially "built out" and few vacant wooded lots remain.

Natural disaster history generally includes hurricane (storm surge, flooding and wind) and wildfire. Additional hazards could include tornado/waterspout, thunderstorms (lightning, flash flooding on some streets), drought (although water is piped in from northern Santa Rosa County), and a very rare chance of ice storm. All of these vulnerabilities are analyzed further below.

For the purposes of this study, "Just Value" is used for estimating monetary damage due to flood hazards. According to the Santa Rosa County Property Appraisers Office, Just Value is the value established by the Property Appraiser for *ad valorem purposes* and includes both the structural and land value. Under Florida Law, Just Value has been the term coined for representing Fair Market Value.

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Based upon GIS analysis, there are ~~eight~~ eleven identified critical facilities in the City of Gulf Breeze. All facilities are vulnerable to hurricane force winds due to sheer geographical location to the sea and have been recorded as such below. However, when examining the remaining hazard categories, ~~four~~ six facilities are spatially located in some other form of hazard area, thus making it vulnerable to damage due to other hazard events. This information was obtained by overlaying GIS hazard layers onto point locations of critical facilities. A summary of Gulf Breeze’s vulnerability by specific hazards is given below:

Facility	Facility Classification	Hurricane	Flood	Storm Surge	Wildfire	Other hazards
Gulf Breeze Water Treatment Plant	Hazmat	X		X		
BellSouth Central Office (Gulf Breeze)	Hazmat	X				
Gulf Breeze Hospital	Hospital	X				
Pier	Marine Facility	X		X		
Gulf Breeze Police Department	Police Dept.	X		X		
Gulf Breeze Elementary	School	X			X	
Gulf Breeze Middle School	School	X				
Gulf Breeze High	School	X			X	
Gulf Breeze Fire Department	Fire Dept.	X				
Bruno’s Grocery Store	Food	X				
The Villas @ Gulf Breeze	Nursing Home	X		X		

As stated above, all facilities are deemed to be vulnerable to hurricane force winds. A more detailed explanation as to the level of vulnerability is given in section 5.2.B. Being that Gulf Breeze rests on a peninsula, all structures are sitting on the forefront of any hurricane event.

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Interestingly, no structures were deemed to be vulnerable to flood events. This type of flooding is not inclusive of storm surge. This will be analyzed further in the next narrative.

Three Four structures are vulnerable to storm surge activity. Specifically, The Pier (marine facility) is vulnerable to all categories of surge. The Gulf Breeze Wastewater Treatment Plant (hazmat) and The Villas at Gulf Breeze (Nursing Home) are vulnerable to both Category Four and Five surge events. The Gulf Breeze Police Department (police department) is vulnerable to a Category Five event.

The wildfire classification is further delineated into three sub-classes. These classes include High, Medium, and Low potential for wildfire as defined by the US Forest Service. For the purposes of this analysis only those facilities vulnerable to "High" potential were included in the table above as this category calls for the most urgent mitigation measures.

The tri-color prioritization scheme was applied using GIS software to determine general areas or parcels in Gulf Breeze that require varying levels of mitigation. The results of the analysis are detailed in the table below:

Priority	Number of Parcels
Red (High)	1
Yellow (Medium)	59
Blue (Low)	2,621

Additionally, "the Florida Division of Forestry developed a process to assess wildfire hazards and risks, and the values to be protected, on a statewide bases. The purpose of the Florida Wildfire Risk Assessment System (FRAS) is to identify the potential for serious wildfires within Florida and to set priorities for wildfire mitigation to reduce risk.

The nation Fire Behavior Prediction System (FBPS) has 13 fuel models used for predicting fire behavior through computer modeling of fuels. Through the FRAS process, the BFPS fuel models have been correlated to actual conditions allowing for a uniform assignment of fuel models throughout Florida.

FRAS calculates two indices for every ¼ acre cell in Florida:

1. The Wildland Fire Susceptibility Index (WFSI) uses computer modeling to represent the likelihood of an acre burning by combining the factors of historic wildfire occurrences, expected fire behavior (fuels, weather, topography, and spread rate), and historic success rates for fire protection (how fast the fire spread and how big it got).

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2. The Fire Effects Index (FEI) is an indication of the expected effects of a fire and combines an environmental effects rating with a fire suppression cost for the area under consideration. This index identifies areas that have environmental values at risk, including wildland-urban interface areas, utility corridors, pine firests (natural and planted), and critical facilities (airports, schools, hospitals, highways). This index includes a rating of areas where wildfires are expensive to suppress, as evaluated by fuel type (e.g., wildfires in muck soils are much costlier to suppress than those in grassy fuels).

These two indices are combined in a single rating of Level of Concern (ranging from 0 to 100) for every area of burnable vegetation in Florida. The Level of Concern is the best measure of wildfire risk because it combines both the likelihood of an acre burning and the expected effects of that wildfire into one measure.”<sup>1</sup>

#### 5.2.B Hurricane

For the purposes of this section, high wind vulnerability shall be the component analyzed. Flooding and surge events associated with hurricanes are analyzed separately further in this document. Since flooding and surge are covered in detail (Section 5.2.C. and 5.2.D.), the only remaining variable in a hurricane event that needs to be examined are high winds and the community's vulnerability to them.

Data used in this section was obtained from ~~MEMPHIS (Mapping for Emergency Management, Parallel Hazard Information System). This system is an experimental web based system that allows emergency managers to easily access a variety of hazard related data. The following draft outputs was were created by Kinetic Analysis Corporation (KAC) under contract with the Florida Department of Community Affairs. HAZUS-MH (Hazards U.S. Multi-Hazard) and the Santa Rosa County Geographic Information System(GIS).~~

Historical storms (past 153 years for tropical cyclones and past 50 years) were simulated using the TAOS model, version 10.2. Winds were computed and hazard zones created based upon these simulations. Wind layers were created based on percent damage expected. Additionally, FEMA Flood Insurance Rate Map (FIRM) data was ingested, and the tabular data sets were run for comparison. (<http://stellarcom.methaz.org/lmsmaps/methodqr.html>, 2004). (do we need to update this model?)

It should also be noted that this TAOS wind data covers the entire county and is not jurisdiction specific. Due to the wide breadth of area this data covers, more detailed information (for example, dollars values) shall be covered in the “Unincorporated Santa Rosa County” section below since this section also covers the entire county.

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<sup>1</sup> Florida Department of Community Affairs and Florida Department of Agriculture and Consumer Services, *Wildfire Mitigation in Florida* (Drummond Press, Jacksonville, Florida, 2004), 43-44

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This section shall outline wind speed vulnerability for the city. A summary of the wind velocity vulnerabilities for the City of Gulf Breeze is summarized in the table below:

Category Event	Gulf Breeze Vulnerability (mph)	Event	Gulf Breeze Vulnerability (mph)
Category 1 (74-95 mph)	75-85	10 Year MLE Wind	50-75
Category 2 (96-100 mph)	95-115	25 Year MLE Wind	50-85
Category 3 (111-130 mph)	115-130	50 Year MLE Wind	50-95
Category 4 (131-155 mph)	130-160	100 Year MLE Wind	95-115
Category 5 (155 mph)	>160		
Source: TAOS model data; 2004, <a href="http://www.methaz.org/lmsmaps/">http://www.methaz.org/lmsmaps/</a>			

The overwhelming majority of structures in Gulf Breeze do not have hurricane shutters. Additionally, they have not been built to recent Florida Building Code standards passed in the early 2000's. (Most structures in Gulf Breeze were built before this code was enacted.) Most structures are constructed to the Southern Building Code standards that were in place prior to the 2000's.

Window, door and roof failure are the primary vulnerability points to most structures. Tree damage and subsequent debris are another aspect of vulnerability. It is anticipated downed trees and branches will cause structural damage, uprooted or utility lines (water, sewer, gas, telephone, cable TV, etc.), and damage to overhead electrical and communications wiring. Debris on roadways will block access to and from emergency services. Additionally, evacuees from other coastal locations may be impacted by debris on roadways. Wind driven debris may damage uncovered windows, making structures vulnerable to interior wind and rain damage.

Gulf Breeze is also vulnerable to the human impacts of hurricane disasters relating to evacuation. U.S. 98 (Gulf Breeze Parkway leading to Pensacola or Navarre) and SR 399 (Pensacola Beach Boulevard and the Bob Sikes Bridge to Pensacola Beach) are the *only* routes of evacuation in the immediate area for some 45,000 residents of Gulf Breeze, Pensacola Beach, unincorporated Santa Rosa County, and the City of Gulf Breeze (not including tourists/visitors). Evacuation orders issued by Escambia County for locations on neighboring Pensacola Beach (located in Escambia County) must be coordinated with Santa Rosa County Emergency Management and the City of Gulf Breeze to ensure traffic flow away from vulnerable beach areas. Daily traffic counts indicate an average daily flow of 50,000 vehicles per day in non-emergency situations on U.S. 98 through Gulf Breeze. The Garcon Point Bridge (SR 281) about seven miles east of Gulf Breeze does alleviate some traffic pressures on the City during evacuation situations. Growth of the Fairpoint Peninsula and on Pensacola Beach, however, places a great deal of pressure on the U.S. 98 route. The Pensacola Area Transportation Planning Organization is considering replacing the aging Pensacola Bay Bridge (U.S. 98 between Gulf Breeze and Pensacola) (likely between 2009 and 2014). Additionally,

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a new bridge corridor is being considered that would run from Pensacola, across Pensacola Bay, to east of Gulf Breeze. There is no funding and no firmly established route for this bridge at this time, however. Issues include traffic management and flow, services needed by a temporary increase in population, and emergency services (accidents, medical emergencies, etc.).

5.2. C Flood

The City of Gulf Breeze has extensive coverage of floodplains, primarily related to proximity to coastal waters and shorelines. In some cases, freshwater wetlands or affiliated low areas create such floodplains. It should be noted storm surge zones (discussed in Section 5.2.D) do not necessarily include all floodplains delineated on National Flood Insurance Program (NFIP) maps. Additionally, the City of Gulf Breeze may record information on flood-prone locations (often due to urban runoff) that may not appear on NFIP or storm surge maps. Users of this document are cautioned to ascertain *all* information regarding potential flood-prone areas.

NFIP maps indicate "VE" (velocity) zones along many coastal areas of the City. "VE" zones extend from the western tip of Fairpoint southeast to Deer Point, and eastward along Santa Rosa Sound to the city limits in the Naval Live Oaks Area of Gulf Islands National Seashore. All "VE" zones are located within immediate proximity to Pensacola Bay or Santa Rosa Sound. No "VE" zones extend east from Fairpoint along the northern shore of the City along Pensacola Bay.

"AE" zones extend around all coastal perimeter areas. These are inland from all "VE" zones. Most land south of Shoreline drive (an east-west local corridor within the City) is within an "VE" zone. This includes all of Deer Point. On the north shore of the City, Town Point and several bayou shorelines are within the "AE" zone.

"AE" zones encompass minor areas of the City. Most notable is an "AE" zone at the terminus of the Pensacola Bay Bridge (U.S. 98) on the north shore of the City.

Using the Digital Flood Insurance Rate Maps as a layer in our GIS application (GoSpatial), 1 percent annual chance and "X" flood zones were overlaid with aerial photographs and tax parcels to determine extent of potential damage. The City of Gulf Breeze has four primary flood zone types that lie within its borders. They include:

Zone Type	Zone Definition
X	An area that is determined to be outside the 1 and 0.2 percent annual chance flood plains.
0.2 percent	An area inundated by 0.2 percent annual chance flooding
AE & VE	An area inundated by 1percent annual chance flooding. (VE only – An area inundated by 1 percent annual chance flooding with velocity hazard (wave action)); BFE's have been determined.

Note: Zone "X" on Q3 maps generally correlates with "Zone C" on Federal Flood Insurance Rate Maps (FIRM's). Similarly, Zone "X500" on Q3's generally correlates with FIRM Zone "B".

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For the purposes of this sub-section on Gulf Breeze, Zone “AE” and “VE” have been joined together in a broader “1 percent annual chance flood” category to streamline data analysis.

According to the analysis results, there are 892 parcels of land within the 1 percent annual chance flood zone in Gulf Breeze with a Just Value of \$534,940,904.00 or 64.6% of the Just Value of all of Gulf Breeze.

There are 2 identified parcels of land in Gulf Breeze (one is a road and the other is a City Park) that lie within the 0.2 percent annual chance flood zone. These parcels have a Just Value of approximately \$2,038,831 or <1.0% of the Just Value of all of Gulf Breeze. Flooding vulnerability for the City of Gulf Breeze is summarized in the following table:

Flood Type	Number of Parcels	Percentage of Gulf Breeze Total Parcels	Just Value (Fair Market)	Percentage of Gulf Breeze Total Just Value (Fair Market)
<b>1% annual chance</b>	892	17.6	\$534,940,904	64.6
<b>0.2% annual chance</b>	2	<1	\$2,038,831	<1
<b>TOTAL</b>	<b>894</b>		<b>\$536,979,735</b>	

#### 5.2.D Storm Surge

Although much of the area of Gulf Breeze is within a storm surge zone of hurricanes, only immediate coastal areas are most vulnerable. In most cases, Category 1 and Category 2 hurricane storm surge zones correlate well with NFIP flood zones “VE”, “AE” and “X”. Category 3 hurricane (the first stage of a major hurricane) storm surge begins to extend beyond the NFIP flood zone coverage, in most areas only 100 to 200 feet beyond NFIP map references. Once Category 4 and 5 (major) hurricane strength is reached, a more extensive coverage of the City occurs. Such coverage includes virtually all of the sparsely developed Naval Live Oaks Area of Gulf Islands National Seashore, and a substantial portion of the urbanized neighborhoods and some commercial locations in the developed portions of Gulf Breeze.

Gulf Breeze is highly prone to storm surge. There is a possibility that those deciding to not evacuate in a major hurricane being unable to leave the City from any direction due not to wind and debris, but to water. Essentially, the core of the City in and around U.S. 98 could become a temporary island until storm surge waters receded. People involved in a late evacuation and unable to leave the area due to bridge closure or inaccessibility

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would be faced with weathering a hurricane and storm surge inside of city limits. This creates a degree of concern for mitigation planning in terms of sheltering, building protection, and the ability to function as a City and community during the response and recovery phase of a hurricane/storm surge emergency.

Homes, businesses, and public infrastructure not otherwise mitigated for flooding (when compared to NFIP flood insurance rate maps) could be inundated or otherwise impacted by storm surge inland.

Using digital storm surge data from the United States Army Corps of Engineers in a GIS application, Category 1, 2, 3, 4, and 5 storm surge zones (Saffir/Simpson Scale) were overlaid on tax parcels to determine extent of potential damage. The City of Gulf Breeze has all five primary storm surge categories that impact structures within its borders. They include:

Category Number	Category Definition
1	Winds 65 to 82 knots (75-95 mph); damage primarily to shrubbery, trees, foliage and unanchored mobile homes. No real damage to permanent building structures. Storm surge, four to five feet above mean water level. Low-lying coastal roads inundated, minor pier damage.
2	Winds 83 to 95 knots (96-110 mph); Considerable damage to shrubbery and tree foliage with some trees blown down. Major structural damage to exposed mobile homes. Some damage to roofing material, windows, and doors. No major damage to permanent building structures. Storm surge, six to eight feet above mean water level. Coastal roads and low-lying escape routes inland cut by rising water. Considerable pier damage and marinas flooded. Evacuation of some shoreline residences and low-lying island areas required.
3	Winds 96 to 113 knots (111-130 mph). Damage to shrubbery and trees. Foliage off trees, large trees blown down. Some roofing material damage; some window and door damage; some structural damage to small residences and utility buildings. Mobile homes destroyed. Minor amount of curtain wall failures. Storm surge, nine to twelve feet above mean water level. Serious flooding along coast with many smaller structures near coast destroyed. Larger structures damaged by battering of floating debris. Low-lying escape routes inland cut by rising water.
4	Winds 114 to 135 knots (131-155 mph). Shrubs and trees down. Extensive roofing material damage; extensive window and door damage. Complete failure of roof structures on many small residences and complete destruction of mobile homes. Storm surge, thirteen to eighteen feet above mean water level. Major damage to lower floors of structures near the shore due to flooding and battering action. Low-lying escape routes inland cut by rising water. Major erosion of beach areas.
5	Winds greater than 135 knots (155 mph); Shrubs and trees down. And roofing damage considerable. Very severe and extensive window and door

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damage. Complete failure of roof structures on many residences and industrial buildings; extensive glass failure; some complete building failures; small buildings overturned and blown over or away and complete destruction of mobile homes. Major power distribution failures causing loss of water and sewer for an extended period. Storm surge, greater than eighteen feet above mean water level. Major damage to lower floors of all structures. Low-lying escape routes inland cut by rising water. Evacuation of residential areas situated on low ground within five to ten miles of the shoreline may be required.

According to the analysis results, there are 153 parcels of land within the Category One storm surge zone in Gulf Breeze with a Just Value of \$60,044,968 or 8.1% of the Just Value of all of Gulf Breeze.

There are 305 identified parcels of land in Gulf Breeze that lie within the Category Two storm surge zone. These parcels have a Just Value of approximately \$104,490,327 or 14.1% of the Just Value of all of Gulf Breeze.

There are 403 identified parcels of land in Gulf Breeze that lie within the Category Three storm surge zone. These parcels have a Just Value of approximately \$167,811,259 or 22.6% of the Just Value of all of Gulf Breeze.

There are 990 identified parcels of land in Gulf Breeze that lie within the Category Four storm surge zone. These parcels have a Just Value of approximately \$305,019,063 or 41.1% of the Just Value of all of Gulf Breeze.

There are 1,499 identified parcels of land in Gulf Breeze that lie within the Category Five storm surge zone. These parcels have a Just Value of approximately \$459,070,461 or 61.8% of the Just Value of all of Gulf Breeze.

Storm surge vulnerability for the City of Gulf Breeze is summarized in the following table:

Category Storm Surge	Number of Parcels	Percentage Gulf Breeze Total	Just Value (Fair Market <u>Parcels Value</u> )	Percentage Gulf Breeze Total <u>Just Value</u>
1	153	5.7	\$60,044,968	8.1
2	305	11.4	\$104,490,327	14.1
3	403	15.0	\$167,811,259	22.6
4	990	36.9	\$305,019,063	41.1
5	1,499	55.9	\$459,070,461	61.8
<b>TOTAL<sup>2</sup></b>	<b>1,499</b>	<b>55.9</b>	<b>\$459,070,461</b>	<b>61.8</b>

<sup>2</sup>Category Five (5) storm surge amounts were used for the total because the boundaries of all other storm surge zones and applicable parcels are all spatially located within the Category Five. These totals represent the maximum damage foreseeable due to storm surge activity. This methodology was chosen to prevent overlap of data and skewing results.

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#### 5.2.E Land Erosion

The majority of the City of Gulf Breeze is located on “potentially highly erodible” soils, according to the Blackwater Soil and Water Conservation District. Small portions of the City are located on “highly erodible soils”. Most uplands are considered potentially highly erodible because of their proximity to topographic slopes associated with being close to coastal bluffs of the bay and sound. Highly erodible soils are usually associated directly with coastal bluffs and are immediately next to the bay or sound.

Potentially highly erodible locations are often created by disturbing natural groundcover during development. Without stormwater controls, gullying could occur, particularly if water can develop velocity seeking lower ground or natural ravines/valleys. Silt fencing/screens at development sites reduce the amount of erosion migrating away from such sites.

Highly erodible soils can be seen in sandy bluffs along both Pensacola Bay and Santa Rosa Sound. Several of the bluffs are located on National Park Service properties and are part of the natural systems

#### 5.2.F Severe Storms

A vulnerability to severe storms is present throughout Gulf Breeze. The risk assessment of this plan identifies tornadoes, waterspouts, severe thunderstorms, lightning, winter storms, heat and drought as possibilities in the area.

Vulnerability is simply through presence. All structures and infrastructure are vulnerable to severe weather in Gulf Breeze.

Tornadoes and waterspouts are virtually impossible to predict (in terms of exact location of formation and path), although technologies such as Doppler Radar are enabling weather forecasters to give accurate warnings during formation and identification of an event. Aside from strong building codes (generally developed around the premise of hurricane mitigation and protection), vulnerability to these events will always be present and difficult to mitigate against.

Thunderstorms and lightning damage can be prevented. Existing and strengthened building codes (usually under consideration to prevent hurricane damage) will provide strength against severe thunderstorm events (especially high winds and hail). Lightning damage is preventable when proper electrical grounding, following building and fire codes, will also prevent damage. Electronic equipment is highly vulnerable to lightning strikes. Good common sense and planning by those using such equipment can prevent or reduce damage due to lightning events.

Winter storm vulnerability is very low in Gulf Breeze. With warm waters surrounding the City, the likelihood of severe winter weather is incredibly low. The greatest vulnerabilities

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would be ice accumulation on bridges leading into and out of the City, ice on electrical lines, and loss of electricity. All residents, business and governmental organizations would be vulnerable. Severe cold can also cause strains on the electrical generation system (provided by Gulf Power Company). Loss of electrical power due to high demand could cause problems for vulnerable populations (especially the elderly).

Similarly, heat waves may cause excessive demand on electrical systems. Air conditioning is a given for most residents. Loss of the ability to cool air in a heat wave could mean the possibilities of opening shelters for vulnerable populations. Although all residents and businesses are vulnerable to heat waves, air conditioning generally mitigates the issue.

Drought can cause water use restrictions, but does not mean that water is unavailable in the area. Water is delivered to Gulf Breeze from inland well systems. Drought can lead to firefighting difficulties (analyzed under wildfire vulnerability assessments).

In all cases, loss of commercial grid electricity is the primary vulnerability for the area. Without a source of electricity, cooling, heating, communications and water supplies cannot be assured.

## 5.2. G Wildfire

About one half of the acreage of the City of Gulf Breeze is woodland. The other half is heavily urbanized with housing, commercial development, and public infrastructure. Most of the developed portions of the City have been built on sandy ridges that once contained a sand pine and longleaf pine forest. Such pine forests have fire-dependant ecologies. This means fire is a natural part of the life cycle.

Development of or near such forests has created some environs that are conducive to wildfire spread within urbanized areas. Particularly vulnerable are buildings, subdivisions, and other development where pine needles are allowed to accumulate on roofs and in yards. Flammable shrubbery close to buildings (usually containing waxy leaves or flammable sap in stems add to the problem. Continual canopies of flammable trees, like pines, can lead to crown fires. Finally, proximity to extensive woodland areas or vacant lots can allow fire to spread into urbanized areas or at least to urban boundaries.

Of particular concern in Gulf Breeze is the interface between the urbanized areas of the City and the western boundary of the Naval Live Oaks Area of Gulf Islands National Seashore. This area also threatens those living outside of the City along the eastern boundary of both the National Park Service lands and the City limits (the boundaries are the same). (To a lesser extent, vacant wooded properties in other locations of the City may be of similar concern, but not to the magnitude of the interface with the National Park Service lands.) Along this boundary, neighborhoods and commercial development directly abut pine forests and other woodland areas. This urban/rural interface has been of concern to the Florida Division of Forestry, the Gulf Breeze Fire Department, and the

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National Park Service. Lightning, arson, smoking, catalytic converters, or other sources could cause a fire in these areas. This would create a serious fire emergency for structures and property near the interface.



Figure 1: Wildfire Potential in Gulf Breeze.  
Source: [www.mangaz.com/lmsmaps](http://www.mangaz.com/lmsmaps) Section 5 Page 12 of 60

To reduce fire danger, prescribed burns have been introduced. This reduces fuel buildup on National Park Service property. The likelihood of an uncontrolled fire is greatly reduced when this practice is maintained.

With controlled burning enacted, attention turns to vulnerability of homes and businesses near this interface. Mitigation activities can include public outreach to those near the interface. Decisions would need to be made by private property owners concerning yard landscaping and pine needle removal in yards and on roofs.

The City of Gulf Breeze is vulnerable to approximately \$742,646,356 (Just Value) in damages due to any wildfire event. Similar to the hurricane data provided above, the data used in this section was obtained from MEMPHIS (Mapping for Emergency Management, Parallel Hazard Information System); an experimental web based system that allows emergency managers to easily access a variety of hazard related data.

The wildfire potential data was created by reclassifying land cover data sets created for hydrologic models. These data sets were reclassified to equate the Anderson Level II classification to fuel models used in the National Fire Danger Rating System. These fuel models are an indication of the ability of a fire to start and spread in the given terrain type, and are used as the input to the Fire Potential Index as well as fire spreading models. The resulting data was compared with the NFDR Fuel Model Map created by the US Forest Service (USFS). The NFDR Fuel Model Map is used for the next generation fire danger rating system being developed by USFS, and is a nationwide map at a resolution of 1000 meters per grid cell based on data from 1997. The KAC developed data for Florida is at a resolution of 90 meters, and compares well the much more general national map while providing a great deal of additional detail, as well as being more up to date due to land cover changes.

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Each of the fuel models was assigned to a risk code of “low”, “medium”, or “high”, based on fire spreading potential during a climatologically “dry” year, and processed with the statewide parcel data base to create the tables supplied with the LMS analysis. The mode of the fuel types within 500 meters of the parcel was used to determine risk category for the parcel (Kinetic Analysis Corporation <http://stellarcom.methaz.org/lmsmaps/methodqr.html>.)

For the purposes of this study, the GIS data depicting wildfire vulnerability were overlaid upon tax parcels whereby values for damage could be assessed. The result of the analysis indicates eleven percent of the land area in Gulf breeze is vulnerable to high potential for wildfire (See Figure 1). Forty five percent is considered to be of low potential, forty three percent of medium, and eleven percent considered high potential.

#### 5.2.H Other Hazards

As identified in Section Four, there are a number of other hazards that affect Santa Rosa County. However, the direct impacts of these hazards in relation to mitigation applications is somewhat negligible, but worth mentioning. These hazards are covered comprehensively for Santa Rosa County below in the section “Unincorporated Santa Rosa County”. It should also be noted that this analysis covers both incorporated and unincorporated areas due to the broad geographical area the base data covers.

### 5.3 Town of Jay

#### 5.3.A Community Mitigation Overview

*(See Appendix 5.3.A. map series)*

The Town of Jay is vulnerable to the following types of natural disasters:

- Hurricane/Tropical Storm
- Flooding
  - o General Flooding
- Severe Storms
  - o Tornado & Waterspout
  - o Thunderstorms and Lightning
  - o Winter Storms
  - o Heat Wave and Drought
- Wildfire

The Town of Jay is Santa Rosa County’s smallest incorporated urban area with a total population of 572<sup>3</sup>. This community lies in the northern portion of the county and experiences only small pockets of localized flooding. There are approximately 504 parcels of land in Jay that have a “Just Value” of roughly \$27,276,154.

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<sup>3</sup> 2007 Population estimate from the Bureau of Economic and Business Research (BEBR).

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The Town of Jay is located in the northwestern corner of Santa Rosa County. The Town consists of a small but active central business district, residential areas, schools, hospital, town hall, parks, community center, fire department, library, and a number of agricultural support industries and outlets, including farm supply stores, a livestock auction market and two cotton gins. Much of the Town's land is in agricultural production, and the Town is surrounded by thousands of acres of land planted in cotton, soybean, and peanut production, and to some extent silvicultural/timber operations.

Jay also supports a number of active oil wells. Oil is shipped by a series of pipelines to the St. Regis separation facility of Exxon-Mobil, located northwest of Jay. These wells are pressurized (meaning oil is being forced out of the ground by natural and man-made forces rather than being "pumped" out of the ground). Additional exploratory wells have been drilled recently. The life of the oil field under Jay is not expected to last beyond five to ten years.

Natural disaster history generally includes hurricane (from high winds). Flooding can occur in small areas, usually caused by excessive rainfall and not from rising water of river floodplains. Thirty properties are affected by flooding, and four roadways are vulnerable to localized flooding events due to level terrain and drainage issues. Additional hazards could include tornado, thunderstorms (lightning, flash flooding on some streets), drought, and a rare chance of ice storm or snow. Hurricane, thunderstorm, and other high wind events cause the most extensive damage, with lightning the second most frequent natural disaster event.

For the purposes of this study, "Just Value" is used for estimating monetary damage due to flood hazards. According to the Santa Rosa County Property Appraisers Office, Just Value is the value established by the Property Appraiser *for ad valorem purposes* and includes both the structural and land value. Under Florida Law, Just Value has been the term coined for representing Fair Market Value

Based upon GIS analysis, there are 13 identified critical facilities in the Town of Jay. All facilities are vulnerable to hurricane force winds due to sheer geographical location to the Gulf of Mexico and have been recorded as such below. None of the facilities are spatially located in any other form of hazard area, thus making it vulnerable to no other damage due to hazard events. This information was obtained by overlaying GIS hazard layers onto point locations of critical facilities. A summary of Jay's vulnerability by specific hazards is given below:

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Facility	Facility Classification	Hurricane	Flood	Storm Surge	Wildfire	Other Hazards
Jay (Town) Fire Department Building	Fire Dept.	X				
Jay Calfee Water Well	Hazmat/Utilities	X				
Jay Elementary School	School	X				
Jay High School	School	X				
Jay Hospital	Hospital	X				
Jay Peanut Farmers Co-Op Inc	Hazmat	X				
Jay School Water Well	Hazmat/Utilities	X				
Jay Wastewater System Lift Stations	Utilities	X	X			X
Jay Wastewater Treatment Plant	Hazmat/Utilities	X				
Santa Rosa County Sheriff's Office District 5	Police Dept	X				
Prescott Gas	Hazmat/Utilities	X				
AT&T Substation	Utilities	X				
Santa Rosa Health	County	X				

As stated above, all facilities are deemed to be vulnerable to hurricane force winds. A more detailed explanation as to the level of vulnerability is given in section 5.3.B. Being that Jay rests in the far northern area of the county, all structures are less vulnerable to hurricane winds when compared to it's coastal neighbors. Interestingly, no structures were deemed to be vulnerable to flood events or storm surge activity.

The wildfire classification is further delineated into three sub-classes. These classes include High, Medium, and Low potential for wildfire as defined by the US Forest Service. For the purposes of this analysis only those facilities vulnerable to "High"

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potential were included in the table above as this category calls for the most urgent mitigation measures. The Town of Jay has no critical facilities located in the “High” category.

The tri-color prioritization scheme was applied using GIS software to determine general areas or parcels in Jay that require varying levels of mitigation. The results of the analysis are detailed in the table below:

Priority	Number of Parcels
Red (High)	0
Yellow (Medium)	28
Blue (Low)	551

### 5.3.B Hurricane

For the purposes of this section, high wind vulnerability shall be the component analyzed. Flooding and surge events associated with hurricanes are analyzed separately further in this document. Since flooding and surge are covered in detail, the only remaining variable in a hurricane event that needs to be examined are high winds and the community’s vulnerability to them.

Data used in this section was obtained from MEMPHIS (Mapping for Emergency Management, Parallel Hazard Information System). This system is an experimental web based system that allows emergency managers to easily access a variety of hazard related data. The following *draft* outputs were created by Kinetic Analysis Corporation under contract with the Florida Department of Community Affairs.

Historical storms (past 153 years for tropical cyclones and past 50 years) were simulated using the TAOS model, version 10.2. Winds were computed and hazard zones created based upon these simulations. Wind layers were created based on percent damage expected. Additionally, FEMA Flood Insurance Rate Map (FIRM) data was ingested, and the tabular data sets were run for comparison. (<http://stellarcom.methaz.org/lmsmaps/methodqr.html>, 2004).

It should also be noted that this TAOS wind data covers the entire county and is not jurisdiction specific. Due to the wide breadth of area this data covers, more detailed information (for example, dollars values) shall be covered in the “Unincorporated Santa Rosa County” section below since this section also covers the entire county.

This section shall outline wind speed vulnerability for the town. A summary of the wind velocity vulnerabilities for the Town of Jay is summarized in the table below:

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Category Event	Jay Vulnerability (mph)	Event	Jay Vulnerability (mph)
Category 1 (74-95 mph)	50-75	10 Year MLE Wind	30-49
Category 2 (96-100 mph)	75-85	25 Year MLE Wind	50-75
Category 3 (111-130 mph)	85-95	50 Year MLE Wind	50-85
Category 4 (131-155 mph)	95-115	100 Year MLE Wind	75-95
Category 5 (155+ mph)	131-160		

Source: TAOS model data; 2004, <http://www.methaz.org/lmsmaps/>

5.3. C Flood

Using the Digital Flood Insurance Rate Maps as layer in our GIS application (GOSpatial), 1 percent annual chance and 0.2 percent annual chance flood zones, were overlaid with aerial photographs and tax parcels to determine extent of potential damage. The Town of Jay has two primary flood zone types that lie within its borders. They include:

Zone Type	Zone Definition
X	An area that is determined to be outside the 1 percent annual chance and 0.2 percent annual chance flood plains.
A	An area designated as within a "Special Flood Hazard Area" (or SFHA) on a FIRM. This is an area inundated by 1 percent annual chance flooding for which BFE's or velocity have not been determined. This may be a local ponding or sheet flow area. No distinctions are made between the different flood hazard zones that may be included within the SFHA. These may include Zones A, AE, AO, AH, A99, AR, V, or VE.

For the purposes of this sub-section on Jay, Zone "A" has been classified into a broader "1 percent annual chance flood" cohort to streamline data analysis.

According to the analysis results, there are 30 parcels of land within the 1 percent annual chance flood zone in Jay with a Just Value of \$2,713,644.00 or **8.0%** of the Just Value of all of Jay.

Flooding vulnerability for the Town of Jay is summarized in the following table:

Flood Type	Number of Parcels	Percentage Jay Total Parcels	Just Value (Fair Market)	Percentage Jay Total Just Value (Fair

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<b>1 percent annual chance 0-Year TOTAL</b>	<b>30</b>	<b>6.7</b>	<b>\$2,713,644</b>	<b>8.0</b>
<b>30</b>	<b>30</b>	<b>6.7</b>	<b>\$2,713,644</b>	<b>8.0</b>

5.2.D Severe Storms

A vulnerability to severe storms is present throughout Jay. The risk assessment of this plan identifies tornadoes, waterspouts, severe thunderstorms, lightning, winter storms, heat and drought as possibilities in the area.

Vulnerability is simply through presence. All structures and infrastructure are vulnerable to severe weather in Jay.

Tornadoes are virtually impossible to predict (in terms of exact location of formation and path), although technologies such as Doppler Radar are enabling weather forecasters to give accurate warnings during formation and identification of an event. Aside from strong building codes (generally developed around the premise of hurricane mitigation and protection), vulnerability to these events will always be present and difficult to mitigate against.

Thunderstorms and lightning damage can be prevented. Existing and strengthened building codes (usually under consideration to prevent hurricane damage) will provide strength against severe thunderstorm events (especially high winds and hail). Lightning damage is preventable when proper electrical grounding, following building and fire codes, will also prevent damage. Electronic equipment is highly vulnerable to lightning strikes. Good common sense and planning by those using such equipment can prevent or reduce damage due to lightning events.

Winter storm vulnerability is probably higher in Jay than in any other municipality in Santa Rosa County. This is due to its inland location about 40 miles north of the Gulf of Mexico. Still, the greatest vulnerabilities would be ice accumulation on bridges leading into and out of the Town, ice on electrical lines, and loss of electricity. All residents, business and governmental organizations would be vulnerable. Severe cold can also cause strains on the electrical generation system (provided by Gulf Power Company and Escambia River Electric Cooperative). Loss of electrical power due to high demand could cause problems for vulnerable populations (especially the elderly).

Similarly, heat waves may cause excessive demand on electrical systems. Air conditioning is a given for most residents. Loss of the ability to cool air in a heat wave could mean the possibilities of opening shelters for vulnerable populations. Although all residents and businesses are vulnerable to heat waves, air conditioning generally mitigates the issue.

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Drought can cause water use restrictions, but does not mean that water is unavailable in the area. Water is delivered via ground water well systems from an aquifer with abundant water resources. Drought can lead to firefighting difficulties (analyzed under wildfire vulnerability assessments).

In all cases, loss of commercial grid electricity is the primary vulnerability for the area. Without a source of electricity, cooling, heating, communications and water supplies cannot be assured.

5.3.E Wildfire

The Town of Jay is vulnerable to approximately \$27,276,154 (Just Value) in damages due to any wildfire event. Similar to the hurricane data provided above, the data used in this section was obtained from MEMPHIS (Mapping for Emergency Management, Parallel Hazard Information System); an experimental web based system that allows emergency managers to easily access a variety of hazard related data.

**Town of Jay: Percent Land Area with Wildfire Potential**

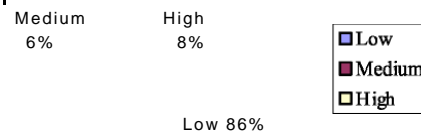


Figure 2: Wildfire Potential in Jay. Source: [www.mangaz.com/lmsmaps](http://www.mangaz.com/lmsmaps)

Using the same data source from the analysis on Gulf Breeze from the Kinetic Analysis Corporation, GIS data depicting wildfire vulnerability were overlaid upon tax parcels whereby values for damage could be assessed. The result of the analysis indicates eighty six percent of the land area in Jay is vulnerable to low potential for wildfire (See Figure 2). Eighty six percent is considered to be of low potential, six percent of medium, and eight percent considered high potential.

5.3.F Other Hazards

As identified in Chapter Four, there are a number of other hazards that affect Santa Rosa County. However, the direct impacts of these hazards in relation to mitigation applications is somewhat negligible, but worth mentioning. These hazards are covered comprehensively for Santa Rosa County below in the section “Unincorporated Santa Rosa County”. It should also be noted that this analysis covers both incorporated and unincorporated areas due to the broad geographical area the base data covers.

**5.4 City of Milton**

5.4.A Community Mitigation Overview

*(See Appendix 5.4.A. map series)*

The City of Milton is vulnerable to the following types of natural disasters:

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- Hurricane/Tropical Storm
- Flooding
  - o General Flooding
  - o Dam Safety
- Land Erosion
  - o Highly Erosive Soils
- Severe Storms
  - o Tornado & Waterspout
  - o Thunderstorms and Lightning
  - o Winter Storms
  - o Heat Wave and Drought
- Wildfire

The City of Milton is Santa Rosa County's largest urban area and the County seat with a total population of 7,717<sup>4</sup>. There are approximately 4,225 parcels of land in Milton that have a "Just Value" of roughly \$375,453,998.

The City of Milton is located in the middle of Santa Rosa County. The City serves as the commercial and governmental center of the County. Extensive residential neighborhoods, commercial districts, a viable and historic downtown central business district, the county courthouse and administrative complex, hospital, schools, and light industries are found within the community.

Milton is located near the bottom of the Blackwater River watershed. The Blackwater enters from the north and east of the City, while a second creek (Pond Creek) terminates near Bagdad south of Milton. Smaller creeks (example: Collins Mill Creek) can also cause some flooding, especially when the Blackwater is at flood stage. An extensive floodplain exists in the City, including all of downtown and neighborhoods to the west of downtown, along the CSX railway, and along the river itself. The wastewater plant, the garage warehouse facility, and city fire department are in this floodplain. U.S. 90 (Caroline Street) and surrounding streets can become completely submerged, causing traffic to be rerouted south to Interstate 10 in such conditions. Such flooding can be caused by hurricanes/tropical systems (including surge backup from Blackwater Bay to the south), heavy and extended periods of rain within the Blackwater River watershed. Although lands have been purchased by the City to mitigate damages, an extensive amount of development remains (and likely *will* remain due to the commercial and historical nature of the area), and other mitigation activities aside from buyout will be necessary to ensure public and private property protection.

Hurricane force winds (whether from hurricanes or thunderstorms) have caused extensive damage to structures, infrastructure, and trees. Although inland, Milton can experience Category 5 wind speeds in rare instances. Few homes in Milton have hurricane shutters. Electrical service has been interrupted for days and perhaps weeks by such situations.

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<sup>4</sup> 2007 Population estimate from the Bureau of Economic and Business Research (BEBR).

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Milton experienced Florida's strongest tornado on record in 1972. Eight people died, and damage was extensive in one neighborhood. Other weather events, such as thunderstorms, can cause lightning damage. Ice and snow are a very rare but distinct possibility. Ice, in particular, may damage power lines and create hazardous driving conditions.

The City has also experienced wildfire threats, especially on its western and northeastern sides where extensive woodlands (mixed with residential neighborhoods in sand-hill fire-prone environments) exist. These areas extend into larger woodland complexes of silvicultural lands, making wildfire of particular interest in some neighborhoods on the urban/rural interface.

Natural disaster history can be summarized as being caused by flooding, hurricane, thunderstorms, and wildfire. Flooding and wind from hurricanes/Gulf storms are the greatest concerns, followed by wildfire. Additional hazards include tornado, thunderstorms (lightning, flash flooding on some streets), drought, and a rare chance of ice storm or snow. Hurricane, thunderstorm, and other high wind events cause the most extensive damage, with lightning the second most frequent natural disaster event.

For the purposes of this study, "Just Value" is used for estimating monetary damage due to flood hazards. According to the Santa Rosa County Property Appraisers Office, Just Value is the value established by the Property Appraiser for *ad valorem purposes* and includes both the structural and land value. Under Florida law, Just Value has been the term coined for representing Fair Market Value

Based upon GIS analysis, there are thirty five identified critical facilities in the City of Milton. All facilities are vulnerable to hurricane force winds due to sheer geographical location to the sea and have been recorded as such below. However, when examining the remaining hazard categories, ten facilities are spatially located in some other form of hazard area, thus making it vulnerable to damage due to other hazard events. This information was obtained by overlaying GIS hazard layers onto point locations of critical facilities. A summary of Milton's vulnerability by specific hazards is given below:

Facility	Facility Classification	Hurricane	Flood	Storm Surge	Wildfire	Other hazards
BellSouth Telephone Central Office (Milton)	Hazmat	X			X	

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Facility	Facility Classification	Hurricane	Flood	Storm Surge	Wildfire	Other Hazards
City Garage Warehouse Facility	Governmental Operations	X	X	X	X	
Hobbs Middle School	School	X				
Jackson Pre K School	School	X	X	X		
King Middle School	School	X				
K-Mart Corporation Store #3 975	Hazmat	X				
Lazy Acres	Mobile Home Park	X				
Milton City Hall	Governmental Operations	X				
Milton Community Center	Public Shelter/American Red Cross Operations	X				
Milton Fire Department	Fire Dept.	X	X	X		
Milton High School	School	X			X	
Milton Police Dept	Governmental Operations	X				
Milton, City Of Wastewater Treatment Plant	Hazmat	X	X	X		
Milton, Vacuum Sewer Station	Governmental Operations	X	X	X	X	X
Milton, Water Well 1	Hazmat	X	X	X		
Milton, Water Well 2	Hazmat					
Milton, Water Well 3	Hazmat	X				
Milton, Water Well 4	Hazmat					
Milton, Water Well 5	Hazmat	X				

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Facility	Facility Classification	Hurricane	Flood	Storm Surge	Wildfire	Other Hazards
North Side Mobile Home Park	Mobile Home Park	X			X	
Pollards Mobile Home Park	Mobile Home Park	X				
Rhodes Elementary School	School	X				
Sandy Ridge Care Center	Adult Living Facility	X				
Santa Rosa Convalescent Center	Adult Living Facility	X				
Santa Rosa Medical Center	Hospital	X				
Vanity Fair Mobile Home Park	Mobile Home Park	X				
West Florida Community Care Center	Hospital	X				
Santa Rosa Health	Health Dept	X				
Winn Dixie	Grocery	X				
Pic-N-Save	Grocery	X				
Santa Rosa Court	Governmental	X	X	X		
SRC Admin Ctr	Governmental	X				
Food World	Grocery	X				
The Heritage of SRC	Adult Living Facility	X				
Forsyth House	Adult Living Facility	X				

As stated above, all facilities are deemed to be vulnerable to hurricane force winds. A more detailed explanation as to the level of vulnerability is given in section 5.4.B.

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Being that Milton is centrally located in the county, all structures are slightly less vulnerable to hurricane winds when compared to it's coastal neighbors.

The wildfire classification is further delineated into three sub-classes. These classes include High, Medium, and Low potential for wildfire as defined by the US Forest Service. For the purposes of this analysis only those facilities vulnerable to "High" potential were included in the table above as this category calls for the most urgent mitigation measures. The City of Milton has four critical facilities located in the "High" category.

The tri-color prioritization scheme was applied using GIS software to determine general areas or parcels in Milton that require varying levels of mitigation. The results of the analysis are detailed in the table below:

Priority	Number of Parcels
Red (High)	14
Yellow (Medium)	303
Blue (Low)	3,908

5.4.B Hurricane

For the purposes of this section, high wind vulnerability shall be the component analyzed. Flooding and surge events associated with hurricanes are analyzed separately further in this document. Since flooding and surge are covered in detail, the only remaining variable in a hurricane event that needs to be examined are high winds and the community's vulnerability to them.

Data used in this section was obtained from MEMPHIS (Mapping for Emergency Management, Parallel Hazard Information System). This system is an experimental web based system that allows emergency managers to easily access a variety of hazard related data. The following *draft* outputs were created by Kinetic Analysis Corporation under contract with the Florida Department of Community Affairs.

Historical storms (past 153 years for tropical cyclones and past 50 years) were simulated using the TAOS model, version 10.2. Winds were computed and hazard zones created based upon these simulations. Wind layers were created based on percent damage expected. Additionally, FEMA Flood Insurance Rate Map (FIRM) data was ingested, and the tabular data sets were run for comparison. (<http://stellarcom.methaz.org/lmsmaps/methodqr.html>, 2004).

It should also be noted that this TAOS wind data covers the entire county and is not jurisdiction specific. Due to the wide breadth of area this data covers, more detailed information (for example, dollars values) shall be covered in the "Unincorporated Santa Rosa County" section below since this section also covers the entire county.

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This section shall outline wind speed vulnerability for the city. A summary of the wind velocity vulnerabilities for the City of Milton is summarized in the table below:

Category Event	Milton Vulnerability (mph)	Event	Milton Vulnerability (mph)
Category 1 (74-95 mph)	50-75	10 Year MLE Wind	30-75
Category 2 (96-100 mph)	85-95	25 Year MLE Wind	50-75
Category 3 (111-130 mph)	95-115	50 Year MLE Wind	50-95
Category 4 (131-155 mph)	115-130	100 Year MLE Wind	85-115
Category 5 (155+ mph)	130-160		

Source: TAOS model data; 2004, <http://www.methaz.org/lmsmaps/>

#### 5.4. C Flood

Using the Digital Flood Insurance Rate Maps as a layer in our GIS application (GoSpatial), 1 percent annual chance and 0.2 percent annual chance flood zones were overlaid with aerial photographs and tax parcels to determine extent of potential damage. The City of Milton has three primary flood zone types that lie within its borders. They include:

#### Zone Type Zone Definition

- X An area that is determined to be outside the 1 and 0.2 percent annual chance flood plains.
- 0.2 percent An area inundated by 0.2 percent annual chance flooding; an area inundated by 1 percent annual chance flooding with average depths of less than 1 foot or with drainage area less than 1 square mile; or an area protected by levees from 1 percent annual chance flooding.
- AE An area designated as within a “Special Flood Hazard Area” (or SFHA) on a FIRM. This is an area inundated by 1 percent annual change flooding for which BFE’s or velocity may have been determined. No distinctions are made between the different flood hazard zones that may be included within the SFHA. These may include Zones A, AE, AO, AH, A99, AR, V, or VE.

According to the analysis results, there are **430** parcels of land within the 1 percent annual chance flood zone in Milton with a Just Value of \$41,131,984 or **12.8%** of the Just Value of all of Milton.

There are **465** identified parcels of land in Milton that lie within the 0.2 percent annual chance flood zone. These parcels have a Just Value of approximately **\$51,447,173** or **13.7%** of the Just Value of all of Milton. Flooding vulnerability for the City of Milton is summarized in the following table:

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Flood Type	Number of Parcels	Percentage Milton Total Parcels	Just Value (Fair Market)	Percentage Milton Total Just Value
1 percent annual chance	430	10.1	\$41,131,984	12.8
0.2 percent annual chance	465	11.0	\$51,447,173	13.7
<b>TOTAL</b>	430	21.1	\$41,131,984	26.5

When one correlates flood zone data to Future Land Use for the City of Milton, a more distinct image becomes apparent as to land use impacts to this type of natural hazard. The following table “fine tunes” the above data. It should also be noted that the above data was extrapolated from existing land use data for Santa Rosa County, whereas the information provided below is based upon future land use specifically for the City of Milton. The data is as follows:

Future Land Use	1 percent annual chance Zone- Total Just Value	0.2 percent annual chance Zone Total Just Value	Total Flood Just Values
<b>Commercial</b>	\$1,765,409	\$160,162	\$1,925,571
<b>Conservation</b>	\$7,672	\$0	\$7,672
<b>Industrial</b>	\$766,215	\$0	\$766,215
<b>Multi-Family</b>	\$1,778,239	\$617,638	\$2,395,877
<b>Residential</b>			
<b>Public Owned Land</b>	\$9,903,355	\$0	\$9,903,355
<b>Recreation</b>	\$1,047,916	\$1,167,642	\$2,215,558
<b>Mixed</b>	\$3,381,121	\$11,157,320	\$14,538,441
<b>Res./Comm.</b>			
<b>Rural/Urban</b>	\$313,995	\$0	\$313,995
<b>Single Family Residential</b>	\$5,461,005	\$12,935,656	\$18,396,661
<b>Unknown</b>	\$2,900,704	\$3,040,499	\$5,941,203
<b>TOTAL</b>	\$27,325,631	29,078,917	\$56,404,548

Note: The values expressed in yellow indicate the highest categorical values per flood event.

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Values in the 1 percent and 0.2 percent annual chance flood zones are mutually exclusive. Meaning that parcels within one zone are not included in the other; hence, the "\$0" values in four cells of the 0.2 percent annual chance Zone-Total Just Value" column. Public Owned Property (\$9,903,355) held the highest Just Value in the 1 percent annual chance flood zone, while Single Family Residential listed as the highest Just Value (\$12,935,656) category in the 0.2 percent annual chance flood zone category.

In summary, when looking at both categories holistically, Mixed Use Res/Comm. and Single Family Residential categories ranked among the highest on the table. Significant mitigation attention should be allotted to these uses for future planning needs due to the significant human population involved with these land uses.

#### 5.4.D Land Erosion

Milton's topography lends itself to some land erosion vulnerabilities. Most commonly, erosion is associated with sandy sedimentation on streets, stormwater systems, and ponds or rivers and creeks. Erosion is most often caused by construction activities (opening of soft sandy soils) to rain events (leading to sedimentation transport on slopes).

It is rare for structures to be impacted by such erosion. More often, roadways, drainage systems, and natural creeks and water bodies are the recipients of sedimentation problems.

The primary means used to control unwanted erosion include screening and hay baling on and near construction sites. Milton has also implemented several multi-million dollar programs to control stormwater and sedimentation problems. Stormwater retention ponds, now required in virtually all new development, have greatly reduced problems of erosion and stormwater runoff once construction is completed.

Mitigation measures are generally considered regulatory. However, erosion issues not yet identified could require public expenditure and grant applications to relieve erosion, probably related to stormwater management activities where development occurred before current new development regulations were adopted in building and planning codes.

#### 5.4.E Storm Surge

Using digital storm surge data from the United States Army Corps of Engineers in a GIS application, Category 1, 2, 3, 4, and 5 storm surge zones (Saffir/Simpson Scale) were overlaid on tax parcels to determine extent of potential damage. The City of Milton has all five primary storm surge categories that impact structures within its borders. These categories are defined in the above section regarding the City of Gulf Breeze.

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According to the analysis results, there are **34** parcels of land within the Category One storm surge zone in Milton with a Just Value of **\$1,685,311 or <1%** of the Just Value of all of Milton.

There are **75** identified parcels of land in Milton that lie within the Category Two storm surge zone. These parcels have a Just Value of approximately **\$3,215,264 or <1%** of the Just Value of all of Milton.

There are **225** identified parcels of land in Milton that lie within the Category Three storm surge zone. These parcels have a Just Value of approximately **\$13,632,970 or 3.6%** of the Just Value of all of Milton.

There are **459** identified parcels of land in Milton that lie within the Category Four storm surge zone. These parcels have a Just Value of approximately **\$41,380,539 or 11.0%** of the Just Value of all of Milton.

There are **663** identified parcels of land in Milton that lie within the Category Five storm surge zone. These parcels have a Just Value of approximately **\$62,026,305 or 16.5%** of the Just Value of all of Milton.

Storm surge vulnerability for the City of Milton is summarized in the following table:

Category Storm Surge	Number of Parcels	Percentage Milton Total Parcels	Just Value (Fair Market)	Percentage Milton Total Just Value (Fair Market)
1	<b>34</b>		<b>\$1,685,311</b>	<b>&lt;1%</b>
2	<b>75</b>		<b>\$3,215,264</b>	<b>&lt;1%</b>
3	<b>225</b>	<b>15.0</b>	<b>\$13,632,970</b>	<b>3.6</b>
4	<b>459</b>	<b>36.9</b>	<b>\$41,380,539</b>	<b>11.0</b>
5	<b>663</b>	<b>55.9</b>	<b>\$62,026,305</b>	<b>16.5</b>
Total <sup>5</sup>	<b>663</b>	<b>55.9</b>	<b>\$62,026,305</b>	<b>16.5</b>

When data storm surge data is coupled with future land use categories for Milton, one gets a clearer idea of specific sectors of the community that could be the most impacted by increasing degrees of storm surge activity. There is no existing land use data for Milton however zoning data is available. Zoning data was not utilized in this study due to the dynamic nature of zoning changes. Whereas existing land use can explain conditions on the land today, zoning applications to parcels can very well be different. For example, a parcel could be zoned commercial, but have a residential, pre-existing use.

<sup>5</sup> Category Five (5) storm surge amounts were used for the total because the boundaries of all other storm surge zones and applicable parcels are all spatially located within the Category Five. These totals represent the maximum damage foreseeable due to storm surge activity. This methodology was chosen to prevent overlap of data and skewing results.

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When correlated with storm surge zones by utilizing GIS technology, the parcels were then categorized and placed in the following table for better analysis based upon the future land use classification scheme used by the City of Milton. The table is as follows:

	Category 1	Category 2	Category 3	Category 4	Category 5
Commercial	\$111,592	\$111,592	\$278,907	\$4,336,118	\$13,817,791
Conservation	\$54,489	\$54,489	\$54,489	\$54,489	\$54,489
Industrial	\$466,503	\$645,758	\$766,215	\$766,215	\$645,758
Multi-family Residential	\$29,667	\$357,363	\$1,055,034	\$1,669,622	\$1,855,451
Public Owned Property	\$149,267	\$149,267	\$4,054,347	\$9,950,172	\$9,962,172
Recreation	\$159,361	\$595,617	\$658,702	\$1,437,130	\$2,604,772
Mixed Res./Comm	\$410,662	\$486,970	\$2,053,584	\$11,042,427	\$15,002,493
Rural/Urban	\$114,879	\$114,879	\$258,141 \$2 93,610 \$3 18,895	\$293,610	\$318,895
Single Family Residential	\$0	\$195,760	\$3,890,274	\$9,869,045	\$17,365,915
Unknown	\$288,258	\$720,151	\$1,334,338	\$5,791,138	\$8,741,390

**Note:** The values expressed in yellow indicate the highest categorical values per storm surge.

Based upon the data above, Industrial land use composes the highest Just Value category for threat under a Category One storm surge (and all surge categories) in the City of Milton at \$466,536. The second and third largest land uses vulnerable under this surge category include Mixed Res./Comm. (\$410,662) and Unknown properties (\$288,258), respectively.

Unknown land uses compose the largest amount of territory under threat from a Category Two storm surge with a Just Value of \$720,151. The second and third largest land use categories falling within this surge category include Industrial (\$645,758) and Recreation (\$595,617) uses, respectively.

Under a Category Three surge event, Public Owned Property (\$4,054,347) is the largest sector of land use hit the hardest. Single Family Residential (\$3,890,274) and Mixed Res./Comm. (\$2,053,584) land uses compose the second and third largest categories affected by this level of surge, respectively.

Mixed Res./Comm. (\$11,042,427) composes the largest area of affected land during this level of surge event. Public Owned Property is the second largest category with a Just Value of \$9,950,172 and Single Family Residential properties the third largest with a Just Value of \$9,869,045.

Finally, under a Category Five event, the largest land use affected is Single Family Residential land (\$17,365,915). Ranking second is Mixed Res./Comm. with a Just Value

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of \$15,002,493. Ranking third are Commercial properties with a Just Value of \$13,817,791.

In summary, when analyzing all categories of storm surge in order of increasing severity, the maximum level of most applicable damage generally changes from more industrial uses under weaker surge events to residential uses under the most powerful surge.

#### 5.4.F Severe Storms

A vulnerability to severe storms is present throughout Milton. The risk assessment of this plan identifies tornadoes, waterspouts, severe thunderstorms, lightning, winter storms, heat and drought as possibilities in the area.

Vulnerability is simply through presence. All structures and infrastructure are vulnerable to severe weather in Milton.

Tornadoes and waterspouts are virtually impossible to predict (in terms of exact location of formation and path), although technologies such as Doppler Radar are enabling weather forecasters to give accurate warnings during formation and identification of an event. Aside from strong building codes (generally developed around the premise of hurricane mitigation and protection), vulnerability to these events will always be present and difficult to mitigate against.

Thunderstorms and lightning damage can be prevented. Existing and strengthened building codes (usually under consideration to prevent hurricane damage) will provide strength against severe thunderstorm events (especially high winds and hail). Lightning damage is preventable when proper electrical grounding, following building and fire codes, will also prevent damage. Electronic equipment is highly vulnerable to lightning strikes. Good common sense and planning by those using such equipment can prevent or reduce damage due to lightning events.

Winter storm vulnerability is possible in Milton. This is due to its inland location about 25 miles north of the Gulf of Mexico. Still, the greatest vulnerabilities would be ice accumulation on bridges leading into and out of the City, ice on electrical lines, and loss of electricity. All residents, business and governmental organizations would be vulnerable. Severe cold can also cause strains on the electrical generation system (provided by Gulf Power Company). Loss of electrical power due to high demand could cause problems for vulnerable populations (especially the elderly).

Similarly, heat waves may cause excessive demand on electrical systems. Air conditioning is a given for most residents. Loss of the ability to cool air in a heat wave could mean the possibilities of opening shelters for vulnerable populations. Although all residents and businesses are vulnerable to heat waves, air conditioning generally mitigates the issue.

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Drought can cause water use restrictions, but does not mean that water is unavailable in the area. Water is delivered via ground water well systems from an aquifer with abundant water resources. Drought can lead to firefighting difficulties (analyzed under wildfire vulnerability assessments).

In all cases, loss of commercial grid electricity is the primary vulnerability for the area. Without a source of electricity, cooling, heating, communications and water supplies cannot be assured.

5.4. G Wildfire

The City of Milton is vulnerable to approximately \$373,436,512 (Just Value) in damages due to any wildfire event. Similar to the hurricane data provided above the data used in this section was obtained from MEMPHIS (Mapping for Emergency Management, Parallel Hazard Information System); an experimental web based system that allows emergency managers to easily access a variety of hazard related data.

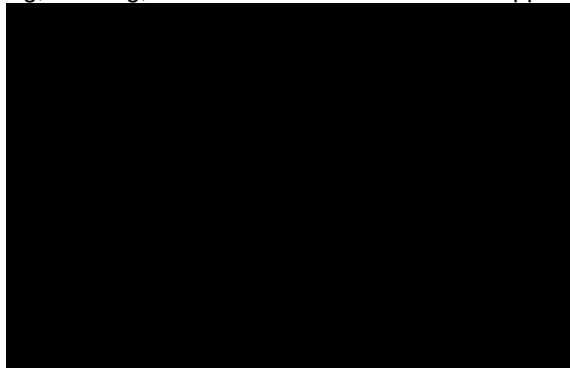


Figure 3: Wildfire Potential in Milton. Source: [www.mangaz.com/lmsmaps](http://www.mangaz.com/lmsmaps)

Using the same methodology as the analysis on Gulf Breeze, GIS data depicting wildfire vulnerability were overlaid upon tax parcels whereby values for damage could be assessed. The result of the analysis indicates forty nine percent of the land area in Milton is vulnerable to low potential for wildfire, forty seven percent of medium, and four percent considered high potential for wildfire (see Figure 3).

Similar to the above sections, Future Land Use data is available for the City of Milton. Coupling this land use data with the wildfire information, wildfire vulnerability by land use can be forecast. The summary of this data is offered in the table below:

	Low Potential	Medium Potential	High Potential
Commercial	\$158,309,760	\$122,009,392	\$19,183,805
Conservation	\$155,795	\$0	\$0
Industrial	\$5,347,751	\$3,979,915	\$117,215
Multi-family Residential	\$100,185,194	\$87,480,571	\$10,076,532
Public Owned Property	\$161,278,919	\$120,405,204	\$7,346,178
Recreation	\$16,218,209	\$8,724,165	\$4,566,923
Mixed Res./Comm	\$18,786,992	\$3,657,081	\$1,560,161

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Fural/Urban	\$684,891	\$1,144,251	\$0
Single Family Residential	\$160,150,481	\$154,726,915	\$25,848,105
Unknown	\$63,544,101	\$111,283,049	\$6,182,443
<b>Note:</b> The values expressed in yellow indicate the highest categorical values per potential risk			

Out of all three categories of wildfire potential, Single Family Residential leads with the largest Just Value amounts for all three categories. Other categories that also generally ranked highest out of all three categories and should also be acknowledged for mitigation would include Commercial, Public Owned Property, and Multi-family Residential. Interestingly, the land uses most vulnerable to wildfire are those involving human residential settlement.

5.4.H Other Hazards

As identified in Section Four, there are a number of other hazards that affect Santa Rosa County. However, the direct impacts of these hazards in relation to mitigation applications is somewhat negligible, but worth mentioning. These hazards are covered comprehensively for Santa Rosa County below in the section “Unincorporated Santa Rosa County”. It should also be noted that this analysis covers both incorporated and unincorporated areas due to the broad geographical area the base data covers.

**5.5 Unincorporated Santa Rosa County**

5.5.A Community Mitigation Overview

*(See Appendix 5.5.A. map series)*

*(Note: Navarre Beach data are often separated in Section 5.5 from other portions of the County. This was done for planning purposes due to Navarre Beach being particularly vulnerable to hurricane/storm surge hazards because of it being a coastal barrier island.*

Unincorporated Santa Rosa County houses the largest proportion of population and parcels in the study area. The majority of the unincorporated land area lies in the northern portion of the county, north of the City of Milton (the County Seat). The unincorporated area of Santa Rosa County has a population of 128,050<sup>6</sup>. There are approximately 73,605 parcels of land in the unincorporated county that have a “Just Value” of roughly \$3,094,925,306.

Santa Rosa County’s vast acreage is vulnerable to many disaster situations. Flooding (whether it be coastal, riverine, or urban) is a frequent problem for structures in floodplains, surge zones, or a combination of the two, or in flood-prone areas not otherwise documented on FEMA or U.S. Army Corps of Engineers’ maps. Navarre Beach is particularly prone to flooding due to its position directly on the Gulf of Mexico on Santa Rosa Island (a coastal barrier island). Navarre, Holley-By-The-Sea, Midway,

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and the neighborhoods east of the City of Gulf Breeze on the Fairpoint Peninsula are particularly vulnerable to hurricane-related and coastal flooding. Additionally, structures along the shorelines and sometimes inland on Garcon Point, including Avalon Beach, Dickerson City, Bayside, Floridatown, and Bagdad, are floodprone. Along East Bay, the community of Holley is vulnerable. Riverine flooding can be experienced along Pond Creek, Blackwater River, Yellow River, Big Coldwater Creek, and the Escambia River, with particular concern in some neighborhoods in East Milton along River Road, Petersen Point and Ward Basin Road. These areas have historically received the majority of flood related damage in the unincorporated portions of the County. Although extensive mitigation efforts have occurred, and participation in the National Flood Insurance Program has raised floor elevations, flood damage still occurs on older structures and against infrastructure (roads, bridges, etc.).

Hurricane and high wind damage can be expected anywhere in the County. The greatest damage will be found along coastal areas (Navarre Beach and the entire Fairpoint Peninsula, and along bay shores along East, Escambia and Blackwater Bays). Inland areas can experience full force winds, regardless of their not being located directly on the coast. Pace, Milton, Jay, Allentown, and Munson can all experience high winds from thunderstorms and hurricanes. Structural damage can be expected in extreme circumstances.

All areas of the County are vulnerable to tornado and waterspout activity.

Drought can impact agricultural areas and some water systems (more from high demand than shortage of water in the aquifer, however).

Snow and especially ice storms could cause problems in the County, but these are very rare events, and would likely create difficulties north of Interstate 10.

For the purposes of this study, "Just Value" is used for estimating monetary damage due to flood hazards. According to the Santa Rosa County Property Appraisers Office, Just Value is the value established by the Property Appraiser *for ad valorem purposes* and includes both the structural and land value. Under Florida Law, Just Value has been the term coined for representing Fair Market Value.

Existing and Future Land Use data was provided for the entire unincorporated county. This will allow a more detailed analysis into the amounts of damage the community is vulnerable based upon what is currently there and where it will be in the foreseeable future.

Whereas this sections covers unincorporated areas in the county, the region of Navarre Beach will be given special consideration in each of the sub-sections below. This region is not an officially incorporated area, but, due to specific County/Federal agreements, functions as one. This region has a considerable amount of development and is located virtually on the beachfront, as the whole area is a peninsula. This region is composed of roughly 1043 parcels with a Just Value of approximately \$629,659,725.

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Based upon GIS analysis and county records, there are 201 identified critical facilities in Unincorporated Santa Rosa County. All facilities are vulnerable to hurricane force winds due to sheer geographical location to the sea and have been recorded as such below. However, when examining the remaining hazard categories, 29 facilities are spatially located in some other form of hazard area, thus making it vulnerable to damage due to other hazard events. This information was obtained by overlaying GIS hazard layers onto point locations of critical facilities. For the purposes of this analysis, only those facilities that are vulnerable to hazards will be included in the table below. The full list of all critical facilities for the entire county is maintained within the Comprehensive Emergency Management Plan (CEMP) (maintained by the County Emergency Management Office). The list in the CEMP is dynamic. Readers of the LMS plan should refer to the CEMP for the latest information. An abbreviated summary of the unincorporated county's vulnerability by specific hazard is given below:

Facility	Facility Classification	Hurricane	Flood	Storm Surge	Wildfire	Other hazards
Air Products & Chemicals Inc.	HAZMAT Facility	X			X	
Bagdad Elementary	School	X		X		
Bagdad Volunteer Fire Department	Fire Department	X		X	X	
Bay View	Mobile Home Park	X		X		
Bear Lake Rec Area	Recreational Vehicle Parking	X	X			
Blackwater State Park	Recreational Vehicle Parking	X	X			
Browns Fish Camp	Mobile Home Park	X	X	X		
By The Bay	Recreational Vehicle Parking	X	X	X		
Coastal Oaks	Mobile Home Park	X		X		
Coldwater Recreational Area	Recreational Vehicle Parking	X	X			
Colemans Court	Mobile Home Park	X		X		
East Bay	Mobile Home Park	X		X		

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Facility	Facility Classification	Hurricane	Flood	Storm Surge	Wildfire	Other hazards
Emerald Beach	Recreational Vehicle Parking	X		X		
Falconhurst	Mobile Home Park	X		X		
Hardies #1	Mobile Home Park	X		X		
Helen's	Recreational Vehicle Parking	X		X		
Holley-Navarre Volunteer Fire Department	Fire Department	X		X		
Holly-Navarre Middle	School	X		X		
Magnolia Beach	Recreational Vehicle Parking	X			X	
Pace	Mobile Home Park	X			X	
Pace Water System, Well #1	HAZMAT Facility	X			X	
Pea Ridge Elementary School	School	X			X	
Shadyoaks	Mobile Home Park	X	X	X		
Ski-Land Fish Camp	Mobile Home Park	X	X	X		
South Santa Rosa Utility System Wastewater Treatment Plant	HAZMAT Facility	X		X	X	
Still Waters	Mobile Home Park	X			X	
The Oaks	Mobile Home Park	X		X		
Whiting Field Nas-North	Navy	X			X	
? Water Treatment Plant	Utility	X				

**Comment [p1]:** Need to add the other Public Water Wells, Water Treatment facilities, and wastewater treatment plants

The tri-color prioritization scheme was applied using GIS software to determine general areas or parcels in unincorporated Santa Rosa County that require varying levels of

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mitigation. It should be noted that the results of the analysis were derived by totaling all red, yellow and blue areas parcels in the incorporated areas and subtracting these numbers from the total red, yellow, and blue parcels for the entire county. The results of the analysis are detailed in the table below:

Priority	Number of Parcels
Red (High)	1,336
Yellow (Medium)	17,063
Blue (Low)	55,206

5.5.B Hurricane

**Note: The information below excludes the region of Navarre Beach.**

For the purposes of this section, high wind vulnerability shall be the component analyzed. Flooding and surge events associated with hurricanes are analyzed separately further in this document. Since flooding and surge are covered in detail, the only remaining variable in a hurricane event that needs to be examined are high winds and the community’s vulnerability to them.

Data used in this section was obtained from MEMPHIS (Mapping for Emergency Management, Parallel Hazard Information System). This system is an experimental web based system that allows emergency managers to easily access a variety of hazard related data. The following *draft* outputs were created by Kinetic Analysis Corporation under contract with the Florida Department of Community Affairs.

Historical storms (past 153 years for tropical cyclones and past 50 years) were simulated using the TAOS model, version 10.2. Winds were computed and hazard zones created based upon these simulations. Wind layers were created based on percent damage expected. Additionally, FEMA Flood Insurance Rate Map (FIRM) data was ingested, and the tabular data sets were run for comparison. (<http://stellarcom.methaz.org/lmsmaps/methodqr.html>, 2004).

It should also be noted that this TAOS wind data covers the entire county and is not jurisdiction specific. Due to the wide breadth of geographic area this data covers, more detailed information will be covered in section since this section also covers the entire county. Building counts and values are also included in this section according to each respective wind category.

This table shall outline wind speed vulnerability for buildings in the **entire** county (incorporated and unincorporated areas) by hurricane categories. A summary of the wind velocity vulnerabilities is below:

Category Event	Category 1	Category 2	Category 3	Category 4	Category 5
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Value in No Damage	\$205,139,296	\$179,671,584	\$179,671,584	\$179,671,584	\$179,671,584
Value in Light Damage (less than 10%)	\$11,400,126,464	\$949,355,840	\$271,407,360	\$36,833,712	\$36,833,712

Category Event	Category 1	Category 2	Category 3	Category 4	Category 5
Value in Moderate Damage (10 - 30%)	NA	\$10,476,175,360	\$11,003,332,608	\$588,604,736	\$20,728,444
Value in Heavy Damage (30 - 50%)	NA	NA	\$150,842,704	\$339,066,400	\$232,479,088
Value in Severe Damage (50- 80%)	NA	NA	NA	\$10,461,020,160	\$624,242,304
Value in Destroyed ( over 80%)	NA	NA	NA	NA	\$10,511,243,264
Bldgs in No Damage	2,665	2,119	2,119	2,119	2,119
Bldgs.in Light Damage (less than 10%)	121,230	9,008	2,835	645	645
Bldgs in Moderate Damage (10 - 30%)	NA	112,768	117,489	5,834	159
Bldgs. In Heavy Damage(30 - 50%)	NA	NA	1,452	2,576	2,128
Bldgs. In Severe Damage(50 - 80%)	NA	NA	NA	112,721	5,673
Bldgs. In Destroyed ( over 80%)	NA	NA	NA	NA	113,171

Source: TAOS model data; 2004, <http://www.methaz.org/lmsmaps/>

When coupling the above data with the recurrence intervals of hurricane events as outlined below, a more detailed picture becomes apparent. The recurrence intervals and correlating damage values are expressed in the table below:

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Category Event	TAOS 10 Year	TAOS 25 Year	TAOS 50 Year	TAOS 100 Year
Value in No Damage	\$ 11,301,126,144	NA	NA	NA
Value in Light Damage (less than 10%)	\$ 304,153,920	\$ 11,605,252,096	\$ 11,605,252,096	\$ 11,520,585,728
Value in Moderate Damage (10 - 30%)	NA	NA	NA	\$ 84,658,696
Bldgs. in No Damage	120,852	NA	NA	NA
Bldgs. in Light Damage (less than 10%)	3,043	123,895	123,894	122,841
Bldgs in Moderate Damage (10 - 30%)	NA	NA	NA	1,054

Source: TAOS model data; 2004, <http://www.methaz.org/lmsmaps/>

#### 5.5. C Flood

**Note: The information below excludes the region of Navarre Beach.**

Using the Digital Flood Insurance Rate Maps as a layer in our GIS application (GoSpatial), 1 percent annual chance and 0.2 percent annual chance flood zones were overlaid with aerial photographs and tax parcels to determine extent of potential damage. Unincorporated Santa Rosa County has five primary flood zone types that lie within its borders. They include:

Zone Type	Zone Definition
X	An area that is determined to be outside the 1 percent annual chance flood plains.
A	An area designated as within a "Special Flood Hazard Area" (or SFHA) on a FIRM. This is an area inundated by 1 percent annual chance flooding for which BFE's or velocity have not been determined. .
AE	An area inundated by 1 percent annual chance flooding, for which BRE's have been determined.
VE	An area inundated by 1 percent annual chance flooding with velocity hazard (wave action); BFE's have been determined.
0.2 percent	An area inundated by 0.2 percent annual chance flooding; an area inundated by 1 percent annual chance flooding with average depths of less than 1 foot or with drainage area less than 1 square mile; or an area protected by levees from 100-year flooding.

For the purposes of this section on Unincorporated Santa Rosa County, Zone "AE", and "VE" have been classified into a broader "1 percent annual chance flood" cohort to streamline data analysis.

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According to the analysis results, there are **9,044** parcels of land within the 1 percent annual chance flood zone in the unincorporated areas with a Just Value of **\$1,030,060,285** or **33.3%** of the Just Value of all of the unincorporated.

There are **9,044** and **3,102** identified parcels of land in unincorporated area that lie within the 1 percent annual chance and 0.2 percent annual chance flood zones, respectively. These parcels have a Just Value of approximately **\$1,030,060,285** or **33.3%** of all the Just Value of unincorporated Santa Rosa County in the 1 percent annual chance flood zone. The 0.2 percent annual chance flood zone houses **\$497,776,578** or **16.1%** of the Just Value of all of unincorporated Santa Rosa County. Flooding vulnerability for Unincorporated Santa Rosa County is summarized in the following table:

Flood Type	Number of Parcels	Percentage Total Parcels	Just Value (Fair Market)	Percentage Total Just Value (Fair Market)
<b>1 percent annual chance</b>	<b>9,044</b>	<b>11.1</b>	<b>\$1,030,060,285</b>	<b>33.3</b>
<b>0.2 percent annual chance</b>	<b>3,102</b>	<b>3.8</b>	<b>\$497,776,578</b>	<b>16.1</b>
<b>TOTAL</b>	<b>12,146</b>	<b>14.9</b>	<b>\$1,527,836,863</b>	<b>49.4</b>

When one correlates flood zone data to Future Land Use for unincorporated Santa Rosa County, a more distinct image becomes apparent as to land use impacts to this type of natural hazard. As with the City of Milton data above, the following table serves to “fine tune” flood data listed above. However, unlike the section on the City of Milton where the data for existing land use was not available, this section shall utilize both existing and future land use. The data is as follows:

Existing Land Use	1 percent Annual Chance Zone- Total Just Value	0.2 percent Annual Chance Zone- Total Just Value	Total Flood Just Values
<b>Agriculture</b>	\$7,369,533	\$9,768,873	<b>\$17,138,406</b>
<b>Agriculture/Homestead</b>	\$35,649,521	\$4,328,429	<b>\$39,977,950</b>
<b>Condo/Town home</b>	\$39,752,777	\$3,223,159	<b>\$42,975,936</b>
<b>City</b>	\$147,538,837	\$168,021,576	<b>\$315,560,413</b>
<b>Commercial</b>	\$33,215,465	\$20,695,313	<b>\$53,910,778</b>
<b>Industrial</b>	\$3,111,793	\$2,317,165	<b>\$5,428,958</b>
<b>Institutional</b>	\$6,106,789	\$3,840,414	<b>\$9,947,203</b>
<b>Multi-Family</b>	\$0	\$221,581	<b>\$221,581</b>
<b>Residential 1</b>			

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<b>Multi-Family Residential 2</b>	\$7,750,953	\$2,070,892	<b>\$9,821,845</b>
<b>Military</b>	\$24,354,317	\$0	<b>\$24,354,317</b>
<b>Mixed Res./Comm.</b>	\$1,502,256	\$590,997	<b>\$2,093,253</b>
<b>Office</b>	\$4,106,341	\$1,289,331	<b>\$5,395,672</b>
<b>Public Owned Property</b>	\$334,061,584	\$8,552,069	<b>\$342,613,653</b>
<b>Recreation/Commercial</b>	\$0	\$11,886,152	<b>\$11,886,152</b>

Existing Land Use	1 percent Annual Chance Zone- Total Just Value	0.2 percent Annual Chance Zone- Total Just Value	Total Flood Just Values
<b>Recreation/Open Space</b>	\$49,815,551	\$11,426,762	<b>\$61,242,313</b>
<b>Right-of-Way</b>	\$233,531,904	\$50,722,306	<b>\$284,254,210</b>
<b>Single Family Residential</b>	\$818,648,580	\$256,782,475	<b>\$1,075,431,055</b>
<b>Silviculture</b>	\$9,397,089	\$4,630,537	<b>\$14,027,626</b>
<b>Unknown</b>	\$3,104,272	\$442,394	<b>\$3,546,666</b>
<b>Utility</b>	\$237,997	\$25,375	<b>\$263,372</b>
<b>Vacant</b>	\$461,154,107	\$120,044,806	<b>\$581,198,913</b>
<b>Water</b>	\$20,879,778	\$1,435,735	<b>\$22,315,513</b>
<b>TOTAL</b>	<b>\$2,307,615,244</b>	<b>\$682,316,241</b>	<b>\$2,989,931,485</b>

Note: The values indicate the highest categorical values per flood

Single Family Homes clearly dominates as the land use category most susceptible to flooding events. Vacant, City, and Public Owned Property also ranked among the highest as indicated above. Based upon this analysis, mitigation attention should be directed toward the built environment with home units garnering the more direct short-term attention.

Future Land Use 100 Year	1 percent Annual Chance Zone – Total Just Value	0.2 percent Annual Chance Zone- Total Just Value	Total Flood Just Values
<b>Agriculture</b>	\$125,750,768	\$18,223,595	<b>\$143,974,363</b>
<b>City</b>	\$154,797,997	\$168,022,576	<b>\$322,820,573</b>
<b>Commercial</b>	\$81,750,347	\$26,835,774	<b>\$108,586,121</b>
<b>Conservation/Recreation</b>	\$340,056,065	\$12,563,264	<b>\$352,619,329</b>
<b>Garcon Point Rural Residential</b>	\$84,184,395	\$38,233,971	<b>\$122,418,366</b>
<b>Garcon Point Single Family Residential</b>	\$174,206,272	\$58,569,021	<b>\$232,775,293</b>
<b>Bagdad Historic District</b>	\$1,727,831	\$3,198,085	<b>\$4,925,916</b>
<b>Industrial</b>	\$6,936,097	\$3,741,743	<b>\$10,677,840</b>
<b>Marina</b>	\$5,821,655	\$387,597	<b>\$6,209,252</b>

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<b>Military</b>	\$23,953,077	\$0	<b>\$23,953,077</b>
<b>Mixed Res./Comm.</b>	\$55,899,314	\$36,624,025	<b>\$92,523,339</b>
<b>Navarre Beach Commercial</b>	\$13,065,332	\$0	<b>\$13,065,332</b>
<b>Navarre Beach Low Density Residential</b>	\$61,865,147	\$0	<b>\$61,865,147</b>
<b>Navarre Beach Medium Density Residential</b>	\$587,366	\$0	<b>\$587,366</b>
<b>Navarre Beach Medium/High Density Residential</b>	\$29,259,258	\$0	<b>\$29,259,258</b>
<b>Navarre Beach Mixed Res./Comm.</b>	\$64,962,260	\$0	<b>\$64,962,260</b>
<b>Navarre Beach Utilities Residential</b>	\$60,509,267	\$0	<b>\$60,509,267</b>
<b>Single Family Residential</b>	\$29,008,931	\$20,364,632	<b>\$49,373,563</b>
<b>Water</b>	\$546,688,489	\$205,307,524	<b>\$751,996,013</b>
<b>Unknown</b>	\$22,284,357	\$1,061,548	<b>\$23,345,905</b>
<b>TOTAL</b>	\$274,235,983	\$54,033,679	<b>\$328,269,662</b>
	<b>\$2,144,484,876</b>	<b>\$647,167,034</b>	<b>\$2,791,651,910</b>

**Note:** The values expressed in yellow indicate the highest categorical values per flood event.

Similar to the data presented for Existing Land Use, Single Family Residential uses rank as the top land use category vulnerable to flood events. Also following this land use in rank order of vulnerability based upon Just Value is Conservation/Recreation, Unknown, City, and Garcon Point Single Family Residential.

#### 5.5. C1 Navarre Beach

For the purposes of this section on Navarre Beach, Zone “AE”, and “VE” have been classified into a broader “1 percent annual chance flood” cohort to streamline data analysis similar to the above analysis on Unincorporated Santa Rosa County.

According to the analysis results, there are **1,037** parcels of land within the 1 percent annual chance flood zone in Navarre Beach with a Just Value of **\$1,124,247,768** or 100% of the Just Value of all of Navarre Beach or, simply, all the parcels are in the 1 percent annual chance flood zone. Flooding vulnerability for Navarre Beach is summarized in the following:

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Flood Type	Number of Parcels	Percentage Total Parcels	Just Value (Fair Market)	Percentage Total Just Value (Fair Market)
<i>1 percent Annual Chance</i>	1,037	100	\$1,124,247,768	100
<b>TOTAL</b>	<b>1,037</b>	<b>100</b>	<b>\$1,124,247,768</b>	<b>100</b>

When one considers the natural hazard of Beach, a more distinct image is presented.

As with the City of Milton data above, the following table serves to “fine tune” flood data listed above. However, unlike the section on the City of Milton where the data for existing land use was not available, this section shall utilize both existing and future land use. The data is as follows:

Existing Land Use	1 percent Annual Chance Zone-Total	Total Flood Just Values
<i>Agriculture</i>	\$59,895	\$59,895
<i>Agriculture/Homestead</i>	\$0	\$0
<i>Condo/Townhome</i>	\$44,933,202	\$44,933,202
<i>City</i>	\$0	\$0
<i>Commercial</i>	\$45,501,243	\$45,501,243
<i>Industrial</i>	\$0	\$0
<i>Institutional</i>	\$0	\$0
<i>Multi-Family</i>	\$0	\$0
<i>Residential 1</i>		
<i>Multi-Family Residential 2</i>	\$162,745	\$162,745
<i>Military</i>	\$0	\$0
<i>Mixed Res./Comm.</i>	\$183,056	\$183,056

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Existing Land Use	1 percent Annual Chance Zone-Total	Total Flood Just Values
<i>Office</i>	\$0	\$0
<i>Public Owned Property</i>	\$851,157,725	\$851,157,725
<i>Recreation/Commercial</i>	\$0	\$0
<i>Recreation/Open Space</i>	\$41,510	\$41,510
<i>Right-of-Way</i>	\$0	\$0
<i>Single Family Residential</i>	\$84,812,792	\$84,812,792
<i>Silviculture</i>	\$0	\$0
<i>Unknown</i>	\$0	\$0
<i>Utility</i>	\$0	\$0
<i>Vacant</i>	\$61,397,680	\$61,397,680
<i>Water</i>	\$400,741	\$400,741
<b>TOTAL</b>	<b>\$1,088,650,58</b>	<b>\$1,088,650,589</b>

Note: The values indicate the highest categorical values per flood

Public Owned Property clearly dominates as the land use category most susceptible to flooding events. Single Family Residential, Vacant, and Commercial property also ranked among the highest as indicated above. Based upon this analysis, mitigation attention should be directed toward the built environment with home units garnering the more direct short-term attention.

Future Land Use	1 percent Annual Chance Zone-Total	Total Flood Just Values
<i>Agriculture</i>	\$282,609	\$282,609
<i>City</i>	\$0	\$0
<i>Commercial</i>	\$0	\$0
<i>Conservation/Recreation</i>	\$641,251,392	\$641,251,392
<i>Garcon Point Rural Residential</i>	\$0	\$0
<i>Garcon Point Single Family Residential</i>	\$0	\$0
<i>Bagdad Historic District</i>	\$0	\$0
<i>Industrial</i>	\$0	\$0
<i>Marina</i>	\$0	\$0

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Future Land Use	1 percent Annual Chance Zone- Total	Total Flood Just Values
<i>Military</i>	\$0	\$0
<i>Mixed Res./Comm.</i>	\$0	\$0
<i>Navarre Beach Commercial</i>	\$226,879,129	\$226,879,129
<i>Navarre High Density</i>	\$15,035,704	\$15,035,704
<i>Navarre Low Density Residential</i>	\$154,516,674	\$154,516,674
<i>Navarre Beach Medium Density Residential</i>	\$301,854,202	\$301,854,202
<i>Navarre Beach Medium/High Density Residential</i>	\$32,902,817	\$32,902,817
<i>Navarre Beach Mixed Res./Comm.</i>	\$69,188,340	\$69,188,340
<i>Navarre Beach Utilities Residential</i>	\$123,147,217	\$123,147,217
<i>Single Family Residential</i>	\$0	\$0
<i>Water Unknown</i>	\$1,112,306	\$1,112,306
	\$121,647,198	\$121,647,198
<b>TOTAL</b>	<b>\$1,687,817,588</b>	<b>\$1,687,817,588</b>

**Note:** The values expressed in indicate the highest categorical values per flood event.

5.5.D Storm Surge

**Note: The information below excludes the region of Navarre Beach.**

Using digital storm surge data from the United States Army Corps of Engineers in a GIS application, Category 1, 2, 3, 4, and 5 storm surge zones (Saffir/Simpson Scale) were overlaid on tax parcels to determine extent of potential damage. The unincorporated areas have all five primary storm surge categories that impact structures within its borders. These categories are defined in the above section regarding the City of Gulf Breeze.

According to the analysis results, there are **2,276** parcels of land within the Category One storm surge zone in unincorporated areas with a Just Value of **\$293,521,297** or **9.5%** of the Just Value of all of unincorporated areas.

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There are **7,049** identified parcels of land in the unincorporated areas that lie within the Category Two storm surge zone. These parcels have a Just Value of approximately **\$863,573,791** or 27.9% of the Just Value of all of the unincorporated areas.

There are **13,078** identified parcels of land in the unincorporated areas that lie within the Category Three storm surge zone. These parcels have a Just Value of approximately **\$1,422,064,776** or 45.9% of the Just Value of all of the unincorporated areas.

There are **17,849** identified parcels of land in the unincorporated areas that lie within the Category Four storm surge zone. These parcels have a Just Value of approximately **\$1,914,843,337**, or 61.8% of the Just Value of all of the unincorporated areas.

There are **22,332** identified parcels of land in the unincorporated areas that lie within the Category Five storm surge zone. These parcels have a Just Value of approximately **\$2,411,756,238** or 77.9% of the Just Value of all of the unincorporated areas.

Storm surge vulnerability for unincorporated Santa Rosa County is summarized in the following table:

Flood Type	Number of Parcels	Percentage Total Parcels	Just Value (Fair Market)	Percentage Total Just Value (Fair Market)
1	2276	2.8	\$293,521,297	9.5
2	7049	8.7	\$863,573,791	27.9
3	13,078	16.1	\$1,422,064,776	45.9
4	17,849	22.0	\$1,914,843,337	61.8
5	22,332	27.6	\$2,411,756,238	77.9
<b>TOTAL<sup>7</sup></b>	<b>22,332</b>	<b>27.6</b>	<b>\$2,411,756,238</b>	<b>77.9</b>

When data storm surge data is coupled with existing and future land use categories for the unincorporated areas, one gets a clearer idea of specific sectors of the community that could be the most impacted by increasing degrees of storm surge activity. For the purposes of this section, Just Values were correlated with storm surge zones by utilizing GIS technology. The parcels were then categorized and placed in the following table for better analysis based upon the existing land use classification scheme used by the Santa Rosa County. The table is as follows:

<sup>7</sup> Category Five (5) storm surge amounts were used for the total because the boundaries of all other storm surge zones and applicable parcels are all spatially located within the Category Five. These totals represent the maximum damage foreseeable due to storm surge activity. This methodology was chosen to prevent overlap of data and skewing results.

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	Category 1	Category 2	Category 3	Category 4	Category 5
Agriculture	\$1,667,273	\$3,863,655	\$24,413,391	\$38,817,163	\$47,930,171
Agr./Homestead	\$2,890,569	\$1,147,653	\$12,205,091	\$11,734,343	\$12,685,003
Condo/Townhome	\$9,573,198	\$9,661,995	\$10,585,283	\$19,412,013	\$20,680,231
City	\$27,388,383	\$11,864,091	\$26,041,548	\$48,773,077	\$67,920,540
Commercial	\$2,397,115	\$2,866,761	\$6,117,417	\$12,532,134	\$18,136,605
Industrial	\$413,798	\$547,480	\$4,709,767	\$4,334,426	\$3,355,556
Institutional	\$1,601,924	\$3,521,634	\$6,247,648	\$6,776,097	\$6,519,263
Multi-Family Res. 1	\$0	\$0	\$574,360	\$398,747	\$438,716
Multi-Family Res. 2	\$3,188,984	\$5,108,443	\$4,754,854	\$4,215,569	\$2,697,027
Military	\$93,310	\$202,695	\$277,531	\$182,781	\$80,795
Mixed Use	\$164,820	\$206,895	\$637,525	\$358,588	\$235,045
Office	\$120,190	\$288,384	\$722,399	\$1,305,525	\$2,244,883
Public-Owned Property	\$25,348,116	\$15,505,129	\$11,945,787	\$8,679,515	\$8,652,040
Rec./Commercial	\$339,311	\$83,050	\$145,392	\$898,556	\$190,986
Rec./Open Space	\$2,803,482	\$2,842,405	\$1,172,149	\$2,125,154	\$1,508,797
Right-of Way	\$98,349,392	\$165,535,587	\$278,496,032	\$372,574,192	\$463,615,149
Single-Family Residential	\$283,783,152	\$307,878,634	\$455,645,541	\$558,020,773	\$641,805,521
Silviculture	\$9,313,124	\$1,545,937	\$2,150,446	\$6,366,552	\$7,879,184
Unknown	\$3,282,375	\$855,793	\$4,518,501	\$8,995,007	\$11,340,993
Utility	\$0	\$265,287	\$1,057,711	\$1,685,806	\$1,292,005
Vacant	\$954,166,536	\$591,731,414	\$884,229,950	\$1,652,067,223	\$1,724,444,049
Water	\$56,477,061	\$455,912,151	\$667,466,820	\$94,042,867	\$93,993,521

**Note:** The values expressed in yellow indicate the highest categorical values per storm surge.

Based upon the data above, vacant land composes the highest Just Value category for threat under a Category One storm surge (and all surge categories) in unincorporated Santa Rosa County at **\$954,166,536**. The second and third largest land uses vulnerable under this surge category include Single Family Residential (**\$283,783,152**) and Right-of-Way properties (**\$98,349,392**), respectively.

Vacant land also composes the largest amount of territory under threat from a Category Two storm surge with a Just Value of **\$591,731,414**. The second and third largest land use categories falling within this surge category include Water (**\$455,912,151**) and Single Family Residential (**\$307,878,634**) uses, respectively.

Under a Category Three surge event, Vacant land use (**\$884,229,950**) again is the largest sector of land use hit the hardest. Similar to the Category Two surge event, Water (**\$884,466,820**) and Single Family Residential (**\$455,645,541**) land uses compose the second and third largest categories affected by this level of surge, respectively.

When analyzing vulnerability during a Category Four surge event, one finds a similar pattern as to that under a Category One event. Vacant land, again, composes the largest area of affected land (**\$1,652,067,223**) during this level of surge event. Single Family Residential is the second largest category with a Just Value of **\$558,020,773** and Right-of Way properties the third largest with a Just Value of **\$372,574,192**.

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Finally, under a Category Five event, the largest land use affected is Vacant land (\$1,724,444,049). Ranking second is Single Family Residential with a Just Value of \$641,805,521. Ranking third is Right-of-Way properties with a Just Value of \$463,615,149.

Using the same methodology as above, future land uses were analyzed by category of storm surge vulnerability as relating to Just Values. The table is as follows:

	Category 1	Category 2	Category 3	Category 4	Category 5
Agriculture	\$17,290,845	\$24,007,378	\$33,617,160	\$46,871,352	\$53,832,003
City	\$675,728,398	\$605,445,149	\$827,403,797	\$878,213,848	\$793,590,434
Commercial	\$12,224,724	\$56,046,398	\$114,450,645	\$96,805,575	\$181,969,907
Conservation/ Recreation	\$100,475,298	\$81,899,078	\$87,956,806	\$99,455,882	\$106,058,418
GP Rural Recreation	\$53,996,887	\$75,976,163	\$96,412,650	\$100,121,180	\$103,740,112
GP Single Family Residential	\$109,550,378	\$164,091,982	\$217,550,852	\$227,393,569	\$236,736,045
Bagdad Historical District	\$656,808	\$1,210,170	\$4,612,537	\$10,356,349	\$13,237,551
Industrial	\$2,098,768	\$2,864,644	\$4,931,066	\$8,369,355	\$13,688,575
Marina	\$4,849,020	\$5,005,964	\$5,368,633	\$5,368,633	\$5,590,065
Military	\$9,558,912	\$72,365,870	\$80,167,480	\$85,074,671	\$85,673,788
Mixed Use Residential	\$13,649,951	\$71,082,320	\$145,028,200	\$236,119,395	\$279,723,237
Residential	\$30,860,817	\$42,785,609	\$78,361,017	\$106,593,112	\$124,288,765
Single Family Residential	\$482,014,211	\$642,095,540	\$829,579,209	\$1,001,645,675	\$1,149,315,474
Water	\$5,525,566	\$11,459,563	\$20,896,859	\$22,115,988	\$22,191,307
Unknown	\$104,766,985	\$193,339,941	\$317,212,732	\$386,638,144	\$489,996,211

**Note:** The values expressed in yellow indicate the highest categorial values per storm surge.

Based upon data for Future Land Use, City land uses compose the highest Just Value category for threat under a Category One storm surge (and all surge categories) at \$675,728,398. The second and third largest land uses vulnerable under this surge category include Single Family Residential (\$482,014,211) and GP Single Family Residential properties (\$109,550,378), respectively.

Single Family Residential composes the largest amount of territory under threat from a Category Two storm surge with a Just Value of \$642,095,540. The second and third largest land use categories falling within this surge category include City (\$605,445,149) and Unknown (\$193,339,921) uses, respectively.

Category Three storm surge affects Single Family Residential (\$829,579,209) the most, again, as it is the largest sector of land use vulnerable. City (\$827,403,797) and

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Unknown (\$317,212,732) uses compose the second and third largest categories affected by this level of surge, respectively.

Single Family Residential uses, again, compose the largest category of use affected by Category Four surge (\$1,001,645,675). Much like the Category Three surge even, City (\$878,213,848) and Unknown (\$386,638,144) uses compose the second and third largest categories affected by surge of this magnitude.

Finally, under a Category Five event, the largest land use affected is Single Family Residential land (\$1,149,315,474). Ranking second are City uses with a Just Value of \$793,590,434. Ranking third are Unknown uses with a Just Value of \$489,996,211.

In summary, when analyzing all categories of storm surge, the most obvious existing land use categories to be vulnerable to storm surge are Single Family Residential, City, and Unknown uses. However, being that this section is concentrating on unincorporated areas, if one excludes City uses, other high values affected by surge that would demand considerable mitigation attention include GP Family Residential and Mixed Use Residential. It should also be noted that the above values were for all areas in Santa Rosa County **including cities and other incorporated urban environments**; thus the high values and heavy weighting towards more City uses in this section.

#### 5.5.D1 Navarre Beach

According to the analysis results, there are 206 parcels of land within the Category One storm surge zone in unincorporated areas with a Just Value of \$207,447,941 or 32.9% of the Just Value of all of the Navarre Beach area.

There are 601 identified parcels of land in the unincorporated areas that lie within the Category Two storm surge zone. These parcels have a Just Value of approximately \$386,972,322 or 61.4% of the Just Value of all of Navarre Beach area.

There are 988 identified parcels of land in the unincorporated areas that lie within the Category Three storm surge zone. These parcels have a Just Value of approximately \$555,265,328 or 88.1% of the Just Value of all of the Navarre Beach area.

There are 1,018 identified parcels of land in the unincorporated areas that lie within the Category Four storm surge zone. These parcels have a Just Value of approximately \$564,304,219, or 89.6% of the Just Value of all of the Navarre Beach area.

There are 1,023 identified parcels of land in the unincorporated areas that lie within the Category Five storm surge zone. These parcels have a Just Value of approximately \$564,304,219 or 89.6% of the Just Value of all of the Navarre Beach area.

Storm surge vulnerability for the Navarre Beach area is summarized in the following table:

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Flood Type	Number of Parcels	Percentage Total Parcels	Just Value (Fair Market)	Percentage Total Just Value (Fair Market)
1	206	19.7	\$207,447,941	32.9
2	601	57.6	\$386,972,322	61.4
3	988	94.7	\$555,265,328	88.1
4	1,018	97.6	\$564,304,219	89.6
5	1,023	98.0	\$565,028,146	90.0
<b>Total<sup>8</sup></b>	<b>1,023</b>	<b>98.0</b>	<b>\$565,028,146</b>	<b>90.0</b>

When data storm surge data is coupled with existing and future land use categories for Navarre Beach, one gets a clearer idea of specific sectors of the community that could be the most impacted by increasing degrees of storm surge activity. For the purposes of this section, Just Values were correlated with storm surge zones by utilizing GIS technology. The parcels were then categorized and placed in the following table for better analysis based upon the land use classification scheme used by the Santa Rosa County. The table below is based upon existing land use classifications and lists all uses applicable to the Navarre Beach area, including:

	Category 1	Category 2	Category 3	Category 4	Category 5
Condo/Townhome	\$6,782,132	\$15,011,458	\$43,978,985	\$45,990,801	\$45,990,801
Commercial	\$0	\$3,843,348	\$14,885,567	\$14,885,567	\$14,885,567
Multi-Family Res.	\$0	\$0	\$162,745	\$162,745	\$162,745
Mixed Use	\$0	\$183,056	\$183,056	\$183,056	\$183,056
Office	\$0	\$186,458	\$186,458	\$186,458	\$186,458
Public-Owned Property	<b>\$181,591,791</b>	<b>\$363,119,592</b>	<b>\$364,153,672</b>	<b>\$364,153,672</b>	<b>\$364,153,672</b>
Rec./Open Space	\$6,502	\$32,010	\$40,512	\$40,512	\$40,512
Single-Family Residential	\$7,281,776	\$33,492,799	\$74,611,266	\$76,593,383	\$76,593,383
Vacant	\$9,326,409	\$28,475,314	\$48,869,001	\$52,185,911	\$52,634,011
<b>Note:</b> The Values expressed in yellow indicate the highest categorical values per storm surge.					

Based upon the data above, Public Owned Property composes the highest Just Value category for threat under a Category One storm surge (and all surge categories) Navarre Beach at **\$181,591,791**. The second and third largest land uses vulnerable under this surge category include Vacant **\$9,326,409** and Single Family Residential (SFR) properties **\$7,281,776**, respectively. Also, it should be noted that Condo/Townhome land uses are a close fourth behind SFR uses.

<sup>8</sup> Category Five (5) storm surge amounts were used for the total because the boundaries of all other storm surge zones and applicable parcels are all spatially located within the Category Five. These totals represent the maximum damage foreseeable due to storm surge activity. This methodology was chosen to prevent overlap of data and skewing results.

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Public Owned Property also composes the largest amount of territory under threat from a Category Two storm surge with a Just Value of **\$363,119,592**. The second and third largest land use categories falling within this surge category include Single Family Residential **(\$33,492,799)** and Vacant **(\$28,475,314)** uses, respectively.

Under a Category Three surge event, Public Owned Property **(\$364,153,672)** again is the largest sector of land use hit the hardest. Similar to the Category Two surge event, Single Family Residential **(\$74,611,266)** and Vacant **(\$48,869,001)** uses compose the second and third largest categories affected by this level of surge, respectively.

When analyzing vulnerability during a Category Four surge event, one finds a similar pattern emerging throughout all categories. Public Owned Property, again, composes the largest area of affected land **(\$364,153,672)** during this level of surge event. Single Family Residential is the second largest category with a Just Value of **\$76,593,383** and Vacant properties the third largest with a Just Value of **\$52,185,911**.

Finally, under a Category Five event, the largest land use affected is Public Owned Land **(\$364,153,672)**. Ranking second is Single Family Residential with a Just Value of **\$76,593,383**. Ranking third are Vacant properties with a Just Value of **\$52,634,011**.

Using the same methodology as above, future land uses were analyzed by category of storm surge vulnerability. The table is as follows:

	Category 1	Category 2	Category 3	Category 4	Category 5
Conservation/Recreation	\$121,098,528	\$183,750,382	\$186,603,207	\$186,603,207	\$262,366,368
Commercial	\$0	\$62,332,940	\$72,971,426	\$72,971,426	\$72,971,426
High Density Residential	\$3,819,323	\$6,536,013	\$8,500,602	\$9,634,992	\$14,718,075
Low Density Residential	\$784,747	\$28,033,658	\$74,503,196	\$81,526,764	\$141,778,593
Medium Density Residential	\$19,103,349	\$42,211,179	\$44,538,074	\$44,538,074	\$165,926,314
Medium/High Density	\$0	\$0	\$30,414,402	\$30,414,402	\$30,414,402
Mixed	\$0	\$0	\$4,452,993	\$4,452,993	\$64,962,260
Utilities	\$60,509,267	\$60,509,267	\$60,509,267	\$60,509,267	\$123,147,217
Unknown	\$0	\$0	\$0	\$0	\$73,370,586
Water	\$0	\$0	\$0	\$0	\$1,112,306

**Note:** The values expressed in yellow indicate the highest categorical values per storm surge.

Based upon data for Future Land Use, Conservation/Recreation composes the highest Just Value category for threat under a Category One storm surge (and all surge categories) Navarre Beach at **\$121,098,528**. The second and third largest land uses vulnerable under this surge category include Utilities **(\$60,509,267)** and Medium Density Residential properties **(\$19,103,349)**, respectively.

Conservation/Recreation also composes the largest amount of territory under threat from a Category Two storm surge with a Just Value of **\$183,750,382**. The second and third largest land use categories falling within this surge category include Commercial **(\$62,332,940)** and Utilities **(\$60,509,267)** uses, respectively.

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Category Three and Four surge events showed remarkable similarity in the amounts of vulnerability each one is susceptible to. Each category had mirrored values per land use category except High Density Residential and Low Density Residential. Conservation/Recreation (\$186,603,207) again is the largest sector of land use vulnerable. Low Density Residential (\$81,526,764) and Commercial (\$72,971,426) uses compose the second and third largest categories affected by this level of surge, respectively.

Finally, under a Category Five event, the largest land use affected is Conservation/Recreation land (\$262,366,368). Ranking second is Low Density Residential with a Just Value of \$141,778,593. Ranking third are Utilities properties with a Just Value of \$123,147,217. In this category, there also a number of Unknown and Water land uses that are not present in the aforementioned categories.

In summary, when analyzing all categories of storm surge, the most obvious existing land use categories to be vulnerable to storm surge are Vacant lands, Single Family Residential, Public Owned Properties, and Condo/Townhome uses. However, Single Family Residential and Condo/Townhome land uses would necessitate the most attention for mitigation being that it is the only category of the four that involves human settlements and the built environment.

When examining future land use versus the 5 categories of storm surge in Navarre Beach, the primary categories that appear to be the most vulnerable are Conservation/Recreation, High and Low Density Residential, Commercial and Utilities. It should also be noted that the above values were for a heavily developed area of condominium and single-family homes; thus the high values and heavy weighting towards more residential uses.

#### 5.5.E Land Erosion

Santa Rosa County's topography and coastline lends itself to some land erosion vulnerabilities. Most commonly, erosion is associated with sandy sedimentation on streets, stormwater systems, and ponds or rivers and creeks. Erosion is most often caused by construction activities (opening of soft sandy soils) to rain events (leading to sedimentation transport on slopes). Also, coastal areas are subject to erosion from storm surge and coastal storms.

It is rare for structures to be impacted by such stormwater erosion, but it is not unheard of. More often, roadways, drainage systems, and natural creeks and water bodies are the recipients of sedimentation problems. Most structures with stormwater-induced erosion can trace the problem to development design problems related to construction of the structure itself, or to overall stormwater management systems in a neighborhood or area.

Coastal erosion, on the other hand, can be a severe problem. Waterfront structures and infrastructure can receive severe if not devastating degrees of erosion. Many of the

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issues surrounding such erosion are storm surge and hurricane related, and the vulnerability to this hazard is covered in appropriate descriptions of storm surge above.

Erosion management in Santa Rosa County is accomplished in a variety of ways. This includes coordination with engineering departments, the Natural Resource Conservation Service, the Florida Division of Forestry, private landowners and developers, and other parties. A primary means used to control unwanted erosion include screening and hay baling on and near construction sites. Large-scale engineered systems also control erosion, generally through the management of stormwater flow and retention. Santa Rosa County has also implemented a number of multi-million dollar programs to control stormwater and sedimentation problems. Stormwater retention ponds, now required in virtually all new developments, have greatly reduced problems of erosion and stormwater runoff once construction is completed.

Mitigation measures are generally considered regulatory. However, erosion issues not yet identified could require public expenditure and grant applications to relieve erosion, probably related to stormwater management activities where development occurred before current new development regulations were adopted in building and planning codes.

#### 5. 5.F Severe Storms

A vulnerability to severe storms is present throughout unincorporated Santa Rosa County. The risk assessment of this plan identifies tornadoes, waterspouts, severe thunderstorms, lightning, winter storms, heat and drought as possibilities in the area.

Vulnerability is simply through presence. All structures and infrastructure are vulnerable to severe weather in Santa Rosa County.

Tornadoes and waterspouts are virtually impossible to predict (in terms of exact location of formation and path), although technologies such as Doppler Radar are enabling weather forecasters to give accurate warnings during formation and identification of an event. Aside from strong building codes (generally developed around the premise of hurricane mitigation and protection), vulnerability to these events will always be present and difficult to mitigate against.

Thunderstorms and lightning damage can be prevented. Existing and strengthened building codes (usually under consideration to prevent hurricane damage) will provide strength against severe thunderstorm events (especially high winds and hail). Lightning damage is preventable when proper electrical grounding, following building and fire codes, will also prevent damage. Electronic equipment is highly vulnerable to lightning strikes. Good common sense and planning by those using such equipment can prevent or reduce damage due to lightning events.

Winter storm vulnerability is possible in Santa Rosa County. The most likely location of winter weather events is generally considered to be north of Interstate 10. This

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demarcates a line north of the warmer waters of the Gulf of Mexico's and inland bay's warming effects. Still, the greatest vulnerabilities would be ice accumulation on bridges, ice on electrical lines, and loss of electricity. All residents, business and governmental organizations would be vulnerable. Severe cold can also cause strains on the electrical generation system (provided by Gulf Power Company and the Escambia River Electric (Cooperative)). Loss of electrical power due to high demand could cause problems for vulnerable populations (especially the elderly).

Similarly, heat waves may cause excessive demand on electrical systems. Air conditioning is a given for most residents. Loss of the ability to cool air in a heat wave could mean the possibilities of opening shelters for vulnerable populations. Although all residents and businesses are vulnerable to heat waves, air conditioning generally mitigates the issue.

Drought can cause water use restrictions, but does not mean that water is unavailable in the area. Water is delivered in a variety of ways to unincorporated residents and businesses. A majority of locations outside of Blackwater River State Forest in unincorporated areas are delivered water through a number of privately owned water systems. Also, municipalities deliver water to locations outside of their Cities in some cases (especially near Milton). Santa Rosa County provides public water to Navarre Beach. Residents near and within Blackwater River State Forest and in some other remote locations of the County utilize individual private well systems for potable water supplies.

All water is withdrawn via ground water well systems from an aquifer with abundant water resources. Drought can lead to firefighting difficulties (analyzed under wildfire vulnerability assessments).

In all cases, loss of commercial grid electricity is the primary vulnerability for the area. Without a source of electricity, cooling, heating, communications and water supplies cannot be assured.

#### 5.5. G Wildfire

Unincorporated Santa Rosa County is vulnerable to approximately **\$7,373,953,978** (Just Value) in damages due to wildfire events. Similar to the hurricane data provided above, the data used in this section was obtained from MEMPHIS (Mapping for Emergency Management, Parallel Hazard Information System); an experimental web based system that allows emergency managers to easily access a variety of hazard related data.

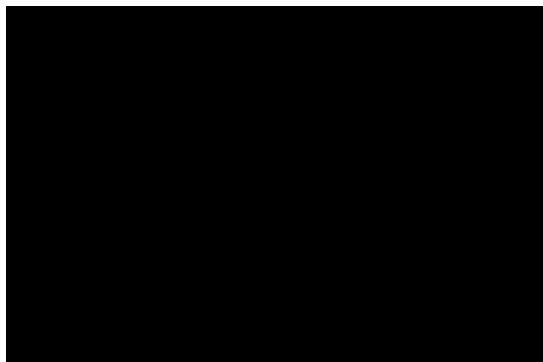


Figure 4: Wildfire Potential in Unincorporated Santa Rosa County. Source: [www.mangaz.com/lmsmaps](http://www.mangaz.com/lmsmaps)

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Using the same methodology as the analysis on the above sections, GIS data depicting wildfire vulnerability were overlaid upon tax parcels whereby values for damage could be assessed. The result of the analysis indicates forty nine percent of the land area in the unincorporated county is vulnerable to medium potential for wildfire (See Figure 4). Subsequently, forty six percent is considered to be low potential and five percent considered high.

Similar to the section on the City of Milton, Future Land Use data is available for the unincorporated county. In addition, Existing Land Use data is also available, allowing for a clearer picture of what land uses that are on the ground today are vulnerable to wildfire. Coupling this land use data with the wildfire information, wildfire vulnerability by land use can be forecast. The summary of Existing Land Use versus wildfire potential is offered in the table below:

	Low Potential	Medium Potential	High Potential
Agriculture	\$93,498,132	\$116,848,881	\$21,156,960
Agr/Homestead	\$61,745,977	\$74,194,671	\$8,044,489
Condo/Townhome	\$4,332,556	\$28,333,077	\$2,710,180
City	\$354,562,800	\$534,494,042	\$285,360,492
Commercial	\$96,234,773	\$124,928,703	\$29,136,731
Industrial	\$23,077,058	\$32,846,341	\$22,878,218
Institutional	\$61,352,077	\$83,534,609	\$21,774,720
Multi-Family Res. 1	\$12,606,847	\$13,085,344	\$1,979,146
Multi-Family Res. 2	\$8,718,918	\$32,909,566	\$3,109,991
Military	\$149,002,925	\$152,623,443	\$1,409,791,470
Mixed Use	\$2,250,458	\$3,735,311	\$8,749,326
Office	\$15,853,192	\$31,639,112	\$9,691,220
Public-Owned Property	\$504,007,408	\$516,198,188	\$197,750,845
Rec./Commercial	\$35,240,903	\$46,587,783	\$109,832,819
Rec./Open Space	\$50,332,669	\$55,392,438	\$8,749,326
Right-of-Way	\$220,663,764	\$531,198,292	\$201,508,604
Single-Family Residential	\$637,787,211	\$1,870,636,150	\$314,739,016
Silviculture	\$6,243,284	\$9,902,734	\$2,221,560
Unknown	\$2,120,652	\$6,974,730	\$360,701
Utility	\$3,731,463	\$6,011,227	\$2,969,303
Vacant	\$318,478,536	\$631,501,101	\$88,737,536
Water	\$1,501,646	\$5,854,456	\$815,425

**Note:** The values expressed in yellow indicate the highest categorical values per potential risk.

Out of all three categories of wildfire potential, Single Family Residential leads with the largest Just Value amounts for both Low and Medium wildfire potential. Military land uses rank highest for high potential of wildfire vulnerability. Other categories that also generally ranked highest out of all three categories and should also be acknowledged for mitigation would include City, Public Owned Property, and Single-family Residential.

Generally, the amount of wildfire vulnerability for applicable Future Land Use categories is highest among City land uses. However, Single Family Residential is the most

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vulnerable analyzing both low and medium potential wildfire categories in terms of monetary damage. A summary of Future Land Use and vulnerability potential is summarized below:

	Low Potential	Medium Potential	High Potential
Agriculture	\$442,931,824	\$467,343,038	\$19,294,028
City	\$693,657,540	\$542,257,770	\$193,927,218
Commercial	\$241,236,744	\$282,358,832	\$28,515,370
Conservation/Recreation	\$78,546,886	\$79,151,637	\$17,438,079
Garcon Point Rural Residential	\$41,418,890	\$58,269,542	\$342,920
Garcon Point Single Family Residential	\$74,269,581	\$97,704,049	\$1,295,754
Bagdad Historical	\$5,117,932	\$5,622,614	\$1,697,707
Industrial	\$88,727,938	\$83,719,548	\$39,679,470
Marina	\$1,141,404	\$1,280,765	\$0
Military	\$137,880,274	\$68,009,916	\$92,056,477
Mixed Res./Comm.	\$183,775,448	\$311,889,486	\$19,294,028
Navarre Beach Commercial	\$2,801,846	\$0	\$0
Navarre Beach High Density Residential	\$9,320,434	\$0	\$0
Navarre Beach Low Density Residential	\$83,385,614	\$32,196,605	\$0
Navarre Beach Medium Density Residential	\$470,807,170	\$426,996,715	\$0
Navarre Beach Med./High Density Residential	\$23,628,160	\$8,762,758	\$0
Navarre Beach Mixed Res./Comm.	\$4,452,993	\$782,040	\$0
Navarre Beach Utilities	\$0	\$0	\$0
Rail	\$193,885	\$117,807	\$0
Residential	\$139,153,009	\$174,002,301	\$7,672,128
Single Family Residential	\$1,401,309,111	\$1,738,769,208	\$190,255,754
Water	\$8,634,727	\$10,035,289	\$531,664
Unknown	\$499,259,160	\$593,197,255	\$50,418,266
<b>Note:</b> The values expressed in yellow indicate the highest categorical values per potential risk.			

#### 5.5.H Other Hazards

The location of dams is equally important to community safety and mitigation planning. FEMA and DMA2K documentation acknowledge dam safety as being a necessary component of sound mitigation planning. Santa Rosa County has 56 registered dams in the county (incorporated and unincorporated areas). Out of these, 5 did not have coordinates for mapping and thus could not be included in this study. This brings the total to 51 dams to that are included in this study. Of the 51 dams, 4 require mitigation attention. The Northwest Florida Water Management District (NFWFMD) has a permit system that allows registration and tracking of all dams in the county. The specific dams and their respective vulnerability are below:

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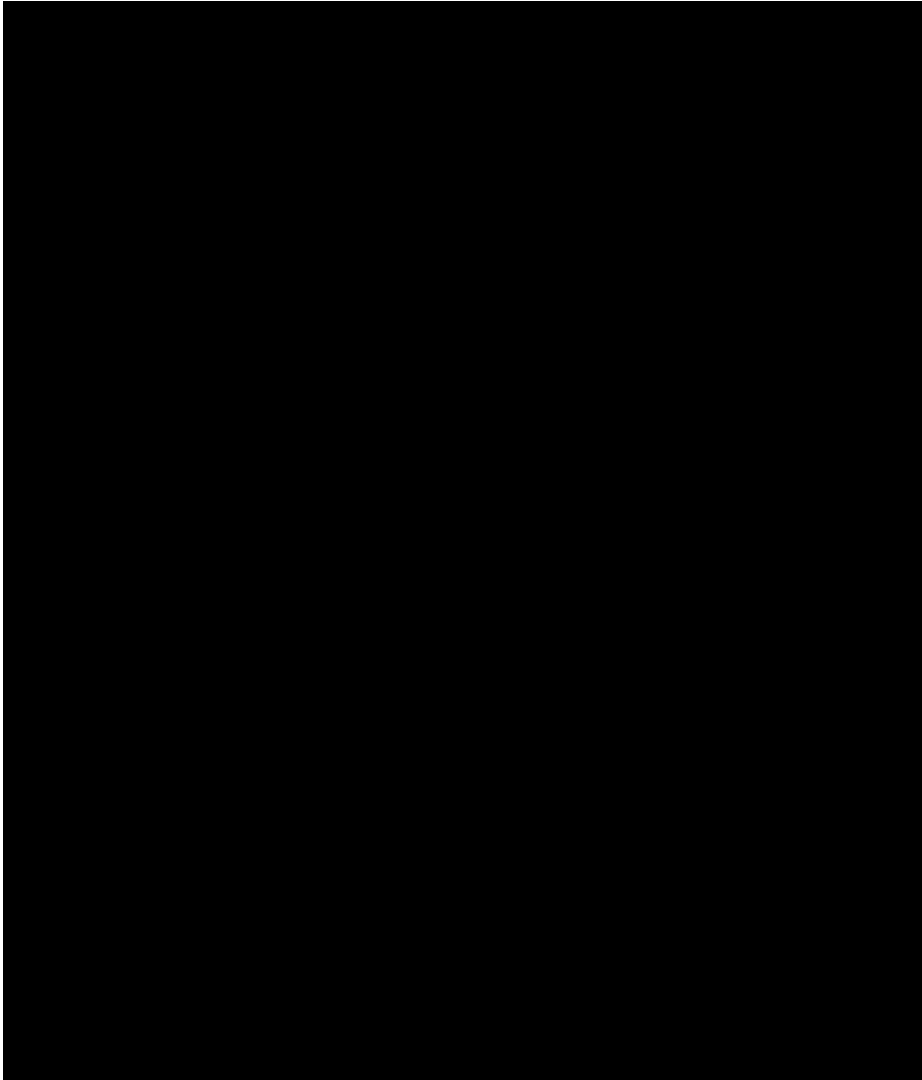
Permit Number	Date of Issue	Flood	Flood and Surge
44-85-011	3/11/1985		X
44-86-029	6/18/1986	X	
44-88-007	11/4/1987		X
44-94-034	5/31/1994		X

It is believed that dams are not vulnerable to wildfire events and have not been included in this study. Moreover, as stated above, hurricane winds affects the entire county, so all dams are vulnerable to high wind velocity by default. As noted above, there is one dam vulnerable to solely flood events, while the other three are vulnerable to both surge and flood. This information was obtained by overlaying GIS layers for flood and surge over dam locations and extracting those dams that would be vulnerable.

In addition to dam safety, highly erodible soils have been identified as being a potential threat to structures throughout the county. However, for the purposes of this plan, highly erodible soils are not considered much of a hazard threat as much as a threat *resulting from* a hazard event; typically due to wind, flood, or surge events. Hence, the inclusion of said data in this final section. The data below represents information for the entire county (both incorporated and unincorporated areas). For the purposes of this plan, only "Highly Erodible Soils" will be considered in estimating vulnerability.

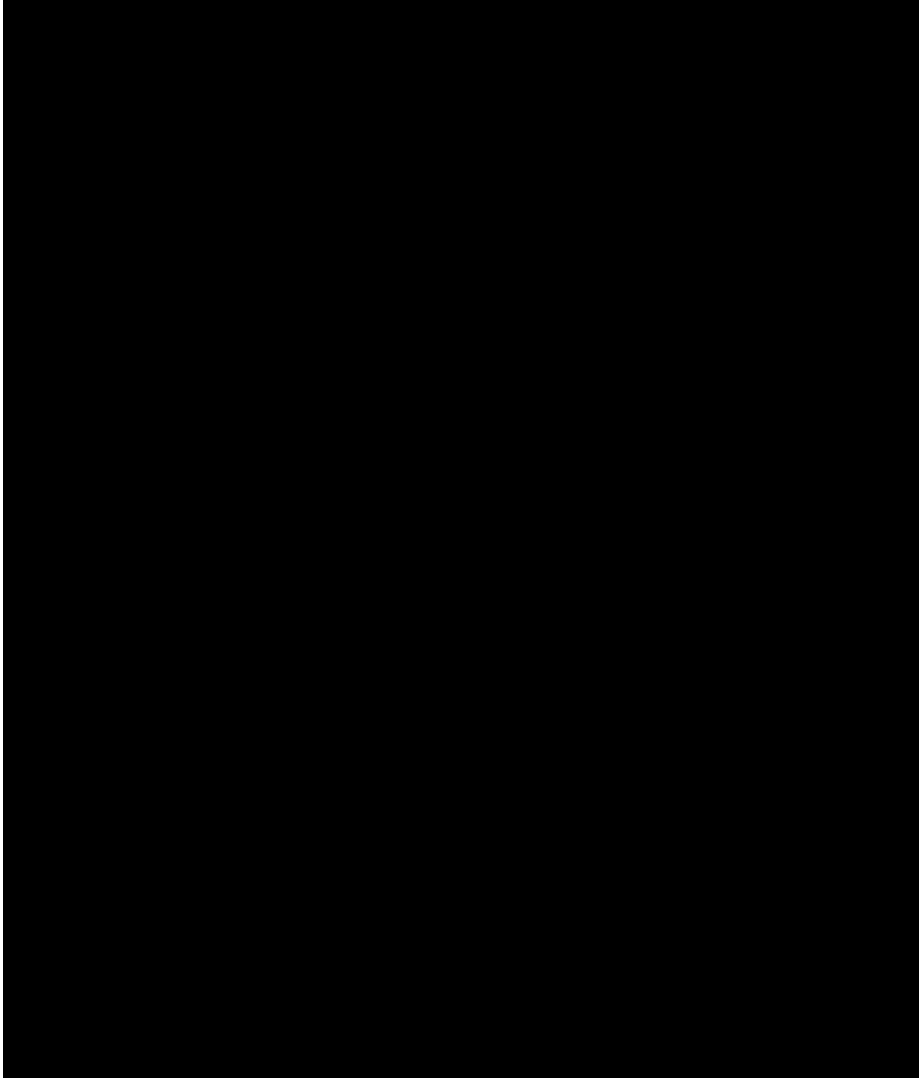
Santa Rosa County is vulnerable to approximately **\$497,878,280** (roughly 5,060 parcels) in damages from highly erosive soil conditions. This just value amount is reflecting upon 6.0% of all parcels in the county. By examining the map, it is evident that the overwhelming majority of the erosive soils exist in primarily rural areas, encompassing parcels of wide spatial extent.

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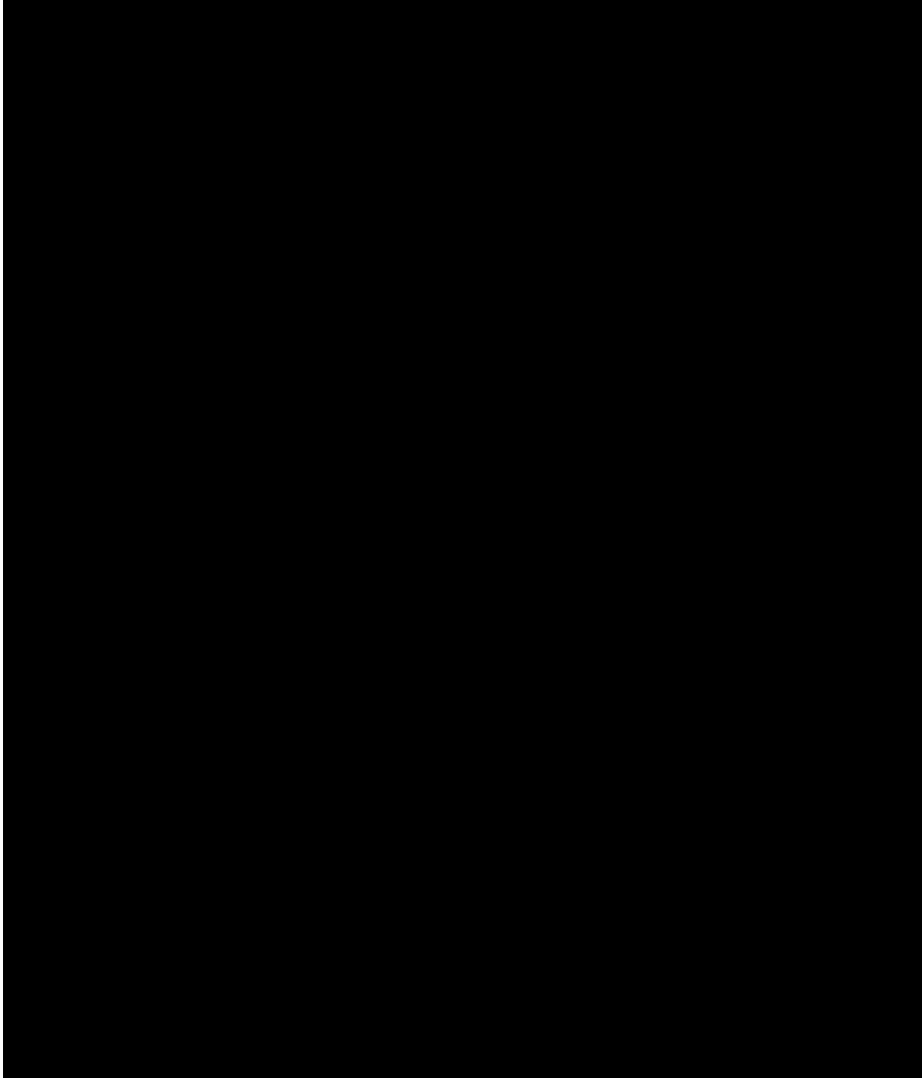
Map 5-1 - USGS Topographic Map of the City of Gulf Breeze and surrounding environs.  
Source: U.S. Geological Survey

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Map 5-2 - USGS Topographic Map of the City of Jay and surrounding environs. Source: U.S. Geological Survey

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Map 5-3 - USGS Topographic Map of the City of Milton and surrounding environs.  
Source: U.S. Geological Survey