Leon County Post-Disaster Redevelopment Plan
Hazard Identification and Vulnerability Assessment

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HAZARD IDENTIFICATION AND VULNERABILITY ASSESSMENT

The economic and social characteristics of a community have a great impact on the success of post-disaster redevelopment and community recovery. This section provides identification of the hazards that could significantly impact Leon County and the City of Tallahassee. It also includes an assessment of vulnerabilities which may require post-disaster redevelopment activities. Housing and public infrastructure are often the common focus of vulnerability discussions and analyses. Characteristics such as the date of construction for structures, building codes in place at the time of construction and location of the structures in hazardous areas have an impact on the community's vulnerability to disasters. Recognizing and identifying these vulnerabilities guide the appropriate actions to be taken before and after a disaster. They also influence the creation of future policies and procedures regarding redevelopment. The information provided here focuses on the hazards identified in the Leon County Comprehensive Emergency Management Plan (CEMP) and vulnerability assessments provided in the Leon County Local Mitigation Strategy (LMS).

I. Hazard Risk Overview

The 2007 Leon County CEMP and the 2009 Leon County LMS highlight that Leon County and the City of Tallahassee are vulnerable to multiple hazards that could warrant post-disaster redevelopment measures. Hurricanes and wildfires are both considered to be high risk hazards as listed in the Leon County CEMP while flooding, tornadoes and thunderstorms are listed as medium risk hazards. The Leon County LMS provides a thorough examination of the historic impact, documented damages, vulnerable populations and potential economic impact associated with each hazard. The data and analysis provided in the LMS is summarized in this chapter for the purposes of the PDRP.

A. Disaster History

Leon County has faced numerous disasters associated with various natural hazards events in the last two decades. The majority of these disasters have resulted from severe storm events, six of which qualified for federal disaster assistance. The table below lists the federal disaster declarations since 1985. All declared disasters have been related to severe weather, however Leon County is considered to be at risk for wildfires as well.

Table 1.1 - Recent Disasters in Leon County, 1985 – 2010			
Declaration	**Date**	**Event**	**Primary Damage**
#756	Nov-85	Hurricane Kate	Debris; Power Outages
#862	Apr-90	Unnamed Storm	Flooding; Power Outages; Debris
#966	Mar-93	Winter Storm	Flooding; Power Outages; Debris
#1035	Jul-94	T.S. Alberto	Flooding; Debris; Power Outages
Undeclared	Aug-94	T.S. Beryl	Flooding; Debris; Power Outages
#1069	Oct-95	Hurricane Opal	Flooding; Debris; Power Outages
#1223	Jun-98	Wildfires	Fire Damage
#2201	Jul-98	Drought	Crop Damage, Severe Heat
#1249	Sep-98	Hurricane Georges	Erosion, and Debris
#1339	Apr-99	Fire; Drought	Fire Damage, Crop Damage, Severe Heat
#1344	Oct-00	T.S. Helene	Riverine and Local Flooding
#1381	Jun-01	T.S. Allison	Riverine and Local Flooding
#1545	Sep-04	Hurricane Frances	Flooding; Debris
#1551	Sep-04	Hurricane Ivan	Flooding; Debris
#1561	Sep-04	Hurricane Jeanne	Debris
#1595	Jul-05	Hurricane Dennis	Debris
#1785	Aug-08	T.S. Fay	Flooding; Debris; Power Outages
#1831	Apr-09	Severe Storms	Flooding; Wind Damage

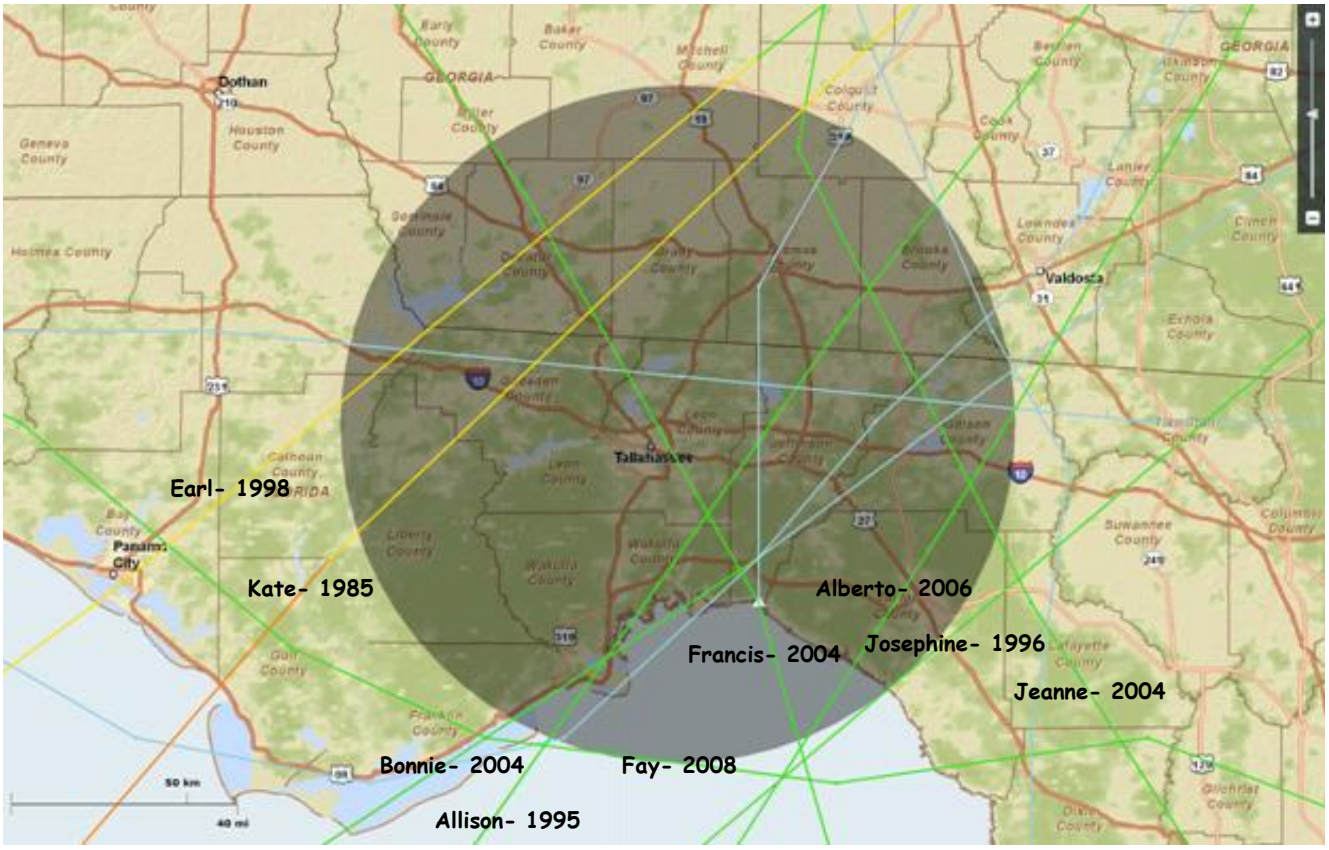
Source: Florida Division of Emergency Management, Bureau of Recovery and Mitigation.
http://www.floridadisaster.org/BRM/Disasters/Disaster_history.htm

B. Hurricanes and Tornadoes

Situated less than 30 miles from the Gulf of Mexico, Leon County is vulnerable to storm surge and wind damage from hurricanes. Map 1.2 indicates the extent of the storm surge possible from category 3, 4 and 5 hurricanes. Based on information from the National Oceanic and Atmospheric Administration (NOAA) 13 tropical cyclones have passed within 60 miles of Leon County between 1985 and 2010. Of these, two were hurricanes when they impacted the Leon County area. The extent of the damaging inland winds, tornadic activity and associated

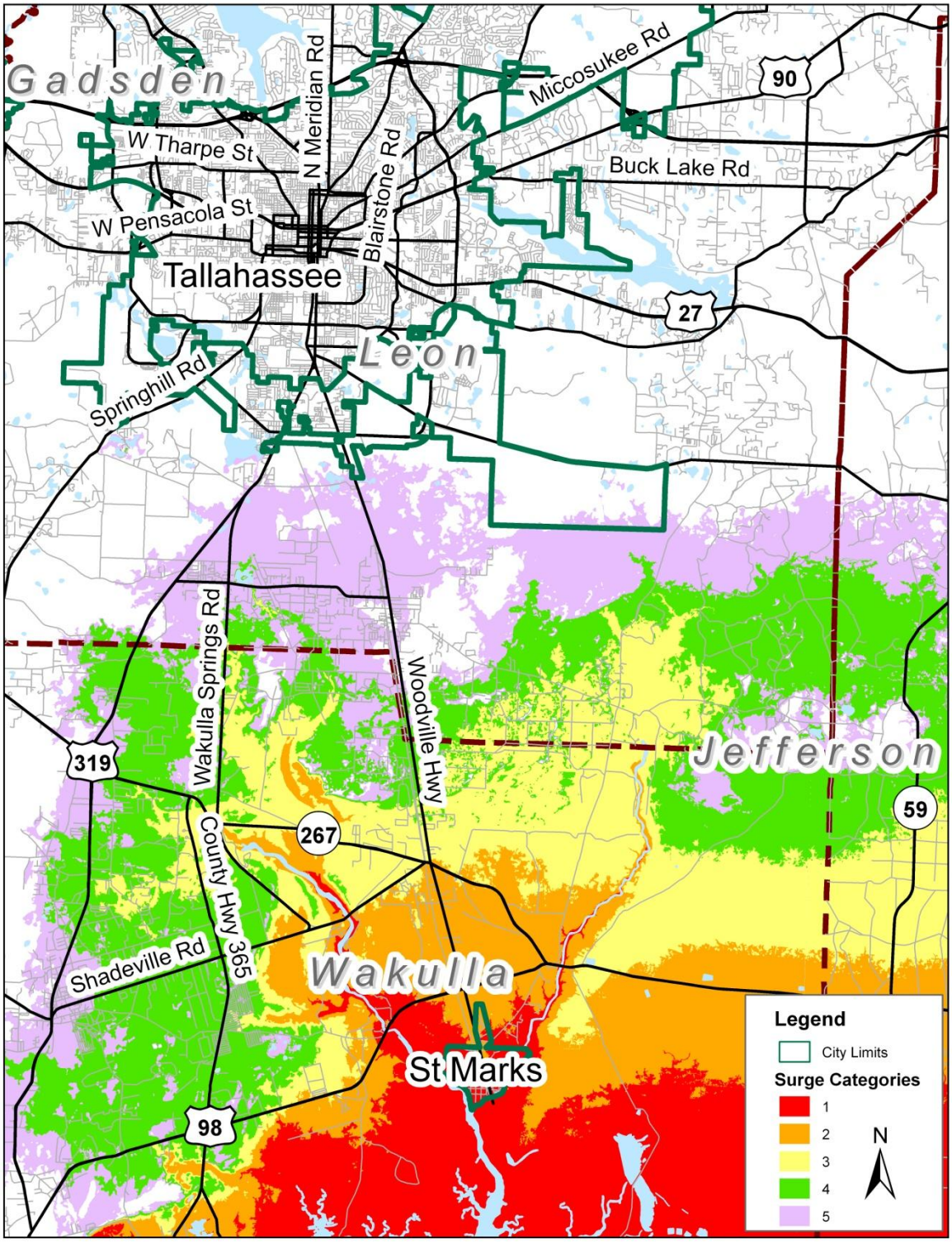
flooding depends on the strength, forward speed and rainfall of each specific storm. Although the entire Leon County population is susceptible to impacts from hurricanes, those living in structurally unsound housing, manufactured housing and low-lying areas face the greatest threat. Extensive damage to infrastructure, public and private property can be expected from high winds, tornadoes and fresh water flooding from heavy rainfall. There have been sixteen reported tornadoes in Leon County from 1945-2006 including an F1 tornado that damaged the Tallahassee-Leon County Civic Center and the South Ride Road area on November 11, 1995.

Map 1.1: Historical Track of Hurricanes Passing Within 60 Miles of Leon County, 1985 – 2010



Source: National Oceanic and Atmospheric Administration, 2011

Map 1.2: Storm Surge from Hurricanes Impacting Leon County



Source: Apalachee Regional Planning Council, 2009

C. Wildfires

Florida's typical "fire season" is from January through May. The most vulnerable areas are those generally located at the wild land urban interface, located throughout the County. Large amounts of dry underbrush require only an ignition source which can come from various sources such as cigarettes, lightning or even the wheels of a passing train. Due to the concentration of residents in rural wooded areas of the county, additional threats to life and property exist therefore requiring increased mitigation efforts. Since 1998 more than 15,000 wildfires have devastated over one million acres and destroyed more than 750 structures in Florida. Leon County and the City of Tallahassee have a county-wide vulnerability to fires, specifically wildfires. However, the majority of large wildfires occurs on public land and is subject to specific management efforts by state and national foresters. The Division of Forestry recorded a total number of 180 wildfires during the period from 1999-2009, or an average of 18 wildfires per year in Leon County. The majority of these are small-acreage (less than 1.0 acres) burnings of debris in southern Leon County.

D. Flooding

Leon County and the City of Tallahassee have experienced significant growth in the last 30 years. Changing the natural topography has accompanied this growth and land development increasing the amount of impervious surfaces. The dynamics of land use within this growth context can serve to exacerbate flooding problems. As upland areas are developed, the natural detention capacity of the land diminishes, resulting in increased runoff rates and flow volumes. Flood problems can arise as conveyance capacities are exceeded and/or the sheer quantity of runoff overwhelms the system's ability to absorb additional stormwater before properties and roadways become impacted. The land development code addresses stormwater runoff rates (not volume) in an open basin and runoff rates and volume in a closed basin, by prohibiting post-development discharge rates from exceeding predevelopment conditions for storms with recurrence frequencies up to a 25-year event. The City of Tallahassee LMS and Leon County Stormwater Management Plan, as detailed in the MPEDS Permit, identifies past development as the largest problem undermining the proper management of stormwater. There remains a significant need to address flood problems that have arisen from past development practices that failed to deal adequately with stormwater. A solution to this problem is difficult given limited available land within the urbanized landscape and the high costs to adequately retrofit problem areas. The City and County are addressing these issues as funding is available through a prioritized Capital Improvements Schedule for stormwater projects.

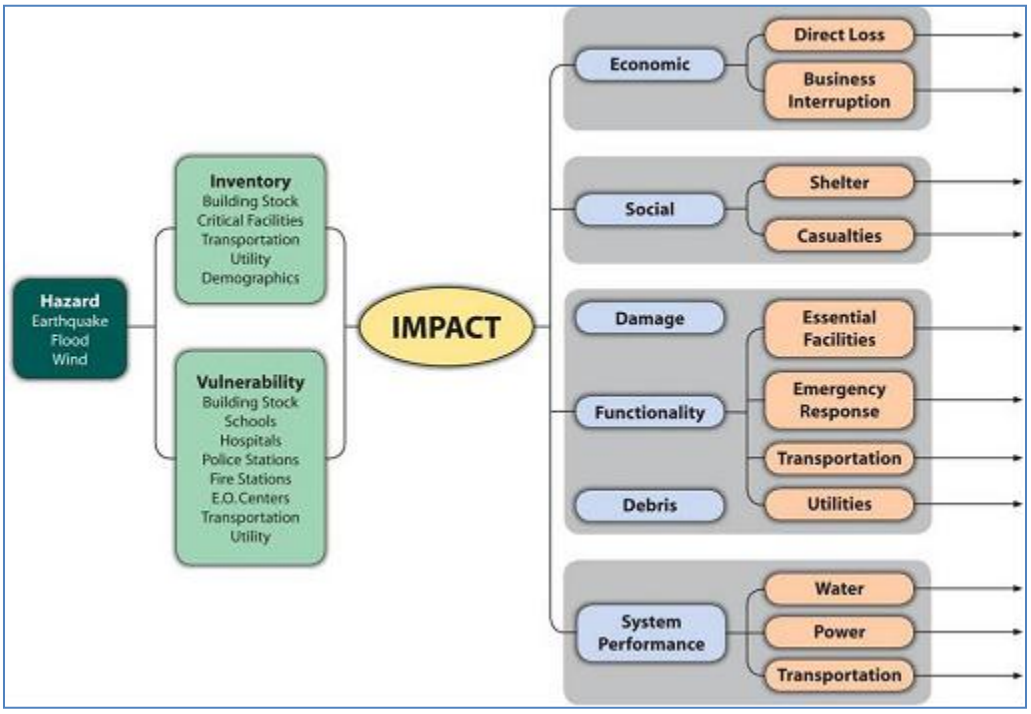
II. GIS Methodology

The vulnerability analysis was conducted using a geographic information systems (GIS) analysis. GIS tools allow users to conduct interactive queries, analyze spatial information, edit data, create maps and present the results of all these operations in a consolidated report.

A. HAZUS-MH 2.0

FEMA's HAZUS-MH 2.0 software is a nationally applicable standardized methodology that contains models for estimating potential losses from floods and hurricanes. It was used to model and generate estimated potential losses for hurricane winds and flooding. The model uses Census 2000 data to determine vulnerable population concentrations. HAZUS-MH 2.0 is FEMA's standardized loss estimation methodology built upon an integrated GIS platform to conduct analysis at a regional level (i.e., not on a structure by-structure basis). The HAZUS-MH 2.0 risk assessment methodology is parametric, in that distinct hazard and inventory parameters (e.g., wind speed and building types) can be modeled using the software to determine the impact (i.e., damages and losses) on the built environment. The figure below displays the data input and output of the HAZUS-MH 2.0 model.

Figure 1.1: Conceptual Model of HAZUS-MH Methodology



Source: Alachua County PDRP

1. HAZUS-MH 2.0 Hurricane Wind Model
   The HAZUS-MH 2.0 Hurricane Wind Model is an improvement over existing loss estimation models because it uses a wind hazard-load-damage-loss framework. New features in the HAZUS-MH 2.0 Wind Model include:
   - Commercial data has been updated to Dun & Bradstreet building valuations have been updated to R.S. Means and building counts are now based on census housing unit counts;
   - An updated historic storms database that includes several existing historic storms;
   - New coastal storm surge modeling capability that includes SLOSH and SWAN;
   - Integration of the CDMS tool;
   - NOAA hurricane advisory data is used to model storms with an adjustment feature for calculating building damage and loss;
   - An updated probabilistic storm set that reflects updates to the Holland pressure profile model and filling model;
   - An updated wind field model for user-defined storms; and
   - A new vulnerability functions to permit calculation of additional losses to manufactured housing due to trees blow down.

   Replacement costs were derived from Means Square Foot Costs for residential, commercial, industrial and institutional building occupancy classes. The Means publication is a nationally accepted reference on building construction costs, which is published annually. This publication provides cost information for a number of low-rise residential buildings, and for 70 other residential, commercial, institutional and industrial buildings. These are presented in a format that shows typical costs for each model building, showing variations by size of building, type of building structure and building enclosure. More detailed information on HAZUS-MH 2.0 is available through FEMA at: www.fema.gov/plan/prevent/hazus/.

   HAZUS-MH 2.0 is a loss estimation tool for planning purposes only. Uncertainties are inherent in any loss estimation methodology and arise in part from incomplete scientific knowledge concerning natural hazards and their effects on the built environment. Uncertainties also result from approximations and simplifications necessary to conduct such a study; incomplete or outdated data on inventory, demographic, or economic parameters; the unique nature and severity of each hazard when it occurs; and the amount of advance notice that residents have to prepare for the incident. As a result, potential exposure and loss estimates are approximations. Results should not be interpreted or used as precise results from and should be used only to understand relative risk.

2. HAZUS-MH 2.0 Flood Model

The HAZUS Flood Model produces loss estimates for vulnerability assessments and plans for flood risk mitigation, emergency preparedness and response and recovery. Losses can be calculated for a single flood event, or for a range of flood events allowing for annualized estimates of damages. Incomplete or inaccurate inventories of the built environment, demographics and economic parameters can result in uncertainty in the estimates produced by the HAZUS Flood Model. The following limitations of the model should be considered:

- While the HAZUS Flood Model can be used to estimate losses for an individual building, the results must be considered as average for a group of similar buildings.
- When using the general inventories included with HAZUS, accuracy of losses may be less than for losses calculated from available local inventory stock imported by the user.
- The Flood Model performs its analysis at the census block level with small numbers of buildings. Damage analysis of these small numbers makes the Flood Model more sensitive to rounding errors.

The Flood Model methodology consists of two basic analytical processes: flood hazard analysis and damage analysis. In the hazard analysis phase, characteristics such as frequency, discharge and ground elevation are used to model the spatial variation in flood depth and velocity. During the loss estimation phase, structural and economic damage is calculated based on the results of the hazard analysis through the use of vulnerability function curves. Model results are then conveyed to the user via a series of reports and maps. Detailed information on the HAZUS Flood Model can be found in the HAZUS Flood Model User Guide and the HAZUS Flood Model Technical Manual.

a. <u>Flood Hazards</u>

The HAZUS Flood Model analyzes both riverine and coastal flood hazards. Flood hazard is defined by a relationship between depth of flooding and the annual chance of inundation to that depth. Depth, duration and velocity of water in the floodplain are the primary factors contributing to flood losses. Other hazards associated with flooding that contribute to flood losses include channel erosion and migration, sediment deposition, bridge scour and the impact of flood-born debris. Since Leon County is not a coastal county, the flood risk assessment is based on a riverine flood hazard scenario.

b. Levels of Analysis

The Flood Model is designed for three levels of analysis, as shown below. Each subsequent level builds on the data and analysis procedures available in previous levels.

Level 1**:** The simplest type of analysis, it is based primarily on data provided with the software (e.g., census information, general building stock, general runoff models, no detailed water control data for hydraulics, etc.). The estimates are crude but are appropriate as initial loss estimates to determine where detailed analyses are warranted.

Level 2**:** Improves Level 1 results by taking into consideration additional data that are readily available. It requires more extensive inventory data and effort by the user than the Default Data Analysis. The purpose of this type of analysis is to provide the best estimates of flood damage/loss that can be obtained using the standardized methods of analysis. The user may need to employ consultants to assist in the implementation of certain methods. For example, knowledgeable users of hydrology and hydraulics models are required to define flood elevations.

Level 3: This analysis requires extensive efforts by the user in developing information on the flood hazard and the measure of exposure. This type of analysis incorporates results from engineering and economic studies carried out using methods and software not included within the methodology. At this level, one or more technical experts are required to acquire data, perform detailed analyses, assess damage/loss, and assist the user in gathering extensive inventory data. This level of analysis typically requires extensive participation by local utilities and operators of special facilities. Level 3 analyses usually take six months to two years to complete. The description of model requirements and typical applications for each level is presented in the table below:

	Level 1	Level 2	Level 3
Hazard	User supplied Digital Terrain or Elevation Model (DEM), typically the USGS 30-meter DEM. The Flood Model will use default hazard data including Hydrologic Unit Codes, and accumulation methodology to develop approximate stream centerlines. USGS regression equations and gage records will be used to determine discharge frequency curves.	User supplied flood stream cross-sections attributed with elevations, or lines of Base Flood Elevation (BFE). Coastal users will supply polygons attributed with the BFE. A flood boundary of some form is required. User supplied hazard data pre-processed via the FIT. DEM consistent with their FIT data.	Similar to Level 2 although the user will likely work with Hydraulic models outside of the Flood Model and the FIT. User will be required to pre-process the data through the FIT.
Inventory	Hazus default data. Allocation of census block data via statistical analysis, and broad assumptions for first floor height based on foundation distributions. Agriculture products, vehicles, essential facilities, some transportation and utility facilities.	User supplied inventory data, such as Tax Assessor data, and inventory data developed via site surveys processed through the Comprehensive Data Management System (CDMS) tool. Users enhance the first floor height and other parameters.	High quality data re: building values, flood vulnerabilities, contents, occupancies, etc, extended to industrial and other high-value facilities.
Damage Curves	Broad regional default curves based on available FIA or USACE depth damage curves. Library of curves available for user selection. User may create their own function using library curves as guides.	User specifically modifies the existing curve library for local practices.	User-input curves based on detailed building surveys, specific crop conditions etc.
Damage Estimation	Area weighted damage estimates based on the depth of flooding within a given census block. Losses developed for general building stock, essential facilities, vehicles, agricultural products, select transportation and utility features.	Consistent with Level 1, estimation enhanced by improved hazard data and detail in inventory data and modification to damage curves.	Consistent with Level 1, estimation enhanced by improved hazard data and detail in inventory data and modification to damage curves.
Direct Loss/ Impacts	Cost of repair / replacement, shelter needs, temporary housing, vehicles, crop & livestock losses.	Consistent with Level 1, estimation enhanced by improved hazard data and detail in inventory data and modification to damage curves.	Consistent with Level 1, estimation enhanced by improved hazard data and detail in inventory data and modification to damage curves.
Induced Losses	Debris developed from direct damage to buildings based on floor areas from the general building stock.	Consistent with Level 1, estimation enhanced by improved hazard data and detail in inventory data and modification to damage curves. Site specific debris generation currently not available in the Flood Model, must be based on census block attribution of floor area.	Consistent with Level 1, estimation enhanced by improved hazard data and detail in inventory data and modification to damage curves. Site specific debris generation currently not available in the Flood Model, must be based on census block attribution of floor area.
Indirect Loss/ Impacts	Sectoral economic impacts.	Sectoral economic impacts.	Sectoral economic impacts.
Typical Applications	• Flood mitigation / regulatory policy-making, regional, state, federal levels • Pre-feasibility studies • Real-time emergency response with no warning • Preliminary planning, zoning development	• Planning, zoning, development • Selecting mitigation alternatives • Pre-feasibility engineering studies • Emergency planning and real-time response • Environmental impact analysis • Education	• Analysis for essential, cultural, high-loss potential facilities • Emergency planning and real-time response • Mitigation and engineering research • Scientific research

The flood risk assessment for Leon County was conducted using a hybrid Level 1-Level 2 approach. The scenario was developed using local flood and elevation data, while the loss estimates were determined using the General Building Stock with some user-added local facilities information.

c. Riverine Hazard Analysis: Depth to Flood Methodology

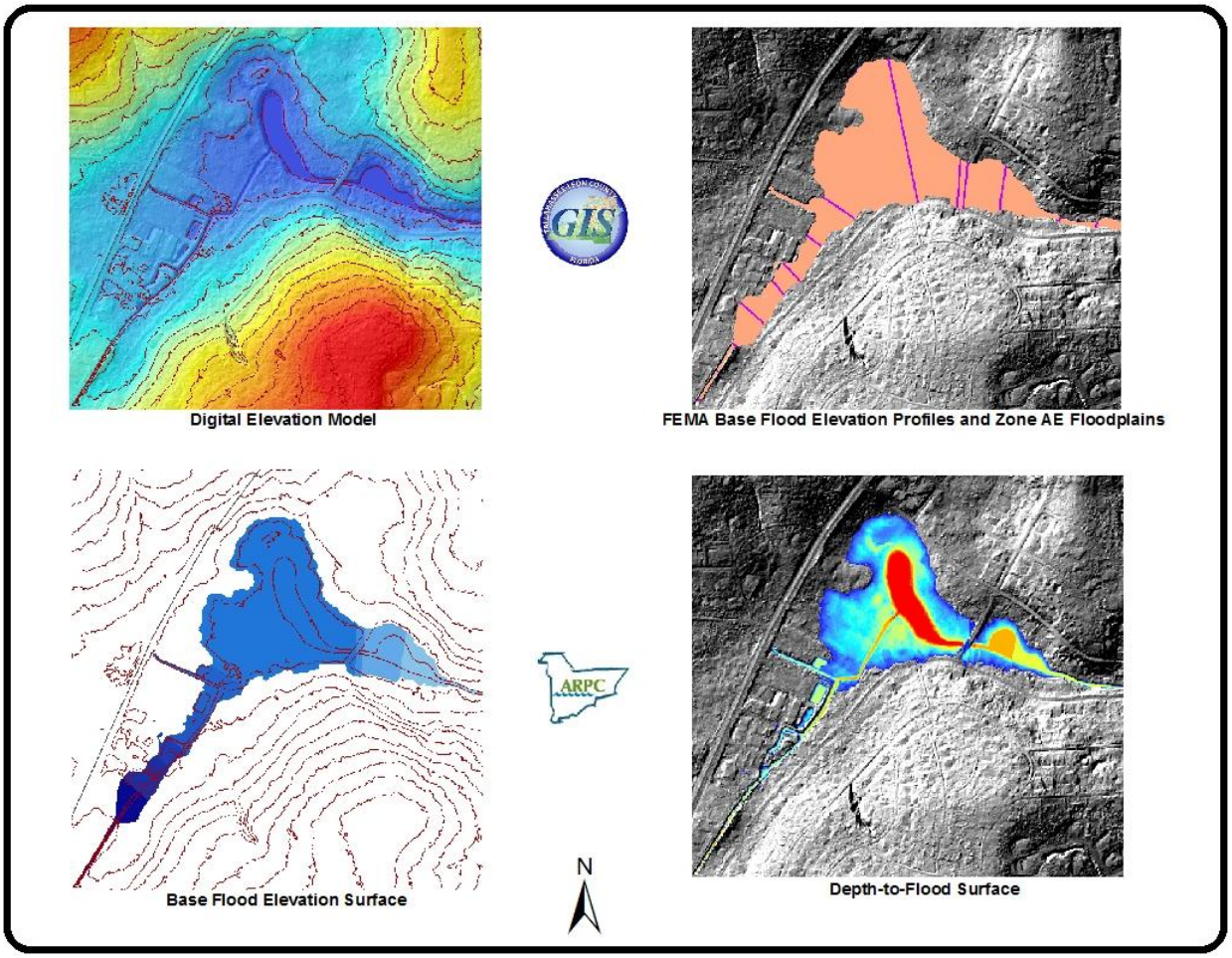
The flood risk assessment was performed using a depth-to-flood approach to compute loss estimates and was generated by comparing Base Flood Elevation (BFE) data with a Digital Elevation Model representing ground elevation. The assessment is computed for a 100-Year return period. The source for 100-year base flood elevations and associated floodplains is the FEMA Digital Flood Insurance Rate (DFIRM) data. The effective DFIRM data for Leon County was published in 2008 pursuant to the FEMA Map Modernization initiative. The floodplain

delineations and BFE data was updated in 2009 to include a Letter of Map Revision submitted by the City of Tallahassee. The ground elevation surface used in the analysis was produced from a LIDAR survey conducted for Leon County and the City of Tallahassee in 2009. This data was produced as part of the 3-year Landbase Update for Tallahassee-Leon County GIS.

The study was constrained to the Zone-AE floodplains from the DFIRM data because HAZUS requires base flood elevation data. The Zone AE floodzones have base flood elevations determined by engineering studies. Base flood elevations are not determined for the Zone-A floodplains, thus, they were excluded from the analysis

The figure below shows the workflow used to produce the depth-to-flood raster surface.

Figure 1.2: Depth-to-Flood Workflow Diagram



Source: Tallahassee-Leon County GIS

The elevation information in the BFE profiles was used to create a Base Flood Elevation surface for the extent of the Zone AE floodplains. The Zone AE floodplains were used to extract the DEM data for the extent of the floodplains. The DEM data was subtracted from the Base Flood Elevation surface to produce the Depth-to-Flood surface. The Depth-to-Flood surface was imported into HAZUS as the flood hazard source for the risk assessment. The General Building Stock was used along with the portion of the user-provided inventory data to produce the loss estimates. The loss estimate data was extracted from HAZUS and provided for this chapter in the loss reports that are part of the HAZUS software. The data is available beginning on page 15.

B. Southern Wildfire Risk Assessment

The wildfire risk assessment was provided by the Florida Forest Service (FFS), a division of the Florida Department of Agriculture and Consumer Services. FFS was a participant in the Southern Wildfire Risk Assessment (SWRA) Project, a collaboration of multiple enties with contribution from a variety of disciplines related to wildfire modeling and analysis. The SWRA project reflects the latest achievements in regional risk assessment and provides a consistent, comparable set of results as a foundation for mitigation planning. The SWRA can also be used to locate areas where interagency planning may be of value to effectively manage wildland fire risk. Detailed information on this project is presented in the SWRA Final Report.

The results of the risk assessment can be used to:

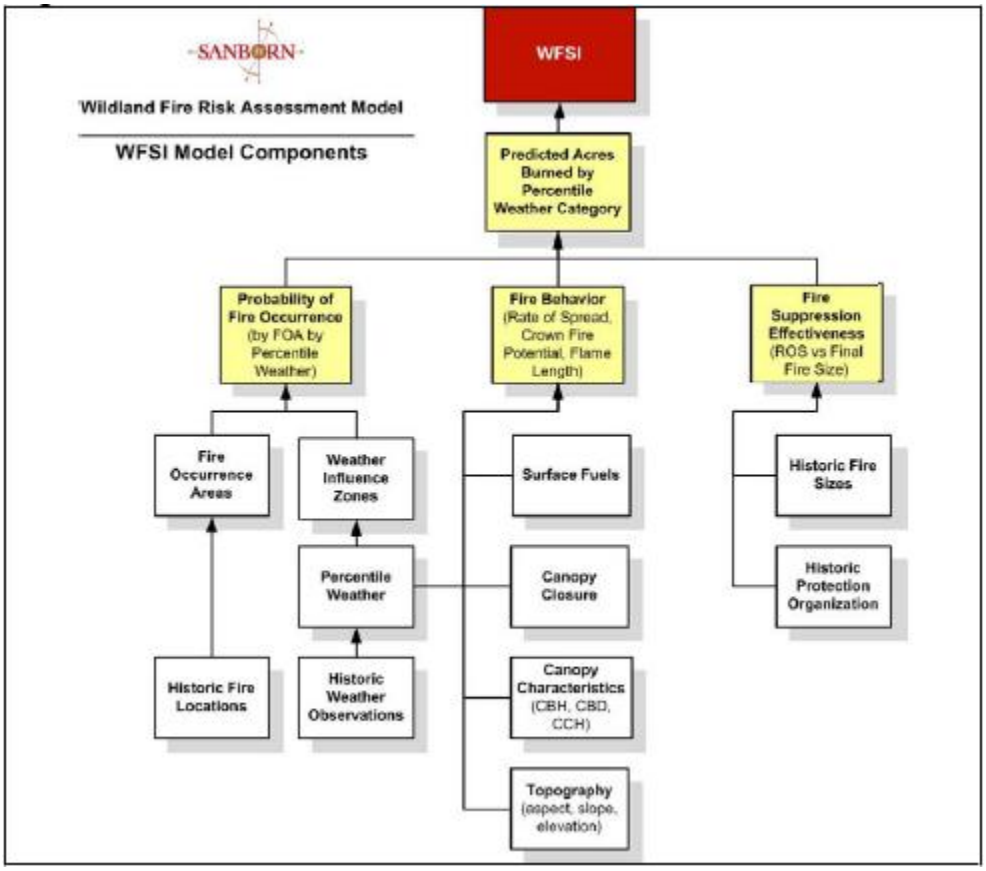
1. Identify areas where mitigation measures may be of value
2. Facilitate communication, better define priorities and improve emergency response
3. Develop a refined analysis of a complex landscape and fire situations using GIS
4. Facilitate communication with local residents to address community priorities and needs

The four principal GIS deliverables are:

1. Development of the Wildland Fire Susceptibility Index (WFSI)
2. Development of the Fire Effects Index (FEI)
3. Development of the Level of Concern (LOC)
4. Development of the Fire Response Accessibility Index (FREI)

The WFSI was selected for use in this report because it represents the key index from the SWRA that can support current fire planning needs of southern fire management agencies. The WFSI is a value between 0 and 1 that represents the likelihood that a given acre will burn. The following figure presents the WFSI model.

Figure 1.3: WFSI Model Components



Source: Florida Forest Service

WFSI integrates the probability of an acre igniting and the expected final fire size based on the rate of spread in four weather percentile categories into a single measure of wildland fire susceptibility. WFSI is comprised of three main data elements:

1. Fire Occurrence
2. Fire Behavior
3. Fire Suppression Effectiveness

Using the same categories of general building stock provided in the HAZUS-MH 2.0 model, the 2010 Leon County Property Appraiser parcel level data was used to produce the value estimates of those properties at risk for wildfire.

III. GIS Vulnerability and Risk Assessment Results

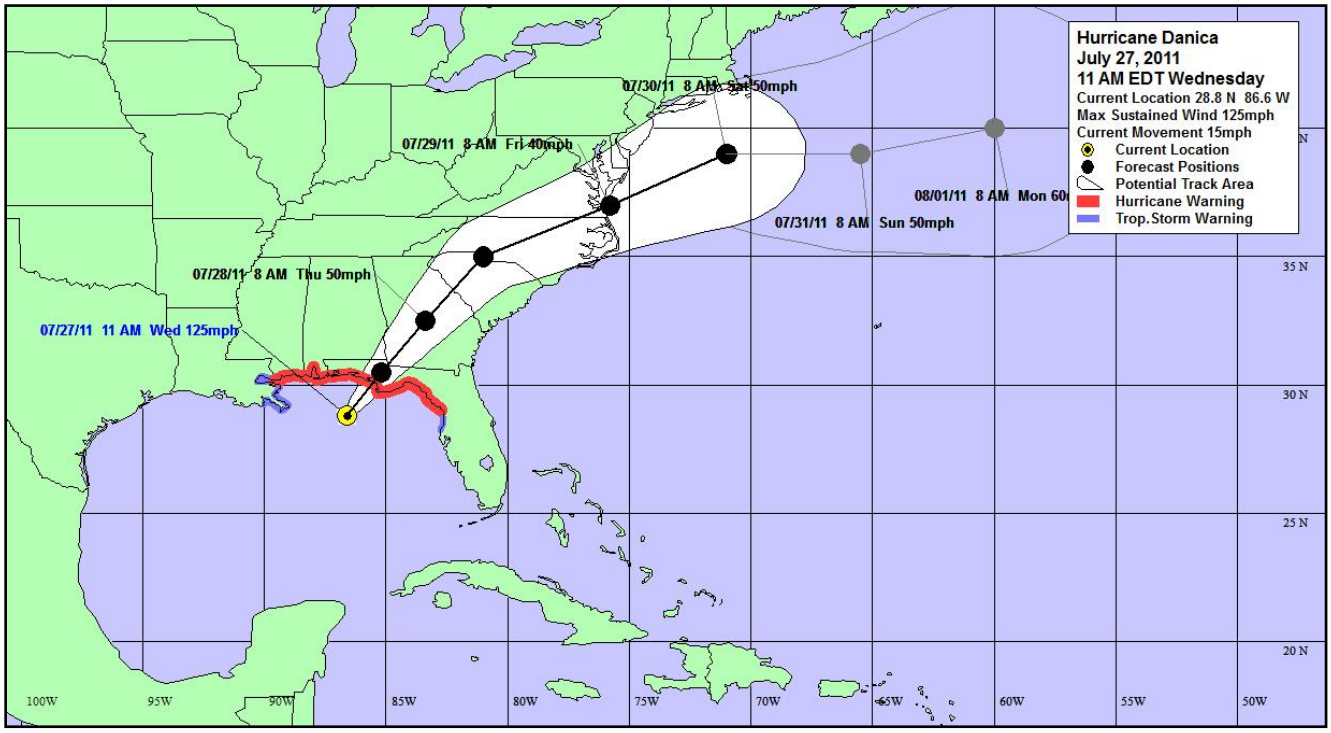
The data sources discussed in the previous section were used to conduct the vulnerability and risk assessment. The vulnerability assessments results were generated using the Tallahassee/Leon County GIS Department's geospatial databases for improved property (structures), critical facilities, other essential facilities and properties of cultural

significance. Building vulnerability was assessed using HAZUS-MH 2.0 for hurricane wind and flooding and by performing a parcel level analysis for wildfire.

A. Hurricane Wind Analysis

For comparison purposes, the Focus Group agreed to use two deterministic scenarios to examine potential impact from a tropical weather event. The Tallahassee Office of the National Weather Service provided three tropical weather scenarios for input into the HAZUS-MH 2.0 Wind Model. These scenarios included a slow moving, category 1 hurricane with heavy rain, a category 1 storm with a similar path to hurricane Kate and the devastating storm of 1877 and the same hurricane as a category 3 storm. The figure below shows the path of the category 3 hurricane.

Map 1.3: Category 3 Hurricane Path



Source: National Weather Service

Based on the default data included in HAZUS-MH, which uses U.S. Census 2000 tract data and 2006 R.S. Means building valuations, there is an estimated 96,877 buildings with a total dollar exposure of over $16 billion dollars in Leon County. The building count and dollar exposure, by property type, are listed in table below.

Table 1.2: General Building Stock in Leon County		
Property Type	**Number of Properties**	**Value**
Residential	71,205	$12,174,373,000
Commercial	17,244	$2,940,634.000
Government	2,131	$372,588,000
Industrial	2,034	$342,449,000
Education	1,647	$278,244,000
Religious	2,423	$407,518,000
Agriculture	291	$46,716,000

Source: HAZUS-MH 2.0

The table below lists the facilities included in HAZUS-MH 2.0 the model; whenever possible local data was used to augment the model data. The facilities with an * are considered to be "essential" facilities by FEMA and are included in calculating damages.

Table 1.3: Essential Facilities	
Facility	**Data Source**
Fire Stations*	HAZUS and local GUS Data
Police Stations*	HAZUS
EOCs*	HAZUS and local GIS Data
Communications	HAZUS
Medical Care Facilities*	HAZUS
Schools*	HAZUS and Local GIS Data
General Building Stock *	HAZUS
Dams and Levees	HAZUS
Highways	HAZUS
Railways	HAZUS
Bus	HAZUS
Airport	HAZUS
Wastewater Facilities	HAZUS
Electric Generating Facilities	HAZUS
Hazardous Materials	HAZUS
Demographics	HAZUS

Source: HAZUS-MH 2.0

1. Category 3 Hurricane Deterministic Scenario
   HAZUS-MH 2.0 calculates losses that are due to building and contents damage and monetary losses resulting from loss of function. Losses are not calculated for individual buildings, but instead are based on the performances of entire occupancy classes of buildings (i.e., residential, commercial and other). Based on the category 3 hurricane deterministic scenario input into HAZUS-MH 2.0, the model estimates that approximately 14,000 buildings will be moderately damaged and 325 buildings will be totally destroyed. The tables below display the estimated economic losses by property type and the estimated damage count also by property type.

Table 1.4: Economic Loss - Category 3 Hurricane

Property Type	Value
Residential	$815,451,000
Commercial	$155,732,000
Industrial	$19,667,000
Other	$51,642,000
Business Interruption	$209.048,000
Total Direct Economic Loss	$1,251,540,000

Source: HAZUS-MH 2.0

Table 1.5: Damage by Property Type – Category 3 Hurricane

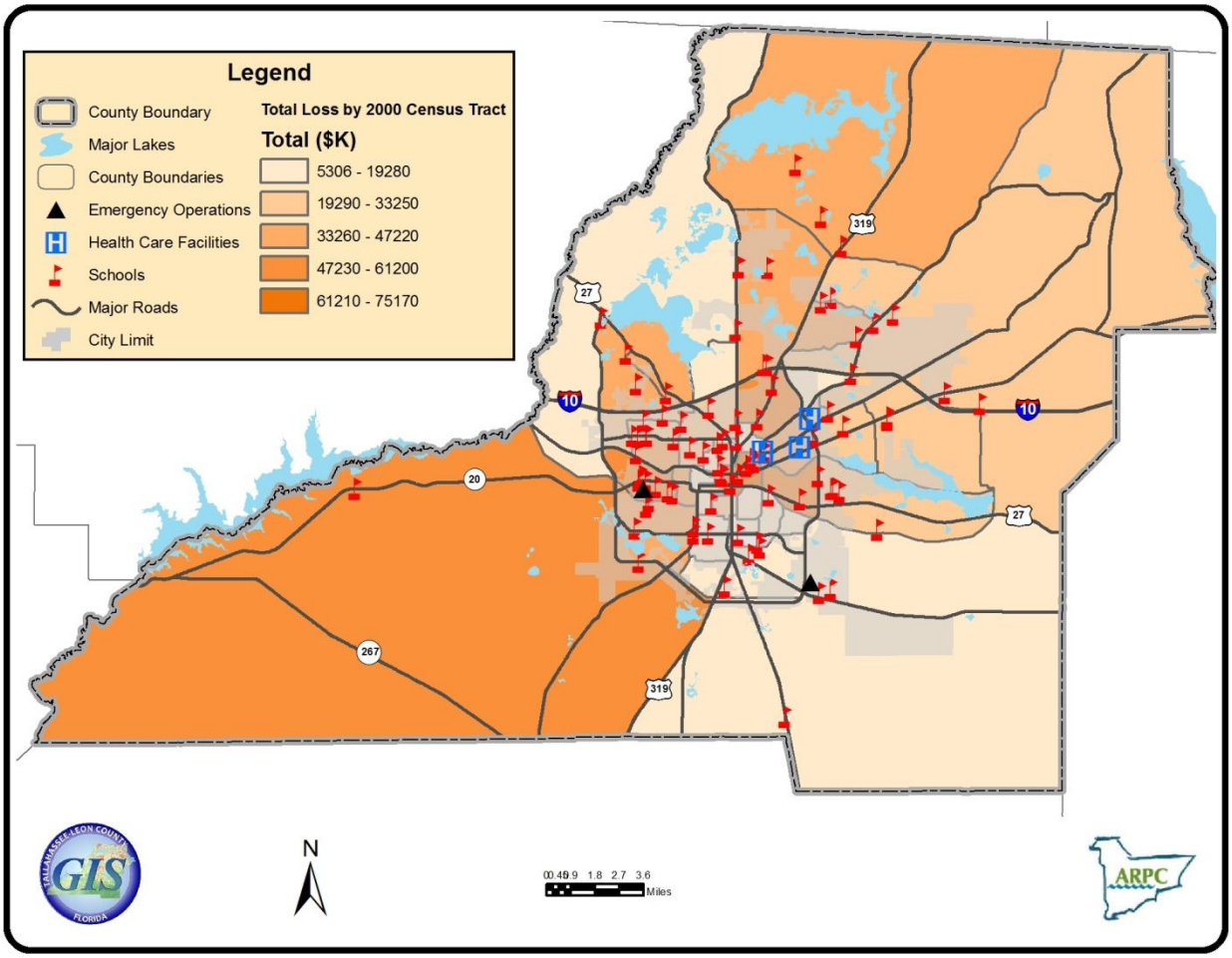
Property Type	Moderate	Severe	Destruction
Residential	10,560	1,046	311
Commercial	1,203	307	6
Government	85	29	0
Industrial	258	86	3
Education	46	15	0
Religious	102	26	0
Agriculture	51	27	5

Source: HAZUS-MH 2.0

   a. The total property damage losses were $1.25 billion, the largest loss was sustained by residential occupancies which account for over 75% of the total loss. Approximately 1,375 residences will be damaged enough to displace those families for a lengthy duration of time. This will require both long-term housing and social services to be provided if these families are to remain in the community. The maps below display the

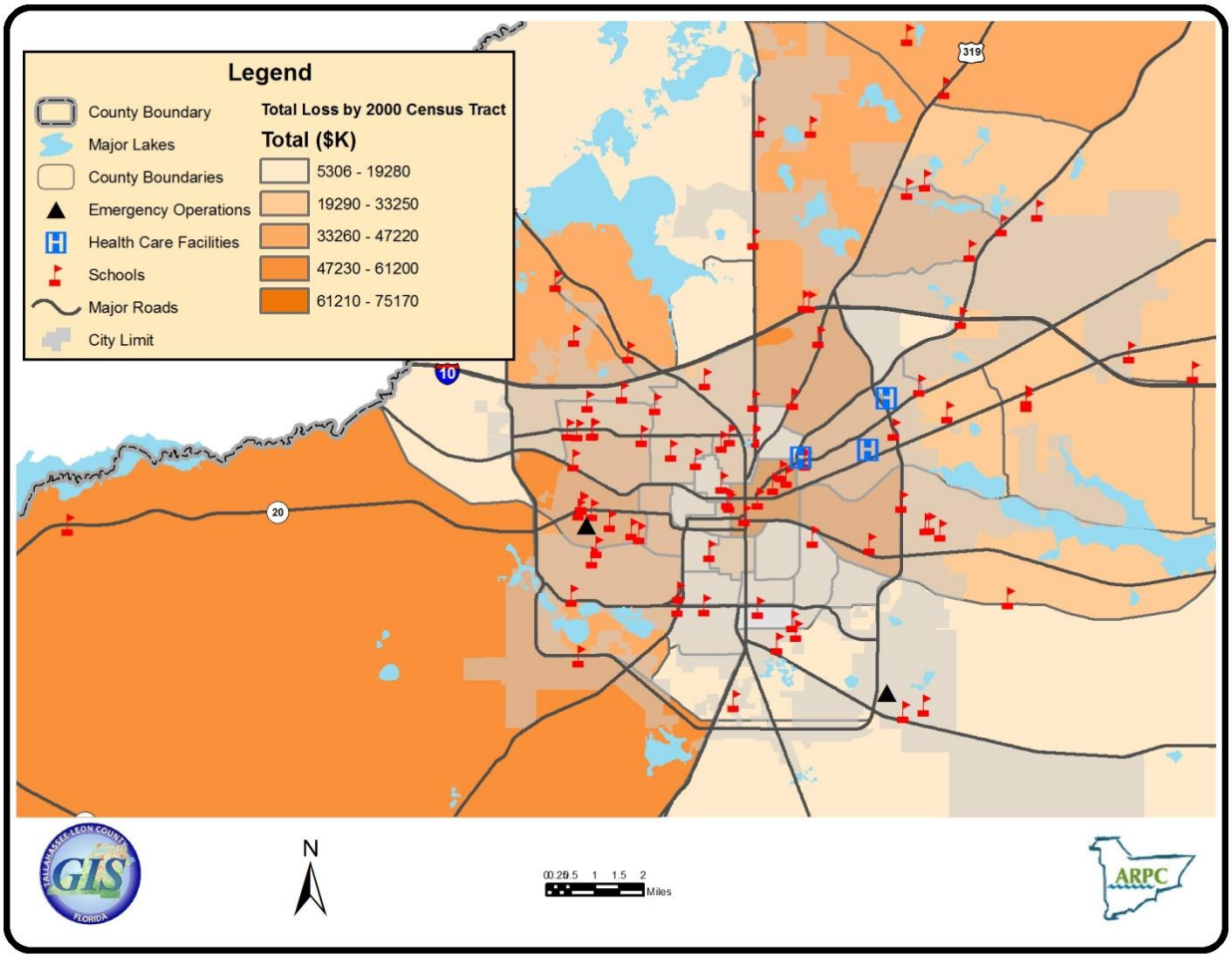
extent of loss by census tract in both the county and the city for the hypothetical category 3 hurricane used for the HAZUS MH3 model.

Map 1.4: Category 3 Hurricane* Loss by Census Tract – Leon County



Source: HAZUS-MH 2.0; *Losses are calculated for a hypothetical category 3 hurricane.

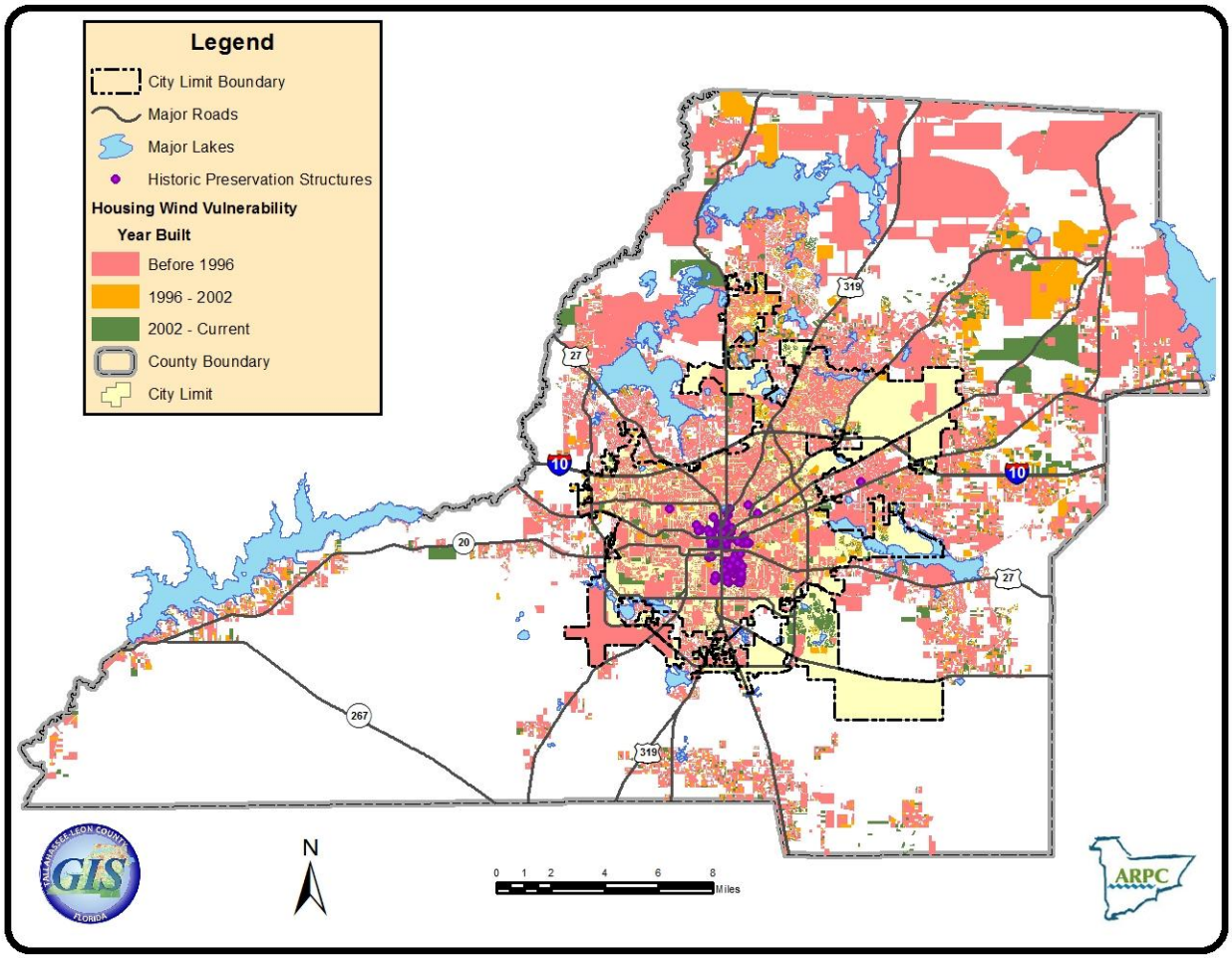
Map 1.5: Category 3 Hurricane Loss* by Census Tract – City of Tallahassee



Source: HAZUS-MH 2.0; *Losses are calculated for a hypothetical category 3 hurricane

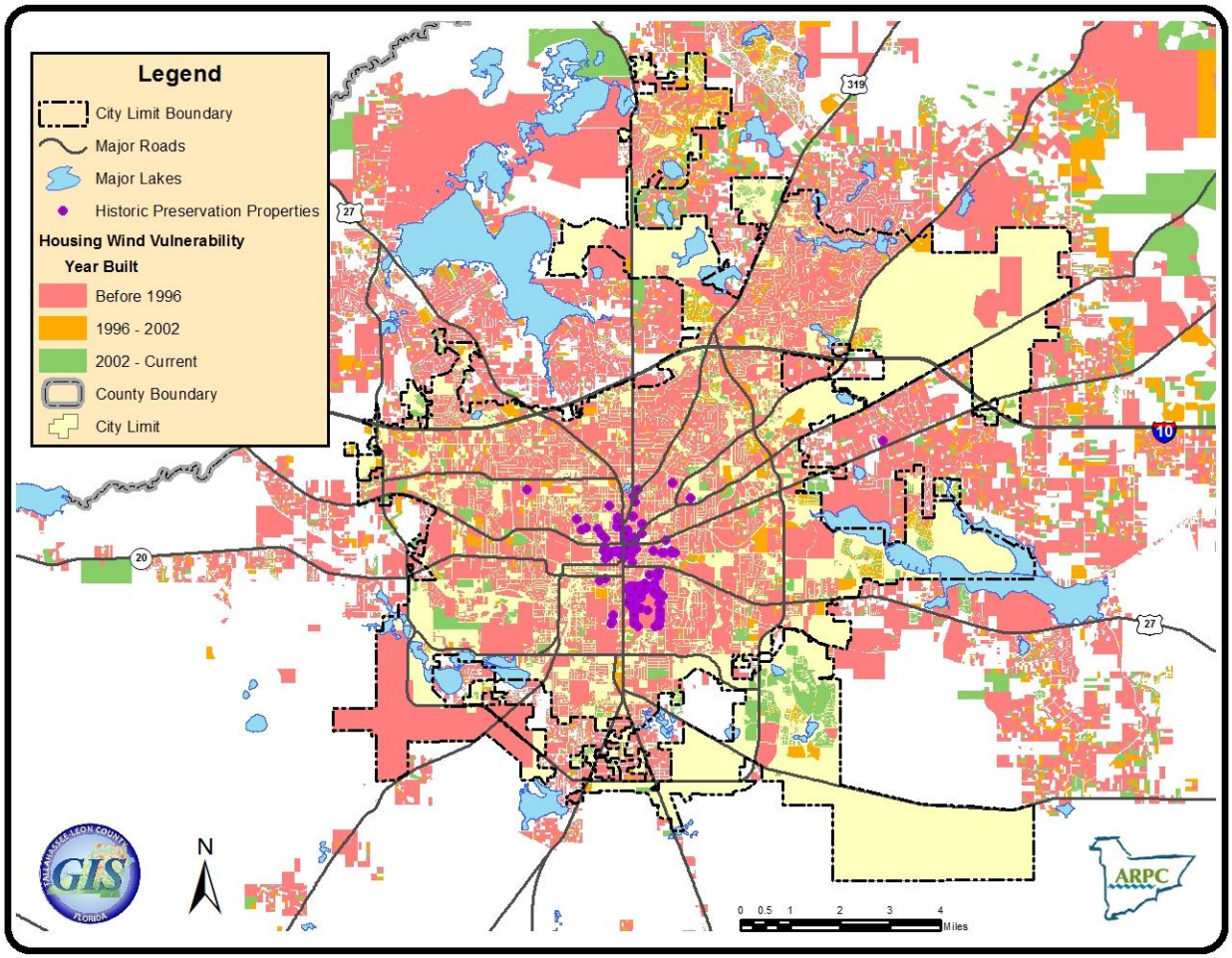
b. In 1951 the City of Tallahassee officially adopted the Southern Standard Building Code by ordinance as the first building code in the city. The Leon County Building Inspection Department was established in 1973 and the 1976 Standard Building Code was adopted. The 2001 Florida Building Code (FBC) was the first statewide code issued and was adopted by both the city and the county. Both the city and the county adopted and enforce the FBC which became effective March 1, 2009. Working with the Leon County Property Appraiser database and building officials from both the City of Tallahassee and Leon County, structural vulnerability was determined based on building codes in place in over the last six decades. The following maps indicate structural vulnerability based on the date of construction in the city and the county. They also include properties on the National Register of Historic Places.

Map 1.6: Housing Vulnerability – Leon County



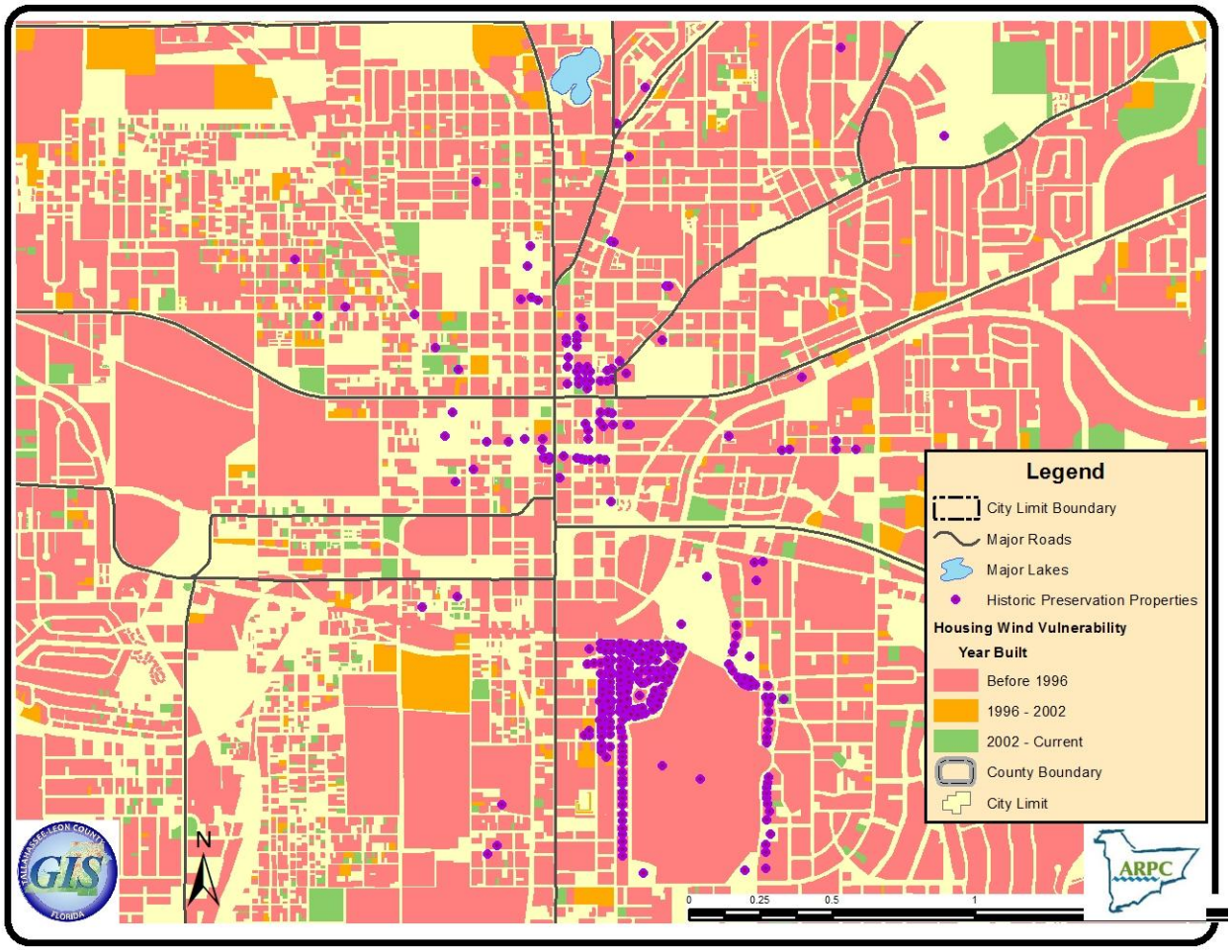
Source: Tallahassee-Leon County GIS

Map 1.7: Housing Vulnerability – City of Tallahassee



Source: Tallahassee-Leon County GIS

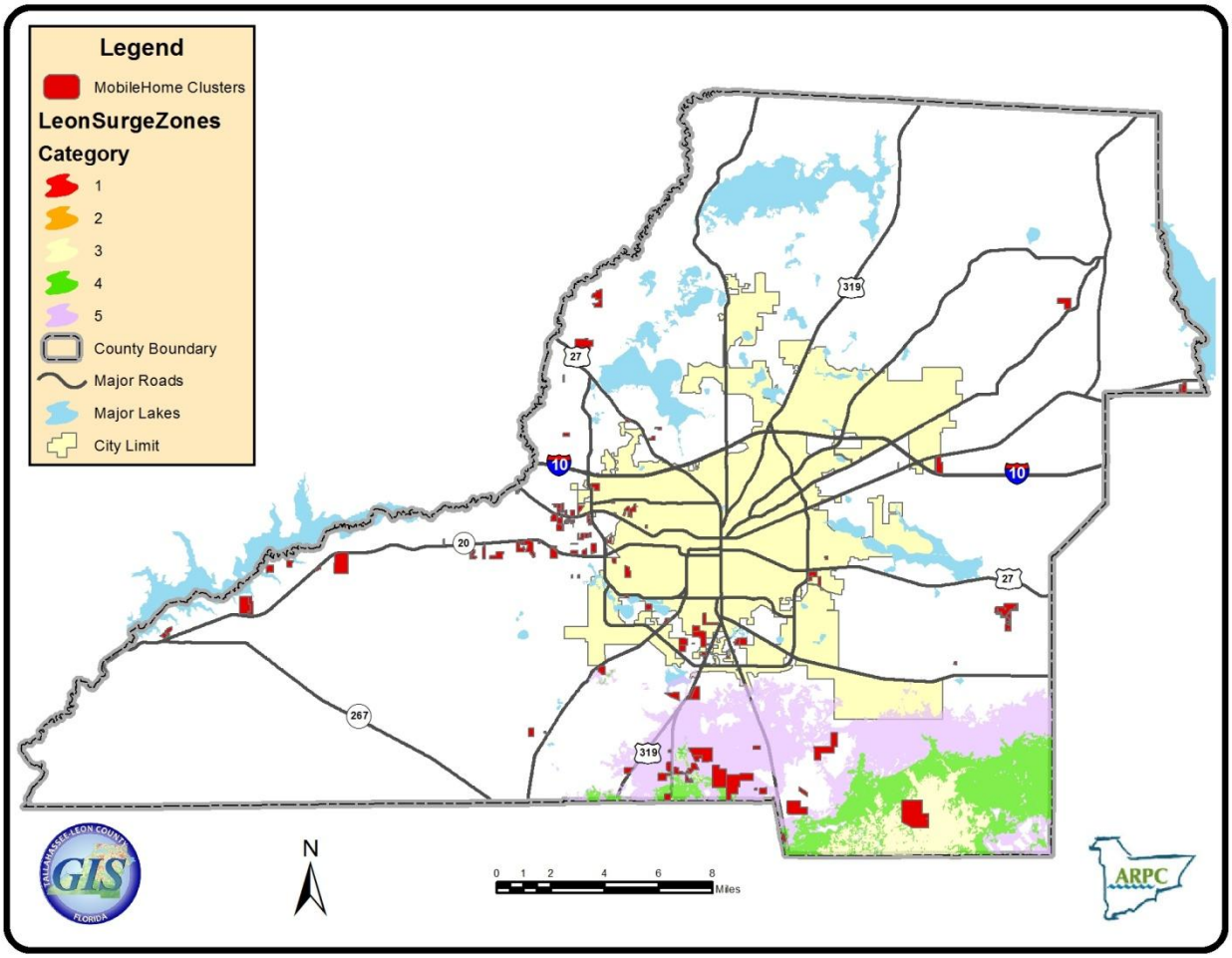
Map 1.8: Historic Properties in the City of Tallahassee



Source: Tallahassee-Leon County GIS

c. Mobile homes are particularly susceptible to hurricanes. Several mobile home clusters are located within storm surge zones as indicated in the map below.

Map 1.9: Mobile Home Cluster and Hurricane Storm Surge



Source: Tallahassee-Leon County GIS

2. Category 1 Hurricane Deterministic Scenario
   In comparison, the economic loss from a category 1 hurricane is significantly less than that of the same hurricane categorized as a category 3 storm. The estimated total property damages are $178 million, but again the largest loss was to residences which accounted for 90% of the total loss. The number of households that may need long-term housing is also significantly less. Less than 15 residences will be significantly damaged in comparison with more than 1,350 from the same hurricane making landfall as a category 3 storm. The tables below display the economic loss and damage by property type for an impact from a category 1 hurricane.

Table 1.6: Economic Loss - Category 1 Hurricane	
Property Type	**Value**
Residential	$147,949,000
Commercial	$8,443,000
Industrial	$555,000
Other	$1,458,000
Business Interruption	$19,217,000
Total Direct Economic Loss	$177,622,000

Source: HAZUS-MH 2.0

Table 1.7: Damage by Property Type – Category 1 Hurricane			
Property Type	**Moderate**	**Severe**	**Destruction**
Residential	646	11	0
Commercial	86	3	0
Government	3	0	0
Industrial	8	1	0
Education	1	0	0
Religious	3	0	0
Agriculture	4	4	0

Source: HAZUS-MH 2.0

3. Slow Moving Category 1-2 Hurricane
   This scenario had a completely different storm track than that of the deterministic scenario used above. In this scenario, the storm made landfall with the eye going directly over the City of Tallahassee. This scenario accounted for heavy driving rain and the damage associated with a slower moving tropical weather event. Total property damage losses totaled $887 million with residential structures accounting for 77% of the total loss.

Table 1.8: Economic Loss from Slow Moving Hurricane	
Property Type	**Value**
Residential	$603,599,000
Commercial	$101,407,000
Industrial	$11,486,000
Other	$33,249,000
Business Interruption	$137,183,000
Total Direct Economic Loss	$886,924,000

Source: HAZUS-MH 2.0

Table 1.9: Damage by Property Type – Slow Moving Hurricane			
Property Type	**Moderate**	**Severe**	**Destruction**
Residential	7,270	503	127
Commercial	898	169	3
Government	66	17	0
Industrial	177	45	2
Education	34	8	0
Religious	73	14	0
Agriculture	38	19	3

Source: HAZUS-MH 2.0

4. Behavioral Analysis
   According to the Apalachee Regional Evacuation Study published in 2010, 70% of the population residing in mobile or manufactured homes intends to evacuate for a category 3 hurricane while only 20% of the residents state they will leave if they live in a site built home. The majority of the evacuating population, 70% from site built homes and 50% from mobile or manufactured homes, state they will leave county while less than 10% intend to use public shelter. The table below display evacuation rates for Leon County.

Table 1.10: Leon County Evacuation Rates					
Housing Type	**Storm Threat Scenario**				
	Cat 1	**Cat 2**	**Cat 3**	**Cat 4**	**Cat 5**
Site Built	5%	10%	20%	25%	30%
Mobile or Manufactured Home	50%	55%	70%	80%	85%

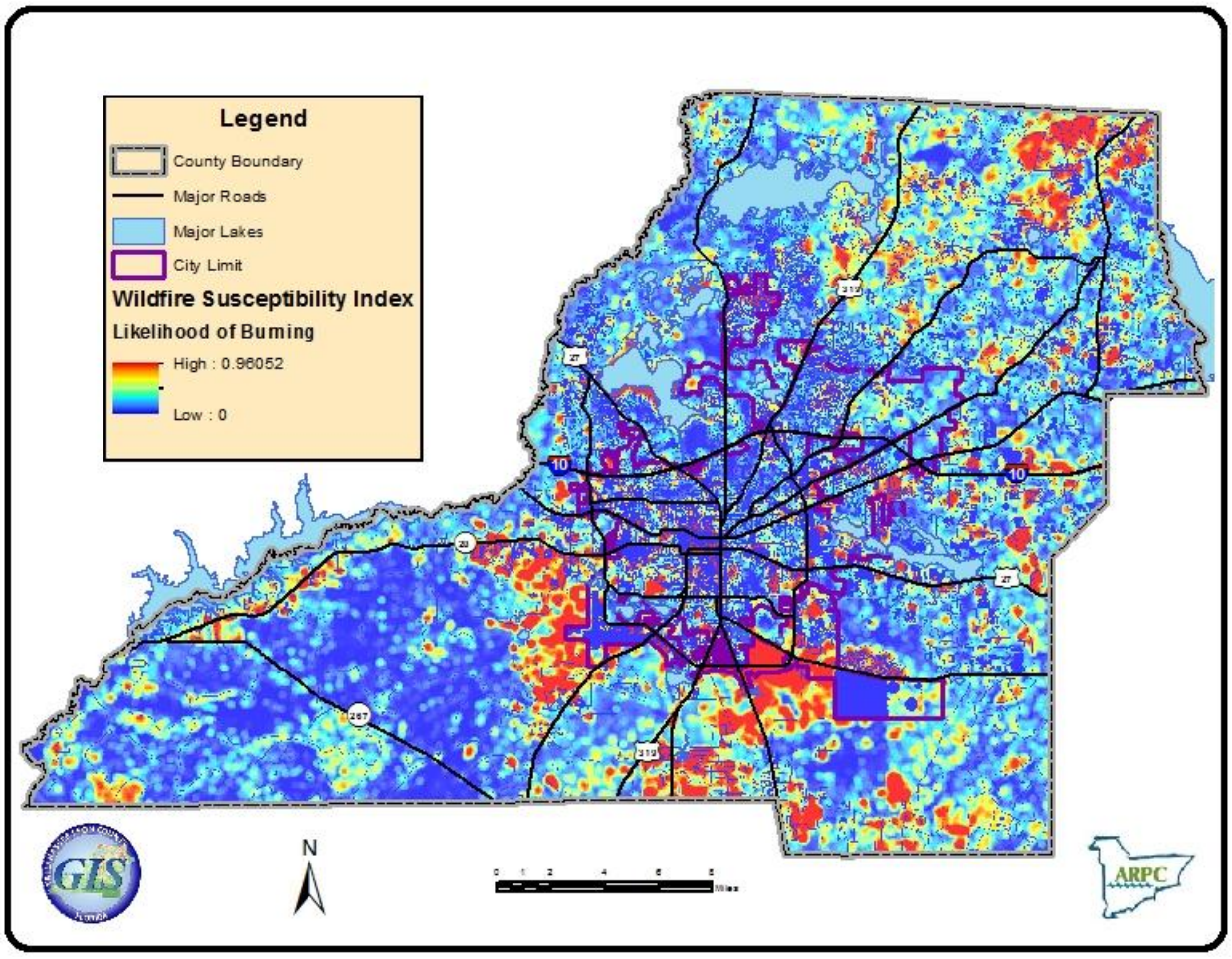
Source: Apalachee Regional Evacuation Study, 2010

B. Wildfire Analysis

The Florida Division of Forestry (DOF) responds to fire events on land outside the city limits. As of November 1998, the DOF's jurisdiction included 214,877 out of the nearly 450,000 acres in Leon County. Of the five counties in Fire District Four (Leon, Gadsden, Jefferson, Wakulla and Franklin Counties) Leon has produced the least number of fires requiring a DOF response. This may be largely due to a lower concentration of combustible fuel types and the significant amount of controlled burning that takes place on a regular basis. For example, large areas in the north and northeast are held as plantations and frequently use controlled burns as a land management tool. Additionally, a significant portion of the southwestern area of the county lies within the Apalachicola National Forest. There is no significant habitation within its borders and the area immediately

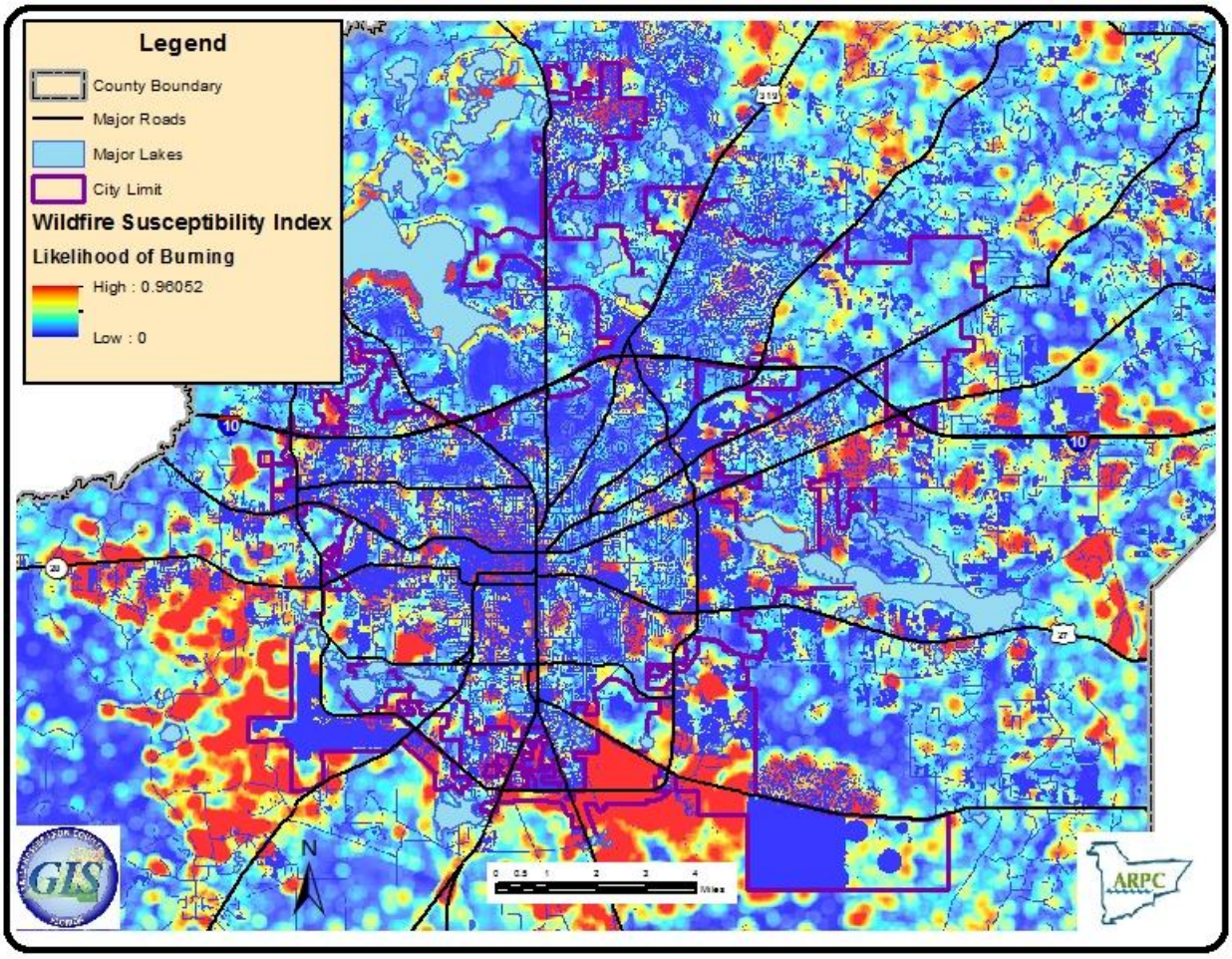
surrounding the forest contains limited development. The two maps below show the wildfire risk for both the City and the County using the methodology previously discussed.

Map 1.10: Wildfire Risk – Leon County



Source: Florida Division of Forestry

Map 1.11: Wildfire Risk – City of Tallahassee



Source: Florida Division of Forestry

While residents may experience a periodic blanketing of smoke, the regular use of prescribed burns by Forest Service personnel reduces the risk of wildfire. The table below displays the historical occurrences of wildfires in Leon County between 1999 and 2000.

Table 1.11: Historical Occurrence of Wildfires in Leon County, 1999 – 2009

Primary Causes	Total Number of Wildfires	Total Acres
Escaped Debris Burns Children Incendiary Equipment Use Lightning	180	1,858

Source: Florida Division of Forestry, 2009

Using the same categories of general building stock provided in the HAZUS-MH 2.0 model, the 2010 Leon County Property Appraiser parcel level data was used to produce the value estimates of those properties at risk for wildfire. The two tables below display a breakdown of total value by property type for the City and the County. It is important to note that these are total property values, not damage values based on the impact of a wildfire.

Table 1.12: Fire Loss Estimates – City of Tallahassee

Property Type	Number of Properties	Value (in dollars)
Residential	4,015	$890,279,779
Commercial	678	$781,059,979
Government	195	$1,565,484,628
Industrial	55	$37,168,980
Education	42	$1,900,844,161
Religion	43	$62,035,540
Agriculture	9	$12,422,559
Vacant	754	$86,696,502

Source: Leon County Property Appraiser, 2010

Table 1.13: Fire Loss Estimates – Leon County

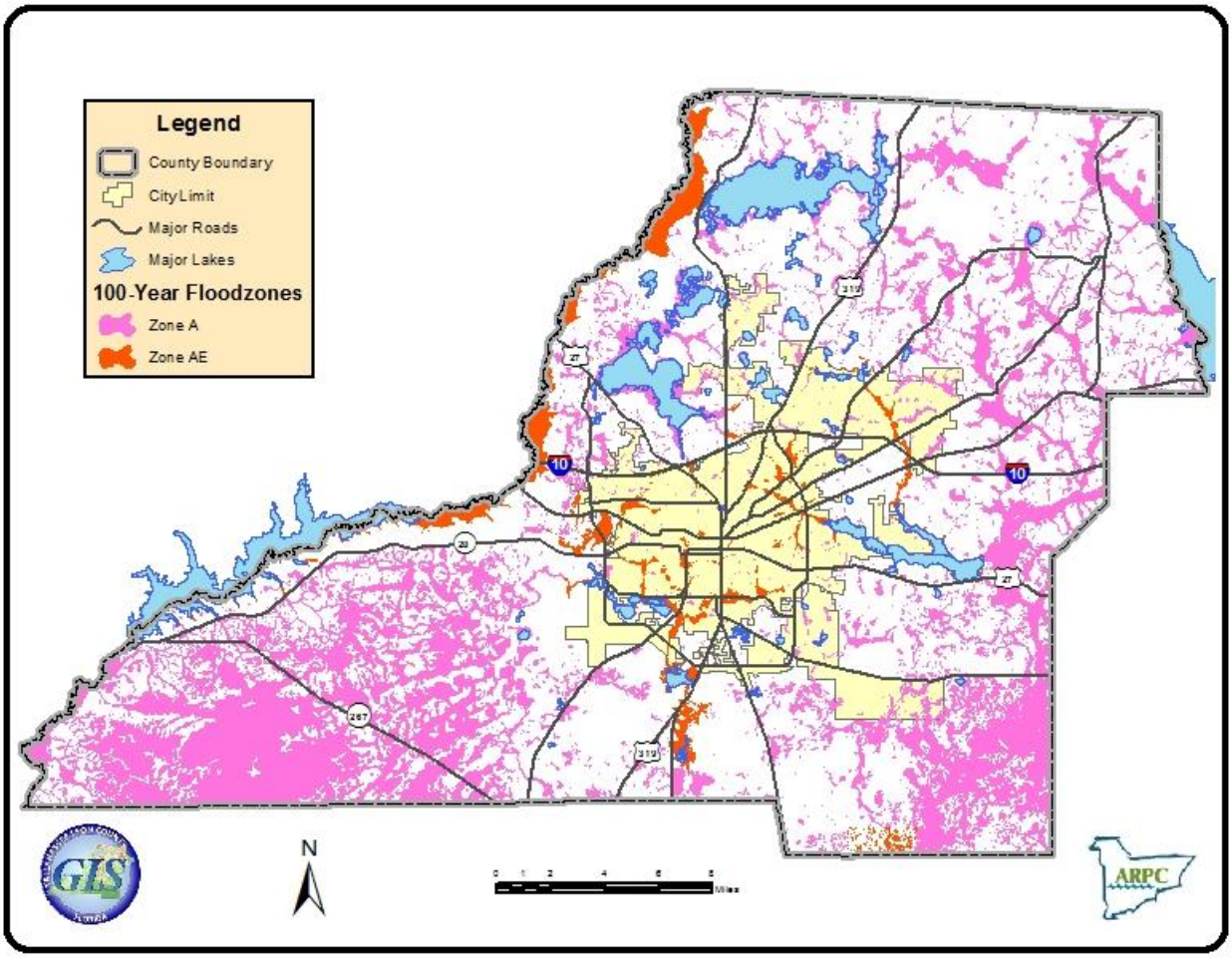
Property Type	Number of Properties	Value (in dollars)
Residential	3,467	$478,138,684
Commercial	87	$95,815,349
Government	92	$141,385,882
Industrial	45	$16,333,050
Education	4	$47,292,350
Religion	23	$17,307,814
Agriculture	215	$242,855,609
Vacant	1,043	$86,538,194

Leon County Property Appraiser, 2010

C. Flooding Analysis

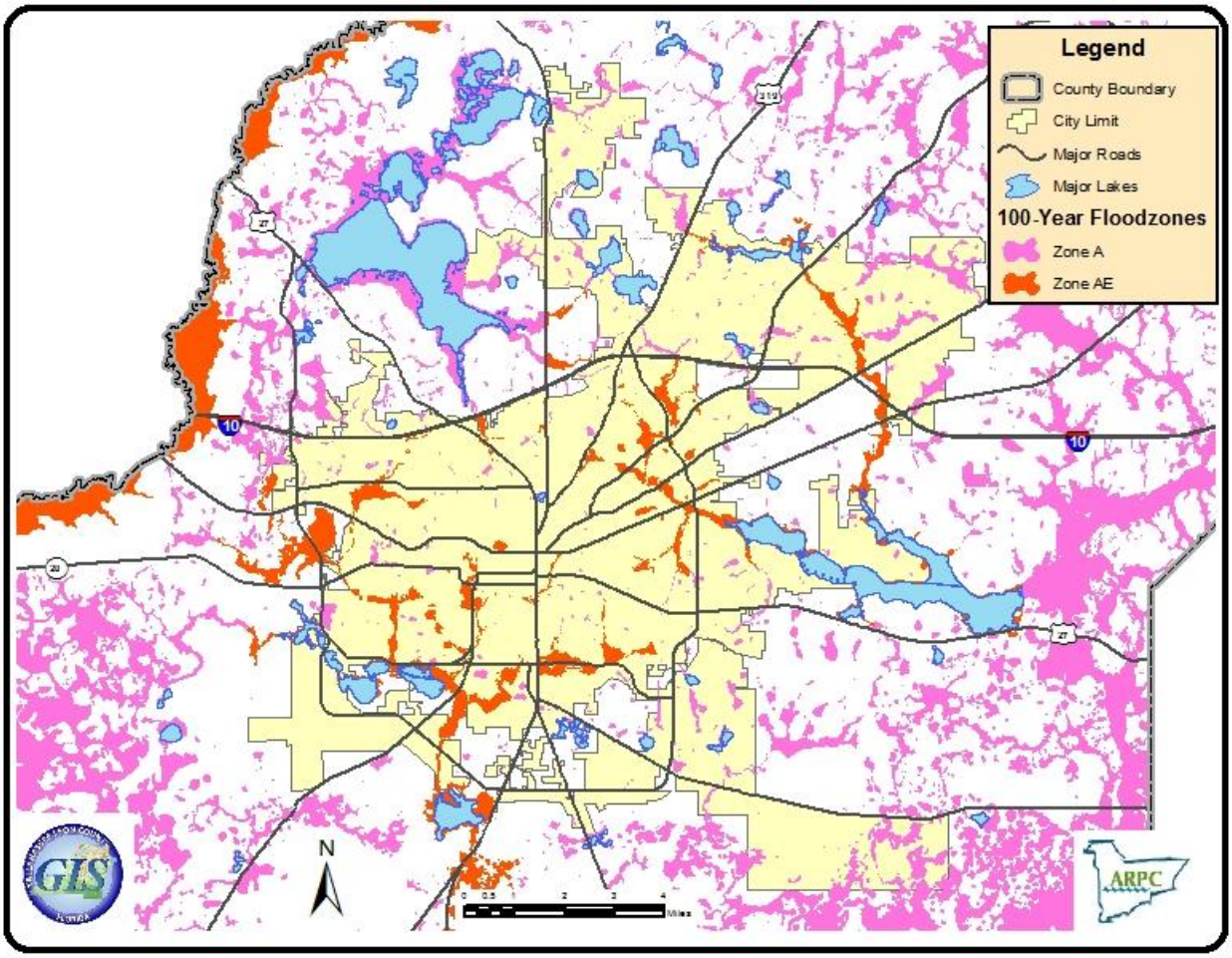
The 100-year flood event, which has a one percent chance of occurring in any given year, is used as the base flood for the purpose of flood mitigation planning. The boundaries of the 100-year floodplain as designated by the FEMA Flood Insurance Rate Maps (FIRM), in Leon County and the City of Tallahassee are indicated in the maps below.

Map 1.12: 100-Year Flood Plain – Leon County



Source: Tallahassee-Leon County GIS

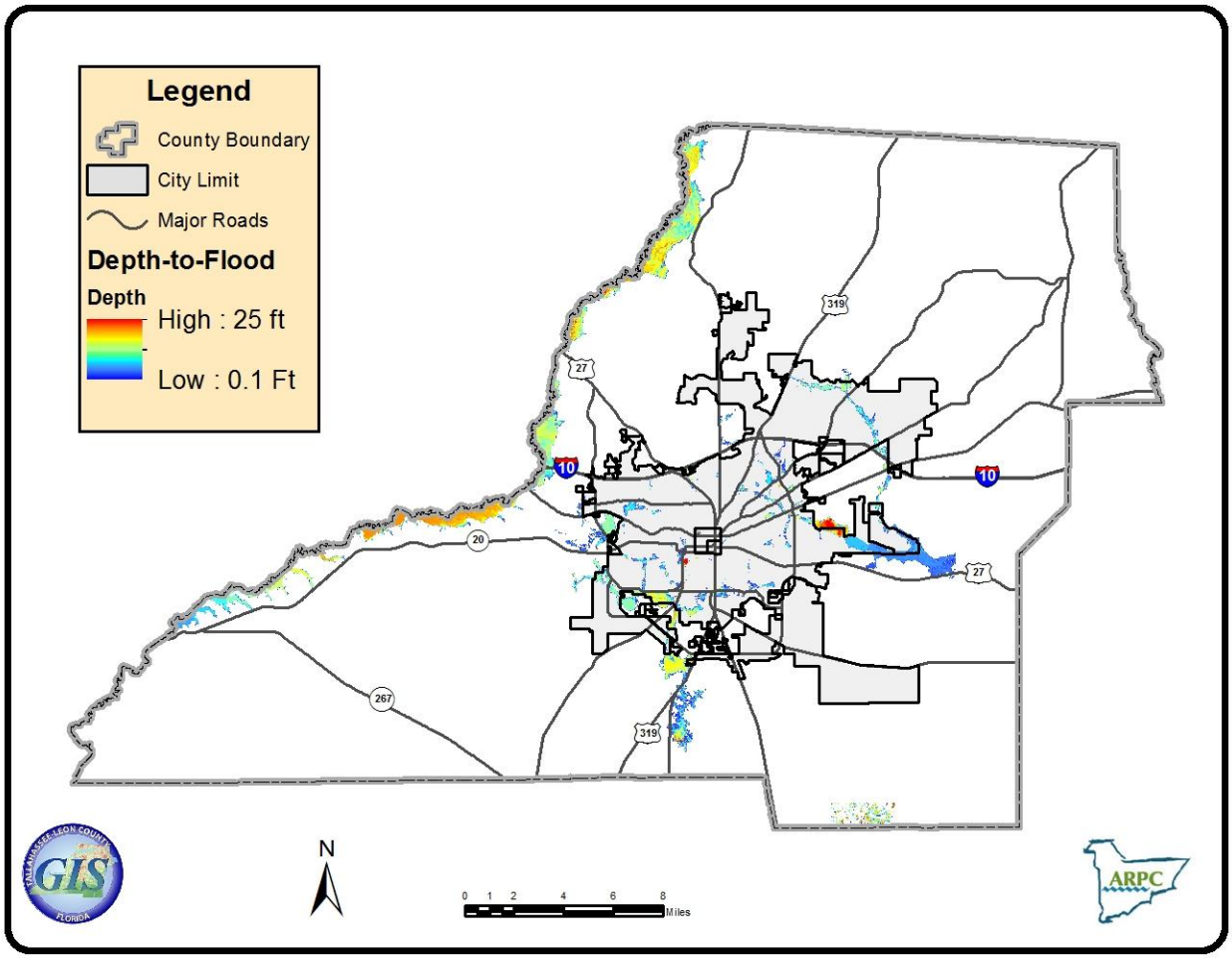
Map 1.13: 100-Year Floodplain – City of Tallahassee



Source: Tallahassee-Leon County GIS

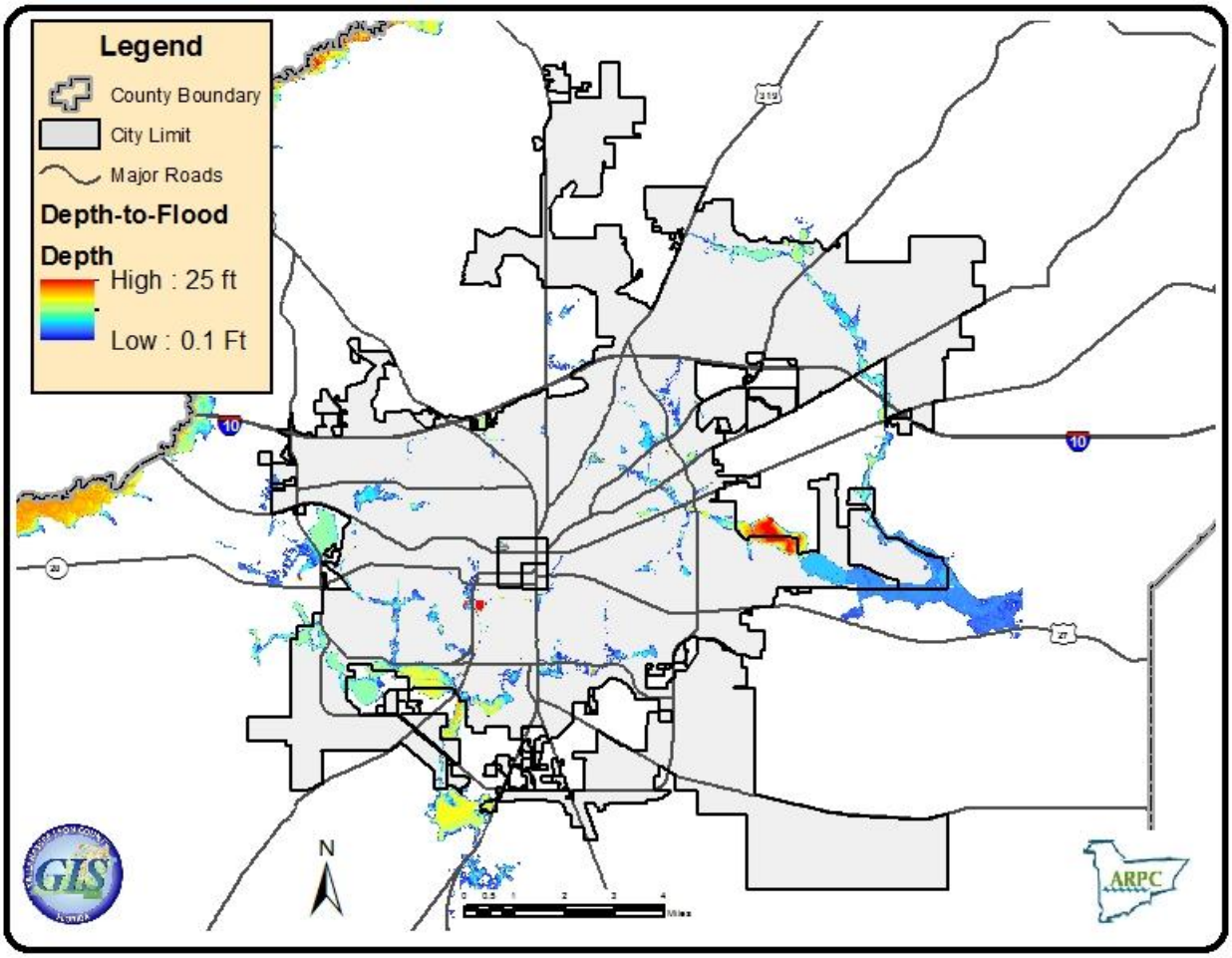
These maps note a distinction between Zones A and AE in the 100-year floodplain. For those areas categorized as Zone AE, engineering data exists that was used to calculate the Base Flood Elevation. This data is necessary for the HAZUS-MH 2.0 model to calculate potential economic loss and this process was described in section IIA2c above. The maps below show the depth of flooding for Zone AE.

Map 1.14: Zone AE Depth-to-Flood – Leon County



Source: Tallahassee-Leon County GIS

Map 1.15: Zone AE Depth-to-Flood – City of Tallahassee



Source: Tallahassee-Leon County GIS

HAZUS-MH 2.0 estimated that the total economic loss for a 100-year flood event is $269 million. It has been a long standing land use policy not to develop areas of the floodplain, so the overall percentage of buildings at risk from flooding of this type is lower. However, it must be remembered that a good portion of the 100-year floodplain is not accounted for in these calculations because it is categorized in Zone A. The table below displays the economic loss by property type. Similar to the hurricane scenarios the greatest impact is to residential properties which make up 55.73% of the total loss.

Table 1.14: Economic Loss from 100-Year Flood Event	
Property Type	**Loss**
Residential	$149,990,000
Commercial	$83,520,000
Industrial	$13,740,000
Other	$20,600,000
Total Direct Economic Loss	$267,840,000

Source: HAZUS-MH 2.0

Table 1.15: Critical Facilities Located in Known Hazard Zones				
Facility	**Hazard**			
	FEMA Zone A	**FEMA Zone AE**	**Wildfire**	**Storm Surge**
Pineview Elementary School		X		
Belle Vue Middle School	X			
Florida High School			X	
John Paul II Catholic High School			X	
Station 13				X

Source: Tallahassee-Leon County GIS

1. National Flood Insurance Program (NFIP)
   The NFIP is administered by FEMA and assists homeowners and renters with flood insurance if their community participates in the program. To be eligible, a community must enforce sound floodplain management standards. Participation in the NFIP affords some protection for properties located within the 100-year floodplain. There are 10,597 parcels in the 100-year floodplain which account for over $6 billion worth of property and structures with the potential for damage in the event of a 100-year flood event. As of May 31, 2011, 3,987 NFIP policies had been issued in Leon County and the City of Tallahassee.

Table 1.16: Leon County/City of Tallahassee NFIP Policies as of May 31, 2011			
Jurisdiction	**Policies In-force**	**Insurance In-force**	**Written Premium In-force**
Leon County (Unincorporated Areas)	1,649	$409,367,600	$811,426
City of Tallahassee	2,338	$525,609,900	$1,381,408
Total	**3,987**	**$934,977,500**	**$2,192,834**

Source: FEMA Policy Claim and Statistics for Flood Insurance, 2011

Table 1.17: Leon County/City of Tallahassee Parcels in the 100-Year Flood Plain, 2010						
Improvement Type	**City of Tallahassee**			**Unincorporated Leon County**		
	Number	**Percent**	**Value ($)**	**Number**	**Percent**	**Value ($)**
Residential	3,987	66	898,830,073	5,066	47	1,122,274,373
Mobile Home	81	1	6,708,908	1,387	13	119,916,427
Commercial	542	9	585,061,256	112	1	83,547,102
Other*	1,439	24	1,977,811,632	4,259	39	1,235,359,054
Total	**6,049**	**100**	**3,468,411,869**	**4,548**	**100**	**2,561,096,956**

Sources: Tallahassee-Leon County Planning Department, Existing Land Use Database, 2008; Leon County Property Appraiser 2010 Tax Roll Data; 100 Year Floodplain, Tallahassee-Leon County GIS

The two largest parcels in the "other" category in terms of market value include the Florida State University (FSU) parcel containing Doak Campbell Stadium and most of the main campus of the Tallahassee Community College (150 acre parcel). FSU staff also identified six structures on campus that are within the 100-year flood plain. Valuations for these structures are included in the figures above. Combined, these values equal two-thirds of the market value of the "other" category for the City of Tallahassee. Three-fourths of the market value of "other" for Unincorporated Leon County was for the Chiles High School parcel.

From 1978 to March 2011, there were 782 countywide losses for flood related claims that were paid in the amount of $9.1 million throughout Leon County. The table below provides a list of losses in Leon County.

Table 1.18: NFIP Flood Losses and Payments by Jurisdiction, 1978 – March 2011		
Jurisdiction	**Total NFIP Losses**	**Total Payments (in dollars)**
City of Tallahassee	254	$3,162,050
Leon County	528	$5,920,934
Countywide Total	782	$9,082,984

Source: FEMA NFIP

a. Repetitive Flood Loss Properties

It is important to note that not all property within the floodplain is equally vulnerable to flooding. Typically, a small proportion of parcels experience more frequent flooding and are considered a higher priority for flood mitigation actions. A Repetitive Loss (RL) property is any insurable building for which the National Flood Insurance Program (NFIP) paid two or more claims of more than $1,000 within any rolling ten-year period, since 1978. At least two of the claims must be more than 10-days apart but, within ten-years of each other. A RL property may or may not be currently insured by the NFIP. In the City of Tallahassee, there are currently 54 properties identified as repetitive loss properties. Approximately 56 percent of RL properties have reported only two losses. The tables below display the number of repetitive loss properties in the City of Tallahassee and Leon County by type and by hazard. Also included is a table that provides a list of repetitive loss properties acquired by Leon County and the City of Tallahassee.

Table 1.19: Leon County Repetitive Loss Properties by Type

Occupancy	Number of Repetitive Loss Properties		Total
	Leon County	City of Tallahassee	
Single-Family	62	42	**104**
Multi-Family	1	12	**13**
Non-Resident	1	23	**24**

Source: TLC GIS; Tallahassee-Leon County Planning Department, 2011

Table 1.20: Leon County Repetitive Loss Properties by Hazard Area

Hazard Area	Number of Repetitive Loss Properties		Total
	Leon County	City of Tallahassee	
FEMA 100-Year Flood Plain	13	58	**71**
Category 3 Storm Surge	1	0	**1**
Category 4 Storm Surge	4	0	**4**
Category 5 Storm Surge	2	0	**2**

Source: TLC GIS; Tallahassee-Leon County Planning Department, 2011

Table 1.21: City of Tallahassee Acquired Repetitive Loss Properties			
Property Address	**Funding Source**	**Purchase Date**	**Purchase Price**
300 Lindgren Avenue	HMGP	1996	$62,000.00
Lindgren Avenue	HMGP	1996	$10,000.00
Lindgren Avenue	HMGP	1996	$16,000.00
309 Lindgren Avenue	HMGP	1996	$83,000.00
321 Lindgren Avenue	HMGP	1996	$54,000.00
Lindgren Avenue	HMGP	1996	$10,000.00
324 Gaile Avenue	HMGP	1996	$92,000.00
322 Gaile Avenue	HMGP	1996	$75,000.00
318 Gaile Avenue	HMGP	1996	$61,000.00
312 Gaile Avenue	HMGP	1996	$115,000.00
308 Gaile Avenue	HMGP	1996	$130,000.00
306 Gaile Avenue	HMGP	1996	$79,000.00
302 Gaile Avenue	HMGP	1996	$94,000.00
2691 Pablo Avenue	HMGP	1996	$69,000.00
Pablo Avenue	HMGP	1996	$8,000.00
4024 Chinook Street	HMGP	1996	$62,022.57
4022 Chinook Street	HMGP	1996	$76,975.00
4018 Chinook Street	HMGP	1996	$67,500.00
4016 Chinook Street	HMGP	1997	$67,500.00
4012 Chinook Street	HMGP	1996	$81,000.00
4010 Chinook Street	HMGP	1996	$66,652.24
2618 Peachtree Drive	HMGP	1996	$57,000.00
2614 Peachtree Drive	HMGP	1996	$52,000.00
2605 Peachtree Drive	HMGP	1996	$60,000.00
2601 Peachtree Drive	HMGP	1996	$57,000.00
2606 Peachtree Drive	HMGP	1996	$55,000.00
2602 Peachtree Drive	HMGP	1996	$60,000.00
2520 Peachtree Drive	HMGP	1996	$41,000.00
2521 Peachtree Drive	HMGP	1996	$43,000.00
2516 Peachtree Drive	HMGP	1996	$40,000.00
2515 Peachtree Drive	HMGP	1996	$43,000.00
2512 Peachtree Drive	HMGP	1997	$12,000.00

Property Address	Funding Source	Purchase Date	Purchase Price
2509 Peachtree Drive	HMGP	1997	$32,854.00
2508 Peachtree Drive	HMGP	1996	$18,000.00
2505 Peachtree Drive	HMGP	1997	$45,000.00
2504 Peachtree Drive	HMGP	1996	$43,750.00
1422 Appleyard Drive	HMGP	1996	$71,000.00
1421 Appleyard Drive	HMGP	1996	$42,000.00
1417 Appleyard Drive	HMGP	1996	$48,000.00
1409 Appleyard Drive	HMGP	1996	$56,000.00
2636 Mission Road	HMGP	1996	$2,102,000.00
2436 Peachtree Drive	HMGP	1996	$62,000.00
2923 Rexwood Drive	HMGP	1996	$71,000.00
2921 Rexwood Drive	HMGP	1996	$67,000.00
2919 Rexwood Drive	HMGP	1996	$73,000.00
2917 Rexwood Drive	HMGP	1996	$73,000.00
2915 Rexwood Drive	HMGP	1996	$66,000.00
2913 Rexwood Drive	HMGP	1996	$59,000.00
2911 Rexwood Drive	HMGP	1996	$65,000.00
2909 Rexwood Drive	HMGP	1996	$61,000.00
2907 Rexwood Drive	HMGP	1996	$73,000.00
2905 Rexwood Drive	HMGP	1996	$67,000.00
2903 Rexwood Drive	HMGP	1996	$52,000.00
2901 Rexwood Drive	HMGP	1996	$62,000.00
1502 Viscount Avenue	HMGP	1996	$69,000.00
2914 Rexwood Drive	HMGP	1996	$62,000.00
2912 Rexwood Drive	HMGP	1996	$58,000.00
2910 Rexwood Drive	HMGP	1996	$62,000.00
2908 Rexwood Drive	HMGP	1996	$84,000.00
2906 Rexwood Drive	HMGP	1996	$63,000.00
2904 Rexwood Drive	HMGP	1996	$70,000.00
2902 Rexwood Drive	HMGP	1996	$67,000.00
2898 Rexwood Drive	HMGP	1996	$140,000.00
1501 Viscount Avenue	HMGP	1996	$84,000.00
1503 Viscount Avenue	HMGP	1996	$88,000.00
1504 Viscount Avenue	HMGP	1996	$74,000.00

Property Address	Funding Source	Purchase Date	Purchase Price
1505 Viscount Avenue	HMGP	1996	$69,000.00
1506 Viscount Avenue	HMGP	1996	$67,000.00
1507 Viscount Avenue	HMGP	1996	$70,000.00
1502 Majestic Avenue	HMGP	1996	$80,000.00
1504 Majestic Avenue	HMGP	1996	$69,000.00
1506 Majestic Avenue	HMGP	1996	$67,000.00
1508 Majestic Avenue	HMGP	1996	$72,000.00
2903 Oakwood Drive	HMGP	1996	$77,000.00
2901 Oakwood Drive	HMGP	1996	$80,000.00
2915 Majestic Avenue	HMGP	1996	$83,000.00
2913 Regent Drive	HMGP	1996	$65,000.00
2911 Regent Drive	HMGP	1996	$70,000.00
2909 Regent Drive	HMGP	1996	$77,000.00
2907 Regent Drive	HMGP	1996	$71,000.00
2905 Regent Drive	HMGP	1996	$82,000.00
2903 Regent Drive	HMGP	1996	$61,000.00
2904 Regent Drive	HMGP	1996	$67,000.00
2902 Regent Drive	HMGP	1996	$76,000.00
1506 Inwood Street	HMGP	1996	$68,000.00
1508 Inwood Street	HMGP	1996	$65,000.00
1510 Inwood Street	HMGP	1996	$71,000.00
2411 Vega Drive	HMGP	1996	$103,000.00
2391 Beechnut Lane	HMGP	1996	$96,000.00
1810 Burns Drive	HMGP	1996	$103,000.00
1808 Burns Drive	HMGP	1996	$99,000.00
1803 Trimble Road	HMGP	1996	$92,000.00
1809 Trimble Road	HMGP	1996	$121,000.00
1813 Trimble Road	HMGP	1996	$149,000.00
2533B W. Tharpe Street	HMGP	1996	$29,000.00
2314 San Pedro Avenue	HMGP	1997	$142,000.00
2007 Travis Court	HMGP	1996	$96,000.00
2377 Peachtree Drive	HMGP	1996	$90,000.00
2381 Peachtree Drive	HMGP	1996	$86,000.00
2385 Peachtree Drive	HMGP	1996	$73,166.65

Property Address	Funding Source	Purchase Date	Purchase Price
1421 Deer Haven Lane	HMGP	1996	$91,000.00
2404 Beechnut Lane	HMGP	1996	$88,000.00
2408 Beechnut Lane	HMGP	1996	$76,000.00
2403 Beechnut Lane	HMGP	1996	$97,000.00
2399 Beechnut Lane	HMGP	1996	$80,000.00
2395 Beechnut Lane	HMGP	1996	$89,000.00
2411 Beechnut Lane	HMGP	1996	$89,000.00
2407 Vega Drive	HMGP	1996	$84,000.00
1500 Inwood Street	HMGP	1997	$71,000.00
2901 Regent Drive	HMGP	1997	$54,800.00
1502 Inwood Street	HMGP	1996	$72,000.00
1504 Inwood Street	HMGP	1996	$72,000.00
1514 Inwood Street	HMGP	1996	$84,000.00
2899 Regent Drive	HMGP	1997	$51,630.56
1706 Salmon Drive	HMGP	2004	$115,500.00
1209 Waverly Road	HMGP	2004	$205,000.00
740 Gwen Street	HMGP	2004	$73,986.00
1325 Linda Ann Drive	HMGP	2004	$65,000.00
821 Abbiegail Drive	FMAP – RLP	2002	$132,000.00
822 Abbiegail Drive	FMAP – RLP	2001	$90,400.00
823 Abbiegail Drive	FMAP – RLP	2002	$118,000.00
828 Abbiegail Drive	FMAP – RLP	2002	$98,800.00

Source: City of Tallahassee, 2011

Table 1.22: Leon County Acquired Repetitive Loss Properties

Property Address	Funding Source
2204 Monaco Drive	HMGP
2203 Monaco Drive	FPP
2205 Monaco Drive	HMGP
4905 Buck Lake Road	HMGP
4907 Buck Lake Road	HMGP
2114 Foshalee Drive	FPP

Property Address	Funding Source
6702 Chevy Way	FPP
1879 Log Ridge Trail	FPP
10095 Buck Point Road	HMGP
2002 Longview Drive	FPP
2004 Longview Drive	FPP
2006 Longview Drive	FPP
2014 Longview Drive	FPP
2013 Longview Drive	HMGP
2001 Longview Drive	FPP
1917 Longview Drive	FPP
2014 Harriet Drive	FPP
2033 Harriet Drive	HMGP
2023 Harriet Drive	HMGP
2021 Harriet Drive	HMGP
2019 Harriet Drive	HMGP
2936 Nepal Drive	FPP
4470 Sherborne Road	HMGP
2014 Casa Linda Court	FPP
2009 Coffee Lane	FPP
1870 Hopkins Drive	FPP
1867 Hopkins Drive	FPP
5804 Tower Road	HMGP
2260 Hickory Court	HMGP
9551 Woodville Highway	HMGP
1829 Robinson Road	HMGP
1853 Robinson Road	HMGP
9044 Celia Court	FPP
3695 Sprinil Road	HMGP
4665 Sprinil Road	HMGP
3647 Sprinil Road	HMGP
3541 Sprinil Road	HMGP
3519 Sprinil Road	HMGP
1652 Eagle Road	HMGP
1313 Munson Boulevard	FPP

Property Address	Funding Source
5284 Wild Olive Way	HMGP
5278 Wild Olive Way	HMGP
8617 Moore Woods Road	HMGP
8611 Moore Woods Road	HMGP
8012 Wakulla Springs Road	FPP
8622 Moore Woods Road	HMGP
8350 Avalon Drive	FPP
8342 Avalon Drive	HMGP
9156 Warbler Street	HMGP
922 Jessica Street	FPP
9167 Warbler Street	HMGP
9157 Warbler Street	HMGP
9133 Warbler Street	FPP
9121 Warbler Street	FPP
9113 Warbler Street	FPP
971 Towhee Road	HMGP
Flicker Road	FPP
1940 Tomberlin Road	FPP
1920 Tomberlin Road	FPP
1910 Tomberlin Road	FPP
Tomberlin Road	FPP
Tomberlin Road	FPP
Tomberlin Road	FPP
Tomberlin Road	FPP
Tomberlin Road	FPP
1901 Tomberlin Road	FPP
8481 Ranchero Road	FPP
694 Spiral Garden Way	HMGP
8866 Freedom Road	HMGP
867 Jessica Street	HMGP
904 Jessica Street	HMGP
880 Jessica Street	FPP
868 Jessica Street	HMGP
8714 Freedom Road	HMGP

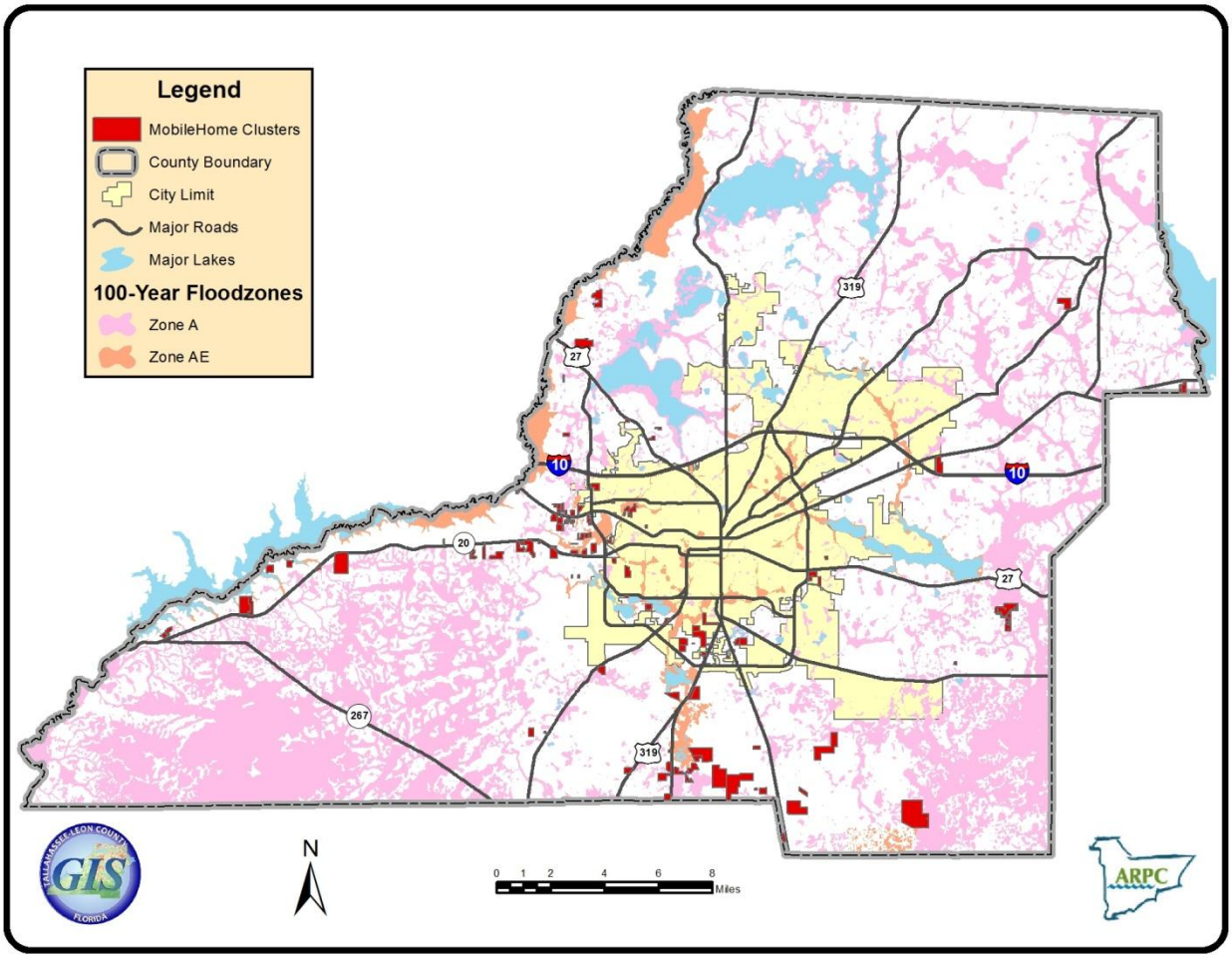
Property Address	Funding Source
8610 Freedom Road	HMGP
663 Nocatee Road	HMGP
9550 Wakulla Springs Road	FPP
9118 Wakulla Springs Road	HMGP
Wakulla Springs Road	HMGP
9098 Wakulla Springs Road	HMGP

Leon County, 2012

b. Flooding Vulnerability

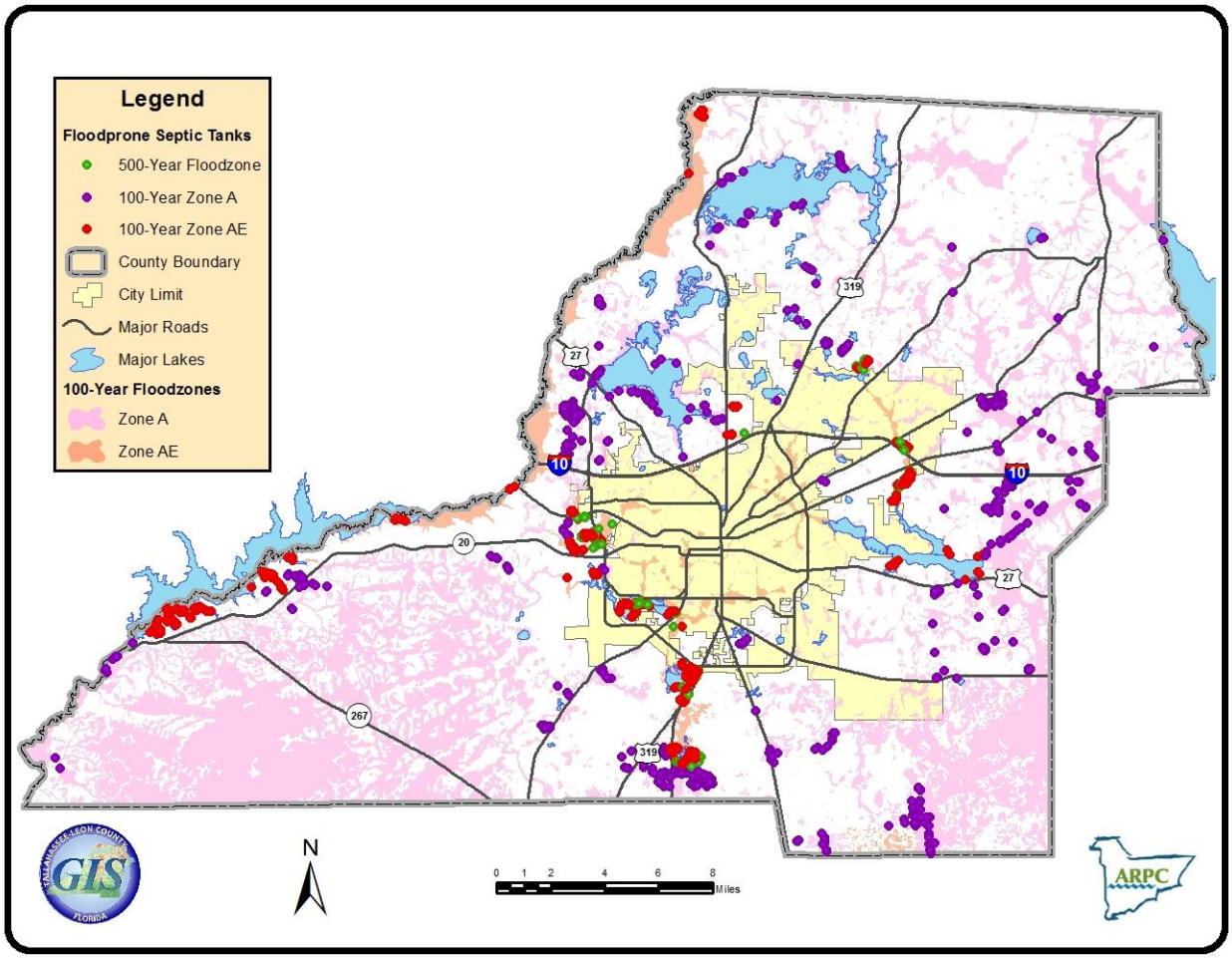
Mobile homes and septic tanks are particularly susceptible to damage from hurricanes and flooding. The maps below depict mobile homes and septic tanks in the 100-year flood plain.

Map 1.16: Mobile Home Clusters in the 100-Year Flood Plain



Source: Tallahassee-Leon County GIS

Map 1.17: Septic Tanks in the 100-Year Floodplain



Source: Tallahassee-Leon County GIS

IV. Population and Social Vulnerability

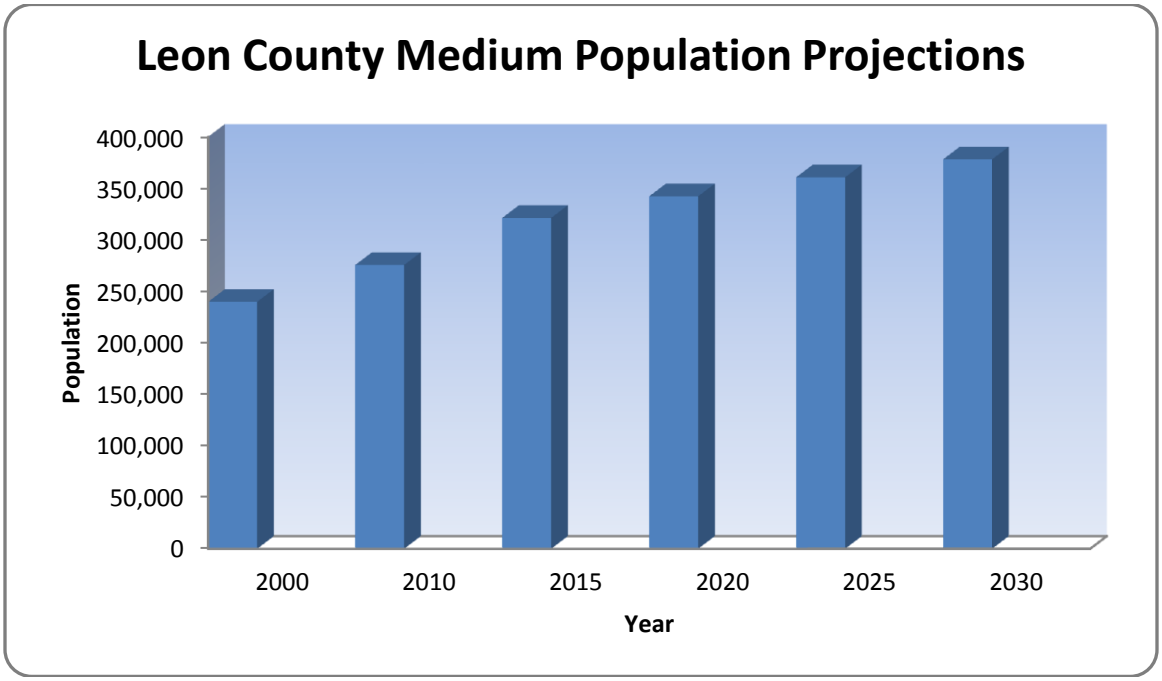
A. Population

The City of Tallahassee is the only incorporated municipality in Leon County, and is the state capital of Florida. Tallahassee is also home to two state universities, Florida State University (FSU) and Florida Agricultural and Mechanical University (FAMU). In 2010, the U.S. Census Bureau reported the total population within Leon County was 275,487 persons. The table below displays the increase in population from 2000 to 2010. According to the University of Florida, Bureau of Economic and Business Research (BEBR), Leon County's population is expected to experience steady population growth rates for the next 25 years.

Table 1.23: Leon County Population Estimates				
Jurisdiction	**Population Census 2000**	**Population Census 2010**	**% Change 2000-2010**	**% of Total Population (2010)**
Tallahassee	150,624	181,376	20.4%	65.8%
Unincorporated	88,828	94,111	5.9%	34.2%
Countywide	239,452	275,487	15%	100%

Source: Census 2010

Based on the medium population projection provided by BEBR, Leon County is expected to add almost 100,000 new residents to its population by the year 2030 (378,100), see the figure below.



Source: BEBR, 2011

B. Social Vulnerability

The U.S. Census for 2010 reported that the population for Leon County is 275,487. This is consistent with the 2007 BEBR estimate of 272,497. On average there are 2.34 persons per household in Leon County. According to the 2006-2010 American Community Survey data Leon County has 109,314 occupied households, with 55.4% being owner occupied and 44.6% being occupied by renters.

1. Special Needs, Disabled and Single Parent Households
   Of particular concern within Leon County's population are those persons with special needs and/or limited resources such as the elderly, low-income or linguistically isolated. In 2010, 430 residents registered with the Leon County Sheriff's Office, Division of Emergency Management as having special needs. They are located throughout the area in nursing homes, assisted living facilities and private residences. This is not to be confused with those individuals having disability status. According to the 2008 – 2010 American Community Survey more than 25,000 individuals in Leon County have disability status. Social services, and the local and non-profit agencies which provide them, will be particularly essential for the members of the community in this demographic to return and rebuild after a major or catastrophic disaster. Additionally, households headed by a single individual may have fewer resources for childcare or post-disaster work opportunities.

Table 1.24: Leon County Social Vulnerability

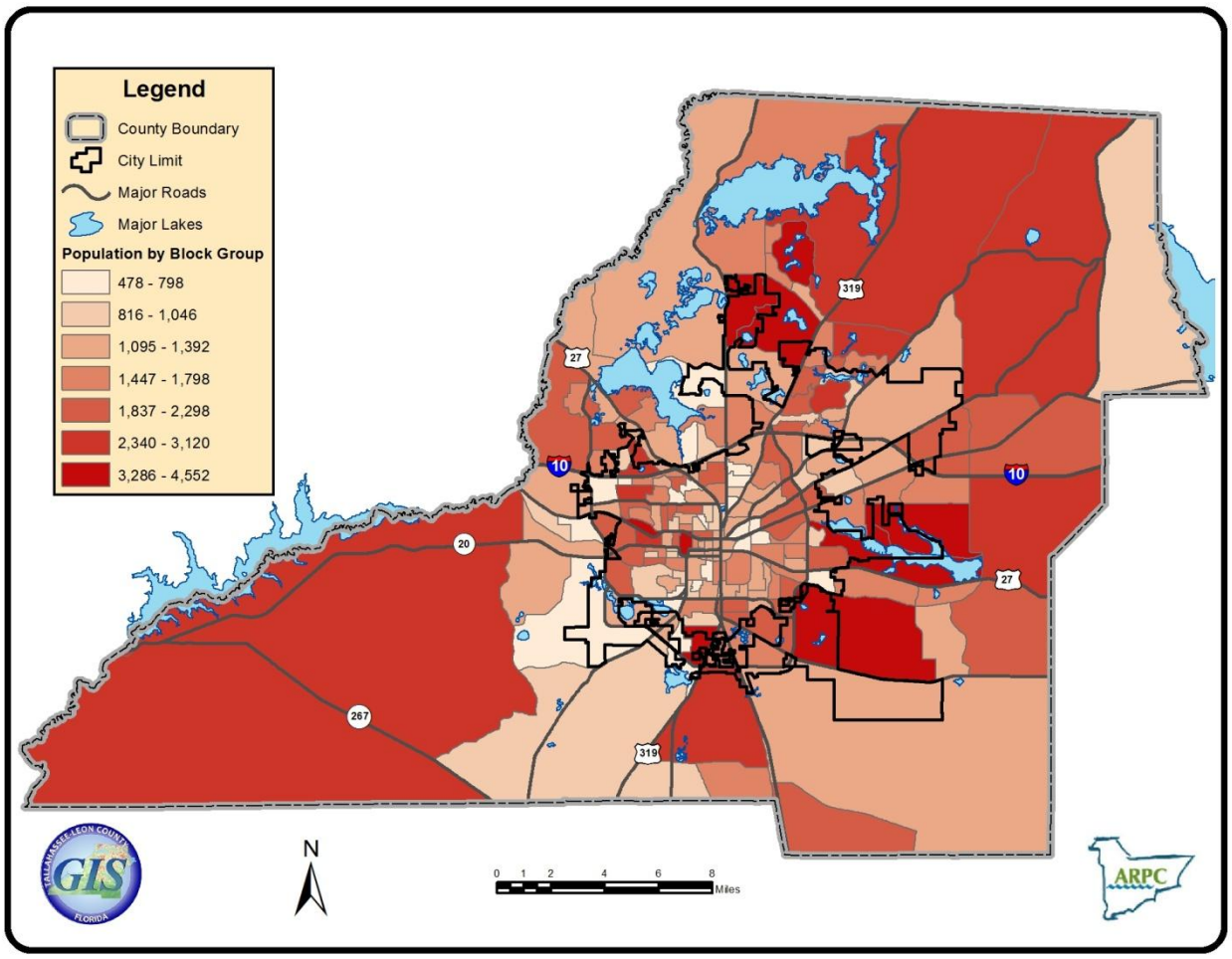
Category	Number of Persons	Percent of Population
Over 65	24,123	8.8%
Under 18	53,014	19%
Under 5	18,290	6.6%
Linguistically Isolated	1,070 Households	1.1%
Households with No Access to Vehicle	7,117 Households	6.5%
Households Living in Poverty	24,198 Households	22.1% of Households
Households Headed by Single Individual with Children under 18 Years of Age	10,833 Households	9.9% of Households

Source: American Community Survey, 2006-2010

2. Student Population
   The City of Tallahassee is home to two universities, one community college and one technical center. Florida State University has a student population of almost 41,000 and Florida A&M University houses an additional 12,000 students. If a major or catastrophic disaster were to impact Leon County while the universities and colleges were in session, temporarily housing students could be a significant issue. Additionally, the rebuilding and reopening of either university would be a key to successful post-disaster community redevelopment.

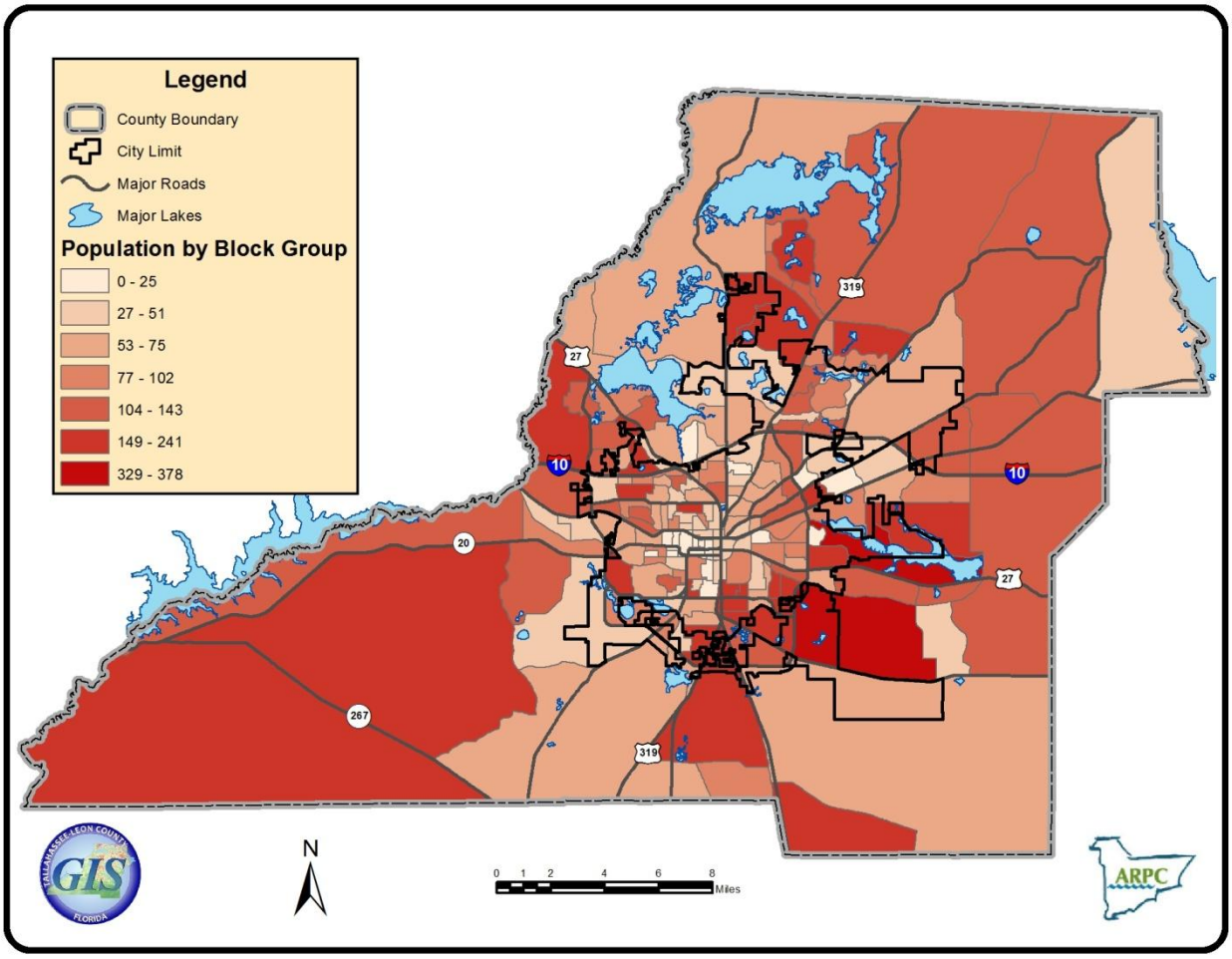
The maps below show the U.S. Census 2010 population per census block group for the City of Tallahassee and Leon County as well as the vulnerable populations of those under 5 years of age and those over 65 years of age. These maps can be useful if disaster impact maps are also available after an emergency.

Map 1.17: Total Leon County Population



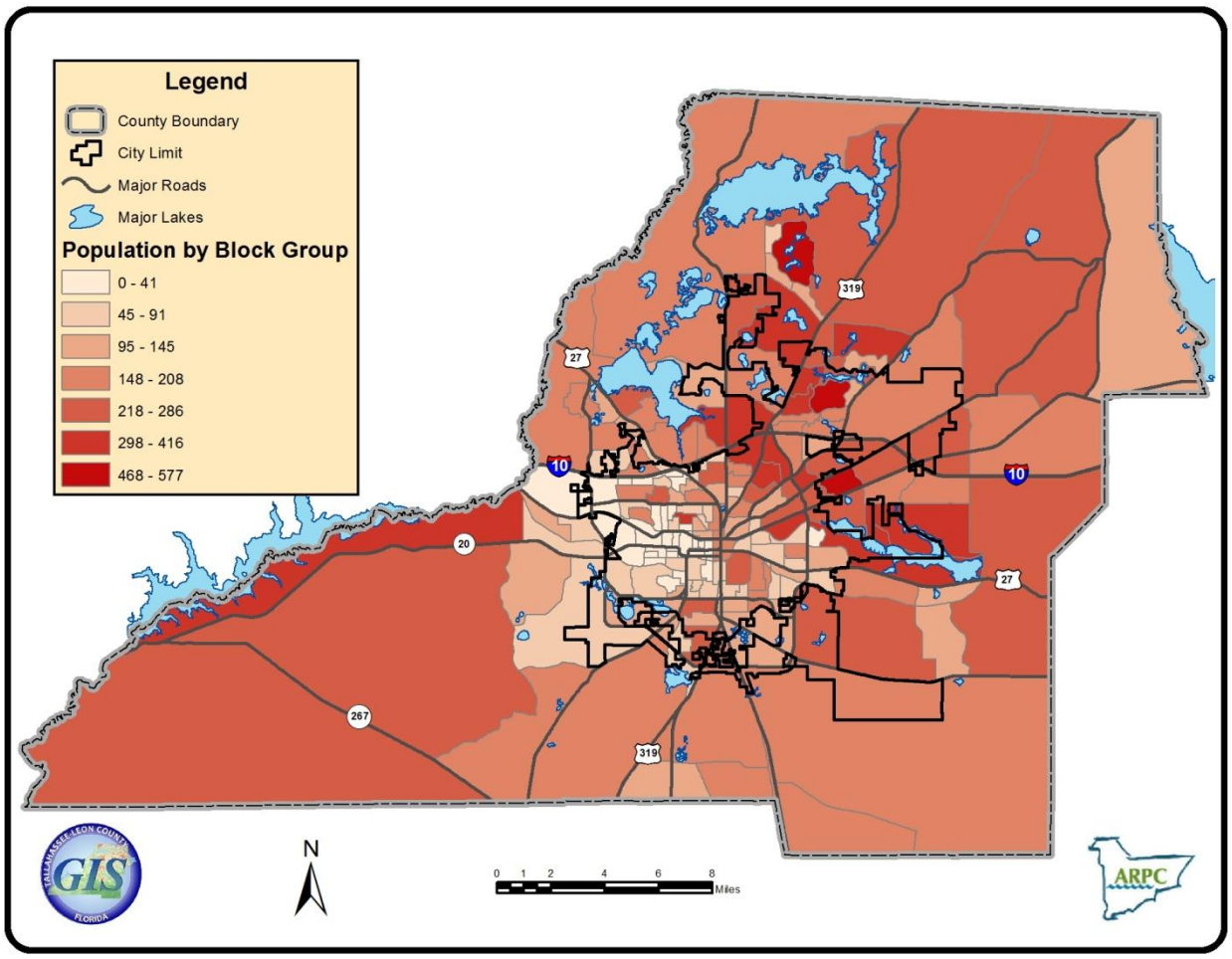
Source: U.S. Census, 2010

Map 1.18: Leon County Population Under 5 Years of Age



Source: U.S. Census, 2010

Map 1.19: Leon County Population Over Age 65



Source: U.S. Census, 2010